ONTARIO ATLAS OF ADULT MORTALITY

1992-2015

TRENDS IN LOCAL HEALTH INTEGRATION NETWORKS

Population Health Analytics Laboratory

UNIVERSITY OF TORONTO
DALLA LANA SCHOOL OF PUBLIC HEALTH

AUTHORS

This atlas was developed through the Ontario Population Trends in Improved Mortality: Informing Sustainability and Equity of the health care system (OPTIMISE) research program, an initiative of the Population Health Analytics Laboratory at the Dalla Lana School of Public Health (DLSPH), University of Toronto. OPTIMISE aims to develop measures of health system functioning and inform health system planning in Ontario.

The following individuals contributed to the atlas:

Emmalin Buajitti, *Epidemiologist,* DLSPH
Tristan Watson, *Research Analyst,* ICES UofT/DLSPH
Kathy Kornas, *Research Officer,* DLSPH
Catherine Bornbaum, *Research Associate,* DLSPH
David Henry, *Professor,* DLSPH
Laura C. Rosella, *Assistant Professor,* DLSPH

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For inquiries, comments and corrections please contact:

Population Health Analytics Laboratory
Health Sciences Building, Suite 661
155 College St., Toronto ON M5T 3M7
Telephone: (416) 978-2201
Website: http://www.pophealthanalytics.com/
Email: pophealthanalytics.dlsph@utoronto.ca

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MEMBERS OF THE OPTIMISE STEERING COMMITTEE

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

FIGURES AND MAPS [MAPS IN BLUE]

TABLES

OVERVIEW

Adult mortality rates in Ontario fell significantly between 1992 and 2015. Improvements took place in all regions of the province, and across several different types of mortality. This atlas offers strong, empirical evidence that Ontario's health systems and policies have been increasingly successful at preventing death over time. However, mortality and its declines is not homogenous across the province. There are significant geographic, socioeconomic, and sex differences in mortality within Ontario's population. Men, low socioeconomic status groups, and residents of southeast and northern Ontario experience the highest mortality rates. These groups are more likely to die, and to die prematurely, many from treatable or preventable causes, than the general Ontario population. Furthermore, socioeconomic and geographic groups with the highest mortality rates in 1992 also made the least improvements between 1992 and 2015. As a result, differences in mortality between LHINs and socioeconomic groups have grown larger since 1992.

HIGHLIGHTS

- This report is based on the linkage of the Ontario Registrar General's death certification file (ORG-D) to a range of routinely collected health data held at the Institute for Clinical Evaluative Sciences. From the linked data we analysed trends in several mortality measures over time, by sex, by socio-economic group and by location (LHIN).
- All-cause mortality rates declined in Ontario between 1992 and 2015 by 40% in males and 30% in females; premature mortality (deaths before age 75) declined by 28% in males and 20% in females.
- The largest declines in all-cause and premature mortality took place in the Local Health Integration Networks located in Central Ontario (Toronto Central, Central, Central West, Mississauga Halton); the smallest declines were in Northern Ontario (North East and North West), and South East LHIN.
- Cancer and cardiovascular disease were the most common causes of death between 1992 and 2012, accounting for 60% of all deaths in Ontario.
- Cancer deaths declined the most in Central West LHIN (28% in males and 25% in females), whereas cardiovascular deaths in males declined the most in Mississauga Halton LHIN (52%) and the least in North East LHIN (40%); in females, declines were largest in Central LHIN (53%).
- Between 2006 and 2012, half of premature deaths were from causes considered amenable to medical care and public health intervention; the highest amenable mortality rates were found in Erie St. Clair, South East, North Simcoe Muskoka, North East, and North West LHINs.
- The relative socioeconomic gradient (low vs. high socioeconomic status) in premature mortality increased in Ontario between 1992 and 2015. The largest socioeconomic disparities, measured by the relative index of inequality, was found in both sexes living in North West, Hamilton Niagara Haldimand Brant, Champlain, and North East LHINS, as well as females in Erie St. Clair and North Simcoe Muskoka LHINs.
- Identifying and understanding the complex relationship between the key factors that are driving the geographic variations in mortality across Ontario's fourteen LHINs requires more detailed analyses of the roles of health behavioural patterns, relationships between socioeconomic disadvantage and geographic location, and additional information on living conditions and access to health and social services.
- Further attention is needed regarding the growing impact of social and economic inequities on premature and avoidable deaths in Ontario.

EXECUTIVE SUMMARY

BACKGROUND

This atlas is a product of the **OPTIMISE research program,** an initiative of the Population Health Analytics Laboratory at the Dalla Lana School of Public Health, University of Toronto. OPTIMISE aims to develop mortality-based measures of health system functioning to inform health system planning in Ontario. To serve that goal, the project used the power generated by linkage of the Ontario Registrar General's death certification file (**ORG-D**) to a range of routinely collected health data held at the Institute for Clinical Evaluative Sciences. The OPTIMISE program is co-led by Dr. Laura Rosella and Dr. David Henry and guided by a steering committee of health system leaders chaired by Dr. Adalsteinn Brown, Dalla Lana School of Public Health, University of Toronto and a scientific committee chaired by Dr. John Frank, Scottish Collaboration for Public Health Research & Policy, University of Edinburgh.

The atlas offers a comprehensive, descriptive summary of adult mortality trends in Ontario between 1992 and 2015. Trends and patterns in mortality are described by sex, by **Local Health Integration Network (LHIN)** region, and over time. Five distinct mortality-based indicators are used: all-cause mortality, cause-specific mortality, premature mortality, amenable mortality (deaths considered amenable to medical care or public health intervention), and the Relative Index of Inequality (a measure of socioeconomic inequality).

Each of the mortality-based indicators put forward by this atlas offers important insights into population health and health system performance in Ontario. Understanding how mortality disparities are manifest across geography, sex, socioeconomic group and time is important to guide improvements in population health. In recognition of the substantive changes in mortality since the early 1990s, this atlas is intended as a resource for those invested in Ontario's health system functioning at any level.

KEY FINDINGS

All-cause mortality

All-cause mortality in this report includes all deaths registered in Ontario between 1992 and 2015 among adults aged 18 or older, regardless of cause of death. The Ontario population expanded and aged substantially during this time, resulting in an increase in the crude number of deaths recorded year-over-year. However, age-standardized mortality rates (to adjust for population size and age structure) reveal a clear and sizeable reduction in mortality between 1992 and 2015.

Mortality rates are not equal between sexes. Age-standardized all-cause mortality rates were higher in males than in females throughout the study period. However, males also experienced a more significant decline in all-cause mortality than females, resulting in a narrowing of the sex gap between 1992 and 2015.

Among geographic regions, rates of all-cause mortality were consistently highest in South East, North East and North West LHINs and consistently lowest in Central West, Mississauga Halton and Central LHINs. Furthermore, North East and North West LHINs also experienced the smallest LHIN-specific improvements in all-cause mortality, indicating that geographic disparities may be growing over time.

Cause-specific mortality

Cause-specific mortality in this report included all deaths registered in Ontario between 1992 and 2012 among adults aged 18 or older, with valid cause of death information. Deaths were then grouped according to ICES-derived ICD-9 codes for the following cause of death groupings: diseases of the cardiovascular and circulatory system, cancers, diseases of the respiratory system, and external causes of injury and poisoning.

Cause-specific mortality rates for cardiovascular and circulatory mortality, cancer mortality and respiratory mortality all declined in Ontario between 1992 and 2012. The improvements were most pronounced among diseases of the cardiovascular and circulatory systems, which were overtaken by cancer as the leading cause of death in Ontario in 2008. As with all-cause mortality, improvements in cause-specific mortality rates were larger in men than in women. External cause mortality (injury and poisoning), which did not decline significantly between 1992 and 2012, had the largest sex differential of all the major cause of death groupings considered.

There were significant LHIN-specific differences in cause-specific mortality, particularly in external cause mortality. These differences tended to mirror the geographic pattern seen in all-cause mortality, where mortality rates were lowest in central Ontario (Central West, Mississauga Halton, Toronto Central and Central LHINs) and highest towards the province's north, east and west borders (Erie St. Clair, South East, North East and North West LHINs). The common exceptions to this pattern were Champlain LHIN, which is in southeast Ontario but had consistently low mortality rates, and Hamilton Niagara Haldimand Brant, which is located centrally but had consistently high mortality.

Premature mortality

Premature mortality was reported for all deaths registered in Ontario between 1992 and 2015 among decedents aged 18 to 74. Like all-cause mortality, premature mortality rates declined significantly between 1992 and 2015. As premature mortality rates are reflective of a population's survival into old age, these findings are consistent with the expanding life expectancy that has been noted both in Ontario and across Canada.

Sex differences observed in premature mortality were more pronounced for all-cause mortality and most forms of cause-specific mortality. However, larger declines in premature mortality rates in males than in females resulted in the substantial narrowing of this gap between 1992 and 2015.

LHIN-specific trends in premature mortality were similar to those seen in other mortality measures. Mississauga Halton, Toronto Central, and Central LHINs had the lowest overall premature mortality rates, and also experienced the largest overall improvements in those rates. At the same time, North East and North West LHINs had the highest premature mortality rates and experienced the smallest improvements between 1992 and 2015.

Premature mortality by socioeconomic status

This report used material deprivation quintiles from the Ontario Marginalization Index (ON-MARG) as a proxy measure of socioeconomic status for all Ontario residents. Based on these scores, group-specific premature mortality rates show a clear, graded association between socioeconomic status and premature

mortality in Ontario. A socioeconomic gradient in premature mortality is seen in both males and females, and in each individual LHIN.

Additionally, Relative Index of Inequality (RII) measures were calculated to assess socioeconomic inequalities in premature mortality, within LHINs and over time. These calculations show that the effect of socioeconomic status on premature mortality varies dramatically across the province – meaning that individuals living in different geographic regions of Ontario experience socioeconomic disadvantage uniquely according to where they live.

Furthermore, the RII data show that relative socioeconomic disparities in adult premature mortality are expanding over time. In males and females across Ontario, RII values increased between 1992 and 2015. Absolute inequalities in adult premature mortality across socioeconomic status groups remained largely stable in the same period. However, the premature mortality gap between the worst-off quintile (bottom 1/5th) of the Ontario population and the next worst-off group grew gradually between 2000 and 2015.

Amenable mortality

Amenable mortality is a subset of premature mortality, made up of all deaths attributed to causes that are considered amenable to medical and/or public health intervention. Amenable mortality in this report considered all amenable deaths (based on an established classification system) registered in Ontario between 2006 and 2012, among decedents aged 18 to 74.

There are clear sex differences in amenable mortality. Between 2006 and 2012, Ontario males were more likely than Ontario females to die from causes amenable to public health intervention and/or medical care. Amenable mortality rates also varied between Ontario LHINs. Populations in Central West, Mississauga Halton, Toronto Central and Central LHINs experienced the lowest amenable mortality rates. Meanwhile, populations in Erie St. Clair, South East, North East and North West LHINs had the highest amenable mortality rates for both sexes.

IMPLICATIONS

Major progress was made in reducing Ontario population mortality between 1992 and 2015. All-cause, premature, circulatory, cancer, and respiratory mortality rates all declined substantially over this period. The significant narrowing of the mortality gap between men and women that took place is also notable.

However, there is evidence of geographic variability appearing repeatedly in both males and females, over time and for different mortality measures. Furthermore, RII measures for premature mortality show that relative socioeconomic inequalities also grew between 1992 and 2015, while absolute inequalities were largely static.

Despite large improvements in population mortality at the provincial level, certain subpopulations within Ontario are not benefiting fully from large-scale public health and healthcare system improvements. Ongoing monitoring of mortality-based indicators is essential to support further identification, comprehension, and minimization of disparities in population health.

1 INTRODUCTION

MORTALITY INDICATORS

Population mortality rates are well-established and robust indicators of population health (1, 2). Mortality rates directly and dynamically reflect the overall health status of a population, and are useful for understanding the distribution of health across population groups (3). Mortality rates, including rates of all-cause, cause-specific, premature and amenable mortality, are frequently used in Canada to monitor health trends over time and identify health disparities between groups (4).

These rates can also be used as indicators of health system performance (5). In publically funded health systems designed to protect and promote the health of all citizens, high or disparate mortality rates may suggest gaps in service delivery or impact, and may be used to identify key inequities in health system functioning. Furthermore, trends in mortality rates over time can be used to assess the impact of system-level changes or program implementation. As a measure of both population health and system performance, mortality-based indicators can be of considerable value to health system planning and evaluation.

This report examines adult mortality trends in Ontario between 1992 and 2015 using four distinct mortality-based indicators. Each offers a different lens through which to understand population health and health system functioning at the provincial and LHIN levels.

1. **All-cause mortality:** Includes all adult deaths, regardless of age or cause of death.
2. **Cause-specific mortality:** Includes all adult deaths, regardless of age. Deaths are then grouped according to their underlying cause: circulatory & cardiovascular diseases, cancers, respiratory diseases, and external causes of injury and poisoning.
3. **Premature mortality:** Includes all adult deaths before age 75, regardless of cause of death.
4. **Amenable mortality:** Includes all premature deaths from causes that are considered amenable to medical care or public health intervention.

Additionally, this report uses a mortality-derived indicator called the **Relative Index of Inequality (RII)**. RII is used in this report to describe socioeconomic inequalities in premature mortality.

This atlas is intended to describe trends in adult mortality only. For all indicators, deaths before age 18 have been excluded from reporting. Causes underlying infant and child mortality are different from those underlying adult mortality (6). As such, adult mortality is often analysed separately from infant and child mortality.

PURPOSE OF THIS ATLAS

While other mortality reports do exist, this document represents the most complete and up-to-date reporting of Ontario mortality trends ever published. It is also the first comprehensive report on mortality at the LHIN level. It offers a descriptive summary of geographic trends in Ontario adult mortality between 1992 and 2015.

Specifically, this atlas is a comprehensive look at how population health in the province has evolved since the early 1990s, based on several robust mortality-based indicators. By leveraging new linkages of Ontario vital statistics, this atlas presents empirical evidence about disparities in mortality across LHIN populations.

The findings of this report have important implications for Ontario's health system. Large variations in mortality between and within LHINs are a sign of gaps in health system access and delivery, which may disadvantage segments of the population. This atlas may support health system decision-makers in assessing system functioning and identifying areas for growth. It may also be useful to researchers, health care providers, the public health community, and others interested in health system planning and assessment.

2 LHIN POPULATION PROFILES

LOCAL HEALTH INTEGRATION NETWORKS IN ONTARIO

Ontario's health care system is divided into fourteen geographic regions, each governed by a Local Health Integration Network (LHIN) (7). LHINs are responsible for overseeing, planning and funding the delivery of health care in their region (8). They are funded by and accountable to the Ministry of Health and Long-Term Care, which delivers province-wide programs and services and establishes the provincial strategic plan for the health system (7, 8). The boundaries for Ontario's 14 LHINs are shown in Figure 2.0.1.

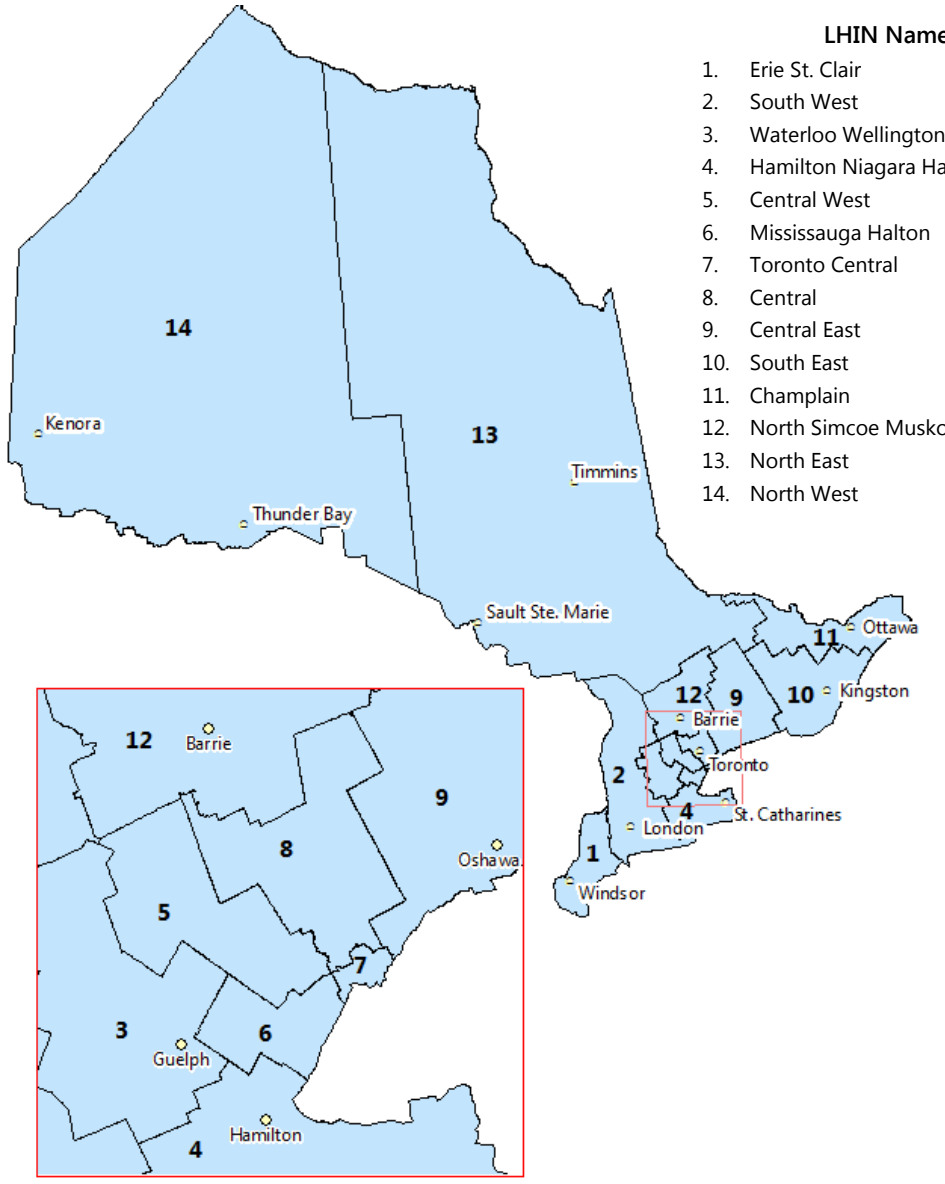


Figure 2.0.1 Local Health Integration Network (LHIN) boundaries, Ontario.

All of the mortality indicators used in this atlas are described for all of Ontario and for each of the 14 LHINs. Additionally, sex-specific mortality rates are presented for males and females within each region. Considering these distinct subpopulations separately allows for greater delineation of group-specific mortality trends, and more nuanced assessment of disparities in population health.

2.1 POPULATION DEMOGRAPHICS

Variables

In the data appendix, Table 2.1.1 lists descriptive characteristics for Ontario and all 14 LHINs, including measurements of geographic size, rurality, and population age and sex distributions. The data were drawn from the Registered Persons' Database and from the Ministry of Health and Long-Term Care. For detailed records about individual LHINs, refer to Table 2.1.1. For a map of all LHIN boundaries and names, see Figure 2.0.1.

Key Findings

Figure 2.1.1 shows the population size of each LHIN as of 2015. The number of people living in each LHIN ranges widely, from a minimum of 207,472 individuals in North West LHIN to a maximum of 1,590,549 in Central LHIN (Table 2.1.1). The LHINs also vary substantially in geographic size. The smallest LHIN, Toronto Central (203 km^2), is less than 1/2,000th the size of the largest LHIN, North West (450,637 km^2) (Table 2.1.1;

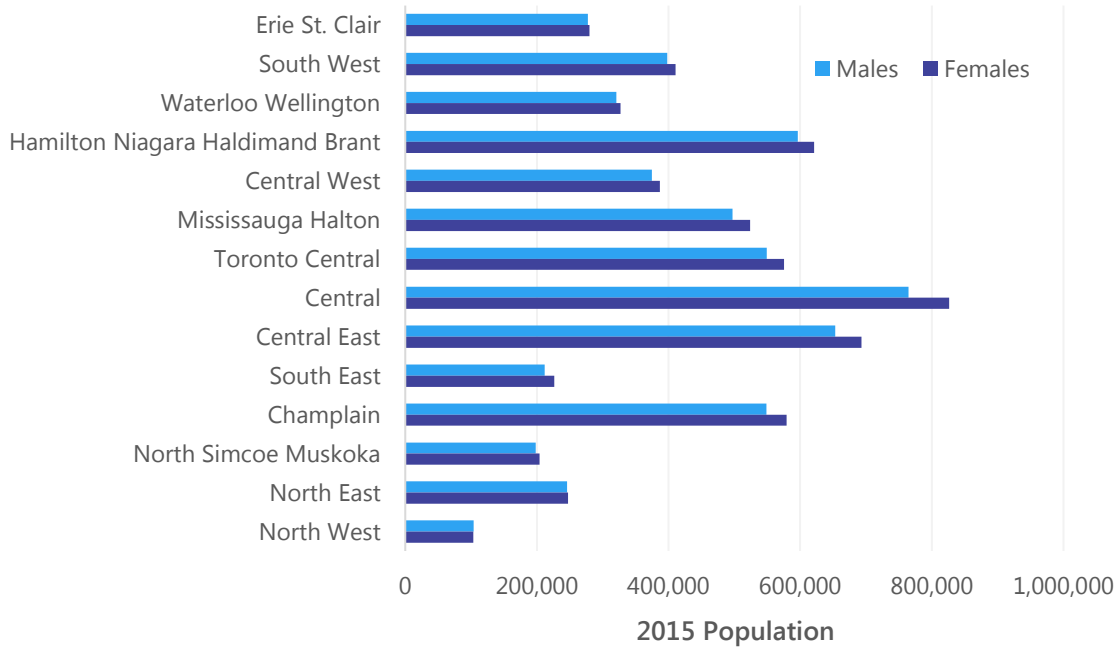


Figure 2.1.1 LHIN population counts by sex, Ontario, 2015.

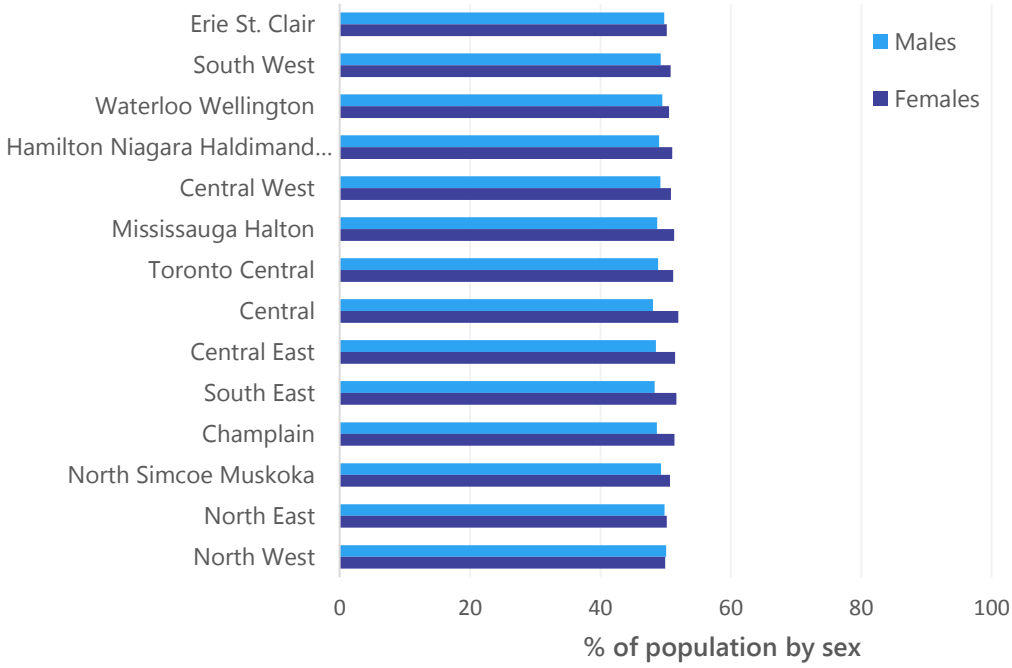


Figure 2.1.2 Sex distribution by LHIN, Ontario, 2015.

see Figure 2.0.1 for reference). These differences in geographic and population size lead irrevocably to differences in population health service needs.

There are also meaningful differences in how LHIN population sizes changed between 1992 and 2015. For example, between 1992 and 2015, the population of Central West LHIN nearly doubled in size, increasing by 99% (Table 2.1.1). This is very different than the population trend seen in nearby Toronto Central LHIN, whose population grew 23% from 1992 to 2015 (Table 2.2.1). Population sizes for each LHIN in 1992 are included in Table 2.2.1 in the data appendix.

Figure 2.1.2 shows the percent of each LHIN's population by sex. The figure shows subtle geographic differences in the distribution of males and females across Ontario. In each region but North West LHIN, there were more females than males in 2015 (Figure 2.1.2). The largest proportion of women was in Central LHIN, where 51.9% of the population was female (compared to 48.1% male; Table 2.1.1). Comparatively, the smallest proportion of females was in North West LHIN, whose population was 50.1% men and 49.9% women (Table 2.1.1). Generally speaking, LHINs located in central Ontario (Central West, Mississauga Halton, Toronto Central, Central and Central East) and southeastern Ontario (South East and Champlain) tended to have a larger proportion of women than LHINs located in northern and southwestern Ontario (Table 2.1.1; refer to map in Figure 2.0.1).

Table 2.1.1 shows the age distribution of each LHIN population. In all fourteen LHINs, there were more women than men aged 75 or greater in 2015 (Table 2.1.1). For both males and females, the smallest proportion of individuals aged 75 or older lived in Central West LHIN, where the population was made up

of 3.08% males aged 75 or greater, and 3.9% females aged 75+ (Table 2.1.1). Central West LHIN also had among the largest proportions of residents aged 18 to 44 (Table 2.1.1). The largest proportion of individuals aged 75 or older was seen in South East LHIN, whose population was 4.9% males 75+ and 6.5% females 75+ in 2015 (Table 2.1.1). South East LHIN also had the smallest proportion of males aged 18 to 44 of all LHINs, and the second-smallest (after North East LHIN) proportion of females aged 18 to 44 (Table 2.1.1).

2.2 SOCIODEMOGRAPHICS

Table 2.2.1 (in the data appendix) describes the sociodemographic makeup of each Ontario LHIN. The variables included in that table are: post-secondary education, family income, material deprivation, visible minority status, immigrant status (arriving between 1985 and 2012), and recent immigration (arriving between 2007 and 2012). Figures 2.2.1 – 2.2.4 in this section depict the distribution of key variables by LHIN and sex. Data sources for sociodemographic variables are described briefly in the text and in greater detail in the technical appendix.

SOCIOECONOMIC CHARACTERISTICS

Variables

This section considers the following socioeconomic variables, which have been demonstrably linked to health and mortality outcomes: education, income level, and material deprivation. Material deprivation, which describes the extent to which an individual is likely to be unable to afford or obtain essential goods

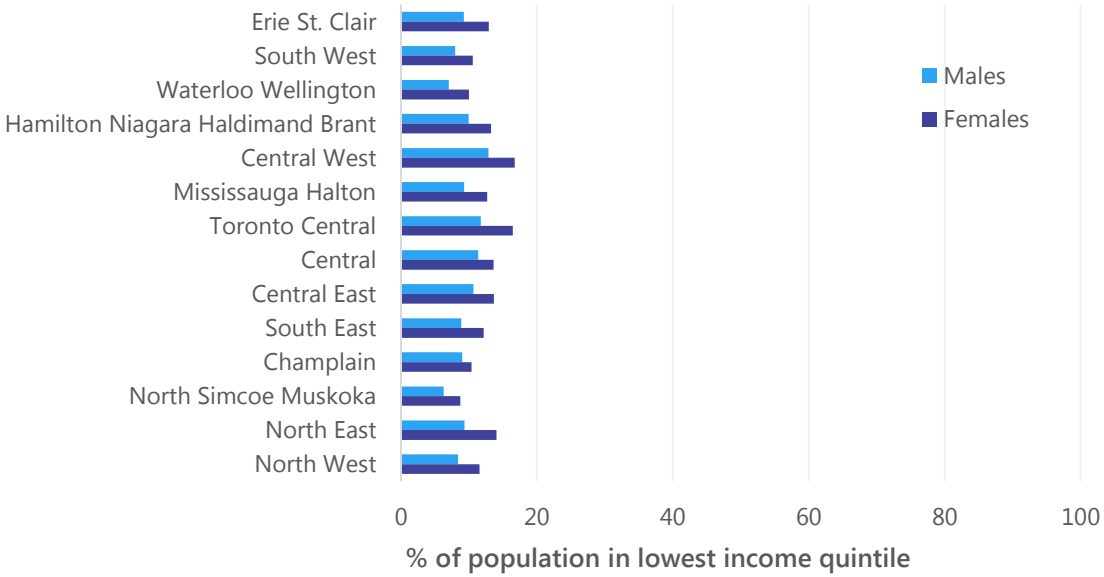


Figure 2.2.1 Percent of population in lowest income quintile by LHIN and sex, Ontario, CCHS combined cohort 2000-2010.

