



# HEALTH SURVEILLANCE INDICATORS: LUNG CANCER

## Public Health Relevance

Lung cancer is one of the top three most commonly diagnosed cancers among both males and females. Lung cancer has a very low survival rate and is the leading cause of cancer mortality in Ontario, accounting for 25% of all cancer deaths.

Risk factors for lung cancer include smoking, second-hand smoke exposure, asbestos, occupational exposure to some chemicals, and outdoor air pollution.

## Highlights

1. Lung cancer incidence and hospitalization rates in Toronto decreased from 2003 to the most recent year of data available.
2. Toronto's lung cancer incidence, hospitalization, and mortality rates were significantly lower than the Ontario health units with the highest rates.
3. West Scarborough, East Scarborough, and Willowdale Don Mills had lower lung cancer hospitalization rates compared to Toronto as a whole.
4. Lung cancer incidence, hospitalization, and mortality rates were all higher among males compared to females, and increased with age.

## Trends Over Time

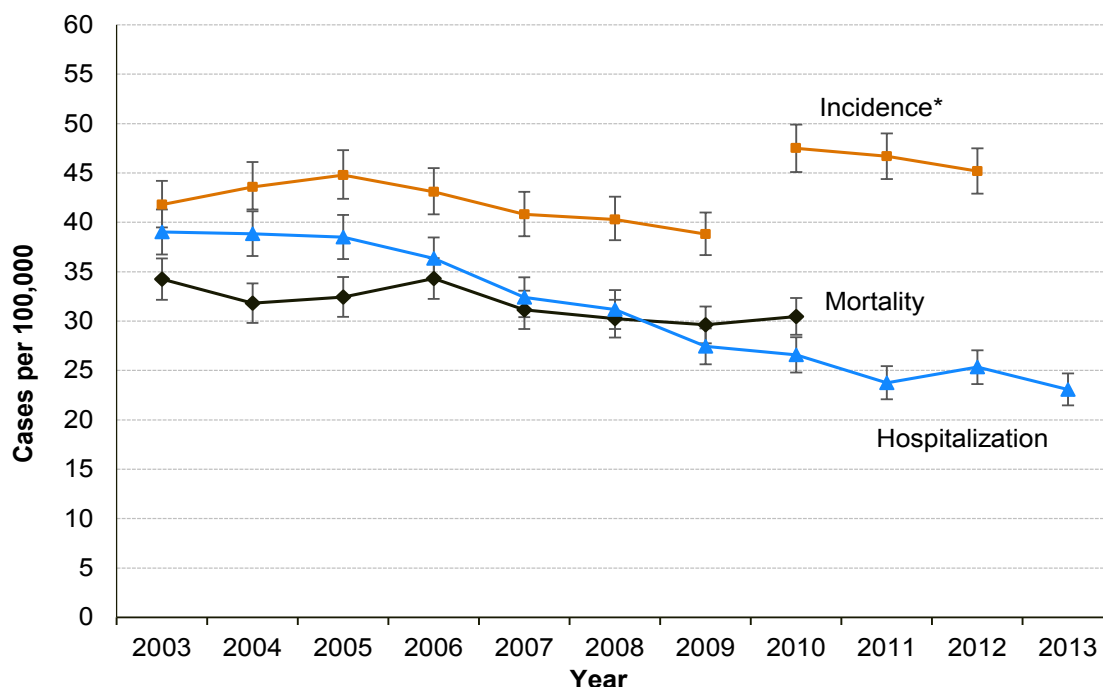
Lung cancer incidence and hospitalization rates in Toronto decreased from 2003 to the most recent year of data available.

Figure 1 shows Toronto's age-standardized lung cancer incidence, hospitalization and mortality rates per 100,000 people from 2003 to the most recent available data year.

