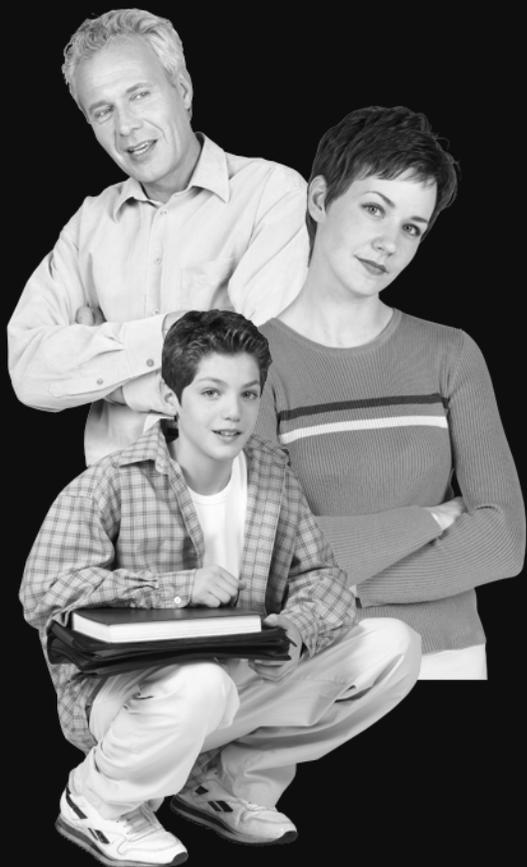


**Lambton County  
2007 Health Status Report**



# Cancer



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## Summary

- In Lambton, prostate, lung and colorectal cancer are the leading cancers among males. Breast, lung and colorectal cancers are the leading cancers among females. Lung cancer is the leading cause of cancer death among Lambton males and females. The distribution of cancer cases and deaths is similar between Lambton and all of Canada.
- Between 1986 and 2003, there were no significant differences between Lambton and Ontario with respect to cancer incidence or mortality for the following sites: oral, esophagus, stomach, pancreas, cervix, uterus, ovary, bladder, kidney, brain, thyroid, lymphoma, myeloma or leukemia.
- Between 1986 and 2003, the number of cancer cases (all sites) in Lambton has increased by 54%, but this increase is mainly due to an aging population. In comparison, age-standardized incidence rates have increased by 12% during this time period.

Incidence and mortality trends over time and age-specific rates were analyzed for several cancer sites. Highlights include:

- **Lung cancer:** Incidence and mortality rates in Lambton were elevated above Ontario rates in both males and females between 1995 and 2003. Rates among Lambton males have been declining, but not to the same extent as Ontario rates. Rates among Lambton and Ontario females have been increasing, but Lambton rates have increased more sharply since the late 1990's. Smoking and occupational exposures (particularly asbestos) are likely the main contributors to elevated lung cancer rates in Lambton, but air pollution and other factors may also play a smaller role.
- **Mesothelioma:** Incidence rates among Lambton males were more than six times higher than Ontario rates between 1986 and 1994 and more than three times higher between 1995 and 2003. Incidence peaked in the mid 1990's. Mortality rates were 4.5 times higher in Lambton versus Ontario between 1995 and 2003. Occupation related asbestos exposure in the 1960's and 70's accounts for most cases of mesothelioma observed recently.
- **Colorectal cancer:** Incidence rates were higher among males in Lambton versus Ontario between 1986 and 2003. No differences in male mortality rates were observed and female incidence and mortality did not differ between Lambton and Ontario. Higher screening rates, diet and heavy alcohol consumption among Lambton males may account for higher rates.
- **Breast cancer:** Between 1995 and 2003, more cases of breast cancer occurred in Lambton than expected based on Ontario rates; however, trend data reveals that age-standardized rates were not consistently above provincial rates and fluctuate over time. Furthermore, incidence rates have not changed significantly between 1986 and 2003, locally or provincially. Mortality rates in Lambton were significantly lower than Ontario and regional rates until the late 1990's, but have shown an upward trend since this time. Mammography screening rates among females aged 50-69 are higher in Lambton versus Ontario.

- **Prostate cancer:** Incidence rates in Lambton have been higher than Ontario rates between 1986 and 2003. Mortality rates have been higher between 1995 and 2003. The rapid adoption of prostate specific antigen (PSA) testing likely accounts for the large peak in prostate cancer incidence in the mid 1990's. Lambton males have higher rates of PSA screening and are more likely to have a screening test in the past year compared to their provincial counterparts.
- **Melanoma of the skin:** Incidence rates have increased dramatically in Lambton since the mid 1990's and are significantly higher than Ontario and regional rates. The differences between Lambton and Ontario are mainly observed for males and females under the age of 65. In 2002, Lambton residents had low awareness of sun exposure as a risk factor for cancer and nearly 45% rarely or never used sunscreen. However, these knowledge and behaviour indicators were similar to regional results, so it is unknown why Lambton has higher melanoma rates. Further research is needed to understand increasing trends in Lambton.
- **Testicular cancer:** Testicular cancer rates in Lambton were higher than expected between 1995 and 2003 based on provincial rates; however, there was large variability associated with this estimate since very few cases occur in Lambton per year. Trend data shows that incidence rates in Lambton vary considerably over time and further surveillance is needed to understand local trends.
- **Cervical cancer:** Incidence and mortality rates are similar in Lambton and Ontario. Approximately 75% of Lambton females reported having a Pap test in the past three years, and those aged 25 to 34 were most likely to report having the test. Similar results were reported for Ontario.
- **Childhood cancers:** Incidence rates of all cancers combined, leukemias, lymphomas, cancers of the brain and nervous system and soft tissue sarcomas did not differ between Lambton and Ontario males and females aged 0-19 years.

#### General conclusions:

- Trends of concern in Lambton include: increasing lung cancer rates among females, elevated mesothelioma rates among males, increasing melanoma rates among males and females less than 65 years of age.
- Known risk factors of concern in Lambton include: smoking, occupational exposures, diet, alcohol use and ultraviolet radiation exposure.
- While further research is needed to understand the risk factors for cancer, particularly environmental and occupational factors and gene-environment interactions, we must continue to focus on reducing risk associated with known factors.
- About half of all cancer deaths are related to tobacco use, diet and physical activity. Therefore, the implementation and continuation of effective interventions aimed at cancer prevention and early detection must continue to be a focus of public health efforts.

# Cancer

Although cancer is often referred to as one disease, it is actually a term that describes a group of more than 100 different diseases. Other terms that are commonly used to describe cancers include malignant tumors and neoplasms. Cancers are characterized by the uncontrolled growth and spread of abnormal cells and are typically named after the part of the body where the cancer starts.

Cancer is caused by abnormalities in a cell's DNA, specifically in the genes responsible for cell growth and repair.<sup>1</sup> It is often unknown why one person develops cancer and another does not, but research shows that certain factors increase one's risk. The most common risk factors for cancer include:<sup>2</sup>

- Growing older
- Tobacco
- Sunlight (ultraviolet radiation)
- Ionizing radiation
- Certain chemicals (both man-made and naturally occurring)
- Some viruses and bacteria
- Certain hormones
- Family history of cancer
- Alcohol
- Poor diet, lack of physical activity, or being overweight

While many risk factors can be avoided, others, such as family history and age, cannot. Also, many risk factors for cancer are unknown, and the complex interactions between genetic, lifestyle and environmental factors are the subject of many ongoing investigations.

Based on current incidence rates, 39% of Canadian women and 44% of men will develop cancer during their lifetimes. While cancer affects people of all ages, it is primarily a disease of older Canadians, as 44% of new cancer cases and 60% of cancer deaths will occur among those who are at least 70 years old. In contrast, less than 1% of new cancer cases and deaths occur in individuals under 20 years of age. While overall cancer incidence and mortality rates are higher in males than females, females have higher rates during the reproductive years.<sup>3</sup> Higher incidence and mortality among younger women is mostly attributable to breast cancer.

In Ontario, the number of cancer cases is rising steadily. The increase is mainly due to an aging population; however, the *Cancer 2020 Action Plan* for Ontario states that approximately 50% of cancers that will be diagnosed by the year 2020 can be prevented or detected early, before they become serious health problems.<sup>4</sup> The plan was released in 2003 and provides specific targets for cancer prevention and early detection with the aim of reducing the burden of cancer on patients, families and the health care system.

Ontario public health units are mandated to provide programs in Chronic Disease Prevention and the Early Detection of Cancer. These programs aim to increase the length and quality of life by reducing morbidity and mortality associated with chronic diseases, such as cancer. Public health units also aim to reduce mortality from cancer,

particularly breast, cervical and colorectal cancers, by increasing early detection through screening.<sup>5</sup>

This is the second in a series of reports that will provide a comprehensive overview of health status indicators for Lambton County. This report describes cancer incidence and mortality rates in Lambton as compared to those in Ontario. Some comparisons are also made between Lambton and other regions within southwestern Ontario, including Chatham-Kent and Windsor-Essex.

## Understanding the Data

### *Data Source*

Cancer incidence and mortality data were obtained from the Ontario Cancer Registry (OCR) of Cancer Care Ontario. The OCR is one of the largest cancer registries in the North America, and includes about 97% of all cancer cases in the province. The OCR has five main data sources: 1) hospital discharge summaries with cancer diagnosis, 2) pathology reports that mention cancer, 3) records from the Regional Cancer Centres or Princess Margaret Hospital, 4) death certificates with cancer as the underlying cause of death, and 5) hospital day surgery reports.<sup>6</sup>

### *Understanding Rates*

Following a short discussion of the leading cancer types in Lambton County based on the number of cases and deaths, the remainder of the report focuses on describing cancer incidence and mortality *rates*.

**Incidence** is defined as the number of new cases of a disease in a defined population, within a specified period of time. **Mortality** is the number of deaths in a defined population, within a specified period of time.<sup>7</sup>

Cancer incidence and mortality rates in Lambton County were compared with Ontario rates using **Standardized Incidence Ratios** (SIRs) and **Standardized Mortality Ratios** (SMRs). The SIR and SMR control for differences in the age structure of two populations and allow smaller populations to be compared with a larger one. Since more cancers may occur in Lambton because it has an older population than Ontario, we can not simply look at crude incidence rates (i.e. the number of cancers divided by the number of people in the population). The SIR is a ratio of the observed number of cancer cases in Lambton to an expected number of cases based on Ontario's age-specific rates. The SMR is calculated similarly using cancer deaths instead of cases.

An SIR/SMR of 1.0 implies that cancer incidence or mortality in Lambton County is equal to that in Ontario. An SIR/SMR greater than 1.0 indicates that the cancer rate is higher in Lambton versus Ontario, whereas an SIR/SMR less than 1.0 indicates that cancer rates are lower in Lambton. For example, an SIR/SMR equal to 1.60 can be interpreted as follows: there were 1.6 times more cases/deaths than expected based on Ontario rates, or 60% more cases/deaths occurred than expected based on Ontario rates.

Since most estimates are based on small numbers and subject to natural variation, confidence intervals are used to determine whether the estimate is significantly different from Ontario. If the 95% confidence interval does not include 1.0, then the difference between Lambton's rate and Ontario's rate is statistically significant. For example, if the 95% confidence interval is 1.10-1.60, we can conclude that Lambton rates are significantly higher than Ontario rates. Furthermore, we can be 95% confident that Lambton's rate is 1.1 to 1.6 times higher than expected based on Ontario rates.

SIRs and SMRs are presented for two time periods: 1986-1994 and 1995-2003. Note that if an SIR/SMR increased from one time period to the next, this does not necessarily mean that cancer incidence or mortality increased, but it indicates that the rates are now

higher relative to Ontario. The SIR/SMR is useful when age-specific rates are unstable due to small numbers for the population of interest.

In order to compare cancer incidence and mortality rates over time, **age-standardized rates** are necessary. In this report, age-standardized incidence and mortality rates are presented for several cancer sites. These include sites that were elevated in Lambton based on SIR/SMRs and those of public health importance (i.e. targets for screening and/or prevention efforts). For these cancers, age-standardized rates are presented to show trends over time in Lambton County and compare these to trends in Ontario and Southwestern Ontario. Age-standardized rates are presented as three-year moving averages (e.g. an estimate for 1987 represents an average of the rates for 1986-1988).

Finally, **age-specific incidence rates** were calculated for Lambton and Ontario for several cancer sites. Age-specific rates allow us to examine which age groups are most likely to be affected by certain types of cancer and to determine for which age groups Lambton differs significantly from Ontario.

### *Analysis*

The SEER “*recode*” variables were used to define the major cancer site groupings for analysis. These groupings are based on a globally standardized classification system [International Classification of Diseases (ICD)].

Age-standardized rates and associated confidence intervals were calculated in SEERStat while Standardized Incidence and Mortality Ratios (SMRs and SIRs) were computed in Excel using counts derived from SEERStat. Equations for calculating confidence intervals for SIRs and SMRs were from Armitage.<sup>8</sup> Rates based on counts of less than 5 were suppressed due to both confidentiality and statistical concerns.

## Leading Cancer Sites: Lambton County (1995-2003)

Figures 1 and 2 show the distribution of cancer cases and deaths for Lambton County males and females between 1995 and 2003. For this period, the top three cancers diagnosed in males were prostate, lung and colorectal cancers, accounting for nearly 60% of all male cancers. The top three cancers diagnosed in females were breast, lung and colorectal cancers, accounting for nearly 56% of all female cancers. Lung cancer continues to be the leading cause of cancer death in both males and females, accounting for 30.0% and 28.4% of all cancer deaths respectively. The distribution of cancer cases and deaths in Lambton County is very similar to that estimated for all of Canada for 2007.<sup>3</sup>

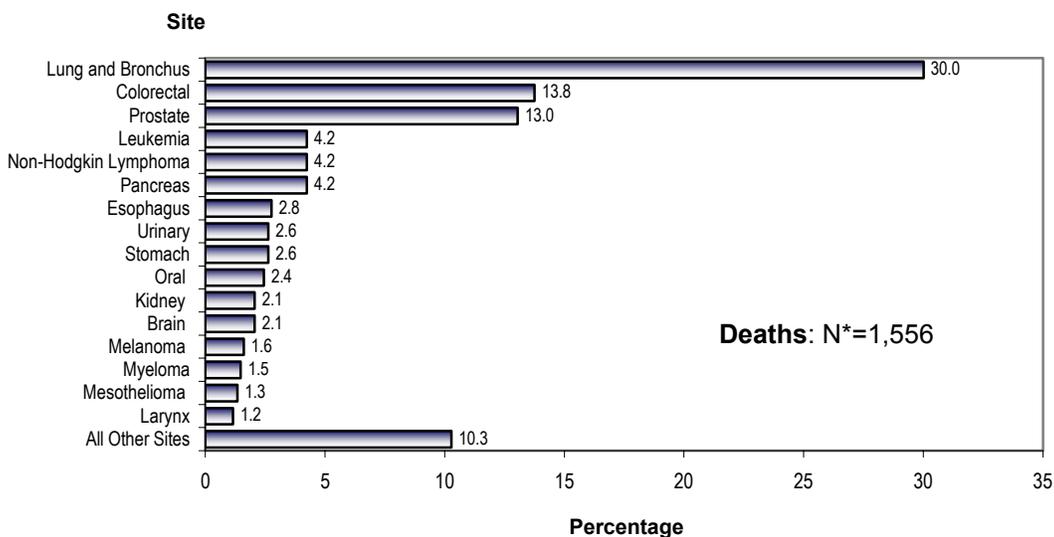
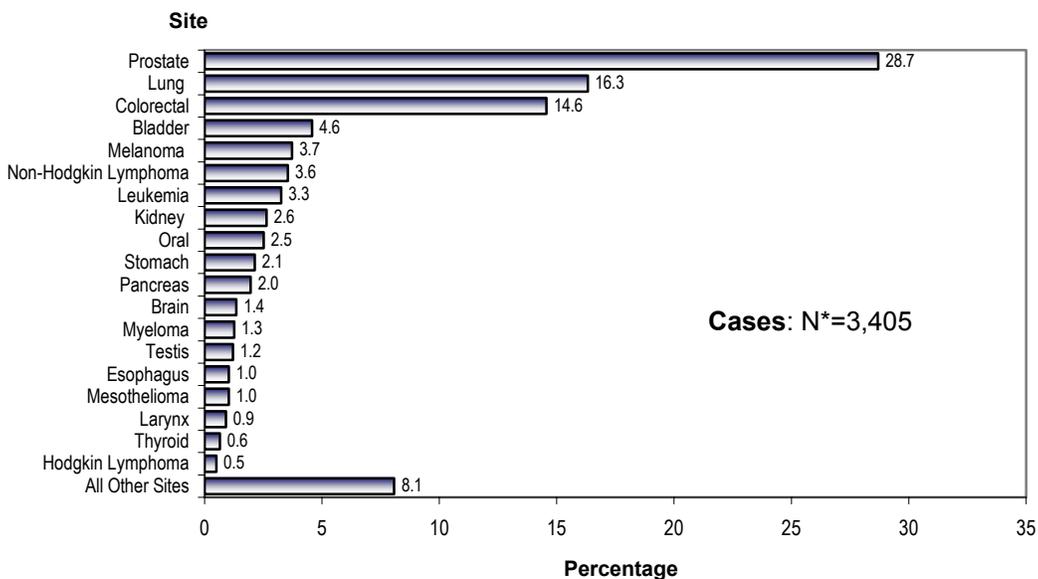
Table 1 shows the number of cancer cases and deaths that occurred in Lambton in 2003. These figures illustrate how common, or rare, each type of cancer is.

