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Cancer Risk Factors in Ontario

Alcohol



Prepared by Stephanie Young, Elisa Candido, Beth Theis and Loraine Marrett, Prevention and Surveillance, Prevention and Cancer Control, Cancer Care Ontario.

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Maria Chu, Alice Peter (Prevention and Surveillance, Cancer Care Ontario); Usman Aslam (Aboriginal Cancer Control Unit, Cancer Care Ontario); Sheila-Mae Young (Central East Regional Cancer Program, Cancer Care Ontario); John Atkinson, Elizabeth Holmes, Lynda MacNiven (Canadian Cancer Society, Ontario Division); Natalie Bocking, Jeremy Herring, Sue Keller-Olaman, Benjamin Rempel (Public Health Ontario); Norman Giesbrecht, Jürgen Rehm (Centre for Addiction and Mental Health); Carolyn Gotay (School of Population and Public Health, University of British Columbia).

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Communications
Cancer Care Ontario
620 University Avenue, Toronto, Ontario, M5G 2L7
Telephone: 416 971 9800
www.cancercare.on.ca
communications@cancercare.on.ca

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FOREWORD



Cancer Risk Factors in Ontario: Alcohol is the third report in our Cancer Risk Factors in Ontario series. It follows the January 2014 release of *Cancer Risk Factors in Ontario: Tobacco*, which provided information on tobacco use in Ontario as it relates to cancer, and estimated the smoking-related cancer risk in the population. The first report, *Cancer Risk Factors in Ontario: Evidence Summary*, reviewed the epidemiologic evidence for a wide range of cancer risk factors. This report series supports one of Cancer Care Ontario's key strategic priorities to reduce chronic disease through prevention.

Alcohol consumption is an established cause of several cancers, as well as other chronic and acute diseases. Awareness of the link between alcohol consumption and cancer is low, with only a third of Canadians aware that they can lower their risk of cancer by reducing their alcohol consumption. While alcohol is a risk factor for cancer when consumed in any quantity, light to moderate levels of consumption can protect against cardiovascular disease. This poses unique challenges for increasing awareness of the link between alcohol consumption and cancer.

Cancer Risk Factors in Ontario: Alcohol presents the prevalence and distribution of alcohol consumption in Ontario, and examines alcohol consumption from a cancer perspective, including estimates of the alcohol-associated cancer burden in the Ontario population. It also offers a detailed examination of socio-demographic variation in alcohol consumption, plus a special section on off-reserve Aboriginal Peoples. The primary source of data for this report is the Canadian Community Health Survey (CCHS), a national cross-sectional survey conducted by Statistics Canada.

The intent of *Cancer Risk Factors in Ontario: Alcohol* is to complement and supplement other reports on alcohol consumption in Ontario and serve as a resource for public health and health professionals, policy-makers and planners involved in both cancer control and alcohol control in the province. Future reports in this series will focus on other well-established cancer risk factors.

Linda Rabeneck, MD MPH FRCPC
Vice-President, Prevention and Cancer Control
Cancer Care Ontario



HIGHLIGHTS

CANCERS ATTRIBUTABLE TO ALCOHOL CONSUMPTION

- In this report, between 1,000 and 3,000 cases of cancer diagnosed in Ontario during 2010 (2%–4% of all new cancer cases) are estimated to be attributable to alcohol consumption. Drinking alcoholic beverages increases the risk of cancers of the oral cavity and pharynx, esophagus, larynx and liver. It is also a cause of colorectal and breast cancers, two of the three leading causes of cancer death in Ontario.

EXCEEDING CANCER PREVENTION RECOMMENDATIONS FOR ALCOHOL CONSUMPTION

- In 2012, nearly 1 million, or 8.8%, of Ontario adults aged 19 years and older reported drinking more alcohol than the upper limit recommended for cancer prevention by the World Cancer Research Fund/American Institute for Cancer Research (i.e., no more than two drinks a day for men and one drink a day for women).¹
- Although the prevalence of drinking in excess of the cancer prevention recommendations has historically been higher in adult males than females, the gap between the sexes has closed in recent years. In 2012, 9.1% of males and 8.6% of females reported exceeding the recommendations.
- While the prevalence of drinking in excess of the daily cancer prevention recommendations averaged across one week was highest in the youngest age group (19–29), the oldest age group (65 and older) exceeded the recommendations on more days per week.
- The prevalence of drinking in excess of the cancer prevention recommendations varies significantly across the province; prevalence among Ontario's 14 Local Health Integration Networks (LHINs) ranged from 5.5%–12.6%, and from 5.7%–15.0% across Ontario's 36 public health units (PHUs).
- Significant socio-demographic inequalities exist for drinking in excess of the cancer prevention recommendations; prevalence was significantly higher among adults living in rural compared with urban areas, among the highest income group compared with all lower income groups, and among Canadian-born adults compared with immigrants in Canada for more than 10 years (numbers among immigrants in Canada 10 years or less are too small for valid estimates).
- In 2012, 3.7% of Ontario males and 2.6% of Ontario females aged 19 and older reported both drinking in excess of the cancer prevention recommendations and being current smokers. Smokers who also drink alcohol are at an especially increased risk for cancers of the oral cavity, pharynx, larynx and esophagus (squamous cell carcinoma).^{2,3}



LEVELS OF ALCOHOL CONSUMPTION

- In 2012, a higher proportion of Ontario's adult females than males reported abstaining from alcohol in the past 12 months, while a higher proportion of males than females reported higher levels of consumption (eight or more drinks during the past week).
- The proportion of Ontarians who said they did not drink during the past 12 months increased significantly between 2003 (males 14.6%, females 23.6%) and 2012 (males 18.0%, females 26.2%), which may be attributable to higher numbers of immigrants who do not drink alcohol rather than to shifts in individual drinking behaviour.
- The prevalence of abstaining during the past 12 months was lowest in younger adults (ages 19–29) and generally rose with increasing age.
- The proportion of the population abstaining during the past 12 months varies significantly across the province, ranging from 13.4%–31.5% among Ontario's 14 LHINs.
- The proportion of adult Ontarians abstaining during the past 12 months was significantly higher among adults living in urban than in rural areas, and decreased significantly with increasing level of education, with increasing income and among immigrants who have been in Canada for longer than 10 years compared with more recent immigrants.
- Males, on average, consumed more drinks per week than females in 2012 (median consumption 2.4 and 0.6, respectively).
- Median drink consumption was significantly higher among adults living in rural than in urban areas, among the most educated than the least educated, among the highest income group than the lowest, and among Canadian-born than immigrants.

ABORIGINAL PEOPLES (OFF-RESERVE)

- In keeping with Cancer Care Ontario's commitment to working on cancer control with Aboriginal Peoples, a section of this report describes alcohol consumption in off-reserve Aboriginal populations.
- Drinking in excess of the cancer prevention recommendations was slightly more prevalent among off-reserve First Nations and Métis populations than non-Aboriginals, although the differences were not statistically significant. Roughly 5% of off-reserve First Nations and Métis reported drinking in excess of the cancer prevention recommendations and being current smokers.
- Significant differences in alcohol consumption were observed for some off-reserve Aboriginal populations; a significantly smaller proportion of Métis adult females than non-Aboriginal adult females reported abstaining during the past 12 months, while Métis adult males had significantly higher median drink consumption during the past week than non-Aboriginal adult males.



IMPLICATIONS FOR CANCER CONTROL

- **Impact on cancer burden.** Because alcohol consumption is a **modifiable** risk factor for several cancers, the findings of this report demonstrate that a substantial number of cancers diagnosed in Ontario (as many as 3,000 annually) could be prevented by reducing alcohol consumption in the population. This highlights a considerable opportunity for cancer prevention efforts in the province and provides a reasonable estimate of the potential impact of successful alcohol-related prevention efforts on the cancer burden in Ontario.
- **A cancer prevention opportunity.** The majority of Ontario adults drink alcohol to some extent, with only 18.0% of males and 26.2% of females reporting that they had not had a drink in the past 12 months.
 - Awareness of the link between alcohol consumption and cancer is low among the Canadian public—survey data show that only a third of Canadians are aware that they can lower their risk of cancer by reducing their alcohol consumption.⁴ These findings highlight a substantial opportunity for increasing public awareness of alcohol as a carcinogen and ultimately reducing alcohol consumption in the Ontario population.
 - While just under 9% of Ontario adults aged 19 years and older (nearly 1 million people) drink more alcohol than recommended for cancer prevention (i.e., more than two drinks per day for men and more than one drink per day for women), this figure has not declined since at least 2003 and may be an underestimate because of under-reporting of alcohol consumption.
 - Although alcohol is a risk factor for cancer when consumed in any quantity, light to moderate levels of consumption can protect against cardiovascular disease. This poses unique challenges for increasing awareness of the link between alcohol consumption and its negative health effects, such as cancer.
- **Priority areas for prevention measures.** Alcohol consumption data play a key role in identifying opportunities and determining strategies for cancer prevention by allowing health professionals and policy-makers to focus their efforts on specific groups that tend to consume more alcohol.
 - Because the prevalence of consuming alcohol in excess of the cancer prevention recommendations is highest among Ontario adults aged 19–29, young adults are increasing their risk of getting cancer in the future, given that the cancer-related effects of excess drinking may not materialize until at least 10 years later.
 - The proportion of the population that exceeds the cancer prevention recommendations for alcohol consumption varies substantially across geographic regions in Ontario.
 - Ontarians who drink in excess of the cancer prevention recommendations are more likely to smoke. This small but important subgroup of the population has a higher risk for some cancers due to the synergistic interaction between tobacco smoking and alcohol consumption. Comprehensive prevention initiatives could be developed to address both risk factors.



- The prevalence of exceeding the cancer prevention recommendations for alcohol consumption varies significantly across several socio-demographic factors, often in different ways than tobacco use. While smoking is more common in lower income groups, drinking alcohol in excess of cancer prevention recommendations is more common in higher income groups, who may be unaware of this aspect of cancer risk.
- Cancer Care Ontario's *Aboriginal Cancer Strategy II (ACS II)* has a plan for addressing risk and preventing cancers caused by many factors, including alcohol, in Ontario's First Nations, Inuit and Métis (FNIM) populations.
- **Monitoring the impact of policy changes.** Evidence supports a number of public policy measures for decreasing alcohol consumption, including reducing population density of outlets and restricting days and hours of sale.⁵ Increasing the price of alcohol is also a highly cost-effective way to reduce alcohol-attributable cancer risk, as well as other alcohol-related harms.⁶ Time trends in the kinds of alcohol consumption data shown in this report, in conjunction with sales information, can help assess the impact of these and other relevant policies.



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ABOUT THIS REPORT



- We hope that this report, with its focus on alcohol as it relates to cancer, will supplement other reports on alcohol consumption in Ontario, and serve as a resource for public health and health professionals, policy-makers and planners involved in both cancer control and alcohol control in the province.
- *Cancer Risk Factors in Ontario: Alcohol* presents the distribution of alcohol consumption in Ontario and features:
 - alcohol-associated cancer risk in the population
 - alcohol consumption behaviours reported according to Local Health Integration Networks and public health units
 - socio-demographic differences in alcohol consumption behaviours
 - the combined prevalence of smoking and alcohol consumption
 - alcohol consumption behaviours in off-reserve Aboriginal populations in Ontario
- This report is the third in Cancer Care Ontario's Cancer Risk Factors in Ontario series. The first report of the series, *Cancer Risk Factors in Ontario: Evidence Summary*, summarized the epidemiologic evidence for a wide range of cancer risk factors, including alcohol. The second report provided information on the prevalence and distribution of tobacco use and cessation in Ontario, as it relates to cancer, and smoking-related cancer risk in the population.
- The primary source of data for this report is the Canadian Community Health Survey (CCHS), Ontario Share files (full survey waves 2000/01, 2003 and 2005 and half-survey annual waves 2007–2012). The CCHS is a national cross-sectional survey conducted by Statistics Canada, with a large sample size considered representative of 98% of the Canadian population aged 12 years and older (individuals who are homeless, residents of First Nations reserves and other Aboriginal settlements, institutional residents, full-time members of the Canadian Forces and residents of certain remote regions are excluded).
- Studies suggest that incidence rates of some alcohol-related cancers, such as colorectal cancer, have increased rapidly over time within Ontario's Aboriginal populations.⁷ Cancer Care Ontario's *Aboriginal Cancer Strategy II (ACS II)* outlines a plan for addressing risk and preventing cancer in Ontario's First Nations, Inuit and Métis (FNIM) communities. The special section in this report on alcohol consumption in off-reserve Aboriginal Peoples provides valuable information that can be used to support cancer control initiatives specific to FNIM populations.
- Data tables for the figures in this report are available online, along with slides for presentation. Methods and indicator definitions are included in the appendices.



1. CONTEXT

1.1 WHY IS ALCOHOL CONTROL IMPORTANT FOR CANCER AND CHRONIC DISEASE PREVENTION?

- Drinking alcoholic beverages is a major preventable cause of morbidity and mortality. Alcohol consumption has a causal impact on a number of chronic and acute disease outcomes, including cancer, alcohol use disorders and depressive disorders, preterm birth complications and fetal alcohol syndrome, and intentional and unintentional injuries. Heavy alcohol consumption is also causally associated with ischaemic heart disease, ischaemic stroke and diabetes mellitus.⁸
- Alcoholic beverages, such as beer, wine and spirits, have been designated as carcinogenic to humans by the International Agency for Research on Cancer (IARC) in its “Group 1” category, meaning there is sufficient evidence of carcinogenicity in humans. Epidemiologic evidence shows that drinking alcoholic beverages increases the risk of cancers of the oral cavity and pharynx, esophagus (primarily squamous cell carcinoma), larynx and liver. It is also a cause of colorectal and breast cancers, two of the three leading causes of cancer death in Ontario. Pancreatic cancer may also be caused by alcohol consumption, although more research is needed to confirm this association.²
- **There is no clear “safe limit” of alcohol intake to prevent an increased risk of cancer.**¹ Even small amounts of alcohol have been shown to increase the risk of some cancers. The relative risk of oral and pharyngeal cancers, for example, is increased by 21% for those consuming one drink* or less per day compared to non-drinkers, and the risk of these cancers increases with the amount consumed.⁹ Similarly, the relative risk of female breast cancer is increased by 7%–10% with every 10 g/day increase in alcohol consumption.^{1,10,11} Heavy alcohol drinkers (intake of four or more drinks per day) are at a substantially increased risk of cancer.^{9,10,12–15}
- All types of alcoholic beverages increase the risk of cancer, suggesting that the increased risk is due to ethanol, a human carcinogen.² Several aspects of alcohol-related cancer risk remain unclear, including whether and how cancer risk is affected by patterns of alcohol consumption (e.g., binge drinking) as opposed to the amount of alcohol consumed, the number of years after initiating drinking when the impact on risk becomes the greatest, and whether the potential for alcohol-related cell damage is higher at certain ages.¹⁶
- Alcohol may increase cancer risk in several ways,¹⁷ including:
 - reactive metabolites of alcohol, such as acetaldehyde, may be carcinogenic and able to damage human DNA
 - alcohol may act as a solvent that allows other carcinogens to penetrate cells more easily and cause genetic damage
 - the production of potentially damaging free radical oxygen through the metabolism of alcohol may mediate its effects

*In Canada, one standard alcoholic drink contains 13.6 g of alcohol—a 341 ml (12 oz) bottle of 5% beer, 142 ml (5 oz) glass of wine, or a 43 ml (1.5 oz) shot of distilled liquor.