Note: Quintiles are based on the Canadian population and do not sum to 20%. In the linked 2000-2010 CCHS cohort on which this figure is based, 11.4% of Ontario residents are in quintile 1.

and services, is the primary indicator of socioeconomic status used in this report (9). Quintiles[1] of material deprivation were assigned to individuals according to their dissemination area of residence by the Ontario Marginalization Index – a census-derived index based on area measures of education, income, receipt of government transfer payments, and other socioeconomic indicators (9). The distribution of material deprivation quintiles for each LHIN was obtained for the 2000-2010 combined CCHS cohort using data linked at ICES.

Additionally, LHIN-specific proportions are reported for population-level post-secondary education attainment and family income level. Educational status and income quintiles are based on data from the 2000-2010 combined CCHS cohort. All of the data are available in Table 2.2.1 in the data appendix.

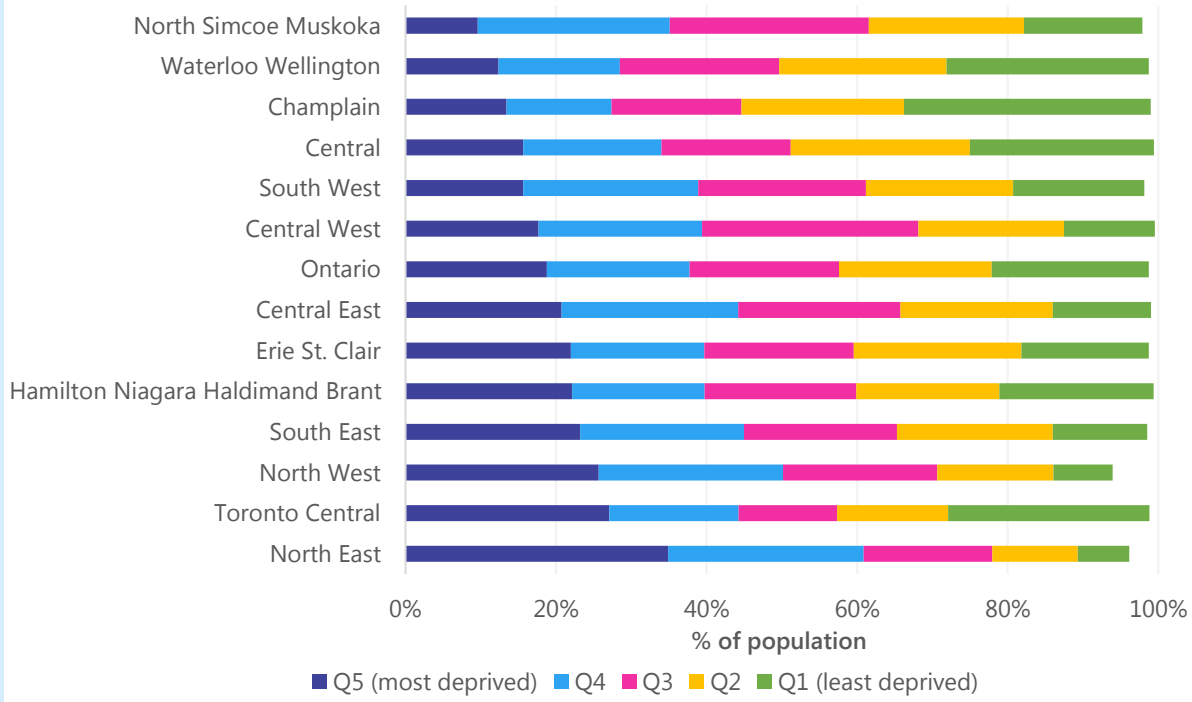


Figure 2.2.2 Percent of LHIN population by quintile of ON-MARG material deprivation, Ontario, CCHS combined cohort 2000-2010.
Note: quintiles do not sum to 100% due to missing ON-MARG information for some individuals.

Key Findings

The distribution of residents in the lowest Canadian income quintile (i.e. lowest-earning 20% of the Canadian population) is shown by LHIN and sex in Figure 2.2.1. The data show that among both males and females, the highest proportion of low-income families was in Central West LHIN, where 12.9% of males and 16.7% of females were among the lowest 20% of Canadian family incomes (Table 2.2.1). These proportions differ dramatically from nearby Mississauga Halton, where just 9.3% of males and 12.7% of females were among

[1] For details about how quintiles were created for this atlas, refer to the technical appendix and to Section 3.4 of this report.

the lowest 20% of Canadian incomes (Table 2.2.1). The proportion of males and females in the lowest Canadian family income quintile were similar within LHINs, though more females than males were in this low-income group among all fourteen LHINs (Table 2.2.1).

Figure 2.2.2 shows the distribution of each LHIN population across all five quintiles of material deprivation.[2] As described earlier, material deprivation represents the extent to which individuals are likely to struggle accessing necessary goods and services. Figure 2.2.2 shows that the distribution of material deprivation varied widely between LHINs.

High levels of material deprivation were evident in several LHINs, including North West, North East and Toronto Central LHINs. For example, in North East LHIN, 60.9% of the population was in the highest two quintiles of material deprivation – meaning they were as materially deprived as the bottom 40% of the Canadian population (Figure 2.2.2). Other LHINs with more than 40% of their population in the highest two quintiles (indicating higher-than-average material deprivation) include Toronto Central, Central East, South East, and North West LHINs (Figure 2.2.2).

Conversely, residents of LHINs such as North Simcoe Muskoka and Champlain were more likely than the general population to have low material deprivation scores (Figure 2.2.2). In Mississauga Halton, 52.6% of the population was in the lowest two quintiles of material deprivation (i.e. the best-off 40% of the Ontario population) (Figure 2.2.2). This demonstrates that on aggregate, material deprivation levels are substantially lower in Mississauga Halton than in the general Ontario population. Other LHINs with more than 40% of their population consisting of low-deprivation residents include Waterloo Wellington, Toronto Central, Central, and Champlain LHINs (Figure 2.2.2).

Considering all five quintiles of material deprivation allows for a nuanced understanding of patterns in socioeconomic status across LHINs. Consider, for example that Toronto Central LHIN has among the largest proportions of individuals in the highest quintile of material deprivation (i.e. in the most deprived or worst-off group) at 27.1% (Figure 2.2.2). Unlike other LHINs with high rates of material deprivation (such as North East and North West LHINs), Toronto Central LHIN also has among the largest groups in the lowest quintile of material deprivation at 26.7% (Figure 2.2.2). This suggests a high degree of socioeconomic disparity within Toronto Central LHIN – a finding which is consistent with other public health research on the subject (10). The extent of within-LHIN disparity is germane to an analysis of socioeconomic mortality inequalities – for more, see 'Premature Mortality by Socioeconomic Status' later in this report.

ETHNORACIAL DEMOGRAPHICS

Variables

Ethnoracial variables include population proportions of visible minorities, landed immigrants, and recent immigrants. Proportion of visible minorities is based on self-identification of individuals in the 2000-2010 combined CCHS cohort. Both landed immigrant and recent immigrant proportions are based on data from

[2] Note that some individuals could not be assigned ON-MARG scores. These individuals were retained in the population denominators, causing quintiles in some LHINs to sum to less than 100%. For details about the assignment of socioeconomic status quintiles, refer to the technical appendix and Section 3.4 of this report.

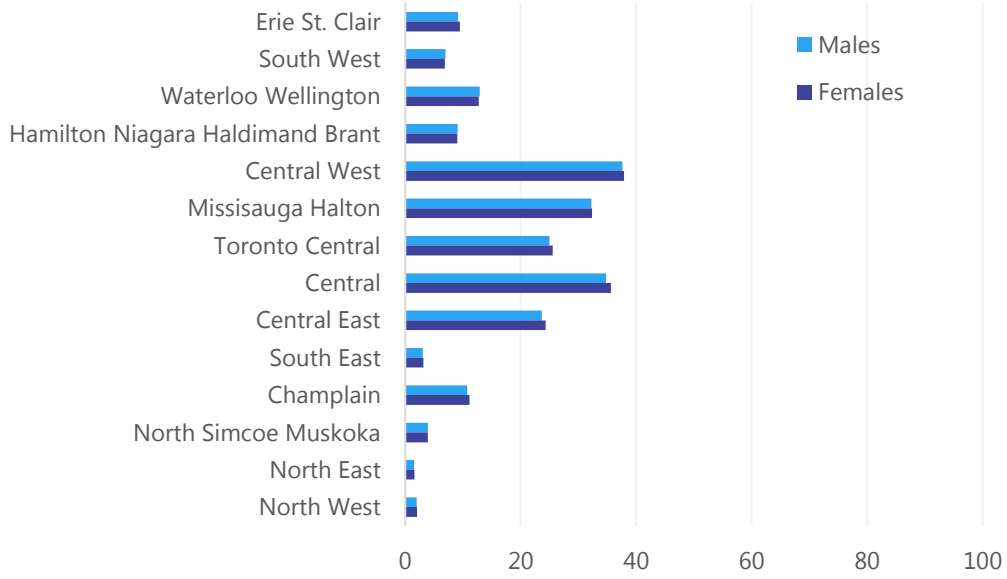


Figure 2.2.3 Percent of LHIN population registered as an immigrant in Immigration, Refugees and Citizenship Canada (IRCC)'s Permanent Resident database, Ontario, as of 2012.

Immigration, Refugees and Citizenship Canada's (IRCC) Permanent Resident Database. Immigrants in IRCC's database include individuals that landed in Ontario between 1985 and 2012 (note that immigrants who landed in other provinces and have since in-migrated to Ontario are not counted). Data from IRCC are not available after 2012. Recent immigrants are defined as those who landed in Canada less than 5 years before December 31, 2012. All data are available in Table 2.1.1 in the data appendix.

Key Findings

Figure 2.2.3 shows the distribution of landed immigrants by LHIN and sex as of 2012. The figure shows that proportions of immigrants were far higher in LHINs in central Ontario – Central West, Mississauga Halton, Toronto Central and Central East – than anywhere else in the province (Figure 2.2.3; Table 2.2.1). Immigrant proportions were very similar between males and females, with slightly more female than male immigrants in most LHINs (Table 2.2.1). LHINs with the smallest number of immigrants included South East, North Simcoe Muskoka, South West, North East and North West LHINs – also the regions with the largest rural populations (Table 2.2.1; rurality data in Table 2.1.1).

Figure 2.2.4 shows the distribution of self-identified visible minority groups by LHIN and sex, based on data from the 2000-2010 combined CCHS cohort. While patterns of visible minority and immigrant groups tended to track closely with one another (as would be expected), notable trends are also apparent. Firstly, there were a great deal more self-identified visible minorities than immigrants in the four LHINs with the smallest immigrant populations – South East, North Simcoe Muskoka, North East and North West (Figure 2.2.4; Table 2.2.1). These differences are likely attributable to large groups of non-white, non-immigrant populations, including Indigenous people. Secondly, Central West and Central East LHINs had large

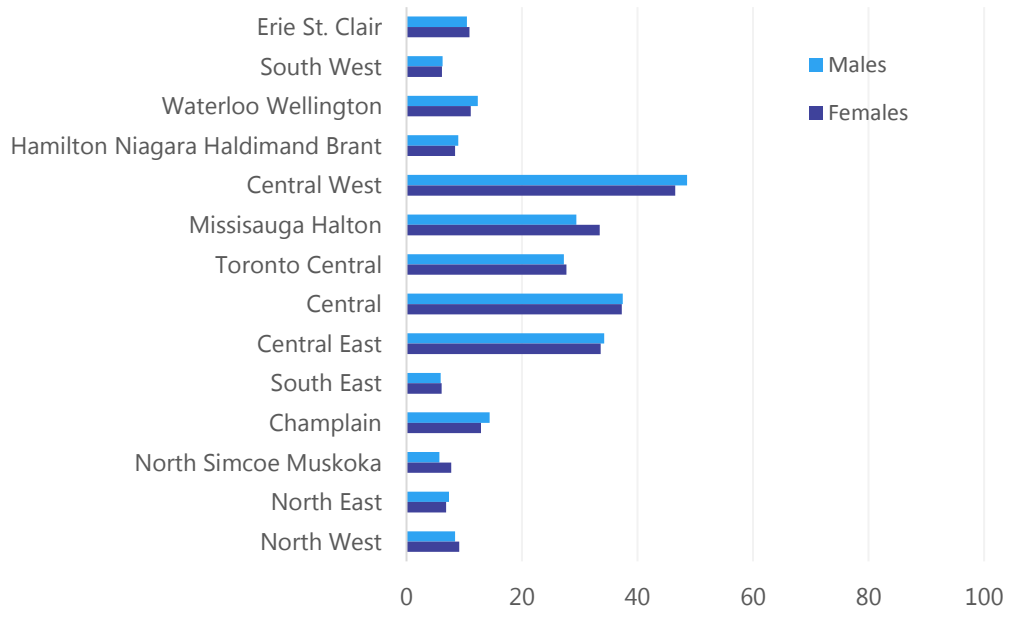


Figure 2.2.4 Percent of LHIN population self-identifying as a visible minority in the 2000-2010 combined CCHS cohort, by sex.

populations of visible minorities relative to other LHINs with high immigrant proportions. This may be the result of large second-generation immigrant populations in these regions, or of immigrants who arrived prior to 1985 and are therefore not captured by CIC.

2.3 BEHAVIOURAL RISK FACTORS

This section describes the distribution, by LHIN and sex, of several behaviourally-linked characteristics which have been identified as risk factors for increased mortality. These risk factors include: overweight and obesity, current smoking, physical inactivity, heavy drinking, and the lack of a regular doctor. All statistics are based on data from the 2000-2010 combined CCHS cohort. Specific variable definitions can be found in the text, and are summarized in the technical appendix. The data for each LHIN, and for all Ontario, are in Table 2.3.1 in the data appendix.

OVERWEIGHT AND OBESITY

Figure 2.3.1 shows the percent of each LHIN population that was overweight or obese, defined as having a Body Mass Index (BMI) of 25.0 or greater. The figure shows that overweight and obesity were common across Ontario, with approximately 57% of males and 41% of females in the province reporting overweight or obesity (Table 2.3.1). Levels of overweight and obesity were particularly concerning among Ontario men, among whom prevalence is greater than in women by approximately 15% in each LHIN (Figure 2.3.1; Table 2.3.1).

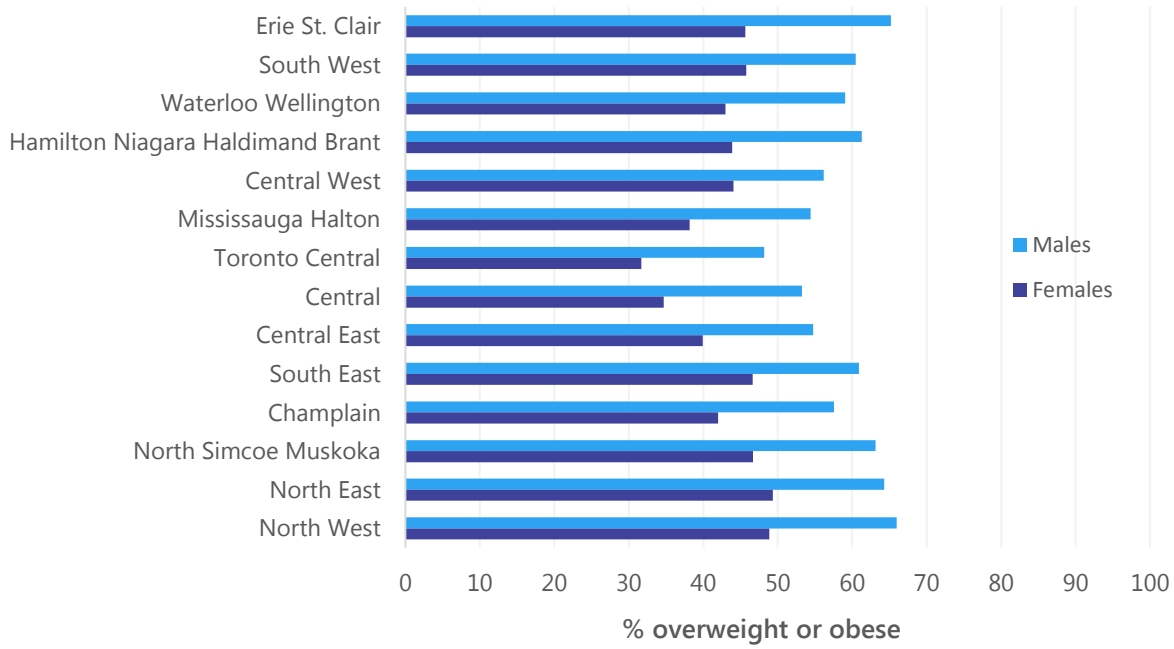


Figure 2.3.1 Percent of population overweight or obese (BMI ≥ 25.0), by LHIN and sex, Ontario CCHS combined cohort 2000-2010.

While overweight and obesity were common across the province, levels did vary by LHIN. Prevalence of overweight and obesity was lowest among both males and females in Toronto Central LHIN, where 48.2% of men and 31.7% of women were overweight or obese (Table 2.3.1). They were highest in North West LHIN, where 66.0% of men and 48.9% of women were overweight or obese – a startling 50% difference in female overweight and obesity prevalence between LHINs (Table 2.3.1).

Generally speaking, prevalence of overweight and obesity was lowest among LHINs in central Ontario (Central West, Mississauga Halton, Toronto Central, Central and Central East) and higher towards the East, West and North borders of the province (Erie St. Clair, South East, North East and North West) (Figure 2.3.1). One notable exception to this was Champlain LHIN, which is located near the far southeastern border of Ontario (between Ontario and Quebec), but had overweight and obesity levels similar to those in the regions surrounding Toronto Central LHIN.

SMOKING

Figure 2.3.2 shows the percent of each LHIN population that was a current smoker, either light or heavy. Males were more likely than females to smoke in each Ontario LHIN. The gap in smoking prevalence between males and females was greatest in regions where smoking prevalence was low (Figure 2.3.2). Correspondingly, there was a greater difference in smoking rates among females across geographic regions than there was among males (Figure 2.3.2; Table 2.3.1).

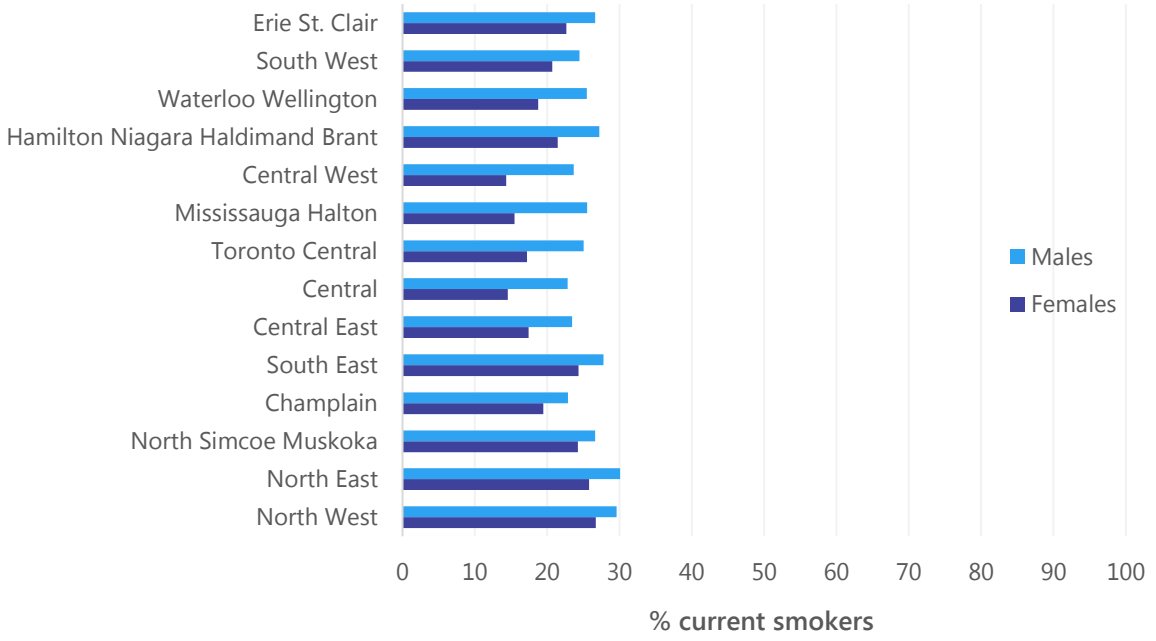


Figure 2.3.2 Percent of population current smokers (light or heavy), by LHIN and sex, Ontario CCHS combined cohort 2000-2010.

In males, smoking prevalence ranged from 22.8% in Central LHIN to 30.1% in North East LHIN (Table 2.3.1). In females, it ranged from 14.4% in Central West LHIN to 26.7% in North West LHIN (Table 2.3.1). The overall geographic pattern of smoking was similar to that of overweight and obesity, wherein prevalence was consistently below average among LHINs in central Ontario, and higher towards the northern, eastern and western regions of the province (Figure 2.3.2). An exception here is Hamilton Niagara Haldimand Brant LHIN, which is located centrally in Ontario but had above-average smoking prevalence (Table 2.3.1).

PHYSICAL INACTIVITY

Figure 2.3.3 shows the percent of each LHIN population that self-reported being physically inactive, defined as exerting fewer than 1.5 metabolic equivalents (MET = kcal/kg) per day. Like with overweight and obesity, the prevalence of physical inactivity was high across Ontario (Figure 2.3.3). Unlike both overweight and obesity and smoking, rates of physical inactivity were higher in females than in males, affecting 46.1% of Ontario males and 53.4% of Ontario females (Table 2.3.1).

Prevalence of physical inactivity did not vary as significantly between LHINs relative to levels of smoking or overweight and obesity, but it did differ across the province (Figure 2.3.3). Among both males and females, the highest prevalence of physical inactivity was in Central West LHIN, where 62.3% of females and 54.7% of males exerted less than 1.5 MET per day (Table 2.3.1). The lowest prevalence of physical inactivity among males was in North East LHIN, where 37.0% of males were physically inactive; the lowest prevalence among females was 46.8% in North Simcoe Muskoka (Table 2.3.1).

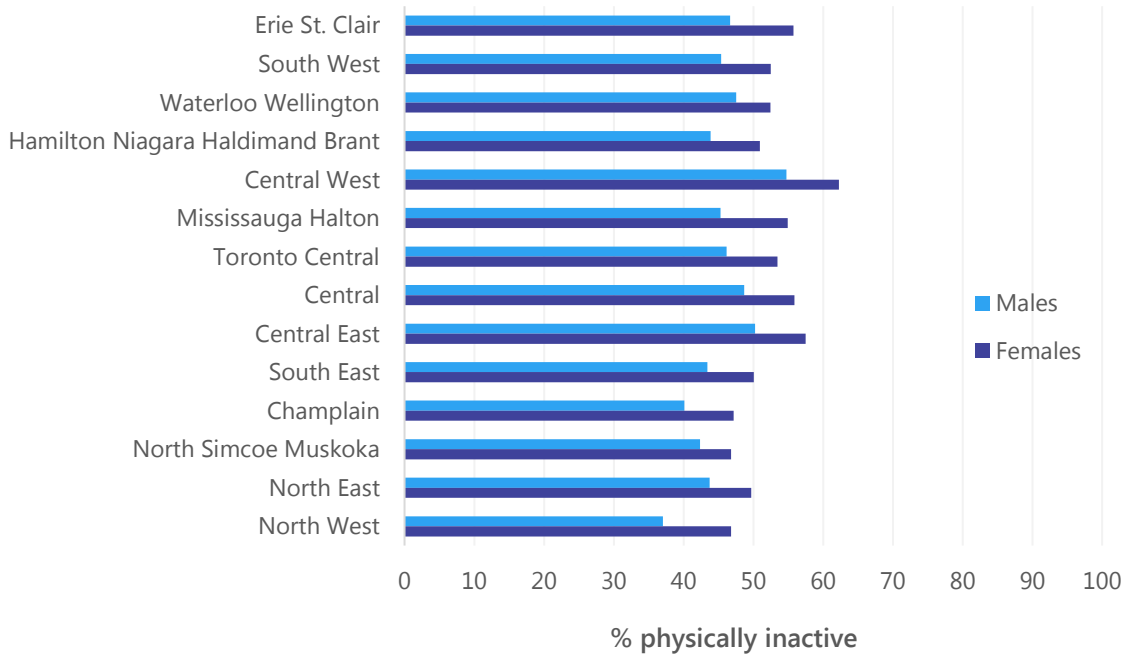


Figure 2.3.3 Percent of population physically inactive (<1.5 kcal per kg per day), by LHIN and sex, Ontario CCHS combined cohort 2000-2010.

Prevalence of physical inactivity was slightly above average in LHINs of central Ontario (particularly Central West, Central and Central East LHINs), and well below average in northern Ontario (North Simcoe Muskoka, North East and North West LHINs) (Figure 2.3.3). This seems to reverse the geographic trend of health behaviours that was observed in overweight and obesity and smoking, where prevalence was lower in central Ontario and higher near the east, west and north borders of the province.

HEAVY DRINKING

Figure 2.3.4 shows the percent of each LHIN population that reported heavy drinking, defined for men as 21 or more drinks and for women as 14 or more drinks in the previous week, or binging behaviour (5 or more drinks on any occasion) on a weekly basis. Relative to other behavioural characteristics considered, prevalence of heavy drinking was low across the province at approximately 12% in males and 4% in females (Table 2.3.1). There was a large difference in heavy drinking prevalence between males and females, with prevalence of heavy drinking being substantially greater among males than females in all fourteen LHINs (Figure 2.3.4).

The geographic pattern of heavy drinking prevalence among males closely mirrors that of overweight and obesity and smoking prevalence, with lower levels in the central LHINs and higher towards the north, east and west borders of the province (Figure 2.3.4). Among males, the highest prevalence of heavy drinking was in North Simcoe Muskoka LHIN, where 16.0% of males in the combined CCHS cohort reported heavy drinking (Table 2.3.1). The lowest prevalence of heavy drinking was in Central West LHIN, where 7.78% of men reported heavy drinking (Table 2.3.1).

This geographic pattern was similar, though not identical, in females. The lowest prevalence of heavy drinking in females was also in Central West LHIN, where just 1.9% of women reported heavy drinking (Table 2.3.1). However, the highest proportion of heavy drinkers among women was in Toronto Central LHIN, with a prevalence of 6.1% (Table 2.3.1). This was quite different than the trend seen among Toronto Central males, whose heavy drinking prevalence of 11.7% was just below the provincial average of 11.9% (Table 2.3.1).

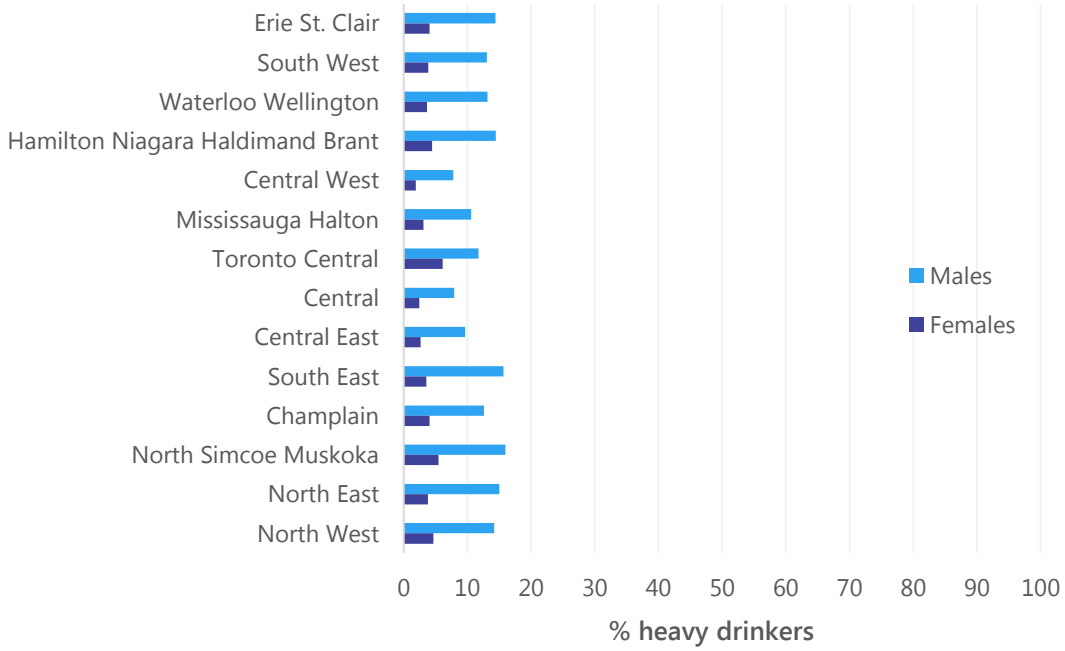


Figure 2.3.4 Percent of population heavy drinkers, by LHIN and sex, Ontario CCHS combined cohort 2000-2010.