**Table 1: Number of Cancer Cases and Deaths in Lambton County, 2003.**

	Males		Females		
	Cases	Deaths	Cases	Deaths	
All Cancers	405	190	345	157	
Prostate Cancer	103	27	Breast Cancer	96	31
Lung Cancer	63	43	Colorectal Cancer	48	14
Colorectal Cancer	52	26	Lung Cancer	44	39
Bladder Cancer	27	5	Uterine Cancer	20	^
Melanoma of the Skin	21	^	Non-Hodgkin Lymphoma	17	5
Non-Hodgkin Lymphoma	20	10	Melanoma of the Skin	16	^
Oral Cancer	14	6	Ovarian Cancer	9	13
Stomach Cancer	11	8	Thyroid Cancer	9	0
Brain Cancer	10	^	Bladder Cancer	9	^
Esophageal Cancer	10	^	Leukemia	8	6
Pancreatic Cancer	9	7	Cervical Cancer	8	^
Leukemia	8	10	Oral Cancer	7	0
Myeloma	7	^	Brain Cancer	6	5
Kidney Cancer	6	^	Pancreatic Cancer	6	^
Mesothelioma	^	6	Kidney Cancer	^	^
Hodgkin Lymphoma	^	0	Myeloma	^	^
			Stomach Cancer	^	^
			Esophageal Cancer	^	^
			Hodgkin Lymphoma	^	0
			Mesothelioma	0	0

^ Not shown due to fewer than five cases or deaths.

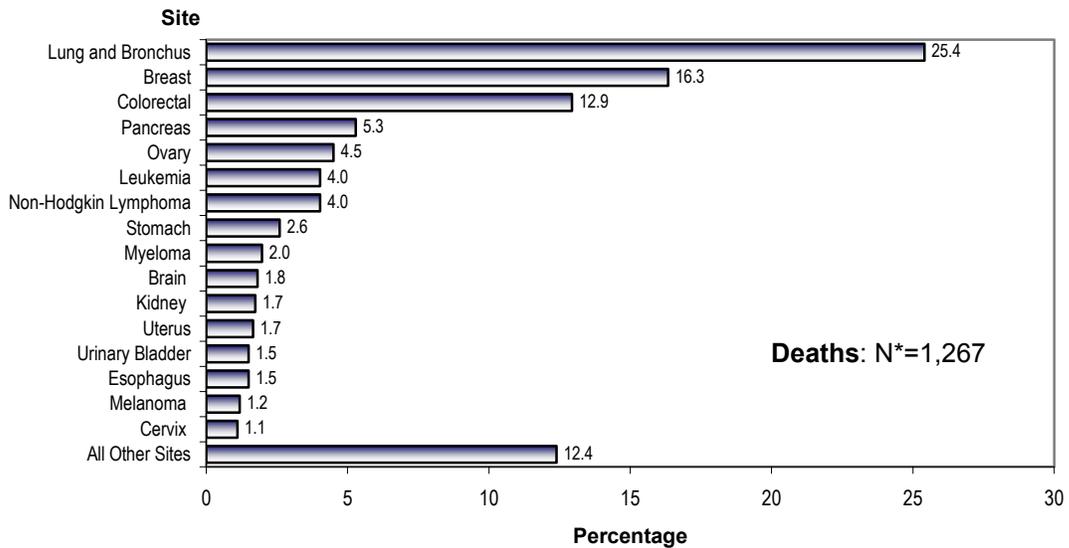
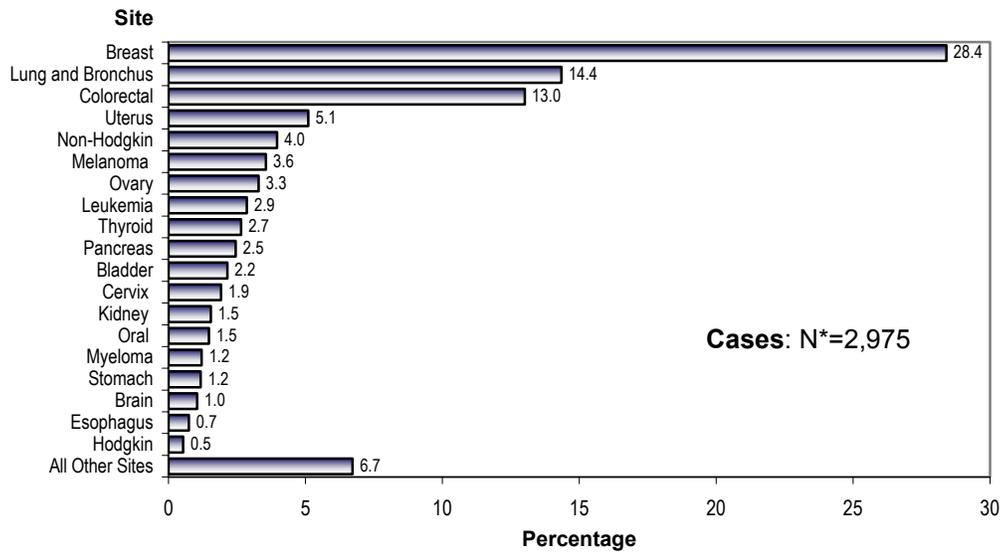
**Figure 1 - Percentage Distribution of New Cases and Deaths for Selected Cancer Sites, Males, Lambton County, 1995-2003**



\*N=total number of cases or deaths between 1995 and 2003 (all sites)

Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 2 - Percentage Distribution of New Cases & Deaths for Selected Cancer Sites, Females, Lambton County, 1995-2003**



\*N=total number of cases or deaths between 1995 and 2003 (all sites)

Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

## Cancer Incidence and Mortality Rates

### *Standardized Incidence Ratios (SIRs) and Standardized Mortality Ratios (SMRs)*

Based on the SIRs and SMRs presented in Tables 2 and 3, Lambton did not differ significantly from Ontario with respect to cancer incidence or mortality between 1986 and 2003 for the following sites:

- Oral
- Esophagus
- Stomach
- Pancreas
- Cervix
- Uterus
- Ovary
- Bladder
- Kidney
- Brain
- Thyroid
- Lymphoma
- Myeloma
- Leukemia

Relative to Ontario, Lambton males have had a statistically higher **incidence** of all cancers combined, colorectal cancer, prostate cancer and mesothelioma for both time periods studied (Table 2). Incidence of lung cancer, melanoma and testicular cancer were elevated only for the most recent time period, 1995-2003. Cancer incidence rates among Lambton females were not significantly higher than Ontario rates between 1986 and 1994, but were elevated for all cancers combined, lung cancer, melanoma and breast cancer between 1995 and 2003 (Table 2). Lambton females had significantly lower incidence rates of oral and cervical cancers between 1986 and 1994, but did not differ significantly from Ontario between 1995 and 2003.

While cancer **mortality** rates among Lambton males were not elevated between 1986 and 1994, rates of all cancers combined, lung cancer, prostate cancer and mesothelioma were higher than Ontario rates between 1995 and 2003 (Table 3). Between 1986 and 1994, myeloma mortality rates were significantly lower among Lambton versus Ontario males, but were not significantly different between 1995 and 2003. Female mortality rates due to lung cancer were higher in Lambton versus Ontario between 1995 and 2003 (Table 3). Females had lower mortality rates due to all cancers combined, breast cancer, cervical cancer and ovarian cancer between 1986 and 1994; however, Lambton and Ontario did not differ significantly with respect to these cancers for the most recent time period, 1995-2003.

One must be careful when interpreting SIRs and SMRs and acknowledge both the size of the difference between Lambton and Ontario and the uncertainty associated with the estimate (i.e. the width of the 95% confidence interval). For example, the SIR for testicular cancer is 1.46 for the period 1995-2003, meaning that 46% more cases occurred in Lambton than expected based on Ontario rates. However, due to the small number of testicular cancer cases in Lambton, the confidence interval is wide and indicates that this value may fall between 1% and 92%. While SIRs/SMRs highlight certain cancer sites for which rates may differ between two populations, it is also important to examine trends over time using age-standardized rates.

The following sections discuss age-standardized incidence and mortality rates and age-specific incidence rates for the cancer sites listed below.

- All sites combined
- Lung
- Mesothelioma
- Colorectal
- Breast
- Prostate
- Melanoma of the skin
- Testis
- Cervix

Cancer screening rates are described where applicable (colorectal, breast, prostate and cervical cancers). Higher screening rates lead to increased detection thereby influencing incidence rates. Also, early detection can lead to better treatment outcomes resulting in decreased mortality rates.

Specific risk factors will also be described for each cancer site. It is important to note that the time between exposure to a risk factor and the clinical diagnosis of cancer is usually 15 to 20 years, depending on the type of cancer. While past exposures are usually more important than current exposures in understanding disease trends, these are often difficult to document. While some references are made to past exposures in this report, current risk factor data is presented in most cases. Current risk factor data is useful for projecting future cancer trends and for focusing prevention efforts.

**Table 2 – Standardized Incidence Ratios (95% Confidence Interval), Selected Cancer Sites, Lambton\***

	Males		Females	
	1986-1994	1995-2003	1986-1994	1995-2003
<b>All Cancers</b>	<b>1.08 (1.04-1.12)</b>	<b>1.08 (1.05-1.12)</b>	1.01 (0.97-1.05)	<b>1.06 (1.02-1.10)</b>
<b>Lung Cancer</b>	1.09 (1.00-1.19)	<b>1.13 (1.03-1.23)</b>	1.10 (0.97-1.23)	<b>1.23 (1.11-1.35)</b>
<b>Colorectal Cancer</b>	<b>1.13 (1.02-1.25)</b>	<b>1.19 (1.08-1.29)</b>	1.06 (0.94-1.18)	1.07 (0.96-1.18)
Oral Cancer	1.04 (0.83-1.25)	0.90 (0.70-1.10)	0.54 (0.31-0.77)	0.95 (0.65-1.25)
Esophageal Cancer	0.79 (0.48-1.09)	0.85 (0.57-1.14)	0.68 (0.26-1.11)	1.26 (0.72-1.79)
Stomach Cancer	0.86 (0.65-1.07)	0.91 (0.69-1.13)	0.88 (0.60-1.16)	0.85 (0.57-1.13)
Pancreatic Cancer	1.12 (0.85-1.40)	1.02 (0.76-1.27)	1.09 (0.82-1.36)	1.07 (0.82-1.31)
<b>Melanoma of the Skin</b>	1.01 (0.77-1.25)	<b>1.39 (1.14-1.64)</b>	0.80 (0.57-1.02)	<b>1.33 (1.07-1.59)</b>
<b>Breast Cancer</b>	N/A	N/A	1.06 (0.98-1.15)	<b>1.09 (1.01-1.16)</b>
Cervical Cancer	N/A	N/A	0.75 (0.54-0.96)	1.01 (0.75-1.28)
Uterine Cancer	N/A	N/A	1.09 (0.90-1.27)	0.99 (0.83-1.15)
Ovarian Cancer	N/A	N/A	0.82 (0.62-1.01)	0.97 (0.77-1.17)
<b>Prostate Cancer</b>	<b>1.23 (1.13-1.32)</b>	<b>1.14 (1.06-1.21)</b>	N/A	N/A
<b>Testicular Cancer</b>	1.02 (0.64-1.39)	<b>1.46 (1.01-1.92)</b>	N/A	N/A
Bladder Cancer	1.05 (0.88-1.22)	1.00 (0.84-1.17)	1.21 (0.90-1.52)	1.07 (0.79-1.36)
Kidney Cancer	1.01 (0.77-1.26)	1.05 (0.83-1.28)	1.02 (0.71-1.32)	0.87 (0.62-1.13)
Brain Cancer	1.07 (0.78-1.36)	0.92 (0.65-1.19)	1.01 (0.70-1.32)	0.93 (0.64-1.22)
Thyroid Cancer	0.96 (0.44-1.48)	0.93 (0.53-1.33)	1.10 (0.79-1.42)	0.92 (0.71-1.13)
Lymphoma	0.98 (0.80-1.17)	0.91 (0.75-1.07)	0.94 (0.74-1.13)	1.04 (0.86-1.23)
Myeloma	0.83 (0.52-1.13)	0.99 (0.68-1.30)	0.91 (0.57-1.26)	0.89 (0.59-1.19)
Leukemia	1.03 (0.81-1.24)	1.08 (0.87-1.30)	1.17 (0.90-1.43)	1.15 (0.89-1.40)
<b>Mesothelioma</b>	<b>6.30 (4.42-8.18)</b>	<b>3.12 (2.01-4.24)</b>	N/A	2.73 (0.34-5.13)

**Table 3 – Standardized Mortality Ratios (95% Confidence Interval), Selected Cancer Sites, Lambton\***

	Males		Females	
	1986-1994	1995-2003	1986-1994	1995-2003
<b>All Cancers</b>	1.03 (0.97-1.08)	<b>1.07 (1.02-1.13)</b>	0.92 (0.87-0.98)	0.99 (0.93-1.04)
<b>Lung Cancer</b>	1.10 (1.00-1.21)	<b>1.15 (1.04-1.25)</b>	0.98 (0.84-1.11)	<b>1.19 (1.06-1.32)</b>
Colorectal Cancer	1.06 (0.90-1.21)	1.14 (0.99-1.29)	0.96 (0.80-1.11)	1.00 (0.85-1.15)
Oral Cancer	0.95 (0.62-1.29)	1.21 (0.82-1.59)	N/A	0.67 (0.26-1.09)
Esophageal Cancer	0.77 (0.49-1.06)	0.92 (0.64-1.19)	0.83 (0.36-1.30)	1.06 (0.58-1.54)
Stomach Cancer	0.79 (0.56-1.03)	0.81 (0.56-1.05)	1.04 (0.69-1.40)	1.06 (0.70-1.42)
Pancreatic Cancer	1.08 (0.82-1.34)	1.02 (0.77-1.26)	0.99 (0.75-1.23)	0.93 (0.68-1.18)
Melanoma of the Skin	1.22 (0.68-1.75)	1.10 (0.67-1.53)	1.25 (0.57-1.97)	1.08 (0.54-1.63)
Breast Cancer	N/A	N/A	0.82 (0.70-0.94)	0.94 (0.81-1.07)
Cervical Cancer	N/A	N/A	0.43 (0.15-0.71)	0.77 (0.37-1.18)
Uterine Cancer	N/A	N/A	0.78 (0.43-1.13)	0.70 (0.40-1.01)
Ovarian Cancer	N/A	N/A	0.69 (0.48-0.91)	0.86 (0.64-1.08)
<b>Prostate Cancer</b>	1.00 (0.84-1.16)	<b>1.22 (1.06-1.39)</b>	N/A	N/A
Bladder Cancer	1.03 (0.72-1.35)	0.87 (0.60-1.13)	1.25 (0.70-1.80)	0.99 (0.54-1.43)
Kidney Cancer	1.09 (0.71-1.48)	0.97 (0.63-1.31)	1.24 (0.71-1.78)	1.15 (0.67-1.63)
Brain Cancer	1.14 (0.78-1.51)	0.92 (0.60-1.24)	0.97 (0.59-1.35)	0.85 (0.51-1.20)
Lymphoma	1.04 (0.75-1.32)	1.16 (0.89-1.42)	1.05 (0.74-1.36)	0.97 (0.71-1.23)
Myeloma	0.55 (0.24-0.86)	0.84 (0.50-1.18)	0.98 (0.54-1.42)	1.01 (0.61-1.40)
Leukemia	1.00 (0.72-1.28)	1.17 (0.88-1.45)	1.34 (0.97-1.71)	1.24 (0.90-1.58)
<b>Mesothelioma</b>	N/A	<b>4.50 (2.58-6.42)</b>	N/A	N/A

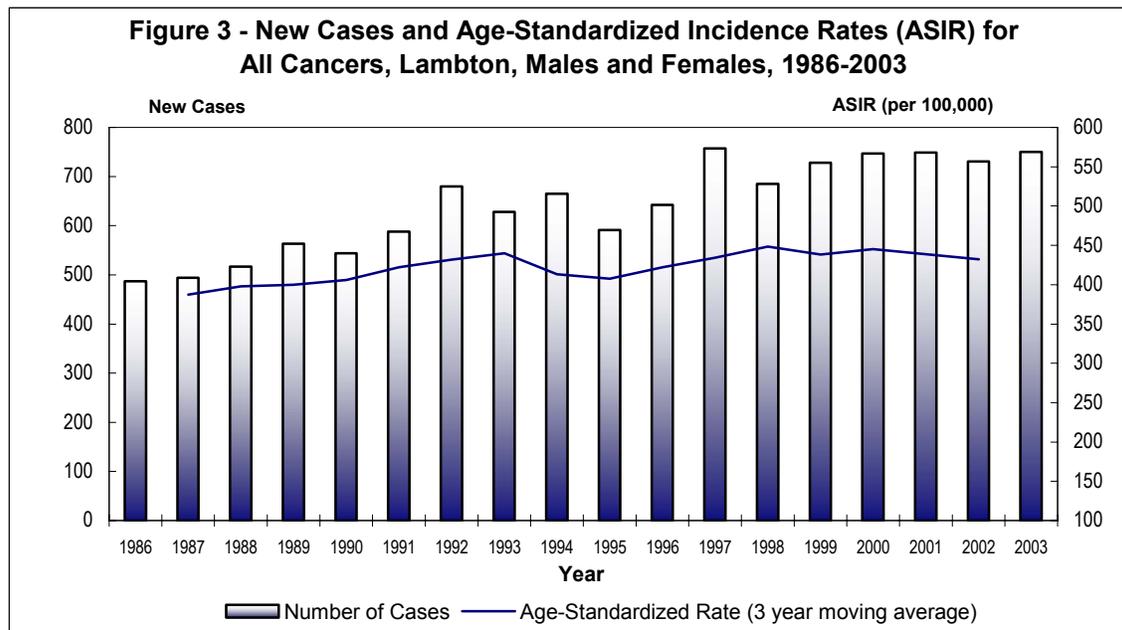
Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

\*Note: Ontario is used as the reference population (Ontario = 1.0); Figures in bold represent significant differences between Lambton and Ontario

## Age-Standardized and Age-Specific Cancer Rates

### All Cancers Combined

Figure 3 shows the number of new cancer cases per year and the age-standardized incidence rates in Lambton between 1986 and 2003. While the number of cases increased by 54% over this time period from 487 to 750 cases, age-standardized rates increased by only 12% from 387.4 to 432.4 cases per 100,000. As the population ages, the number of cases will increase, but a corresponding increase in age-standardized rates will not be observed since the age distribution of the population is accounted for in the calculation of these rates.



