



Ontario Cancer Profiles

Data Sources & Notes

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Definitions of Indicators

Cancer Incidence and Mortality

- **Age-Standardized Incidence Rate**

- Age-standardized rates are weighted averages of age-specific rates using a standard population. They provide the rate that would occur if the population of interest had the same age distribution as a given standard population (in Ontario Cancer Profiles, the 2011 Canadian population)
- An age-specific incidence rate is defined as the number of new cases of cancer per 100,000 people in a five-year age group (0–4, 5–9, ... 85+) diagnosed during a time period (e.g. a year) divided by the total number of people in that age group and time period

- **Age-Standardized Mortality Rate**

- Age-standardized rates are weighted averages of age-specific rates using a standard population. They give the rate that would occur if the population of interest had the same age distribution as a given standard population (in Ontario Cancer Profiles, the 2011 Canadian population)
- An age-specific mortality rate is defined as the number of deaths from cancer per 100,000 people in a five-year age group (0–4, 5–9, ..., 85+) that occurred during a time period (e.g. a year) divided by the number of people in that age group that and time period

More information regarding standardization of rates can be found on the [Association of Public Health Epidemiologists of Ontario website](#).

Cancer Screening

- **Ontario Breast Screening Program (OBSP) Participation Gap**

- Definition: the percentage of Ontario screen-eligible women, 52-74¹ years old, who were overdue for breast cancer screening tests
- Calculation:
 - Numerator: total number of Ontario screen-eligible women, ages 52–74, who had no Mammogram in previous 30 months as of index date
 - Denominator: total number of Ontario screen-eligible women, 52-74 years old

¹ The Ontario Breast Screening Program serves screen-eligible women ages 50 to 74. However, the data to describe overdue rates only includes women ages 52 to 74 because 52 is the minimum age at which someone can be overdue for breast cancer screening.

- **Ontario Cervical Screening Program (OCSP) Participation Gap**
 - Definition: the percentage of Ontario screen-eligible women, 24-69² years old, who were overdue for cervical cancer screening tests
 - Calculation:
 - Numerator: total number of Ontario screen-eligible women, ages 24–69, who had no Pap test in previous 42 months as of index date
 - Denominator: total number of Ontario screen-eligible women, 24-69 years old

- **Colorectal Cancer Screening (CCC) Participation Gap**
 - Definition: the percentage of Ontario screen-eligible people, 50–74 years old, who were overdue for colorectal cancer screening in a given calendar year
 - Calculation
 - Numerator: total number of Ontario screen-eligible people, 50–74 years old, who were overdue for colorectal cancer screening by the end of the calendar year
 - Denominator: total number of Ontario screen-eligible people, 50–74 years old in a given calendar year

Chronic Disease Risk Factors

Data on the five modifiable risk factors and one socio-demographic variable (Household Food Insecurity) included in Ontario Cancer Profiles were taken from the 2005/2006 (Cycle 3.1) and 2013–14 Canadian Community Health Survey (CCHS), Ontario Share Files, which are defined as:

1. **Current Smoking (“Smoking”)**: the percentage of Ontario adults aged 20 years and older who report smoking cigarettes daily or occasionally
2. **Alcohol Consumption (“Alcohol”)**: the percentage of Ontario adults aged 19 years and older exceeding the maximum recommended level of alcohol consumption for cancer prevention. The maximum recommended alcohol consumption for men is two drinks per day and for women is one drink per day, as specified by the World Cancer Research Fund and the American Institute for Cancer Research (WCRF; AICR)
3. **Overweight and Obesity**: Body Mass Index (BMI) estimates calculated from CCHS data are based on respondents’ self-reported height and weight. This indicator refers to the percentage of Ontario adults aged 18 years and older that are overweight (BMI 25.0-29.99) or obese (BMI ≥30.0) corrected for biases in using self-reported height and weight based on sex-specific equations developed by Statistics Canada
4. **Inadequate Vegetable and Fruit Consumption**: the percentage of Ontario adults aged 18 and older who reported eating non-starchy vegetables and fruit less than five times per day. Respondents who reported consuming fruit juice more than once daily were considered as having consumed it only once, to align with the recommendations by the WCRF/AICR

² The Ontario Cervical Screening Program serves screen-eligible women ages 21 to 69. However, the data to describe overdue rates only includes women ages 24 to 69 because 24 is the minimum age at which someone can be overdue for cervical cancer screening.