Lung cancer incidence remained fairly unchanged from 2003 (42 per 100,000 people) to 2009 (39 per 100,000 people). In 2010, a new rule for counting cancer cases was adopted. Therefore, the rates from 2010 onwards cannot be directly compared to those from previous years (please see the data notes for details). The lung cancer incidence rate was 45 cases per 100,000 people in 2012.

Lung cancer hospitalization decreased significantly from 39 cases per 100,000 people in 2003 to 23 cases per 100,000 people in 2013. The mortality rate remained relatively stable at just over 30 deaths per 100,000 people from 2003 to 2010.

**Figure 1: Age-Standardized Incidence\*, Hospitalization, and Mortality Rates for Lung Cancer per 100,000 People, Toronto, 2003 to 2013\*\***



\* Incidence: A new rule for counting cancer cases was adopted from 2010 onwards. Please see data note 6 on page 9.

\*\*Data are presented to the most recent year available. Incidence includes data to 2012, hospitalization to 2013, and mortality to 2010.

Error bars ( $\bar{I}$ ) represent 95% confidence intervals.

Data Sources: See Data Notes.

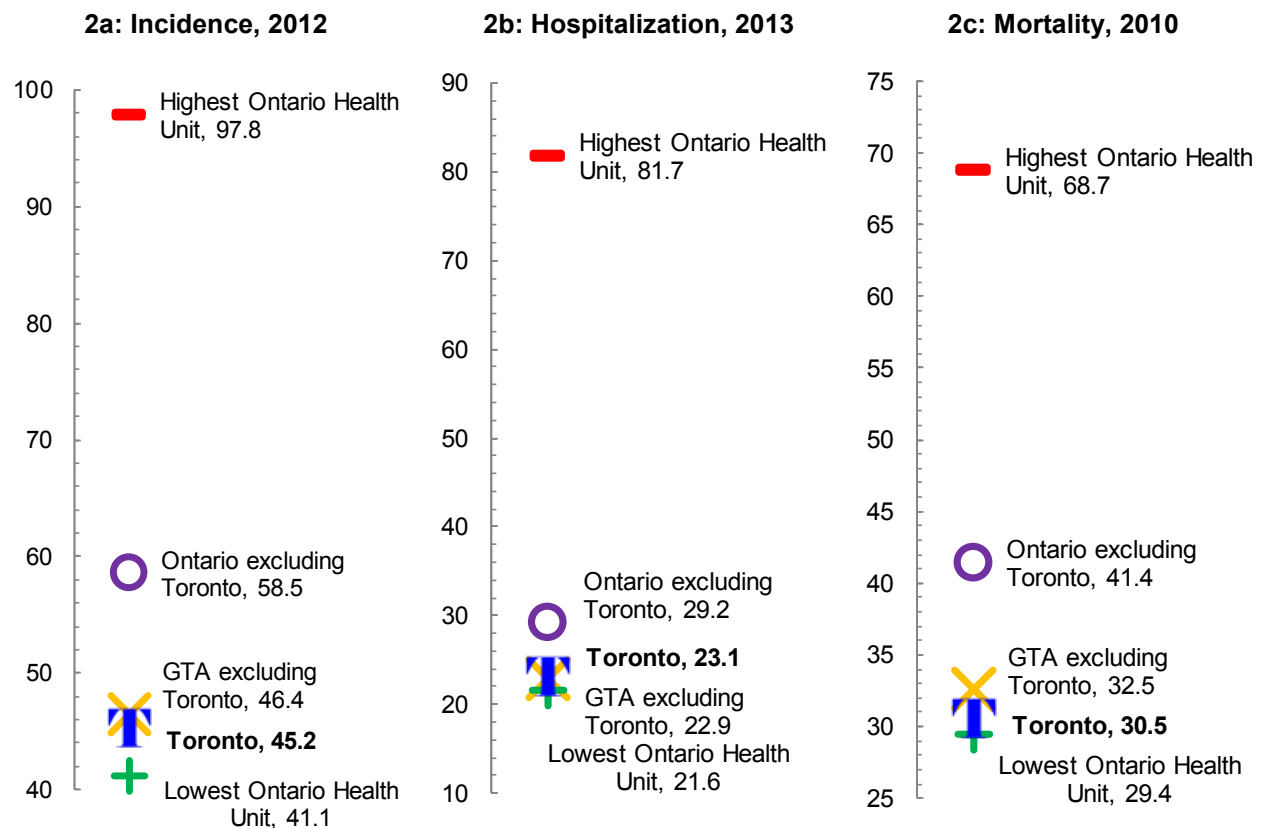
## Regional Comparisons

Toronto's lung cancer incidence, hospitalization, and mortality rates were significantly lower than the Ontario health unit with the highest rate.

Figures 2a, 2b, and 2c show age-standardized incidence, hospitalization, and mortality rates per 100,000 people for lung cancer in Toronto compared to the rest of the Greater Toronto Area (GTA excluding Toronto), the rest of Ontario (Ontario excluding Toronto), and the health units in Ontario with the highest and lowest rates in the most recent available data year.

Toronto's lung cancer incidence, hospitalization, and mortality rates were significantly lower than the rest of Ontario and the Ontario health units with the highest rates. Toronto's lung cancer incidence, hospitalization, and mortality rates were not significantly different from the rest of the GTA and the Ontario Health Units with the lowest rates.