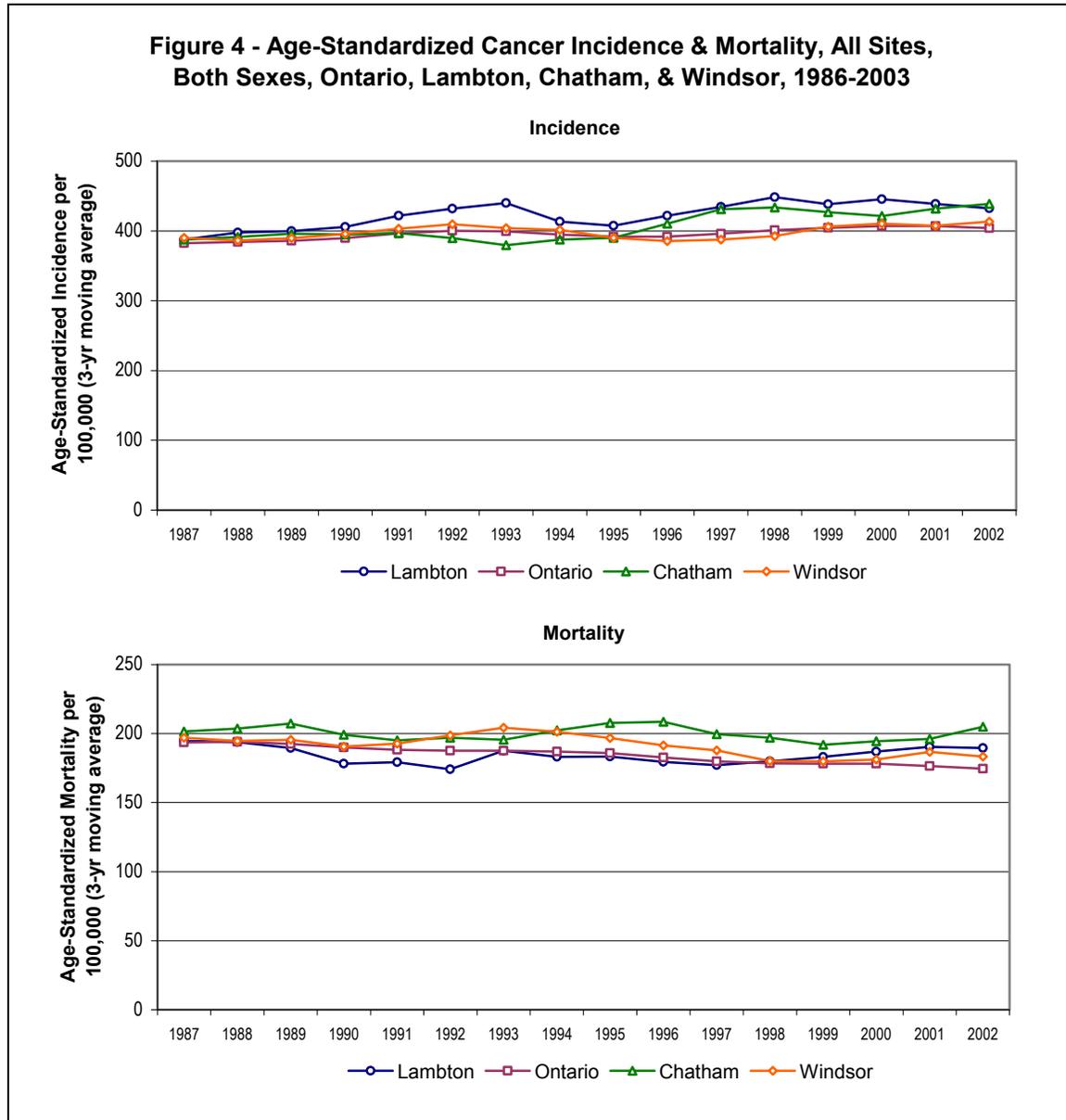
Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

Based on SIR results, cancer incidence for all sites was 8% (5-12%) higher than expected for Lambton males between 1986 and 2003 and 6% (2-10%) higher for Lambton females between 1995 and 2003 (Table 2). Overall cancer mortality rates were significantly higher among males between 1995 and 2003, with 7% (2-13%) more deaths occurring in Lambton than would be expected based on Ontario rates (Table 3).

Between 1986 and 2003, age-standardized cancer incidence and mortality rates have been relatively stable over time in Ontario, Lambton, Chatham-Kent and Windsor-Essex (Figure 4). Cancer incidence and mortality is greater in males versus females in both Lambton and Ontario (Figure 5). Supporting the SIR results, incidence rates have been higher among males in Lambton versus Ontario between 1988 and 2003, but did not become elevated among Lambton females until the late 1990's (Figure 5). Mortality rates due to all cancers have been gradually declining among Ontario males, but this downward trend is not apparent among Lambton males. Female all cancer mortality rates have been stable and similar to provincial rates for all years examined (Figure 5).

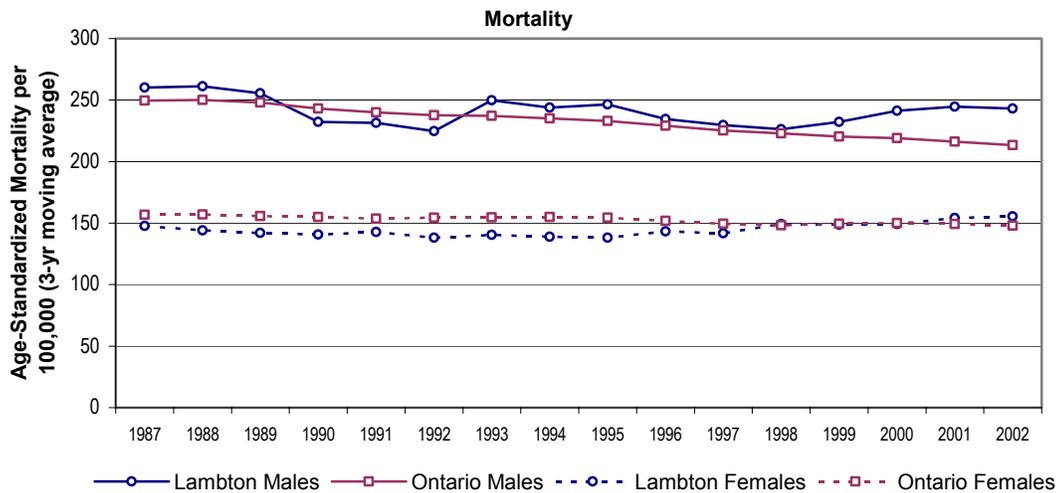
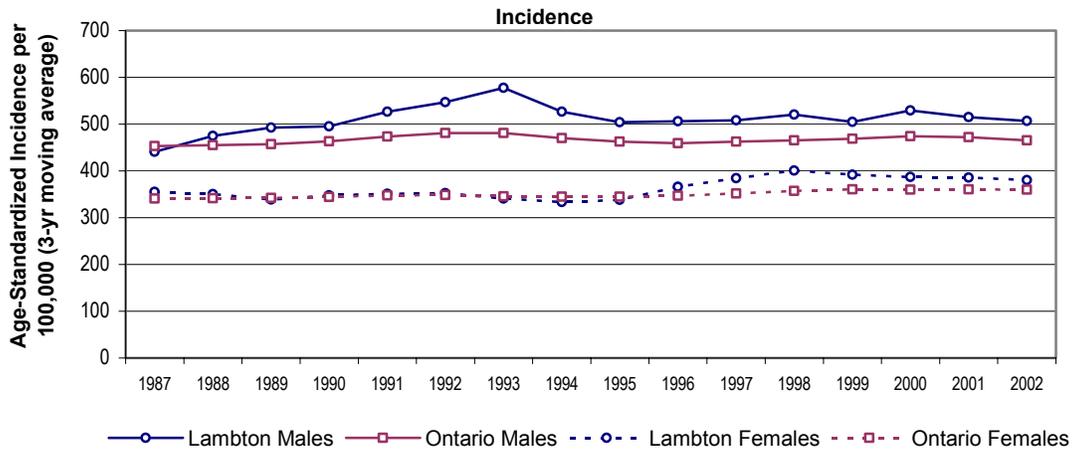
Figure 6 shows age-specific cancer incidence rates for all cancer sites in both males and females between 1995 and 2003. It is evident that rates of cancer increase with age. Incidence rates are significantly higher in Lambton versus Ontario for males aged 45 and older and females aged 45 to 64.

It is difficult to interpret data for all cancers combined because cancer types are so different and they are not all affected by the same risk factors. The most common cancers (lung, colorectal, prostate and breast) greatly influence patterns for all cancers combined. Therefore, it is necessary to examine trends for each cancer separately.



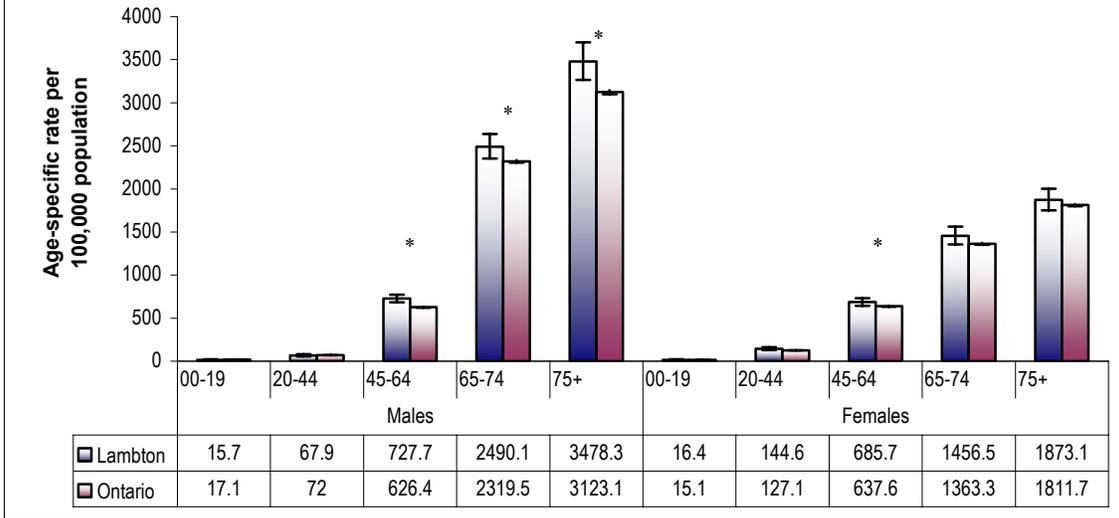
Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 5 - Age-Standardized Cancer Incidence & Mortality by Gender, All Sites, Ontario & Lambton, 1986-2003**



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 6 - Age Specific Cancer Incidence, All Cancer Sites, Males & Females, Lambton & Ontario, 1995-2003**



\*Lambton is significantly higher than Ontario, p=0.05.

Source: Cancer Incidence 1986-2003, Cancer Care Ontario, Release 5, October 2006.

## Lung Cancer

Based on the SIR results for 1995-2003, lung cancer incidence was 13% (3-23%) and 23% (11-35%) higher in Lambton versus Ontario for males and females respectively (Table 2). For the same time period, lung cancer mortality was 15% (4-25%) and 19% (6-32%) higher than expected for males and females respectively (Table 3).

Lambton's age-standardized lung cancer incidence and mortality rates were similar to Ontario rates and lower than rates in Chatham-Kent and Windsor-Essex for much of the late 1980's and early 1990's; however, rates escalated beginning in the late 1990's and remained higher than provincial and regional rates until the end of the study period (Figure 7).

This increase was especially apparent among Lambton females (Figure 8). While lung cancer incidence and mortality has gradually increased among Ontario females, rates in Lambton show a departure from provincial rates beginning in 1997/1998. Continued monitoring will help to determine whether rates among females are leveling off or starting to decline. Lung cancer incidence and mortality rates among Lambton males have not declined to the same extent as provincial rates, working further to maintain higher rates in Lambton County.

*Figure 9* shows age-specific lung cancer incidence rates for males and females in Lambton and Ontario between 1995 and 2003. Rates are significantly higher in Lambton versus Ontario for males aged 65 to 74 and females aged 20 to 64 and 75 years and older.

### *Risk Factors*

Factors that increase one's risk of lung cancer include:<sup>9,10</sup>

- Tobacco smoke
- Asbestos and other substances
- Radon
- Air pollution
- Family history of lung cancer
- Age over 65

The most important risk factor for lung cancer is smoking. One's risk increases as the frequency and duration of smoking increases. People who live or work closely with a smoker are also at increased risk due to exposure to second-hand smoke. Based on the Canadian Community Health Survey (CCHS, Cycle 3.1, 2005), the percentage of current daily or occasional smokers, aged 12 and older, is not significantly different between Lambton [24.5% (20.9-28.2)] and Ontario [20.7% (20.1-21.3)]. However, examining age-specific rates, the percentage of current smokers is higher in Lambton versus Ontario for females aged 35 to 64 (this difference is statistically significant for females aged 45 to 64). While there is evidence of higher smoking rates among Lambton males 35 years and older, the differences were not significant due to the small sample size (Figure 10). Overall, the percentage of adult smokers in both Lambton and Ontario is much higher than the 5% target set in the *Cancer 2020 Action Plan*.<sup>4</sup> While quitting smoking reduces lung cancer risk significantly, former smokers are still at greater risk compared to people

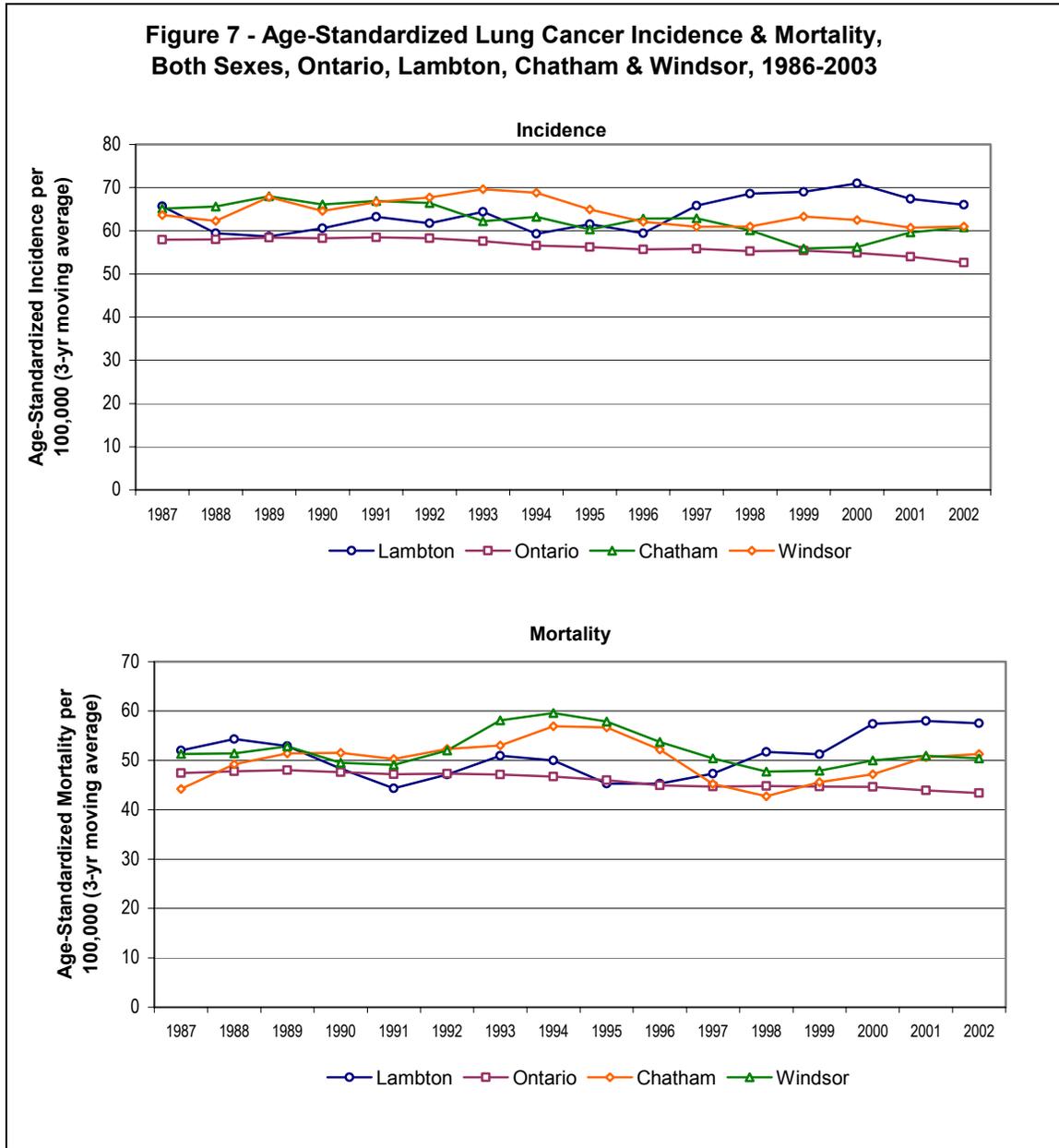
who never smoked. Examining trends in former smoking does not reveal any major differences between Lambton and Ontario males or females (Figure 11). It appears that elevated current smoking rates, particularly among Lambton females, may be one contributing factor to higher lung cancer rates observed.