- alcohol increases the production of estrogen, which can increase the risk of some cancers, such as breast
- the diets of people who are heavy alcohol drinkers may be lacking essential nutrients, which may make body tissues more susceptible to carcinogenesis
- The effect of cessation of alcohol consumption on cancer risk has not been studied extensively for all associated cancer types. Recent meta-analyses suggest, however, that the risk of cancers of the head and neck,¹⁸ the esophagus^{18,19} and the larynx²⁰ is significantly reduced after cessation, although risk appears to remain elevated above that of never-drinkers for many years after cessation (15 to more than 20 years).

1.2 SYNERGISM BETWEEN ALCOHOL CONSUMPTION AND TOBACCO SMOKING

- For some cancers, particularly those of the oral cavity, pharynx, larynx and esophagus (squamous cell carcinoma),^{2,3} there is a synergistic interaction between tobacco smoking and alcohol consumption, whereby the risk for these cancers among people who both drink alcohol and smoke tobacco is much greater than among people who only smoke or drink.
- In general, the risk of cancers of the oral cavity, pharynx, larynx and esophagus is much higher among people who are both heavy drinkers and heavy smokers than among people who do not drink or smoke.

1.3 GUIDELINES AND RECOMMENDATIONS FOR ALCOHOL CONSUMPTION

At an individual level, guidelines and recommendations for alcohol consumption patterns have been developed to minimize the potential short- and long-term harms of alcohol. These include an internationally developed cancer prevention recommendation and Canada's low-risk alcohol drinking guidelines:

- **Maximum alcohol recommendations for cancer prevention.** Although in 2007 the World Cancer Research Fund and the American Institute for Cancer Research developed the maximum recommended intake of alcohol to prevent an increased risk of cancer, these organizations acknowledge that there is **no established "safe limit"** to prevent an increased risk of cancer. Their recommendations were developed to take into account that light to moderate alcohol consumption can protect against cardiovascular disease.

The World Cancer Research Fund/American Institute for Cancer Research recommendation is specific to cancer and used by the Canadian Partnership Against Cancer and Cancer Care Ontario:

- "If alcoholic beverages are consumed, limit consumption to no more than two drinks per day for men and one drink per day for women."¹

The Canadian Cancer Society recommendations are slightly more conservative, using the wording "less than" instead of "no more than" to reflect the current evidence that there is



no known safe level of alcohol consumption for cancer prevention and that the less alcohol consumed, the lower the risk of cancer.²¹

- **Canada's Low-Risk Alcohol Drinking Guidelines.** Published by the Canadian Centre on Substance Abuse, *Canada's Low-Risk Alcohol Drinking Guidelines* aim to provide consistent information to Canadians, allowing them to moderate their alcohol consumption and reduce short- and long-term alcohol-related harm. These guidelines have support from federal, provincial and territorial health ministers, as well as several public health organizations. The low-risk guidelines pertain to a broad group of health effects and the alcohol amounts specified in them are higher than those in recommendations for cancer prevention:^{22,23}
 - Reduce long-term health risks by drinking no more than 10 drinks* per week, with no more than two drinks per day on most days, for women and no more than 15 drinks per week, with no more than three drinks per day on most days, for men.
 - Reduce your risk of injury and harm by drinking no more than three drinks (for women) and four drinks (for men) on any one day. Stay within the weekly limits outlined above.
 - The remaining three guidelines address drinking by youth and situations when drinking should be avoided, such as during pregnancy.

As part of their Low-Risk Drinking Guidelines Topic Summaries series, the Canadian Centre for Substance Abuse recently released *Cancer & Alcohol*, which promotes the Canadian Cancer Society alcohol consumption recommendation for cancer risk reduction and acknowledges that alcohol amounts in their cancer prevention guidelines are lower than those in *Canada's Low-Risk Alcohol Drinking Guidelines*.

Throughout this report, alcohol consumption is measured in relation to the alcohol recommendations for cancer prevention specified by the World Cancer Research Fund/American Institute for Cancer Research, calculated based on the amount of alcohol consumed daily averaged over one week. This is in line with alcohol consumption measurement by the Canadian Partnership Against Cancer.²⁴

*In these guidelines and throughout Canada, one standard alcoholic drink contains 13.6 g of alcohol – a 341 ml (12 oz) bottle of 5% beer, 142 ml (5 oz) glass of wine, or a 43 ml (1.5 oz) shot of distilled liquor.



1.4 ALCOHOL CONTROL IN ONTARIO

Several system-level policies exist or are recommended in Ontario to control the sale and consumption of alcohol:

- Through the Liquor Control Board of Ontario (LCBO), a Crown corporation of the Ontario government, there is a partial government monopoly over off-premise sale of alcohol. In addition to the publicly owned LCBO retail outlets, alcohol is sold through the Beer Store network and the Ontario winery stores, which are privately run by Ontario's brewers and vintners, respectively.
- The physical availability of alcohol is regulated through provincial restrictions on hours of sale. Ontario has a lower population density of on- and off-premise alcohol outlets than most other Canadian provinces; survey data show, however, that over 75% of Ontarians live within a 10-minute commute of an alcohol retail outlet.²⁵ The Ontario government recently announced plans to expand the number of LCBO outlets in the province to 672 locations by the end of 2015/16, which is up from 638 locations at the end of 2012/13,²⁶ and to open LCBO express outlets within large grocery stores.²⁷
- *Taking Action to Prevent Chronic Disease: Recommendations for a Healthier Ontario*, prepared by Cancer Care Ontario and Public Health Ontario, includes four population-level recommendations for preventing chronic disease in Ontario that are specific to alcohol consumption:²⁸
 - Maintain and reinforce socially responsible pricing.
 - Ensure effective controls on alcohol availability.
 - Strengthen targeted controls on alcohol marketing and promotion.
 - Increase access to brief counselling interventions.



2. WHAT PROPORTION OF CANCERS IN ONTARIO CAN BE ATTRIBUTED TO ALCOHOL CONSUMPTION?

An estimate of population prevalence of alcohol consumption is required in order to calculate the proportion of cancers in Ontario that can be attributed to alcohol consumption (see **Appendix C**). While self-reported consumption data are available from population surveys, these tend to underestimate alcohol use when compared with per capita consumption based on sales data.²⁹ For other surveys of alcohol use in Canada—depending on design, sampling and type of measure used—the magnitude of undercoverage has been estimated at 60% to over 70% of adult per capita consumption.^{30,31}

Despite this limitation, population survey data are needed for calculating the alcohol-attributable cancer burden because per capita consumption based primarily on sales data is an aggregate statistic that cannot be disaggregated by sex and age group. Survey data can be adjusted for undercoverage of per capita consumption and unrecorded consumption (e.g., from home production of alcohol). Both unadjusted and adjusted estimates of the number and proportion of cancer cases attributable to alcohol consumption are presented in this report (**Figure 1** and **Table 1**). Adjustment and calculation methods are described in detail in **Appendix C: Analytic Methods**, and in a more detailed technical appendix available at the internet address listed on the inside cover of this report.

- **Overall proportion of cancers.** An estimated 1,000 new cases of cancer diagnosed in Ontario during 2010 (equivalent to about 2% of all new cancer cases) can be attributed to alcohol consumption (**Table 1**). If alcohol exposure is adjusted to account for undercoverage, almost 3,000 new cases of cancer for that year (equivalent to about 4% of all new cancer cases) may be attributed to alcohol consumption.
- **Cancers with the highest proportions attributable to alcohol consumption.** Because of their relatively high risk associated with alcohol, cancers of the upper aero-digestive tract have the highest percentages of cases attributable to alcohol consumption in Ontario (**Figure 1a** and **Table 1**). Alcohol accounted for an estimated 19% of oral cavity and pharyngeal cancers, and 14% of laryngeal cancers diagnosed in males during 2010, although these percentages may be as high as 56% and 40%, respectively, depending on the calculation method (see **Appendix C** and **Technical Appendix**). Among females, alcohol accounted for an estimated 7%–23% of oral cavity and pharyngeal cancers, and 5%–15% of laryngeal cancers. Cancers of the esophagus are another group with a substantial alcohol-attributed proportion — an estimated 13%–37% of esophageal cancers in males and 4%–13% in females.
- **Differences by sex.** A larger proportion of cancer cases in males are attributable to alcohol consumption (10%–29% of alcohol-related cancers) than in females (3%–8% of alcohol-related cancers). This is primarily because alcohol consumption has historically been higher among males.
- **Female breast cancer.** Among Ontario females, 2%–7% of breast cancer cases can be attributed to alcohol consumption. Although this proportion is lower than for some other alcohol-related cancers, it represents a substantial number of avoidable new cancer cases (about 200–600 in 2010; **Figure 1b** and **Table 1**) because of the high numbers of breast cancers

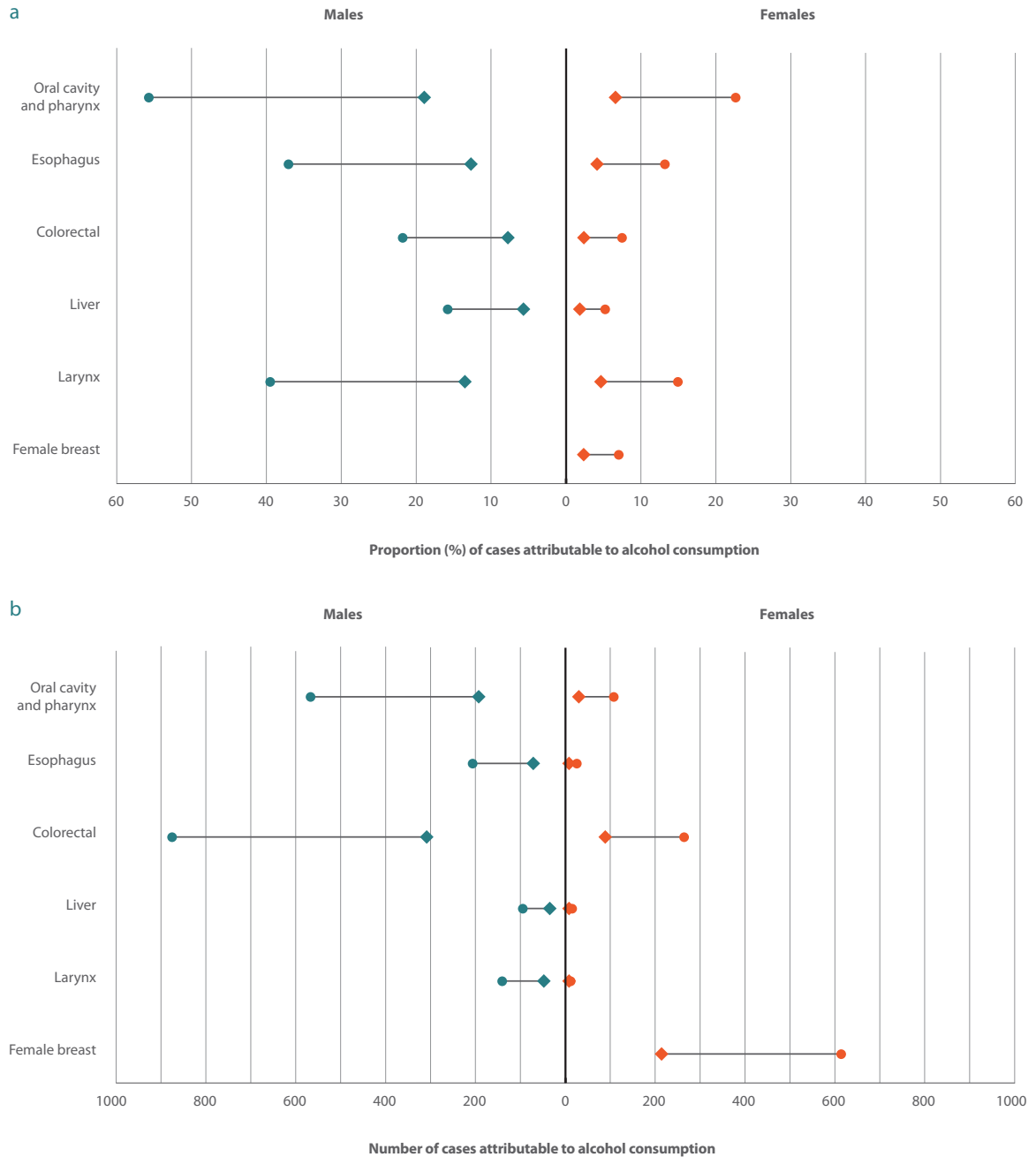


relative to other types of cancer. Breast cancer is the most commonly diagnosed cancer and the second most common cause of cancer death in Ontario females.³²

- **Colorectal cancer.** About 400–1,100 new cases of colorectal cancer diagnosed in Ontario during 2010 can be attributed to alcohol consumption (Figure 1b and Table 1). Because of the high numbers of colorectal cancers relative to other types of cancer, this represents as much as 40% of all alcohol-attributable cancer cases. Colorectal cancer is the third most commonly diagnosed cancer in Ontario males and females.³²
- **International comparison.** The proportion of Ontario cancer cases attributed to alcohol consumption in this report is lower than estimates previously reported in other countries (see Technical Appendix).^{33,34} This is primarily because levels of alcohol consumption in Ontario are lower than in the United Kingdom and other European countries where these studies were conducted.^{33,34}
- **Alcohol and tobacco.** Despite adjusting for survey undercoverage, these estimates may be conservative estimates of the population cancer burden attributable to alcohol because of the synergistic relationship between tobacco and alcohol in causing some types of cancer.



FIGURE 1.
Proportion (a) and number (b) of cancer cases attributable to alcohol consumption, by sex and cancer type, Ontario, 2010



Notes: Diamonds (◆) represent unadjusted estimates while circles (●) represent estimates adjusted for survey undercoverage of alcohol consumption.
Sources: Ontario Cancer Registry, 2013 (Cancer Care Ontario); Canadian Community Health Survey, 2000/01 (Statistics Canada) (see Appendix A)



TABLE 1.