3 MORTALITY TRENDS

3.1 ALL-CAUSE MORTALITY

Scope

All-cause mortality includes all adult deaths that were registered in Ontario between 1992 and 2015, regardless of cause of death. All-cause mortality rates have been **age-standardized** to the 2000 adult Canadian standard population. Age-standardization of all-cause mortality rates corrects for underlying differences in age structure between populations, and allows for comparisons between groups (11, 12). See the technical appendix for a detailed description of rate age-standardization.

For methodological details regarding the calculation of age-standardized all-cause mortality rates in this report, refer to the technical appendix. For mapping purposes, all-cause mortality rates have been reported as aggregated (i.e. cumulative) rates for the following eras: 1992-1999, 2000-2007, and 2008-2015.

Use

All-cause mortality is an important indicator of overall population health (11). Decreasing population mortality and increasing survival are core responsibilities of local and regional health systems. All-cause mortality rates are therefore a meaningful indicator of health system functioning (13). Furthermore, evaluating trends in all-cause mortality over time can highlight long-term changes in population health.

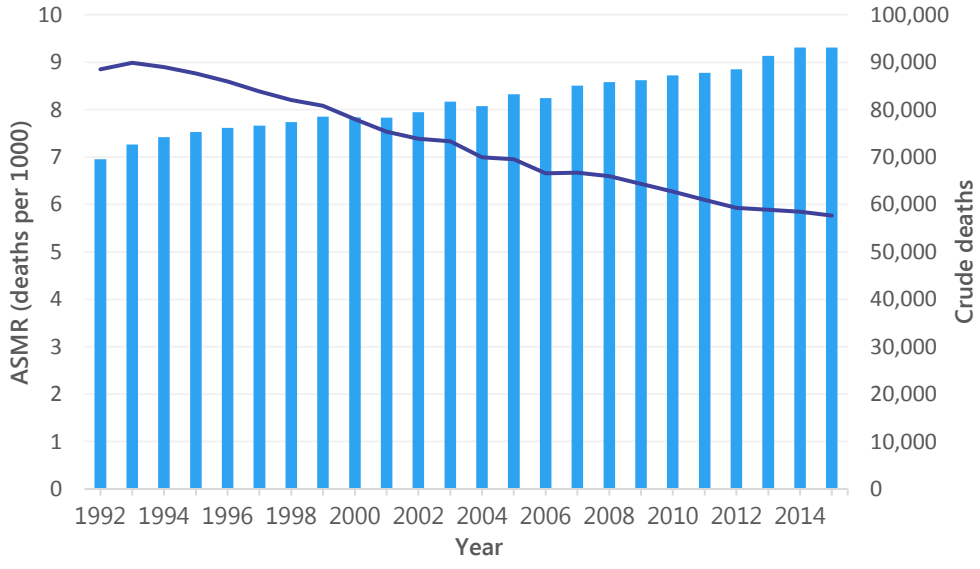


Figure 3.1.1 Age-standardized all-cause mortality rates (line graph) with crude death counts (bar graph), all Ontario, 1992-2015.

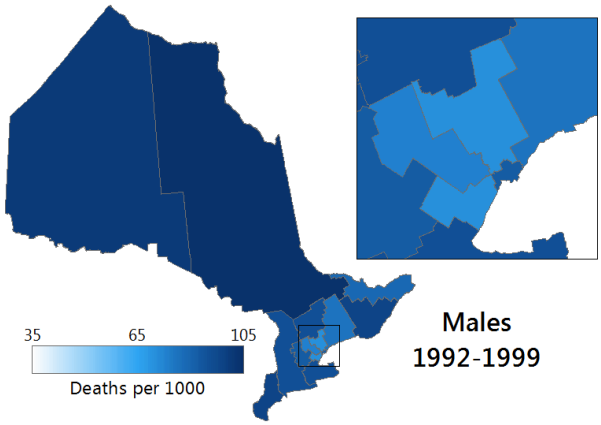


Figure 3.1.2 Cumulative all-cause mortality (total deaths per 1000), males, 1992-1999.

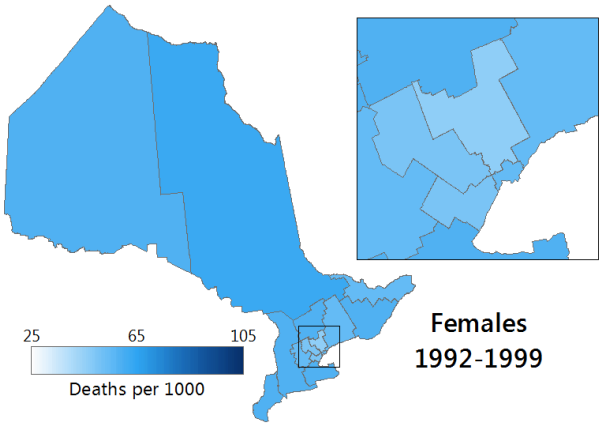


Figure 3.1.3 Cumulative all-cause mortality (total deaths per 1000), females, 1992-1999.

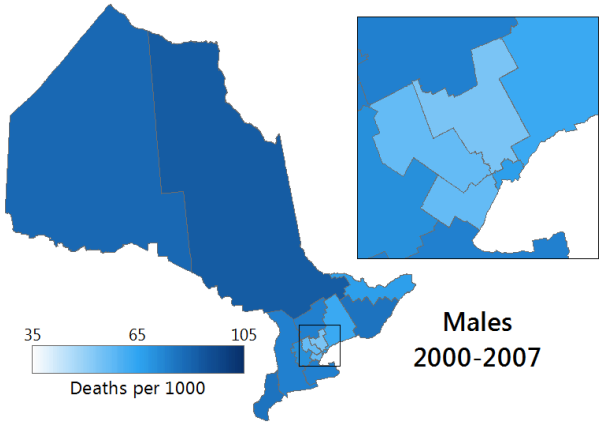


Figure 3.1.4 Cumulative all-cause mortality (total deaths per 1000), males, 2000-2007.

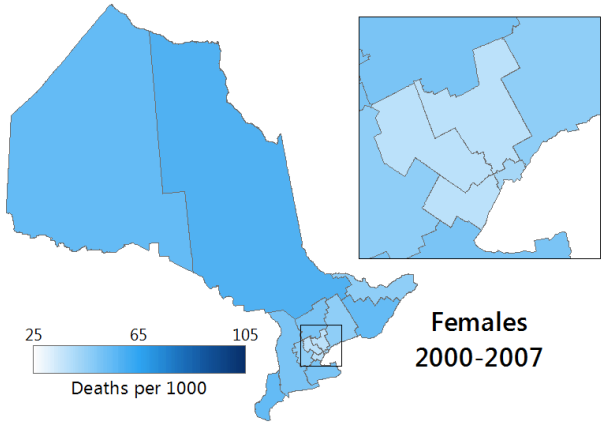


Figure 3.1.5 Cumulative all-cause mortality (total deaths per 1000), females, 2000-2007.

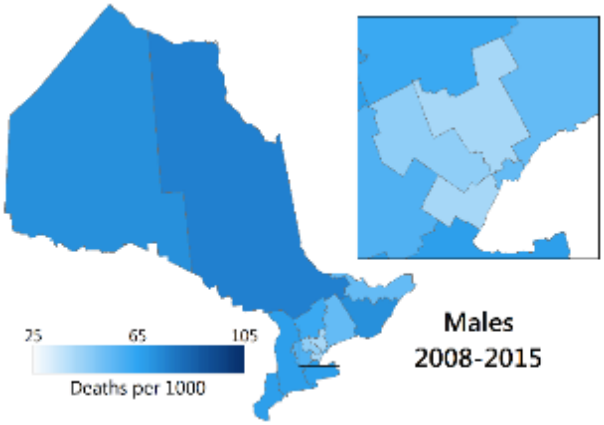


Figure 3.1.6 Cumulative all-cause mortality (total deaths per 1000), males, 2008-2015.

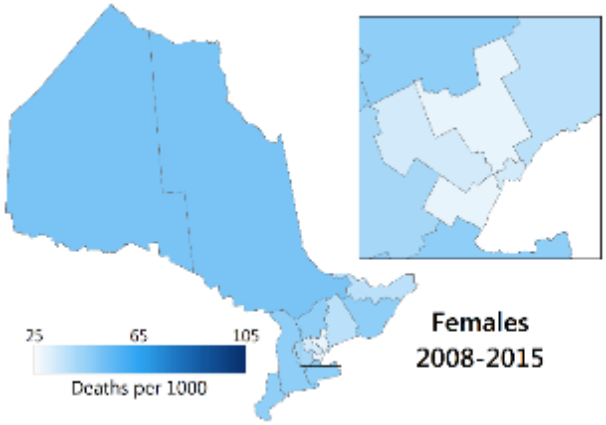


Figure 3.1.7 Cumulative all-cause mortality (total deaths per 1000), females, 2008-2015.

Because they have been adjusted for underlying population age differences, age-standardized all-cause mortality rates are useful for comparing between groups or over time. These rates can also be used to identify geographic and temporal patterns in mortality. However, by considering all deaths in a population equally (in contrast to age- or cause-specific mortality rates), all-cause mortality is rarely a definitive measure of specific population health phenomena. All-cause mortality is best used in combination with other, more granular, mortality rates or health indicators (14).

Findings

Age-standardized all-cause mortality rates in Ontario between 1992 and 2015 are shown in Figure 3.1.1. LHIN- and sex-specific all-cause mortality rates are mapped by era in Figures 3.1.2 – 3.1.7. These era mortality rates, with corresponding mortality risk ratios, are available in Table 3.1.1 in the data appendix. Yearly age-standardized all-cause mortality rates for each LHIN, which have not been mapped, are shown in Figure 3.1.8 and Table 3.1.2 in the data appendix.

Across Ontario, the total number of deaths recorded annually rose steadily between 1992 and 2015 (Figure 3.1.1). However, this was a function of population growth and changing population age structures; specifically, that Ontario's population rapidly expanded and aged over the past number of years (15). Age-standardized mortality rates (which were adjusted for population size and age differences) declined consistently over the same period across Ontario (Figure 3.1.1). Figures 3.1.2 – 3.1.8 show the extent of decline in all-cause mortality rates by LHIN and sex between 1992 and 2015.

In all fourteen LHINs, age-standardized all-cause mortality rates were lower in females than in males throughout the study period (Figures 3.1.2 – 3.1.8; Table 3.1.2). However, the all-cause mortality gap between males and females narrowed over time in all LHINs, as evidenced by Figure 3.1.8. This was the result of faster improvements in all-cause mortality in males than in females (Tables 3.1.1 and 3.1.2). This finding is consistent with research, both from Canada and other high-income countries, that has repeatedly shown a narrowing gap between men and women in the late 1990s and early 2000s (16-19). However, the underlying cause of the shrinking mortality gap is unclear. Further consideration of this trend can be found in the 'Discussion' section of this report[3].

Among males, the greatest decline in all-cause mortality took place in Mississauga Halton LHIN, where all-cause mortality declined 39%, from 72.6 deaths per 1000 in 1992-1999 to 44.2 deaths per 1000 in 2008-2015 (Table 3.1.1). Declines of close to 40% also took place in males of Central West, Toronto Central and Central LHINs (Table 3.1.1). The smallest decline in all-cause mortality among males took place in North East LHIN, where rates declined 26% from 102.1 to 75.7 deaths per 1000 between 1992-1999 and 2008-2015 (Table 3.1.1). Other LHINs with small declines in all-cause mortality among males include Hamilton Niagara Haldimand Brant, South East and North West LHINs; all-cause mortality in these LHINs declined between 25% and 27% between 1992-1999 and 2008-2015.

[3] See also Rosella LC, Calvazara A, Frank JW, Fitzpatrick T, Donnelly PD, Henry D. Narrowing mortality gap between men and women over two decades: a registry-based study in Ontario, Canada. BMJ Open. 2016;6(11):e012564.

Figure 3.1.8 Age-standardized all-cause mortality by LHIN, males and females, 1992-2015.

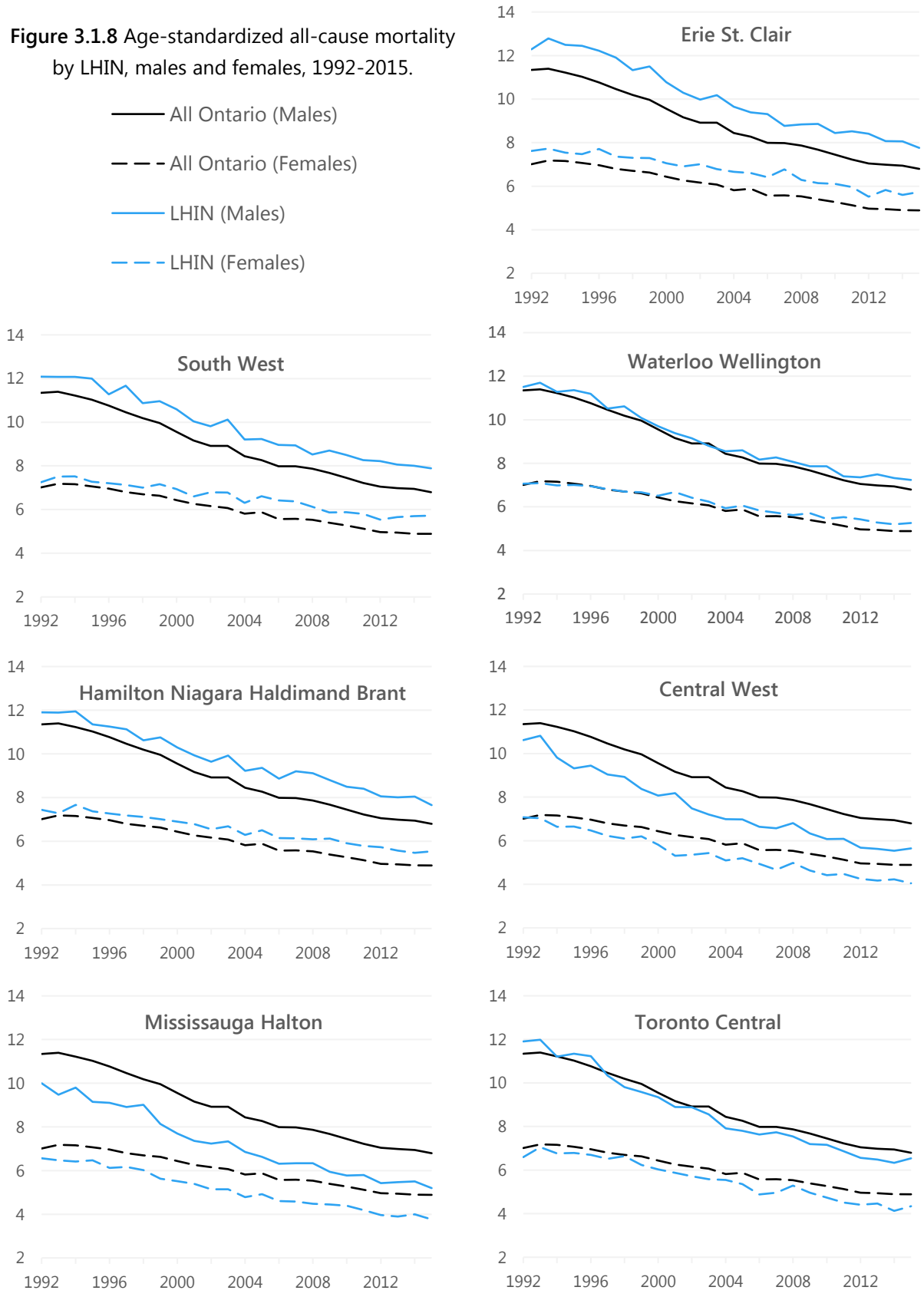
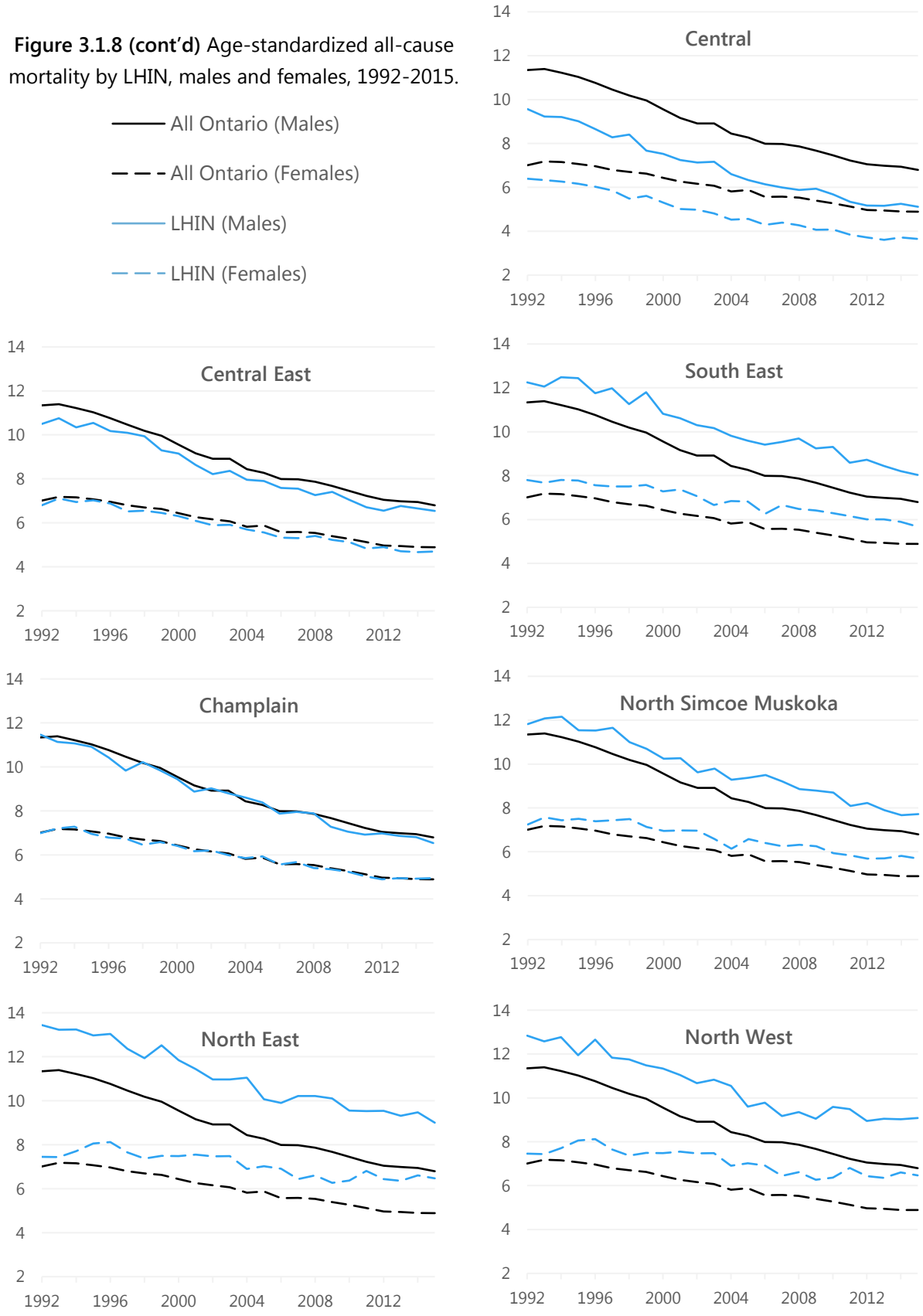


Figure 3.1.8 (cont'd) Age-standardized all-cause mortality by LHIN, males and females, 1992-2015.



Among females, the greatest decline in all-cause mortality took place in Central LHIN, where age-standardized female all-cause mortality rates dropped 37% from 47.6 to 30.1 deaths per 1000 between 1992-1999 and 2008-2015 (Table 3.1.1). Large declines in all-cause mortality were also observed in Central West (-39%), Mississauga Halton (-39%) and Toronto Central LHIN (-39%) females in the same period (Table 3.1.1). These declines are in sharp contrast with trends in North West LHIN females, where mortality rates decreased 16% from 60.8 deaths per 1000 in 1992-1999 to 51.3 deaths per 1000 in 2008-2015. Small declines in female all-cause mortality were also seen in South East (-20%) and North East (-18%) LHINs (Table 3.1.1).

LHIN-specific trends of all-cause mortality are concerning. LHINs with the highest baseline mortality rates, including South East, North East and North West LHINs, also had smaller declines in mortality between 1992 and 2015 than other LHINs (Table 3.1.1). This suggests that geographic disparities in all-cause mortality are expanding over time.

3.2 CAUSE-SPECIFIC MORTALITY

Scope

Cause-specific mortality includes all adult deaths registered in Ontario between 1992 and 2012 with valid cause of death information.[4] Additionally, deaths have been stratified by cause of death, according to the following four code groups in ICD-9: Diseases of the cardiovascular and circulatory system, cancers, diseases of the respiratory system, and external causes of injury and poisoning (20).

Cause of death is an ICES-derived variable based on the underlying cause of death recorded on the decedent's Medical Certificate of Death (21). All deaths that fall outside of the codes assigned to the cause of death groupings have been assigned a cause of death of 'Other.' Across the study period, the four major cause of death groupings account for approximately 78% of all deaths reported in Ontario (see Table 3.2.1 in the data appendix).

Cause-specific mortality rates have been age-standardized to the 2000 adult Canadian standard population. As before, age-standardization corrects for underlying differences in population age structures, and allows for comparisons between groups (11, 12). For details regarding calculation of cause-specific mortality rates, refer to the technical appendix.

Cause-specific mortality rates are reported as aggregated rates for the following eras: 1992-1998, 1999-2005, and 2006-2012.

Use

Cause-specific mortality rates are important for understanding the factors underlying trends in all-cause mortality. Cause-specific trends can offer insights into which interventions are contributing to reductions in

[4] Cause-specific mortality rates use a shorter data collection period than all-cause and premature mortality rates. This is due to administrative delays in reporting of cause of death information from ORG-D. Valid cause of death information is only available for deaths registered before December 2012; deaths occurring after this time have been excluded from this section.

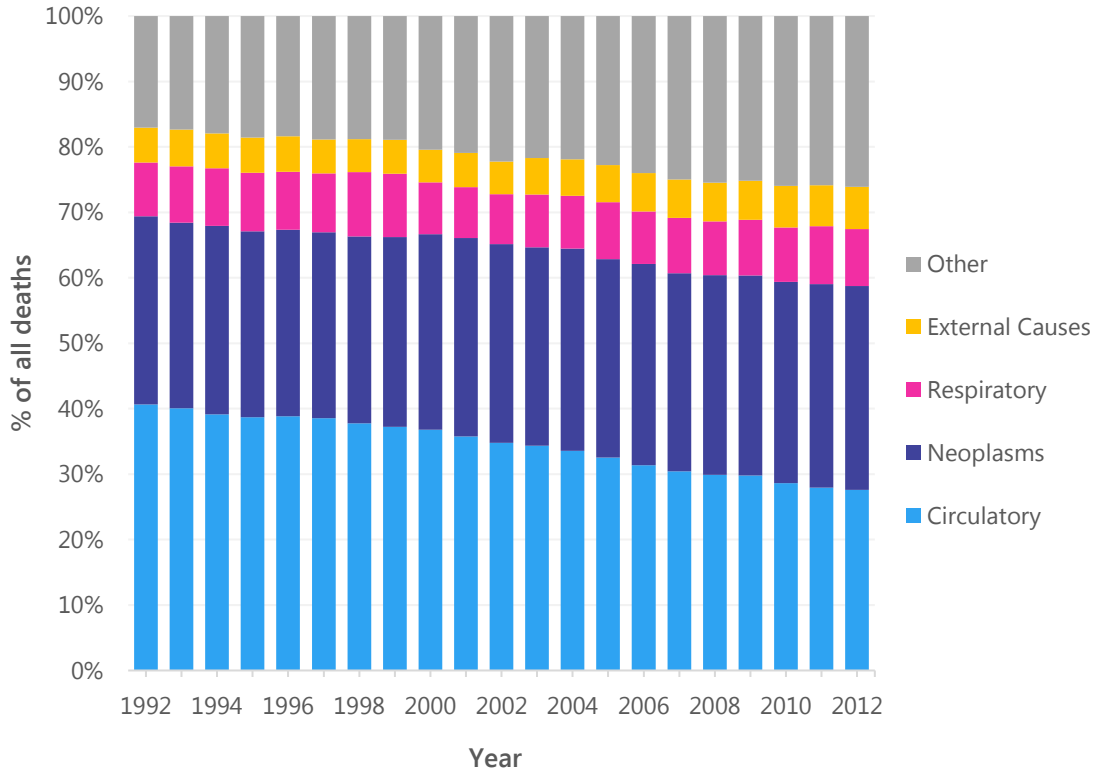


Figure 3.2.1 Percent of all deaths by cause, all Ontario, 1992-2012.
Note: leading groups of death in "Other" category include mental disorders, endocrine disorders, and diseases of the digestive and genitourinary system.

all-cause mortality, and for which population groups. Furthermore, understanding how leading causes of death have changed over time is important for a health system wishing to continue making reductions in population mortality.

In interpreting these findings, consider that each of the cause-specific mortality rates presented in this report are aggregated to include a group of individual underlying causes. For example, respiratory mortality includes deaths from acute respiratory infections, pneumonia, influenza, chronic obstructive pulmonary disease (COPD), and other diseases of the respiratory system. Trends observed at this level may not fully represent individual disease-level trends.

Findings

Table 3.2.1 in the data appendix lists the total number of deaths in Ontario for each of the major cause of death groupings, by year between 1992 and 2012. Figure 3.2.1 shows, for all Ontario, the proportion of all deaths attributed to each cause of death grouping for each of those years.

Between 1992 and 2012, cancers overtook cardiovascular and circulatory disease as the leading cause of death in Ontario (Figure 3.2.1; Table 3.2.1). Over the same period of time, over 60% of all deaths in Ontario were attributable to one of those two causes (Figure 3.2.1).

DISEASES OF THE CARDIOVASCULAR & CIRCULATORY SYSTEM

Scope

Circulatory mortality includes all deaths registered in Ontario adults between 1992 and 2012 and attributed to a disease of the circulatory or cardiovascular system according to ICES-derived cause of death records. This category includes ICD-9 codes between 390 and 459.9. It includes all forms of heart disease, hypertensive disease, and all other circulatory disorders (20). A majority of circulatory mortality is caused by arteriosclerosis ("hardening of the arteries"), particularly acute myocardial infarction and acute stroke (22).

Findings

Age-standardized circulatory mortality rates for all Ontario between 1992 and 2012 are shown by sex and era in Figure 3.2.2. LHIN-specific rates are mapped by sex and era in Figures 3.2.3 – 3.2.8. All circulatory mortality rates are available in Table 3.2.2 in the data appendix.

Between 1992 and 2012, circulatory mortality rates declined across Ontario in both males and females (Figure 3.2.2; Table 3.2.2). Throughout the study period, circulatory mortality rates were higher among males than in females (Figures 3.2.2 – 3.2.8; Table 3.2.2). Importantly, declines across Ontario were more pronounced in males than in females, resulting in a narrowing of the mortality gap between sexes between 1992 and 2012.

