The 2018 Cancer System Performance Report

November 2018

Technical Appendix

Five-year Net Survival

This analysis was conducted by the CONCORD-3 Programme at the London School of Hygiene and Tropical Medicine. Details on methodologies were published in The Lancet in 2018 (https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)33326-3.pdf).

Cancer deaths

Definition:	Age-standardized mortality rates per 100,000 population died from the specified cancer sites
Rationale for measurement:	Data and metrics regarding age-standardized mortality rates are needed to provide an accurate measure of the burden of disease across Canada.
Measurement timeframe:	Years 1992 to 2014
Denominator:	Canadian population estimates by year, sex and age group
Numerator:	Number of deaths in the measure timeframe from the specified cancers
Exclusion criteria:	For breast cancer, males were excluded
Data availability:	All provinces and territories
Stratification:	1) Cancer site: prostate, lung, breast (female), colorectal 2) By sex if applicable 3) By year
Data source:	Statistics Canada, Vital Statistics Death Database
Data retrieval date:	December 2017
Variables details:	1) Up to the year 1999, the cause of deaths from invasive cancer sites/types were defined in ICD-9: • Prostate: 185 • Lung: 162 • Breast (female): 174 • Colorectal: 153-154 2) After the year 1999, the cause of deaths from invasive cancer sites/types were defined in ICD-10: • Prostate: C61.9 • Lung: C34 • Breast: C50 • Colorectal: C18, C19.9, C20.9, C26.0
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Data presented were jurisdictions combined for ages 0+. 2) The cause of death from cancer sites/types were classified by World Health Organization, International Classification of Diseases (ICD). Up to the year 1999, the Ninth Edition (ICD-9) was used. After the year 1999, the Tenth Edition (ICD-10) was used. 3) Mortality rates were age standardized to the Canadian 2011 population using direct method.
Changes to definition compared to previous years:	Not applicable

Cancer incidence

Definition:	Age-standardized incidence rates per 100,000 population diagnosed for the specified cancer sites
Rationale for measurement:	Data and metrics regarding age-standardized incidence rates and trends are needed to provide an accurate measure of the burden of disease across Canada.
Measurement timeframe:	Years 1992 to 2013
Denominator:	Canadian population estimates by year, sex and age group
Numerator:	Number of new invasive cases for the specified cancers diagnosed in the measure timeframe
Exclusion criteria:	1) For breast cancer, males were excluded
Data availability:	Data were aggregated at national level: • All provinces and territories, except QC which 2010 data have been copied forward to 2011, 2012 and 2013.
Stratification:	1) Data were aggregated at national level: • Cancer site: prostate, lung, breast (female), colorectal • By sex if applicable • By year
Data source:	Statistics Canada, Canadian Cancer Registry (CANSIM table 103-0554)
Data retrieval date:	October 2017
Variables details:	The cancer sites/types were defined in ICD-O3 with behavior code 3 (invasive): • Prostate: C61.9 • Lung: C34 • Breast: C50 • Colorectal: C18, C19.9, C20.9, C26.0 Cancer cases with histology types 9590-9992 (leukemia, lymphoma and multiple myeloma), 9050-9055 (mesothelioma) and 9140 (Kaposi sarcoma) are excluded.
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Data presented were jurisdictions combined for ages 0+. 2) The cancer incidence sites/types were classified by World Health Organization, International Classification of Diseases for Oncology, Third Edition (ICD- O-3). The International Agency for Research on Cancer (IARC) rules were used for determining multiple primaries sites. 3) QC incidence data were not available for 2011 onward, incidence cases and population data in 2010 were copied forward to 2011, 2012 and 2013. 4) Incidence rates were age standardized to the Canadian 2011 population using direct method.

Changes to definition compared to previous years:	Not applicable

Cancer incidence for stage IV at diagnosis

Definition:	Age-standardized incidence rates per 100,000 population for stage IV at diagnosis for the specified cancer sites
Rationale for measurement:	Late stage cancer diagnosis can have negative implications on the effectiveness of cancer treatments and likelihood of survival. Measuring changes in the incidence of Stage IV cancer diagnosis over time is an important indicator of the effectiveness of screening and early detection efforts for various cancers.
Measurement timeframe:	Figure 1.4: Diagnosis year 2010 to 2015 Heat map: Diagnosis year 2015
Denominator:	Canadian population estimates by period, province, sex and age group
Numerator:	Number of new invasive cases for the specified cancers diagnosed in the measurement timeframe
Exclusion criteria:	1) For breast cancer, males were excluded 2) Incidence cases with age under 18 were excluded
Data availability:	All provinces except QC. QC does not stage cases.
Stratification:	1) By province 2) Cancer site: a. Figure 1.4: lung, breast (female), colorectal b. Heat Map: lung, breast (female), colorectal, prostate (male)
Data source:	Figure 1.4: Statistics Canada, Canadian Cancer Registry Heat Map: Provincial cancer agencies and programs
Data retrieval date:	June 2018
Variables details:	The cancer sites were defined in ICD-O3 with behavior code 3 (invasive): • Prostate: C61.9 • Lung: C34.0 to C34.9 • Breast: C50.0 to C50.9 • Colorectal: C18, C19.9, C20.9, C26.0 Cancer cases with histology types 9590-9992 (leukemia, lymphoma and multiple myeloma), 9050-9055 (mesothelioma) and 9140 (Kaposi sarcoma) are excluded.
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) American Joint Committee on Cancer (AJCC) Cancer Staging Manual 7th edition was used to classify cancer stage groups. 2) Data presented were jurisdictions combined (except QC) for ages 18+ for which AJCC Staging Manual 7th applies.

	3) Incidence rates were age standardized to the Canadian 2011 population using direct method.
Changes to definition compared to previous years:	Not applicable

Participation rate in breast cancer screening program

The results were extracted from figure 3B in the report: Breast Cancer Screening in Canada: Monitoring and Evaluation of Quality Indicators - Results Report, January 2011 to December 2012.
Details on methodologies can be found in the report:
https://content.cancerview.ca/download/cv/prevention_and_screening/screening_and_early_diagnosis/documents/breast_cancer_screening_canada_monitoring_evaluating_report_2011_12p?attachment=0

Participation rate in colorectal cancer screening program

The results were extracted from figure 5 in the report: Colorectal Cancer Screening in Canada: Monitoring & Evaluation of Quality Indicators – Results Report, January 2013 – December 2014.
Details on methodologies can be found in the report:
https://content.cancerview.ca/download/cv/prevention_and_screening/screening_and_early_diagnosis/documents/colorectal_cancer_screening_canada_monitoring_evaluating_report_2013?attachment=0

Participation rate in cervical cancer screening program

The results were extracted from figure 1 in the report: Cervical Cancer Screening in Canada. Toronto (ON): Canadian Partnership Against Cancer; updated 2016 July.
Details on methodologies can be found in the report:
https://content.cancerview.ca/download/cv/prevention_and_screening/cccic_microsite/documents/ccicmonitoringevalqualityindicatorspdf?attachment=0

Abnormal call in subsequent screening mammograms

Definition:	Percentage of subsequent screening mammograms that are identified as abnormal in women aged 50-69
Rationale for measurement:	Abnormal call rate is an important indicator of the quality of the mammography image and interpretation. A high abnormal call rate can increase the false positive rate and result in unnecessary (and potentially avoidable) tests. Programs should strive to balance the number of abnormal calls with the number of cancers detected. This can be monitored by comparing the number of abnormal screens per extra cancer detected. Programs with extremely low abnormal call rates should also be monitored as this may

	results in lower cancer detection and higher post-screen cancer rates.
Measurement timeframe:	Screening years 2003 to 2012
Denominator:	Number of subsequent screening mammograms during the timeframe in women aged 50-69
Numerator:	Number of subsequent screening mammograms identified as abnormal in women aged 50-69
Exclusion criteria:	1) Women with ages beyond 50-69 2) Cases referred by clinical breast exam (CBE) alone 3) Women new to the screening program
Data availability:	All provinces and NT
Stratification:	By years
Data source:	Canadian Breast Cancer Screening Database
Data retrieval date:	Mar 2016
Variables details:	Not applicable
Notes from Jurisdictions:	AB: Excluded from data prior to 2007 as the Alberta Breast Cancer Screening Program was launched in 2007. QC: Complete diagnostic/cancer information was available to September 30, 2012.
Methodology notes:	Analysis was conducted by Public Health Agency of Canada (PHAC).
Changes to definition compared to previous years:	Not applicable

Invasive cancer detection in subsequent screening mammograms

Definition:	Invasive breast cancer detection rate (per 1,000 screens) in women aged 50-69 through subsequent screening mammograms
Rationale for measurement:	The cancer detection rate is to evaluate how successful the program is at finding invasive cancers. It is also meaningful when considered in relation to the abnormal call rate.
Measurement timeframe:	Screening years 2003 to 2012
Denominator:	Number of subsequent screening mammograms during the timeframe in women aged 50-69
Numerator:	Number of invasive breast cancer detected in subsequent screening mammograms in women aged 50-69
Exclusion criteria:	1) Women with ages beyond 50-69. 2) Cancers detected by clinical breast exam (CBE) alone 3) Women new to the screening program
Data availability:	All provinces and NT
Stratification:	By years
Data source:	Canadian Breast Cancer Screening Database
Data retrieval date:	Mar 2016
Variables details:	Not applicable
Notes from Jurisdictions:	**AB**: Excluded from data prior to 2007 as AB Breast Cancer Screening Program (ABCSP) launched in 2007

Methodology notes:	Analysis was conducted by Public Health Agency of Canada (PHAC).
Changes to definition compared to previous years:	Not applicable

Removal and examination of 12 or more lymph nodes in colon resections

Definition:	The percentage of colon resections with 12 or more lymph nodes removed and examined within 12 months of diagnosis
Rationale for measurement:	The removal and examination of 12 or more lymph nodes is important for proper staging and subsequent treatment planning and has been associated with improved survival. Most clinical guidelines recommend that a minimum of 12 lymph nodes be removed and examined by a pathologist to more definitively establish a cancer's nodal status.
Measurement timeframe:	Diagnosis years 2011 to 2014
Denominator:	All invasive colon cancer cases resected within 12 months of diagnosis in the timeframe, which meet the criteria in "Variable details" box
Numerator:	Invasive colon cancer cases that were resected with 12 or more lymph nodes removed and examined within 12 months of diagnosis in the timeframe
Exclusion criteria:	1) Cases with age ≤ 17 2) Cases with unknown number of lymph nodes removed and examined were excluded
Data availability:	2011-2014: AB, SK, MB, NB, NS, PE, NL 2011-2013: BC 2013-2014: ON
Stratification:	1) By year 2) By province
Data source:	Provincial cancer agencies and programs
Data retrieval date:	October 2017
Variables details:	Cancer definition: 1) Colon cancer was defined as C18 in ICD-O3 with behavior code 3 (invasive) C18.1 (Appendix) was excluded For the cancer cases with lymphoma Codes M-95 to M-98, sarcoma codes neuroendocrine carcinoma, and squamous cell carcinoma were excluded (see Appendix A). Resection identification: 2) Colon resections were identified using CCI codes: 1NM87 or 1NM89 or 1NM91. CCI code 1NM87BA was excluded 3) All resections were included regardless of margin status.