Proportion and number of cancer cases attributable to alcohol consumption, by sex and cancer type, Ontario, 2010

PROPORTION (%) OF CANCER CASES ATTRIBUTABLE TO ALCOHOL CONSUMPTION						
Cancer type	Both sexes		Males		Females	
	Unadjusted	Adjusted*	Unadjusted	Adjusted*	Unadjusted	Adjusted*
Oral cavity and pharynx	14.9	45.2	18.8	55.8	6.6	22.8
Esophagus	10.4	30.7	12.7	37.1	4.2	13.2
Colorectal	5.3	15.1	7.7	21.8	2.5	7.5
Liver	4.6	13.0	5.7	15.8	1.9	5.3
Larynx	12.3	36.2	13.5	39.5	4.7	15.0
Female breast	2.4	7.0	–	–	2.4	7.0
All alcohol-related cancers†	5.0	14.7	10.0	28.8	2.6	7.8

NUMBER OF CANCER CASES ATTRIBUTABLE TO ALCOHOL CONSUMPTION						
Cancer type	Both sexes		Males		Females	
	Unadjusted	Adjusted*	Unadjusted	Adjusted*	Unadjusted	Adjusted*
Oral cavity and pharynx	222	676	191	567	31	109
Esophagus	79	233	71	206	8	27
Colorectal	399	1,141	309	875	90	266
Liver	38	108	34	96	4	12
Larynx	51	148	48	140	3	8
Female breast	214	617	–	–	214	617
All alcohol-related cancers	1,003	2,923	653	1,884	350	1,039

Notes: *Adjusted for survey undercoverage of alcohol consumption

†These proportions are calculated by dividing the number of alcohol-attributable cancer cases by the total number of cases diagnosed within the six alcohol-related cancer types.

Sources: Ontario Cancer Registry, 2013 (Cancer Care Ontario); Canadian Community Health Survey, 2000/01 (Statistics Canada) (see Appendix A)

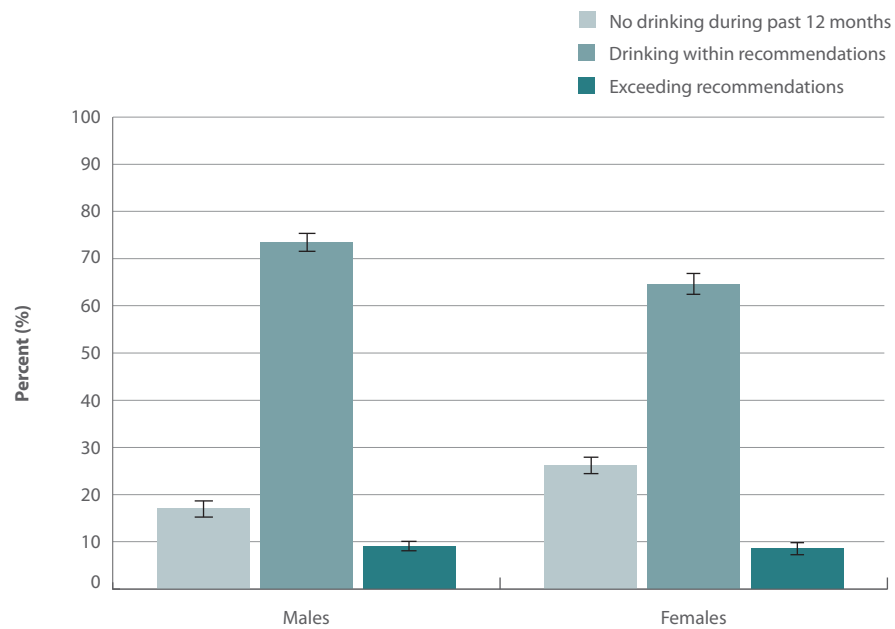


3. EXCEEDING CANCER PREVENTION RECOMMENDATIONS FOR ALCOHOL CONSUMPTION

3.1 OVERVIEW: DRINKING WITHIN OR EXCEEDING RECOMMENDATIONS

FIGURE 2.

Alcohol consumption in relation to cancer prevention recommendations during past 12 months, Ontario adults (aged 19+), 2012



Notes: Estimates are age-standardized to the 2006 Canadian population.
I represent 95% confidence intervals.

The alcohol consumption cancer prevention recommendations are no more than two drinks a day for men and one drink a day for women.

Source: Canadian Community Health Survey, 2012 (Statistics Canada)

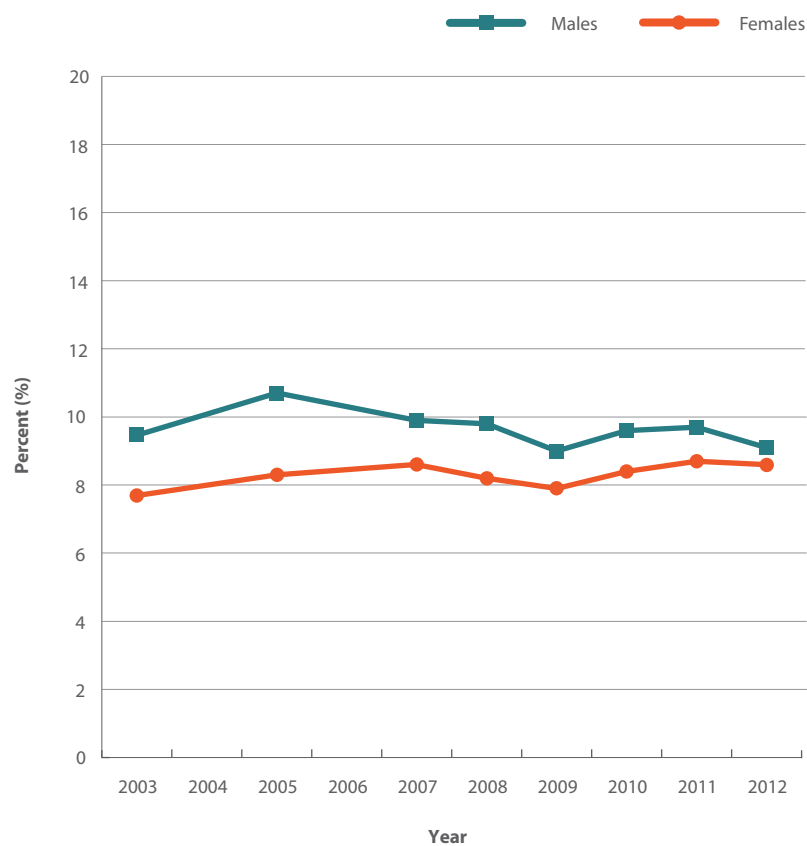
- In 2012, 8.8% of Ontario adults aged 19 years and older reported drinking more alcohol, on average, than recommended for cancer prevention by the World Cancer Research Fund/American Institute for Cancer Research (i.e., no more than two drinks a day for men and one drink a day for women).¹ This represents nearly 1 million Ontario adults drinking in excess of the cancer prevention recommendations.
- A similar proportion of adult males (9.1%) and females (8.6%) reported drinking alcohol in excess of the recommendations (Figure 2).
- A significantly larger proportion of adult females (26.2%) than males (17.0%) reported drinking no alcohol during the past 12 months.
- The proportion consuming a level within the cancer prevention recommendations was significantly higher in males (73.4%) than females (64.6%).
- Because the proportion of adults drinking in excess of the cancer prevention recommendations is based on alcohol consumption reported for one week (see Appendix B),



its validity depends on how representative that week is of someone's typical consumption. It may be underestimated if people who normally drink in excess of the recommendations self-reported no alcohol consumption during the week before the survey interview. This may be balanced, however, by the inclusion of people who normally do not drink more than the recommendations but reported consuming more during that week.

3.2 TRENDS IN EXCEEDING RECOMMENDATIONS

FIGURE 3.
Percentage of Ontario adults (aged 19+) exceeding cancer prevention recommendations for alcohol consumption, 2003–2012



Notes: Estimates are age-standardized to the 2006 Canadian population.
Source: Canadian Community Health Survey, 2003, 2005, 2007–2012 (Statistics Canada)

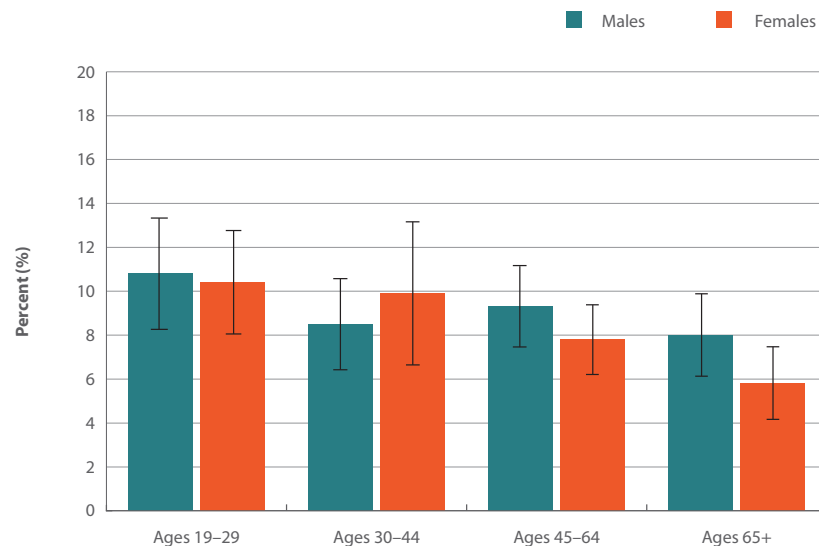


- Although the prevalence of drinking in excess of the World Cancer Research Fund/American Institute for Cancer Research cancer prevention recommendations (no more than two drinks a day for men and one drink a day for women)¹ was historically higher in adult males (aged 19+) than females in Ontario, the gap between the sexes has closed in recent years. Before 2007, the proportion of adults who reported drinking more alcohol than recommended was significantly higher among males than females; from 2007 to 2012, the difference was not statistically significant (Figure 3). The proportion of males who exceeded the cancer prevention recommendation remained stable between 2003 and 2012.
- The proportion of females who exceeded the cancer prevention recommendation appeared to increase between 2003 and 2012. While this is not statistically significant, it is important given that there is no established “safe” lower limit of consumption to prevent an increased risk of cancer.¹

3.3 DIFFERENCES AMONG AGE GROUPS IN EXCEEDING RECOMMENDATIONS

FIGURE 4.

Percentage of Ontario adults (aged 19+) exceeding cancer prevention recommendations for alcohol consumption, by age group, 2012



Notes: I represent 95% confidence intervals.

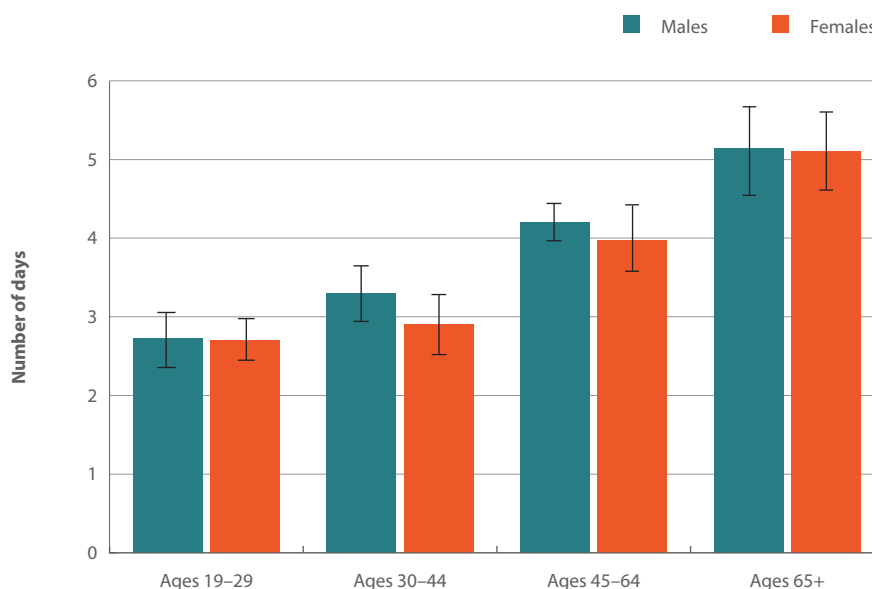
Source: Canadian Community Health Survey, 2012 (Statistics Canada)

- In 2012, the prevalence of exceeding the daily cancer prevention recommendations for alcohol consumption, averaged across one week, was highest among males in the 19–29 age group (10.8%) (Figure 4). Among females, prevalence was highest in the 19–29 (10.4%) and 30–44 (9.9%) age groups. Prevalence was lower at ages 65 and older (males 8.0%, females 5.8%) compared with adults aged 19–29, although this difference was statistically significant for females only.



- The prevalence of drinking in excess of the cancer prevention recommendations, particularly in the 19–29 age group, may actually be higher than reported here. College and university students living away from home, and especially in on-campus residences, may be under-represented in the Canadian Community Health Survey (CCHS); a US study showed alcohol consumption in this subgroup to be higher than among students living at home.³⁵

FIGURE 5. Average number of days per week exceeding cancer prevention recommendations for alcohol consumption among Ontario adults (aged 19+) who exceed the recommendations on average, by age group, 2012



Notes: I represent 95% confidence intervals.
Source: Canadian Community Health Survey, 2012 (Statistics Canada)

- Among Ontario adults who reported drinking more alcohol than recommended for cancer prevention in 2012, based on their average consumption during the past week, the average number of days per week in which they exceeded the recommendations was significantly higher in those aged 65 and older than those in younger age groups (average of 5.1 days for both males and females) (Figure 5).
- Ontarians aged 45–64 also drank more than recommended on significantly more days per week (average of 4.2 days for males and 4.0 days for females) than Ontarians aged 19–29 (average of 2.7 days for both males and females).
- While Figure 4 shows that younger adults had the highest prevalence of drinking in excess of the daily cancer prevention recommendations when consumption was averaged across



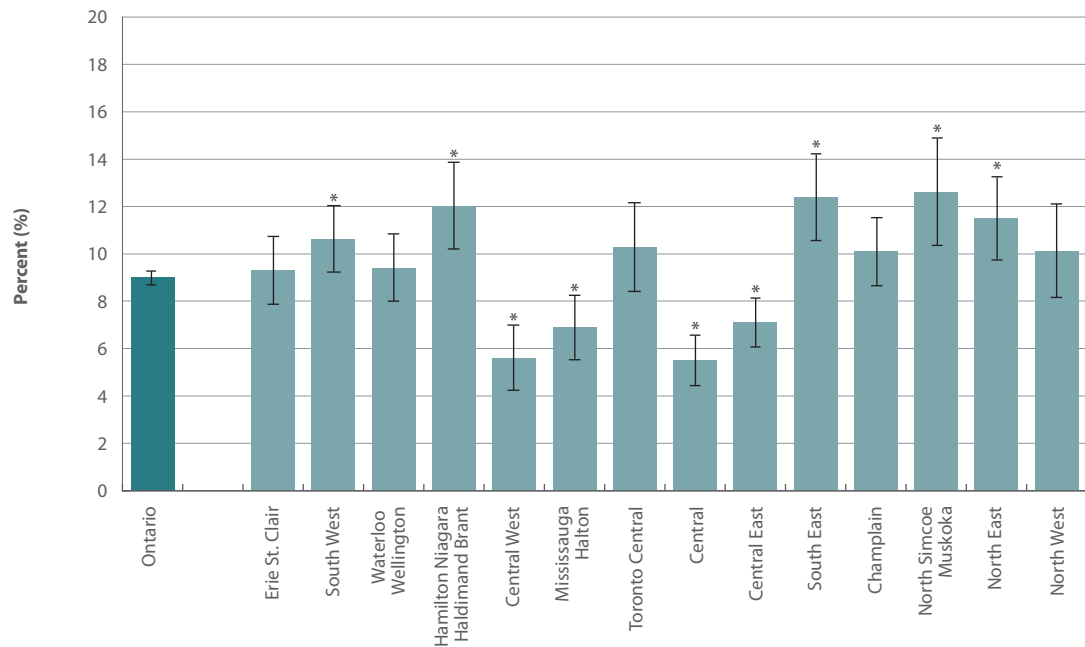
one week, Figure 5 shows that, among those exceeding the recommendations on average, older adults did so on the greatest number of days per week. This suggests that younger drinkers consume more alcohol per occasion than older drinkers, and older consumers drink more often than younger consumers. These figures do not indicate the amount of alcohol consumed on each drinking occasion. Binge drinking, often defined as consuming five or more drinks on a single occasion, is most prevalent among Ontarians aged 18–29.³⁶

3.4 REGIONAL VARIATIONS IN EXCEEDING RECOMMENDATIONS

Compared to the other Canadian provinces and territories, Ontario had one of the highest proportions of adults who reported drinking more alcohol than recommended for cancer prevention. In 2005, the most recent year for which data covering all Canadian provinces and territories are available, the proportion of adults who reported exceeding the cancer prevention recommendations ranged from 7% in Prince Edward Island to 13% in the Yukon, with a national average of 9%.²⁴ Ontario was tied with Québec and British Columbia, with 9.5% of adults (aged 18+) reporting exceeding the cancer prevention recommendations. While the prevalence in the Northwest Territories (11.7%) and Yukon (12.5%) was higher than in Ontario, the difference was not statistically significant for the comparison between either territory and Ontario.