Exposure to asbestos, arsenic, chromium, nickel, soot, tar, and other substances can cause lung cancer. Risk increases as years of exposure increases. Individuals who work with these substances are more likely to be exposed to elevated concentrations, so they often face a higher risk of cancer than the general public. Occupational exposure to asbestos among workers in the Sarnia-Lambton area has been well documented.<sup>11,12</sup> While one consequence of asbestos exposure is mesothelioma (see below), it is estimated that for every one mesothelioma case there are two asbestos-related lung cancer cases.<sup>13</sup> In Lambton, 79 cases of mesothelioma were diagnosed among males between 1986 and 2003. It follows that approximately 158 or 14.5% of the 1,091 lung cancer cases diagnosed among Lambton males during this time period might be attributable to asbestos exposure.<sup>14</sup> It is important to note that these are estimates and that it is difficult to detect relatively small increases in lung cancer rates above the high background rates in industrialized countries.<sup>13</sup> Also, most asbestos-related lung cancers are attributable to the combined effects of asbestos and tobacco smoke.<sup>13</sup> Since smoking rates do not differ significantly between Lambton and Ontario males, it is likely that occupational exposure is one of the contributing factors leading to higher lung cancer rates among Lambton males. Occupational exposures likely contribute to female lung cancer rates as well, though not to the same extent as for males.

Radon is a colourless, odorless, radioactive gas that occurs naturally in the environment due to the natural breakdown of uranium in soils and rocks.<sup>15</sup> The amount of radon gas in the open air is very small and does not pose a health risk. However, in some confined spaces like basements and underground mines, radon can accumulate to relatively high levels. Exposure at these levels has been associated with a slightly increased risk of lung cancer.<sup>15</sup> In some areas, radon can enter homes through cracks in floors, walls, or foundations. Radon levels can be higher in homes that are well insulated, tightly sealed, and/or built on uranium-rich soil.<sup>16</sup> Overall, Health Canada has found that high radon levels are not widespread in Canadian homes.<sup>15</sup> Within Ontario, higher levels have been found over the Canadian Shield and lower levels have been found in the Toronto area.<sup>17</sup> A soil survey is currently being conducted in Southwestern Ontario and this will help to determine the extent of potential radon exposure in this region.<sup>17</sup>

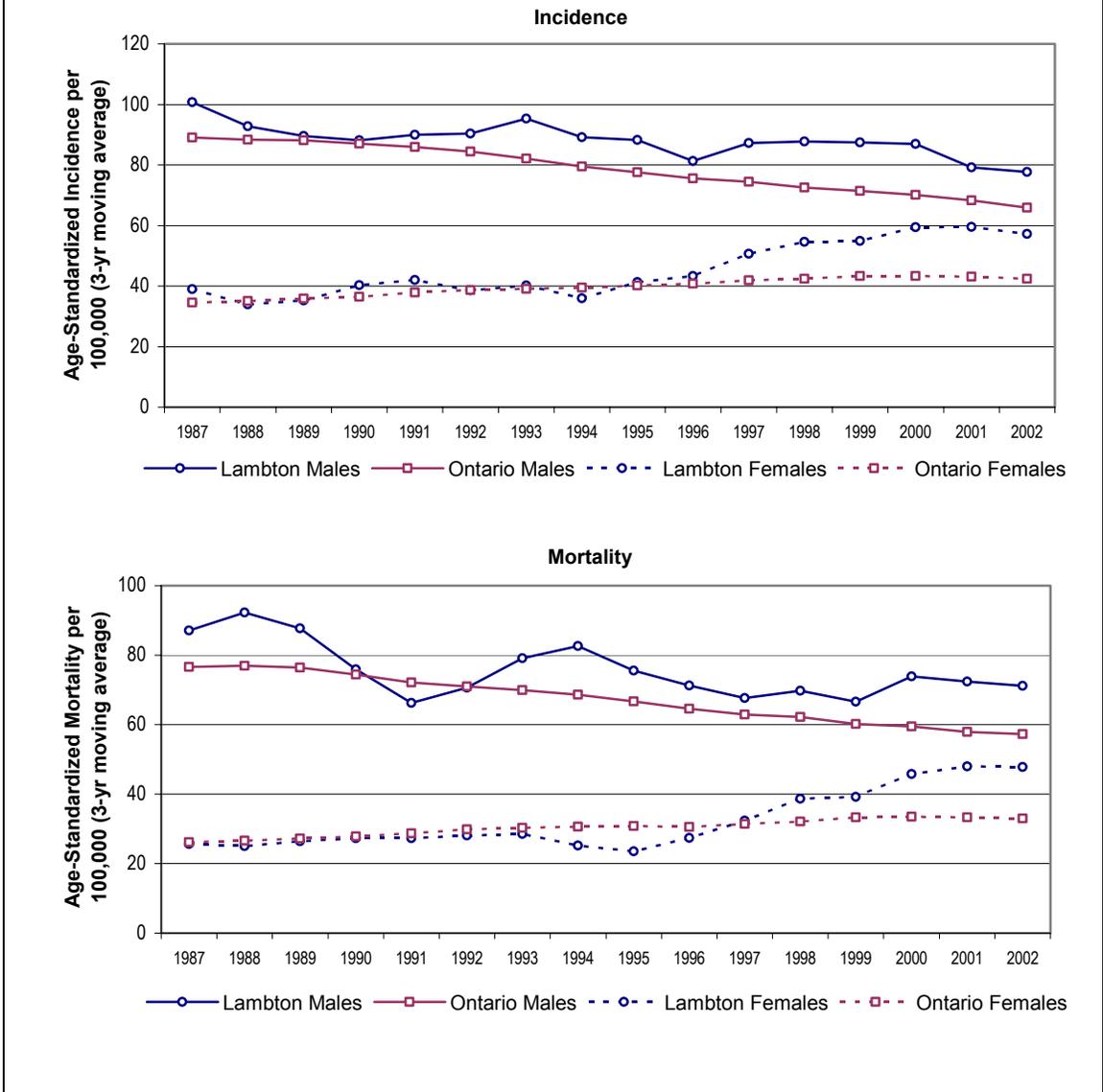
Doll and Peto,<sup>18</sup> in their 1981 review, estimated that 1-2% of lung cancer cases were related to air pollution. More recently, Alberg *et al.*<sup>19</sup> suggest that this is still a reasonable estimate and that the contribution of air pollution to lung cancer is minimal compared to that of tobacco smoke. Previous studies of air pollution and lung cancer have been limited by the difficulty of estimating exposures and accounting for confounders (e.g. smoking); however, descriptive evidence is consistent with a role for air pollution in causing small relative increases in lung cancer rates.<sup>19,20</sup> Lambton County is affected by local, regional and transboundary emissions and has historically had elevated levels of various pollutants, including fine particulate matter (PM<sub>2.5</sub>), ground-level ozone and sulphur dioxide.<sup>21-30</sup> Therefore, it is likely that air pollution is a factor in a small proportion of Lambton lung cancer cases.

Finally, it is important to note that environmental agents, even tobacco smoke, cause lung cancer in only a minority of exposed persons, leading to the suggestion that some people are more susceptible based on their genetic makeup.<sup>19</sup>



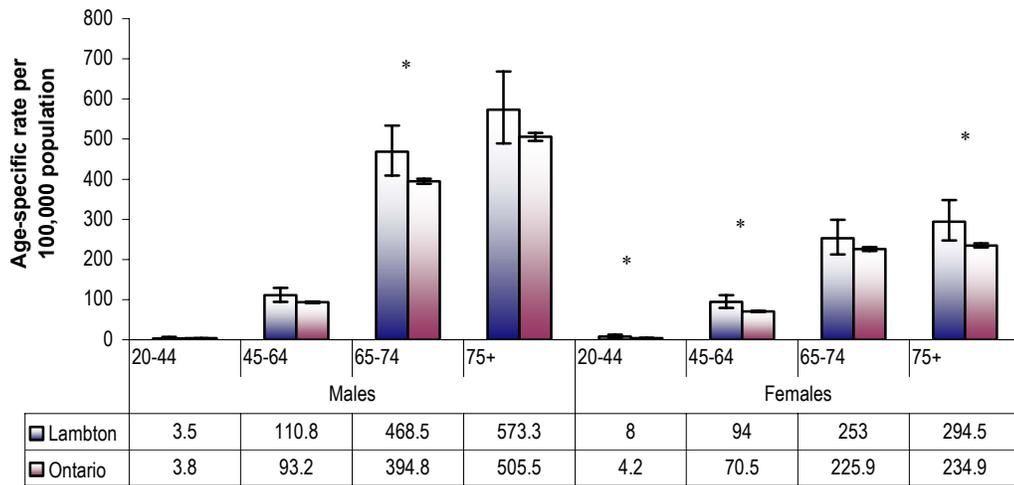
Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 8 - Age-Standardized Lung Cancer Incidence & Mortality, By Gender, Lambton & Ontario, 1986-2003**



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

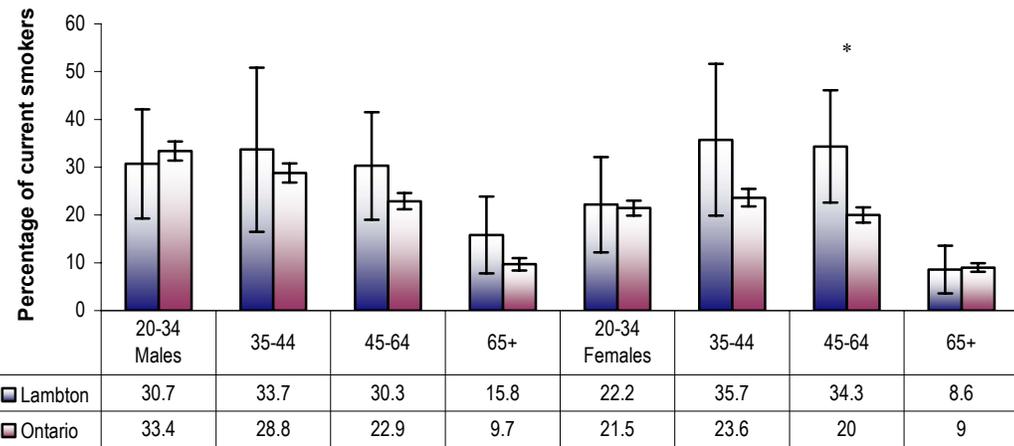
**Figure 9 - Age-Specific Lung Cancer Incidence, Males & Females, Lambton & Ontario, 1995-2003**



\*Lambton is significantly higher than Ontario, p=0.05.

Source: Cancer Incidence 1986-2003, Cancer Care Ontario, Release 5, October 2006.

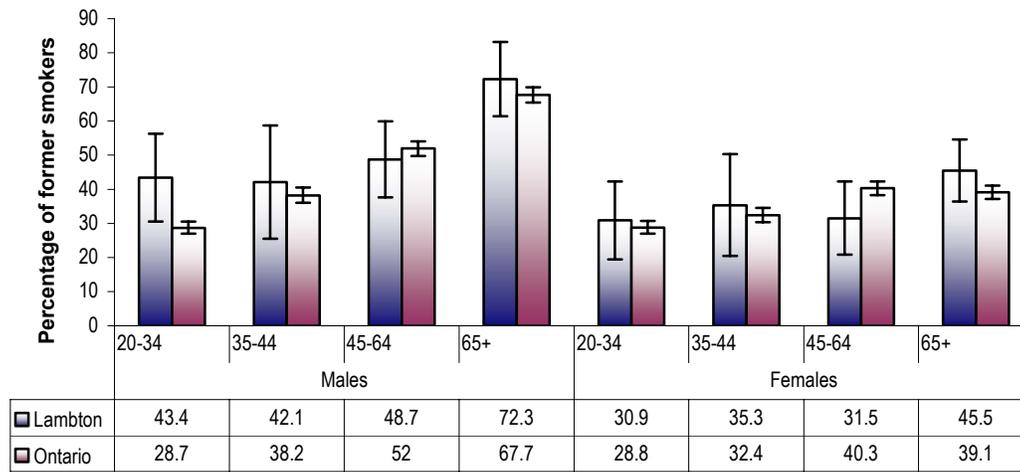
**Figure 10 - Percentage of current daily or occasional smokers by age, Males & Females, Lambton & Ontario, 2005**



\*Lambton is significantly higher than Ontario, p=0.05.

Source: Canadian Community Health Survey (CCHS, Cycle 3.1, 2005).

**Figure 11 - Percentage of former daily or occasional smokers by age, Males & Females, Lambton & Ontario, 2005**



Source: Canadian Community Health Survey (CCHS, Cycle 3.1, 2005).

## Mesothelioma

Malignant mesothelioma is an aggressive and highly fatal cancer that develops in cells that line various body cavities.<sup>31</sup> The most common site is the pleura (i.e. the membrane lining the lungs and chest cavity), accounting for 80-90% of all mesotheliomas.<sup>31</sup>

Based on SIR results, mesothelioma rates among Lambton males were 6.3 times higher than expected between 1986 and 1994 and 3.1 times higher than expected between 1995 and 2003 (Table 2). While there were too few deaths during the earlier time period to calculate an SMR, mortality rates among Lambton males were 4.5 times greater than expected between 1995 and 2003 (Table 3). There were eight cases of mesothelioma among Lambton females between 1986 and 2003. Due to the small number of cases, SIR/SMRs could either not be calculated or had large variability associated with the estimate.

Age-standardized incidence rates of mesothelioma among males have been higher in Lambton versus Ontario throughout the study period, peaking in the mid 1990's (Figure 12). The surge of new cases in the mid 1990's may have been due to increased awareness and detection. Since this time, mesothelioma rates remain higher in Lambton versus Ontario, but have stabilized locally and provincially.

### *Risk Factors*

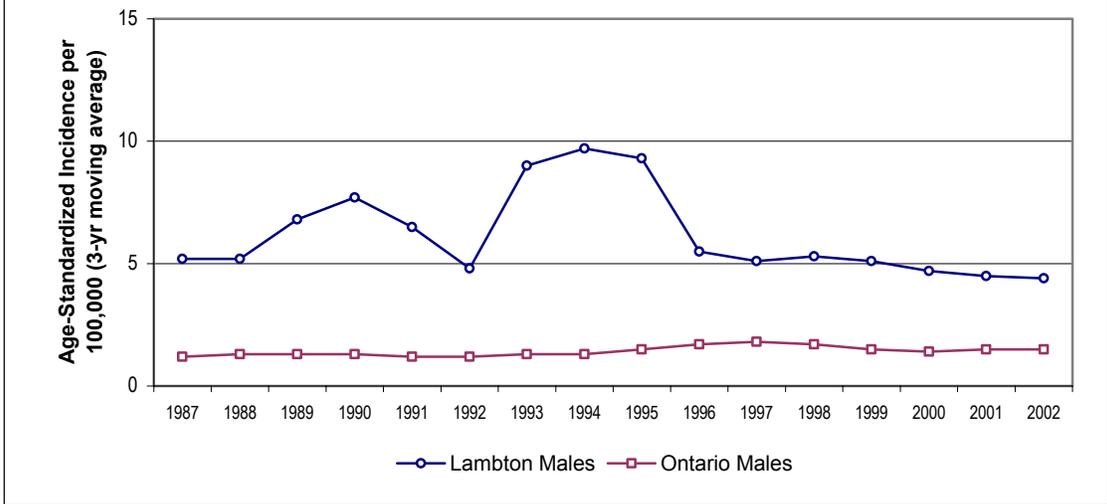
It is accepted that at least 80% of people who develop mesothelioma have occupational or environmental exposures to asbestos at high levels.<sup>32</sup> Other risk factors include radiation, other minerals, previous pleural scarring and possibly genetics.<sup>32</sup>

As mentioned above, occupational exposure to asbestos among workers in Lambton County has been well documented.<sup>11,12</sup> High-risk occupations include: foundry and insulation workers, construction workers, pipe fitters, boilermakers, power plant workers, firefighters and other emergency personnel.<sup>31</sup> It has also been reported that family members of these workers, who have been exposed to asbestos fibers on clothing brought into the home, are also at risk of mesothelioma and other asbestos-related conditions.<sup>11</sup>

Since symptoms often do not appear until 20 to 40 years after exposure, individuals diagnosed recently were likely exposed to asbestos in the 1960's and 1970's. It is expected that mesothelioma rates in Lambton will remain elevated above provincial rates until the latency period for highly exposed workers is surpassed.