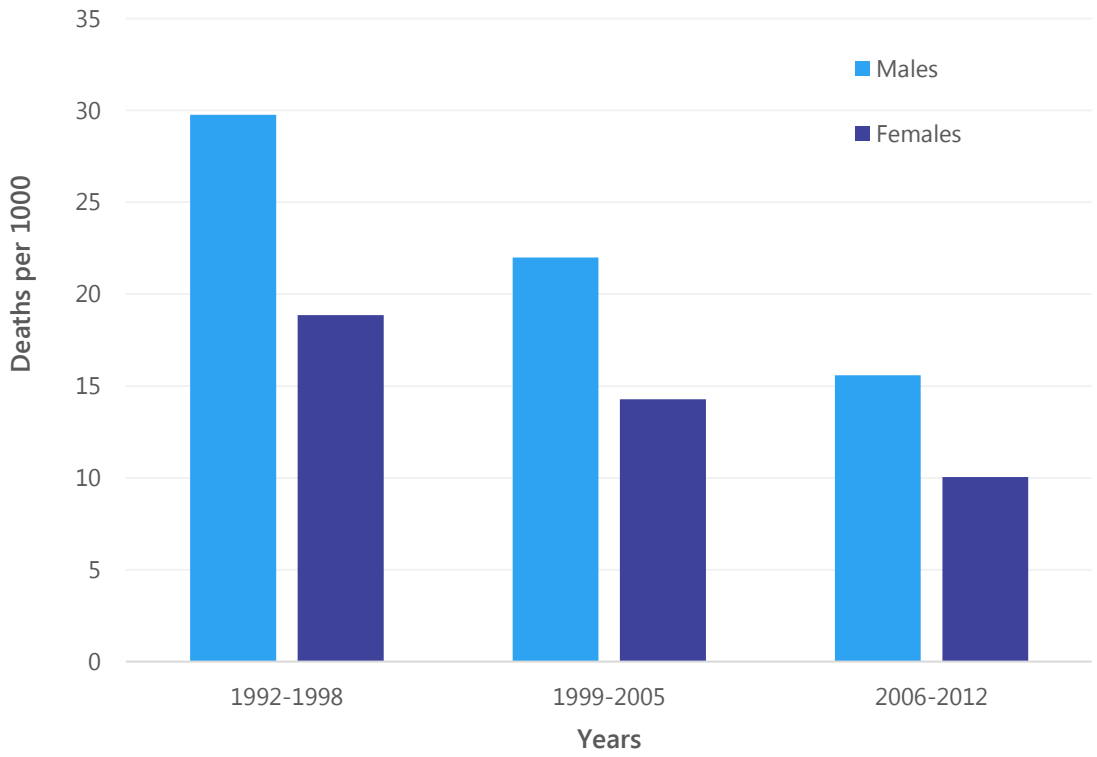


Figure 3.2.2 Age-standardized circulatory mortality rates (total deaths per 1000) by era, males and females, all Ontario.

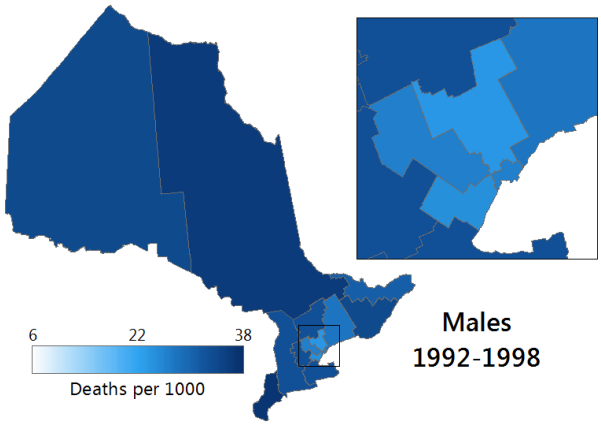


Figure 3.2.3 Cumulative age-standardized circulatory mortality (total deaths per 1000), males, 1992-1998.

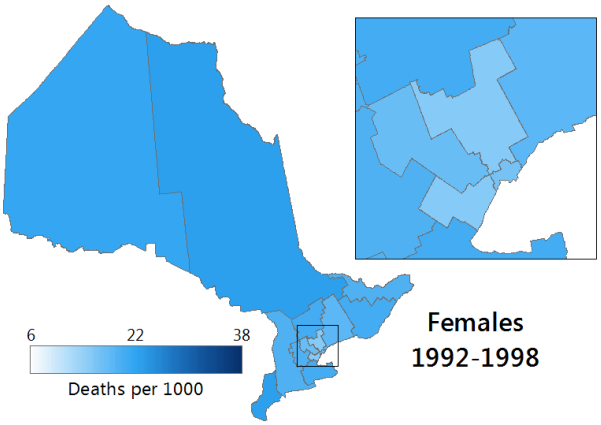


Figure 3.2.4 Cumulative age-standardized circulatory mortality (total deaths per 1000), females, 1992-1998.

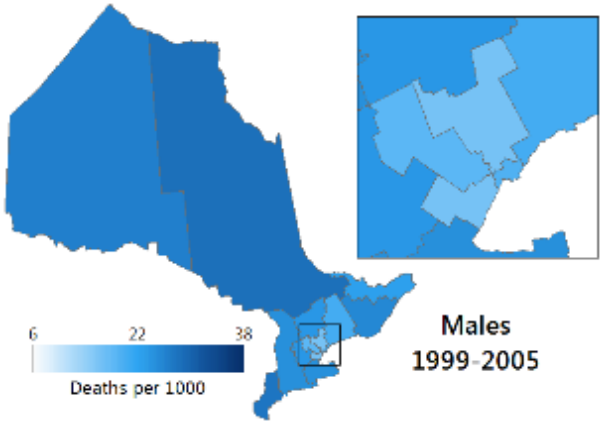


Figure 3.2.5 Cumulative age-standardized circulatory mortality (total deaths per 1000), males, 1999-2005.

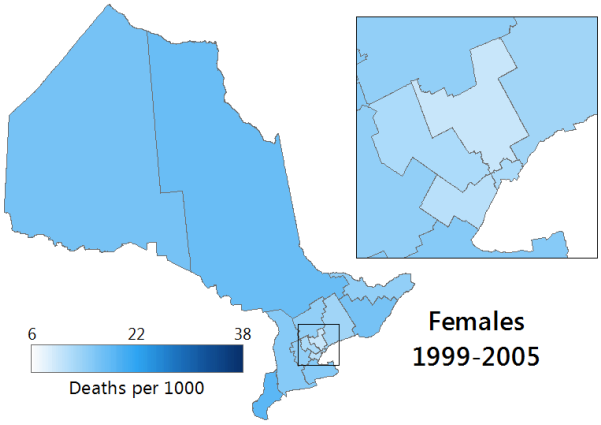


Figure 3.2.6 Cumulative age-standardized circulatory mortality (total deaths per 1000), females, 1999-2005.

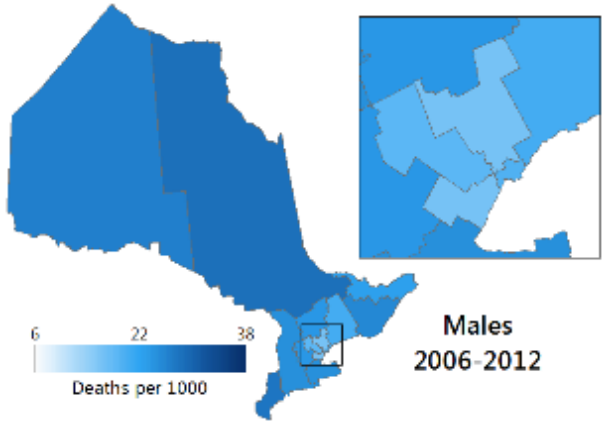


Figure 3.2.7 Cumulative age-standardized circulatory mortality (total deaths per 1000), males, 2006-2012.

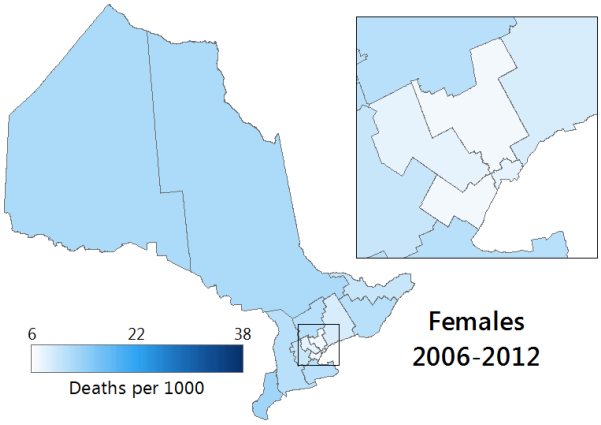


Figure 3.2.8 Cumulative age-standardized circulatory mortality (total deaths per 1000), females, 2006-2012.

Among LHINs, the largest declines in circulatory mortality among males took place in Mississauga Halton LHIN, where rates decreased from 24.1 deaths per 1000 in 1992-1998 to 11.5 deaths per 1000 in 2006-2012 among males, corresponding to a 52% decline (Table 3.2.2). In females, the largest decline was in Central LHIN, where rates dropped a comparable 53%, from 15.7 to 7.3 deaths per 1000, in the same period (Table 3.2.2). Other LHINs with large improvements in circulatory mortality rates between 1992 and 2012 include Central West, Mississauga Halton and Toronto Central.

The smallest decline in circulatory mortality for males occurred in North East LHIN, where rates declined approximately 40% from 35.1 deaths per 1000 in 1992-1998 to 20.9 deaths per 1000 in 2006-2012 (Table 3.2.2). In females, the decline was smallest in South West LHIN, where rates dropped an equal 40% – from 19.3 to 11.5 deaths per 1000 between 1992-1998 and 2006-2012. Improvements in circulatory mortality over this time period were also small in Erie St. Clair and North West LHINs (Table 3.2.2).

CANCERS

Scope

Cancer mortality includes all adult deaths registered in Ontario between 1992 and 2012 with an assigned cause of death between ICD-9 codes 140 and 239.9 (20). This category includes both benign and malignant neoplasms occurring in any part of the body, including non-melanoma skin cancer. Diseases with the largest contribution to cancer mortality include lung, colorectal and prostate cancers among men, and breast and colorectal cancers among women (23).

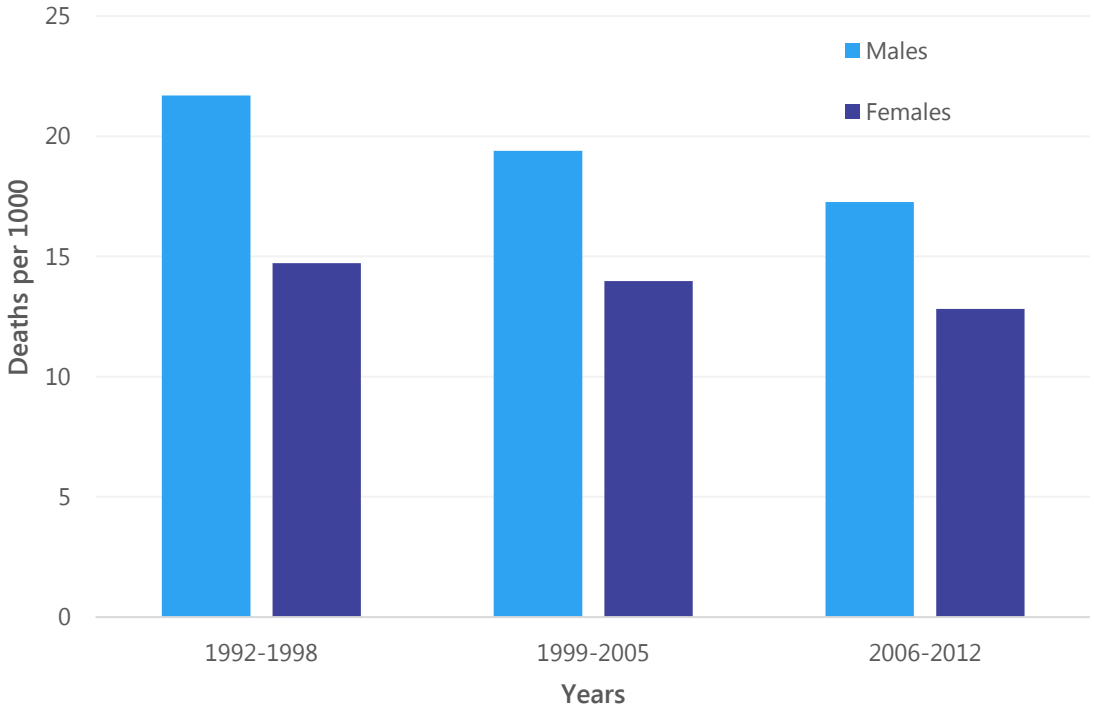


Figure 3.2.9 Age-standardized cancer mortality rates (total deaths per 1000) by era, males and females, all Ontario.

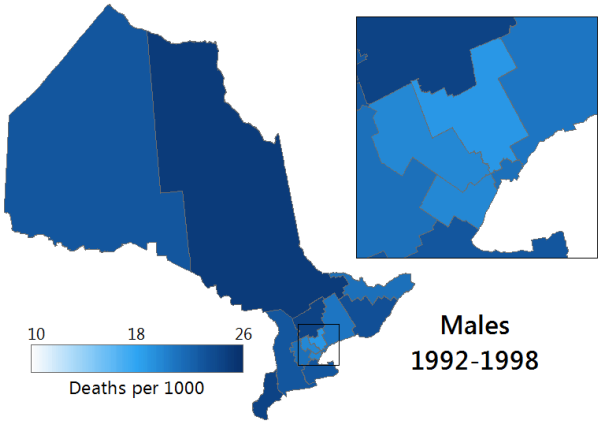


Figure 3.2.10 Cumulative age-standardized cancer mortality (total deaths per 1000), males, 1992-1998.

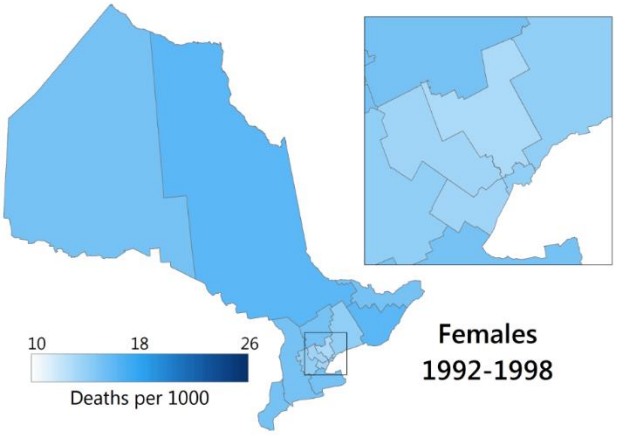


Figure 3.2.11 Cumulative age-standardized cancer mortality (total deaths per 1000), females, 1992-1998.

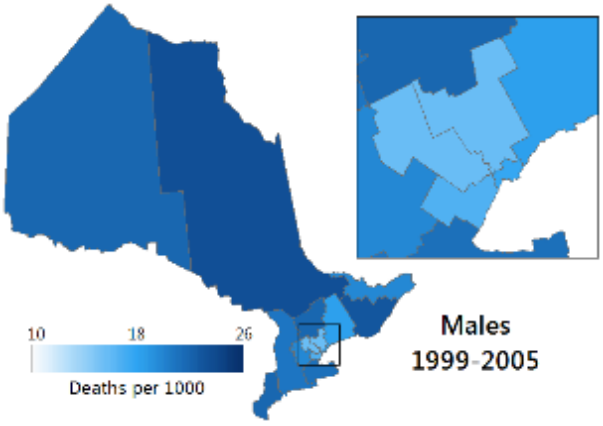


Figure 3.2.12 Cumulative age-standardized cancer mortality (total deaths per 1000), males, 1999-2005.

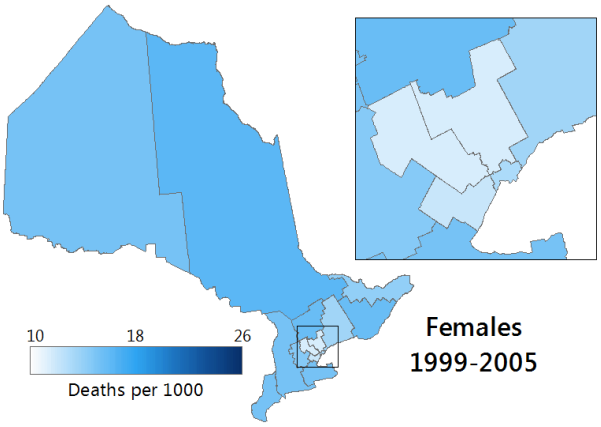


Figure 3.2.13 Cumulative age-standardized cancer mortality (total deaths per 1000), females, 1999-2005.

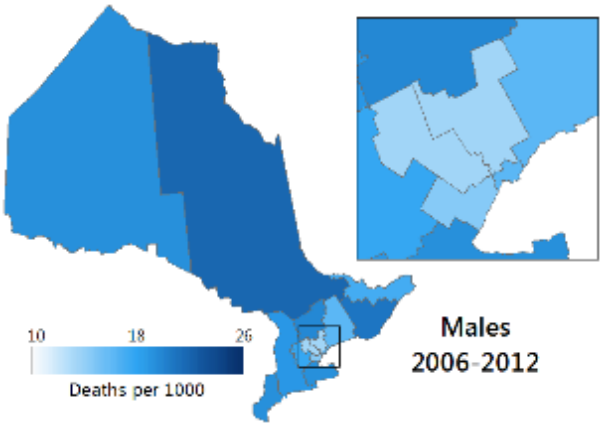


Figure 3.2.14 Cumulative age-standardized cancer mortality (total deaths per 1000), males, 2006-2012.

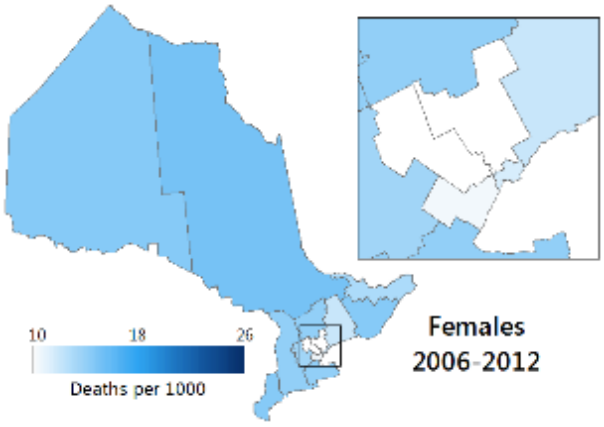


Figure 3.2.15 Cumulative age-standardized cancer mortality (total deaths per 1000), females, 2006-2012.

Findings

Age-standardized cancer mortality rates in Ontario between 1992 and 2012 are mapped by LHIN, sex and era in Figures 3.2.10 – 3.2.15. Rates for all Ontario are shown by sex and era in Figure 3.2.9. All cancer mortality rates are available in Table 3.2.3 in the data appendix.

Cancer mortality rates declined substantially among males between 1992 and 2012 (Figures 3.2.10 – 3.2.16; Table 3.2.3). The declines were less pronounced in females than in males (Figure 3.2.9). While males in all LHINs achieved at minimum 12% reductions in cancer mortality between 1992-1998 and 2006-2012, rates among females in Erie St Clair, South West, Waterloo Wellington, Hamilton Niagara Haldimand Brant, South East, North Simcoe Muskoka, North East and North West LHINs all declined by less than 10% in the same period (Table 3.2.3).

These declines, or lack thereof, highlight clear sex differences in cancer mortality trends. While males experienced higher cancer mortality rates than females throughout the study period, the gap between sex-specific rates in Ontario narrowed considerably between 1992 and 2012 (Figure 3.2.9). Between 1992 and 1998, cancers in males resulted in 21.7 deaths per 1000, compared to 14.7 deaths per 1000 in females (Table 3.2.3). By 2006-2012, rates in males had declined to 17.3 deaths per 1000 – much nearer to the 12.8 deaths per 1000 seen in females for the same years (Table 3.2.3).

Among both males and females, the largest declines in cancer mortality took place in Central West LHIN. There, cancer mortality rates in males decreased 28%, from 19.5 deaths per 1000 in 1992-1998 to 14.0 deaths per 1000 in 2006-2012 (Table 3.2.3). In females, rates dropped 25% from 13.6 to 10.23 deaths per 1000 between 1992-1998 and 2006-2012 (Table 3.2.3). Declines during this period were also large in females in Mississauga Halton (-22%) and Central (-24%) LHINs.

The smallest cancer mortality decline occurred in females in North West LHIN, where rates decreased just 3% from 15.3 to 14.9 deaths per 1000 between 1992-1998 and 2006-2012 (Table 3.2.3). In males, the smallest decline was a 12% drop in South East LHIN, from 23.3 to 20.6 deaths per 1000. Other LHINs with relatively small improvements in cancer mortality include Hamilton Niagara Haldimand Brant (males -15%, females -5%) and North East (males -13%, females -8%) LHINs, as well as females in Erie St. Clair (-4%) and South West (-7%) (Table 3.2.3).

DISEASES OF THE RESPIRATORY SYSTEM

Scope

Respiratory mortality includes all adult deaths registered in Ontario between 1992 and 2012 caused by diseases of the respiratory system. This corresponds to ICD-9 codes 460 to 519.9 (20). Causes include both acute and chronic respiratory illnesses, such as acute respiratory infections, pneumonia, influenza, and chronic obstructive pulmonary disease (COPD). Note that lung cancer, which is sometimes considered a respiratory disease in other contexts, is not included in respiratory mortality in this report. A majority of respiratory mortality in Canada is attributable to either influenza, pneumonia, or COPD (24).

Findings

Age-standardized respiratory mortality rates for all Ontario between 1992 and 2012 are shown by sex and era in Figure 3.2.16. LHIN-specific rates for all Ontario are mapped, also by sex and era, in Figures 3.2.17 – 3.2.22. All respiratory mortality rates are available in Table 3.2.4 in the data appendix.

Respiratory mortality rates declined considerably between 1992 and 2012 in both males and females across Ontario (Figure 3.2.16; Table 3.2.4).

Among LHINs, the largest decreases in respiratory mortality between 1992 and 2012 took place in Mississauga Halton LHIN (Table 3.2.4). Male respiratory mortality in Mississauga Halton LHIN declined 48%, from 6.5 deaths per 1000 in 1992-1998 to 3.4 deaths per 1000 in 2006-2012. Meanwhile, female respiratory mortality dropped 39% from 3.8 to 2.3 deaths per 1000 in the same period. Also with large improvements in respiratory mortality were males in Waterloo Wellington LHIN (-47%), females in Toronto Central LHIN (-35%), and both sexes in Central LHIN (males -43%, females -37%) (Table 3.2.4).

The smallest declines in respiratory mortality were in North Simcoe Muskoka LHIN, among males, and Erie St. Clair LHIN among females. In North Simcoe Muskoka, male respiratory mortality decreased 30% from 7.9 to 5.5 deaths per 1000 between 1992-1998 and 2006-2012 (Table 3.2.4). In Erie St. Clair LHIN, female respiratory mortality declined by just 9%, from 3.6 to 3.3 deaths per 1000, in the same period (Table 3.2.4). Improvements in respiratory mortality were also small among males in South West (-33%) and Hamilton Niagara Haldimand Brant LHINs (-32%), and among females in North East and North West LHINs (both -16%) (Table 3.2.4). Notably, the lowest overall improvement in respiratory mortality among males (-30% in North Simcoe Muskoka) was still greater than the province-wide improvement in respiratory mortality among females of 26%.

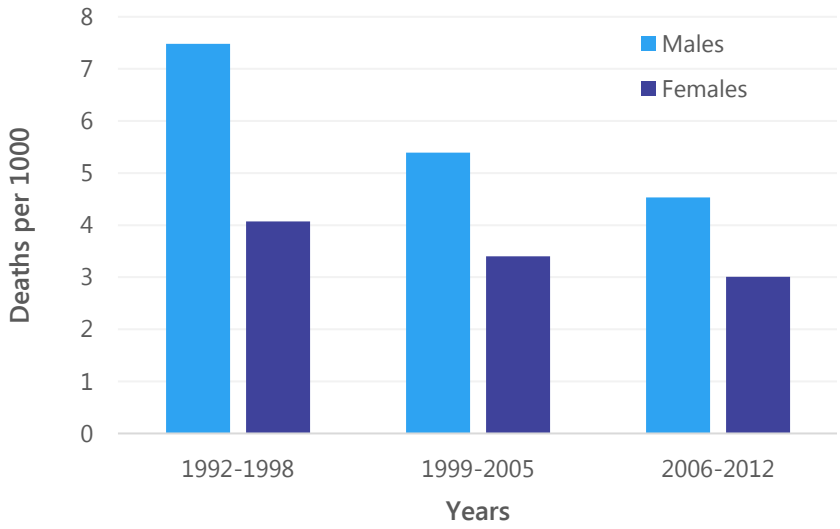


Figure 3.2.16 Age-standardized respiratory mortality rates (total deaths per 1000) by era, males and females, all Ontario.

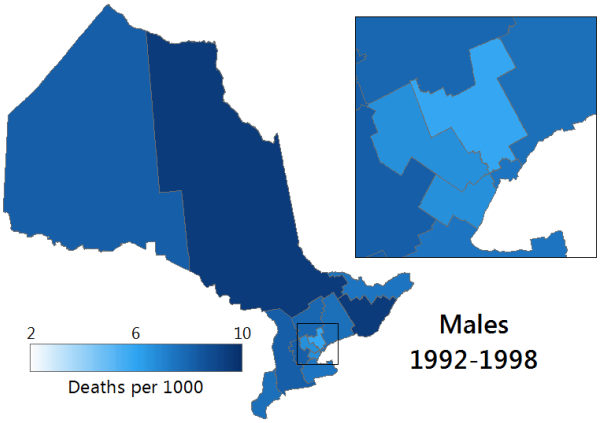


Figure 3.2.17 Cumulative age-standardized respiratory mortality (total deaths per 1000), males, 1992-1998.

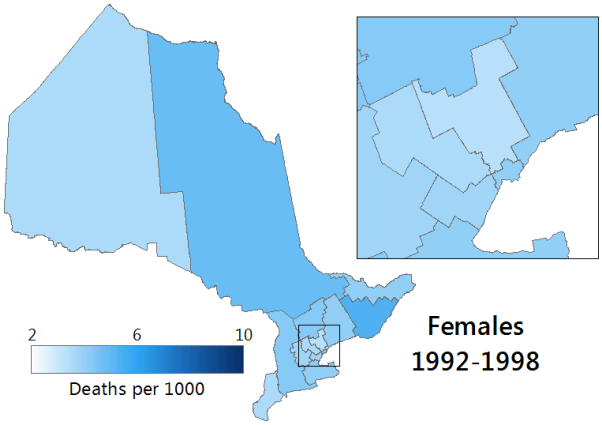


Figure 3.2.18 Cumulative age-standardized respiratory mortality (total deaths per 1000), females, 1992-1998.

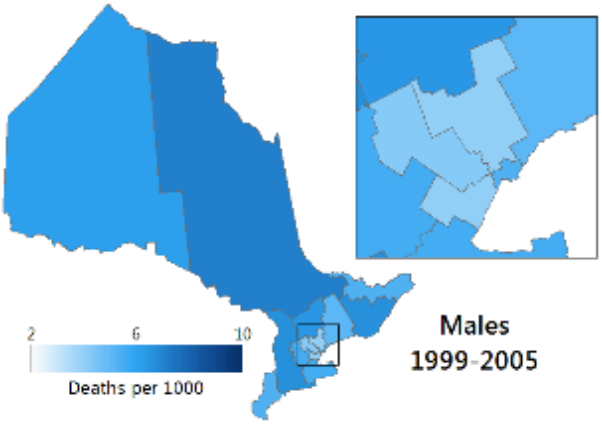


Figure 3.2.19 Cumulative age-standardized respiratory mortality (total deaths per 1000), males, 1999-2005.

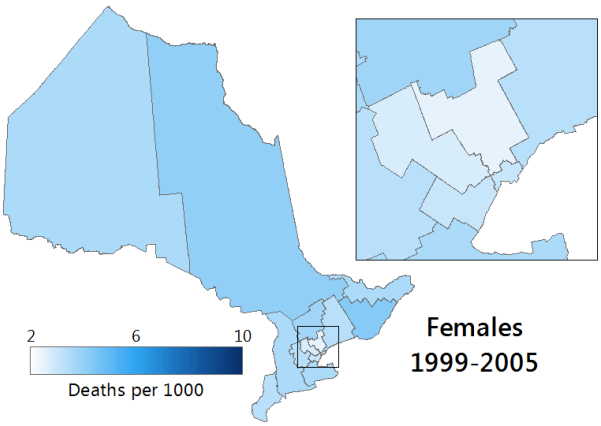


Figure 3.2.20 Cumulative age-standardized respiratory mortality (total deaths per 1000), females, 1999-2005.