FIGURE 6.
Percentage of Ontario adults (aged 19+) exceeding cancer prevention recommendations for alcohol consumption, by Local Health Integration Network, 2010–2012 combined



Notes: Estimates are age-standardized to the 2006 Canadian population.
 I represent 95% confidence intervals.
 Data from CCHS cycles 2010 through 2012 combined to increase sample size for analyses by Local Health Integration Network.
 *Estimate is significantly higher or lower than the Ontario estimate.

Source: Canadian Community Health Survey, 2010–2012 (Statistics Canada)

- Within Ontario there is significant regional variation in the prevalence of drinking in excess of the cancer prevention recommendations, with the lowest rates occurring in the Greater Toronto Area (except for the Toronto Central Local Health Integration Network) and the highest occurring in parts of central, eastern, southwestern and northern Ontario.
- The prevalence of drinking in excess of the cancer prevention recommendations among Ontario’s 14 Local Health Integration Networks (LHINs) ranged from a low of 5.5% in the Central LHIN to a high of 12.6% in the North Simcoe Muskoka LHIN (Figure 6; see Appendix D for map showing LHIN boundaries).
- Compared to the 2010–2012 combined provincial estimate of 9.0%, the age-adjusted prevalence of drinking in excess of the cancer prevention recommendations was significantly higher in the South West, Hamilton Niagara Haldimand Brant, South East, North Simcoe Muskoka and



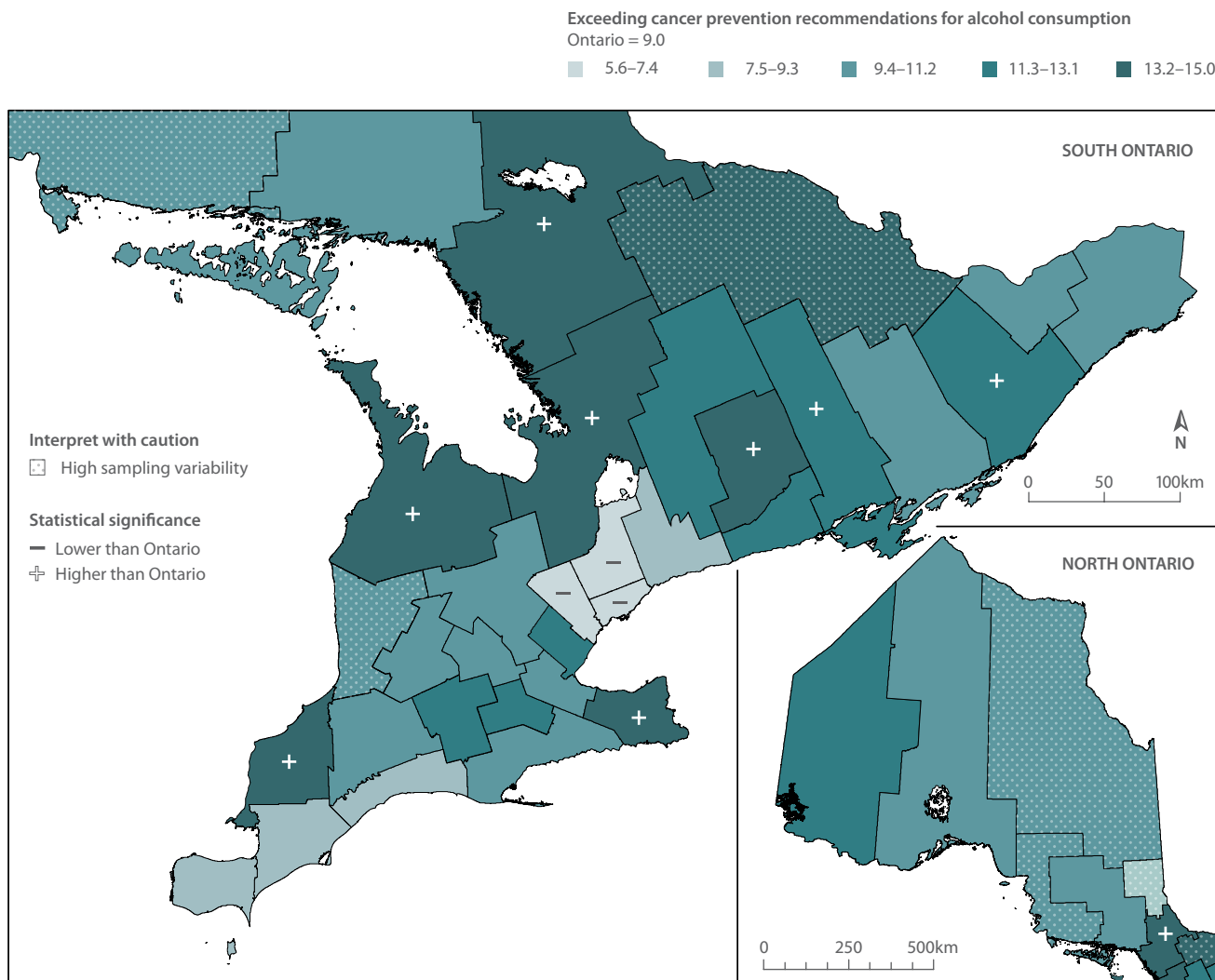
North East LHINs, and significantly lower in the Central West, Mississauga Halton, Central and Central East LHINs.

- The proportion of drinking in excess of the cancer prevention recommendations among Ontario's 36 public health units (PHUs) ranged from a low of 5.7% in the Peel PHU to a high of 15.0% in the Niagara Region PHU (Figure 7; see Appendix D for map showing PHU boundaries).
- Compared to the provincial estimate of 9.0%, the age-adjusted prevalence of drinking in excess of the cancer prevention recommendations was significantly higher in the Niagara Region, North Bay Parry Sound, Grey Bruce, Simcoe Muskoka, Peterborough, Lambton, Hastings and Prince Edward Counties, and Leeds Grenville and Lanark District PHUs, and significantly lower in the Peel, York Region and Toronto PHUs.
- Greater regional variation was apparent at the PHU level than at the LHIN level, with marked variation between some PHUs in the same LHIN. In Erie St. Clair, for example, the prevalence of drinking more than recommended ranged from 8.3% in the Chatham-Kent PHU to 13.3% in the Lambton PHU; these differences are averaged out at the LHIN level resulting in an estimate that is similar to the all-Ontario estimate.
- Variations among LHINs and PHUs may potentially be explained, in part, by the population composition of the different regions. There is a lower prevalence of drinking in excess of the cancer prevention recommendations in immigrant populations than in Canadian-born adults, for example (Figure 8), so immigrant distribution may play a role. The factors underlying the income, immigrant and geographic patterns of alcohol consumption in Ontario are complicated and inter-related.



FIGURE 7.

Percentage of Ontario adults (aged 19+) exceeding cancer prevention recommendations for alcohol consumption, by public health unit, 2010–2012 combined



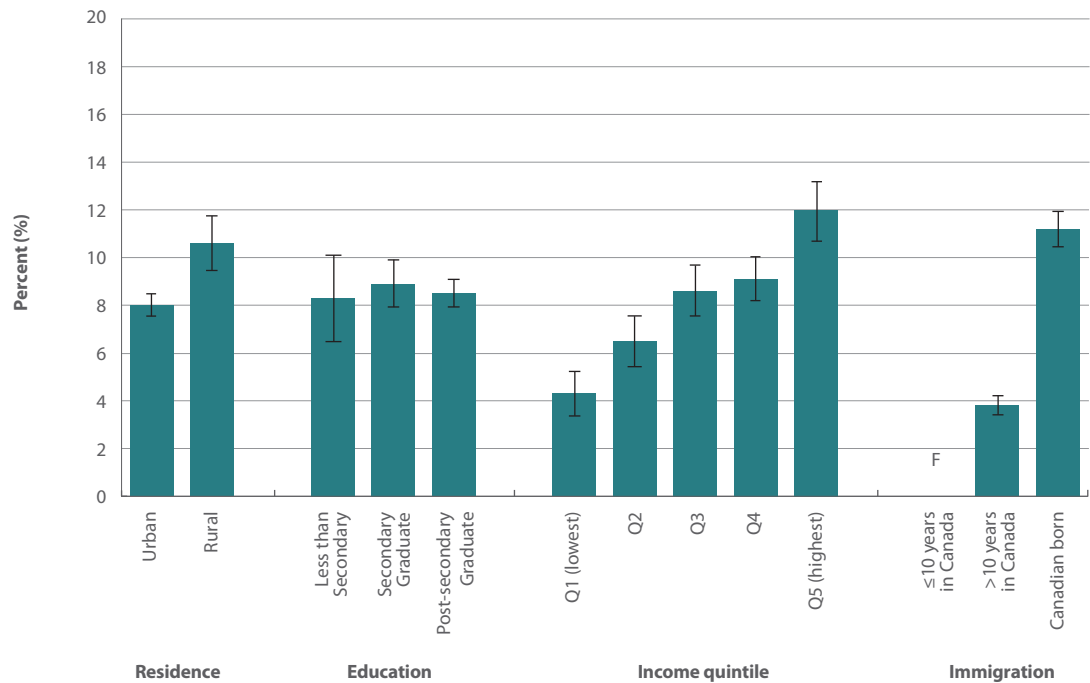
Notes: ¹Estimates are age-standardized to the 2006 Canadian population.
 Data from CCHS cycles 2010 through 2012 combined to increase sample size for analyses by public health unit.
 Sources: Canadian Community Health Survey, 2010–2012; 2006 Census Boundaries (Statistics Canada)



3.5 SOCIO-DEMOGRAPHIC DISPARITIES IN EXCEEDING RECOMMENDATIONS

FIGURE 8.

Percentage of Ontario adults (aged 30+) exceeding cancer prevention recommendations for alcohol consumption, by selected socio-demographic factors, 2010–2012 combined



Notes: Estimates are age-standardized to the 2006 Canadian population.

┆ represent 95% confidence intervals.

— Estimates have been suppressed due to very high sampling variability.

Data from CCHS cycles 2010 through 2012 combined to increase sample size for analyses by socio-demographic factors.

Source: Canadian Community Health Survey, 2010–2012 (Statistics Canada)

- The proportion of Ontario adults drinking in excess of the cancer prevention recommendations differed significantly across levels of four socio-demographic factors (Figure 8). Socio-demographic characteristics were analyzed for adults aged 30 and over to restrict the sample to those who have likely completed their education and reached their adult socio-demographic status.
- For 2010–2012 combined, the prevalence of drinking in excess of the cancer prevention recommendations was significantly higher among adults (aged 30+) living in rural (10.6%) than in urban areas (8.0%), among the highest income quintile (12.0%) than in all lower income quintiles (e.g., the lowest at 4.3%) and among Canadian-born adults (11.2%) compared with immigrants who have been in Canada for more than 10 years (3.8%). The proportion



of adults who exceeded the alcohol recommendations for cancer prevention did not differ significantly among levels of education.

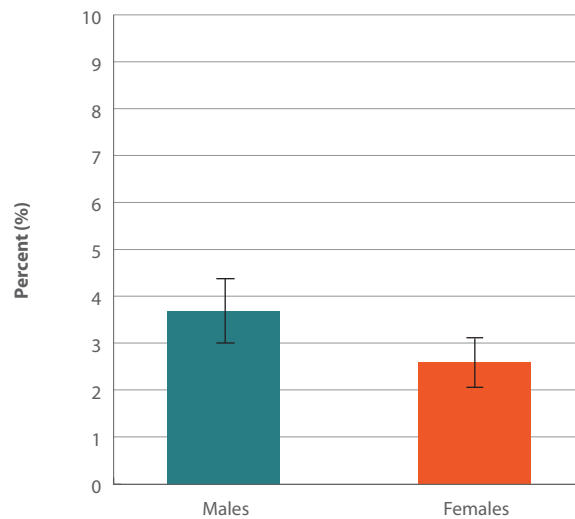
- Increase in prevalence of drinking more than recommended with increasing income is consistent with studies in Europe and the US.^{37,38} Individuals in the higher income quintiles can afford, for example, to purchase larger volumes of alcohol than those with lower incomes. Other differences, such as choice of leisure activities, may also be contributing factors.
- The predominant countries of origin among immigrants to Canada have changed over the past several decades. Before 1961, 93% of immigrants to Ontario were from Europe;³⁹ between 2006 and 2011, 71% of immigrants were arriving from Asia (including the Middle East) and Africa.⁴⁰ The lower prevalence of drinking in excess of the cancer prevention recommendations among immigrants than among Canadian-born adults may be explained by the increased proportion of immigrants from Asia and Africa, where adult per capita alcohol consumption is much lower.⁴¹ The lower prevalence of exceeding the recommendations among immigrants compared with Canadian-born adults is consistent with what is seen for some other cancer risk factors, including tobacco.
- Income and immigrant disparities in the prevalence of drinking in excess of the cancer prevention recommendations may be related because immigrants may be disproportionately represented in the lower income groups.⁴²



3.6 DRINKING AND CURRENT SMOKING

FIGURE 9.