	Treatment criteria: 4) All colon resections were within 12 months of diagnosis. If there were multiple resections, counted the last resection: last resection date (if multiple) – diagnosis date ≤ 365 days
Notes from Jurisdictions:	**BC:** We do not have surgery data past 2014 and since the indicator includes surgery up to 1 year following diagnosis, we cannot provide data for diagnosis year 2014. **ON:** Synoptic reporting in Ontario completed in 2012. 2011, and part of 2012 are incomplete down to level of lymph node examined counts. **PE:** Out of province treatment is included if known about.
Methodology notes:	1) The cancer incidence sites/types were classified by World Health Organization, International Classification of Diseases for Oncology, Third Edition (ICD- O-3). 2) The Canadian Classification of Health Interventions (CCI) codes were used to identify surgery types, except AB.
Changes to definition compared to previous years:	Not applicable

Pre-operative radiation therapy for patients with stage II or III rectal cancer

Definition:	The percentage of stage II or III rectal cancer cases receiving pre-operative radiation therapy up to 120 days before resections within one year of diagnosis
Rationale for measurement:	The delivery of radiation therapy (along with chemotherapy) prior to surgical resection for Stage II and III rectal cancer has been shown to improve local disease control compared with surgery alone or post-operative radiation therapy. Also, it has been associated with a reduction in treatment-related toxicity compared with post-operative radiation therapy. Clinical practice guidelines therefore recommend pre-operative radiation therapy (combined with chemotherapy) for patients with Stage II and III rectal cancer.
Measurement timeframe:	Diagnoses years 2011 to 2014
Denominator:	Stage II and III rectal cancer cases diagnosed during the timeframe and receiving rectal resection within one year of diagnosis
Numerator:	Stage II and III rectal cancer cases diagnosed during the timeframe and receiving pre-operative radiation therapy up to 120 days before resection within one year of diagnosis
Exclusion criteria:	Cases with age ≤ 17 were excluded
Data availability:	2011-2014: AB, MB, NB, NS, PE, NL 2011-2013: BC
Stratification:	1) By year 2) By province
Data source:	Provincial cancer agencies and programs
Data retrieval date:	October 2017

Variables details:	Cancer definition: 1) Rectal cancer was defined as C20.9 in ICD-O3 with behavior code 3 (invasive)For cancer cases with lymphoma Codes M-95 to M-98, sarcoma codes (see Appendix A), neuroendocrine carcinoma and squamous cell carcinoma were excluded 2) Rectal cancer cases were restricted to stage II and stage III in American Joint Committee on Cancer (AJCC). Resection identification: 3) Rectal resections were identified in CCI codes as 1NQ87 or 1NQ89. CCI code 1NQ87BA was excluded. Treatment criteria: 4) All rectal resections were within 1 year of diagnosis. If there were multiple resections, the first resection was counted: First resection date (if multiple) – diagnosis date ≤ 365 days 5) All pre-operative radiation therapies were up to 120 days before resections. If there were multiple resections, the first resection was counted. First resection date – Radiation therapy date ≤120 days
Notes from Jurisdictions:	**BC:** We do not have surgery data past 2014 and since the indicator includes surgery up to 1 year following diagnosis, we cannot provide data for diagnosis year 2014. **NB:** 2010/2011 radiation treatment may be incomplete. **PE:** Did not have data on whether the resection margins were negative so cannot comment either way.
Methodology notes:	1) Data presented include stage II and III combined 2) The cancer incidence sites/types were classified by World Health Organization, International Classification of Diseases for Oncology, Third Edition (ICD- O-3). 3) American Joint Committee on Cancer (AJCC) Cancer Staging Manual 7th edition was used to classify cancer stage groups. 4) The Canadian Classification of Health Interventions (CCI) codes were used to identify surgery types, except AB.
Changes to definition compared to previous years:	1) Resections with negative margin were not required.

Post-operative chemotherapy for patients with stage II or IIIA non-small cell lung cancer

Definition:	The percentage of patients diagnosed with stage II or IIIA non-small cell lung cancer (NSCLC) who received post-operative chemotherapy within 120 days of resections
Rationale for measurement:	The delivery of chemotherapy following resection has been shown to improve outcomes (i.e., disease-free and overall survival) and prevent recurrences in patients with Stage II

	and IIIA NSCLC, compared with surgery alone. Clinical practice guidelines therefore recommend post-operative chemotherapy for patients with Stage II and IIIA NSCLC.
Measurement timeframe:	Diagnosis years 2011 to 2014
Denominator:	Stage II and IIIA non-small cell lung cancer cases diagnosed during the timeframe and having a lung resection within one year of diagnosis.
Numerator:	Stage II and IIIA non-small cell lung cancer cases having post-operative chemotherapy within 120 days of resections, which were diagnosed during the timeframe and receiving resections within one year of diagnosis
Exclusion criteria:	Cases with age ≤ 17 were excluded.
Data availability:	2011-2014: AB, SK, MB, ON, NS, NL and PE 2011-2013: BC
Stratification:	Data were aggregated at national level: 1) By year and age group: 18-59, 60-69, 70-79, 80+ Data were aggregated at provincial level: 1) By year
Data source:	Provincial cancer agencies and programs
Data retrieval date:	October 2017
Variables details:	Cancer definition: 1) Non-small cell lung cancer (NSCLC) was defined as C34 in ICD-O3 with behavior code 3 (invasive). Cancer cases with lymphoma codes M-95 to M-98, sarcoma codes (see Appendix A), and 8002, 8041, 8043, 8044, 8045, and 8803, 8042 were excluded 2) Non-small lung cancer cases were restricted to stage II and stage IIIA in AJCC. Resection identification: 3) Lung resections were identified in CCI codes as 1GR87, 1GR89, 1GR91, 1GT59, 1GT87, 1GT89, 1GT91, or 1GV87. Treatment criteria: 4) Chemotherapy included oral (as available in data) and IV chemotherapy. 5) All lung resections were within 1 year of diagnosis. If there were multiple resections, the last resection was counted: Last resection date (if multiple) – diagnosis date ≤ 365 days 6) All post-operative chemotherapy were within 120 days after resections: Chemo start date – Last resection date (if multiple) ≤120 days
Notes from Jurisdictions:	**AB:** The ACR codes out of province treatment to provincial residents if they are notified and/or it is mentioned in the documents. The following small-cell morphologies were

	excluded: 8002, 8041, 8042, 8043, 8044, 8045, 8803. For Step3 cases with both neo-adjuvant and adjuvant chemotherapy were excluded. **SK:** Chemo includes oral and intravenous (IV). We are unable to differentiate between the two modalities in Saskatchewan. **MB**: Oral chemotherapy data is only recorded if it is documented in the chart. **ON:** For oral data-Oral chemotherapy included if available but may not be complete. DAD/NACRS and ALR were included. ODB wasn't included. **NS:** These numbers differ from what had been provided in the past for a number of reasons. First, we are no longer using site-specific factors in the Collaborative Stage data to identify resections. Instead, we have used DAD/NACRS data. Second, the DAD/NACRS data include a small number of persons who received their surgical resection(s) outside Nova Scotia as well, which is a first. However, we will not have treatment data for these persons if they received treatment outside Nova Scotia, so it's possible the percentage receiving chemo could be slightly underestimated. Third some histology codes associated with NSCLC were excluded along with other squamous cell carcinoma in the past. **PE:** Oral data would be included if known about.
Methodology notes:	1) Data presented include stage II and IIIA combined 2) The cancer incidence sites/types were classified by World Health Organization, International Classification of Diseases for Oncology, Third Edition (ICD- O-3). 3) American Joint Committee on Cancer (AJCC) Cancer Staging Manual 7th edition was used to classify cancer stage groups. 4) The Canadian Classification of Health Interventions (CCI) codes were used to identify surgery types, except AB.
Changes to definition compared to previous years:	Not applicable

Adult clinical trial participation for cancer-related therapeutic trials or clinical research studies

Definition:	The ratio of the total number of all patients aged 19 years or older newly enrolled in cancer-related therapeutic trials or clinical research studies to the projected number of new incident cancer cases
Rationale for measurement:	Patients who are treated in cancer centres with active clinical trial programs tend to have better health outcomes than those treated in centres that do not participate in

	clinical trials. This finding is likely due to better processes and delivery of care, including treatment guideline concordance. Although the number of cancer clinical trials opened per year remained the same or grew from 2000 to 2010, patient enrolment per year has plateaued or decreased. Comparing clinical trial participation across the country can identify opportunities for action.
Measurement timeframe:	Years 2012 to 2015
Denominator:	For year 2012 – 2014: All new cancer incidence cases with age ≥ 19 For year 2015 Projected number of new invasive cancer cases with age ≥ 19
Numerator:	Number of cancer patients (≥19 years) newly enrolled in cancer-related therapeutic clinical trials or clinical research at provincial cancer centers.
Exclusion criteria:	1) Patient age ≤ 18 were excluded 2) In-situ cancers except in-situ bladder cancer were excluded
Data availability:	BC, AB, SK, MB, ON, NB, PE and NL
Stratification:	1) By year 2) By province
Data source:	Provincial cancer agencies and programs; Canadian Cancer Society, Canadian Cancer Statistics; Statistics Canada, Canadian Cancer Registry
Data retrieval date:	October 2017
Variables details:	For cancer cases: 1) Cancer cases include all invasive cancer cases and *In situ* bladder cancer cases. For patients enrolled in clinical trials: 2) Cancers related to the patients enrolled in clinical trial include all invasive cancers and in-situ bladder cancer (to ensure consistency with Canadian Cancer Statistics). 3) For patient enrolled in multiple clinical trials, all occurrences were counted.
Notes from Jurisdictions:	**AB:** To be consistent with data previously submitted from other years, Indicator 1d includes the total number of accruals for cancer patients (>=19 years) newly enrolled in cancer related therapeutic trials or clinical research in 2012-2015 who were on the Alberta Cancer Clinical Trials (ACCT) database. If a patient went on multiple clinical trial accruals in the given year, a patient would be counted for each accrual. The ACCT database also includes patients who were living outside of Alberta, as long as they were on a clinical trial in Alberta. The ACCT database includes both females

	and males in the Breast Tumour Group. The ACCT database may include clinical trials for non-melanoma skin patients. **MB:** We can exclude out of province patients treated in Manitoba if necessary. This would result in a decrease of 1 patient in the GU group. **ON:** The Ontario recruitment numerator also included biomarker studies IF the results were directing patient management. Cancer-specific numbers not available. The numerator includes the number of cancer patients (⩾18 years) newly enrolled in cancer-related therapeutic clinical trials or clinical research at provincial cancer centres. Ontario does not report in situ bladder cancer **NS:** Nova Scotia will not be providing these data this time around. There has always been a suspicion that the numbers underrepresented the true number of Nova Scotia cancer patients enrolled in clinical trials, since the data are not centralized. The Nova Scotia health system has recently been restructured, staff have changed, and clinical trial processes are being stream-lined. Nova Scotia will provide these numbers in the future once we have confidence that the numbers accurately represent accrual activity across the province.
Methodology notes:	1) Data for newly enrolled in cancer-related therapeutic clinical trials or clinical research were provided by pprovincial cancer agencies and programs. Data for cancer incidence cases were retrieved from Canadian Cancer Statistics. 2) Due to availability, the number of cancer incidence cases for years 2012 to 2014 were actual; while for year 2015 it was projected from Canadian Cancer Statistics. 3) Data for the cancer incidence cases were re-estimated to the age ≥ 19, correspondingly to the ages for the newly enrolled in cancer-related therapeutic clinical trials or clinical research. 4) Data presented include all invasive cancer cases and in-situ bladder cancer cases.
Changes to definition compared to previous years:	No applicable

Physical inactivity

Definition:	Percentage of adults aged 18 and older who are not meeting Canadian Physical Activity Guidelines
Rationale for measurement:	Measuring physical activity levels across the country allows for the monitoring how many Canadians are leading active lives and helps to identify areas were active transportation and physical activity could be promoted.
Measurement timeframe:	Years 2015-16 combined

Denominator:	Total population aged 18 and older
Numerator:	Number of individuals aged 18 and older who had less than 150 minutes of moderate to vigorous physical activity per week
Exclusion criteria:	1) Respondents with age ≤ 17 were excluded 2) Respondents with answers to the related questions "Don't know", "Not stated", "Refusal" were excluded
Data availability:	All provinces/territories
Stratification:	1) By provinces/territories 2) By year
Data source:	Statistics Canada, Canadian Community Health Survey (CANSIM table 105-0509)
Data retrieval date:	October 2017
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Data regarding about physical activity were downloaded from CANSIM table for the Canadian Community Health Survey data, which are based on a representative sample and then is extrapolated to the overall population. % of physical inactivity = 100% - % of physical activity. 2) Canadian physical activity guidelines recommend: For adults aged 18-64 years should accumulate at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more. (http://www.csep.ca/CMFiles/Guidelines/CSEP_PAGuidelines_adults_en.pdf) 3) Classification of physical active levels aligns to the Canadian physical activity guideline and are derived from the total number of minutes engaged in the past 7 days prior to the survey, which represent the total minutes in active transportation and moderate to vigorous recreational and other physical activities.
Changes to definition compared to previous years:	Not applicable

Overweight and obesity

Definition:	The percentage of adults aged 18 or older classified as overweight or obese
Rationale for measurement:	Reporting on overweight and obesity patterns across the country can monitor progress in promoting and supporting Canadians maintain a healthy body weight and help identify gaps in addressing the continued rise of excess weight in the population.
Measurement timeframe:	Years 2015-16 combined
Denominator:	Total number of adults aged 18 years and older with valid height and weight responses
Numerator:	Number of adults aged 18 years and older with adjusted Body Mass Index (BMI) classified as:

	• 25.00 ≤ BMI ≤ 29.99: overweight • 30.00 ≤ BMI: obese
Exclusion criteria:	1) Individuals with age ≤ 17 were exclude. 2) Pregnant women aged 18-55 were excluded 3) Individuals who "don't know", "refusal", "Not stated" to the relevant questions were exclude
Data availability:	All provinces and territories
Stratification:	1) By provinces/territories
Data source:	Statistics Canada, Canadian Community Health Survey (CANSIM table 105-0509)
Data retrieval date:	October 2017
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Data were downloaded from CANSIM table for the Canadian Community Health Survey data, which are based on a representative sample and then is extrapolated to the overall population. 2) Adjusted Body Mass Index (BMI) is adopted by Health Canada and is used to classify body weight for this indicator. This is because a systematic review of the literature concluded that the use of self-reported data among adults underestimates weight and overestimates height, resulting in lower estimates of obesity than those obtained from measured data as a screening tool to identify weight-related health risk. 3) BMI categories are adopted from a body weight classification system recommended by Health Canada and the World Health Organization (WHO) which has been widely used internationally. The categories are: • BMI<18.5: underweight • 18.5 ≤ BMI ≤ 24.99: normal weight • 25.00 ≤ BMI ≤ 29.99: overweight • 30.00 ≤ BMI: obese
Changes to definition compared to previous years:	Not applicable

Fruit and Vegetable consumption

Definition:	The percentage of the population aged 12 or older who reported consuming fruit and vegetables less than five times per day.
Rationale for measurement:	Reporting on fruit and vegetable consumption patterns across the country allows for monitoring of progress in promoting healthy eating and helping to identify areas and populations that would benefit from increased prevention efforts.
Measurement timeframe:	Years 2015-16 combined

Denominator:	Total population aged 12 years and older
Numerator:	Number of individuals aged 12 years and older reporting consuming fruits and vegetables less than five times daily
Exclusion criteria:	1) Individuals aged < 12 years old were excluded. 2) Individuals who responded "Don't know", "Not stated", "Refusal" to the relevant questions were exclude.
Data availability:	All provinces and territories
Stratification:	By jurisdiction
Data source:	Statistics Canada, Canadian Community Health Survey (CANSIM table 105-0509)
Data retrieval date:	January 2018
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Data were downloaded from CANSIM table for the Canadian Community Health Survey data, which are based on a representative sample and then is extrapolated to the overall population. 2) Daily consumption of fruit and vegetable is measured the total number of times (frequency) consumed for the last month at the time of interview. The types of fruit and vegetable include fruit juice (not fruit-flavored drinks or fruit punch), fruit, dark vegetable, potatoes (not deep fried), orange-colored vegetable, and other vegetable. 3) This indicator serves as a proxy measure of the percentage of the population consuming the recommended servings of fruit and vegetables daily, as the CCHS measures only the number of times fruit and vegetables are consumed daily (frequency), not the amount consumed (servings).
Changes to definition compared to previous years:	Not applicable

Alcohol Consumption

Definition:	The percentage of adults aged 18 and older drinking in excess of Canada's Low Risk Alcohol Guidelines for cancer
Rationale for measurement:	Understanding rates of alcohol consumption across the country can indicate the level of adherence to low-risk drinking guidelines and the effectiveness of prevention strategies to limit excessive alcohol consumption.
Measurement timeframe:	Years 2015-16 combined
Denominator:	Total population aged 18 years and older
Numerator:	Includes: • Men who consumed averagely more than 2 drinks per day in the past 7 days prior to the survey

	• Women who consumed averagely more than 1 drinks per day in the past 7 days prior to the survey
Exclusion criteria:	1) Individuals aged < 18 years were excluded. 2) Individuals who responded "Don't know", "Not stated", "Refusal" to the relevant questions were exclude.
Data availability:	All provinces and territories
Stratification:	1) By provinces/territories
Data source:	Statistics Canada, Canadian Community Health Survey
Data retrieval date:	March 2018
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Data were based on a representative sample and was extrapolated to the overall population. 2) Canada's Low Risk Alcohol Drinking Guidelines for cancer recommends males should not exceed 15 drinks a week, with no more than 2 drinks a day on most days; women should not exceed 10 drinks a week, without no more than 1 drinks a day on most day. 3) Due to the feasibility of survey questions about alcohol consumption, an average daily alcohol consumption in the week prior to the survey interview is used as a proxy measure of exceeding the alcohol consumption guidelines, which is calculated using total number of weekly drinks the respondent reported consuming in the week prior to the survey interview, divided by 7 days 4) A 'drink' refers to: • A bottle or small can of beer, cider or cooler with 5% alcohol content, or a small draft; • A glass of wine with 12% alcohol content; • A glass or cocktail containing 1½ oz. of a spirit with 40% alcohol content.
Changes to definition compared to previous years:	Not applicable

Breast cancer diagnosis wait times

Definition:	1) The median and 90th percentile wait time (weeks) between an abnormal breast screen result and resolution 2) Percentage of screens with resolution within the target wait times: • 5 weeks for resolution not requiring a tissue biopsy • 7 weeks for resolution requiring a tissue biopsy
Rationale for measurement:	The wait time from screen to resolution is an important indicator of effectiveness across the entire screening episode from index screen to final diagnosis. Longer wait

	times from an abnormal screen result to resolution can worsen prognosis and have negative psychological impacts on screening participants. The time from an abnormal screening result to final diagnosis is impacted by mammographic suspicion, type of diagnostic test performed, provincial and programmatic capacity, and the final diagnosis.
Measurement timeframe:	All provinces: Screening year 2015 NT: Screening years 2013–15 combined
Population:	Total number of abnormal breast screens performed in the measurement timeframe among women aged 50 to 69 years for whom the resolution date is within 6 months of abnormal screen.
Measure:	1) Wait time Median and 90th percentile time interval (weeks) between an abnormal breast screen result and resolution, for abnormal screens with and without tissue biopsy respectively 2) Percentage of patients with resolution within the target wait time **Denominator**: Total number of abnormal breast screens performed in the measurement timeframe among women aged 50 to 69 years for whom the resolution date is within 6 months of abnormal screen **Numerator**: The number of women with resolution within the target wait time: • For abnormal screens requiring a tissue biopsy: number of women who received resolution within 7 weeks of an abnormal breast screen • For abnormal screens not requiring a tissue biopsy: number of women who received resolution within 5 weeks of an abnormal breast screen
Exclusion criteria:	1) Abnormal screens that took longer than 6 months for definitive diagnosis were excluded. 2) Screens referred by clinical breast exam (CBE) alone were excluded. 3) Screens lost to follow-up or with missing date information were excluded. 4) Screens without diagnostic assessment were excluded.
Data availability:	All provinces and NT
Stratification:	1) By province 2) Tissue biopsy requirement: requiring a tissue biopsy, not requiring a tissue biopsy
Data source:	Provincial breast cancer screening programs
Data retrieval date:	July - October 2017
Variables details:	Not applicable

Notes from Jurisdictions:	**AB:** Data Sources (Accessed on Aug 1, 2017): a. Alberta Breast Cancer Screening Database; b. Alberta Physician Claim data **BC:** Screens referred by clinical breast exam (CBE) alone cannot be determined and therefore are not excluded from the data. **NT:** Data obtained from the BSP Database **ON:** Women with Final Result of Unknown/Lost to Follow-up and those with a diagnostic resolution date greater than 6 months from abnormal screen were excluded from this measure. **SK:** Tissue Biopsy: If the investigation type is Hook Wire Assisted Biopsy, Lumpectomy, MRI Guided Biopsy, Mammogram / Ultrasound / Biopsy, Mastectomy, Node Dissection, Biopsy, Re-excision, Stereo-tactic Core, Surgical Excision, Sentinel Node, Ultrasound Guided Core, Vacuum Assisted Biopsy and Vacuum Bx + Mammogram then it is defined as Tissue Biopsy.
Methodology notes:	1) Data were analyzed and provided by provincial breast cancer screening programs. 2) Age refers to the age at the screen date. 3) The date of abnormal breast screen refers to the screen date. 4) Date of resolution is considered date of definitive diagnosis as either cancer (invasive or in situ), or benign/normal case and can depend on behaviour of tumour: a) For invasive or DCIS: The date of definitive diagnosis of cancer is the date of the first core or open surgical biopsy that confirms cancer. In rare occasions, FNA biopsy may also be used as a definitive diagnosis of cancer. b) For benign or normal case: The date of definitive diagnosis is the last benign biopsy/procedure, or last procedure prior to a recommendation to return to regular screening. 5) Tissue biopsy includes core (needle) biopsy with or without image guidance and open (*excisional*) biopsy with or without image guidance. 6) Tissue biopsy does not include fine needle aspiration (FNA). 7) Each woman is counted once regardless of the number of mammograms performed. If a woman had multiple abnormal mammograms in a given year(s), the first abnormal test date is selected.

Changes to definition compared to previous years:	Not applicable

Colorectal cancer diagnosis wait times

Definition:	1) Wait time between abnormal fecal tests to follow-up colonoscopy through organized colorectal cancer screening • The median and 90th percentile wait time (days) between an abnormal fecal test result and a follow-up colonoscopy required to resolve the diagnosis • Percentage of fecal tests with follow-up colonoscopy within the target wait times (60 days) through organized colorectal cancer screening 2) Wait time between follow-up colonoscopy to definitive diagnosis • The median and 90th percentile wait time (days) between a follow-up colonoscopy and definitive pathological diagnosis
Rationale for measurement:	Monitoring and reporting on colorectal cancer diagnosis wait times across Canada can help to reveal where efforts need to be targeted to improve how various parts of the system involved in screening and diagnosing colorectal cancer work together to ensure prompt resolution of abnormal results.
Measurement timeframe:	Screening year 2015
Population:	1) Wait time between abnormal fecal tests to follow-up colonoscopy • Individuals aged 50-74 with an abnormal fecal test in the measure timeframe who went on to receive a colonoscopy within 180 days of the fecal test result 2) Wait time between follow-up colonoscopy to definitive diagnosis • Individuals aged 50-74 who had a follow-up colonoscopy that is within the measurement timeframe and that is within 180 days of the abnormal fecal test result
Measure:	1) Wait time between abnormal fecal tests to follow-up colonoscopy through organized colorectal cancer screening • Median and 90th percentile time interval (days) between an abnormal fecal test and a follow-up colonoscopy • Percentage of fecal tests with follow-up colonoscopy within the target wait times **Denominator**: Individuals aged 50-74 with an abnormal fecal test in the measure timeframe who went on to

	receive a colonoscopy within 180 days of the fecal test result. **Numerator**: Number of individuals who received follow-up colonoscopy within 60 days of abnormal fecal tests. 2) Wait time between follow-up colonoscopy to definitive diagnosis • Median and 90th percentile time interval (days) from a follow-up colonoscopy to definitive pathological diagnosis.
Exclusion criteria:	1) Wait time between abnormal fecal tests to follow-up colonoscopy through organized colorectal cancer screening • Screens outside of the programmatic colorectal screening were excluded • Colonoscopies received longer than 180 days after abnormal fecal tests were excluded 2) Wait time between follow-up colonoscopy to definitive diagnosis • Screens outside of the programmatic colorectal screening were excluded • Colonoscopies received longer than 180 days after abnormal fecal tests were excluded • Screens if no specimen is sent to pathology diagnosis were excluded
Data availability:	1) Wait time between an abnormal fecal test result and a follow-up colonoscopy: AB, BC, ON, NB, SK, MB, NS, PE, NL 2) Wait time (days) between a follow-up colonoscopy and definitive pathological diagnosis: BC, NB, SK, MB, NS, PE, NL
Stratification:	By province
Data source:	Provincial cancer agencies and programs
Data retrieval date:	July - September 2017
Variables details:	Not applicable
Notes from Jurisdictions:	**AB:** Yes, Alberta follows guidelines on the calculation of wait times for a follow-up colonoscopy. We exclude the individuals from the analysis, who had colonoscopy done outside 180 days time-frame. In the database, we are unable to identify patients that experienced delayed follow-up testing by choice. **NB:** NB follows the guidelines on the calculation of wait times for a follow-up colonoscopy or colorectal cancer diagnosis. It does not exclude individuals from the analysis, who have chosen to delay their colonoscopy appointments. During this period, Colon Cancer Screening was only

	accessible to 11% of the province (half the population in Health Zone 2). **NL:** Outliers that do not fall within the 180 days due to patient initiated scheduling delays are excluded. The NL colon screening program follows the recommendations of the National Colorectal Cancer Screening Network that works to have a follow up colonoscopy 60 days following a positive FIT result. **NS:** We have not excluded any individuals from this analysis. Only follow-up colonoscopies performed within the screening program were included for analysis. Approximately 10% of FIT+ patients decline the services offered by the program. **ON:** Individuals who have chosen to delay their colonoscopy appointments were included in the calculation. Our calculation of wait times restricts to Ontario screen-eligible individuals, 50–74 years old, with an abnormal program FOBT result in 2015, who underwent colonoscopy within 180 days of the abnormal FOBT result. We exclude from our calculation the following individuals: a) those with a missing or invalid HIN, date of birth, sex or postal code, b) those with an invasive colorectal cancer before the abnormal FOBT date, and c) those with a total colectomy before the abnormal FOBT date.
Methodology notes:	1) Data were analyzed and provided by provincial colorectal cancer screening programs. 2) Considerations about wait time between abnormal fecal tests to follow-up colonoscopy through organized colorectal cancer screening • The date of the abnormal fecal test is the date that the result is reported by the laboratory for each individual. • The fecal test must be performed within the organized screening program, but the follow-up colonoscopy can be performed within or outside of the screening program. • Each individual is counted once regardless of the number of fecal tests performed. If an individual had multiple abnormal fecal tests in a given year(s), the first abnormal test date is selected. • If multiple follow-up colonoscopies are performed after the abnormal fecal test, count the first colonoscopy after the abnormal fecal test. • All colonoscopies are included regardless of whether they are complete (for whatever reason) 3) Consideration about wait time between follow-up colonoscopy to definitive diagnosis