**Figure 2: Age-Standardized Lung Cancer Incidence, Hospitalization and Mortality Rates per 100,000, Selected Regions in Ontario**



Data Sources: See Data Notes.

## Toronto Neighbourhood Comparisons

West Scarborough, East Scarborough, and Willowdale Don Mills had lower lung cancer hospitalization rates compared to Toronto as a whole.

Table 1 shows age-standardized hospitalization and mortality rates per 100,000 people for lung cancer, by Toronto Public Health's Chronic Disease and Injury Prevention (CDIP) Service Delivery Areas (SDAs). The estimates presented are for the three most recent available years of data, which provide large enough numbers to compare data for smaller areas. Incidence rates are not currently available for smaller geographic areas.

West Scarborough, East Scarborough, and Willowdale Don Mills had lower hospitalization rates than Toronto as a whole. Willowdale Don Mills also had a lower mortality rate than Toronto as a whole. York South Humber had a higher hospitalization rate compared to Toronto as a whole and Danforth East York had a higher mortality rate.

**Table 1: Age-Standardized Hospitalization and Mortality for Lung Cancer, by Service Delivery Area\*, Toronto**

CDIP Service Delivery Area	Hospitalization (2011 to 2013 combined)	Mortality (2008 to 2010 combined)
Rexdale Etobicoke	28.5	29.4
York South Humber	30.4 <sup>H</sup>	30.6
Humber-Downsview	25.4	26.1
Willowdale Don Mills	20.3 <sup>L</sup>	24.8 <sup>L</sup>
Toronto Centre	27.6	27.3
Danforth East York	27.5	40.4 <sup>H</sup>
West Scarborough	19.0 <sup>L</sup>	27.5
East Scarborough	19.2 <sup>L</sup>	30.4
<b>Toronto</b>	<b>24.5</b>	<b>29.0</b>

\* Toronto Public Health's Service Delivery Areas (SDAs) for Chronic Disease and Injury Prevention (CDIP)

<sup>H</sup> Significantly higher than the Toronto total, indicating an unfavourable result for that area.

<sup>L</sup> Significantly lower than the Toronto total, indicating a favourable result for that area.

Data Sources: see Data Notes.

Map 1 shows age-standardized lung cancer hospitalization rates by Toronto neighbourhood, 2011 to 2013 combined.