Percentage of Ontario adults (aged 19+) exceeding cancer prevention recommendations for alcohol consumption who are current smokers, 2012



Notes: Estimates are age-standardized to the 2006 Canadian population.

┆ represent 95% confidence intervals.

Current smokers are defined as adults who reported that they presently smoke cigarettes "daily" or "occasionally".

Source: Canadian Community Health Survey, 2012 (Statistics Canada)

- In 2012, 3.7% of Ontario males and 2.6% of Ontario females aged 19 and older reported drinking in excess of the cancer prevention recommendations and being current (daily or occasional) smokers (Figure 9). Smoking enhances the carcinogenic effect of alcohol and vice versa so that smokers who also drink alcohol are at an especially increased risk for cancers of the oral cavity, pharynx, larynx and esophagus (squamous cell carcinoma).^{2,3}
- Ontarians who drank in excess of the cancer prevention recommendations were more likely to be current smokers (39.5% males, 29.6% females) than those who drank within the recommended amount for cancer prevention (22.7% males, 16.6% females). The association between alcohol consumption and tobacco use has been demonstrated in studies from various countries.^{37,38,43}



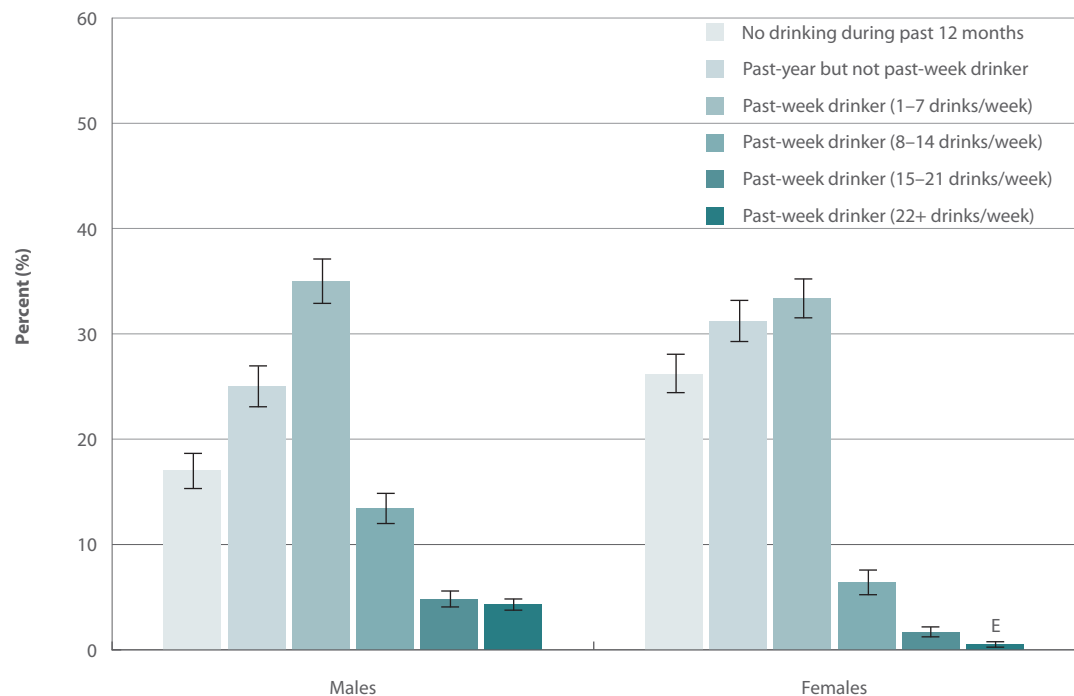
4. LEVELS OF ALCOHOL CONSUMPTION

While most adult Ontarians are not drinking more than recommended for cancer prevention, it is important to monitor all levels of alcohol consumption, given that there is no known “safe” lower limit of consumption to prevent an increased risk of cancer.¹ Even small amounts of alcohol have been shown to increase the risk of some cancers, and the risk of oral and pharyngeal cancers, as well as breast cancer, is increased with each additional drink consumed per day.^{1,9–11}

4.1 OVERVIEW: DRINKING AT DIFFERENT LEVELS OF CONSUMPTION

FIGURE 10.

Alcohol consumption patterns during past 12 months and past week, Ontario adults (aged 19+), 2012



Notes: Estimates are age-standardized to the 2006 Canadian population.

┆ represent 95% confidence intervals.

E—Interpret with caution due to high sampling variability.

Alcohol consumption categories are mutually exclusive.

Source: Canadian Community Health Survey, 2012 (Statistics Canada)

- The majority of Ontario adults consume alcohol, with consumption generally higher among males than females. In 2012, 17.0% of adult males and 26.2% of adult females in Ontario reported that they had not had a drink in the past 12 months. This is similar to estimates published in other Ontario studies.³⁶
- In 2012, a similar proportion of adult males (35.0%) and females (33.4%) reported having one to seven drinks during the past week, or an average of up to one drink a day (Figure 10).



A significantly larger proportion of males, however, reported having eight to 14 drinks (13.4% males, 6.4% females), or an average of more than one and up to two drinks a day.

- Significantly more males reported drinking at higher levels of consumption; 4.8% of males compared with 1.7% of females reported having 15 to 21 drinks during the past week (an average of more than two and up to three drinks a day), while 4.3% of males compared with less than 1% of females reported having more than 22 drinks per week (an average of more than three drinks a day). Ontario adults drinking at higher levels of consumption are at an especially increased risk for cancer, given the substantial increase in risk associated with heavy alcohol drinking (four or more drinks per day).^{9,10,12–15}

4.2 ABSTAINING DURING PAST YEAR

FIGURE 11.
Percentage of Ontario adults (aged 19+) abstaining from drinking alcohol during past 12 months, 2003–2012



Notes: Estimates are age-standardized to the 2006 Canadian population.

Source: Canadian Community Health Survey, 2003, 2005, 2007–2012 (Statistics Canada)

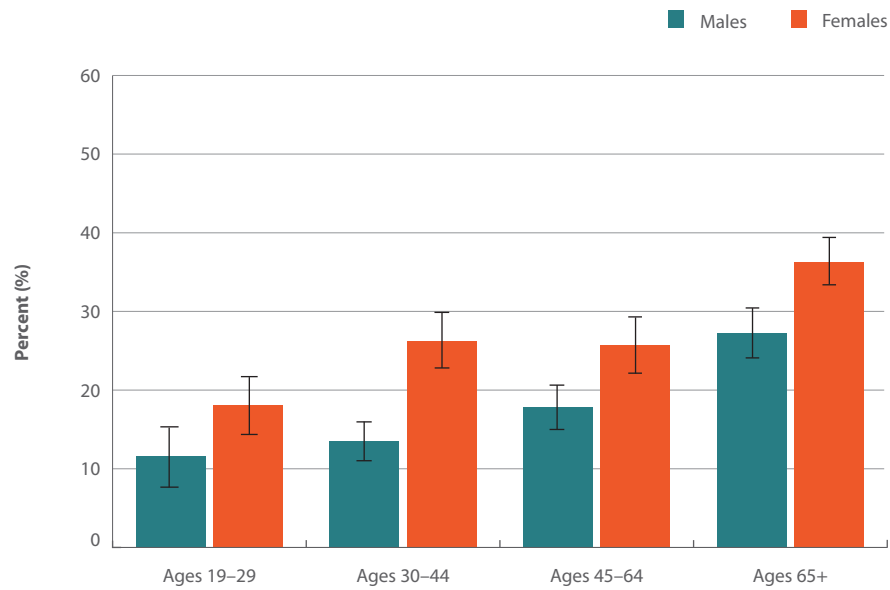


- The prevalence of abstaining during the past 12 months increased significantly between 2003 (males 14.6%, females 23.6%) and 2012 (males 17.0%, females 26.2%); the proportion was consistently higher in females than in males throughout this period (Figure 11).
- The group of adults who have not had a drink in the past 12 months is likely heterogeneous, with composition that includes never-drinkers, as well as people who have stopped drinking alcohol for a variety of reasons, including past problem-drinking behaviours. Although data on past drinking behaviour is not currently available in the Canadian Community Health Survey (CCHS), data from 2005, the most recent year for which data on former drinkers are available, show that over half of adults who reported not drinking during the past 12 months were former drinkers (67% males, 59% females) who reported having at least one drink in their lifetime. Among those who were former drinkers, the proportion of former drinkers who regularly drank more than 12 drinks a week was much higher in males (35%) than in females (7%).
- The increase in prevalence of abstaining from drinking may be explained, in part, by the increased proportion of immigrants from countries where alcohol consumption is less common. The immigrant proportion of Canada's population has increased steadily, while the countries of origin among immigrants to Canada have changed from mostly European to predominantly Asian and African over the past several decades.⁴⁴



FIGURE 12.

Percentage of Ontario adults (aged 19+) abstaining from drinking alcohol during past 12 months, by age group, 2012



Notes: I represent 95% confidence intervals.

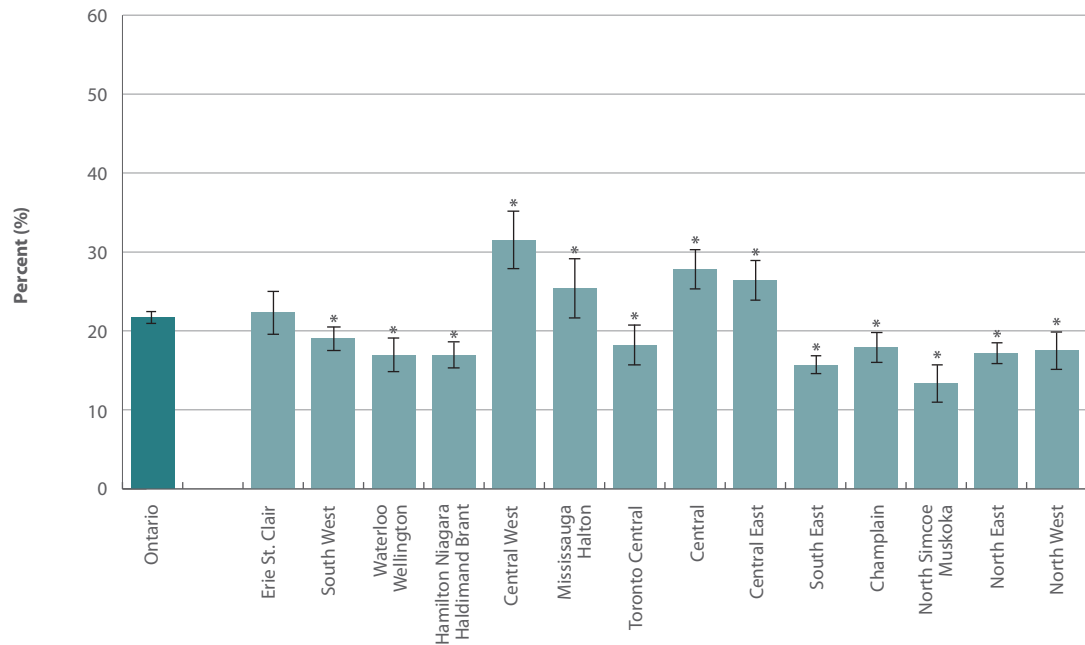
Source: Canadian Community Health Survey, 2012 (Statistics Canada)

- In 2012, the age-specific prevalence of abstinence during the past 12 months was lowest in the 19–29 age group (males 11.6%, females 18.1%) and generally rose with increasing age (Figure 12). Prevalence was significantly higher among adults aged 65 and older (27.2% males, 36.3% females) than among all younger age groups.
- For all age groups, a larger proportion of females than males reported abstaining in the past 12 months.



FIGURE 13.

Percentage of Ontario adults (aged 19+) abstaining from drinking alcohol during past 12 months, by Local Health Integration Network, 2010–2012 combined



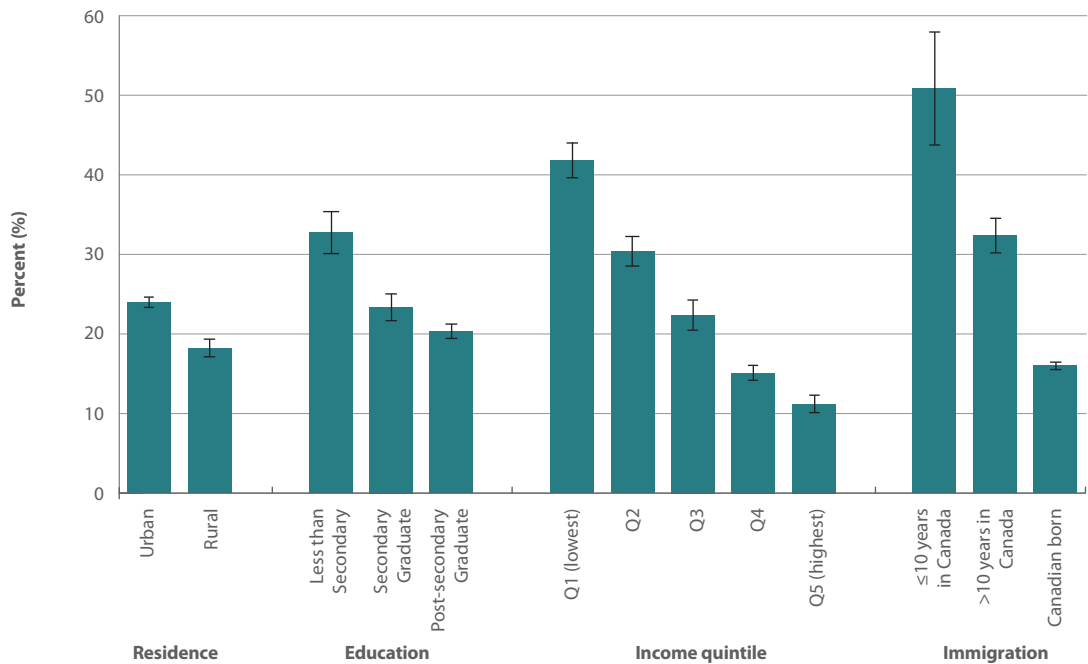
Notes: Estimates are age-standardized to the 2006 Canadian population.
 I represent 95% confidence intervals.
 Data from CCHS cycles 2010 through 2012 combined to increase sample size for analyses by Local Health Integration Network.
 *Estimate is significantly higher or lower than the Ontario estimate.
Source: Canadian Community Health Survey, 2010–2012 (Statistics Canada)

- The proportion of adults abstaining from drinking during the past 12 months varied significantly among Ontario’s 14 Local Health Integration Networks (LHINs), from a low of 13.4% in the North Simcoe Muskoka LHIN to a high of 31.5% in the Central West LHIN (Figure 13; see Appendix D for map showing LHIN boundaries). This is consistent with Figure 6, which shows that the prevalence of drinking in excess of the cancer prevention recommendations was the highest in the North Simcoe Muskoka LHIN and among the lowest in the Central West LHIN.
- The prevalence of abstinence during the past 12 months differed significantly from the provincial estimate of 21.7% in all LHINs except Erie St. Clair. Prevalence in the Central West, Mississauga Halton, Central and Central East LHINs was higher than the provincial estimate, while prevalence in the South West, Waterloo Wellington, Hamilton Niagara Haldimand Brant, Toronto Central, South East, Champlain, North Simcoe Muskoka, North East and North West LHINs was significantly lower.
- Differences in the demographics, and in particular immigration, may have contributed to the variation among LHINs in the proportion of the population that abstained from



drinking in the past 12 months. Recent immigrants were substantially more likely to have reported abstinence during the past year compared with Canadian-born adults (Figure 14) and the proportion of the population they comprise varies widely from LHIN to LHIN.⁴⁵

FIGURE 14.
Percentage of Ontario adults (aged 30+) abstaining from drinking alcohol during past 12 months, by selected socio-demographic factors, 2010–2012 combined



Notes: Estimates are age-standardized to the 2006 Canadian population.
 ┆ represent 95% confidence intervals.
 Data from CCHS cycles 2010 through 2012 combined to increase sample size for analyses by socio-demographic factors.
Source: Canadian Community Health Survey, 2010–2012 (Statistics Canada)

- The proportion of adult Ontarians abstaining from drinking alcohol during the past 12 months differs strikingly across levels of four socio-demographic factors (Figure 14).
- For 2010–2012 combined, the prevalence of abstinence during the past 12 months was significantly higher among adults (aged 30+) living in urban (24.0%) than in rural areas (18.2%), among the least educated group (32.8%) than in the most educated group (20.3%), among the lowest income group (41.8%) than in the highest (11.2%) and among immigrants who have been in Canada for 10 years or less (50.8%) than Canadian-born adults (16.0%).