	• The measurement timeframe refers to the date of the colonoscopy. • The date of definitive pathological diagnosis refers to the date of the initial pathological report after a colonoscopy that confirms the presence (or absence) of colorectal cancer or adenoma. • Include both complete and incomplete colonoscopies – as long as there is definitive diagnosis via a pathology report • The fecal test must be performed within the organized screening program, but the follow-up colonoscopy can be performed within or outside of the screening program. • Each individual is counted once regardless of the number of fecal tests performed. If an individual had multiple abnormal fecal tests in a given year(s), the first abnormal test date is selected. • If multiple follow-up colonoscopies are performed after the abnormal fecal test, count the first complete colonoscopy after the abnormal fecal test.
Changes to definition compared to previous years:	Not applicable

Screening for distress

Definition:	Proportion of patient self-assessments (ESAS-r) reporting no distress, low distress, moderate distress or high distress respectively by specific symptoms (i.e., pain, fatigue, anxiety and depression)
Rationale for measurement:	Routine screening of symptoms is important to identify cancer patients' psychological, social, spiritual, practical or physical concerns that may negatively affect a person's ability to cope with cancer and its treatment. One common self-report tool used to measure patient-reported outcomes is the Edmonton Symptom Assessment System (ESAS), which measures nine commonly reported symptoms (pain, tiredness, nausea, depression, anxiety, drowsiness, appetite, lack of well-being and shortness of breath).
Measurement timeframe:	1 October 2016 - 31 March 2017
Denominator:	Total number of questionnaires completed
Numerator:	Number of questionnaires reporting the level of distress by: • no distress • low • moderate • high level
Exclusion criteria:	1) Questionnaires with patients aged <18 were excluded

	2) Questionnaires with patients diagnosed with benign hematologic diseases were excluded 3) Questionnaires with no response to each symptom and level of score were excluded respectively
Data availability:	AB, SK, MB, ON, QC, NS, PE
Stratification:	Data were pooled together by four symptoms of distress: • Pain • Fatigue • Anxiety • Depression
Data source:	Patient-Reported Outcome (PRO) Initiative partners
Data retrieval date:	October 2017
Variables details:	The questions on symptoms of distress varied by province. For each province, relevant questions were identified and included in the analysis.
Notes from Jurisdictions:	**MB:** Patients are screened for distress at every physician visit which includes new, on treatment and follow-up appointments. Inclusions: 1. Patient age ≥ 18 2. All cancers with the exception of Head and Neck cancer (including metastatic cases and benign hematological cases). **NS:** We have defined Positive for Distress on this indicator as a score from 1-10 on the Distress Thermometer (DT). As noted above, 74.9% of patients who completed the DT from October 2016-March 2017, indicated some level of distress. We do not have the ability to report on this indicator (i.e., number of questionnaires positive for distress as defined by score of 1-10 for any symptom) on the ESAS-r at present. The denominator for this Indicator is different than the denominator for Indicator 2 because not all patients completed the Distress Thermometer on our Screening Tool (which consists of DT, CPC, and ESAS-r). There were 101 patients who completed the Screening Tool, but chose not to complete the Distress Thermometer item on the tool. **ON:** All field on ESAS are mandatory using the ISAAC data capture system, so it is assumed that there are zero 'no responses'. Any discrepancies are likely due to patients not completing all questions when completing ESAS via paper.
Methodology notes:	1) Data came from partners that participated in the Patient Reported Outcome (PRO) initiative survey 2) Edmonton Symptom Assessment System-revised (ESAS-r), a self-assessment tool, was used to collect common symptoms in cancer patients during their treatment. 3) Respondents scored the degree of symptoms using a scale of 0–10. These responses were grouped into four categories: • No distress: score 0 • Low: scores 1–3

	• Moderate: scores 4–6 • High: scores 7–10 4) Each symptom has a small number of no responses that are excluded: pain, 0.5%; fatigue, 0.4%; anxiety, 0.5%; depression, 0.5%.
Changes to definition compared to previous years:	Not applicable

Place of death

Definition:	The percentage of cancer patients who died in hospital, private home and other places
Rationale for measurement:	Measuring place of death, although a crude measure, addresses one important aspect of end-of-life care and may contribute to better planning and quality of end-of-life care for cancer patients.
Measurement timeframe:	Year 2013
Denominator:	Number of deaths due to any invasive cancers
Numerator:	Number of deaths due to any invasive cancers grouped into 3 locations: • hospital • private home • other places
Exclusion criteria:	Not applicable
Data availability:	All provinces and territories
Stratification:	By jurisdiction (territories were combined)
Data source:	Statistics Canada, Vital Statistics Death Database
Data retrieval date:	October 2017
Variables details:	Not applicable
Notes from Jurisdictions:	**QC:** "Hospital" includes residential and long-term care centres. **MB:** Designated palliative care units were included in "Hospital." In other provinces this type of bed may be considered part of long-term care ("Other"). **SK:** A very small proportion of deaths were recorded as private home, so that private home and other were combined together.
Methodology notes:	1) Data were retrieved from Vital Statistics Death Databases. 2) Data presented include ages 0+, provinces/territories combined 3) The percentages of place of death were based on random rounded counts using Statistics Canada algorithm. 4) The definition of hospital varied across provinces. Hospices can be classified as "Other" or "Hospital" depending on province.

	5) "Other" included other specified locality, other health care facility, private home and unknown localities.
Changes to definition compared to previous years:	Not applicable

Smoking prevalence

Definition:	The percentage of the population aged 12 years and older who reported smoking daily or occasionally
Rationale for measurement:	Reporting on tobacco use at the population level allows for the assessment of tobacco prevention and cessation strategies.
Measurement timeframe:	• At national level: Years 2001 to 2014 and 2015-16 combined • At provincial level: Reporting year 2015-16 combined
Denominator:	Total individuals aged 12 years and older
Numerator:	Number of individuals aged 12 years and older reporting daily or occasionally smoking At national level: Combined daily or occasional smokers At provincial level: Separated by daily and occasional smokers
Exclusion criteria:	Responses with "don't know", "refusal to answer", or "not stated" were excluded
Data availability:	All provinces and territories
Stratification:	• At national level: By year • At provincial level: By smoking status (daily or occasionally)
Data source:	Statistics Canada; Canadian Community Health Survey (CCHS),CANSIM 105-0509
Data retrieval date:	August 2017
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Data were downloaded from CANSIM table for the Canadian Community Health Survey data, which are based on a representative sample and then is extrapolated to the overall population.
Changes to definition compared to previous years:	Not applicable

Human papillomavirus (HPV) vaccination uptake

Definition:	The percentage of girls in the age group/school grade targeted for immunization that have completed the HPV

	vaccine series based on the provincially/territorially recommended vaccination schedule
Rationale for measurement:	Reporting on HPV vaccination uptake helps to inform opportunities to increase efforts in prevention activities.
Measurement timeframe:	School years 2015/16 to 2016/17 (measurement timeframe varies by jurisdiction – refer to 'Data Availability' section)
Denominator:	Number of girls in the target grade/age group in schools for the provincial/territorial school-based HPV vaccination program.
Numerator:	Number of girls who have received the final dose (second or third dose, depending on the province/territory) of the HPV vaccination through the provincially/territorially organized program
Exclusion criteria:	Not applicable
Data availability:	School year 2015/16: MB, ON, NS, PE, NL, NT School year 2016: SK School year 2016/17: BC, AB, QC, NB, YT
Stratification:	By province/territory
Data source:	Provincial/territorial immunization programs
Data retrieval date:	December 2017
Variables details:	Not applicable
Notes from Jurisdictions:	**NT:** Vaccination occurs in grades 4–6. Vaccination uptake listed is for grade 7 girls. **SK:** HPV vaccination is offered in grade 6, but immunization coverage rates in SK are assessed based on an age cohort. HPV vaccination uptake is assessed at age 13. Saskatchewan switched to the two-dose series on September 1, 2015. Most of the 13-year-old girls in 2016 would have been initially offered the three-dose series. **ON:** Routine coverage monitoring in Ontario assesses children by birth year as a proxy for grade. Female students who turned 13 years of age by December 31st, 2015 (born in 2002) were used to estimate coverage in grade 8 girls. Girls who completed a valid 2 dose or 3 dose HPV immunization series are represented in the coverage estimate in the column marked '2nd dose'. Although the routine school-based program typically administers a 2 dose series, some girls require 3 doses based on age at first dose or if immunocompromised. **YT:** Girls who received ≥ 2 or 3 dose series completion as defined by age of 1st dose. Two valid dose(s) of HPV if series started before 15 years of age; 3 valid doses if series started on or after 15 years of age.
Methodology notes:	Data were analyzed and provided by provincial/territorial immunization programs
Changes to definition compared to previous years:	

Breast cancer screening mammograms performed within and outside guideline

Definition:	1) The percentage of all screening mammograms in the past year reported by women aged 40 – 49 2) Distribution of screening mammograms in the past year by age groups
Rationale for measurement:	Screening mammography has been shown to reduce breast cancer morbidity and mortality associated with advanced cancer, but the evidence of benefit is strongest for women between the ages of 50 and 74. Reporting on mammograms performed outside of the recommended age range can help identify how mammogram screening practices across the country can become better aligned with best practice guidelines and recommendations, in order to avoid any unnecessary and potentially harmful interventions.
Measurement timeframe:	1) The percentage of all screening mammograms in the past year reported by women aged 40 – 49: Years 2008-2012 combined 2) Distribution of screening mammograms in the past year by age groups: Years 2008, 2012 and 2014
Denominator:	The number of women reported having had a screening mammogram in the past year for asymptomatic reasons
Numerator:	1) The percentage of all screening mammograms in the past year reported by women aged 40 – 49: The number of women aged 40-49 reporting having a screening mammogram in the past one year for asymptomatic reasons 2) Distribution of screening mammograms in the past year by age groups: The number of women reporting having had a screening mammogram in the past one year for asymptomatic reasons, separated by age group: • 40-49 • 50-74 • 75+
Exclusion criteria:	1) Women aged <40 were excluded 2) Women reporting having had a screening mammogram in the past year for symptomatic reasons were excluded
Data availability:	1) The percentage of all screening mammograms in the past year reported by women aged 40 – 49 by jurisdiction: All jurisdictions provided data in 2008 and 2012. Mammography module was optional from 2009 to 2011; the following jurisdictions provided data in 2009:

	AB, NB, NS, NL and NT; 2010: AB, NB, NS, NL and NT; 2011: AB, ON, NL and NU 2) Distribution of screening mammograms in the past year by age groups in 2008, 2012 and 2014 includes data from NS, NB, AB and NT
Stratification:	1) The percentage of all screening mammograms in the past year reported by women aged 40 – 49: By jurisdiction 2) Distribution of screening mammograms in the past year: By age group: 40-49, 50-74, 75+
Data source:	Statistics Canada, Canadian Community Health Survey (CCHS)
Data retrieval date:	1) The percentage of all screening mammograms in the past year reported by women aged 40 – 49: January 2016 2) Distribution of screening mammograms in the past year: February 2018
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Data were based on a representative sample and was extrapolated to the overall population. 2) Contents about woman breast cancer mammograms in survey questionnaire are optional, not all jurisdictions have data available across the years from 2008 to 2012 3) At jurisdiction level, data were pooled through 2008 to 2012 whenever data were available to get the most stable statistical measures of breast screening mammograms in the age 40 - 49; 4) Jurisdiction combined includes 4 provinces: NS, NB, AB and NT. These provinces have data available across the years (2008, 2012 and 2014) to reflect the time trend of breast screening mammograms by age group, especially for age groups outside of the guideline: 40-49 and 75+. 5) A woman is deemed to have had screening mammography due to asymptomatic reasons if she self-reported one of the following reasons: family history of breast cancer, regular check-up/routine screening, age, or current use of hormone replacement therapy. Any of the following reasons were <u>not</u> considered screening mammography for asymptomatic reasons: lump, follow-up to breast cancer treatment, breast problem or other.
Changes to definition compared to previous years:	Not applicable

Mastectomies performed as day surgeries

Definition:	Percentage of breast cancer mastectomies that were performed as day surgery.
Rationale for measurement:	Reporting on mastectomies performed as day surgery allows detection of variations in practice across provinces, and helps to identify opportunities to improve patients' experiences and reduce system costs by avoiding in-patient stays for patients who could safely recover at home.
Measurement timeframe:	1) Data were aggregated at national level: Fiscal years 2008/09 to 2015/16 2) Data were aggregated at provincial level: Fiscal years 2014/15-2015/16 combined
Denominator:	Total number of mastectomies for women aged 18+ diagnosed with breast cancer
Numerator:	The number of mastectomies performed as day surgery for women aged 18+ diagnosed with breast cancer
Exclusion criteria:	1) Women younger than 18 years of age 2) Potential duplicate records are identified as discharges with identical values in some of the data elements. In the event that duplicate records are found, the most recent record is retained, the remaining duplicate records are removed 3) Invalid Health Card Number 4) Procedures coded as abandoned 5) Newborns, stillbirths and cadaveric donors 6) Invalid procedure date 7) No discharge procedure laterality assigned 8) Invalid postal codes
Data availability:	1) Data were aggregated at national level: BC, AB, MB, ON, NB, NS and NL 2) Data were aggregated at provincial level: All provinces and territories, except QC
Stratification:	1) Data were aggregated at national level: By fiscal year 2) Data were aggregated at provincial level: By province
Data source:	Canadian Institute for Health Information; Hospital Morbidity Database (HMDB); National Ambulatory Care Reporting System; Alberta Ambulatory Care Reporting System.
Data retrieval date:	November 2017
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable

Methodology notes:	1) Analysis was conducted and provided by Canadian Institute for Health Information. 2) Patients receiving a mastectomy anywhere within the discharge record containing the surgical episode associated with the patient's first breast resection are considered mastectomy cases. 3) Based on patient's place of residence.
Changes to definition compared to previous years:	Not applicable

Intensive care use in the last 14 days of life

Definition:	The percentage of adult cancer patients who died in an acute cancer hospital, and were admitted to an intensive care unit (ICU) in the last 14 days of life
Rationale for measurement:	Examining interprovincial variation in the use of critical care units in the last 14 days of life can point to opportunities for learning from other jurisdictions about strategies for optimizing appropriate use of ICUs at the end-of-life for cancer patients.
Measurement timeframe:	1) Data were aggregated at national level: Fiscal years 2011/12 to 2015/16 2) Data were aggregated at provincial level: Fiscal years 2014/15 and 2015/16 combined
Denominator:	The total number of all cancer patients aged 18 years and older who died with a cancer diagnosis in an acute care hospital
Numerator:	The number of adult cancer patients aged 18 years and older who died with a cancer diagnosis in an acute care hospital and were admitted to an ICU in the last 14 days of life
Exclusion criteria:	1) Patients less than 18 years of age 2) Records submitted by Quebec facilities or records with Quebec-issued health cards
Data availability:	All provinces and territories, except QC
Stratification:	1) Data were aggregated at national level: By fiscal year 2) Data were aggregated at provincial level: By province
Data source:	Canadian Institute for Health Information (CIHI), Discharge Abstract Database
Data retrieval date:	September 2016
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Analysis was conducted and provided by Canadian Institute for Health Information.

	2) Includes only facilities in the study that reported intensive care unit data. 3) Cancer patients were identified using ICD-10-CA codes for either a significant diagnosis of malignant neoplasm or neoplasms of uncertain or unknown behavior; or a most responsible diagnosis of palliative care, with a secondary diagnosis of malignant neoplasm. 4) Only records indicating at least one ICU visit within 14 days of death were included in the percentage of patients admitted to ICU in the last 14 days of life. All cancer patients died in ICU, regardless of when they were admitted to an ICU, were included in the percentage of cancer patients died in an ICU. 5) To pool data with jurisdictions combined or fiscal years combined, the denominators (number of cancer patients aged 18 and older who died in an acute-care hospital) are back calculated using the corresponding numerators and the percentages.
Changes to definition compared to previous years:	Not applicable

Use of breast conserving surgery over mastectomy for breast cancer resections

Definition:	The percentage of women (aged 18+) receiving a breast cancer resection for whom breast-conserving surgery (BCS) was their final procedure (i.e., where BCS was their first surgery or where a wider excision in the context of BCS was performed within one year of their first surgery).
Rationale for measurement:	Breast-conservation therapy is less invasive than mastectomy and is associated with lower morbidity, improved cosmetic appearance and better psychological outcomes. In addition, mastectomy and breast-conservation therapy yield comparable survival outcomes. Identifying breast conservation surgery rates can indicate variations in practice across provinces, which could help identify opportunities for improving patient experience.
Measurement timeframe:	2014/15-2015/16 combined
Denominator:	Women with invasive breast cancer who received breast conserving surgery and/or a mastectomy
Numerator:	Women who received breast conserving surgery (BCS) as their final procedure
Exclusion criteria:	1) Women younger than 18 years of age 2) Potential duplicate records are identified as discharges with identical values in some of the data elements. In the event that duplicate records are found, the most recent record is retained, the remaining duplicate records are removed

	3) Invalid Health Card Number 4) Procedures coded as abandoned 5) Newborns, stillbirths and cadaveric donors 6) Invalid procedure date 7) No discharge procedure laterality assigned 8) Invalid postal codes
Data availability:	All provinces and territories, except QC
Stratification:	By jurisdiction
Data source:	Canadian Institute for Health Information; Hospital Morbidity Database (HMDB); National Ambulatory Care Reporting System; Alberta Ambulatory Care Reporting System.
Data retrieval date:	November 2017
Variables details:	Not applicable
Notes from Jurisdictions:	Not applicable
Methodology notes:	1) Analysis was conducted and provided by Canadian Institute for Health Information. 2) In order to identify a mastectomy, the following surgical codes were used according to CCI: 1.YM.89 to 1.YM.92. 3) The following CCI codes were used to identify a breast conserving surgery: 1.YM.87, 1.YM.88. 4) Based on patient's place of residence.
Changes to definition compared to previous years:	Not applicable

Appendix A

Histology codes of neuroendocrine in ICD-O3

Histology	Description
8013/3	Large cell neuroendocrine carcinoma
8041/3	Small cell neuroendocrine carcinoma
8240/3	Neuroendocrine carcinoma, low grade
8240/3	Neuroendocrine carcinoma, well-differentiated
8244/3	Mixed adenoneuroendocrine carcinoma
8246/3	Neuroendocrine carcinoma, NOS
8249/3	Neuroendocrine carcinoma, moderately differentiated
8247/3	Merkel cell carcinoma
8247/3	Primary cutaneous neuroendocrine carcinoma

International Classification of Diseases for Oncology (ICD-O-3) online for Neuroendocrine carcinoma
http://codes.iarc.fr/search.php?cx=009987501641899931167%3A2_7lsevqpdm&cof=FORID%3A9&ie=UTF-8&ie=ISO-8859-1&oe=ISO-8859-1&sa=&q=neuroendocrine+carcinoma

Histology codes of squamous cell carcinomas in ICD-O3

Histology	Description

8045/3	Combined small cell-squamous cell carcinoma
8052/2	Papillary squamous cell carcinoma, non-invasive
8052/3	Papillary squamous cell carcinoma
8070/2	Squamous cell carcinoma in situ, NOS
8070/3	Squamous cell carcinoma, metastatic, NOS
8071/6	Squamous cell carcinoma, keratinizing, NOS
8072/3	Squamous cell carcinoma, large cell, nonkeratinizing, NOS
8073/3	Squamous cell carcinoma, small cell, nonkeratinizing
8074/3	Squamous cell carcinoma, spindle cell
8075/3	Squamous cell carcinoma, adenoid
8076/2	Squamous cell carcinoma in situ with questionable stromal invasion
8076/3	Squamous cell carcinoma, microinvasive
8078/3	Squamous cell carcinoma with horn formation
8083/3	Basaloid squamous cell carcinoma
8084/3	Squamous cell carcinoma, clear cell type
8051/3	Verrucous carcinoma, NOS
8051/3	Verrucous squamous cell carcinoma
8081/2	Bowen disease
8081/2	Intraepidermal squamous cell carcinoma, Bowen type
8094/3	Basosquamous carcinoma
8094/3	Mixed basal-squamous cell carcinoma
8560/3	Adenosquamous carcinoma
8560/3	Mixed adenocarcinoma and squamous cell carcinoma

International Classification of Diseases for Oncology (ICD-O-3) online for Squamous cell carcinoma: http://codes.iarc.fr/search.php?cx=009987501641899931167%3A2_7lsevqpdm&cof=FORID%3A9&ie=UTF-8&ie=ISO-8859-1&oe=ISO-8859-1&sa=&q=squamous+cell+carcinoma

Histology codes of sarcoma in ICD-O3

Histology	Description
8710	Glomangiosarcoma
8800	Sarcoma
8801	Spindle cell sarcoma
8802	Giant cell sarcoma (except of bone M-9250/3)
8803	Small cell sarcoma
8804	Epithelioid sarcoma
8805	Undifferentiated sarcoma
8806	Desmoplastic small round cell tumour
8810	Fibrosarcoma
8811	Fibromyxosarcoma
8812	Periosteal fibrosarcoma (C40._, C41._)
8813	Fascial fibrosarcoma
8814	Infantile fibrosarcoma
8832	Dermatofibrosarcoma (C44._)

8833	Pigmented dermatofibrosarcoma protuberans (C44._)
8840	Myxosarcoma
8850	Liposarcoma
8851	Liposarcoma, well differentiated
8852	Myxoid liposarcoma
8853	Round cell liposarcoma
8854	Pleomorphic liposarcoma
8855	Mixed liposarcoma
8857	Fibroblastic liposarcoma
8858	Dedifferentiated liposarcoma
8890	Leiomyosarcoma
8891	Epithelioid leiomyosarcoma
8894	Angiomyosarcoma
8895	Myosarcoma
8896	Myxoid leiomyosarcoma
8900	Rhabdomyosarcoma
8901	Pleomorphic rhabdomyosarcoma, adult type
8902	Mixed type rhabdomyosarcoma
8910	Embryonal rhabdomyosarcoma, NOS
8912	Spindle cell rhabdomyosarcoma
8920	Alveolar rhabdomyosarcoma
8921	Rhabdomyosarcoma with ganglionic differentiation
8930	Endometrial stromal sarcoma (C54.1)
8931	Endometrial stromal sarcoma, low grade (C54.1)
8933	Adenosarcoma
8935	Stromal sarcoma
8936	Gastrointestinal stromal sarcoma
8963	Rhabdoid sarcoma
8964	Clear cell sarcoma of kidney (C64.9)
8980	Carcinosarcoma, NOS
8981	Carcinosarcoma, embryonal
8991	Embryonal sarcoma
9040	Synovial sarcoma
9041	Synovial sarcoma, spindle cell
9042	Synovial sarcoma, epithelioid cell
9043	Synovial sarcoma, biphasic
9044	Clear cell sarcoma, NOS (except of kidney M-8964/3)
9051	Sarcomatoid Mesothelioma
9120	Hemangiosarcoma
9124	Kupffer cell sarcoma (C22.0)
9140	Kaposi sarcoma
9170	Lymphangiosarcoma
9180	Osteosarcoma (C40._, C41._)
9181	Chondroblastic osteosarcoma (C40._, C41._)
9182	Fibroblastic osteosarcoma (C40._, C41._)