5. **Physical Inactivity:** the CCHS collects self-reported information on leisure time activities during the previous three months. Statistics Canada then converts this information into daily energy expenditure (EE) levels based on daily totals. Ontario Cancer Profiles presents data on Ontario adults aged 18 and older whose activities met the inactive level of daily energy expenditure (average EE of less than 1.5 kcal/kg/day) during leisure time
6. **Food Insecurity (“Household Food Insecurity”):** the percentage of Ontario households that were identified as food insecure at any point in the past 12 months due to lack of money. This measure is based on a set of 18 questions in the CCHS and responses are categorized by Statistics Canada into three kinds of situations: food secure; moderately food insecure; and severely food insecure. Included in this indicator are those who were categorized as moderately food insecure (indication of compromise in quality and/or quantity of food consumed) or severely food insecure (indication of reduced food intake and disrupted eating patterns)

Analytic Considerations:

- All estimates were age-standardized to the age distribution of the 2011 Canadian population using the age groups from the CCHS person-level sampling strategy: 18–29, 30–44, 45–64 and 65+
- Respondents identified as a refusal, don’t know, or not stated to the required survey questions were excluded
- Boot strapping techniques were used to obtain variance estimates and 95% confidence intervals of all estimates
- Estimates for Local Health Integration Networks (LHINs) were analyzed using survey weights that were calibrated to the LHIN geographic boundaries, where available
- In accordance with guidelines from Statistics Canada, the co-efficient of variation (CV) was calculated to determine the sampling variability of the estimate. Estimates with a CV of 0.0–16.5 can be released without any special notation. Estimates with a CV of 16.6–33.3 can be released when accompanied by a warning cautioning users of the high sampling variability associated with the estimates. Such estimates are identified with a “Y” in the CV flag column of the data tables in Ontario Cancer Profiles. For estimates with a CV of greater than 33.3, Statistics Canada recommends to suppress these estimates due to unreliable and unacceptable quality

Socio-Demographic Variables

Data on four of the five social determinants of health (socio-demographic variables) included in Ontario Cancer Profiles were taken from the 2006 Canadian Census of the Population, mandatory long-form questionnaire, which are defined as:

1. **Income (“Low Income”)**: prevalence of low income before tax is the proportion or percentage of economic families or persons not in economic families in a given classification that fall below the before-tax low income cut-offs. The low income cut-off (LICO) is a statistical measure, adjusted for community size and family size, of the income threshold below which Canadians are estimated to spend at least 20 percent more of their income than the average family on necessities of food, shelter and clothing. These prevalence rates are calculated from unrounded estimates of economic families and persons not in economic families 15 years of age and over
2. **Highest Level of Educational Attainment (“Education”)**: proportion of the Ontario population aged 25–64 without a high school diploma. Educational attainment was analyzed for adults aged 25–64 to restrict the sample to those who have likely completed their education and reached their adult socio-demographic status and to account for any cohort effects in the population aged 65+
3. **Unemployment**: persons were considered unemployed if they were not employed during the week prior to the Census day, but were searching for a job in the past four weeks, waiting for recall from a temporary lay-off or waiting to begin a new job that started within the next four weeks. To be counted as unemployed, a person must have been available for work in the reference week
 - a. The unemployment rate refers to the unemployed expressed as a percentage of the labour force. The labour force does not include students, homemakers, retired workers, seasonal workers in an ‘off’ season who were not looking for work, and persons who could not work because of a long-term illness or disability
4. **Visible Minority**: percentage of the population aged 15 and older who self-identify as non-Caucasian in race or non-white in skin colour

Data Sources

Cancer Incidence and Mortality

Cancer incidence and mortality data in Ontario Cancer Profiles comes from the Ontario Cancer Registry (OCR). Cancer Care Ontario has been granted authority under the *Cancer Act*, 1990 to operate the OCR, a population-based cancer registry that maintains data on diagnosed cases of cancer among Ontario residents. It also includes data on cancer mortality.