- A clear gradient is observed for each socio-demographic factor; the proportion of adults abstaining decreased significantly with increasing education level, increasing income and increasing time spent in Canada.
- The predominant countries of origin among immigrants to Canada have changed over the past several decades. Before 1961, 93% of immigrants to Ontario were from Europe;³⁹ between 2006 and 2011, 71% of immigrants were arriving from Asia (including the Middle East) and Africa.⁴⁰ This suggests that, as with immigrant and non-immigrant differences in exceeding cancer prevention recommendations (see section 3.5), the higher prevalence of abstinence during the past 12 months among immigrants—particularly recent immigrants—compared with Canadian-born adults might be explained by the increased proportion of immigrants from Asia and Africa, where adult per capita consumption of alcohol is much lower.⁴¹

4.3 NUMBER OF DRINKS CONSUMED WEEKLY

FIGURE 15.
Number of drinks consumed weekly among Ontario adults (aged 19+) who reported having a drink during past 12 months, 2003–2012



Source: Canadian Community Health Survey, 2003, 2005, 2007–2012 (Statistics Canada)

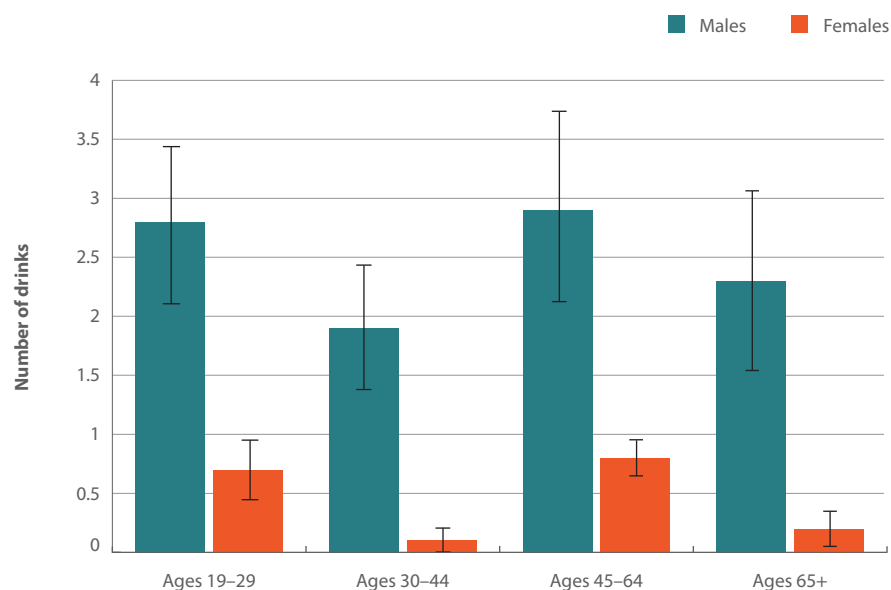


- The median and average number of drinks consumed during the past week among adult Ontarians who reported having a drink during the past 12 months are shown in **Figure 15**. Because the majority of the population consumes low levels of alcohol, while a small number of individuals consume high levels, the median is more representative of the typical level of consumption. The mean is also displayed for comparison with other reports of alcohol consumption.³⁶
- In 2012, half of males in Ontario consumed less than 2.4 drinks per week, while half of females consumed less than 0.6 drinks per week.
- For males, the median number of drinks consumed during the past week appeared to increase slightly between 2003 and 2005 before declining through 2012. For females, the median remained relatively stable at around half a drink per week between 2003 and 2012.
- Between 2003 and 2012, the average number of drinks consumed during the past week remained relatively stable at around six drinks for males and three drinks for females. This is similar to estimates published in other Ontario studies.³⁶
- Both the median and mean number of drinks consumed during the past week were consistently higher in males than females.
- While self-reports of alcohol exposure underestimate per capita alcohol consumption, a consistently strong association between trends in survey and sales data has been demonstrated, indicating that both are important sources of information.⁴⁶ Per capita sales data, while suggesting higher consumption than self-reported data, show the same stability over time as the trend observed in **Figure 15**.⁴⁷



FIGURE 16.

Median number of drinks consumed weekly among Ontario adults (aged 19+) who reported having a drink during past 12 months, by age group, 2012



Notes: I represent 95% confidence intervals.

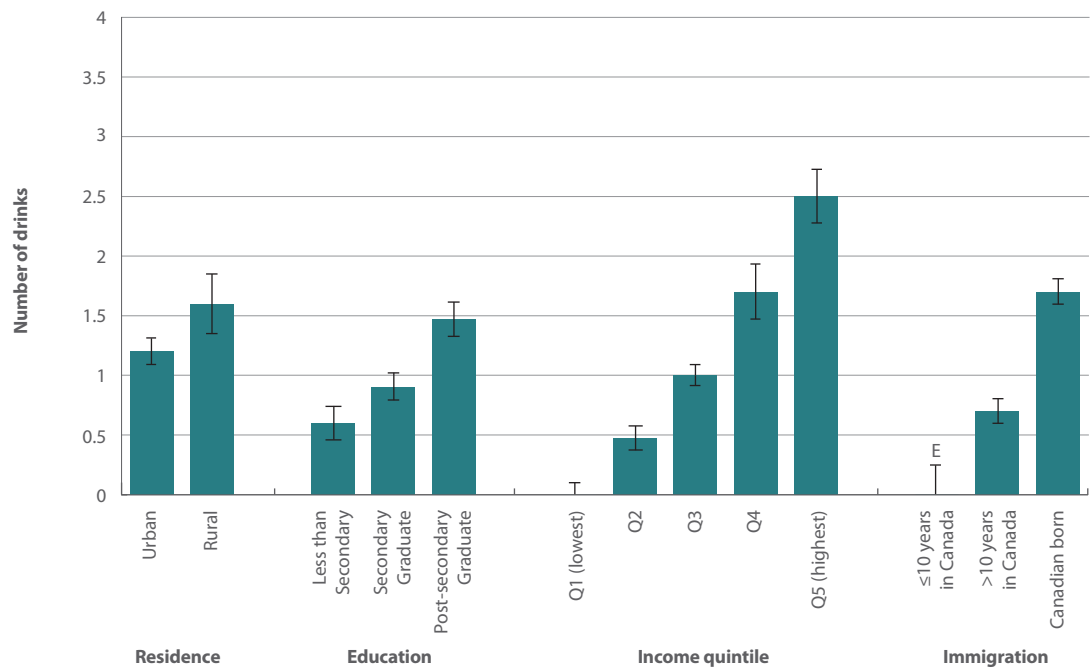
Source: Canadian Community Health Survey, 2012 (Statistics Canada)

- In 2012, median alcoholic drink consumption among adult Ontarians who reported having a drink during the past 12 months varied widely by sex and age group (Figure 16). The median number of drinks consumed during the past week was higher in the 19–29 and 45–64 age groups than in the 30–44 and 65 and older age groups. These differences were statistically significant for females only. Across all age groups, median data showed that males reported drinking significantly more alcoholic beverages per week on average than females.
- Median drink consumption appeared to be the lowest among adults aged 30 to 44 for both males and females, which may reflect this being the typical age group for childbearing and childrearing.



FIGURE 17.

Median number of drinks consumed weekly among Ontario adults (aged 30+) who reported having a drink during past 12 months, by selected socio-demographic factors, 2010–2012 combined



Notes: I represent 95% confidence intervals.

E—Interpret with caution due to high sampling variability.

Data from CCHS cycles 2010 through 2012 combined to increase sample size for analyses by socio-demographic factors.

Source: Canadian Community Health Survey, 2010–2012 (Statistics Canada)

- The median number of drinks consumed during the past week differed significantly across levels of four socio-demographic factors (Figure 17).
- For 2010–2012 combined, median drink consumption was significantly higher among adults (aged 30+) living in rural (1.6 drinks) than in urban areas (1.2 drinks), among the most educated group (1.5 drinks) than the least educated group (0.6 drinks), among the highest income group (2.5 drinks) than the lowest (0 drinks), and among Canadian-born adults (1.7 drinks) than immigrants who have been in Canada for 10 or more years (0.7 drinks).
- These results, together with the prevalence of drinking in excess of the cancer prevention recommendations and not drinking during the past 12 months by socio-demographic factors, reflect significant disparities in alcohol consumption in Ontario. Adults living in rural areas, those with the highest level of education, those with the highest income and those born in Canada are more likely to drink more alcohol.

5. ABORIGINAL PEOPLES (OFF-RESERVE)

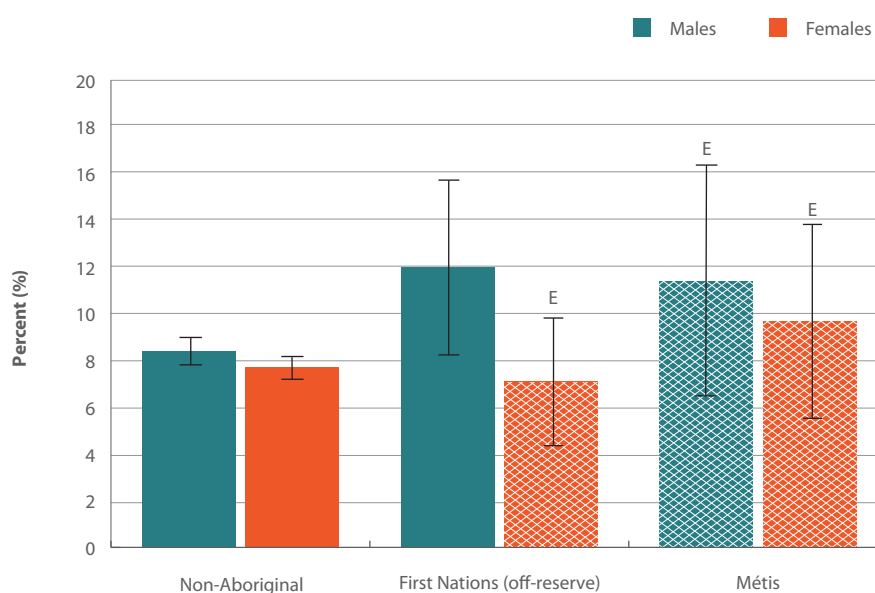


In keeping with Cancer Care Ontario's commitment to working on cancer control with Aboriginal Peoples, this section describes alcohol consumption in off-reserve Aboriginal populations. This report addresses only off-reserve populations because the Canadian Community Health Survey does not include residents of First Nations reserves. Results specific for Inuit are not presented due to small sample sizes.

5.1 EXCEEDING CANCER PREVENTION RECOMMENDATIONS FOR ALCOHOL CONSUMPTION BY ABORIGINAL IDENTITY

FIGURE 18.

Percentage of Ontario adults (aged 19+) exceeding cancer prevention recommendations for alcohol consumption, by Aboriginal identity (off-reserve), 2008–2012 combined



Notes: Estimates are age-standardized to the 2006 Canadian population.
 I represent 95% confidence intervals.
 E—Interpret cross-hatched estimates with caution due to high sampling variability.
 Data from CCHS cycles 2008 through 2012 combined to increase sample size for analyses by Aboriginal identity.
Source: Canadian Community Health Survey, 2008–2012 (Statistics Canada)

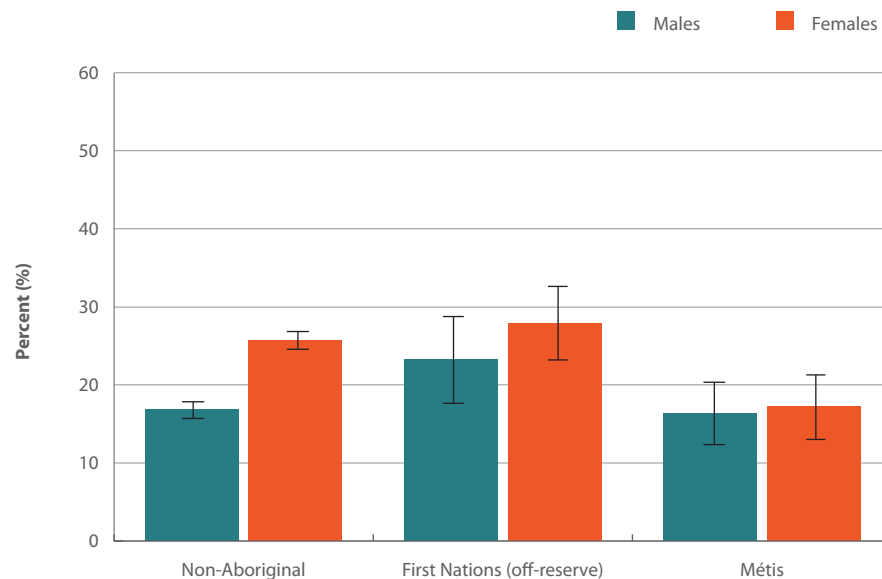
- The proportion of adult males who reported drinking in excess of the cancer prevention recommendations was slightly higher among off-reserve First Nations (12.0%) than in non-Aboriginals (8.4%), although this difference was not statistically significant (Figure 18). The proportion of adult females who reported drinking in excess of the cancer prevention recommendations was similar among off-reserve First Nations (roughly 7%) to non-Aboriginals (7.7%). Among Métis, the proportion of adults exceeding the recommendations was approximately 11% for males and 10% for females.
- From 2008 to 2012, roughly 5% of off-reserve First Nations and Métis aged 19 and older reported drinking in excess of the cancer prevention recommendations and being current



(daily or occasional) smokers (data not shown). Smokers who also drink alcohol, and particularly those who are both heavy smokers and heavy drinkers, are at an especially increased risk for cancers of the oral cavity, pharynx, larynx and esophagus (squamous cell carcinoma).^{2,3}

5.2 LEVELS OF ALCOHOL CONSUMPTION BY ABORIGINAL IDENTITY

FIGURE 19.
Percentage of Ontario adults (aged 19+) abstaining from drinking alcohol during past 12 months, by Aboriginal identity (off-reserve), 2008–2012 combined



Notes: Estimates are age-standardized to the 2006 Canadian population.
I represent 95% confidence intervals.
Data from CCHS cycles 2008 through 2012 combined to increase sample size for analyses by Aboriginal identity.