9183	Telangiectatic osteosarcoma (C40._, C41._)
9184	Osteosarcoma in Paget disease of bone (C40._, C41._)
9185	Small cell osteosarcoma (C40._, C41._)
9186	Central osteosarcoma (C40._, C41._)
9187	Intraosseous well differentiated osteosarcoma (40._, C41._)
9192	Parosteal osteosarcoma (C40._, C41._)
9193	Periosteal osteosarcoma (C40._, C41._)
9194	High grade surface osteosarcoma (C40._, C41._)
9195	Intracortical osteosarcoma (C40._, C41._)
9220	Chondrosarcoma (C40._, C41._)
9221	Juxtacortical chondrosarcoma (C40._, C41._)
9231	Myxoid chondrosarcoma
9240	Mesenchymal chondrosarcoma
9242	Clear cell chondrosarcoma (C40._, C41._)
9243	Dedifferentiated chondrosarcoma (C40._, C41._)
9250	Giant cell sarcoma of bone
9251	Malignant giant cell tumour of soft parts
9252	Malignant tenosynovial giant cell tumor
9260	Ewing sarcoma
9270	Odontogenic sarcoma
9290	Ameloblastic odontosarcoma
9330	Ameloblastic fibrosarcoma
9342	Odontogenic carcinosarcoma
9442	Gliosarcoma (C71._)
9480	Cerebellar sarcoma, NOS (C71.6) [obs]
9530	Meningial sarcoma
9539	Meningeal sarcomatosis
9581	Alveolar soft part sarcoma
9591	Reticulosarcoma
9662	Hodgkin sarcoma [obs]
9684	Immunoblastic sarcoma
9740	Mast cell sarcoma
9755	Histiocytic sarcoma
9756	Langerhans cell sarcoma
9757	Interdigitating dendritic cell sarcoma
9758	Follicular dendritic cell sarcoma
9930	Myeloid sarcoma (see also M-9861/3)

Impact Calculations

Meeting target rate for resections with 12 or more lymph nodes for colon cancers

Measure	The additional number of resections where 12 or more lymph nodes are removed and examined for colon cancers if all jurisdictions met the target rate.
Ideal state	Target rate: 90% of all colon resections to have 12 or more lymph nodes removed and examined. The target rate was set by the Canadian Partnership Against Cancers' System Performance Targets and Benchmarks Working Group.
Methodology	The sum of additional resections (where 12 or more lymph nodes are removed and examined) performed across jurisdictions if the target rate of 90% is met. Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} (rate_{jurisdiction} - 90\%) \times N_{jurisdiction}$$ Where: • $rate_{jurisdiction}$ is the current resection rate where 12 or more lymph nodes are removed and examined in a given jurisdiction • $N_{jurisdiction}$ is the current number of colon cancer cases with resection within 12 months of diagnosis in a jurisdiction.
Notes	• Data used in calculations are provided by the provincial caner registries and programs. • The most current data is based on 2014 diagnosis year for all jurisdictions except BC where 2013 was the most current data year available. • QC and territories are not included in the calculations due to data unavailability. Results should be interpreted with caution. • If a jurisdiction met or performed better than the target, the number of additional resections was considered to be 0. • Please refer to the indicator "Removal and examination of 12 or more lymph nodes in colon resections" in Technical Appendix for details.

Improving the rate of adult clinical trial participation rate

Measure	The additional number of adult cancer patients (aged 19+) participating in clinical trials if the current clinical trial participation rate was increased to the target rate.
Ideal state	Target rate: 14% of adult cancer patients to participate in clinical trials. The target rate is based on the highest participation rate reported in the United Kingdom.
Methodology	The sum of additional number of adult cancer patients who would participate in clinical trials if the current national clinical trial participation rate increased to the target rate. Specifically, it is estimated by the following formula: $$(14\% - rate_{current}) \times N_{current}$$ Where: • $rate_{current}$ is the current adult participation rate for clinical trial at national level

	• $N_{current}$ is the current number of adults participating clinical trial at national level
Notes	• The current national adults' clinical trial participation rate is estimated using data provided from provincial cancer agencies and based on 2013. • The current number of adult cancer cases is estimated by using the projected cancer cases in Canadian Cancer Statistic 2017. • QC, NS and territories are not included in the calculations due to data unavailability. Results should be interpreted with caution. • Please refer to the indicator of "Adult Clinical Trial Participation" in Technical Appendix for details.

Reducing Canadians who are overweight or obese

Measure	The additional number of Canadian adults (aged 18+) who will be at a healthier weight if all jurisdictions reduced the rate of overweight/obesity to the rate of the jurisdiction with the lowest rate of overweight/obesity.
Ideal state	The lowest rate of overweight/obesity is chosen as a benchmark; BC has the best performing rate of 56.8%
Methodology	The sum of additional number of Canadian adults who would be at a healthier weight across jurisdictions if all jurisdictions reduced the rate of overweight/obesity to the rate of the jurisdiction with the lowest rate. Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} \left(rate_{jurisdiction} - rate_{lowest}\right) \times N_{jurisdiction}$$ Where: • $rate_{jurisdiction}$ is the current rate for overweight or obesity in a given jurisdiction • $N_{jurisdiction}$ is the current weighted number of Canadian adults classified as overweight or obese in a given jurisdiction.
Notes	• Data used in calculations are from CCHS 2015-16 combined dataset which were downloaded from Statistics Canada website (CANSIM). • For stability, a baseline rate is chosen from the provinces with a population greater than 1,000,000 people (BC, AB, SK, MB, ON and QC). • If a jurisdiction (with population < 1,000,000 people) met or performed better than the baseline, the additional number of Canadian adults at a healthier weight is considered to be 0. • Please note that it is possible that Canadians who would no longer be considered overweight/obese may either be classified into "normal" or "underweight" categories. The calculation does not differentiate between these two categories when classifying "healthier weight". • Please refer to the indicator of "Adult Classified as Overweight or Obese" in Technical Appendix for details.

Increasing physically active Canadians

Measure	The additional number of Canadians adults (aged 18+) who would be physically active if all jurisdictions improved the rate of physical activity to the rate of the jurisdiction with the highest rate of physical activity.
Ideal state	The highest rate for physical activity is chosen as a benchmark; BC has the best performing rate of 68.2%
Methodology	The sum of additional number of Canadians adults who would be physically active across jurisdictions if all jurisdictions improved the rate of physical activity to the rate of the jurisdiction with the highest rate. Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} (rate_{highest} - rate_{jurisdiction}) \times N_{jurisdiction}$$ Where: • $rate_{jurisdiction}$ is the current rate for physical activity in a given jurisdiction • $N_{jurisdiction}$ is the current weighted number of Canadian adults who are physically active
Notes	• Data used in calculations are from CCHS 2015-16 combined dataset which were downloaded from Statistics Canada website (CANSIM). • For stability, a baseline rate is chosen from the provinces with a population greater than 1,000,000 people (BC, AB, SK, MB, ON and QC). • If a jurisdiction (with population < 1,000,000 people) met or performed better than the baseline, the additional number of physically active Canadian adults is considered to be 0. • Please refer to the indicator "Physical inactivity" in Technical Appendix for details.

Canadians adhering to cancer drinking guidelines

Measure	The additional number of Canadian adults (aged 18+) who would drink within the recommendations of Canada's Low Risk Alcohol Drinking Guidelines for cancer if all jurisdictions reduced their rates of drinking to the rate of the jurisdiction with the lowest rate of drinking in excess of the guidelines
Ideal scenario	The lowest rate of drinking in excess of Canada's Low Risk Alcohol Drinking guidelines for cancer is chosen as a benchmark; SK has the best performing rate of 7.5%
Methodology	The sum of additional number of Canadian adults who would drink within the Canada's Low Risk Alcohol Drinking Guidelines for cancer across jurisdictions if all jurisdictions improved the rate of drinking in excess of the guidelines above the guidelines to the rate of jurisdiction with the lowest rate. Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} (rate_{jurisdiction} - rate_{lowest}) \times N_{jurisdiction}$$ Where:

	• $rate_{jurisdiction}$ is the current rate for drinking in excess of the guidelines in a given jurisdiction • $N_{jurisdiction}$ is the current weighted number of Canadians drinking in excess of the guidelines in a given jurisdictions
Notes	• Data used in calculations are from CCHS 2015-16 combined dataset which were downloaded from Statistics Canada website (CANSIM). • For stability, a baseline rate is chosen from the provinces with a population greater than 1,000,000 people (BC, AB, SK, MB, ON and QC). • If a jurisdiction (with population < 1,000,000 people) met or performed better than the baseline, the additional number of Canadian adults who will drink within the guidelines is considered to be 0. • For definition of drinking excess of Canada's Low Risk Alcohol Guidelines for Cancer, please refer to the indicator of "Alcohol Consumption" in Technical Appendix for detail.

Increasing fruits and vegetable consumptions

Measure	The additional number of Canadians (aged 12+) who would consume fruit and vegetables five or more times on a daily basis if all jurisdictions improved their rates of fruit and vegetable consumption to the rate of the jurisdiction with the highest rate
Ideal scenario	The highest rate of fruits and vegetable consumption is chosen as a benchmark; QC has the highest rate of 38.6%
Methodology	The sum of additional number of Canadians who would consume fruit and vegetables five or more times on a daily basis if all jurisdictions improved the rate of fruit and vegetable consumption to the rate of jurisdiction with the highest rate. Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} (rate_{highest} - rate_{jurisdiction}) \times N_{jurisdiction}$$ Where: • $rate_{jurisdiction}$ is the current rate of adequate fruits and vegetable in a given jurisdiction • $N_{jurisdiction}$ is the current weighted number of Canadians consuming fruits and vegetables five or more times on a daily basis in a given jurisdictions
Notes	• Data used in calculations are from CCHS 2015-16 combined dataset which were downloaded from Statistics Canada website (CANSIM). • For stability, a baseline rate is chosen from the provinces with a population greater than 1,000,000 people (BC, AB, SK, MB, ON and QC). • If a jurisdiction (with population < 1,000,000 people) met or performed better than the baseline, the additional number of Canadian adults with adequate fruits and vegetables consumption is considered to be 0. • For definition and details of fruits and vegetable consumption, please refer to the indicator "Fruit and Vegetable consumption" in Technical Appendix for detail.

Increasing number of diagnoses with shorter wait times in breast screens

Measure	The additional number of breast cancers cases receiving a faster diagnosis if all jurisdictions met the target rate and wait times from breast screens to definitive diagnosis
Ideal scenario	Below are the target rates and wait times for abnormal breast screens to definitive diagnosis: • 90% within 5 weeks for diagnosis without tissue biopsy • 90% within 7 weeks for diagnosis with tissue biopsy requirement The guideline was developed by Public Health Agency of Canada in collaboration with the Quality Determinants Working Group
Methodology	The sum of additional number of breast cancer cases receiving a faster diagnosis across all jurisdictions if the respective targets for abnormal breast screens is met. Note that calculations for those requiring tissue biopsy and those that do not require tissue biopsy are done separately (as different targets are set). Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} (90\% - rate_{jurisdiction}) \times N_{jurisdiction}$$ Where: • $rate_{jurisdiction}$ is the current rate for breast cancer screens diagnosed within the target wait time within a jurisdiction • $N_{jurisdiction}$ is the current number of breast cancer screens diagnosed within the target wait time in a jurisdiction.
Notes	• Data used in calculations are provided by breast screening program network from each jurisdiction. • The most current data is based on 2015. • Territories are not included in the calculations due to data unavailability. Results should be interpreted with caution. • If a jurisdiction met or performed better than the target, the additional number of breast cancer cases receiving a faster diagnosis is considered to be 0. • Please refer to the indicator of "Breast cancer diagnosis wait times" in Technical Appendix for detail

Reducing cancer patients dying in hospital

Measure	The number of cancer patients who would pass away in a non-hospital setting if all jurisdictions reduced the rates of in-hospital deaths to the rate of jurisdiction with the lowest in-hospital death for cancer patients
Ideal state	The lowest percentage of cancer deaths in hospital is chosen as a baseline as an attainable goal to promote benchmarking and mutual learning among jurisdictions. BC has the best performing rate of 48.6%.

Methodology	The sum of the in-hospital deaths from cancer patients across all jurisdictions if all jurisdictions reduced the rate of cancer deaths in hospital to the rate of the jurisdiction with the lowest rate. Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} \left(Percent_{jurisdiction} - Percent_{lowest}\right) \times N_{jurisdiction}$$ Where: • $rate_{jurisdiction}$ is the current cancer death rate in hospital in a jurisdiction • $N_{jurisdiction}$ is the current number of cancer deaths in hospital in a jurisdiction
Notes	• Data used in calculations are from the Vital Statistics Database from Statistics Canada and based on 2013. • Please refer to the indicator of "Place of death" in Technical Appendix for details.