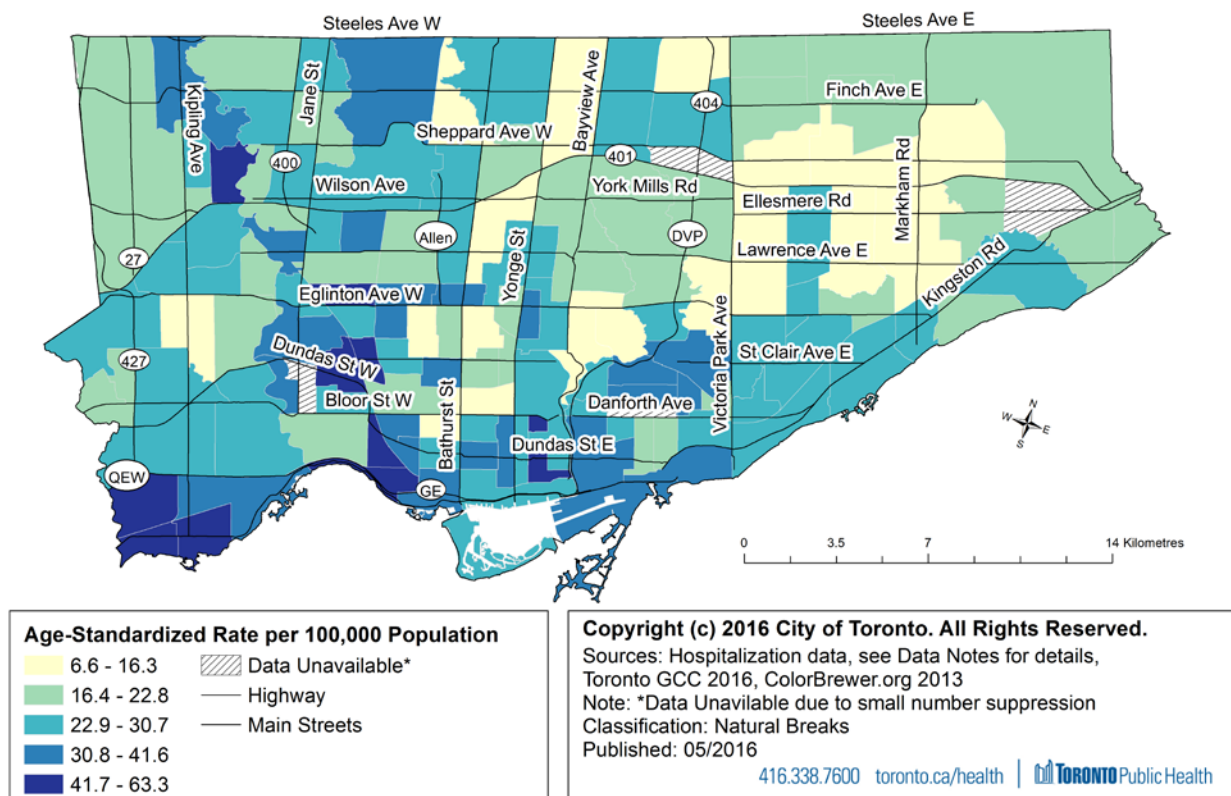
The downtown Toronto Waterfront and southwest Etobicoke had clusters of neighbourhoods with higher hospitalization rates than the city as a whole. Some neighbourhoods with significantly higher rates include:

- Junction Area
- Long Branch
- Moss Park
- New Toronto
- North St. James Town
- Roncesvalles

Midtown Toronto and northern Scarborough had clusters of neighbourhoods with lower lung cancer hospitalization rates than the city as a whole. Some neighbourhoods with significantly lower rates include:

- Annex
- Bedford Park-Nortown
- Malvern
- Newtonbrook East
- Thorncliffe Park
- Willowdale East

**Map 1: Age-Standardized Hospitalization Rate for Lung Cancer by Neighbourhood, Toronto, 2011 to 2013 combined**



Map 2 shows age-standardized lung cancer mortality by Toronto neighbourhood, 2008 to 2010 combined.