While the link between asbestos exposure and mesothelioma is well established, there is very little information in Ontario on the overall burden of occupational cancers. The development of a high-quality occupational cancer surveillance program is a priority in the *Cancer 2020 Action Plan*. The plan also promotes working towards eliminating or reducing workplace carcinogens to the lowest possible levels.<sup>4</sup>

**Figure 12 - Age-Standardized Incidence of Mesothelioma, Males, Ontario & Lambton, 1986-2003**



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

## Colorectal Cancer

Based on SIR results, colorectal cancer incidence among Lambton males was higher than expected for both time periods: 13% (2-25%) higher between 1986 and 1994 and 19% (8-29%) higher between 1995 and 2003 (Table 2). There was no significant difference between Lambton and Ontario with respect to female incidence rates. Male and female mortality rates also did not differ significantly between Lambton and Ontario (Table 3).

Overall, age-standardized colorectal cancer incidence rates have been stable in Ontario and Southwestern Ontario between 1986 and 2003 (Figure 13). Colorectal cancer incidence rates in Lambton have been consistently higher than those in Ontario and Windsor-Essex and similar to those in Chatham-Kent during this time period.

Colorectal cancer mortality rates have declined regionally and provincially between 1986 and 2003 (Figure 13). Mortality rates in Lambton have been similar to those in Ontario and Windsor-Essex and lower than those in Chatham-Kent throughout much of the study period.

Colorectal cancer is more common in males than females (Figure 14). The higher incidence in Lambton overall is due to higher rates among males, as Lambton and Ontario females have had similar rates throughout the study period.

Colorectal cancer incidence increases with age. Based on age-specific rates presented in *Figure 15*, Lambton males, aged 65 to 74 have significantly higher rates as compared to Ontario.

### *Screening*

Colorectal cancer screening is promoted in order to detect cases earlier, when treatment is more effective. There is a 90% chance of curing colorectal cancer if it is detected early and only a 10% chance if it is detected at an advanced stage.<sup>33</sup> The 2001 Canadian Task Force on Preventive Health Care and the Guideline Advisory Committee of the Ontario Medical Association and Ministry of Health and Long-Term Care endorse performing fecal occult blood tests (FOBT) every two years on average-risk persons (i.e., 50 to 74 years with no family history of the disease).<sup>33</sup> Other procedures, such as colonoscopies, are given to individuals at increased risk because of a family history of colorectal cancer and those who have a positive FOBT.

The *Cancer 2020 Action Plan* target is that 90% of Ontario residents participate in an organized colorectal screening program.<sup>4</sup> Cancer Care Ontario and the Ministry of Health and Long-Term Care launched Canada's first population-based colorectal screening program in 2007 to help achieve this target. Based on surveys conducted in 2004 and 2005 as part of the Rapid Risk Factor Surveillance System (RRFSS), FOBT rates in Lambton appear to be increasing over time and will likely increase further with the launch of the organized program (Table 4). While province-wide data is not available from the same source, a report by Cancer Care Ontario indicates that the percentage of Ontario residents, aged 50-74, who report having a FOBT test in the past two years was between 10 and 15% in 2002/2003 and 15 and 20% in 2004/2005 (slightly lower than Lambton values shown in Table 4).<sup>34</sup>

**Table 4: Percentage of men and women, aged 50-74, who reported having a fecal occult blood test (FOBT) in the past two years in Lambton (95% Confidence Interval).**

	2004	2005
Total population	20.2 (16.6-23.8)	27.3 (22.9-31.7)
Males	21.6 (16.2-27.0)	23.6 (17.6-29.6)
Females	18.6 (13.9-23.3)	30.8 (24.4-27.2)

Source: RRFSS (2004: n=486), (2005: n=392).

A report on colorectal cancer screening showed that Lambton had higher colonoscopy rates compared to Ontario.<sup>35</sup> In 2001, colonoscopy utilization rates were nearly 50% higher in Lambton versus Ontario.<sup>35</sup> Furthermore, the proportion of the population aged 50-74 years who reported having a colonoscopy at least once between 1992 and 2001 was significantly higher in Lambton (24.2%) versus Ontario (15.7%).<sup>35</sup>

Colorectal cancer screening increases the probability of detecting a case, so higher screening rates in Lambton likely contribute to higher incidence rates. However, screening also decreases associated mortality, helping to explain why Lambton mortality rates are similar to provincial rates.

### *Risk Factors*

While there is no single cause of colorectal cancer, some risk factors include:<sup>36</sup>

- Age over 50
- Polyps – small growths on the inner wall of the colon and rectum
- Family history
- Diet – low intake of fruits, vegetables, fiber; high intake of animal fats
- Obesity
- Physical inactivity
- Heavy alcohol consumption
- Inflammatory bowel disease (ulcerative colitis or Crohn's disease)
- Smoking

The most recent cycle of the Canadian Community Health Survey (2005) provides data on obesity, alcohol consumption, fruit and vegetable consumption, smoking and physical activity. These data suggest that males in Lambton County are more likely than those in Ontario to report frequent heavy drinking (i.e. five or more drinks on one occasion, 12 or more times per year) and they are also more likely to report consuming fruits and vegetables less than five times per day. There is also a suggestion that Lambton males are more likely to be obese than Ontario males, though this difference is not statistically significant (see Table 5). Greater alcohol consumption and poorer diets among Lambton males may contribute to elevated colorectal cancer rates. However, it is also important to note that many people develop colorectal cancer without any of these known risk factors.

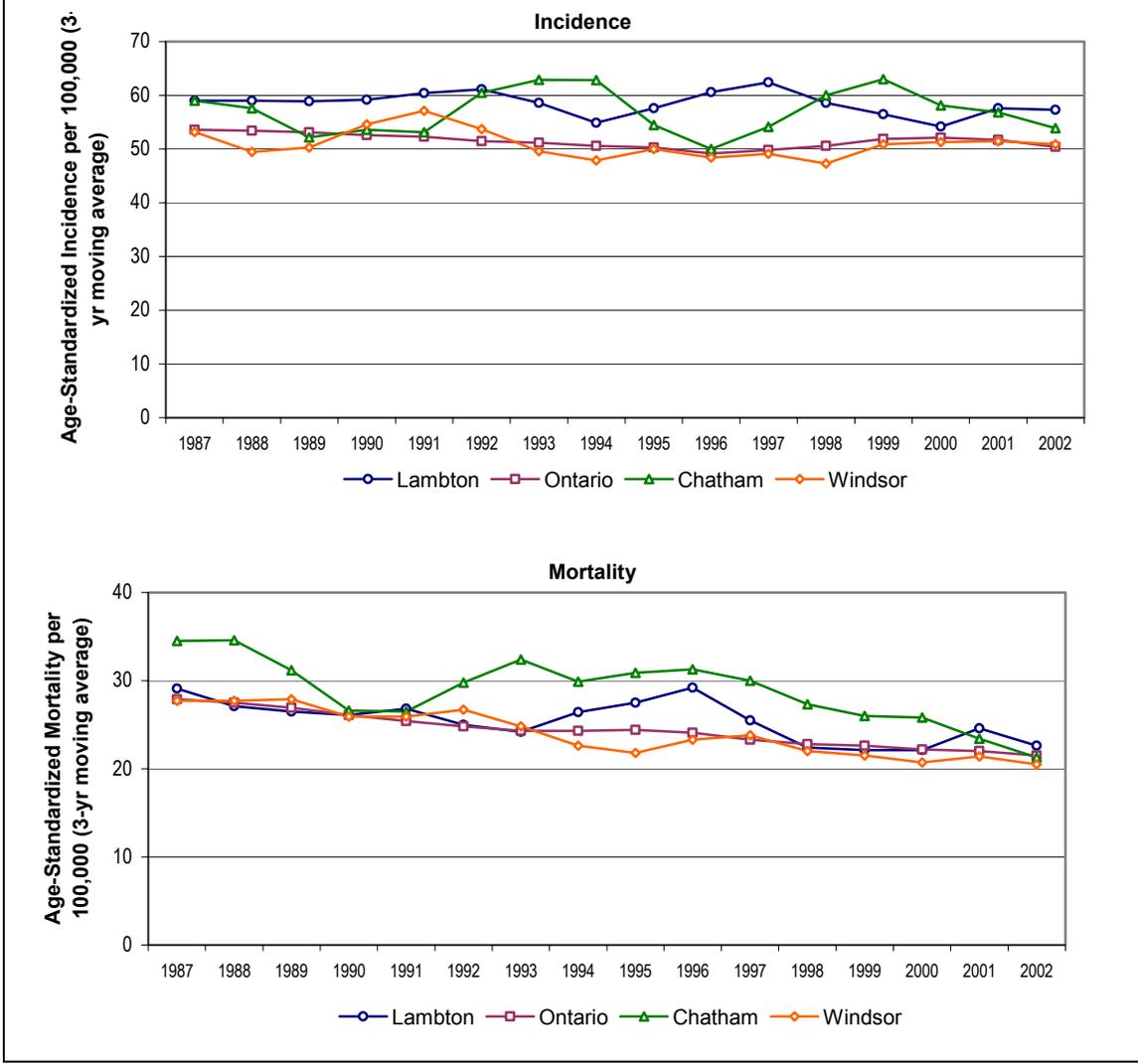
The *Cancer 2020 Action Plan* targets for the above risk factors are: 10% of Ontarians are obese; 10% of Ontarians consume less than five servings of fruit and vegetables daily; 98% of Ontarians follow the low-risk drinking guidelines set out by the Centre for Addiction and Mental Health; 5% of adults are current smokers; and 90% of Ontarians participate in moderate to vigorous activity on most days of the week.<sup>4</sup> It is clear that large improvements must be made in both Lambton and Ontario in order to meet these targets by 2020.

**Table 5: Percentage of Lambton and Ontario males, aged 12 and older, reporting various risk factors for colorectal cancer, 2005.**

<b>Risk Factor</b>	<b>Lambton</b>	<b>Ontario</b>
<i>Obesity</i>		
Overweight (BMI 25.0-29.9)	40.8 (33.8-47.8)	41.1 (39.9-42.3)
Obese (BMI ≥30.0)	20.2 (13.3-27.1)	16.3 (15.5-17.2)
<i>Diet</i>		
Consumes fruit and vegetables < five times per day	<b>68.3 (62.8-74.0)</b>	59.5 (58.5-60.5)
<i>Alcohol Consumption</i>		
Has 5+ drinks on one occasion, 12+ times per year	<b>39.1 (32.1-46.1)</b>	30.2 (29.1-31.2)
<i>Smoking</i>		
Current daily or occasional smoker	25.7 (20.7-30.7)	23.3 (22.5-24.1)
<i>Physical Activity</i>		
Active or moderately physically active	53.8 (47.8-60.1)	54.5 (53.4-55.6)

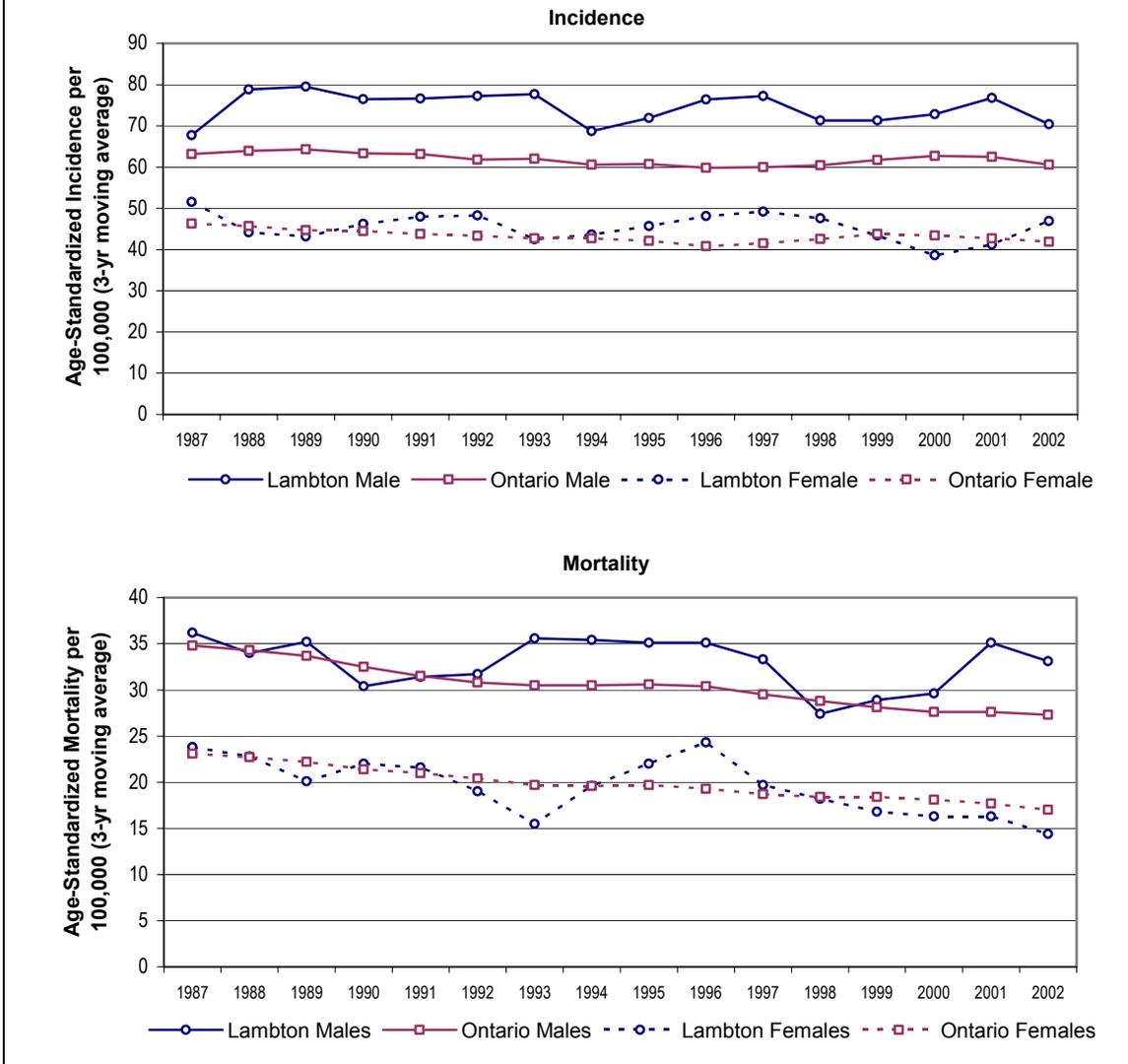
Source: Canadian Community Health Survey Cycle 3.1, 2005.

**Figure 13 - Age-Standardized Colorectal Cancer Incidence & Mortality, Both Sexes, Ontario, Lambton, Chatham, & Windsor, 1986-2003**



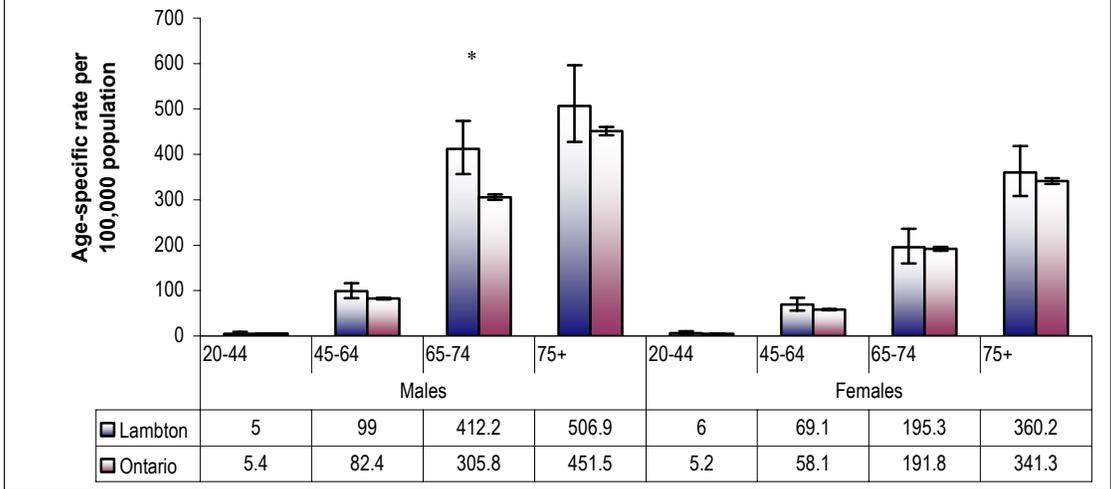
Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 14 - Age-Standardized Colorectal Cancer Incidence & Mortality, Ontario & Lambton, 1986-2003**



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 15 - Age-Specific Colorectal Cancer Incidence, Males & Females, Lambton & Ontario, 1995-2003**



\*Lambton is significantly higher than Ontario, p=0.05.