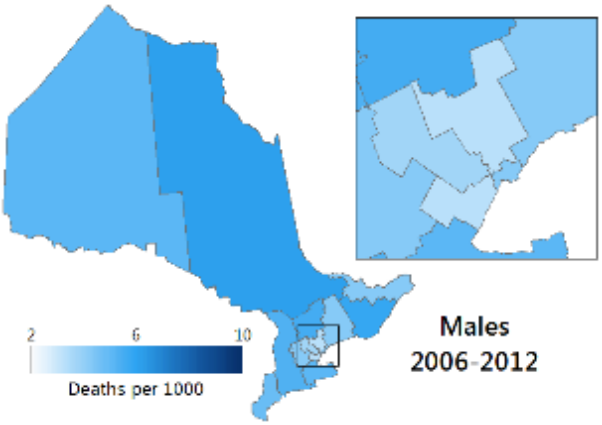


Figure 3.2.21 Cumulative age-standardized respiratory mortality (total deaths per 1000), males, 2006-2012.

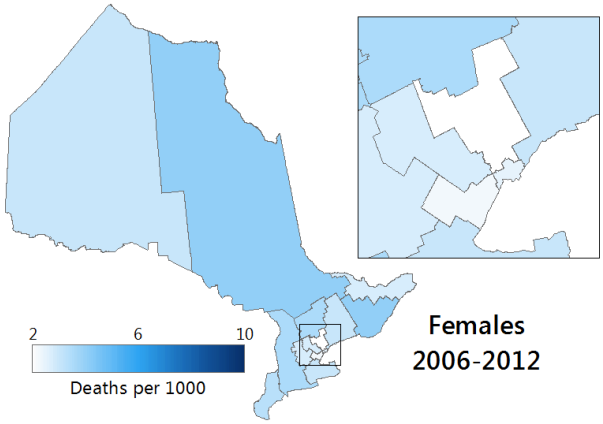


Figure 3.2.22 Cumulative age-standardized respiratory mortality (total deaths per 1000), females, 2006-2012.

EXTERNAL CAUSES OF INJURY & POISONING

Scope

External cause mortality includes adult deaths registered in Ontario between 1992 and 2012 resulting from any form of injury or poisoning, including deaths from violence, suicide and accidental trauma (20). Specifically, this refers to ICD-9 codes between 800 and 999.9 (20). Notably, poisoning includes both intentional and unintentional toxic effects of prescription and non-prescription drugs. By far the most common deaths from external causes are related to unintentional injury, predominantly from motor vehicle collisions and unintentional falls, with a much smaller number of deaths attributed to intentional injury by another person (i.e., homicide or assault), suicide, or self-harm (25, 26).

Findings

Age-standardized external cause mortality rates between 1992 and 2012 for all Ontario are shown by sex and era in Figure 3.2.23. LHIN-specific rates are mapped by sex and era in Figures 3.2.24 – 3.2.29. All external cause mortality rates are available in Table 3.2.5 in the data appendix.

External cause mortality rates are much higher in males than in females (Figures 3.2.23 – 3.2.29; Table 3.2.5). Between 1992 and 2012, rates of external cause mortality were between 2.1 and 2.2 times as high in males as in females across Ontario (Table 3.2.5). In LHINs, rates ranged between 1.8 times (Mississauga Halton, 2006-2012) and 2.7 times (North East, 1992-1998) higher in males than females (Table 3.2.5). The gap in external cause mortality rates between sexes seems to have narrowed slightly between 1992 and 2012, predominantly due to small declines in males accompanied by stagnant rates in females (Figure 3.2.23). Relative to other causes of mortality, the gap between males and females in external cause mortality remains large.

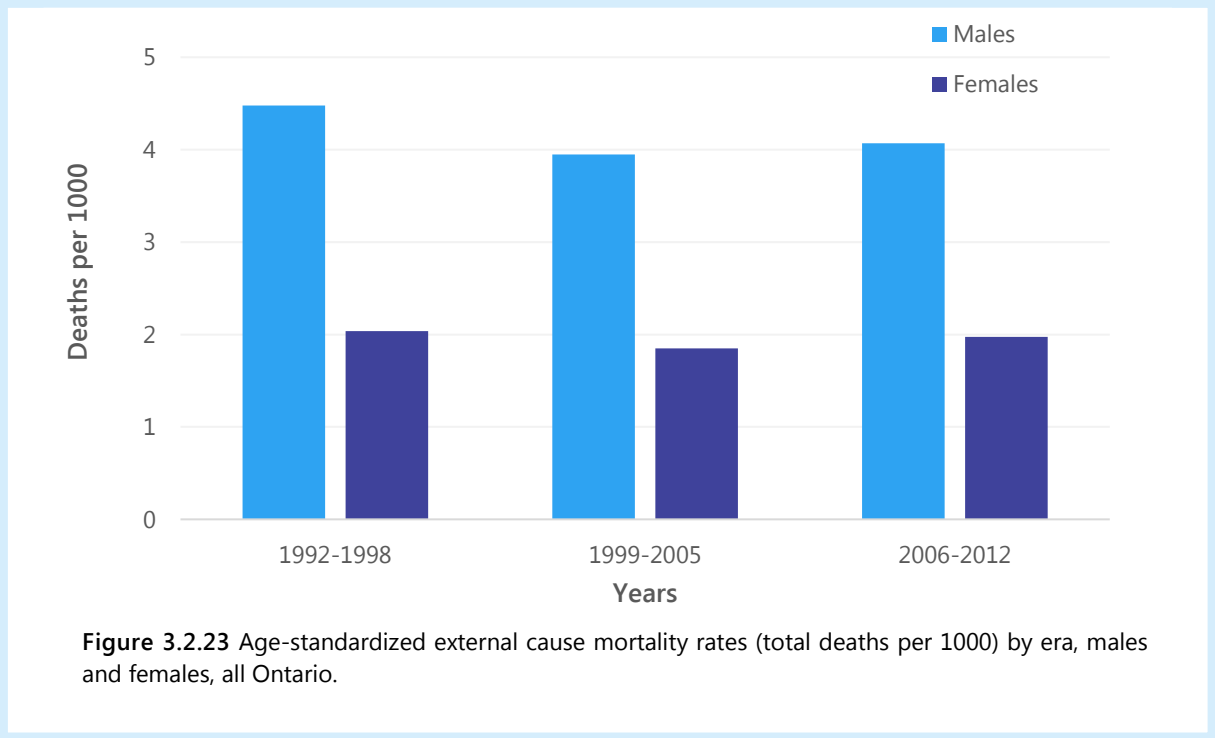


Figure 3.2.23 Age-standardized external cause mortality rates (total deaths per 1000) by era, males and females, all Ontario.

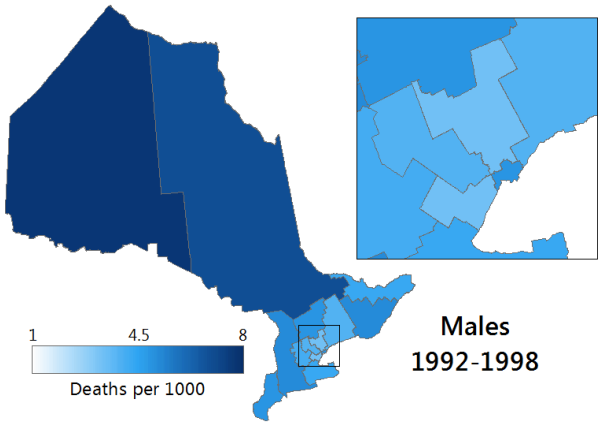


Figure 3.2.24 Cumulative age-standardized external cause mortality (total deaths per 1000), males, 1992-1998.

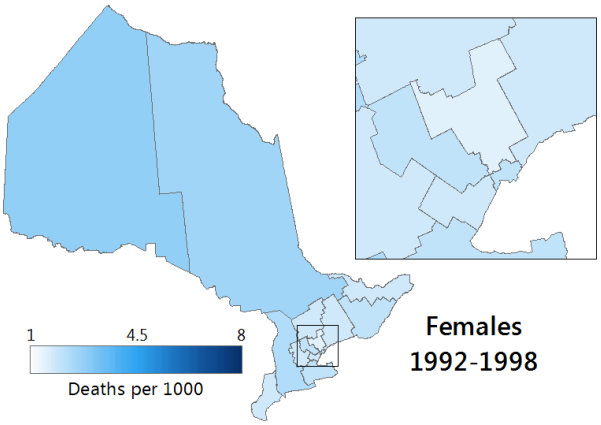


Figure 3.2.25 Cumulative age-standardized external cause mortality (total deaths per 1000), females, 1992-1998.

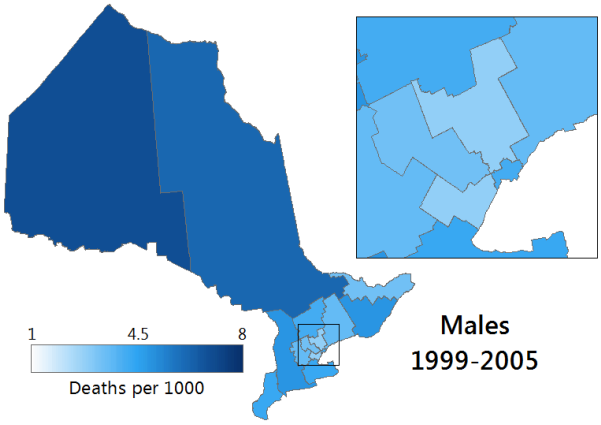


Figure 3.2.26 Cumulative age-standardized external cause mortality (total deaths per 1000), males, 1999-2005.

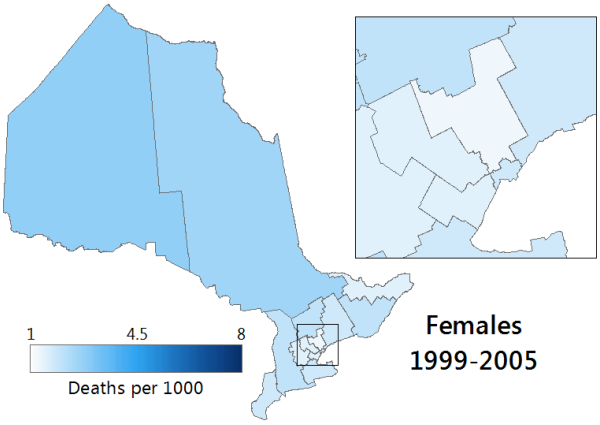


Figure 3.2.27 Cumulative age-standardized external cause mortality (total deaths per 1000), females, 1999-2005.

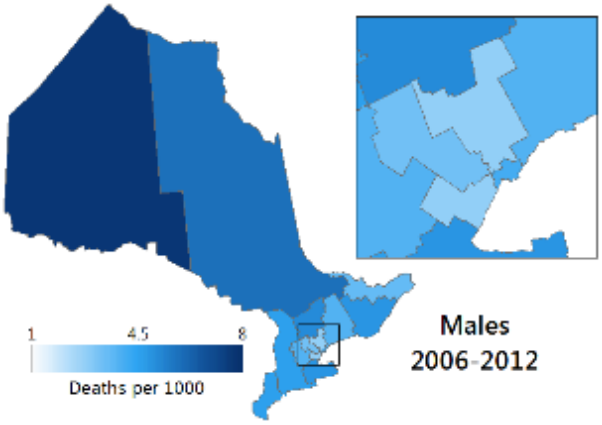


Figure 3.2.28 Cumulative age-standardized external cause mortality (total deaths per 1000), males, 2006-2012.

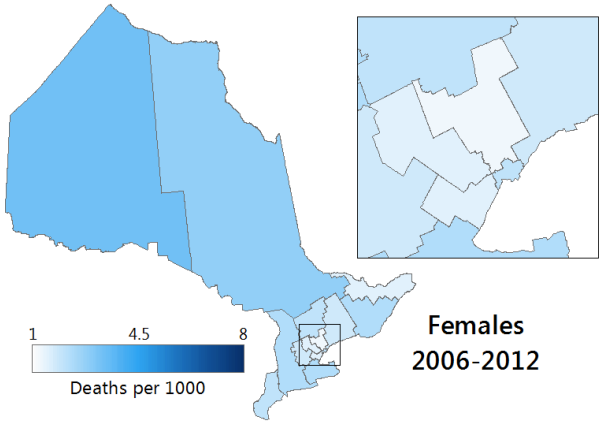


Figure 3.2.29 Cumulative age-standardized external cause mortality (total deaths per 1000), females, 2006-2012.

3.3 PREMATURE MORTALITY

Scope

Premature mortality includes all deaths registered in Ontario between 1992 and 2015 among decedents who were between 18 and 74 years old at the time of their death. The age cut-off of 75 years is consistent with the upper age limit used by CIHI when using premature mortality as a health indicator (14), and with definitions of premature mortality in practice in other countries (27-29).

Premature mortality rates discussed in this section, unlike the all-cause and cause-specific mortality rates presented earlier in this report, have not been age-standardized[5]. Age-standardized premature mortality rates have also been calculated, and are included in the data appendix in Tables 3.3.3 and 3.3.4.

For detailed methodology regarding calculation of the premature mortality rates in this report, and for discussion of age-standardized premature mortality rates, refer to the technical appendix. For mapping purposes, premature mortality rates have been reported as aggregated (i.e. cumulative) rates for the following eras: 1992-1999, 2000-2007 and 2008-2015.

Use

Premature mortality is a subset of all-cause mortality, including only the deaths of those who die before age 75. This is useful for identifying deaths which occur before old age. In general, premature mortality rates are more likely than all-cause mortality rates to be reducible via medical or public health intervention (see 'Amenable Mortality' in this report). They are thus highly meaningful for population health assessment (30). For example, high premature mortality rates may indicate room for improvement in local or provincial public health and health care service delivery.

Premature mortality rates also offer valuable insights into trends over time, since premature mortality directly reflects the life expectancy of a population (31). For example, decreasing premature mortality rates over time indicate that a larger proportion of the population is living past age 75, which in turn implies a growing population life expectancy. However, it is important to note that premature mortality rates are sensitive to differences in the age structure of populations between LHINs or over time.

Findings

Yearly premature mortality rates for all Ontario males and females between 1992 and 2015 are shown in Figure 3.3.1, and available in Table 3.3.2 in the data appendix. LHIN-specific premature mortality rates are mapped by era and sex in Figures 3.3.2 – 3.3.7. The aggregated mortality rates are also available in Table 3.3.1 in the data appendix.

[5] The decision not to age-standardize premature mortality rates was made in recognition of the core purpose of this atlas – which is to describe, rather than explain, geographic differences in adult mortality trends. The authors felt that while age-standardizing is an appropriate and standard practice in the context of all-cause mortality, to do so with premature mortality rates would remove valuable information about what is actually taking place in Ontario. This decision was supported by a supplementary analysis of age-standardized premature mortality rates, which showed the same geographic pattern as non-age-standardized rates. Discussion of age-standardized premature mortality rates can be found in the technical appendix. The data are available in Tables 3.3.3 and 3.3.4 of the data appendix.

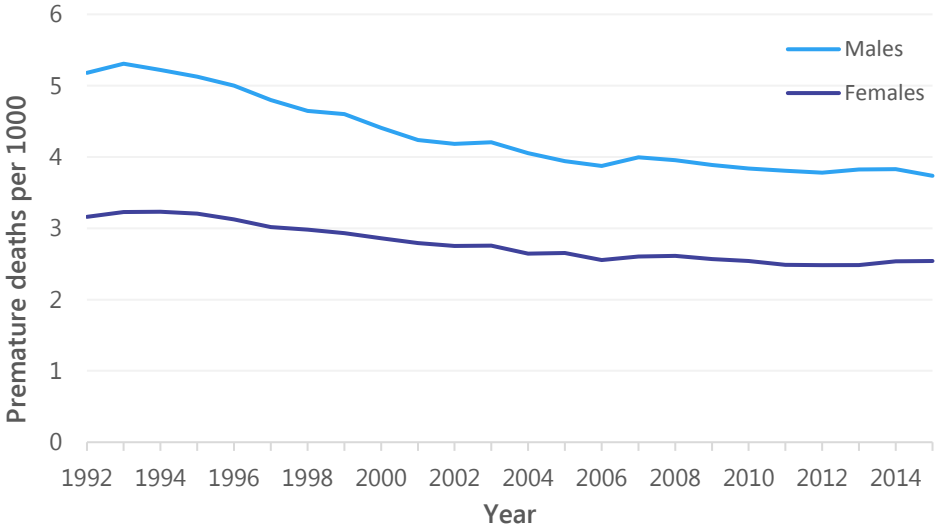


Figure 3.3.1. Annual premature mortality (deaths per 1000 per year), all Ontario, males and females, 1992-2015.

Figures 3.3.2 to 3.3.7 show substantial declines in premature mortality rates among both males and females between 1992 and 2015. Decreases in premature mortality took place in every group, for every era, with the exception of North East and North West LHIN females. That said, declines in premature mortality were not achieved equally between sexes and LHINs. Premature mortality rates were higher among males than females in every Ontario LHIN throughout the study period. At the same time, declines in premature mortality were less pronounced in females than in males, resulting in a shrinking gap in premature mortality between sexes (Figures 3.3.2 – 3.3.7; Table 3.3.2).

Among LHINs, the greatest decline in premature mortality took place in Toronto Central LHIN, where premature mortality declined 35.5% in males, from 41.4 deaths per 1000 in 1992-1999 to 26.7 deaths per 1000 in 2008-2015, and 32.6% in females, from 23.7 deaths per 1000 in 1992-1999 to 16.0 deaths per 1000 in 2008-2015 (Table 3.3.1). Similarly large declines were seen in Central (males -34%, females -31%) and Mississauga Halton (males -28%, females -26%) LHINs (Table 3.3.1). Conversely, the least improvements in premature mortality were seen in North East LHIN females, where rates increased 3% from 31.8 to 32.7 deaths per 1000 between 1992-1999 and 2008-2015, and North West LHIN males, where rates declined 5% from 47.3 to 45.0 deaths per 1000 in the same period (Table 3.3.1). Improvement in premature mortality was also slow in South East (males -15%, females -12%), South West (males -17%, females -11%), and Hamilton Niagara Haldimand Brant (males -17%, females -15%) LHINs.

Because the all-cause mortality rates presented in this report have been age-standardized while premature mortality rates have not, we cannot compare directly between the two. However, it may be useful to consider the proportion of all deaths that occurred among individuals aged 74 or younger. Figure 3.3.8 shows the total number of premature deaths as a proportion of all deaths in Ontario between 1992 and 2015. The figure shows that from 1992 to 2015, there was a consistent trend of decline in the proportion of deaths occurring before age 75 (Figure 3.3.8). This trend implies that over time, a greater number of Ontario residents are surviving into old age, which is consistent with a gradually expanding life expectancy noted both in Ontario and across Canada (32).

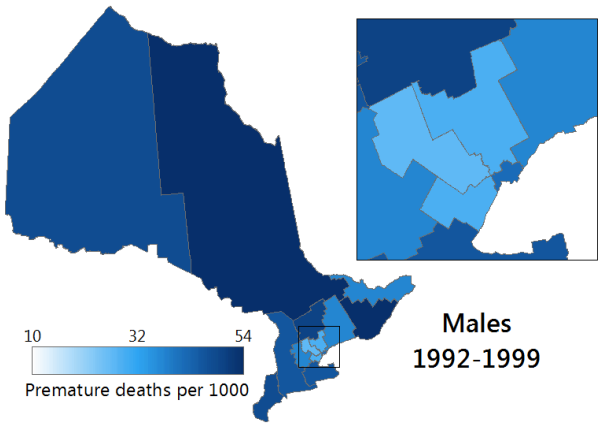


Figure 3.3.2 Cumulative premature mortality (total deaths per 1000), males, 1992-1999.

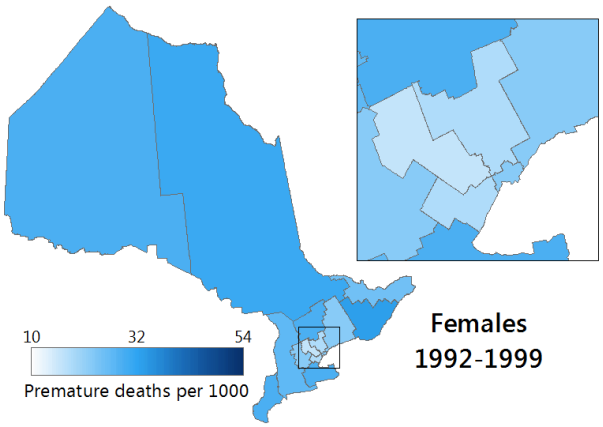


Figure 3.3.3 Cumulative premature mortality (total deaths per 1000), females, 1992-1999.

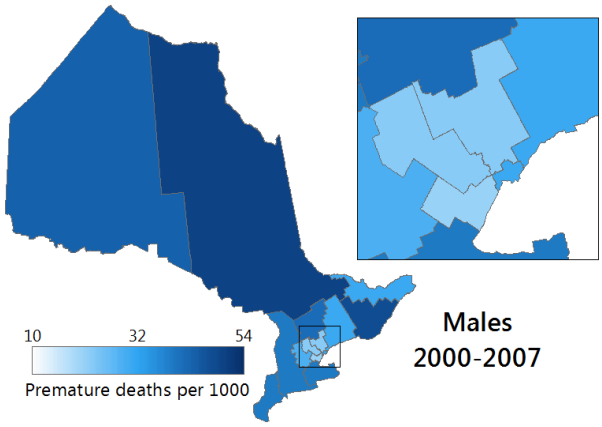


Figure 3.3.4 Cumulative premature mortality (total deaths per 1000), males, 2000-2007.

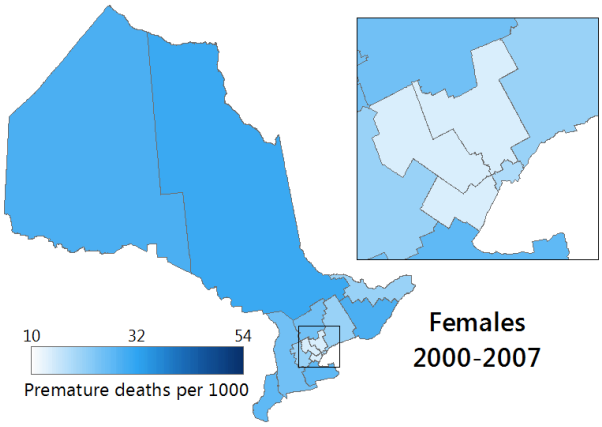


Figure 3.3.5 Cumulative premature mortality (total deaths per 1000), females, 2000-2007.

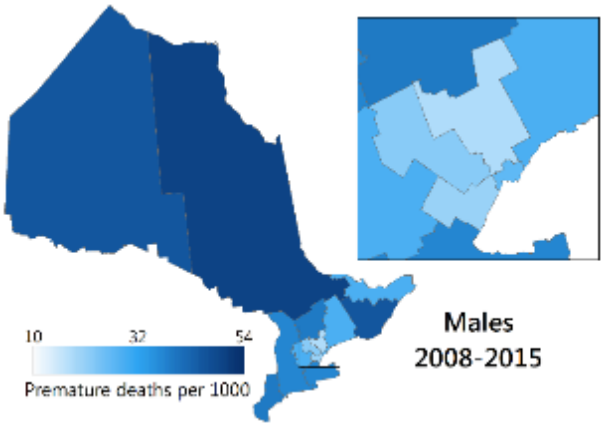


Figure 3.3.6 Cumulative premature mortality (total deaths per 1000), males, 2008-2015.

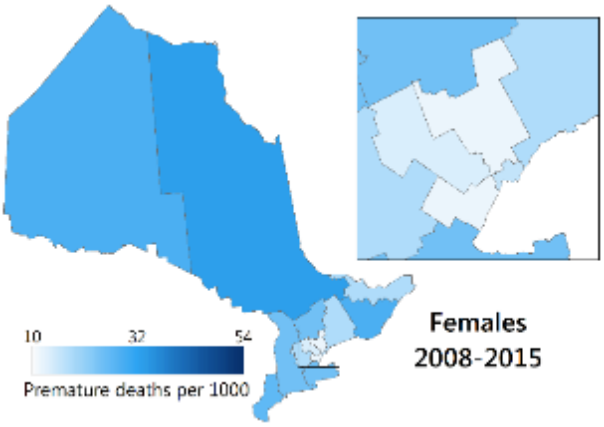


Figure 3.3.7 Cumulative premature mortality (total deaths per 1000), females, 2008-2015.

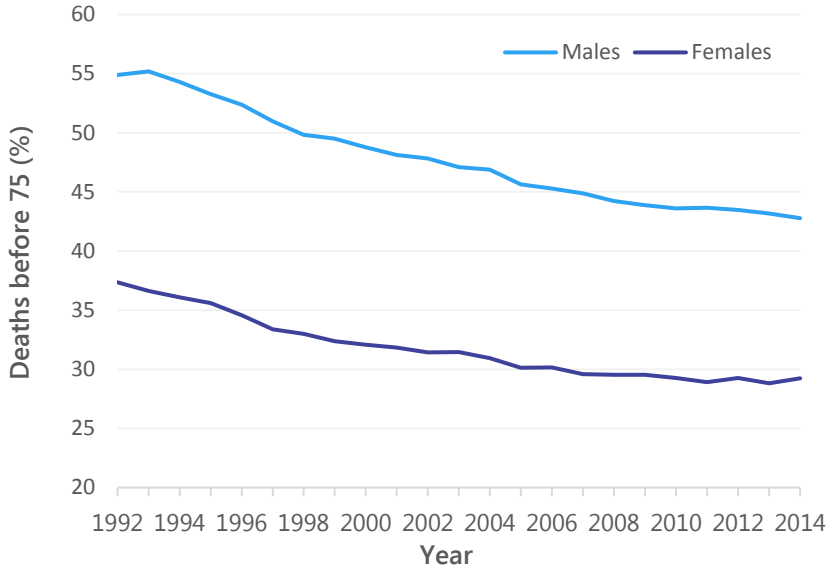


Figure 3.3.8 Premature deaths (before age 75) as a proportion of all deaths, all Ontario, males and females, 1992-2015.

3.4 PREMATURE MORTALITY BY SOCIOECONOMIC STATUS

Scope

Premature mortality, as before, includes all deaths registered in Ontario between 1992 and 2015 among individuals between 18 and 74 years old at the time of their death. Additionally, this section stratifies premature deaths into quintiles of socioeconomic status. This is achieved by subdividing the population of Ontario into five ranked groups, each containing 20% of the population, according to their relative social and economic position (i.e. the worst-off 20% are assigned quintile 1, the next worst-off group form quintile 2, and so on).

Specifically, socioeconomic status quintiles in this report have been assigned using a proxy measure of material deprivation, from the Ontario Marginalization Index (ON-MARG) (9). ON-MARG material deprivation scores are based on census reporting, and describe the likelihood that an individual is unable to afford or attain essential goods and services (33). These scores are assigned to individuals based on the **dissemination area** in which they live, using a number of census indicators including education, income, receipt of government transfer payments, and unemployment (9, 34).

After stratifying the Ontario population into socioeconomic status quintiles, premature mortality rates were calculated for each quintile, on two time scales: yearly rates, and aggregated (i.e. cumulative) rates for the following eras: 1992-1999, 2000-2007, and 2008-2015. For detailed methodology regarding assessment of socioeconomic status and calculation of stratified premature mortality rates in this report, refer to the technical appendix.

Use

Understanding how socioeconomic status influences health in a population is important for identifying and addressing health inequalities. Large disparities in mortality have been noted between high- and low-socioeconomic status groups, in Canada and worldwide, and time trend data suggest that the gap is widening over time (35-38). Such inequalities have important implications for health systems, since they suggest that low-socioeconomic status groups may not be accessing, utilizing or benefiting from health services to their fullest potential (39).

Reducing health inequalities is a core responsibility and goal of Ontario's health system. Understanding how these inequalities have manifested and changed over time is fundamental to that goal. Furthermore, considering premature mortality rates stratified by socioeconomic status group lends greater nuance to our understanding of aggregate premature mortality trends.