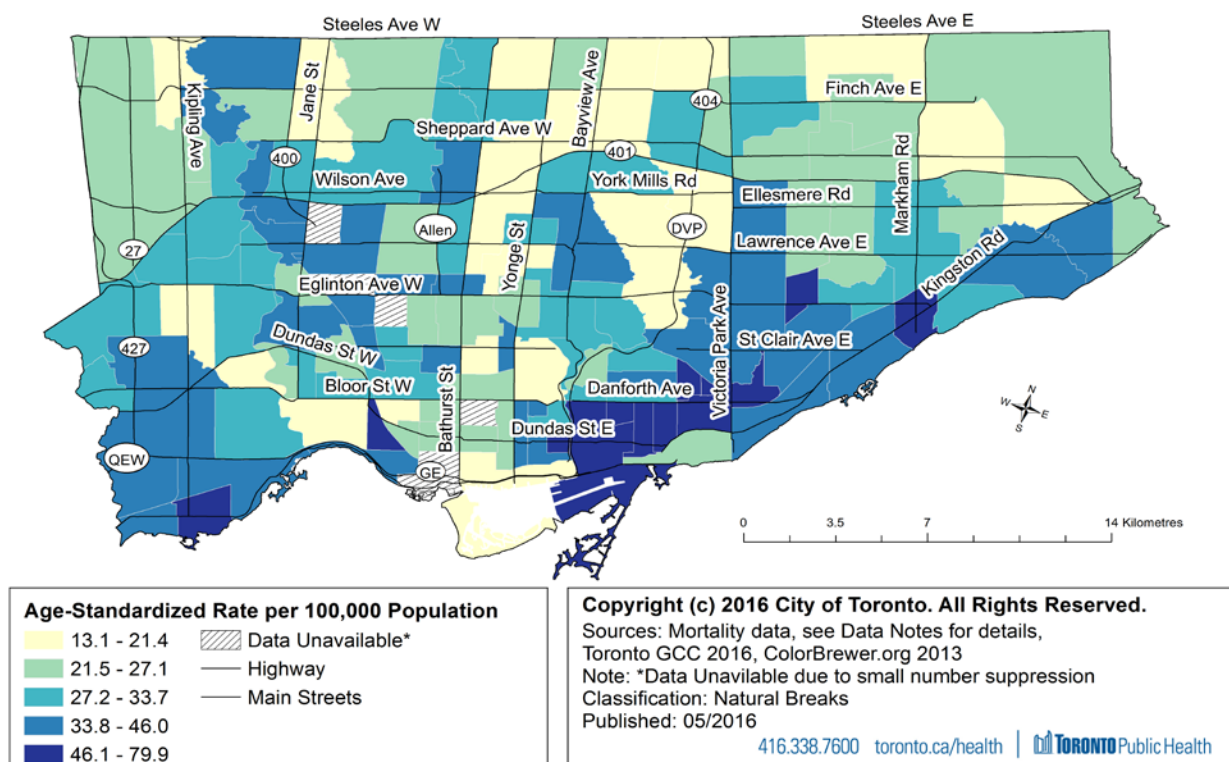
The downtown Toronto Waterfront and southwest Etobicoke had clusters of neighbourhoods with higher mortality rates than the rest of the city. Some neighbourhoods with significantly higher rates include:

- Greenwood-Coxwell
- North Riverdale
- Regent Park
- South Riverdale
- Woodbine Corridor
- Woodbine-Lumsden

Midtown Toronto and northern Scarborough had clusters of neighbourhoods with lower mortality rates for lung cancer compared to the city as a whole. Some neighbourhoods with significantly lower rates include:

- Black Creek
- Highland Creek
- High Park-Swansea
- Kingsway South
- Lansing-Westgate
- Mount Olive-Silverstone-Jamestown

**Map 2: Age-Standardized Mortality Rate for Lung Cancer by Neighbourhood, Toronto, 2008 to 2010 combined**



## Socio-demographics

Lung cancer incidence, hospitalization, and mortality rates were all higher among males compared to females, and increased with age.