Source: Cancer Incidence 1986-2003, Cancer Care Ontario, Release 5, October 2006.

## Breast Cancer

Breast cancer rates are only presented for females, as less than 1% of all breast cancers occur in males.<sup>37</sup>

Based on SIR results, breast cancer incidence among Lambton females was 9% (1-16%) higher than expected between 1995 and 2003, but did not differ significantly from Ontario for the earlier time period, 1986-1994 (Table 2). Significantly fewer breast cancer deaths occurred in Lambton than expected between 1986 and 1994, but rates in Lambton and Ontario did not differ significantly between 1995 and 2003 (Table 3).

Age-standardized breast cancer incidence rates among females in Ontario and Southwestern Ontario have been steady between 1986 and 2003 (Figure 16). Rates were similar in all regions throughout the 1990's, but were elevated in Lambton between 1999 and 2001. Breast cancer rates in Lambton have fluctuated over time. An increasing trend is not apparent, as rates at the beginning and the end of the study period are almost identical. Local rates appear to be approaching provincial rates at the end of the study period.

Age-standardized mortality rates appear to have declined steadily in Ontario and Windsor-Essex between 1986 and 2003 (Figure 16). While Lambton and Chatham-Kent rates declined until the late 1990's, an increasing trend is apparent in these two regions between 1998 and 2003. While Lambton mortality rates were significantly below regional and provincial rates for most of the study period, they were elevated for the most recent years of study (though this difference was not statistically significant). Further surveillance is necessary to determine whether this increasing trend will continue in Lambton.

In Ontario, breast cancer incidence increases with age (Figure 17). In Lambton, incidence peaks among those aged 65 to 74 years and females in this age group have a significantly higher incidence of breast cancer as compared to Ontario. In general, breast cancer rates among younger women are relatively high compared to most cancers, as this disease strikes many women under the age of 50.

## *Screening*

The Ontario Breast Screening Program (OBSP) encourages all women aged 50-69 to go for a screening mammogram and clinical breast exam every 1 to 2 years. Studies have shown that breast screening in this age group can reduce breast cancer mortality rates.<sup>38</sup> According to the Canadian Community Health Surveys conducted in 2000/2001, 2003 and 2005, the proportion of women aged 50-69 who reported having a mammogram as part of routine screening in the past two years has been higher in Lambton versus Ontario, though this difference was only statistically significant in 2000/2001 (Table 6). While the proportion of women screened is higher in Lambton versus Ontario, there has been no change over time and screening rates are not approaching the *Cancer 2020* target of 90%.<sup>4</sup> It is important to note that changing practices and access to screening technology can impact the rate of detection and influence incidence rates at the local level.

**Table 6: Percentage of women aged 50-69 who reported having a mammogram as part of routine screening in the past two years in Lambton and Ontario (95% Confidence Interval).**

	2000/2001	2003	2005
Lambton	<b>65.3 (57.1-73.5)</b>	60.8 (51.0-70.6)	60.2 (50.1-70.3)
Ontario	53.5 (51.5-55.5)	49.8 (47.9-51.7)	53.0 (51.0-55.0)

Source: Statistics Canada, CCHS Cycle 1.1 (2000/2001), Cycle 2.1 (2003), Cycle 3.1 (2005).

### *Risk Factors*

Factors that are known to influence the risk of getting breast cancer include a mixture of reproductive/hormonal, lifestyle and hereditary factors as summarized below:

Reproductive/Hormonal	Lifestyle	Hereditary/Other
<ul style="list-style-type: none"> <li>• Older age at first birth</li> <li>• Fewer births</li> <li>• Did not breastfeed</li> <li>• Starting menstruation early</li> <li>• Irregular periods</li> <li>• Late menopause</li> <li>• Use of birth control pills or combined hormone therapy (HRT)</li> </ul>	<ul style="list-style-type: none"> <li>• Obesity (post-menopausal breast cancer)</li> <li>• Physical inactivity</li> <li>• Alcohol consumption</li> <li>• High-fat diet (possible)</li> <li>• Exposure to second-hand smoke (possible)</li> </ul>	<ul style="list-style-type: none"> <li>• Family history of breast cancer</li> <li>• BRCA1 or BRCA2 gene mutations</li> <li>• Ionizing radiation (medical or occupational exposure)</li> <li>• Benign breast disease</li> <li>• Dense breast tissue</li> <li>• Exposure to environmental contaminants (possible)</li> </ul>

Source: Canadian Cancer Statistics 2007 (p. 74).

While lifestyle factors are modifiable, these factors explain only a small fraction of breast cancer cases. Even so, based on current knowledge, the best opportunities for reducing risk include eating a healthy diet, being physically active, minimizing alcohol consumption and avoiding nonessential hormones.<sup>3</sup> Considering risk factors for which data is available, Lambton and Ontario females do not differ significantly with respect to obesity, diet, alcohol consumption or exposure to second-hand smoke and they are more likely to be physically active (Table 7).

The *Cancer 2020 Action Plan* targets for the above risk factors include: 10% of Ontarians are obese; 10% of Ontarians consume less than five servings of fruit and vegetables daily; 98% of Ontarians follow the low-risk drinking guidelines set out by the Centre for Addiction and Mental Health; <1% of adults are exposed to second-hand smoke; and 90% of Ontarians participate in moderate to vigorous activity on most days of the week.<sup>4</sup> It is clear that large improvements are needed in both Lambton and Ontario in order to meet these targets by 2020.

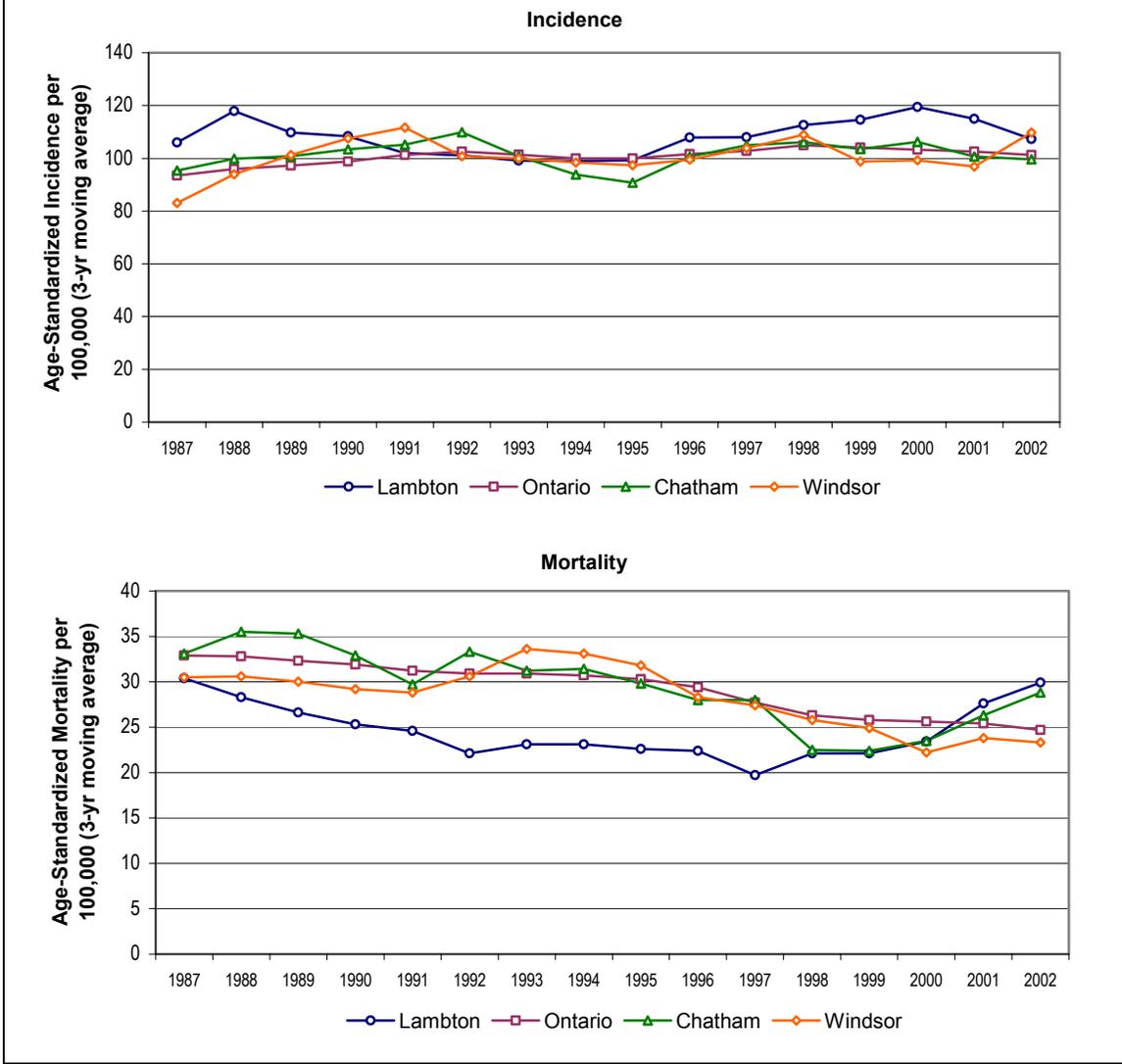
**Table 7: Percentage of Lambton and Ontario females, aged 12 and older, reporting various risk factors for breast cancer, 2005.**

<b>Risk Factor</b>	<b>Lambton</b>	<b>Ontario</b>
<i>Obesity</i>		
Overweight (BMI 25.0-29.9)	26.8 (20.6-33.1)	25.9 (25.0-26.8)
Obese (BMI ≥30.0)	17.2 (12.9-21.5)	13.9 (13.2-14.5)
<i>Diet</i>		
Consumes fruit and vegetables < five times per day	51.7 (45.3-58.0)	47.5 (46.5-48.6)
<i>Alcohol Consumption</i>		
Has 5+ drinks on one occasion, 12+ times per year	15.1 (10.1-20.2)	12.1 (11.3-12.8)
<i>Smoking</i>		
Exposure to second-hand smoke in home	8.3 (5.2-11.4)	6.9 (6.3-7.4)
<i>Physical Activity</i>		
Active or moderately physically active	<b>55.4 (49.5-61.4)</b>	48.2 (47.2-49.2)

Source: Canadian Community Health Survey Cycle 3.1, 2005.

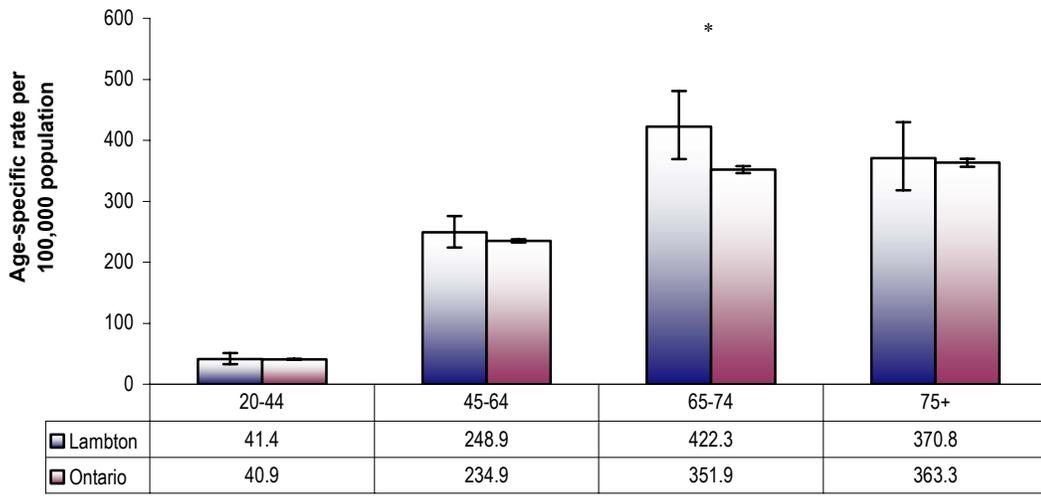
Most women with breast cancer do not have a family history of the disease or any of the identified risks, so researchers continue to search for the causes of this disease.<sup>39</sup> The Canadian Cancer Society has stated that more research is needed to identify additional modifiable risk factors for breast cancer, including occupational and environmental exposures.<sup>3</sup> While a large amount of research is being done to understand the influence of environmental exposures on breast cancer risk, there is not enough evidence to date to show a clear link.<sup>37</sup>

**Figure 16 - Age-Standardized Breast Cancer Incidence & Mortality, Females, Ontario, Lambton, Chatham & Windsor, 1986-2003**



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 17 - Age-Specific Breast Cancer Incidence, Females, Lambton & Ontario, 1995-2003**



\*Lambton is significantly higher than Ontario, p=0.05.

Source: Cancer Incidence 1986-2003, Cancer Care Ontario, Release 5, October 2006.

## Prostate Cancer

Based on SIR results, prostate cancer incidence rates in Lambton were higher than expected for both time periods studied: 23% (13-32%) higher between 1986 and 1994 and 14% (6-21%) higher between 1995 and 2003 (Table 2). Mortality rates were 22% (6-39%) higher than expected for the most recent time period, 1995-2003 (Table 3).

Age-standardized prostate cancer incidence rates increased in all regions examined between 1986 and 2003 (Figure 18). A rapid increase in the incidence of prostate cancer has been reported across Canada starting in 1990, when unsanctioned prostate specific antigen (PSA) screening started in Canada.<sup>40</sup> Rapid uptake of PSA screening in Lambton relative to other regions likely explains the dramatic increase in prostate cancer incidence during the early 1990's. As PSA screening rates have become more uniform across the province and the initial surge of detection in Lambton has ceased, incidence rates have become similar throughout Southwestern Ontario and are similar to provincial rates.

Prostate cancer mortality appears to have decreased among Ontario, Windsor-Essex and Chatham-Kent males since the late 1990's; however, this decline is not as pronounced in Lambton and local rates remain higher than other regions during the most recent years of study (Figure 18).

Prostate cancer incidence increases with age and is mainly a disease of older males (Figure 19). Lambton age-specific rates are higher than Ontario rates for males aged 45 to 64 and 75 years and older.