Data in the OCR is collected from four primary sources:

- hospital admission and discharge information;
- pathology reports;
- consultation and treatment records of patients; and
- death certificates.

For more information on the OCR, visit the [Ontario Cancer Registry](#) webpage on CCO's website.

Cancer incidence and mortality statistics in Ontario Cancer Profiles were generated using the SEER*Stat software with incidence and mortality data extracted from the Ontario Cancer Registry in November 2016.

Cancer Screening

Data for the cancer screening participation gap indicators are obtained by linking several administrative data sources. The data sources relevant to each cancer screening program are listed below.

- **Ontario Breast Screening Program (OBSP) Participation Gap**
 - OHIP CHDB (Ontario Health Insurance Plan, Claims History Database)—Mastectomy claims, and non-OBSP mammograms
 - ICMS (Integrated Client Management System)—OBSP mammograms
 - OCR (Ontario Cancer Registry)—Resolved in situ and invasive breast cancers
 - RPDB (Registered Persons Database)—Demographic data
 - PCCF+, version 6C (Postal Code Conversion File Plus)—Residence and socio-demographic information
- **Ontario Cervical Screening Program (OCSP) Participation Gap**
 - CytoBase—Pap tests
 - OHIP CHDB (Ontario Health Insurance Plan, Claims History Database)—Hysterectomies, assessment procedure, and Pap tests
 - OCR (Ontario Cancer Registry)—Invasive cervical cancers
 - RPDB (Registered Persons Database)—Demographic data
 - PCCF+, version 6C (Postal Code Conversion File Plus)—Residence and socio-demographic information

- **Colorectal Cancer Screening (CCC) Participation Gap**

- OHIP's CHDB (Ontario Health Insurance Plan, Claims History Database)—Colectomy claims, non-CCC gFOBT, colonoscopy, flexible sigmoidoscopy
- CIRT (Colonoscopy Interim Reporting Tool)—CCC colonoscopy records
- LRT (Laboratory Reporting Tool)—CCC gFOBTs
- OCR (Ontario Cancer Registry)—Resolved invasive colorectal cancers
- RPDB (Registered Persons Database)—Demographic data
- PCCF+, version 6C (Postal Code Conversion File Plus)—Residence and socio-demographic information

Chronic Disease Risk Factors

Data on the five modifiable risk factors and one socio-demographic variable (Household Food Insecurity) included in Ontario Cancer Profiles come from the 2005/2006 (Cycle 3.1) and 2013–14 Canadian Community Health Survey (CCHS), Ontario Share Files from Statistics Canada:

- The CCHS is a population-based cross-sectional survey conducted by Statistics Canada that collects information on health status, healthcare utilization and determinants of health for the Canadian population aged 12 years and older living in private dwellings
- It is representative of 98% of the Canadian population aged 12 and older and produces reliable estimates at the health region level
- Individuals living on First Nations reserves and other Aboriginal settlements, institutional residents, full-time members of the Canadian Forces and residents of certain remote regions are not sampled in the CCHS


For more information on the [CCHS, visit Statistics Canada's website](#).

Socio-Demographic Variables

Data on four of the socio-demographic variables included in Ontario Cancer Profiles (Education, Low Income, Unemployment and Visible Minority) come from the 2006 Canadian Census of the Population from Statistics Canada:

- The Census is conducted every five years and enumerates everyone living in Canada, including: non-institutionalized Canadian citizens (aged 15+), both native-born and naturalized, landed immigrants and non-permanent residents³ and members of their families living with them in Canada
- Data are not available for incompletely enumerated Indian reserves or Indian settlements
- Most households (80%) receive the short Census questionnaire, which contains eight questions on basic topics such as relationship to person 1, age, sex, marital status, and mother tongue. One in five households (20%) receive the long Census questionnaire, which