Table 2 shows Toronto incidence, hospitalization, and mortality rates per 100,000 people for lung cancer by sex.

Toronto's lung cancer incidence, hospitalization, and mortality rates were all significantly higher in males compared to females.

**Table 2: Age-Standardized Lung Cancer Incidence, Hospitalization, and Mortality Rates per 100,000 People by Sex, Toronto**

Sex	Incidence (2012)	Hospitalization (2013)	Mortality (2010)
Male	57.6 <sup>H</sup>	27.3 <sup>H</sup>	41.7 <sup>H</sup>
Female	35.8 <sup>L</sup>	19.7 <sup>L</sup>	22.0 <sup>L</sup>

<sup>H</sup> Significantly higher than the the other sex group, indicating an unfavourable result for this group.

<sup>L</sup> Significantly lower than the other sex group, indicating a favourable result for this group.

Data Sources: see Data Notes.

Table 3 shows incidence, hospitalization and mortality rates per 100,000 people for lung cancer by age group.

Toronto lung cancer incidence, hospitalization and mortality rates all increased with age.

**Table 3: Lung Cancer Incidence, Hospitalization, and Mortality Rates per 100,000 People by Age Group, Toronto**

Age	Incidence (2012)	Hospitalization (2013)	Mortality (2010)
20 to 39	0.8	1.1	0.4
40 to 64	48.2	24.9	26.7
65 plus	300.6	142.6	222.7

Data Sources: see Data Notes.

Table 4 shows age-standardized hospitalization and mortality rates per 100,000 people for lung cancer by income quintile. Quintile 1 contains the areas in Toronto with the highest percent of people living below the low-income measure (LIM), making it the lowest income quintile. Quintile 5 contains the areas in Toronto with the lowest percent of people living below the LIM, making it the highest income quintile.

There were no significant differences in hospitalization and mortality rates between Quintile 5 and Quintile 1, 2, 3, or 4.

**Table 4: Age-standardized Hospitalization and Mortality Rates per 100,000 People for Lung Cancer by Income Quintile, Toronto**

<b>Income Level</b>	<b>Hospitalization (2011 to 2013)</b>	<b>Mortality (2008 to 2010 combined)</b>
Quintile 1 (lowest)	26.3	32.1
Quintile 2	21.0	27.8
Quintile 3	25.7	29.8
Quintile 4	26.1	29.6
Quintile 5 (highest)	23.7	27.1

Data Sources: see Data Notes.



## Data Notes

### Notes

- Significant differences were estimated using overlapping confidence intervals. Although this method is conservative ( $\alpha \sim < 0.01$ ) and most appropriate when comparing mutually exclusive groups, it was chosen as an objective means of making conclusions on population-based data. Also note that the multiple comparisons performed in the analysis were not taken into consideration when choosing the level of significance to test. The inverse chi-squared distribution is used by the U.S. National Cancer Institute's SEER\*Stat program and has been adopted by Cancer Care Ontario to calculate confidence intervals for age-standardized cancer incidence rates in Ontario. The Poisson distribution, the standard used by Toronto Public Health, was used to calculate confidence intervals for age-standardized cancer hospitalization and mortality rates.
- Toronto is compared to the rest of Ontario (Ontario excluding Toronto) as opposed to the Ontario total because Toronto comprises such a large proportion of the Ontario population. Toronto is also compared to the rest of the GTA (Greater Toronto Area) for the same reason.
- Tables 1 and 4 and Maps 1 and 2 are based on three years of data combined in order to obtain a sample size large enough to analyze the data at smaller geographic levels. By combining years of data, changes over time in and between geographic areas may be hidden.
- For comparisons of smaller geographic areas, any person who could not be linked to a valid Toronto postal code was excluded from the total.
- Estimates are age-standardized to the 1991 Canadian population. This allows for comparison of estimates over time and geography. However, because the standard population's distribution is younger than the current Toronto population, the age-standardized estimates are lower than the true rates.
- For cancer cases diagnosed from 2010 onwards, the new Ontario Cancer Registry (OCR) adopted the Surveillance, Epidemiology and End Results (SEER) rules for identifying multiple primary cancers and assigning histology to cases. Prior to 2010, the OCR did not recognize a second primary cancer unless it differed substantially from the first primary on both topography and morphology. With the new rules, the number of newly diagnosed cancer cases registered by the OCR in 2010–2012 is 5.8 per cent higher than the number of cases that would have been reported using the old rules due to greater recognition of multiple primaries. The impact of the change in multiple primary rules varies by cancer. This does not mean more people are being diagnosed or treated, just that more cases of certain types of cancer are being registered. This impacts understanding trends over time. The trend line in Figure 1 is broken to show where this change occurred.