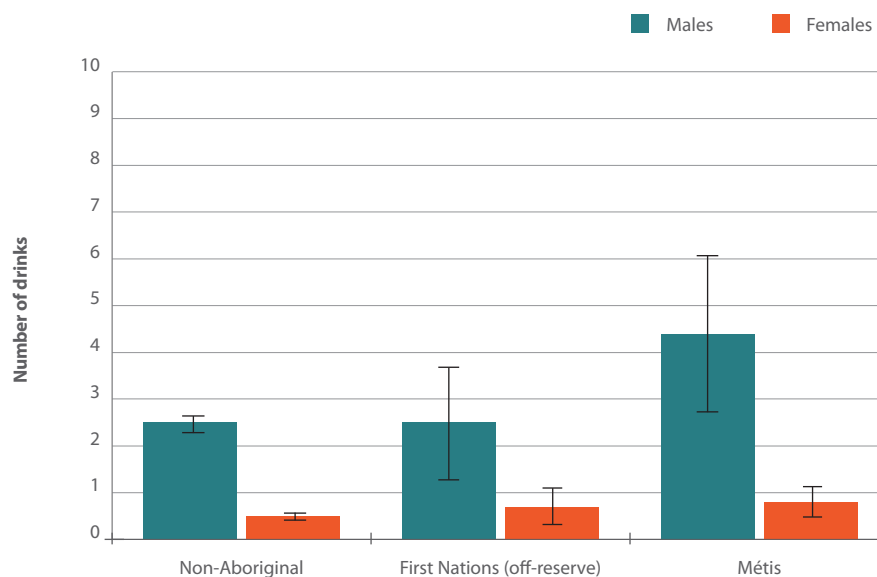
Source: Canadian Community Health Survey, 2008–2012 (Statistics Canada)

- A significantly smaller proportion of Métis adult females (17.2%) than non-Aboriginal adult females (25.7%) abstained from drinking during the past 12 months (Figure 19). The difference between Métis and non-Aboriginal adult males was not statistically significant.
- There were no statistically significant differences for abstinence during the past 12 months between off-reserve First Nations and non-Aboriginal males and females.



FIGURE 20.

Median number of drinks consumed weekly among Ontario adults (aged 19+) who reported having a drink during past 12 months, by Aboriginal identity (off-reserve), 2008–2012 combined



Notes: \pm represent 95% confidence intervals.

Data from CCHS cycles 2008 through 2012 combined to increase sample size for analyses by Aboriginal identity.

Source: Canadian Community Health Survey, 2008–2012 (Statistics Canada)

- Adult males had higher median drink consumption during the past week than females in all three groups: off-reserve First Nations, Métis and non-Aboriginals (Figure 20).
- Métis adult males had significantly higher median drink consumption (4.4 drinks) than non-Aboriginal males (2.5 drinks). There were no statistically significant differences for females.
- There were no statistically significant differences in median drink consumption between off-reserve First Nations and non-Aboriginal males and females.

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APPENDIX A: DATA SOURCES

CANADIAN COMMUNITY HEALTH SURVEY (CCHS), ONTARIO SHARE FILES

The Canadian Community Health Survey (CCHS) is a population-based cross-sectional survey conducted by Statistics Canada that collects information on health status, healthcare utilization and determinants of health for the Canadian population aged 12 years and older living in private dwellings. Individuals living on First Nations reserves and other Aboriginal settlements, institutional residents, full-time members of the Canadian Forces and residents of certain remote regions are excluded from the CCHS. It is representative of 98% of the Canadian population aged 12+ and produces reliable estimates at the health region level.

The CCHS began in 2000/01 and was initially designed to be administered every two years, sampling approximately 130,000 respondents (39,000 in Ontario) in each cycle. In 2007, this format changed to its current iteration where approximately 65,000 respondents (20,000 in Ontario) are sampled annually.

For this report, CCHS full survey waves 2003 and 2005 and half-survey annual waves 2007 to 2012 were used in most analyses. CCHS cycle 1.1, administered in 2000/01, was used to obtain historic prevalence estimates of alcohol consumption to estimate the burden of cancer in Ontario that could be attributed to alcohol.

ONTARIO CANCER REGISTRY (OCR)

The Ontario Cancer Registry (OCR) is operated by Cancer Care Ontario and registers all newly diagnosed cases of invasive neoplasia, except for basal and squamous cell skin cancers. Electronic records are linked at the person level and then “resolved” into incident cases of cancer using computerized medical logic. Major data sources are:

1. Cancer-related hospital discharge and day surgery records from the Canadian Institute for Health Information
2. Cancer-related pathology reports, received mostly electronically from hospital and community laboratories
3. Consultation and treatment records of patients referred to one of 14 Regional Cancer Centres
4. Death certificates with cancer identified as the underlying cause of death, received from the Ontario Registrar General

The OCR was used to obtain the number of new cancer cases diagnosed in 2010 for the analysis of population attributable fractions (PAF) calculated for alcohol.

APPENDIX B: INDICATOR DEFINITIONS

PERCENTAGE EXCEEDING CANCER PREVENTION RECOMMENDATIONS FOR ALCOHOL CONSUMPTION

Definition: Percentage of Ontario adults aged 19 years and older exceeding the maximum recommended level of alcohol consumption for cancer prevention.

Method of Calculation:

$$\frac{\text{Weighted number of adults aged 19 and over who on average exceed the maximum recommended alcohol consumption for cancer prevention}}{\text{Weighted total population aged 19 and over}} \times 100$$

- The average number of drinks consumed daily was calculated from the total number of drinks consumed in the week prior to the survey interview.*
- The maximum recommended alcohol consumption for men is two drinks per day and for women is one drink per day, as specified by the World Cancer Research Fund and the American Institute for Cancer Research.
- Respondents identified as a refusal, don't know or not stated to the required survey questions were excluded.
- Respondents who answered yes, refusal, don't know or not stated to the pregnancy question were excluded.

Survey Questions:

- When we use the word 'drink' it means:
 - one bottle or can of beer or a glass of draft
 - one glass of wine or a wine cooler
 - one drink or cocktail with one and a half ounces of liquor.
- Thinking back over the past week, did you have a drink of beer, wine, liquor or any other alcoholic beverage?
- Starting with yesterday, how many drinks did you have?†

AVERAGE NUMBER OF DAYS PER WEEK EXCEEDING CANCER PREVENTION RECOMMENDATIONS

Definition: Average number of days per week Ontario adults aged 19 years and older exceed the maximum recommended level of alcohol consumption for cancer prevention, among those who exceeded it based on their average consumption during the past week.

Method of Calculation:

$$\text{Weighted average number of days per week exceeding the maximum recommended alcohol consumption for cancer prevention by adults aged 19 and over who exceeded the recommendations based on their average consumption during the past week}$$

- The maximum recommended alcohol consumption for men is two drinks per day and for women is one drink per day, as

specified by the World Cancer Research Fund and the American Institute for Cancer Research.

- Respondents identified as a refusal, don't know or not stated to the required survey questions were excluded.
- Respondents who answered yes, refusal, don't know or not stated to the pregnancy question were excluded.

Survey Questions:

- Thinking back over the past week, did you have a drink of beer, wine, liquor or any other alcoholic beverage?
- Starting with yesterday, how many drinks did you have?†

PERCENTAGE EXCEEDING CANCER PREVENTION RECOMMENDATIONS FOR ALCOHOL CONSUMPTION AND CURRENTLY SMOKING

Definition: Percentage of Ontario adults aged 19 years and older exceeding the maximum recommended level of alcohol consumption for cancer prevention who report smoking cigarettes daily or occasionally.

Method of Calculation:

$$\frac{\text{Weighted number of adults aged 19 and over who on average exceed the maximum recommended alcohol consumption for cancer prevention and smoke cigarettes daily or occasionally}}{\text{Weighted total population aged 19 and over}} \times 100$$

- The maximum recommended alcohol consumption for men is two drinks per day and for women is one drink per day, as specified by the World Cancer Research Fund and the American Institute for Cancer Research.
- Respondents identified as a refusal, don't know or not stated to the required survey questions were excluded.
- Respondents who answered yes, refusal, don't know or not stated to the pregnancy question were excluded.

Survey Questions:

- Thinking back over the past week, did you have a drink of beer, wine, liquor or any other alcoholic beverage?
- Starting with yesterday, how many drinks did you have?†
- At the present time, do you smoke cigarettes daily, occasionally or not at all?

PERCENTAGE NOT DRINKING ALCOHOL DURING PAST 12 MONTHS

Definition: Percentage of Ontario adults aged 19 years and older who reported not having an alcoholic drink in the past 12 months.

*A limitation of this method of calculation is that the World Cancer Research Fund/American Institute for Cancer Research recommendations for alcohol consumption provide daily, but not weekly, limits. If this indicator looked at exceedance of the recommendations on any single day during the week prior to the survey interview, the percentage of the population exceeding the recommendations would be roughly twice as high.

† Question repeated for each day of past week

Method of Calculation:

$$\frac{\text{Weighted number of adults aged 19 and over who did not drink during past 12 months}}{\text{Weighted total population aged 19 and over}} \times 100$$

- Respondents identified as a refusal, don't know or not stated to the required survey questions were excluded.
- Respondents who answered yes, refusal, don't know or not stated to the pregnancy question were excluded.

Survey Questions:

- During the past 12 months, have you had a drink of beer, wine, liquor or any other alcoholic beverage?

MEDIAN NUMBER OF DRINKS CONSUMED WEEKLY

Definition: Median number of drinks consumed per week among adults aged 19 years and older who reported having an alcoholic drink in the past 12 months.

Method of Calculation:

Weighted median number of drinks per week among adults aged 19 and over who had an alcoholic drink during the past 12 months

- Respondents identified as a refusal, don't know or not stated to the required survey questions were excluded.
- Respondents who answered yes, refusal, don't know or not stated to the pregnancy question were excluded.

Survey Questions:

- Thinking back over the past week, did you have a drink of beer, wine, liquor or any other alcoholic beverage?
- Starting with yesterday, how many drinks did you have?*

DEFINITION OF CANCER TYPES ASSOCIATED WITH ALCOHOL CONSUMPTION

CANCER TYPE	ICD-O-3 SITE CODE ^{†,‡}
Oral cavity and pharynx	C00–C14
Esophagus	C15
Colorectal	C18–C20, C26.0
Liver	C22
Larynx	C32
Female breast	C50

[†]ICD-O-3 refers to the Third Edition of the International Classification of Diseases for Oncology (2000). ICD-O-3 site/histology codes were based on the Surveillance, Epidemiology, and End Results (SEER) site recode definition. See http://seer.cancer.gov/siterecode/icdo3_d01272003/.

[‡]All histology codes excluding 9590–9989, 9050–9055, and 9140

*Question repeated for each day of past week

APPENDIX C: ANALYTIC METHODS

ALCOHOL-RELATED PREVALENCE ESTIMATES

- Most estimates were age-standardized to the age distribution of the 2006 Canadian population using the age groups from the Canadian Community Health Survey (CCHS) person-level sampling strategy: 19–29, 30–44, 45–64 and 65+. The exceptions were age-specific estimates and estimates for the average number of days exceeding the cancer prevention recommendations and median drink consumption, for which unadjusted estimates were provided.
- Bootstrapping techniques were used to obtain variance estimates and 95% confidence intervals of all estimates.¹
- Time periods varied according to the availability of CCHS content for a given indicator or population:

2000/01: Used in the population attributable fraction analyses to provide the greatest lag time between alcohol exposure and cancer outcome.

2012: Used for most analyses because it is the most current CCHS data available when writing this report.

2003–2012: Used to examine time trends; estimates from the 2000/01 CCHS cycle were excluded because a change in the administration of the survey beginning in 2003 affected some alcohol consumption estimates.²

2010–2012 combined: Pooled data used to increase the survey sample to a size that is acceptable for the release of indicators stratified by geographic regions and socio-demographic characteristics without introducing a high degree of sampling variability.

2008–2012 combined: Pooled data used to increase the survey sample to a size that is acceptable for the release of indicators stratified by off-reserve Aboriginal identity without introducing a high degree of sampling variability.

- Socio-demographic characteristics were analyzed for adults aged 30+ to restrict the sample to those who have likely completed their education and reached their adult socio-demographic status. These factors were defined as follows:
Urban/rural residence: Respondents living within any census metropolitan area (CMA) or census agglomeration (CA) were considered “urban residents” and those living outside of any CMA or CA were classified as “rural residents.”
Income quintile: Sorts respondents’ derived household income into quintiles based on the ratio of household income to the low-income cut-off (LICO) for the household size and community. Starting in 2011, Statistics Canada imputed all missing household incomes to account for the one-third of missing responses to the income question.
Education: Highest level of education attained by the respondent, according to three categories: less than secondary school graduation, secondary school graduation or some post-secondary education, and post-secondary graduation.
Immigration status: Distinguishes immigrants, according to time since immigration, from the Canadian-born population based on three categories: Canadian-born, immigrant > 10

years in Canada and immigrant ≤ 10 years in Canada. The years since immigration refers to the first time the respondent arrived in Canada (excluding holidays) to live as a landed immigrant, by claiming refugee status, with a work permit or with a study permit.