³ Non-permanent residents are persons who hold a work or study permit, or who claim refugee status.



contains the eight questions from the short form plus 53 additional questions on topics such as education, ethnicity, mobility, income and employment

For more information on the [2006 Census of Population, visit Statistics Canada's website.](#)

Data Notes

Cancer Incidence and Mortality

- Rates are per 100,000 person-years and age-adjusted to the 2011 Canadian population
- All case counts are randomly rounded to multiples of 5 to ensure no back-calculation of data that were suppressed due to case counts between 1 and 5
- To be comparable with the Local Health Integration Network (LHIN)-level statistics, Ontario counts and rates exclude cases with unknown residence (LHIN); therefore, provincial statistics may not match the true counts and rates published elsewhere, such as the [Ontario Cancer Statistics 2018 report](#)
- An asterisk in place of data indicates that measure has been suppressed due to: a) a small cell count (i.e. a count less than 6) to protect personal health information or; b) an imprecise estimate [relative standard error (RSE⁴) > 23%]
- Cancers in adults (ages 15+) and children (ages 0-14) are separate options in the tool; therefore, the user cannot generate all-ages incidence and mortality counts and rates
- Data are provided starting after the year 2010 in consideration of changes to the Ontario Cancer Registry (OCR) rules for counting multiple primary cancers. [The Surveillance, Epidemiology and End Results \(SEER\) Program Multiple Primary and Histology Rules](#) were adopted by the OCR to count cancers for cases diagnosed on January 1, 2010 onward, replacing more conservative rules used previously (a modified version of the IARC/IACR⁵ rules). For further details, please see the [Technical Appendix, Ontario Cancer Statistics 2018 report](#)

Cancer Screening

When examining the cancer screening data on the map, it is recommended to adjust the legend to show three data classes (the default is five):

- Due to the narrow data range, using more than three data classes creates small groups which might lead to misinterpreting the true screening participation gap across the regions
- Using three data classes breaks the “percent overdue” measure into three “categories” of low, medium and high, which may be easier to interpret
- **Ontario Breast Screening Program (OBSP) Participation Gap**
 - The OBSP serves screen-eligible women ages 50 to 74. However, this data only includes women ages 52 to 74 because 52 is the minimum age at which someone can be overdue for breast cancer screening
 - Data Availability and Limitations
 - Historical Registered Persons Database (RPDB) address information is incomplete; therefore, the most recent primary address was selected for reporting

⁴ The RSE is equal to the standard error of the estimate divided by the estimate and multiplied by 100%

⁵ International Agency for Research on Cancer/International Association of Cancer Registries

- CHDB code X178 for screening bilateral mammography was introduced in October 2010
 - CHDB code X185 was used for both screening and diagnostic mammography prior to October 2010; since October 2010, X185 has been used for diagnostic mammography only; however, some screening mammograms after October 2010 may still use X185 for claims. High risk data are available from July 2011; there is up to a year reporting for high risk. Because for women, it may take up to one year from being referred to the OBSP High Risk Screening Program to completion of genetic assessment
- **Ontario Cervical Screening Program (OCSP) Participation Gap**
 - The OCSP serves screen-eligible women ages 21 to 69. However, this data only includes women ages 24 to 69 because 24 is the minimum age at which someone can be overdue for cervical cancer screening
 - Data Availability and Limitations
 - Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting
 - A small proportion of Pap tests performed as a diagnostic test could not be excluded from the analysis
- **Colorectal Cancer Screening (CCC) Participation Gap**
 - Overdue for colorectal cancer screening is defined as screen-eligible people (both males and females) ages 50 to 74 who had not had a gFOBT in the last two years, and flexible sigmoidoscopy or colonoscopy in the last 10 years
 - A five-year look-back window for flexible sigmoidoscopy was used to calculate the percentage overdue for colorectal cancer screening because before May 2016, people screened with flexible sigmoidoscopy were recommended to be re-screened every five years. The new colorectal cancer screening guideline released in May 2016 recommends a 10-year recall interval for flexible sigmoidoscopy
 - Data Availability and Limitations
 - Historical RPDB address information is incomplete; therefore, the most recent primary address was selected for reporting, even for historical study periods
 - gFOBTs in hospital labs could not be captured
 - A small proportion of gFOBTs performed as diagnostic tests could not be excluded from the analysis