Findings

Yearly premature mortality rates by socioeconomic status quintile are shown for all Ontario in Figure 3.4.1. These rates, along with yearly LHIN- and sex-specific rates, are available in Table 3.4.2 in the data appendix. Era rates are in Table 3.4.1 in the data appendix. Rates for the most recent era (2008-2015) are shown by LHIN and socioeconomic status quintile in Figure 3.4.2.

As was established earlier in this report, premature mortality rates declined substantially across Ontario between 1992 and 2015 (Tables 3.4.1 and 3.4.2; see also 'Premature Mortality'). Figure 3.4.1 shows that declines in premature mortality were achieved in all five quintiles of socioeconomic status. However, the figure also shows a clear and sustained association between socioeconomic status and premature mortality,

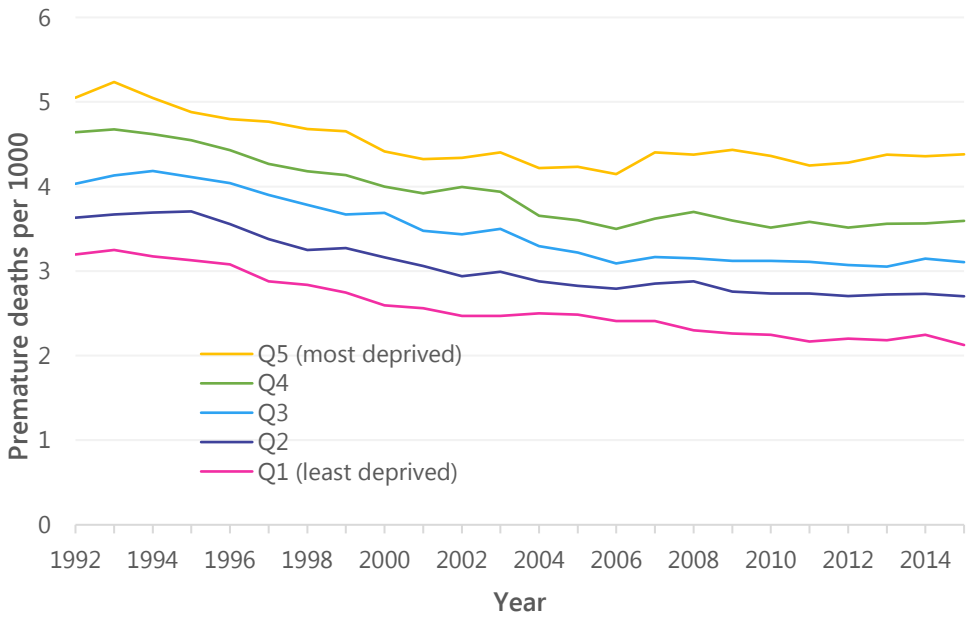


Figure 3.4.1 Premature mortality rates (deaths per 1000) by socioeconomic status quintile, all Ontario, 1992-2015.

whereby each successive increase in material deprivation is accompanied by a graded jump in premature mortality (Figure 3.4.1; Tables 3.4.1 and 3.4.2). This is consistent with socioeconomic gradients in health seen throughout the world (40, 41).

This socioeconomic gradient of premature mortality also exists in each individual LHIN, as shown by Figure 3.4.2. However, the nature and size of the socioeconomic gradient varies significantly between LHINs (Figure 3.4.2; Tables 3.4.1 and 3.4.2). For example, the least deprived group in South East LHIN (LHIN #10) experienced higher premature mortality rates between 2008 and 2015 than the most deprived group in Toronto Central LHIN (LHIN #7; Figure 3.4.2). Thus the effect of socioeconomic status on premature mortality varies with, or is influenced by, other characteristics of LHIN populations.

The stratified mortality rates can reveal patterns of socioeconomic inequality in premature mortality, between LHINs or over time. For example, the rates plotted in Figure 3.4.1 show that despite substantial reductions in group-specific premature mortality between 1992 and 2015, there has been no accompanying narrowing of the absolute[6] mortality gap between deprivation quintiles. The results support the finding that absolute (arithmetic difference) socioeconomic inequalities have remained largely stable over time. However, the gap between quintiles 4 and 5 (the two most deprived groups) has grown much wider since the early 2000s than the other inter-quintile gaps (Figure 3.4.1). This confirms a trend identified in Canadian life expectancy estimates (42).

Reaching objective conclusions about the nature or extent of socioeconomic disparity demands consolidating these discrete, quintile-specific data into more robust measures of health inequalities (43). The rest of this chapter describes geographic and temporal trends in premature mortality inequalities using one such measure, the regression-based **Relative Index of Inequality (RII)**.

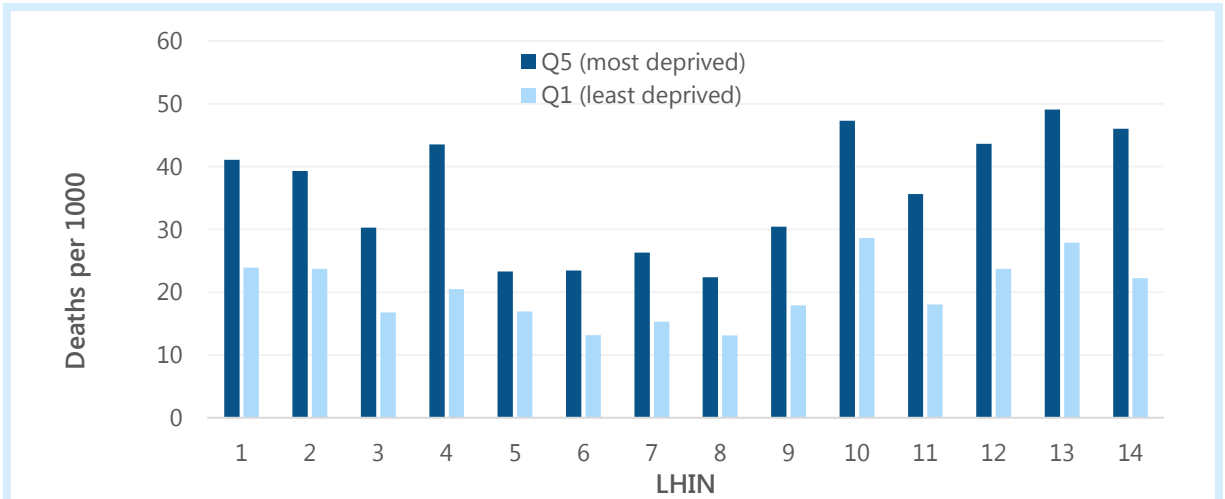


Figure 3.4.2 Cumulative premature mortality rates (total deaths per 1000), by LHIN and socioeconomic status quintile, Ontario, 2008-2015. *LHIN numbers:* **1)** Erie St. Clair; **2)** South West; **3)** Waterloo Wellington; **4)** Hamilton Niagara Haldimand Brant; **5)** Central West; **6)** Mississauga Halton; **7)** Toronto Central; **8)** Central; **9)** Central East; **10)** South East; **11)** Champlain; **12)** North Simcoe Muskoka; **13)** North East; **14)** North West.

[6] For a discussion of the relationship between absolute and relative inequalities, see Mackenbach, J. P. (2015). "Should we aim to reduce relative or absolute inequalities in mortality?" European Journal of Public Health 25(2): 185-185.

RELATIVE INDEX OF INEQUALITY (RII)

Scope

The **relative index of inequality (RII)** is a measure of socioeconomic inequality developed to be intentionally analogous to, yet more sophisticated than, a **rate ratio** measure (44, 45). A rate ratio describes group differences by dividing rates in a group of interest (numerator) by the equivalent rate in an appropriate comparison group (denominator). In the context of socioeconomic mortality gradients, a rate ratio may be used to show that, for example, individuals in the most deprived quintile experienced two times the mortality rates of those in the least deprived quintile (RR = Q5 ÷ Q1 = 2).

The RII measure expands the functionality of the rate ratio by also incorporating information from all socioeconomic groups in the population (in the given example, adding quintiles 2, 3 and 4) (44). This is commonly accomplished using statistical regression methods[7] (46). By including data from all quintiles, RII is able to reflect the true gradient of premature mortality across the entire population (43, 47).

In this report, RII was calculated for premature mortality using ON-MARG material deprivation quintiles as a proxy for socioeconomic status. For a detailed description of the regression methods used to calculate RII, refer to the technical appendix. RII values were calculated for the following eras: 1992-1999, 2000-2007, and 2008-2015.

Use

RII is used to describe the relative disadvantage associated with low socioeconomic status in a population (46). In this report, RII is used to estimate the effect of socioeconomic status (as measured by proxy of material deprivation) on premature mortality rates within LHINs, as well as how that effect has changed over time. Using RII is preferable to stratified rates in this context because – and unlike absolute measures of health inequalities – it can be compared more directly between groups and across health outcomes (43, 45). It is also preferable to a rate ratio (Q5 ÷ Q1) measure because it considers the entire population's experience, and is sensitive to mortality rates in all socioeconomic strata (47).

The interpretation of an RII measure is closely similar to that of a rate ratio. Whereas the rate ratio example given earlier compared mortality rates in the most deprived quintile to those in the least deprived quintile, the RII compares the theoretically worst-off individual in a population and the theoretically best-off individual in that same population[8]. Thus an RII of 2 indicates that individuals of the lowest socioeconomic status are expected to experience two times the premature mortality rate of individuals of the highest socioeconomic status.

[7] A detailed summary of RII, with standard approaches for calculating it, can be found in Sergeant, J. C. and D. Firth (2006). "Relative index of inequality: definition, estimation, and inference." Biostatistics 7(2): 213-224.

[8] RII was originally defined by Pamuk (1988) as the slope index of inequality (SII, an equivalent measure of absolute inequality) divided by the mean population event rate. This definition was updated by Kunst and Mackenbach (1995) to represent the mortality ratio of the worst-off member of a population (socioeconomic rank = 0) to the best-off member of that same population (socioeconomic rank = 1). The RII analysis in this report, which is based on the approach suggested by Moreno-Betancur et al. (2015), uses the latter definition. For details, refer to the technical appendix.

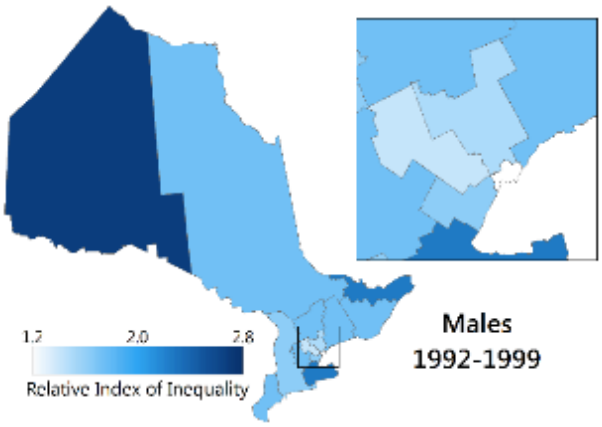


Figure 3.4.3 Relative index of inequality (RII), males, 1992-1999.

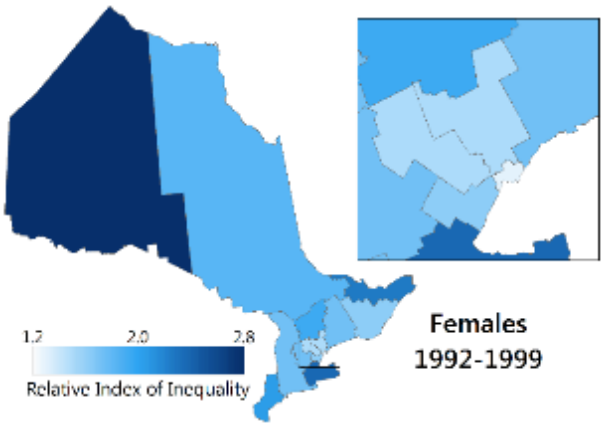


Figure 3.4.4 Relative index of inequality (RII), females, 1992-1999.

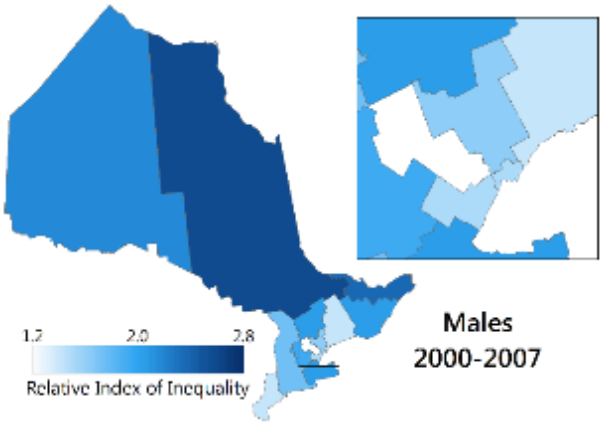


Figure 3.4.5 Relative index of inequality (RII), males, 2000-2007.

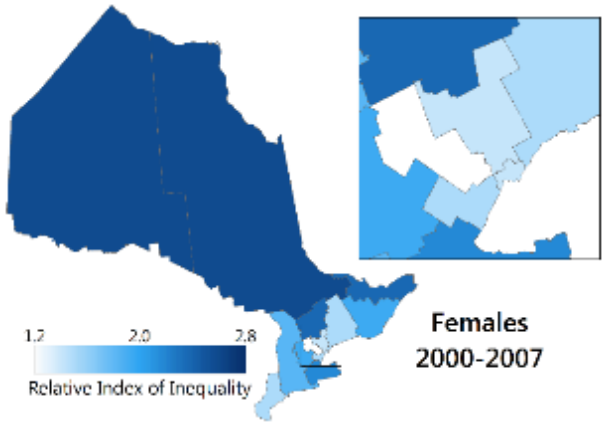


Figure 3.4.6 Relative index of inequality (RII), females, 2000-2007.

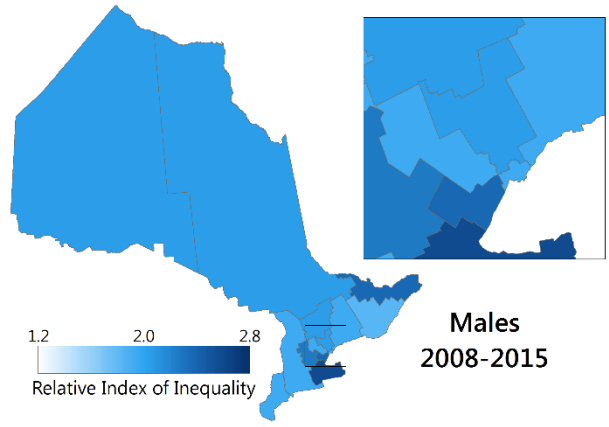


Figure 3.4.7 Relative index of inequality (RII), males, 2008-2015.

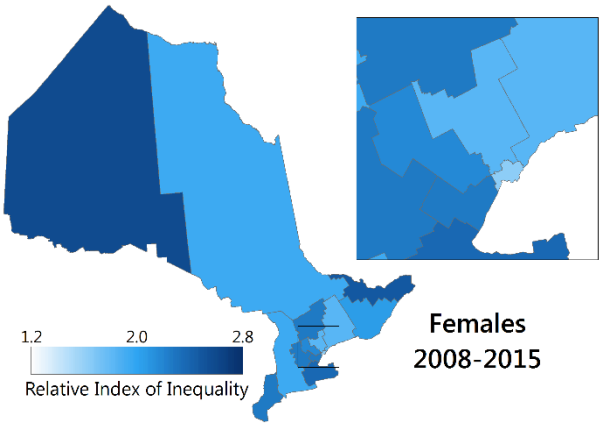


Figure 3.4.8 Relative index of inequality (RII), females, 2008-2015.

Findings

RII values for premature mortality are mapped by sex and era for all Ontario LHINs between 1992 and 2015 in Figures 3.4.3 to 3.4.8. The values are also available in Table 3.4.3 in the data appendix. RII by era for all Ontario is plotted in Figure 3.4.9 and is included in Table 3.4.3.

Figures 3.4.3 to 3.4.8 show that RII, and thus socioeconomic inequality, varies widely between groups. For example, females in Toronto Central LHIN between 1992 and 1999 had an RII of 1.3, compared with an RII of 2.7 among males in North West LHIN in the same period (Table 3.4.3). This is a substantial difference, reflecting more than two times the relative impact of socioeconomic status on premature mortality in North West versus in Toronto Central LHIN.

Unlike most other indicators used in this report, RII is fairly equal between males and females (Figures 3.4.3 – 3.4.9; Table 3.4.3). Despite underlying differences in mortality rates, the relative association between socioeconomic status and premature mortality does not vary substantially between sexes.

The highest RII was calculated in North West LHIN females between 1992 and 1999, a value of 2.8 (Table 3.4.3). This means that in North West LHIN, women of the lowest socioeconomic status are likely to die prematurely at 2.8 times the rate of women of the highest socioeconomic status. Furthermore, RII for North West LHIN females did not drop below 2.5 in any era, suggesting a persistent trend of large socioeconomic inequalities in that LHIN (Table 3.4.3). Other groups with consistently high RII values include both sexes in

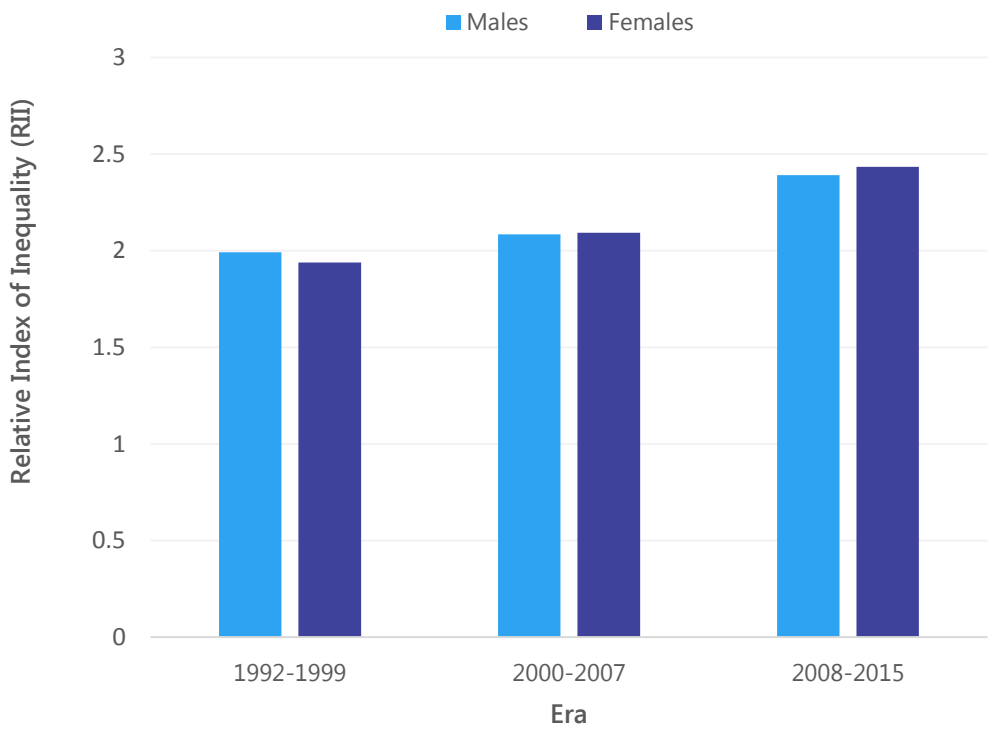


Figure 3.4.9 Relative Index of Inequality (RII, by sex and 7-year era, all Ontario, 1992-2015.

Hamilton Niagara Haldimand Brant, Champlain and North East LHINs, males in North West LHIN, and females in Erie St. Clair and North Simcoe Muskoka LHINs (Table 3.4.3).

Conversely, the lowest RII was calculated in Central West LHIN males between 2000 and 2007 at 1.2 (Table 3.4.3). This indicates that Central West males of the lowest socioeconomic status would be expected to die prematurely 20% more often than those of the highest socioeconomic status. This is substantially less than the difference observed in females in North West LHIN, but is nonetheless a sizeable socioeconomic mortality gap. Other LHINs with low RII values throughout the study period included males and females in Central East and Toronto Central LHINs, males in Central LHIN, and females in South West and Central West LHINs. (Table 3.4.3).

Figure 3.4.9 highlights a concerning trend in RII between 1992 and 2015. The figure shows that among both males and females, RII values for all Ontario increased between 1992-1999 and 2000-2007 and again from 2000-2007 to 2008-2015 (see also Table 3.4.3). A stepwise increase in RII was also seen in ten groups within the province: males and females in South West, Waterloo Wellington, Toronto Central and Champlain LHINs, males in Central LHIN, and females in South East LHIN (Table 3.4.3). Steadily increasing RII implies that relative premature mortality disparities between high and low socioeconomic groups in those populations have expanded in recent decades. As premature mortality rates decline across the province, not all groups are improving at the same rate.

Increasing relative inequalities should be considered in the context of decreasing underlying mortality rates. For mathematical reasons, relative measures of inequality (including, in this case, RII) often increase as population mortality rates decline[9] (48, 49). Trends in RII should therefore be interpreted in conjunction with trends in *absolute* inequalities. Figure 3.4.1 (discussed earlier in this chapter) shows that these inequalities remained largely static between 1992 and 2015. However, there has been a noted increase in the absolute premature mortality gap between the worst-off and second-worst-off quintile since the early 2000s.

AMENABLE MORTALITY

Scope

Amenable mortality is a subset of premature mortality, made up of causes of death that may be avoided through appropriate public health intervention and/or medical care (50). Specifically, amenable mortality in this report includes all deaths registered in Ontario between 2006 and 2012 for which the age at death is between 18 and 74, and the cause of death is considered amenable to either public health or medical care. The list of amenable causes is based on established classification systems, and includes conditions such as treatable cancers, infections, diabetes and cardiovascular disease (38, 51). The upper age limit of 74 years is based on the assumption that death becomes more difficult to prevent, and therefore less amenable to intervention, at older ages (50). For a full list of amenable causes, see Table TA.1 in the technical appendix.

[9] For more on this phenomenon, see Mackenbach, J. P., et al. (2016). "The arithmetic of reducing relative and absolute inequalities in health: a theoretical analysis illustrated with European mortality data." Journal of Epidemiology and Community Health.

For methodological details regarding the calculation of amenable mortality rates in this report, refer to the technical appendix. For mapping purposes, amenable mortality rates are aggregated over the entire data period (2006 to 2012).

Use

Amenable mortality is a valuable indicator of health system performance, and has been put forward by CIHI for use in a Canadian context (14, 52). It was first developed as an indicator of avoidable mortality, that is, premature deaths which may have been prevented given timely and appropriate intervention (53). Amenable mortality is closely linked to premature mortality, but offers added value in that it responds directly (at least in theory) to improvements in health system performance (54)

Findings

Figure 3.5.1 shows amenable and non-amenable mortality rates, by sex, for all Ontario. Figures 3.5.2 and 3.5.3 show mapped amenable mortality rates by sex and LHIN. The data for both are available in Table 3.5.1 in the data appendix.

Between 2006 and 2012, 47% of male deaths and 52% of female deaths before age 75 were attributed to causes considered amenable to medical care and/or public health intervention (Table 3.5.1). This suggests that there is still a lot of room for improvement in premature mortality among Ontario adults. In females, unlike in males, total amenable mortality rates were slightly higher than non-amenable mortality rates (Figure 3.5.1). However, because the overall burden of premature mortality is higher in males than females, the burden of amenable mortality in Ontario is higher in males than in females (Figure 3.5.1).

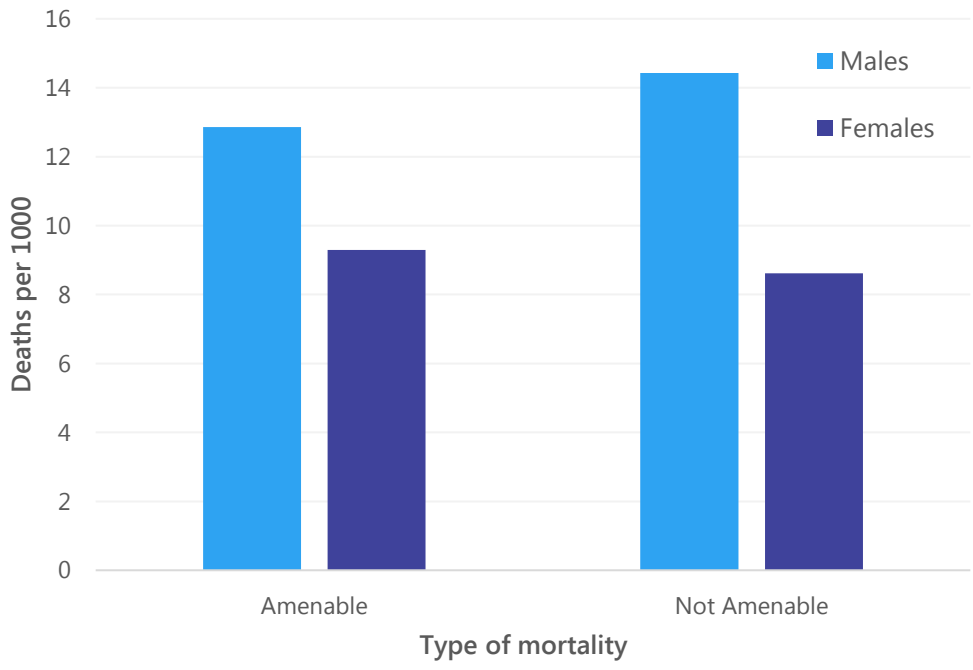


Figure 3.5.1 Cumulative mortality rates (deaths per 1000), by amenability to public health or medical care intervention, all Ontario, 2006-2012.

There are substantial differences in amenable mortality rates between LHINs. Though the rates vary between sexes, some overarching geographic patterns can be noted. Firstly, particular LHINs have low rates of amenable mortality relative to other areas (Figures 3.5.2 and 3.5.3). For example, Central LHIN had among the lowest amenable mortality rates for both males (8.0 deaths per 1000 vs. 12.9 in all Ontario) and females (5.8 vs. 9.3 deaths per 1000) (Table 3.5.1). Other LHINs with low amenable mortality rates in both sexes included Central West and Mississauga Halton LHINs (Figures 3.5.2 and 3.5.3; Table 3.5.1). Notably, all of these LHINs are located in central Ontario.

Other LHINs tended to have among the highest LHIN-specific amenable mortality rates for both sexes compared to the Ontario average. For example, both males (16.9 vs. 12.9 deaths per 1000) and females (12.4 vs. 9.3 deaths per 1000) in Erie St. Clair were well above the Ontario average for amenable mortality (Table 3.5.1). Also with high amenable mortality rates were South East, North Simcoe Muskoka, North East and North West LHINs (Figures 3.5.2 and 3.5.3; Table 3.5.1).

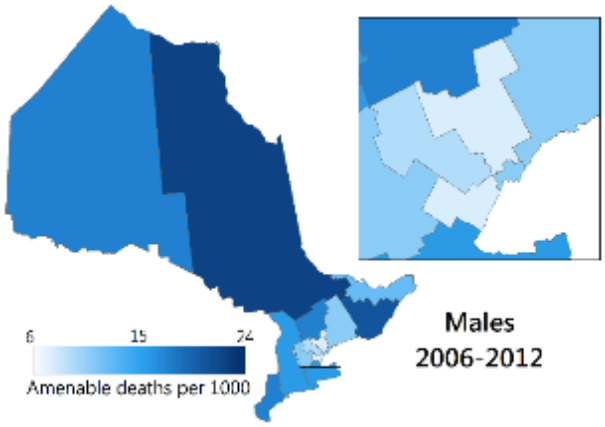


Figure 3.5.2 Cumulative amenable mortality (total deaths per 1000), males, 2006-2012.

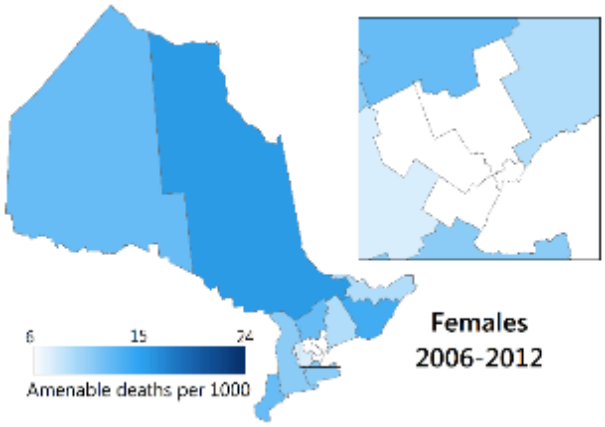


Figure 3.5.3 Cumulative amenable mortality (total deaths per 1000), females, 2006-2012.