### *Screening*

PSA screening is controversial because it has not been shown to reduce mortality and because the effectiveness of interventions for prostate cancer has been questioned. However, early results from trials of PSA screening indicate that cancers can be detected at an earlier stage with screening. While it is unknown whether this will translate into improvements in mortality, the general consensus is that men should be informed of the availability of the test and its advantages and disadvantages. They should then make their own decisions about whether to be tested.<sup>40</sup>

According to the Canadian Community Health Survey (CCHS, Cycle 1.1, 2000/2001), the proportion of men 40 years of age and older who ever had a PSA blood test was significantly higher in the Essex-Kent-Lambton area [52.4% (48.4-56.4)] compared to Ontario [45.1% (43.5-46.7)]. In Lambton, approximately 53% of men reported ever having a PSA test. The proportion of men having this test within the last year was significantly higher in Lambton [74.2% (65.2-83.2)] versus Ontario [61.9% (60.0-63.8)].<sup>41</sup>

### *Risk factors*

Despite peaks due to the introduction of PSA screening, a long-term increase in prostate cancer incidence is still apparent across Canada. While early detection may partially explain this gradual increase, changes in risk factors may also be responsible.<sup>42</sup>

While little is known about the causes of prostate cancer, the following factors appear to increase one's risk of developing it:<sup>37</sup>

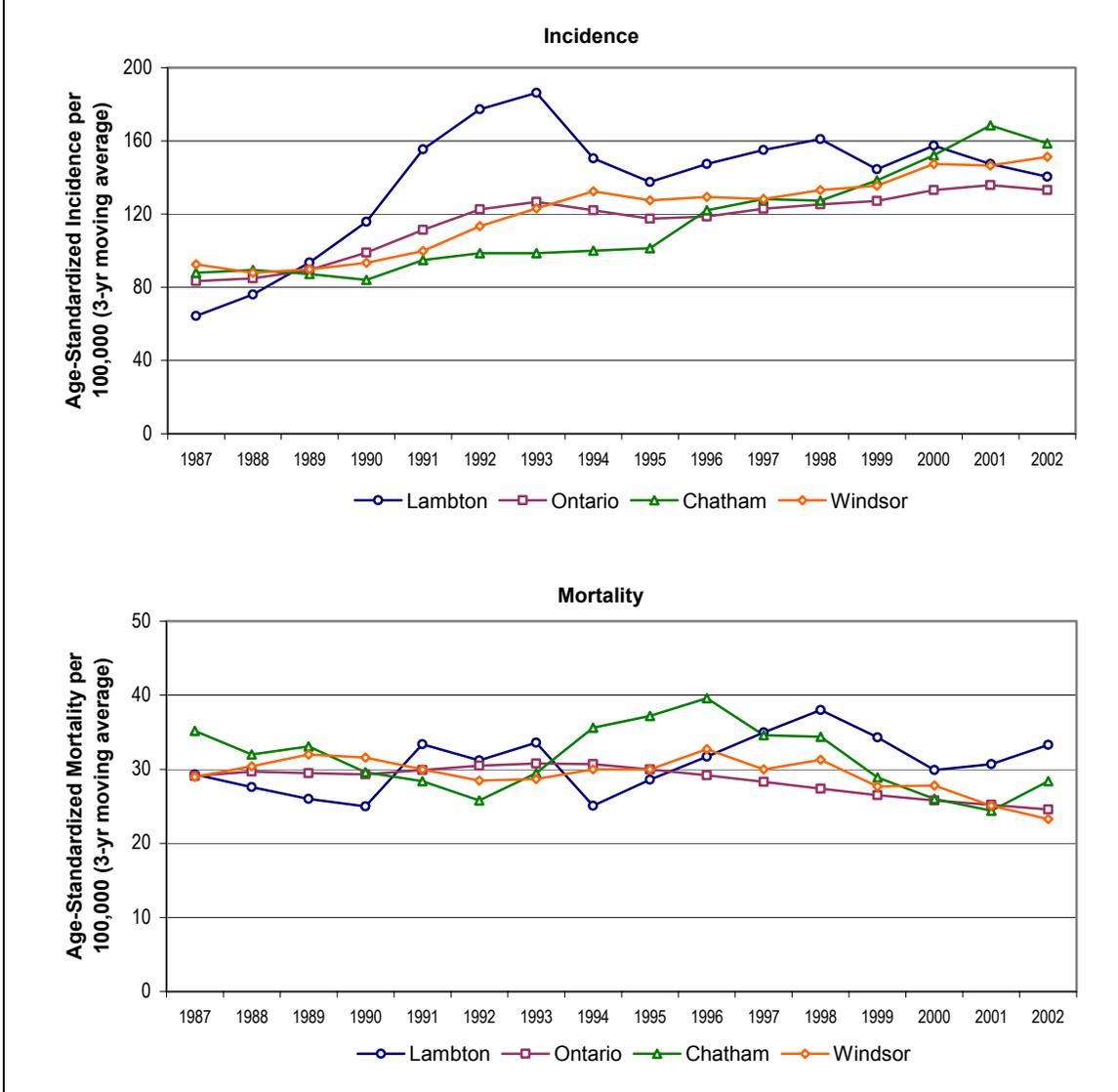
- age – particularly after 65 (uncommon in men under 50)
- family history of prostate cancer
- diet high in fat
- African ancestry

Many men with prostate cancer do not have any of these risk factors, so researchers are investigating the effects of several other factors, including<sup>37</sup>:

- Inherited genes
- Exposure to cadmium
- Exposure to dioxin
- Exposure to testosterone
- Lack of vitamin D
- Human papillomavirus (HPV)
- Sexually transmitted diseases
- Obesity
- Physical inactivity

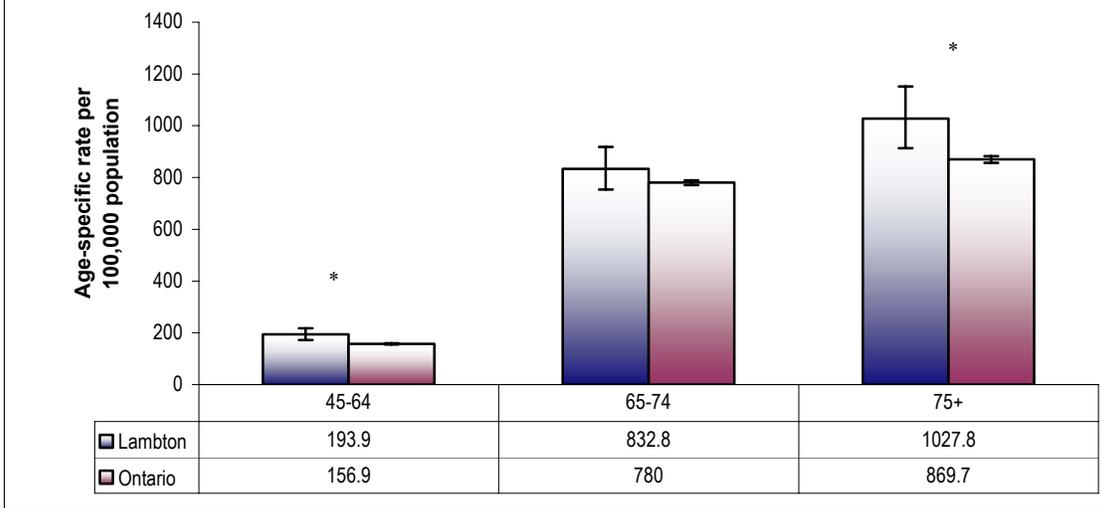
Due to the uncertainties about the risk factors for prostate cancer, prevention advice is premature; however, it is felt that a reduction in dietary fat intake may be wise.<sup>43</sup> While there is no local data about dietary fat intake, there is evidence that Lambton males may have a poorer diet than Ontario males (Table 5), leaving room for improvement.

**Figure 18 - Age-Standardized Prostate Cancer Incidence & Mortality, Males, Ontario, Lambton, Chatham & Windsor, 1986-2003**



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 19 - Age-Specific Prostate Cancer Incidence, Males, Lambton & Ontario, 1995-2003**



\*Lambton is significantly higher than Ontario, p=0.05.

Source: Cancer Incidence 1986-2003, Cancer Care Ontario, Release 5, October 2006.

## Melanoma of the Skin

Based on SIR results, melanoma rates in Lambton were higher than expected for both males [39% (14-64%)] and females [33% (7-59%)] between 1995 and 2003 (Table 2). Mortality rates did not differ significantly between Lambton and Ontario (Table 3).

While age-standardized incidence rates of melanoma have been relatively stable in Ontario, Windsor-Essex and Chatham-Kent between 1986 and 2003, Lambton rates have increased considerably since the mid 1990's and are well above regional and provincial rates (Figure 20). Note that mortality rates are not presented, as very few deaths due to melanoma occur in Lambton on a yearly basis. In general, melanoma is more common in males versus females and similar trends are seen in both sexes (Figure 21).

While incidence increases with age, the differences noted between Lambton and Ontario appear to be due to higher rates among those under 65 years of age (Figure 22). For males, incidence rates are higher in the 20 to 44 and 45 to 64 age groups, while in females, incidence is higher between the ages of 45 to 64 years.

The rate of melanoma in Ontario has increased over the past few decades and is much more common now than in the 1970s.<sup>44</sup> However, it is important to note that while melanoma is the most serious form of skin cancer, it is also the rarest form. The Ontario Cancer Registry does not collect data on other skin cancers (basal and squamous cell carcinomas) which account for over 90% of all skin cancers.<sup>45</sup> It is very difficult to gather statistics on non-melanoma skin cancer, because it occurs frequently and is usually treated successfully without hospitalization. Due to this lack of data, it is unknown whether Lambton also has elevated rates of these other skin cancers.

### *Risk factors*

The most important risk factor for developing melanoma is ultraviolet radiation. The main source of UV radiation is the sun, but indoor tanning beds and sun lamps are also becoming important sources of exposure. Other factors that appear to increase the risk of developing malignant melanoma are:<sup>37,46,47</sup>

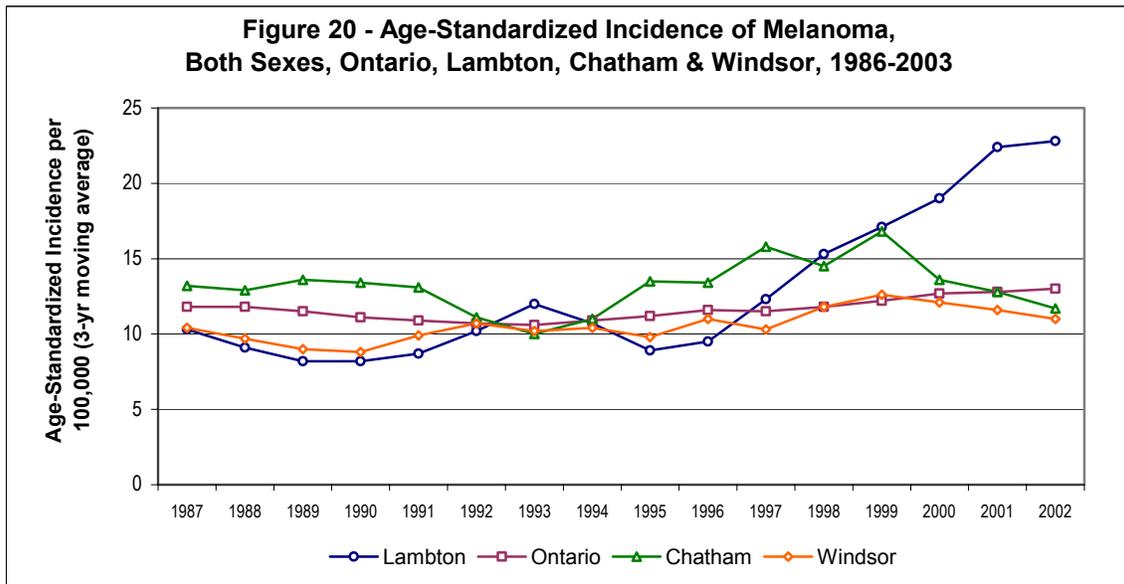
- Certain types and a large number of moles
- Family history of melanoma in more than one relative
- Blond or red hair
- Blue or green eyes
- Fair or freckled complexion
- A history of sunburns early in life
- Exposure to the sun through work and play

Some people develop skin cancer without any of these risk factors.

Based on a survey conducted in 2002 as part of the Rapid Risk Factor Surveillance System (RRFSS), only 17.5% (14.9-20.2%) of Lambton residents, aged 18 and older, identified sun exposure as a risk factor for cancer (813 residents surveyed). A similar survey in 2003 found that 44.8% (40.5-49.1%) of Lambton residents rarely or never used sunscreen (505 residents surveyed). Sunscreen use was less common among males

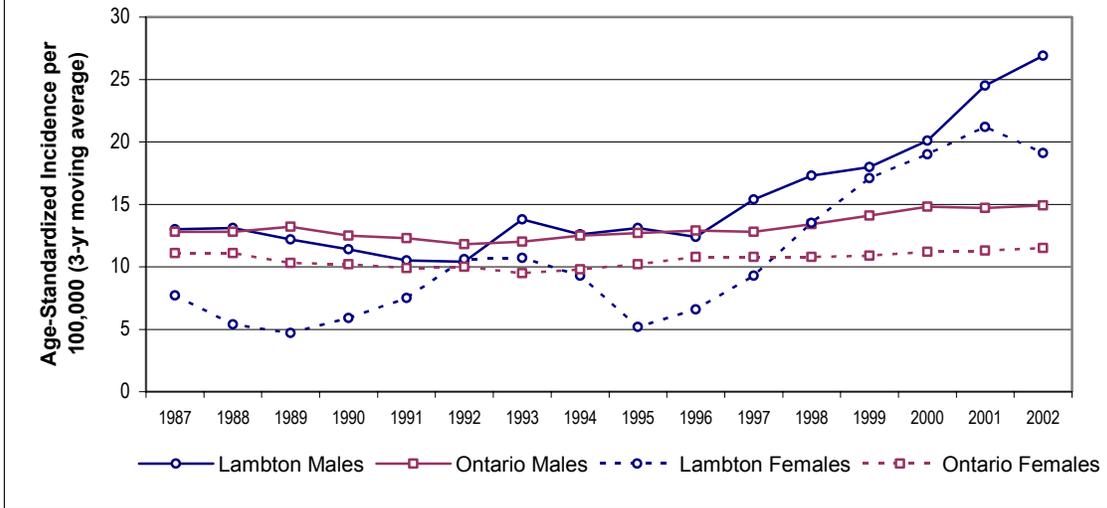
compared to females [54.2% (47.7-60.8%) versus 37.4% (31.7-43.0%) rarely or never used it]. It was also less common among younger (18-24 years) and older (65+ years) age groups, as compared to those 25 to 64 years old (Figure 23). Lambton did not differ significantly from Windsor-Essex (data not shown),<sup>48</sup> who also participated in RRFSS, so it appears that these measured factors cannot explain the higher rates in Lambton.

It is unknown whether Lambton residents spend more time outdoors than their regional or provincial counterparts, either for leisure or occupational purposes. It is also unknown whether there are relatively higher screening rates in Lambton that may lead to higher detection rates. Melanoma incidence rates should continue to be monitored in Lambton County and sun safety messages should be emphasized to residents.



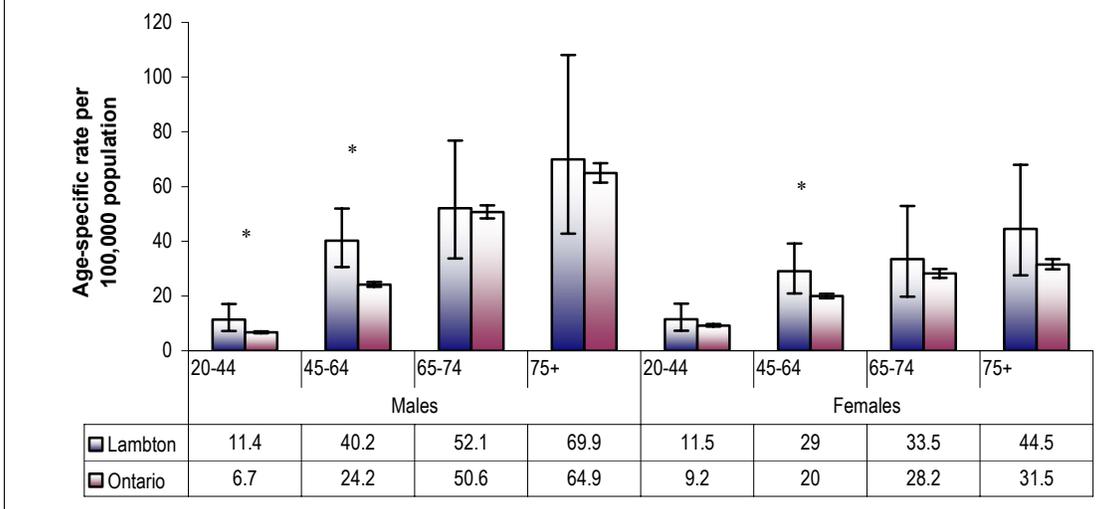
Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 21 - Age-Standardized Incidence of Melanoma by Gender, Ontario & Lambton, 1986-2003**



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

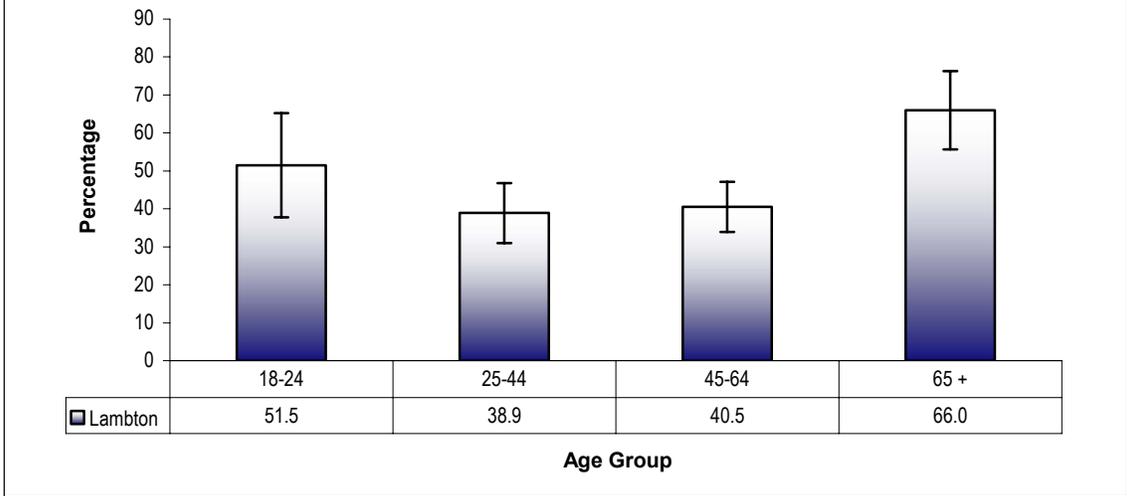
**Figure 22 - Age-Specific Cancer Incidence, Melanoma, Males & Females, Lambton & Ontario, 1995-2003**



\*Lambton is significantly higher than Ontario, p=0.05.

Source: Cancer Incidence 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 23 - Percentage of Lambton Residents Reporting Rarely or Never Using Sunscreen, by Age, 2003**



Source: Rapid Risk Factor Surveillance System (RRFSS), Prevalence Data, 2003.