Chronic Disease Risk Factors and Socio-Demographic Variables

- The data on modifiable risk factors and social determinants of health (socio-demographic variables) presented in Ontario Cancer Profiles come from population-based sample surveys and are ecologic in nature
- The estimates reflect the overall prevalence of risk factors and social determinants of health for the entire geographic region (Local Health Integration Network; LHIN). However, heterogeneity within

large geographic areas (LHINs) often exists and is difficult to assess using the data available in sample surveys due to small sample sizes. More complex sub-LHIN analyses were outside of the scope of this phase of the project but may be explored in future phases

- Estimates are provided for both sexes combined as some Census topics are not provided by sex in the standard Census datasets. In other cases the data are for households and are therefore not sex-specific

Canadian Community Health Survey, Ontario Share Files

Due to the constraints of the availability of high-quality current data on social determinants of health, we chose to provide data on risk factors for two time periods:

- Canadian Community Health Survey (CCHS) 2005/06: the 2005/06 data were presented to align the years of data for the modifiable risk factors and social determinants of health and allow for a latency period between exposure and outcome. Incidence data were extracted for the years 2011–2013 which are the most current data available from the Ontario Cancer Registry. This allows users to explore a six to eight year latency period
- CCHS 2013-14: the 2013-14 CCHS data are the most current data available from Statistics Canada on risk factors. These data were provided to allow users to look at the current prevalence of risk factors by Local Health Integration Network and explore changes that occurred over time
- CCHS data on modifiable risk factors are self-reported. Respondents of self-reported surveys tend to under-report behaviours that are socially undesirable or unhealthy (alcohol use, tobacco use, etc.) and over-report behaviours that are socially desirable (physical activity, vegetable and fruit consumption, etc.)

2006 Canadian Census of Population

Ontario Cancer Profiles uses data from the 2006 Canadian Census of Population due to a lack of up-to-date high-quality data for several social determinants of health that have historically been collected from the long-form Census:

- The 2006 Census data represent the most recent data available from the mandatory long Census questionnaire
- During the 2011 Census, a voluntary “National Household Survey” replaced the mandatory long form Census
- Because the NHS was a voluntary survey, with a lower response rate than the mandatory long form Censusⁱ, the quality of the data collected varies by region and according to the Census topic. Most notably, the data related to income are not comparable to data collected from the long form Census in previous Census yearsⁱⁱ limiting our ability to measure disparities according to these factors
- We provide the most comprehensive source of Census data from Statistics Canada available during the creation of this tool

Citation and Acknowledgement

Citation

The following citation to indicate the source must be used:

Cancer Care Ontario. Ontario Cancer Profiles [Internet]. 2018 [cited <date>]. Available from: www.cancercareontario.ca/ontariocancerprofiles.

Acknowledgement

Cancer Care Ontario should be acknowledged as the source of data in all papers, publications, and reports which result from the use of the data. The acknowledgement must be in the following form: “Parts of this material are based on data and information compiled and provided by Cancer Care Ontario. However, the analyses, conclusions, opinions and statements expressed herein are those of the author, and not necessarily those of Cancer Care Ontario.”

ⁱ Statistics Canada. Sampling and weighting technical report: National Household Survey, 2011 [Internet]. Ottawa: Minister of Industry; 2015 [cited 2016 Feb 18]. Available from: <http://www12.statcan.gc.ca/nhs-enm/2011/ref/reports-rapports/sw-ep/99-002-x2011001-eng.pdf>.

ⁱⁱ Statistics Canada. National Household Survey: Income of Canadians [Internet]. Ottawa: Statistics Canada; 2013 Sep 11 [cited 2016 Feb 18]. Available from: <http://www.statcan.gc.ca/daily-quotidien/130911/dq130911a-eng.htm>.