4 CONCLUSION

KEY TRENDS

Time

All-cause mortality rates declined substantially across Ontario between 1992 and 2015, among both males and females. The decline in age-standardized all-cause mortality rates took place despite year-over-year increases in crude death counts, which were driven by the growth and aging of the Ontario population. Decreasing age-standardized all-cause mortality rates indicate that over the study period Ontario observed a reduced risk of death across the life course.

Premature mortality rates also declined over time in Ontario for both sexes. Decreasing rates of premature mortality suggest that from 1992 to 2015, an increasing proportion of Ontarians survived into old age. This is an indicator of a gradually expanding life expectancy in the province, and also suggests that Ontario's health system and broader policies around the determinants of health have been increasingly successful at preventing early deaths over time.

Cause-specific mortality rates declined over time for cardiovascular and circulatory diseases, cancers and respiratory diseases, but remained stagnant for external causes of injury and poisoning. The largest declines were seen in mortality from diseases of the cardiovascular and circulatory systems, which decreased dramatically between 1992 and 2012 among both men and women. Substantial improvements also took place in mortality from cancers and diseases of the respiratory system. On the other hand, mortality rates from external causes of injury and poisoning, including violence and suicide, showed little improvement between 1992 and 2012, and were entirely unchanged after 1999.

Sex

Despite overall improvements in Ontario mortality, differences were observed in mortality trends between males and females. In both all-cause and premature mortality, mortality rates were greater in men than in women for the entire period between 1992 and 2015. This sex gap was larger in premature mortality than in all-cause mortality, indicating that more women than men are surviving past age 75. Within cause-specific mortality, sex differences were greatest in cancer and external cause (injury and poisoning) mortality, where rates among males were higher than among females.

The mortality gap between sexes appears to be narrowing over time. Greater improvements were made among males than females in all-cause and premature mortality, shrinking sex differences between 1992 and 2015. A similar pattern was observed for cancer mortality, which declined more rapidly in males than in females. A notable exception to this trend took place in external cause mortality (from injury and poisoning), for which rates were substantially higher among males than females, but with no noticeable change in sex differences taking place over time.

LHINs

Mortality disparities were observed between LHINs in all of the indicators used in this report. Specifically, LHINs located in central regions of Ontario consistently experienced lower mortality rates than LHINs located in peripheral regions. For instance, both all-cause and premature mortality showed consistently lower mortality rates in Central West, Mississauga Halton and Central LHINs, and consistently higher rates in South East, North East and North West LHINs, throughout the study period. Similar geographic patterns were observed in cause-specific mortality, particularly for cardiovascular and circulatory, cancer, and external cause mortality rates.

Unlike the narrowing mortality gap seen between males and females, disparities in mortality between the best- and worst-off LHINs remained stable between 1992 and 2015. Progress in reducing mortality rates seems to have been greatest in the LHINs of central Ontario, such as Toronto Central, Central East, and North Simcoe Muskoka, where mortality rates were close to the Ontario average in 1992 and gradually improved in the decades following. Meanwhile, progress in reducing mortality was slow and even occasionally stagnant among LHINs with high baseline mortality rates, meaning that geographic disparities in premature and all-cause mortality have expanded over time. This is especially evident when looking at cause-specific rates for cardiovascular and circulatory mortality and cancer mortality, the two largest causes of death in Ontario, where gaps between LHINs have grown between 1992 and 2012.

Amenable mortality rates in LHINs may offer insights into where health system improvements are most needed. Geographic differences in amenable mortality are pronounced, with particularly high rates of amenable mortality in South East and northern LHINs (noted above as having consistently high premature and all-cause mortality rates).

Socioeconomic Status

The findings of this atlas confirm that socioeconomic status is an important predictor of premature mortality in Ontario. There is a clear, stepwise increase in premature mortality rates for each increasing quintile of material deprivation. This socioeconomic gradient is seen in both males and in females, and in every LHIN in Ontario. Importantly, the effect of socioeconomic status is not equal across the province – for instance, the least materially deprived residents of North Simcoe Muskoka LHIN experienced higher premature mortality rates than the least materially deprived group in Central LHIN.

Socioeconomic disparity in premature mortality is growing over time. Relative Index of Inequality (RII) measures show that for both males and females, relative differences in premature mortality rates across socioeconomic groups expanded gradually between 1992 and 2015. RII results suggest that relative socioeconomic inequalities in males and females are growing at approximately the same rate. The geographic disparities seen in premature mortality rates are not consistent with geographic patterns of RII. Even LHINs with low overall premature mortality showed evidence of growing RII.

In the same time, absolute inequalities in premature mortality (considered as gaps in mortality rates between five socioeconomic status quintiles) have stayed constant. The one major exception is the gap between premature mortality rates in the highest quintile of material deprivation (the worst-off group) and the next highest quintile, which has grown substantially since the early 2000s. This is a worrisome trend.

Future work should prioritize determining how and why this increase in inequality has taken place, and how it can best be targeted and addressed.

CONSIDERATIONS

Strengths

These analyses are strengthened by the powerful linkage of ORG-D data. By including nearly all Ontario deaths between 1992 and 2015, this atlas presents a comprehensive population-based profile of mortality trends in Ontario's LHIN regions. Furthermore, by leveraging linkages to other provincial data holdings (for enrichment of cause of death coding) and the Ontario Marginalization Index (for assessment of socioeconomic status), the atlas moves beyond simple mortality-based indicators (such as premature and all-cause mortality) to consider mortality trends in finer detail.

By presenting mortality trends using LHIN geography, this atlas represents a valuable resource for health system planning in the province. LHIN boundaries are central to the administrative division of health care delivery in Ontario. The findings presented in this atlas enhance our understanding of population health in specific LHINs, and of the effectiveness of Ontario's health system as a whole.

Limitations and Interpretive Cautions

Several limitations should be considered when interpreting these findings. Mortality trends which are reported at the LHIN level are not necessarily representative of the experience of smaller communities or subpopulations within each LHIN (55). For instance, an observation of decreasing mortality in an entire LHIN may mask the fact that within that LHIN, mortality is increasing among members of a specific subpopulation. Likewise, large declines at the LHIN level may not be achieved equally across the entire LHIN population (as seen in 'Premature mortality by socioeconomic status').

Similarly, studying mortality across long time periods introduces particular challenges. Cause of death coding practices have changed periodically in Ontario since the establishment of ORG-D, resulting in structural differences in data holdings from different time periods. Specifically, between 2002 and 2003 the province moved from ICD-9 to ICD-10 coding, changing cause of death reporting patterns slightly (56). While every effort has been made to appropriately convert the data to ICD-9 codes, there may be some residual inconsistencies in cause of death coding over time.

Analyses for time trends were also limited to the years available in the databases. The date range for data sources varied somewhat, so analyses were conducted using different time frames. For example, at the time of this analysis, valid cause of death information from ORG-D was only available until December 2012, so cause-specific mortality analyses were truncated at that year. Furthermore, ON-MARG information was not available for the most current census year (2011). This resulted in 2006 ON-MARG scores being applied for all years between 2004 and 2015.

IMPLICATIONS

This atlas offers extensive empirical evidence about mortality trends in Ontario between 1992 and 2015. The findings confirm trends which had been previously identified, and add to the evidence base by mapping geographic nuances in Ontario's LHIN regions (32). Each of the mortality-based indicators used holds distinct meaning within the context of population health. The current mortality atlas is intended to serve as a resource to inform health system planning and decision-making.

It will be important, moving forward, to continue monitoring mortality trends. The findings in this report show that major changes in mortality took place in Ontario between 1992 and 2015. Integrating mortality-based indicators into ongoing population health surveillance offers a practical means for understanding mortality disparities and inequities. Considering mortality trends as a part of health system evaluation and policy development processes supports conscientious, evidence-informed decisions to improve population health at all levels.

TAKING ACTION

Ontario has made important gains towards reducing mortality. This report reveals that there remains significant variation in premature mortality across geography and socioeconomic status. This variation suggests that subpopulations within Ontario may not be benefiting fully from Ontario's large-scale health system improvements.

These challenges are not unique to Ontario. In recent years, many jurisdictions around the world have taken steps to address these gaps and reduce the determinants of premature mortality.

Within Canada, British Columbia (57) and Quebec (58) have implemented strategies designed to reduce chronic diseases — the major cause of premature mortality in Canada. Internationally, Australia (59) and England (60) have used a similar approach focused on reducing chronic disease rates and improving population health. Notably, Australia's strategy places special emphasis on vulnerable groups, such as those with mental illness, who often experience higher levels of chronic disease and premature mortality. Reducing disparities among vulnerable groups is essential to reducing premature mortality and enhancing population health.

To reduce premature mortality and minimize variation in who is benefiting from reductions, two things are needed:

First, a strong vision with clear goals aimed at reducing premature mortality and closing the geographic and socioeconomic gaps in population mortality and health. This strategy must involve action at all levels, where government, municipalities and health organizations can all contribute, with dedicated and aligned program action.

Second, investment is needed to support this large-scale coordinated action. Based on the potential to reduce chronic diseases, including cancer and cardiovascular disease, and in light of the progress already achieved in Ontario, efforts to reduce premature death and close these gaps will significantly improve the health of Ontarians, reduce the strain on our health care system and ensure that all Ontarians are benefiting.

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TECHNICAL APPENDIX

DATA SOURCES

This atlas used multiple databases linked at the Institute for Clinical Evaluative Sciences (ICES). They are as follows:

Ontario Registrar General's death certification file (ORG-D)

ORG-D is a mortality database containing records for all deaths registered in Ontario, based on data listed on an individual's Medical Certificate of Death (61). The data are regularly collected by the Ontario Registrar General as part of routine vital statistics reporting, and linked at ICES to the Ontario Registered Persons Database (RPDB). Linkage rates between ORG-D and RPDB are greater than 96%.

ORG-D data holdings include cause of death information from the decedent's Medical Certificate of Death. At ICES, cause of death is enriched through linkage with other provincial data holdings, such as health administrative data. All-cause of death entries are converted to ICD-9 codes using established conversion tables to ensure consistency over time.

Ontario Registered Persons Database (RPDB)

RPDB is the central population registry file in Ontario. RPDB includes records for all individuals that have ever been registered for insured health services in Ontario (61). It allows linkage to other health and demographic databases in Ontario.

Canadian Community Health Survey (CCHS)

The Canadian Community Health Survey is a cross-sectional survey which gathers health-related data at sub-provincial levels of geography (62). Between 2001 and 2005, data were collected every two years. Since 2007, data have been collected annually and are reported for both one-year and two-year cycles.

CCHS data were linked at ICES for males and females in cycles 1.1, 2.1, 3.1, 2007/2008, and 2009/2010. Bootstrap sampling weights, provided by Statistics Canada, were used to adjust for the complexity of the survey sampling design and to produce estimates reflecting the Ontario population. The total linked cohort size is 149,262 respondents with approximately 50.7% females and 49.3% males. The CCHS data were used in this atlas to inform the LHIN population profiles – variables used included demographic, socioeconomic and health behaviour characteristics aggregated at the LHIN level.

Immigration, Refugees and Citizenship Canada's (IRCC) Permanent Resident Database

IRCC's permanent resident database contains records for all immigrants who landed in Ontario between 1985 and 2012. It does not include records for immigrants who landed in another Canadian province and later relocated to Ontario. All records in IRCC's permanent resident database are linked at ICES to other health and demographic databases.

This atlas used IRCC data to calculate LHIN-specific proportions of immigrants and new immigrants (defined as those that landed in Ontario in the past 5 years) for the LHIN population profiles.

Ontario Marginalization Index (ON-MARG)

ON-MARG is a census-derived index, linked at ICES to the RPDB, which measures levels of marginalization across Ontario at the dissemination area level (9). It has been frequently used as a proxy measure for socioeconomic status in the study of socioeconomic gradients in Ontario populations (63-65). Specifically, this atlas used dissemination area-level quintiles of material deprivation, which describe the likelihood that an individual is unable to afford or attain necessary goods and services (9). ON-MARG indices are available for 2006 and 2001; socioeconomic status has been assigned using nearest-census information.

POPULATION

This atlas considered all adult deaths registered in ORG-D between January 1992 and December 2015 which could be linked to a record in the RPDB. Adult deaths included all those with an age at death between 18 and 120 years old. The total number of deaths included is 1,962,634.

Analyses that required cause of death information (i.e., cause-specific and amenable mortality rates) excluded deaths registered after December 2012. This is because cause of death updating of ORG-D holdings is complete only up to 2013. Furthermore, cause-specific deaths that occurred in 2013 were excluded due to changes in ORG-D coding practices between 2012 and 2013. Deaths were also excluded from these analyses if they did not have valid cause of death information in ORG-D. The total number of deaths included for cause-specific and amenable mortality analyses is 1,684,203.

All denominators used to calculate mortality rates were population counts based on RPDB holdings. When calculating era mortality rates, the median year population was used.

METHODS

LHIN geography

In this report, LHIN geography refers to the geographic area, within the province of Ontario, assigned to a given Local Health Integration Network (LHIN). For the purposes of geocoding, LHIN geography is assessed using 2006 census geography at the dissemination area (DA) level.

All-cause mortality rates

Age-standardized all-cause mortality rates were calculated using data from ORG-D and RPDB. For each year between 1992 and 2015, age- and sex-specific all-cause mortality rates were calculated as the number of adult (age 18+) deaths registered in ORG-D per 1000 adults. Population counts were based on the number of individuals registered in RPDB. Age-standardized, sex-specific rates were then calculated as a weighted average of the age-specific rates, using the age distribution of the 2000 Canadian standard population.

Aggregated era rates were calculated for the following eras: 1992-1999, 2000-2007, and 2008-2015. For era rates, death counts (numerator) were calculated as the total number of adult deaths registered during the era. Population counts (denominator) used the RPDB population from the median year of each era (1996, 2004, and 2012). Age standardization was conducted as before, and all rates similarly reported as deaths per 1000.

Cause-specific mortality rates

Cause-specific mortality rates were calculated using data from ORG-D and RPDB. Cause of death was assigned using the ICES-derived cause of death variable in ORG-D, which is based on Medical Certificate of Death coding, enhanced via linkages with other provincial data holdings, and converted to ICD-9 codes. Cause-specific mortality rates were calculated for the following four groupings, based on chapters of ICD-9: Diseases of the cardiovascular and circulatory system (ICD-9 codes 309-459), cancers (ICD-9 codes 140-239), diseases of the respiratory system (ICD-9 codes 460-519), and external causes of injury and poisoning (ICD-9 codes 800-999.9). All other deaths with valid cause of death records were assigned the cause of death category of 'Other.'

Mortality rates were calculated using ORG-D death counts (numerator) and RPDB population counts (denominator), and reported, age-standardized to the 2000 Canadian standard population, as deaths per 1000. Cause-specific mortality rates were calculated using the following eras: 1992-1998, 1999-2005, and 2006-2012. Era rate population counts used the RPDB population from the median year of each era (1995, 2002, and 2009). Age standardization of cause-specific mortality rates was carried out as previously described.

Premature mortality rates

Premature mortality rates were calculated using data from ORG-D and RPDB. Death counts were collected from ORG-D and included all deaths among decedents aged 18 to 74. Population counts, based on RPDB holdings, were calculated as the number of Ontario residents below age 75.

Premature mortality rates are reported as deaths per 1000 for both annual and era rates. Era rates used the same eras (1992-1999, 2000-2007 and 2008-2015) and population denominator years (1996, 2004 and 2012) as all-cause mortality rates.

Premature mortality rates by socioeconomic status

Socioeconomic status was assigned using material deprivation quintiles from ON-MARG, which are assigned to individuals based on their dissemination area of residence at time of death. ON-MARG was developed using 2001 and 2006 Canadian census data, so nearest-census data were used for all other years: 2001 data were applied to deaths between 1992 and 2003, and 2006 data for deaths 2004 – 2015. Individuals were excluded from this analysis if they were missing material deprivation data from their ON-MARG record (N=24,908). Note that ON-MARG quintiles are based on the Ontario-wide distribution of material deprivation.

Stratified premature mortality rates were calculated as detailed above. They are reported as deaths per 1000 for both annual and era rates.

Relative Index of Inequality (RII)

Relative index of inequality measures were calculated using data from ORG-D, RPDB and ON-MARG. The approach used was based on work by Moreno-Betancur, Latouche, Menvielle, Kunst and Rey (2015) (66). In this approach, RII is defined as RII = h(1)/h(0), where h(x) is the premature mortality rate for socioeconomic rank x and 0 and 1 refer to the socioeconomic ranks of the worst- and best-off individuals in a population,

respectively. Socioeconomic rankings are assigned as the proportion of the population with higher socioeconomic status. In this case, individuals in the highest population quintile (top 20%) of material deprivation would be assigned a socioeconomic rank of 0.9, with those in the next-highest quintile assigned socioeconomic rank 0.7 and so on.

A Cox proportional hazards model was employed to calculate a hazard rate estimator for RII. The model used time-on-study as the time scale and included no covariates, generating unadjusted RII estimates for each LHIN- and sex-specific group.

Amenable mortality rates

Amenable mortality rates were calculated using data from ORG-D and RPDB, including cause of death data from ORG-D. Death counts for all deaths that occurred before age 75 were obtained using ORG-D records. Each death with valid cause of death information was categorized as amenable to medical care, amenable to public health, amenable to both medical care and public health, or amenable to neither. Groupings were based on ICD-9 codes, according to established classification lists for amenable mortality. The full list of amenable ICD-9 cause of death codes is included in Table TA.1 at the end of the technical appendix.

Amenable mortality rates were calculated only for the most recent era of available cause of death information (2006-2012). Population counts were captured from RPDB, using 2009 as the population denominator year. As with premature mortality rates, amenable mortality rates were not age-standardized.

Relative risks

For all mortality rates, relative mortality risks were calculated from the same data used to calculate era mortality rates. For each era after the reference period (1992-1999 for all-cause and premature mortality, 1992-1998 for cause-specific mortality), relative risks were calculated by dividing the era mortality rate by the rate observed in the reference era. Confidence intervals for relative risks were calculated using cumulative death counts and population counts from both eras.

AGE-STANDARDIZED PREMATURE MORTALITY RATES

The premature mortality rates discussed in Section 3.3 of this report were not age-standardized. The decision not to age-standardize premature mortality rates, which is discussed on page 41, was made to support the descriptive intent of this atlas. However, age-standardized premature mortality rates were also calculated, and are available in Tables 3.3.3 and 3.3.4 in the data appendix. Yearly age-standardized premature mortality rates for all Ontario are shown by sex in Figure TA.1.

As with non-age-standardized rates, age-standardized rates show sizeable declines in premature mortality in both males and females between 1992 and 2015 (Figure TA.1). Generally, relative and absolute improvements in premature mortality were more pronounced when using age-standardized rates than when using non-age-standardized rates (Tables 3.3.3 and 3.3.4; see Tables 3.3.1 and 3.3.2 for reference). Decreases in age-standardized premature mortality took place for every group and era between 1992 and 2015 (Table 3.3.3). This differs from non-age-standardized premature mortality rates, in which females in North East and North West LHINs did not experience declines (Table 3.3.1). Declining age-standardized rates over time suggest that mortality trends may be influenced by aging LHIN populations.

However, as with non-age-standardized premature mortality rates, large geographic disparities persisted in age-standardized premature mortality (Tables 3.3.3 and 3.3.4). The same geographic pattern was seen in both age-standardized and non-age-standardized rates. This suggests that age differences between LHINs are not responsible for geographic disparities in premature mortality, nor in differences in how individual LHINs' premature mortality changed over time.

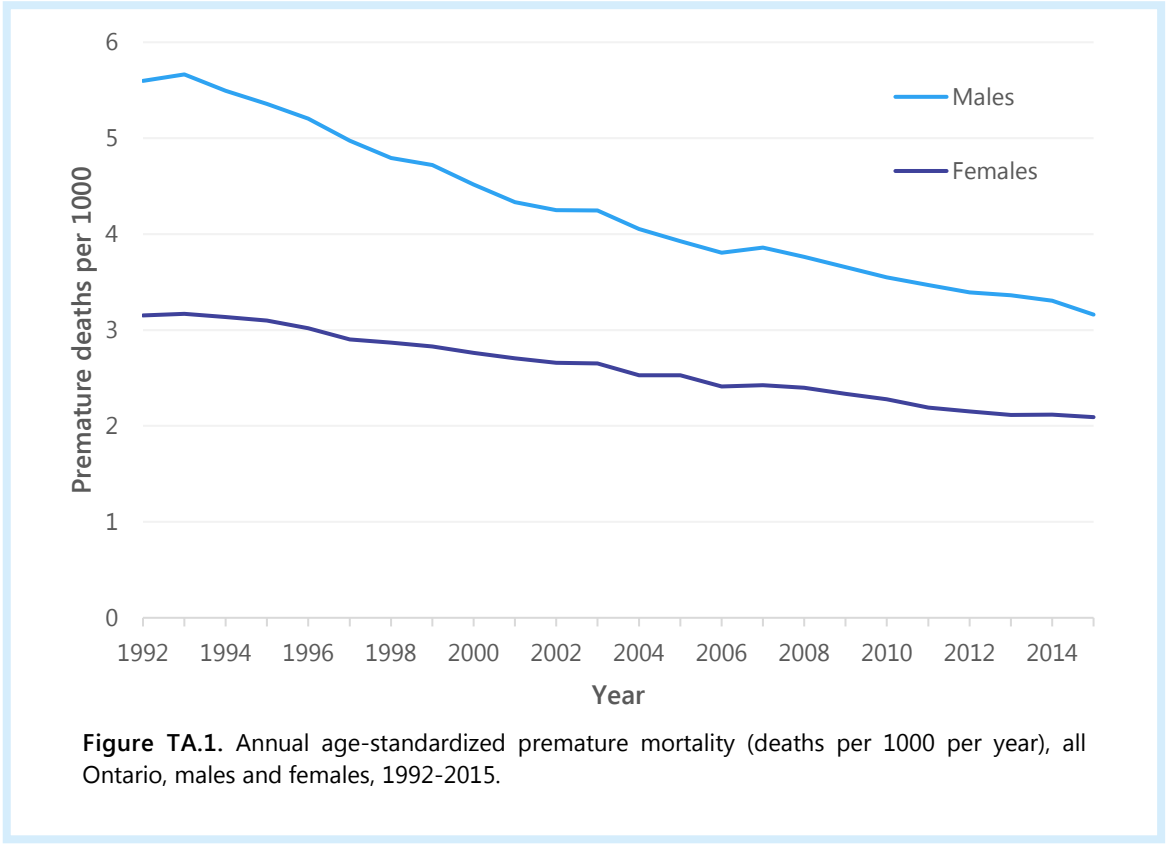

Figure TA.1. Annual age-standardized premature mortality (deaths per 1000 per year), all Ontario, males and females, 1992-2015.

Table TA.1. List of causes of deaths amenable to medical care and public health intervention.

Cause	ICD – 9 Code	Age group (years)
Deaths amenable to both medical care and public health		
Ischaemic heart disease	410 – 414, 429.2	35 – 74
Deaths amenable to medical care		
Intestinal infection	001 – 009	0 – 14
Tuberculosis	010 – 018, 137	0 – 74
Diphtheria	032	0 – 74
Whooping cough	033	0 – 14
Tetanus	037	0 – 74
Septicemia	038	0 – 74
Poliomyelitis	045	0 – 74
Measles	055	1 – 14
Syphilis	090 – 097	0 – 74

Cause	ICD – 9 Code	Age group (years)
Deaths amenable to medical care (cont.)		
Other bacterial infections	019 – 031, 034, 320 – 322, 381 – 383, 390 –392, 680 – 686, 711	0 – 74
Female breast cancer	174	25 – 74
Cervical cancer	180	15 – 74
Other uterine cancers	179, 182	15 – 74
Testicular cancer	186	0 – 74
Hodgkin's disease	201	0 – 74
Leukemia	204 – 208	0 – 14
Diseases of the thyroid	240 – 246	0 – 74
Diabetes mellitus	250	0 – 74
Deficiency anemia	280, 281	0 – 74
Epilepsy	345	0 – 74
Active rheumatic fever	390 – 392	0 – 74
Chronic rheumatic heart disease	393 – 398	0 – 74
Hypertensive disease	401 – 405	35 – 74
Cerebrovascular disease	430 – 438	35 – 74
Influenza	487	0 – 74
Pneumonia	480 – 483, 485 – 486	0 – 74
Other acute respiratory infections	460 – 466	1 – 14
Asthma	493	0 – 49
Peptic ulcer	531 – 534	0 – 74
Appendicitis	540 – 543	0 – 74
Abdominal hernia	550 – 553	0 – 74
Ileus without hernia	560	0 – 74
Cholelithiasis, cholecystitis and cholangitis	574 – 575.1, 576.1	0 – 74
Nephritis and nephrosis	580 – 589	0 – 74
Infections of the urinary system	590, 595	0 – 74
Hyperplasia of the prostate	600	0 – 74
Complications of pregnancy	630 – 676	0 – 74
Osteomyelitis and periostitis	730	0 – 74
Congenital cardiovascular anomalies	745 – 747	0 – 74
Congenital digestive anomalies	750 – 751	0 – 74
Perinatal conditions, excluding still births*	760 – 779	0 – 74
Misadventures to patients during surgical and medical care	E870 – 876, E878 – 879	0 – 74
Deaths amenable to public health		
HIV	042	0 – 74
Lung cancer	162	0 – 74
Skin cancer	173	0 – 74
Chronic obstructive pulmonary disease	490 – 492, 496	0 – 74
Cirrhosis of the liver	571	0 – 74
Motor vehicle accidents	E810 – 825	0 – 74

*No age restriction, other than the one used to define perinatal deaths (first month of life).

DATA APPENDIX

Table 2.1.1. Population characteristics of Ontario's Local Health Integration Networks (LHINs), by sex.
[1] Cell values represent the proportion of each LHIN's population in each category as of 2015.

LHIN	Sex	Population (1992)	Population (2015)	Age groups (%)[1]			LHIN size (km^2)	% rural[2]
				18-44	45-74	75+		
Erie St. Clair	M	219,268	277,416	21.4	24.1	4.27	7,835	9.15
	F	231,003	279,623	20.3	24.0	5.93		8.58
South West	M	312,352	398,060	21.5	23.4	4.37	22,151	33.7
	F	330,507	410,461	20.7	24.1	5.98		33.2
Waterloo Wellington	M	208,330	320,688	24.0	22.0	3.56	5,041	11.4
	F	216,134	327,208	23.3	22.4	4.84		11.3
Hamilton Niagara Haldimand Brant	M	461,021	596,449	21.1	23.4	4.48	6,937	5.03
	F	487,635	621,381	20.6	24.1	6.27		4.70
Central West	M	190,710	374,588	24.2	21.9	3.08	2,733	3.17
	F	191,625	387,037	25.1	21.9	3.88		2.25
Mississauga Halton	M	284,452	497,277	22.5	22.8	3.36	1,113	0.11
	F	297,779	524,034	23.4	23.4	4.54		0.08
Toronto Central	M	446,567	549,065	24.8	20.8	3.24	203	0.00
	F	469,752	575,304	25.8	20.7	4.71		0.00
Central	M	440,162	764,434	22.0	22.2	3.86	3,207	0.58
	F	466,903	826,115	23.1	23.7	5.15		0.71
Central East	M	461,896	653,420	21.3	23.1	4.10	17,333	8.55
	F	488,330	692,970	21.5	24.3	5.61		8.00
South East	M	163,167	211,941	19.1	24.3	4.91	20,233	40.0
	F	176,849	226,583	19.4	25.8	6.47		37.4
Champlain	M	381,728	548,659	21.8	23.1	3.76	19,249	16.8
	F	412,424	579,369	22.3	23.9	5.21		16.3
North Simcoe Muskoka	M	115,599	198,360	20.5	24.3	4.46	9,793	35.6
	F	120,518	203,893	19.8	25.1	5.72		33.2
North East	M	227,527	245,620	20.2	25.0	4.64	413,487	29.6
	F	232,089	247,346	19.2	24.9	6.05		28.7
North West	M	94,692	103,907	21.9	24.1	4.14	450,637	32.8
	F	94,510	103,565	20.9	23.5	5.48		33.9
All Ontario	**M**	**4,054,394**	**5,739,885**	**22.1**	**22.9**	**3.92**	**979,953**	**11.6**
	F	**4,252,386**	**6,004,891**	**22.3**	**23.5**	**5.34**		**11.1**

[2] Source: data obtained from the 2000-2010 CCHS combined cohort.