- Analyses by Aboriginal identity (off-reserve), conducted for adults aged 19+, distinguish respondents who self-identify as Aboriginal (First Nations, Métis or Inuk/Inuit) and were born in Canada, the United States or Germany, from those who do not identify themselves as Aboriginal or were not born in the specified countries, based on CCHS derived variable socio-demographic characteristics for Aboriginal identity (SDCDABT). Aboriginal (off-reserve) respondents were further subdivided based on self-identification with any of First Nations, Métis or Inuk/Inuit groups. Self-identified off-reserve First Nations (Status and Non-Status Indians) were categorized as First Nations if they had not also identified as Métis, while those identifying as Métis at any time were categorized as Métis.
- Estimates for Local Health Integration Networks (LHINs) were analyzed using survey weights that were calibrated to the LHIN geographic boundaries, which do not correspond to the standard population weights at the public health unit (PHU) level.
- Statistically significant differences in risk factor prevalence between a given LHIN or PHU and Ontario and between categories of a given socio-demographic factor were tested by comparing the absolute difference between the two estimates with the square root of the sum of the margin of error (i.e., the upper 95% confidence limit minus the estimate) squared for each estimate being compared. If the difference between the estimates was greater than the square root of the sum of the squares of the two margins of error then the estimates were considered significantly different (approximately $p < 0.05$).
 - Socio-demographic factors were compared against the following reference variables: urban areas for analyses by urban/rural residence, income quintile 5 (Q5) for analyses by income quintile, post-secondary graduate for analyses by education status and Canadian-born for analyses by immigration status.
- Limitations to analyses that used CCHS data include:
 - The relatively short time period available to examine time trends in prevalence estimates.
 - The use of self-report data, where socially undesirable behaviours, such as heavy alcohol consumption, are likely to be under-reported by respondents. While self-report data are known to underestimate alcohol consumption when compared with sales data, population survey data allow for analyses to be conducted at a fine geographic level (e.g., by PHU as presented in this report).
 - The limitations of the survey questions regarding alcohol use. For example, questions about the quantity of alcohol consumed were restricted to the week before the survey was administered, which may not be representative of typical consumption. Beginning in 2007, there were no questions about respondents’ consumption before the year

prior to the survey. Finally, the validity of survey responses may be limited by the accuracy of respondents' recall and their interpretation of the question wording "a drink of beer, wine, liquor or any other alcoholic beverage."

- The presentation of prevalence estimates that were adjusted for age only and did not adjust for other important factors (e.g., socio-economic status) that may contribute to differences in prevalence estimates between groups.

POPULATION ATTRIBUTABLE FRACTIONS (PAF) FOR ALCOHOL CONSUMPTION

- Population attributable fraction (PAF) for alcohol consumption was calculated as follows:

$$PAF = \frac{\sum (p_x \times ERR_x)}{1 + \sum (p_x \times ERR_x)}$$

where p_x is the proportion of the population in consumption category x and ERR_x is the excess relative risk ($RR_x - 1$) in consumption category x

- The ERR of alcohol consumption for each category x was calculated as follows:

$$ERR_x = \exp(R_g \times G_x) - 1$$

where R_g is the increase in risk per gram of alcohol intake and G_x is the quantity of alcohol consumed (grams per day) in consumption category x

- The proportion of the population in each consumption category was derived from the 2000/01 cycle, the earliest year for which data on alcohol consumption could be easily extracted. The age groups used to generate age-specific proportion estimates were 19–29, 30–44, 45–64 and 65+, consistent with the age group sampling strategy of the CCHS.
- Consumption categories were derived from the CCHS based on the following questions (see Technical Appendix for details):
 1. Thinking back over the past week, did you have a drink of beer, wine, liquor or any other alcoholic beverage? If yes, how many drinks did you have on each day?
 2. During the past 12 months, how often did you drink alcoholic beverages?
 3. Have you ever had a drink? If yes, did you ever regularly drink more than 12 drinks a week? (Respondents were only asked this question if they reported not drinking during the past 12 months.)

The estimated proportions of males and females in the different consumption categories are shown in Table C1 (for proportions by age group, see Technical Appendix, Table 1).

TABLE C1. ESTIMATED PROPORTION OF THE POPULATION AGED 19+ IN ALCOHOL CONSUMPTION CATEGORIES, BY SEX, 2000/01

CATEGORY DESCRIPTION (CATEGORY NUMBER)	PROPORTION (%)		
	MALES	FEMALES	
Drank during the past week an average of	up to 1 drink a day (1)	35.6	33.8
	more than 1 and up to 2 drinks a day (2)	11.9	5.1
	more than 2 and up to 3 drinks a day (3)	4.8	1.1
	more than 3 and up to 4 drinks a day (4)	2.0	0.2
	more than 4 drinks a day (5)	1.9	0.2
Did not drink during the past week, but reported drinking during the past year	less than once a month (6)	10.8	19.2
	once a month (7)	5.2	5.9
	2–3 times a month (8)	5.0	5.3
	once a week (9)	3.9	2.8
	2–3 times a week (10)	1.8	1.2
	4–6 times a week (11)	0.3	0.1
	every day (12)	0.4	0.1
Did not drink during the past year, but has had at least one drink in their lifetime and	used to regularly drink more than 12 drinks a week (13)	3.2	0.9
	did not regularly drink more than 12 drinks a week (14)	7.1	13.1
Did not drink during the past year	and has never had a drink (15)	5.9	11.0

- Risk estimates for each cancer type associated with alcohol consumption (increase in risk per gram of alcohol intake; Table C2) were obtained from Parkin's study of cancers attributable to alcohol consumption,³ which, in turn, were derived from several meta-analyses and large epidemiologic studies.^{4,9}

TABLE C2. INCREASE IN RISK OF CANCER ASSOCIATED WITH 1 GRAM OF ALCOHOL PER DAY³

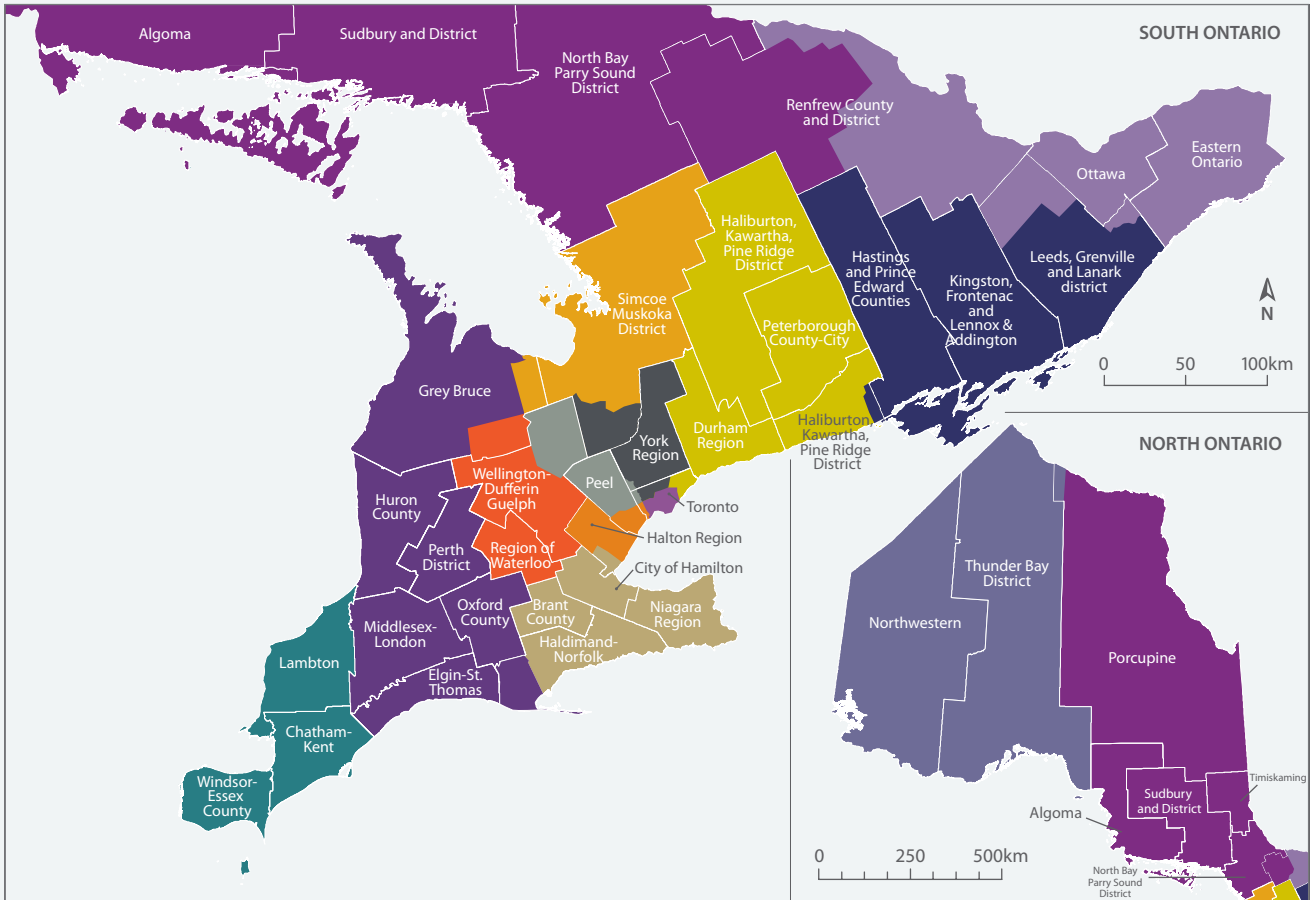
CANCER TYPE	INCREASE IN RISK PER GRAM OF ALCOHOL PER DAY
Oral cavity and pharynx ⁴	0.0185
Esophagus ⁴	0.0129
Colorectal ⁵⁻⁸	0.0080
Liver ⁴	0.0059
Larynx ⁴	0.0136
Breast ⁹	0.0071

- The exposure level, or quantity of alcohol consumed, was calculated for each consumption category (see Technical Appendix for details). Briefly, consumption categories 1 through 5, in Table C1 above, were assigned the median number of drinks per day consumed in each category, categories 6 through 12 were assigned a quantity based on similar respondents who reported drinking during the past week, and categories 13 and 14 were assigned a quantity based on their estimated volume of consumption before the past year. The number of drinks assigned to each category was multiplied by 13.6 g, the amount of alcohol in a standard alcoholic drink, to obtain the quantity of alcohol consumed in grams.
- To evaluate the potential impact of using underestimates of alcohol exposure to calculate the alcohol-attributable fractions, they were recalculated using survey data adjusted according to the coverage rate, or the degree to which survey data account for the amount of alcohol sold (see Technical Appendix for details). Briefly, the average volume of alcohol consumed in Ontario, as captured by the 2000/01 CCHS, was calculated. This was compared with recorded consumption (per capita consumption in Ontario based on sales data, averaged for 2000 and 2001) and unrecorded consumption (calculated as 19.5% of total consumption based on an Ontario study).¹⁰ The coverage rate of the 2000/01 CCHS was calculated to be 30% of recorded and unrecorded per capita consumption, which was used to adjust exposure level for each consumption category following methods used by Shield et al.¹¹ The quantity of alcohol consumed assigned to each consumption category was multiplied by 80% of the inverse of the coverage rate, upon the assumption that 20% of the estimated total volume was not consumed due to wastage and spillage and to account for undercoverage in the studies used to determine the risk estimates.
- For each cancer type associated with alcohol consumption, the PAF was calculated for each sex and age group combination, using cancer-specific risk estimates and sex- and age-specific estimates for the proportion of the population and quantity of alcohol consumed in each consumption category. Sex- and age-specific PAFs were summed for each cancer type and sex to obtain an overall PAF for that particular cancer.
- Cancers diagnosed in 2010 were examined, allowing for a latent period of 10 years between the time of exposure to alcohol and the time of cancer diagnosis. Based on this 10-year latency, the age groups used for extracting cancer incidence data were 29–39, 40–54, 55–74 and 75+.
- This method of calculating PAF for alcohol consumption adopts several assumptions that may result in somewhat conservative estimates:
 - For each respondent, past-week consumption is representative of their typical consumption.
 - Current consumption reflects past consumption. (Such an assumption is commonly made in PAF calculations, for which longer-term consumption information is usually unavailable.)
 - Survey respondents who reported consuming alcohol in the past 12 months, but did not report drinking during the past week, regularly drink the same amount of alcohol as those who did.
 - Former drinkers have the same magnitude of increased cancer risk as current drinkers.
 - A latent period of 10 years between exposure to alcohol and an increased risk of cancer is appropriate.
 - The increase in cancer risk per gram of alcohol intake is linear on a logarithmic scale.

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APPENDIX D: MAP OF ONTARIO'S LOCAL HEALTH INTEGRATION NETWORKS AND PUBLIC HEALTH UNITS



- | | | | |
|----------------|---------------------|------------------------------------|------------------------|
| □ PHU boundary | LHIN regions | ■ Erie St. Clair | ■ Central |
| | | ■ South West | ■ Central East |
| | | ■ Waterloo Wellington | ■ South East |
| | | ■ Hamilton Niagara Haldimand Brant | ■ Champlain |
| | | ■ Central West | ■ North Simcoe Muskoka |
| | | ■ Mississauga Halton | ■ North East |
| | | ■ Toronto Central | ■ North West |

For more information:

The *Cancer Risk Factors in Ontario* publication series is designed to support Cancer Care Ontario's priority to reduce chronic disease through prevention.

- *Cancer Risk Factors in Ontario: Evidence Summary*, published 2013, is the first report in the series and summarizes the epidemiologic evidence for a wide range of cancer risk factors.

Please see www.cancercare.on.ca/riskfactor

- *Cancer Risk Factors in Ontario: Tobacco*, published early 2014, provides information on tobacco use in Ontario as it relates to cancer and estimates the smoking-related cancer risk in the population.

Please see www.cancercare.on.ca/tobaccoreport

Ontario Cancer Facts are short, monthly fact sheets intended to increase knowledge about cancer and its risk modifiers in Ontario. Data typically originate from several sources including the Ontario Cancer Registry, Cancer Care Ontario publications, and Canadian, provincial or regional health surveys. Readers may subscribe to receive *Ontario Cancer Facts* by e-mail.

Please see www.cancercare.on.ca/cancerfacts

The Cancer Quality Council of Ontario is an advisory council to Cancer Care Ontario and the Ministry of Health and Long-Term Care established in 2002 to guide quality improvement efforts and monitor and publicly report on the performance of Ontario's Cancer System. One mechanism by which this is achieved is the **Cancer System Quality Index**, an interactive web-based tool released annually since 2005, that reports on a variety of evidence-based indicators covering every aspect of cancer control, from cancer prevention to recovery and end-of-life care, and tracks Ontario's progress against seven dimensions of quality.

Please see www.csqi.on.ca

Cancer Care Ontario's *Aboriginal Cancer Strategy II (ACSII)* sets out a clear plan for addressing the growing burden of cancer from 2012 to 2015. It recognizes the unique challenges faced by First Nations, Inuit and Métis (FNIM) Ontarians, and the importance of establishing relationships with FNIM that are based on trust and mutual respect. Through this relationship, the ACS II identifies the tools and the initiatives to drive improvements in the cancer system for these populations.

Please see www.cancercare.on.ca/acs



Cancer Care Ontario
620 University Avenue
Toronto, Ontario
M5G 2L7

416 971 9800
publicaffairs@cancercare.on.ca
www.cancercare.on.ca