## Testicular Cancer

Based on SIR results, testicular cancer rates in Lambton were 46% (1-92%) higher than expected between 1995 and 2003 (Table 2). While this result was statistically significant, the confidence interval is very wide; therefore, this result should be interpreted with caution due to the small number of cases occurring in Lambton per year (seven or fewer). There were too few deaths from testicular cancer to compare local and provincial mortality rates (Table 3). Few people who get testicular cancer die from it because treatments are so effective.<sup>49</sup>

*Figure 24* shows the age-standardized incidence rates for Ontario and Southwestern Ontario for the years 1986 to 2003. While Ontario rates have increased gradually between 1986 and 2003, regional rates vary due to the small number of cases. Lambton rates were lower than provincial rates until the early 1990's, rose and peaked in the mid 1990's and then returned to just above provincial rates. For the most recent years of data, Lambton rates are similar to regional rates. Due to the small number of cases and large variability of testicular cancer rates in Lambton, further surveillance is needed to understand local trends.

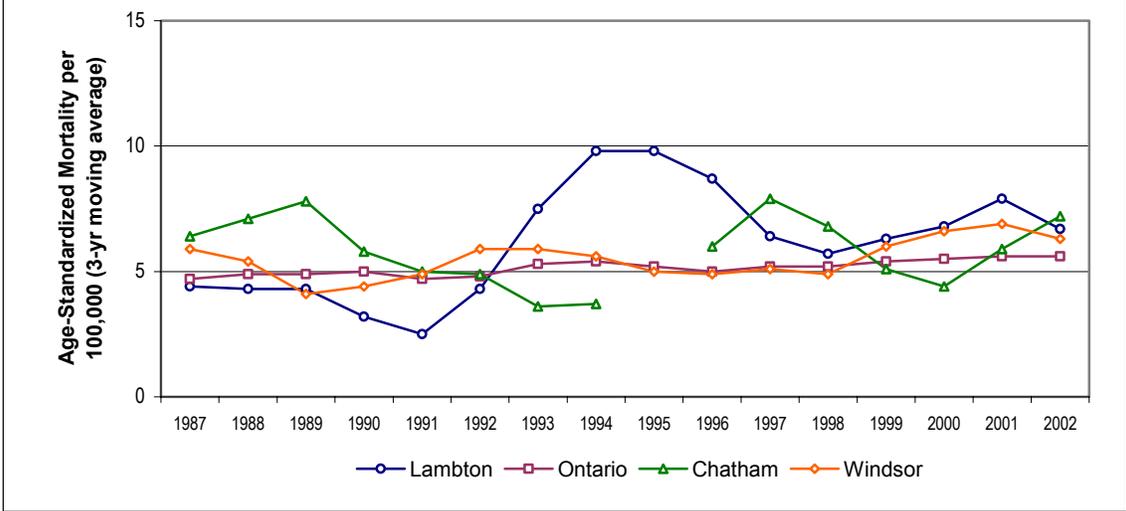
### *Risk Factors*

There is no single cause of testicular cancer but some factors seem to increase the risk of developing it:<sup>50</sup>

- Delayed descent of the testicles (if not corrected early)
- Age – 80% of testicular cancer cases are diagnosed before age 45.<sup>51</sup>
- Family or personal history of testicular cancer
- Abnormal development of the testicle

In Canada, testicular cancer is the most common cancer in young men and its incidence has increased significantly since 1980.<sup>51,52</sup> Since the risk factors for testicular cancer are not well defined, there is no accepted explanation for the increasing trend. Since this cancer occurs at a relatively young age, prenatal exposures may be important. In particular, elevated maternal estrogen levels during pregnancy, including the use of diethylstilbestrol (a drug used to prevent miscarriages between 1940 and 1970), have been suggested to increase risk, although evidence is not strong or consistent.<sup>51,52</sup> Other factors, such as age at puberty and exposure to estrogen-like compounds in the environment, have also been suggested as possible risk factors, though supporting evidence is limited and further investigation is needed.<sup>51,52</sup>

**Figure 24 - Age-Standardized Testicular Cancer Incidence Rates, Males, Ontario, Lambton, Chatham & Windsor, 1986-2003**



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.  
 Note: The data point for 1995 for Chatham is suppressed, as the rate is based on a case count of less than 5.

## Cervical Cancer

Based on SIR/SMRs, there were significantly fewer cases and deaths from cervical cancer than expected among Lambton females between 1986 and 1994. There were no significant differences between Lambton and Ontario in cervical cancer incidence or mortality between 1995 and 2003 (Table 2 & 3).

For most years studied, age-standardized cervical cancer incidence rates in Lambton were lower or similar to those in Ontario (Figure 25). Similar to regional rates, Lambton's rate fluctuates over time due to the small number of cases per year (average: 6 cases per year). While Ontario rates have declined over time, the same trend is not apparent in Lambton. There are too few deaths due to cervical cancer in Lambton to examine mortality trends.

### *Screening*

Cervical cancer incidence and mortality rates in Canada have been declining for many decades, largely due to the widespread use of Pap test screening.<sup>3</sup> Pap tests can detect cell changes in the cervix before they turn into cancer. They can also detect most, but not all, cervical cancers at an early, curable stage.<sup>53</sup>

The Ontario Cervical Screening Guidelines recommend that:<sup>54</sup>

- All women who are, or have ever been, sexually active should be screened.
- Screening should be done annually until there are at least three consecutive negative Pap tests.
- After three annual negative Pap tests, screening should continue every 2-3 years.
- Screening may be discontinued after the age of 70 if a woman has had at least three negative tests in the past 10 years.

Pap test screening rates are similar in Lambton and Ontario for women between the ages of 18 and 69 (Table 8). Screening rates peak among females aged 25-34 and are lowest for those 18-19 and 64-69 years old (Figure 26). While rates are high compared to other cancer screening practices, they still fall short of the *Cancer 2020 Action Plan* target of 95% and do not appear to be changing over time.<sup>4</sup>

**Table 8: Percentage of women aged 18-69 who reported having a Pap test in the past three years in Lambton and Ontario.**

	2000/2001	2003	2005
Lambton	75.7 (70.7-80.7)	76.5 (71.0-82.0)	74.1 (67.2-81.0)
Ontario	74.2 (73.2-75.2)	73.9 (72.9-74.9)	72.9 (71.8-74.0)

Source: Canadian Community Health Survey, Cycle 1.1 (2000/01), Cycle 2.1 (2003), Cycle 3.1 (2005).

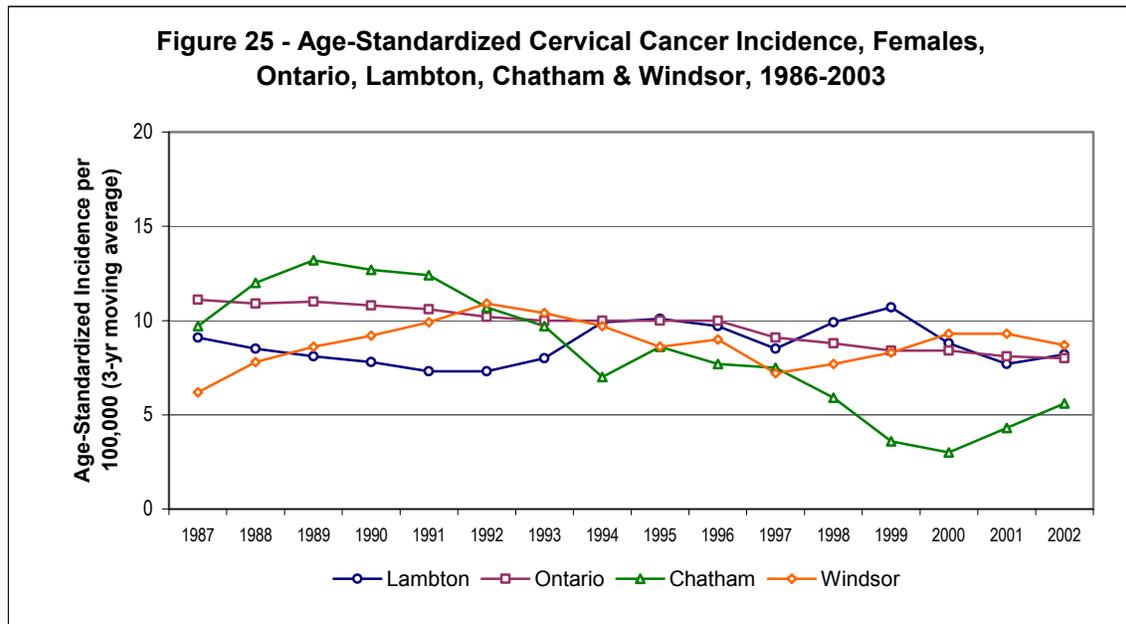
### *Risk Factors*

The main risk factor for developing cervical cancer is infection of the cervix with human papillomavirus (HPV). HPV is a group of more than 100 viruses. Some types of HPV can be passed easily from person to person through sexual contact. While most HPV infections usually go away without treatment, certain types of sexually transmitted HPV can cause changes to cells in the cervix that may lead to cervical cancer.

Other factors that appear to increase the risk of developing cervical cancer include:<sup>37</sup>

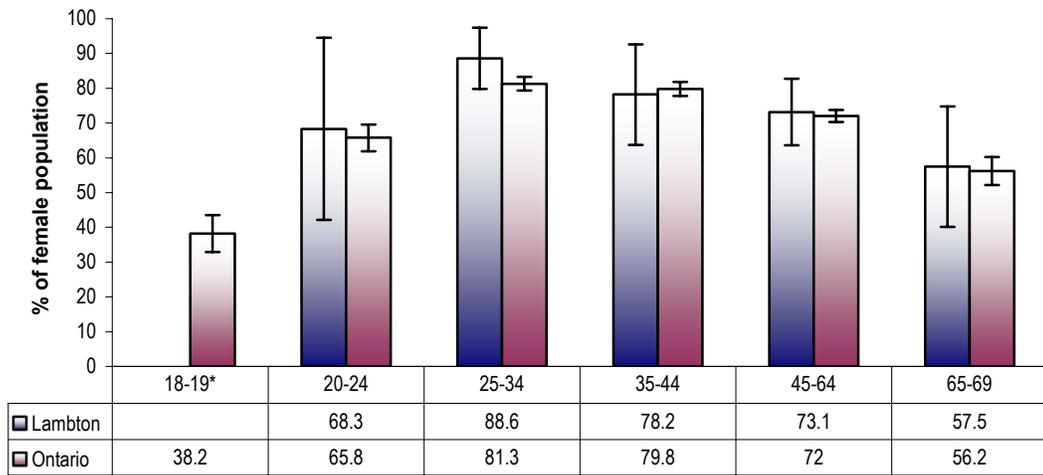
- not having regular Pap tests
- early age of sexual activity
- multiple sex partners
- smoking
- having a weakened immune system (e.g. AIDS)
- using birth control pills for a long time
- having taken diethylstilbestrol (DES) or being the daughter of a mother who took DES (a form of estrogen that was used between 1940 and 1971 to treat women with certain problems during pregnancy, such as miscarriages)

The HPV vaccine, Gardasil™, was approved for use in Canada by Health Canada on July 10, 2006. This new vaccine provides protection against four strains of HPV, two of which are responsible for 70% of cervical cancers. Beginning in the fall of 2007, the HPV vaccine is being offered to all female students in Grade 8 across Ontario. Public Health Units are responsible for administering the vaccination program. It is hoped that this program will begin protecting females from HPV and prevent many future cases of cervical cancer in Ontario.<sup>53</sup>



Source: Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

**Figure 26 - Percentage of women who reported having a Pap test within the past three years, Lambton & Ontario, 2005**



\*Data for Lambton suppressed due to high variability  
 Source: Canadian Community Health Survey, Cycle 3.1 (2005).

## Childhood Cancer

In Canada, childhood cancer is rare, and most children who develop cancer will survive their illness due to effective treatment options.<sup>3</sup> The most common cancers affecting children in Canada are leukemias (25% of new cases), lymphomas (17%), and cancers of the brain and nervous system (17%).<sup>55</sup>

Table 8 shows age specific cancer rates for Lambton and Ontario children and adolescents aged 0-19 years. Data for males and females are combined due to the small number of cases occurring in Lambton during each time interval (approximately 6 cases per year for all sites combined). There were no significant differences between Lambton and Ontario children for all cancers, leukemias, brain cancers, lymphomas (Hodgkin's and Non-Hodgkin's combined) or soft tissue sarcomas.

**Table 8: Age-specific cancer incidence rates for Lambton and Ontario, per 100,000 children aged 0-19 years (95% confidence interval).**

	1986-1994		1995-2003	
	Lambton	Ontario	Lambton	Ontario
<b>All Sites</b>	16.4 (12.4-21.2)	16.3 (15.8-16.8)	16.0 (12.0-21.0)	16.2 (15.7-16.6)
<b>Leukemia</b>	3.7 (2.0-6.3)	4.3 (4.1-4.6)	2.2 (0.9-4.4)	4.2 (4.0-4.4)
<b>Brain and Nervous System</b>	2.8 (1.4-5.2)	2.7 (2.5-2.9)	2.2 (0.9-4.4)	2.4 (2.2-2.6)
<b>Lymphoma</b>	2.0 (0.8-4.1)	2.7 (2.5-2.9)	2.2 (0.9-4.4)	2.5 (2.3-2.7)
<b>Soft Tissue Sarcoma</b>	1.4 (0.5-3.3)	0.8 (0.7-0.9)	2.2 (0.9-4.4)	1.0 (0.8-1.1)

Cancer Incidence and Mortality 1986-2003, Cancer Care Ontario, Release 5, October 2006.

### *Risk Factors*

In most cases, the causes of childhood cancers are unknown. Known risk factors include: certain genetic conditions, prenatal exposure to ionizing radiation (e.g. X-rays), previous radiation or chemotherapy for cancer treatment, viral infections (e.g. Epstein-Barr virus, HIV), and inherited or acquired immune system problems.<sup>56,57</sup> Researchers continue to investigate potential risk factors and look for primary prevention opportunities, but the major advancements thus far have been in the treatment of childhood cancers and the management of complications.<sup>56</sup>

## Conclusion

This report provides an overview of cancer incidence and mortality rates in Lambton County between 1986 and 2003. It examines how these rates compare to provincial and regional rates and describes various known and potential risk factors for specific cancers. While these results increase our understanding of cancer trends in our community, many questions remain as to *why* we see some of these trends.

Cancer is a complex grouping of several diseases, all with different characteristics and risk factors. Genetic, lifestyle and environmental factors interact along complex pathways, eventually leading to the development of cancer at a particular site. Also, since individuals with similar characteristics, such as socioeconomic status, occupation, lifestyle, age and ethnicity, tend to live in similar areas, it is difficult to separate out and understand the effects of each factor.

Based on the results presented in this report, Lambton does not differ significantly from Ontario or Southwestern Ontario for many cancer types. Where there was a significant difference noted between Lambton and Ontario, trends over time, screening rates and risk factors were further examined.

In some cases, elevated incidence rates appear to be influenced by higher screening rates locally (e.g. prostate and colorectal cancers). In other cases, elevated rates can largely be explained by exposure to a specific risk factor (e.g. asbestos exposure and mesothelioma and lung cancer). For breast cancer, while incidence rates were higher in Lambton versus Ontario between 1995 and 2003 on average, trends show fluctuations over time and have not been consistently above provincial rates. Finally, for some cancers, further investigation is needed to understand trends, either due to the small number of cases (e.g. testicular cancer) or because the level of risk in our community is not well understood (e.g. melanoma).

While all the results presented in this report are important, specific trends of concern in Lambton include:

- Elevated lung cancer incidence and mortality rates, particularly the increasing rates observed among females.
- Elevated mesothelioma incidence and mortality rates among males.
- Elevated and increasing melanoma incidence rates among males and females, particularly those less than 65 years of age.

Also, based on data presented about known risk factors for cancer, particular areas of focus in Lambton should include:

- Smoking
- Occupational exposures
- Diet, particularly among males
- Alcohol use, particularly among males
- Ultraviolet radiation exposure

The increasing number of cancer cases in Lambton is largely due to our aging population and this has important implications for the health care system. While

prevention is the key to reducing the burden of cancer illness and death over time, services aimed at treating affected individuals will continue to be heavily stressed as the 'baby boomer' generation ages.

It is estimated that if the Cancer 2020 targets are met in only three areas (reducing smoking, increasing fruit and vegetable consumption and increasing physical activity), thousands of new cancer cases could be avoided.<sup>4</sup> In fact, approximately half of all cancer deaths are related to tobacco use, diet and physical activity.<sup>58</sup> Even when Lambton does not differ significantly from Ontario with respect to risk factors for cancer, improvements are necessary to reach these targets and to reduce the burden of cancer.

While further research is needed to understand the risk factors for cancer, particularly environmental and occupational factors and gene-environment interactions, we must continue to focus on reducing risk associated with known factors. Therefore, the implementation and continuation of effective interventions aimed at cancer prevention and early detection must continue to be a focus of public health efforts.

## **Acknowledgements**

The section “Understanding the Data” was adapted from a report by the Durham Region Health Department, *Radiation & Health in Durham Region 2007*.

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