Reducing in-patient mastectomies

Measure	The number of hospitalizations and resources (hospital days and health care dollars saved) that could be redirected if a proportion of current in-patient mastectomies were instead performed as day surgery
Ideal state	To perform 15% of current in-patient mastectomies instead as day surgery (15% was chosen as it is a high but attainable goal that has important implications for resource expenditures).
Methodology	The number of additional day surgery mastectomies is equivalent to the sum of 15% of current in-patient mastectomies being done across all jurisdictions. Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} N_{jurisdiction} \times 15\%$$ Where: • $N_{jurisdiction}$ is the current number of in-patient mastectomies in a jurisdiction The total in-patient days saved is estimated by multiplying the number of additional day surgery mastectomies (in place of in-patient mastectomies) by the average length of hospital stay (1.3 days). Amount of money that could potentially be redirected is estimated by multiplying the total number of additional day surgery mastectomies by the cost difference between in-patient and day surgery mastectomy ($1,777).
Notes	• Data used in calculations are provided by the Canadian Institute for Health Information and based on fiscal years 2014/15 and 2015/16 combined. The estimate presented, however, is based on a single year. • QC, PE, SK and territories are not included in the calculations due to data unavailability.

	• The average hospital stay and the cost difference between in-patient and day-surgery mastectomy are from CIHI's Patient Cost Estimator. • Please refer to the indicator "Mastectomies performed as day surgeries" for details.

Reducing ICU admission near the end of life

Measure	The number of ICU admissions near the end of life by cancer patients and other associated resources that could be redirected to other areas of care.
Ideal scenario	Reduction of current ICU admissions near the end of life by 15% (15% was chosen as it is a high but attainable goal that has important implications for resource expenditures).
Methodology	The number of ICU admissions avoided is equivalent to the sum of 15% of the current number of ICU admissions of cancer patients, in their last 14 days of life, across all jurisdictions. Specifically, it is estimated by the following formula: $$\sum_{jurisdiction} N_{jurisdiction} \times 15\%$$ Where: • $N_{jurisdiction}$ is the current number of ICU admissions of cancer patients in their last 14 days of life in each jurisdiction The total number of ICU days saved is estimated by multiplying the number of ICU admissions that could be avoided (from the previous calculation) by the average ICU stay (1.6 days) The costs saved by having a palliative care consult instead of ICU admission are calculated as follows: • For those admitted to ICU then discharged: • $7,700 is the cost saved by having palliative care consult instead of ICU admission $$\sum_{jurisdiction} \left(1 - rate_{jurisdiction}\right) \times N_{jurisdiction} \times 7700$$ • For those admitted to ICU then died: • $5,250 is the cost saved by having a palliative care consult instead of being admitted to the ICU $$\sum_{jurisdiction} rate_{jurisdiction} \times N_{jurisdiction} \times 5250$$ Where: • $rate_{jurisdiction}$ is the current cancer patient death rate in ICUs in a given jurisdiction • $N_{jurisdiction}$ is the current number of ICU admissions in cancer patients in their last 14 days of life in a given jurisdiction.

Notes	• The calculations are based on data provided by CIHI and based on fiscal years 2014/15 and 2015/16 combined and the death rate from 2014/15 fiscal year was applied to both years. The estimates presented, however, are annual estimates. • The average day of stay in ICU and the cost difference between palliative care and ICU are adopted from CIHI Patient Cost Estimator. • QC is not included in the calculations due to data unavailability. • Please refer to the indicator "Intensive care use in the last 14 days of life" for details.

Impact Calculations using OncoSim

Canadian Partnership Against Cancer Modelling

The OncoSim model, led and supported by the Canadian Partnership Against Cancer, with model development by Statistics Canada through funding from Health Canada, was designed to evaluate the impact of cancer care policy changes in the Canadian system. OncoSim incorporates the risk of developing and dying from cancer and other causes, as well as screening and clinical management with healthcare costs and labour data and can be used to assess both health outcomes and economic impact. OncoSim includes a suite of models for lung, colorectal, cervical and breast cancers.

OncoSim rests on a microsimulation platform, which uses real-world clinical and economic evidence and can integrate data from a variety for sources. It is supported by a user-friendly, web-enabled platform to allow for browsing and custom scenario development by registered users (https://oncosim.ca). It models the development and progression of disease for the most common cancers that affect Canadians. Resulting clinical and economic outputs can be used to assess health consequences and inform resource allocation decisions for cancer control interventions. Specifically, OncoSim can evaluate cancer control strategies for prevention, screening and treatment of common cancers, by comparing projections of incidence, mortality, resource needs, direct health care costs and broader economic impacts such as lost wages.

All OncoSim simulation results are based on version 2.5. The lung cancer scenarios were run using 32 million simulated cases (scaled to the size of the Canadian population). The HPV vaccination scenarios were run using 80 million simulated cases. The incidence of cervical cancer in the Canadian population is small and this analysis was conducted in a small targeted group which required a larger run size to generate robust analysis. An in-depth analysis was conducted to assess the potential impact of:

1. An increase in the HPV vaccination rate among Canadian girls from a weighted average of 67% to the national target of 90% [1]
2. An increase in the provincial/territorial HPV vaccination rates among girls, and boys where applicable, from their respective vaccination rates to the national target of 90%
3. A reduction in the smoking prevalence in Canada from an average of 19.3% to 5% by 2035 [2]
4. A reduction in the provincial/territorial smoking prevalence from their respective smoking rates to 5% by 2035
5. A reduction in the smoking prevalence in Canada to match the lowest smoking rate in Canada (British Columbia has the lowest smoking rate in 2018 at 14.1% [3]).

[1] Government of Canada. Vaccine coverage goals and vaccine preventable disease reduction targets by 2025. Available from: https://www.canada.ca/en/public-health/services/immunization-vaccine-priorities/national-immunization-strategy/vaccination-coverage-goals-vaccine-preventable-diseases-reduction-targets-2025.html#1.2.1

[2] The Government of Canada has set a target to reduce the prevalence of smoking among Canadians to 5% by 2035. To see the benefits that can be realized by achieving the 5% smoking target by 2035, please see page 47.

[3] The above calculation uses the lowest smoking rate attained in Canada to promote benchmarking and mutual learning among jurisdictions, so a similar reduction in smoking rates can be attained across Canada.

Data

OncoSim simulates and projects a representative sample of the Canadian population using Statistics Canada's official demographic projections. OncoSim considers births, mortality, immigration and inter-provincial migration to represent the age-sex, provincial structure of the population. The Canadian Cancer Registry is a fundamental source of cancer data used to inform the incidence and staging of colorectal, lung and cervical cancers. Healthcare costs were obtained predominantly from Ontario sources and included the Ontario Health Insurance Plan Schedule of Benefits for physician fees, the Ontario Case Costing Initiative for hospital costs, Ontario's Drug Formulary and Cancer Care Ontario's New Drug Funding Program. Costs are reported in 2016 Canadian dollars. Sources for economic data included census and other simulation models at Statistics Canada. Multiple data sources and expert opinion have been utilized for standard disease-specific diagnostic and treatment practices, health care costs and utilities, expected personal income and tax revenue[1,2]. Additional data sources for parameters (see Table IV) were obtained from randomized controlled trials, academic publications and grey literature, including survival data, data to inform natural history of cancer progression, end-of-life care costs and efficacy of screening. [4]

Cervical cancer simulations

Methods

The OncoSim HPV/Cervical cancer model consists of two complementary components: Human Papillomavirus Microsimulation Model (OncoSim-HPVMM) and Cervix Model (OncoSim-Cervix). The OncoSim-HPVMM component is an interacting agent model that simulates HPV transmission through sexual contact networks. Data from OncoSim-HPVMM are used as inputs into OncoSim-Cervix, including HPV incidence rates under various vaccinations strategies. The OncoSim-Cervix model simulates the natural history from HPV infection to cervical intraepithelial neoplasia to cancer, as well as infection to anogenital warts in women. It also simulates screening, treatment, progression and case-fatality.

OncoSim-HPVMM

OncoSim-HPVMM simulates hypothetical people to model sexual network, virus transmission and vaccination strategies. OncoSim-HPVMM was developed based on a published model by Van de Velde et al. (3). The interacting nature of the model allows men and women aged 10 years and older to form multiple relationships with variable durations over time, propagating different strains of HPV. When an HPV vaccination program of adequate coverage is applied to the hypothetical population in OncoSim-HPVMM, herd immunity against cervical cancer will take effect.

OncoSim-HPVMM assumes that the population being simulated is stationary (i.e., the population does not grow nor shrink over time) and that the characteristics ruling individuals' sexual behaviours (e.g., sexual debut, partnership formation/separation, sexual acts) and virus transmission rate (e.g., virus infection,

[4] For a comprehensive list of data sources please contact oncosim@partnershipagainstcancer.ca.

clearance) are constant over time. Under these assumptions, OncoSim-HPVMM generates HPV prevalence and incidence at a steady-state level in the absence of a vaccination program. Please note, however, that OncoSim-HPVMM does not account for HPV transmission arising from same-sex relationships due to the lack of data.

Six HPV serotype categories are currently modelled: 6, 11, 16, 18, "other carcinogenic types combined" and "other non-carcinogenic combined". Bivalent and quadrivalent vaccines are currently available in OncoSim-HPVMM for assessment. The model allows 100 years of projection to assess the effect of various vaccination strategies on HPV prevalence and incidence in men and women. Note that the effects of HPV infection on other HPV-related cancers (e.g. oral and head and neck cancers) are not modelled at this time in OncoSim.

OncoSim-HPVMM utilizes various data for building the model. Information on demography is based on Canadian vital statistics. Parameters associated with sexual network and virus transmission are based on Van de Velde et al. (3), academic and grey literature, clinical trials and Statistics Canada surveys. Input parameters, particularly those associated with sexual behaviour and virus transmissions are subject to a high degree of uncertainty due to limited information available. Therefore, extensive parameter estimation was performed to find feasible parameter sets (solutions) that are consistent with observed data on sexual behaviours and HPV prevalence. The parameter estimation was done by running thousands of simulations repeatedly, each time with a different combination of input parameters systematically drawn from the range of pre-specified input parameter values through Latin Hypercube Sampling. Projections from OncoSim-HPVMM, therefore, can be presented as a range of outputs (i.e., confidence bands) that account for the possible variations in outputs resulting from uncertain input parameter values. OncoSim-HPVMM was run with 250,000 interacting agents with 100-year burn-in to obtain equilibrium sexual network and HPV prevalence levels. All OncoSim-HPVMM simulation results are based on version 1.8.0.0, and results are scaled to reflect the population size of Canadians aged 10 years and older in 2011.

OncoSim-Cervix

OncoSim-Cervix is a dynamic, non-interacting agent model that simulates the representative Canadian population and models the natural history of cervical abnormalities, screening, treatment of abnormal lesions/warts, cervical cancer incidence and progression, cervical cancer treatment and death. By communicating results from OncoSim-HPVMM, the natural history of HPV is simulated through infection status (susceptible / immune / infected) and cervical abnormality (cervical intraepithelial neoplasia, adenocarcinoma in situ, genital warts), which allows the abnormal lesions to progress or regress. Eligible women follow cervical cancer screening protocols, which can detect abnormal lesions through various screening/diagnostic modalities. Calibrated to match real-world data, a small proportion of women with abnormal lesions develop cervical cancers. Upon cancer detection (through screening or clinical detection), a cancer stage is assigned, and women follow a detailed sequence of cancer treatments based on their stage. Cancers can be cured, relapse and/or result in death.

The model is consistent with recent and past observed practice/data with respect to the screening and follow-up strategies. A wide variety of future screening strategies can be evaluated by altering primary screening modalities (conventional or liquid-based cytology, HPV DNA, or combinations) and optional follow-up protocols based on target age, time and vaccination status. Input data come from a variety of sources, including the Canadian Cancer Registry, randomized clinical trials, academic literature and environmental scans. Costing data are based on publicly available sources such as Ontario Case Costing

Initiative and provincial formularies. The model was calibrated extensively to ensure the model reflects observed data. Incidence of cervical cancer was validated against age-specific, provincial incidence derived from the Canadian Cancer Registry over time. Additional model assessment was conducted so that model outcomes associated with natural history and screenings are consistent with published data. Conceptual model specification and face-validity of inputs and results were ensured through a pan-Canadian expert working group consisting of oncologists, epidemiologists and other cancer specialists. The sub models are described in detail with calibration and evaluation results by Miller et al. (4)

Uncertainty

There is considerable uncertainty for the parameters describing sexual behaviour, long-term vaccine efficacy and the development and progression of lesions and HPV related cancers and associated with the very low prevalence of cervical cancer. As the analysis was based on a small cohort, results should be interpreted with caution.