### Definitions

**95% Confidence Interval** is the range within which the true value lies, 19 times out of 20.

**Age Standardization** is a technique based on weighted averaging which removes the effects of the distribution of age when comparing two or more populations.

**GTA excluding Toronto** means the Greater Toronto Area (GTA) with Toronto removed from the GTA data.

**Hospitalization** includes people who have stayed in a hospital bed overnight because of lung cancer.

**Incidence** includes people who were diagnosed with lung cancer by a medical professional.

**Income Quintiles:** Five groups, each containing approximately 20% of the population, were created by ranking Toronto's census tracts based on the percent of residents living below the Statistics Canada after-tax Low Income Measure (LIM). Quintile 1 includes the census tracts with the highest percent of people living below the LIM and is therefore the lowest income quintile. Quintile 5 includes the census tracts with the lowest percent of people living below the LIM, making it the highest income quintile. LIM is an income level set at 50% of the median income in Canada in a given year, adjusted for household size.

**Lung Cancer** includes cancer of the lung and bronchus, and is defined by ICD-10 code C-34.

**Mortality** includes people whose primary cause of death is lung cancer.

**Ontario excluding Toronto** means Ontario with Toronto removed from the Ontario data.

**Sex** defines people based on their biological characteristics, whereas gender is a socially constructed concept. From a social determinants of health perspective, certain health conditions can be associated with gender, and from a biological perspective, health conditions can be associated with sex. Although reporting based on both concepts would be preferable, the data source used here only collects information on sex, and not gender.

## Sources

**Cancer Incidence:** SEER\*Stat Package Release 10 – Ontario Cancer Registry, Cancer Care Ontario, August 2015. Used in:

- Figures 1, 2a, 2b, and 2c
- Tables 2 and 3

**Hospitalization:** Inpatient Discharges 2003 to 2013, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO. Date Extracted: June 2015. Used in:

- Figures 1, 2a, 2b, and 2c
- Tables 1, 2, 3 and 4
- Maps 1 and 2

**Mortality:** Ontario Mortality Data 2003 to 2010, Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO. Date Extracted: June 2015. Used in:

- Figures 1, 2a, 2b, and 2c
- Tables 1, 2, 3 and 4
- Maps 1 and 2

**Income Quintiles:** Income Estimates for Census Families and Individuals (T1 Family File), Table F-18, Statistics Canada, 2009-2013. Used in:

- Table 4

**Denominator data:**

**Population for Toronto and Larger Areas:** Population Estimates 2003 to 2013, Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO. Date extracted: June 2015. The population estimates for cancer incidence was extracted in May 2016. Used in:

- Figures 1, 2a, 2b, and 2c
- Tables 2 and 3

**Population for Neighbourhood or Service Delivery Areas or Income Quintile:** 2011 Canada Census, Statistics Canada. Used in:

- Tables 1 and 4
- Map 1 and 2

Health Surveillance Indicator: Lung Cancer

Category: Chronic Disease

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This indicator report is part of a series that informs the ongoing assessment of Toronto's health status. For a full list of the indicators, please go to: [www.toronto.ca/health](http://www.toronto.ca/health).