Cohort analysis

For the HPV-cervical modelling, a cohort analysis was conducted to evaluate the effect among a defined group of individuals over a given time period. In this particular analysis, a cohort of 5-10-year-old girls in 2015 were followed over their lifetime, to evaluate the short- and long-term effects of HPV vaccination on cervical cancer incidence. This methodology contrasts with the lung cancer modelling, which was done at a population level.

Scenarios

Cervical screening

Cervical screening outcomes reflect a combination of historical patterns (from 1955) and future patterns based on primary cytology (Pap) testing (both conventional and liquid-based), and follow-up protocols are based on current practice.

Scenarios were run to show the impact of:

1. An increase in the HPV vaccination rate among Canadian girls from a weighted average of 67% to the national target of 90%
2. An increase in the provincial/territorial HPV vaccination rates among girls, and boys where applicable, from their respective vaccination rates to the national target of 90%

Outcomes reported were cervical cancer incidence and mortality.

- Overall scenario assumptions:
    - Cohort: 5-10-year old girls in 2015
    - Triennial cervical cancer screening with Pap testing for women aged 21–69 (2015 and onwards)
    - Vaccines are perfectly effective (i.e., 100% efficacious with no waning over time)

- Additional HPV vaccination assumptions for Canadian scenarios:
    - National weighted-average of 67% HPV vaccine uptake was used as a baseline comparator (i.e. the estimated current uptake rate in Canada)

- Vaccination of 12-year-old girls annually with three doses of a quadrivalent HPV vaccine
- Vaccination program beginning in 2008 without a ramp-up in vaccination rates

- Additional provincial and territorial scenario assumptions:
  - Provincial and territorial vaccination rates and vaccination grades for both boys and girls were provided by the respective immunization programs
  - The vaccine program initiation year and dosage has been derived from an environmental scan. (5)

Results

Projected impact of increasing HPV vaccination on cervical cancer

Incidence

If we increased HPV vaccine uptake from a weighted average of 67% to the national target of 90% among a modelled cohort of eligible women[+], then over the lifetime of this cohort, we would expect to see a reduction of cervical cancer incidence of 1,400 cases (23%).

Mortality

If we increased HPV vaccine uptake from a weighted average of 67% to the national target of 90% among a modelled cohort of eligible women[+], then over the lifetime of this cohort, we would expect to see a reduction of cervical cancer deaths of 400 cases (21%).

[+]Cohort includes all 5 to 10-year-old girls in 2015 and follows them throughout their lifetime.

Table I highlights the scenario assumptions:

Table I

	Deployment year†	Vaccination rates ††		School grade when immunization given ††	Age of vaccination	
		Girls	Boys		Girls	Boys
NL	2007	92.0%	N/A	Grade 6	11-12	N/A
PEI	2007	84.3%	85.0%	Grade 6	11-12	11-12
NS	2007	80.8%	N/A	Grade 7	12-13	N/A
NB	2008	74.7%	N/A	Grade 7	12-13	N/A
QB	2008	76.0%	N/A	Grade 4	9-10	N/A
ON	2007	61.0%	N/A	Grade 8	13-14	N/A
MB	2008	62.2%	51.3%	Grade 6	11-12	11-12
SK	2008	61.4%	61.4%	Age 13	13-14	N/A
AB	2008	66.7%	62.9%	Grade 5	10-11	10-11
BC	2008	66.5%	N/A	Grade 6	11-12	N/A
YK	2009	66.5%	N/A	Grade 6	11-12	N/A
NT	2009	57.1%	N/A	Grade 7	12-13	N/A

† Canadian Partnership Against Cancer. Cervical Cancer Screening in Canada: Environmental Scan [Internet]. Toronto (ON): Canadian Partnership Against Cancer; 2017 [cited (2018 07). Available from: http://www.cancerview.ca/preventionandscreening/cervicalcancercontrolincanada/

††Provincial and territorial vaccination rates and grades for both boys and girls were provided by the respective immunization programs

Table II shows the impact of increasing HPV vaccination rates in the provinces and territories

Table II

Province	Current vaccination rate	Target vaccination rate	Impact on incidence	Impact on mortality
NL	92.0%	100.0%**	Results suppressed due to small numbers	
PEI	84.3%	90.0%	Results suppressed due to small numbers	
NS	80.8%	90.0%	5%	4%
NB	74.7%	90.0%	Results suppressed due to small numbers	
QB	76.0%	90.0%	16%	16%
ON	61.0%	90.0%	29%	28%
MB	62.2%	90.0%	23%	24%
SK	61.4%	90.0%	16%	28%
AB	66.7%	90.0%	13%	13%
BC	66.5%	90.0%	18%	18%
YK	66.5%	90.0%	Results suppressed due to small numbers	
NT	57.1%	90.0%	Results suppressed due to small numbers	

**** Target was agreed to be a 100% as the current rate is already greater than 90%**

Lung cancer simulations

Methods

OncoSim-Lung can be used to assess the health and economic impacts of tobacco reduction strategies, variable uptake of conventional and new therapies, and lung cancer screening strategies. It has been validated extensively and is well described[1,2,6,7]. "Briefly, the program simulates individual lives from birth through development of cancer and progression to death, tracking health-related quality of life, health care interventions and costs. OncoSim then aggregates these results across millions of heterogeneous individuals. Data are derived from a wide range of sources including vital statistics, health surveys, cancer registry data, the medical literature, drug and hospital costs, and expert opinion when necessary. Cancer incidence and mortality data produced by the model have aligned well with cancer registry data, have been internally validated and have been compared with other models with good face validity." (1, 7)

OncoSim-Lung includes a screening component that can be used to assess low-dose computed tomography scans for a variety of screening strategies, including thresholds of risk for eligibility to program, age to start and end screening, screening frequency, and various participation and cost assumptions. The module has been calibrated and assessed against the U.S.-based National Lung Screening Trial results. (1)

OncoSim simulates the hazard of developing lung cancer using a risk equation from the literature (8) that combines the risk associated with cumulative lifetime radon and smoking exposure and was aligned with the number of cases reported to the Canadian Cancer Registry by age, sex and province. Smoking behaviour was simulated to match Canadian survey data over time, by age, sex and province, based on the 1979 Canada Health Survey, the 1994/1995 National Population Health Survey and the 2008 Canadian Community Health Survey. (9-11) Smoking trajectories were externally validated against other survey years and tobacco manufacturers' data. (12) Trajectories before 1979 were extrapolated and compared with smoking data previously compiled for Canada. (13) Recent smoking trends were extrapolated after 2008. (1)

Baseline incidence rates were calibrated to the number of new cases in the Canadian Cancer Registry for 2005 and assessed for alignment across years 1999 to 2009. Lung cancer mortality was calibrated to the Canadian Mortality Database for 2005 and compared across time. (1)

The limitations of OncoSim have been reported in detail. (14) Briefly, resource costs were derived predominantly from one province in Canada, although analysts can modify various OncoSim inputs for region-specific analyses. Costs from the patient perspective were not assessed.

Scenarios

Scenarios were run to show the impact of:

1. A reduction in the smoking prevalence in Canada from an average of 19.3 % to 5% by 2035

2. A reduction in the provincial/territorial smoking prevalence from their respective smoking rates to 5% by 2035
3. A reduction in the smoking prevalence in Canada to match the lowest smoking rate in Canada (British Columbia has the lowest smoking rate in 2018 at 14.1%).

Outcomes reported include lung cancer treatment costs, lung cancer incidence, mortality and impact on the quality-adjusted life years. We did not model any costs associated with smoking cessation interventions.

General assumptions:

Scenario #1: A reduction in the smoking prevalence in Canada, from 19.3% to 5% by 2035

- Base case scenario: assume constant smoking rates continue in the future
- Comparator scenario: Smoking rate is gradually reduced in Canada until 5% is reached by 2035

Scenario #2: A reduction in the smoking prevalence in all Canadian provinces and territories to 5% by 2035

- Base case scenarios:
    - Assume constant smoking rates continue in the future
    - Data from the 2017 Canadian Community Health Survey (CCHS) 2017 was used to estimate smoking prevalence for all provinces (15)
    - Data for the territories were used from 2014 CCHS (16)
- Comparator scenarios:
    - Smoking rate is gradually reduced in each province/territory until 5% is reached by 2035

Scenario #3: A reduction in the smoking prevalence in Canada to match the lowest smoking rate in Canada (British Columbia has the lowest smoking rate in 2018 at 14.1%).

- Base case scenario: assume recent smoking trends continue into the future
- Comparator scenario:
    - The average smoking rate in Canada was reduced to 14.1% in 2018

Results

Projected impact of a reduction in the smoking prevalence to 5% by 2035 in Canada

The results generated by OncoSim show that by 2035, compared to the reference scenario, the following impacts are seen:

- Approximately 31,000 fewer cases of lung cancer, cumulatively from 2017-2035, and 4,600 fewer diagnoses annually by 2035
- Approximately 21,000 fewer deaths, cumulatively due to lung cancer from 2017-2035, and 3,400 fewer deaths annually by 2035
- A cumulative total of $680 million in lung cancer treatment costs could be averted
- Approximately 457,000 QALYs gained cumulatively from 2018-2035

*Both costs and QALYs are undiscounted and costs are reported in 2016 Canadian dollars.

Projected impact of a reduction in the smoking prevalence in Canada to 14.1% in 2018

The results generated by OncoSim show that by 2035, compared to the reference scenario, the following impacts are seen:

- Approximately 7,000 fewer cases of lung cancer, cumulatively from 2017-2035, and 820 fewer diagnoses annually by 2035
- Approximately 4,800 fewer deaths, cumulatively due to lung cancer from 2017-2035, and 700 fewer deaths annually by 2035
- A cumulative total of $155 million in lung cancer treatment costs could be averted
- Approximately 95,000 QALYs gained cumulatively from 2017-2035

*Both costs and QALYs are undiscounted and costs are reported in 2016 Canadian dollars.

Table III shows the impacts of reducing the prevalence of smoking to 5% by 2035 in all the provinces and territories

Table III

Province/ Territory	Lung cancer cases avoided		Lung cancer mortality averted		Treatment costs saved (in $M Cdn)	Quality-adjusted life years gained
	Cumulative (2018-2035)	Annually by 2035	Cumulative (2018-2035)	Annually by 2035	Cumulative (2018-2035)	Cumulative (2018-2035)
NL	460	25	330	20	10.7	8,600
PEI	60	5	45	2	1.3	1,400
NS	490	25	300	15	11.3	7,300
NB	330	20	240	15	7.7	4,300
QB	4,200	230	2,800	150	88.8	60,100
ON	3,800	210	2,500	140	81.7	70,300
MB	540	30	300	15	11.5	9,600
SK	910	50	610	35	19.4	16,100
AB	910	50	660	35	19.6	20,100
BC	890	50	550	30	19.3	18,500
YK	25	1	7	1 every 2.5 years	0.5	640
NT	20	1	10	1	0.3	860
NU	50	3	35	2	1.2	1,800

Table IV: Data sources

Data Type	Source
Mortality, birth, population projections	Vital Statistics (1950-2005), Census (2006, 2011)
Incidence, staging, survival	Canadian Cancer Registry (1992-2010)
Cancer survival by stage	British Columbia Cancer Registry Data (1992-2012) Chart review (1991-92), Literature (1981, 1990-2000, 2005)
Smoking rates	Canadian Community Health Survey (2000-2007), National Population Health Survey (1994-2004), Canadian Health Survey (1979)
Time use data	General Social Survey (2005)
Earnings, transfers and taxes	Census 2006, SPSD/M v16.1 (2005)
Total health care expenditures	Canadian Institute for Health Information (2006)
Health care costs: diagnosis, treatment, follow-up, palliative and terminal care	Ontario Case Costing Initiative (2007-2008), Provincial formulary (2009), Provincial Ministries of Health (2009)
Current treatment practice	Expert Opinion, Ontario administrative data
Screening, Lung cancer risk equation, Radon exposure, sexual network, HPV virus transmission	Canadian Breast Cancer Screening Database, British Columbia administrative data, CCHS, Reports, Literature
Health status	Classification and Measurement System, CCHS

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