Table 2.2.1. Sociodemographic characteristics of Ontario LHINs, by sex.

LHIN	Sex	% with post-secondary education[1]	% in lowest income quintile[1]	% in highest material deprivation quintile[1]	% identifying as visible minority[1]	% landed immigrants (as of 2012)[2]	% recent immigrants (arrived 2007-2012)
Erie St. Clair	M	73.8	9.24	21.8	10.4	9.11	1.15
	F	73.5	12.9	22.1	10.9	9.46	1.33
South West	M	73.7	7.99	15.9	6.23	6.96	1.08
	F	72.7	10.6	15.4	6.12	6.82	1.13
Waterloo Wellington	M	74.9	7.05	13.1	12.3	12.88	1.94
	F	74.3	10.0	11.6	11.1	12.74	2.11
Hamilton Niagara Haldimand Brant	M	74.8	9.94	21.9	8.94	9.05	1.38
	F	73.7	13.2	22.4	8.40	8.99	1.49
Central West	M	75.6	12.9	16.6	48.6	37.6	5.94
	F	72.1	16.7	18.7	46.5	37.9	6.49
Mississauga Halton	M	81.3	9.28	10.2	29.4	32.2	4.55
	F	82.4	12.7	11.9	33.4	32.4	5.00
Toronto Central	M	78.8	11.8	27.4	27.2	25.0	4.55
	F	79.2	16.4	26.8	27.7	25.6	4.92
Central	M	80.0	11.3	14.9	37.4	34.8	4.98
	F	78.7	13.6	16.3	37.3	35.6	5.72
Central East	M	76.1	10.6	20.7	34.2	23.6	3.16
	F	76.2	13.7	20.7	33.6	24.3	3.47
South East	M	75.4	8.88	23.4	5.93	3.0	0.55
	F	74.0	12.2	23.0	6.07	3.1	0.56
Champlain	M	81.4	9.01	13.5	14.4	10.7	1.79
	F	80.1	10.4	13.4	12.9	11.1	2.02
North Simcoe Muskoka	M	75.4	6.28	9.4	5.69	3.90	0.56
	F	72.7	8.75	9.8	7.75	3.91	0.60
North East	M	72.7	9.36	33.3	7.34	1.51	0.30
	F	70.2	14.0	36.5	6.85	1.57	0.34
North West	M	73.3	8.39	26.2	8.41	1.95	0.37
	F	72.8	11.6	25.1	9.14	2.02	0.38
All Ontario	**M**	**77.0**	**9.8**	**18.6**	**21.6**	**18.8**	**2.84**
	F	**76.2**	**12.9**	**19.0**	**21.6**	**19.3**	**3.16**

[1] Source: self-reported data obtained from the 2000-2010 CCHS combined cohort.

[2] Source: data obtained from the Immigration, Refugees and Citizenship Canada (IRCC) Permanent Residency database.

Table 2.3.1. Health behaviour characteristics of Ontario LHINs, by sex.[1]

LHIN	Sex	Overweight or obese (%)	Current smokers (%)	Physically inactive (%)	Heavy drinkers (%)	High life stress (%)	No regular doctor (%)
Erie St. Clair	M	65.2	26.6	46.7	14.4	21.2	13.4
	F	45.7	22.6	55.8	4.07	23.0	7.39
South West	M	60.5	24.5	45.4	13.1	20.5	10.4
	F	45.8	20.7	52.5	3.87	22.3	6.66
Waterloo Wellington	M	59.0	25.5	47.5	13.2	22.2	9.90
	F	43.0	18.8	52.4	3.64	25.6	6.19
Hamilton Niagara Haldimand Brant	M	61.3	27.2	43.9	14.5	22.7	7.85
	F	43.9	21.4	51.0	4.48	25.9	4.61
Central West	M	56.2	23.7	54.7	7.78	25.1	10.6
	F	44.1	14.4	62.3	1.92	24.7	4.72
Mississauga Halton	M	54.4	25.5	45.3	10.6	27.0	12.0
	F	38.2	15.5	54.9	3.09	28.4	5.63
Toronto Central	M	48.2	25.0	46.2	11.7	25.1	19.2
	F	31.7	17.2	53.5	6.11	27.3	8.35
Central	M	53.2	22.8	48.7	7.92	23.1	9.75
	F	34.7	14.6	55.9	2.44	26.4	5.02
Central East	M	54.7	23.4	50.3	9.61	19.5	10.1
	F	40.0	17.4	57.5	2.66	23.6	5.09
South East	M	60.9	27.8	43.4	15.6	22.1	8.80
	F	46.6	24.3	50.1	3.54	25.5	6.21
Champlain	M	57.6	22.9	40.1	12.6	22.7	14.6
	F	42.0	19.5	47.2	4.05	26.2	8.36
North Simcoe Muskoka	M	63.1	26.7	42.3	16.0	21.4	11.4
	F	46.7	24.2	46.8	5.46	22.6	6.58
North East	M	64.3	30.1	43.7	15.0	20.0	14.8
	F	49.3	25.8	49.7	3.81	23.5	11.1
North West	M	66.0	29.6	37.0	14.2	18.7	18.5
	F	48.9	26.7	46.8	4.64	23.7	12.8
All Ontario	**M**	**57.3**	**25.1**	**46.1**	**11.9**	**22.6**	**11.8**
	F	**41.2**	**18.9**	**53.4**	**3.70**	**25.3**	**6.45**

[1] Source: self-reported data obtained from the 2000-2010 CCHS combined cohort.

Table 3.1.1. Cumulative age-standardized all-cause mortality rates (total deaths per 1000), with relative risks and 95% confidence intervals, by LHIN, sex and era, Ontario, 1992-2015.

		Total deaths per 1000			Relative all-cause mortality risk (95%CI)[1]	
LHIN	**Sex**	**1992-1999**	**2000-2007**	**2008-2015**	**2000-2007**	**2008-2015**
Erie St. Clair	M	96.2	77.4	65.8	0.805 (0.790 - 0.820)	0.694 (0.681 - 0.707)
	F	59.6	53.6	46.7	0.899 (0.879 - 0.920)	0.788 (0.770 - 0.806)
South West	M	92.3	76.3	65.2	0.826 (0.813 - 0.839)	0.710 (0.699 - 0.722)
	F	57.8	52.4	45.9	0.907 (0.889 - 0.924)	0.795 (0.779 - 0.810)
Waterloo Wellington	M	87.5	69.2	59.5	0.790 (0.775 - 0.805)	0.684 (0.670 - 0.697)
	F	54.9	48.5	43.0	0.884 (0.863 - 0.905)	0.784 (0.766 - 0.803)
Hamilton Niagara Haldimand Brant	M	90.3	75.6	65.6	0.837 (0.826 - 0.848)	0.731 (0.722 - 0.741)
	F	58.1	51.4	45.7	0.884 (0.870 - 0.898)	0.789 (0.776 - 0.802)
Central West	M	75.3	56.7	46.2	0.753 (0.737 - 0.769)	0.625 (0.612 - 0.638)
	F	51.6	40.9	34.2	0.792 (0.772 - 0.812)	0.671 (0.655 - 0.688)
Mississauga Halton	M	72.6	54.4	44.2	0.750 (0.736 - 0.763)	0.616 (0.605 - 0.627)
	F	49.1	39.1	32.3	0.797 (0.780 - 0.814)	0.664 (0.651 - 0.679)
Toronto Central	M	87.2	66.3	53.6	0.760 (0.749 - 0.771)	0.618 (0.609 - 0.627)
	F	53.2	43.7	36.3	0.822 (0.808 - 0.836)	0.683 (0.671 - 0.696)
Central	M	69.4	52.8	42.3	0.760 (0.749 - 0.772)	0.616 (0.607 - 0.625)
	F	47.6	37.0	30.1	0.778 (0.764 - 0.791)	0.638 (0.627 - 0.650)
Central East	M	80.8	64.3	53.6	0.796 (0.785 - 0.807)	0.671 (0.661 - 0.680)
	F	53.7	45.4	38.7	0.845 (0.832 - 0.859)	0.727 (0.715 - 0.739)
South East	M	95.3	79.0	69.3	0.829 (0.812 - 0.847)	0.730 (0.715 - 0.746)
	F	60.8	54.1	48.5	0.889 (0.867 - 0.912)	0.798 (0.778 - 0.819)
Champlain	M	84.4	68.0	55.1	0.806 (0.794 - 0.817)	0.658 (0.648 - 0.668)
	F	54.8	47.1	40.1	0.860 (0.845 - 0.875)	0.734 (0.721 - 0.747)
North Simcoe Muskoka	M	91.6	75.2	64.7	0.821 (0.801 - 0.841)	0.712 (0.695 - 0.730)
	F	58.7	51.5	46.6	0.879 (0.853 - 0.905)	0.798 (0.774 - 0.822)
North East	M	102.1	86.4	75.7	0.847 (0.832 - 0.862)	0.746 (0.732 - 0.760)
	F	63.8	57.5	52.6	0.902 (0.882 - 0.922)	0.827 (0.808 - 0.846)
North West	M	97.2	82.3	72.4	0.846 (0.823 - 0.870)	0.751 (0.729 - 0.773)
	F	60.8	56.9	51.3	0.935 (0.903 - 0.968)	0.847 (0.817 - 0.878)
All Ontario	**M**	**85.8**	**68.1**	**56.7**	**0.794 (0.791 - 0.798)**	**0.668 (0.665 - 0.671)**
	F	**55.2**	**47.1**	**40.3**	**0.854 (0.849 - 0.858)**	**0.735 (0.731 - 0.739)**

[1]Relative risks use the 1992-1999 era as a reference period. For methodology, refer to the technical appendix.

Table 3.1.2: Annual age-standardized all-cause mortality rates (deaths per 1000 per year) by LHIN and sex, Ontario, 1992 to 2015.

LHIN[1] and sex		Deaths per 1000 per year																							
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	M	12.3	12.8	12.5	12.4	12.2	11.9	11.3	11.5	10.8	10.3	10.0	10.2	9.7	9.4	9.3	8.8	8.8	8.9	8.4	8.5	8.4	8.1	8.1	7.8
	F	7.6	7.7	7.5	7.5	7.7	7.4	7.3	7.3	7.1	6.9	7.0	6.8	6.7	6.6	6.4	6.8	6.3	6.1	6.1	6.0	5.5	5.8	5.6	5.7
2	M	12.1	12.1	12.1	12.0	11.3	11.7	10.9	11.0	10.6	10.0	9.8	10.1	9.2	9.2	9.0	8.9	8.5	8.7	8.5	8.3	8.2	8.1	8.0	7.9
	F	7.3	7.5	7.5	7.3	7.2	7.1	7.0	7.2	6.9	6.6	6.8	6.8	6.3	6.6	6.4	6.4	6.1	5.9	5.9	5.8	5.5	5.7	5.7	5.7
3	M	11.5	11.7	11.3	11.4	11.2	10.5	10.6	10.1	9.7	9.4	9.2	8.8	8.6	8.6	8.2	8.3	8.1	7.9	7.9	7.4	7.4	7.5	7.3	7.2
	F	7.1	7.1	7.0	7.0	7.0	6.8	6.7	6.7	6.5	6.7	6.4	6.2	5.9	6.1	5.8	5.7	5.6	5.7	5.5	5.5	5.4	5.3	5.2	5.3
4	M	11.9	11.9	11.9	11.4	11.2	11.1	10.6	10.8	10.3	9.9	9.6	9.9	9.2	9.4	8.9	9.2	9.1	8.8	8.5	8.4	8.1	8.0	8.0	7.7
	F	7.4	7.3	7.7	7.4	7.3	7.2	7.1	7.0	6.9	6.8	6.6	6.7	6.3	6.5	6.1	6.1	6.1	6.1	5.9	5.8	5.7	5.6	5.5	5.5
5	M	10.6	10.8	9.8	9.3	9.4	9.0	8.9	8.4	8.1	8.2	7.5	7.2	7.0	7.0	6.6	6.6	6.8	6.3	6.1	6.1	5.7	5.6	5.5	5.7
	F	7.1	7.0	6.6	6.7	6.5	6.2	6.1	6.2	5.8	5.3	5.4	5.4	5.1	5.2	4.9	4.7	5.0	4.6	4.4	4.5	4.3	4.2	4.2	4.0
6	M	10.0	9.5	9.8	9.1	9.1	8.9	9.0	8.1	7.7	7.4	7.2	7.3	6.9	6.6	6.3	6.3	6.3	5.9	5.8	5.8	5.4	5.5	5.5	5.2
	F	6.6	6.5	6.4	6.5	6.1	6.2	6.0	5.6	5.5	5.4	5.1	5.1	4.8	4.9	4.6	4.6	4.5	4.5	4.4	4.2	4.0	3.9	4.0	3.8
7	M	11.9	12.0	11.2	11.3	11.2	10.3	9.8	9.6	9.4	8.9	8.9	8.6	7.9	7.8	7.6	7.7	7.5	7.2	7.2	6.9	6.6	6.5	6.3	6.5
	F	6.6	7.1	6.8	6.8	6.7	6.5	6.6	6.2	6.0	5.9	5.7	5.6	5.5	5.4	4.9	5.0	5.3	5.0	4.7	4.5	4.4	4.5	4.1	4.3
8	M	9.6	9.2	9.2	9.0	8.7	8.3	8.4	7.7	7.5	7.2	7.1	7.2	6.6	6.3	6.1	6.0	5.9	5.9	5.7	5.3	5.2	5.2	5.2	5.1
	F	6.4	6.3	6.3	6.2	6.0	5.9	5.5	5.6	5.3	5.0	5.0	4.8	4.5	4.6	4.3	4.4	4.3	4.1	4.1	3.8	3.7	3.6	3.7	3.7
9	M	10.5	10.8	10.3	10.5	10.2	10.1	9.9	9.3	9.1	8.6	8.2	8.4	8.0	7.9	7.6	7.6	7.3	7.4	7.1	6.7	6.6	6.8	6.7	6.5
	F	6.8	7.1	6.9	7.0	6.9	6.5	6.6	6.4	6.3	6.1	5.9	5.9	5.7	5.6	5.3	5.3	5.4	5.2	5.1	4.8	4.9	4.7	4.7	4.7
10	M	12.3	12.1	12.5	12.4	11.8	12.0	11.3	11.8	10.8	10.6	10.3	10.2	9.8	9.6	9.4	9.5	9.7	9.2	9.3	8.6	8.7	8.4	8.2	8.0
	F	7.8	7.7	7.8	7.8	7.6	7.5	7.5	7.6	7.3	7.4	7.1	6.7	6.8	6.8	6.3	6.7	6.5	6.4	6.3	6.2	6.0	6.0	5.9	5.7
11	M	11.5	11.1	11.1	10.9	10.4	9.8	10.2	9.8	9.5	8.9	9.0	8.8	8.6	8.4	7.9	8.0	7.9	7.3	7.1	6.9	7.0	6.9	6.8	6.5
	F	7.0	7.2	7.3	7.0	6.8	6.7	6.5	6.6	6.4	6.2	6.2	6.0	5.9	5.9	5.6	5.7	5.4	5.3	5.2	5.0	4.9	4.9	4.9	4.9
12	M	11.8	12.1	12.2	11.5	11.5	11.7	11.0	10.7	10.2	10.3	9.6	9.8	9.3	9.4	9.5	9.2	8.9	8.8	8.7	8.1	8.2	7.9	7.7	7.7
	F	7.2	7.6	7.4	7.5	7.4	7.4	7.5	7.1	6.9	7.0	7.0	6.6	6.1	6.6	6.4	6.3	6.3	6.3	5.9	5.8	5.7	5.7	5.8	5.7
13	M	13.4	13.2	13.2	13.0	13.0	12.4	11.9	12.5	11.8	11.4	11.0	11.0	11.0	10.1	9.9	10.2	10.2	10.1	9.6	9.5	9.5	9.3	9.5	9.0
	F	7.9	8.2	8.3	8.2	8.1	7.9	7.8	7.7	7.5	7.4	7.3	7.3	7.2	7.3	6.9	6.7	6.9	6.9	6.6	6.8	6.3	6.7	6.4	6.4
14	M	12.8	12.6	12.8	11.9	12.7	11.8	11.8	11.5	11.3	11.0	10.7	10.8	10.5	9.6	9.8	9.2	9.3	9.1	9.6	9.5	8.9	9.0	9.0	9.1
	F	7.5	7.4	7.7	8.1	8.1	7.6	7.4	7.5	7.5	7.5	7.5	7.5	6.9	7.0	6.9	6.4	6.6	6.3	6.4	6.8	6.4	6.4	6.6	6.5
ON	**M**	**11.3**	**11.4**	**11.2**	**11.0**	**10.8**	**10.5**	**10.2**	**10.0**	**9.6**	**9.2**	**8.9**	**8.9**	**8.4**	**8.3**	**8.0**	**8.0**	**7.9**	**7.7**	**7.5**	**7.2**	**7.0**	**7.0**	**6.9**	**6.8**
	F	**7.0**	**7.2**	**7.2**	**7.1**	**7.0**	**6.8**	**6.7**	**6.6**	**6.4**	**6.3**	**6.2**	**6.1**	**5.8**	**5.9**	**5.6**	**5.6**	**5.5**	**5.4**	**5.3**	**5.1**	**5.0**	**4.9**	**4.9**	**4.9**

[1]*LHIN numbers:* **1)** Erie St. Clair; **2)** South West; **3)** Waterloo Wellington; **4)** Hamilton Niagara Haldimand Brant; **5)** Central West; **6)** Mississauga Halton; **7)** Toronto Central; **8)** Central; **9)** Central East; **10)** South East; **11)** Champlain; **12)** North Simcoe Muskoka; **13)** North East; **14)** North West. **ON** = all Ontario.

Table 3.2.1 Total deaths by cause, Ontario, 1992-2012.

Year	Cause of death				
	Diseases of the circulatory and cardiovascular systems	Cancers	Diseases of the respiratory system	External causes (injury & poisoning)	Other
1992	28,247	19,994	5,702	3,704	11,851
1993	29,097	20,588	6,242	4,100	12,590
1994	29,035	21,382	6,533	3,966	13,293
1995	29,110	21,408	6,728	4,064	13,959
1996	29,546	21,717	6,705	4,137	13,986
1997	29,555	21,735	6,910	3,978	14,440
1998	29,168	22,015	7,593	3,912	14,500
1999	29,225	22,778	7,582	4,075	14,844
2000	28,811	23,392	6,185	3,925	15,983
2001	27,967	23,745	6,084	4,080	16,359
2002	27,598	24,120	6,046	3,956	17,658
2003	28,030	24,753	6,616	4,561	17,698
2004	27,086	24,910	6,519	4,481	17,653
2005	27,067	25,230	7,240	4,701	18,953
2006	25,841	25,352	6,615	4,848	19,761
2007	25,879	25,716	7,194	4,989	21,224
2008	25,660	26,173	7,037	5,053	21,855
2009	25,670	26,339	7,336	5,159	21,668
2010	24,961	26,819	7,261	5,517	22,642
2011	24,522	27,273	7,771	5,509	22,674
2012	24,404	27,577	7,697	5,706	23,100

Table 3.2.2. Cumulative circulatory mortality rates (total deaths per 1000) by LHIN, sex and era, Ontario, 1992-2012.

		Total circulatory deaths per 1000			Relative circulatory mortality risk (95%CI)[1]	
LHIN	**Sex**	**1992-1998**	**1999-2005**	**2006-2012**	**1999-2005**	**2006-2012**
Erie St. Clair	M	36.4	27.3	20.1	0.750 (0.727 - 0.774)	0.552 (0.534 - 0.571)
	F	22.6	18.2	13.3	0.804 (0.773 - 0.835)	0.587 (0.563 - 0.612)
South West	M	32.5	24.5	18.2	0.754 (0.733 - 0.776)	0.562 (0.545 - 0.579)
	F	19.3	15.6	11.5	0.807 (0.779 - 0.835)	0.598 (0.576 - 0.621)
Waterloo Wellington	M	32.1	23.4	16.7	0.729 (0.705 - 0.754)	0.519 (0.500 - 0.538)
	F	19.1	15.0	10.8	0.787 (0.754 - 0.821)	0.565 (0.540 - 0.591)
Hamilton Niagara Haldimand Brant	M	32.3	24.5	18.0	0.760 (0.743 - 0.778)	0.559 (0.545 - 0.573)
	F	20.4	15.9	11.5	0.779 (0.757 - 0.802)	0.566 (0.549 - 0.584)
Central West	M	26.3	18.7	12.8	0.709 (0.683 - 0.737)	0.485 (0.466 - 0.505)
	F	17.6	12.7	8.8	0.724 (0.692 - 0.759)	0.503 (0.479 - 0.527)
Mississauga Halton	M	24.1	16.8	11.5	0.696 (0.673 - 0.719)	0.477 (0.461 - 0.495)
	F	16.0	11.5	7.5	0.721 (0.693 - 0.750)	0.469 (0.449 - 0.489)
Toronto Central	M	26.2	19.7	14.0	0.750 (0.731 - 0.770)	0.534 (0.519 - 0.550)
	F	16.8	12.4	8.5	0.737 (0.713 - 0.761)	0.506 (0.488 - 0.524)
Central	M	23.4	16.6	11.4	0.707 (0.688 - 0.726)	0.485 (0.471 - 0.499)
	F	15.7	10.9	7.3	0.693 (0.671 - 0.715)	0.468 (0.452 - 0.485)
Central East	M	27.8	20.7	14.1	0.743 (0.725 - 0.761)	0.506 (0.493 - 0.520)
	F	18.0	13.7	9.3	0.756 (0.734 - 0.779)	0.514 (0.497 - 0.530)
South East	M	33.1	25.2	18.5	0.760 (0.731 - 0.789)	0.557 (0.535 - 0.581)
	F	20.5	16.5	11.8	0.802 (0.765 - 0.840)	0.575 (0.547 - 0.605)
Champlain	M	30.3	22.3	15.5	0.736 (0.718 - 0.756)	0.513 (0.498 - 0.527)
	F	19.2	14.5	10.0	0.755 (0.732 - 0.779)	0.523 (0.505 - 0.541)
North Simcoe Muskoka	M	32.2	23.8	17.8	0.739 (0.707 - 0.772)	0.552 (0.527 - 0.578)
	F	20.4	14.8	11.2	0.726 (0.687 - 0.767)	0.548 (0.518 - 0.580)
North East	M	35.1	28.1	20.9	0.802 (0.776 - 0.827)	0.596 (0.576 - 0.617)
	F	22.2	17.0	12.7	0.767 (0.737 - 0.799)	0.572 (0.547 - 0.597)
North West	M	33.9	26.0	19.0	0.766 (0.729 - 0.806)	0.560 (0.529 - 0.592)
	F	21.5	16.3	12.6	0.758 (0.711 - 0.808)	0.584 (0.545 - 0.626)
All Ontario	**M**	**29.8**	**22.0**	**15.6**	**0.739 (0.733 - 0.745)**	**0.524 (0.519 - 0.528)**
	F	**18.9**	**14.3**	**10.0**	**0.757 (0.750 - 0.765)**	**0.533 (0.527 - 0.538)**

[1]Relative risks use the 1992-1998 era as a reference period. For methodology, refer to the technical appendix.

Table 3.2.3. Cumulative cancer mortality rates (total deaths per 1000) by LHIN, sex and era, Ontario, 1992-2012.

		Total cancer deaths per 1000			Relative cancer mortality risk (95%CI)[1]	
LHIN	Sex	1992-1998	1999-2005	2006-2012	1999-2005	2006-2012
Erie St. Clair	M	24.0	21.8	19.4	0.908 (0.875 - 0.942)	0.807 (0.777 - 0.838)
	F	15.4	15.1	14.7	0.978 (0.935 - 1.023)	0.956 (0.914 - 0.999)
South West	M	22.7	20.9	18.8	0.919 (0.890 - 0.949)	0.829 (0.802 - 0.856)
	F	15.3	15.2	14.2	0.996 (0.959 - 1.034)	0.928 (0.893 - 0.963)
Waterloo Wellington	M	21.4	19.7	17.9	0.921 (0.885 - 0.958)	0.835 (0.803 - 0.869)
	F	14.3	14.5	13.6	1.016 (0.970 - 1.064)	0.948 (0.905 - 0.992)
Hamilton Niagara Haldimand Brant	M	22.9	21.4	19.5	0.933 (0.909 - 0.957)	0.849 (0.827 - 0.872)
	F	15.5	15.1	14.4	0.977 (0.947 - 1.007)	0.930 (0.902 - 0.959)
Central West	M	19.5	16.0	14.0	0.817 (0.783 - 0.853)	0.716 (0.686 - 0.746)
	F	13.6	12.0	10.2	0.882 (0.839 - 0.928)	0.753 (0.716 - 0.791)
Mississauga Halton	M	19.8	17.0	14.8	0.857 (0.828 - 0.887)	0.746 (0.720 - 0.772)
	F	13.9	12.3	10.9	0.881 (0.847 - 0.917)	0.781 (0.751 - 0.813)
Toronto Central	M	21.2	17.8	16.0	0.840 (0.817 - 0.865)	0.755 (0.733 - 0.778)
	F	14.1	13.1	11.8	0.932 (0.902 - 0.964)	0.834 (0.806 - 0.864)
Central	M	18.6	15.8	13.5	0.846 (0.822 - 0.871)	0.726 (0.705 - 0.747)
	F	13.2	11.5	10.1	0.873 (0.845 - 0.903)	0.763 (0.738 - 0.788)
Central East	M	20.8	18.2	16.5	0.871 (0.848 - 0.895)	0.792 (0.770 - 0.814)
	F	14.3	13.5	12.5	0.949 (0.920 - 0.979)	0.875 (0.848 - 0.903)
South East	M	23.3	22.6	20.6	0.968 (0.927 - 1.011)	0.882 (0.844 - 0.921)
	F	16.1	15.7	14.7	0.976 (0.928 - 1.026)	0.913 (0.868 - 0.959)
Champlain	M	21.3	19.9	17.4	0.933 (0.906 - 0.961)	0.816 (0.792 - 0.84)
	F	15.0	14.5	13.2	0.963 (0.931 - 0.995)	0.877 (0.848 - 0.907)
North Simcoe Muskoka	M	24.2	21.9	19.6	0.906 (0.863 - 0.952)	0.812 (0.774 - 0.852)
	F	15.4	15.7	14.4	1.014 (0.956 - 1.075)	0.931 (0.879 - 0.987)
North East	M	24.7	23.2	21.5	0.942 (0.908 - 0.977)	0.872 (0.840 - 0.905)
	F	16.5	16.0	15.2	0.975 (0.933 - 1.019)	0.923 (0.883 - 0.965)
North West	M	22.8	21.7	19.4	0.950 (0.896 - 1.007)	0.851 (0.801 - 0.904)
	F	15.3	15.1	14.9	0.987 (0.920 - 1.060)	0.969 (0.903 - 1.041)
All Ontario	**M**	**21.7**	**19.4**	**17.3**	**0.894 (0.886 - 0.903)**	**0.796 (0.789 - 0.803)**
	F	**14.7**	**14.0**	**12.8**	**0.950 (0.940 - 0.960)**	**0.871 (0.862 - 0.880)**

[1]Relative risks use the 1992-1998 era as a reference period. For methodology, refer to the technical appendix.

Table 3.2.4. Cumulative respiratory mortality rates (total deaths per 1000) by LHIN, sex and era, Ontario, 1992-2012.

		Total respiratory deaths per 1000			Relative respiratory mortality risk (95%CI)[1]	
LHIN	**Sex**	**1992-1998**	**1999-2005**	**2006-2012**	**1999-2005**	**2006-2012**
Erie St. Clair	M	7.54	5.28	4.92	0.701 (0.653 - 0.752)	0.653 (0.607 - 0.701)
	F	3.58	3.36	3.26	0.939 (0.855 - 1.032)	0.911 (0.829 - 1.001)
South West	M	8.09	6.53	5.43	0.806 (0.763 - 0.852)	0.671 (0.633 - 0.710)
	F	4.38	3.73	3.56	0.852 (0.792 - 0.917)	0.814 (0.756 - 0.875)
Waterloo Wellington	M	8.07	5.58	4.28	0.692 (0.646 - 0.742)	0.531 (0.494 - 0.571)
	F	3.81	3.40	2.85	0.893 (0.814 - 0.980)	0.747 (0.680 - 0.822)
Hamilton Niagara Haldimand Brant	M	7.35	5.51	5.03	0.750 (0.714 - 0.788)	0.683 (0.650 - 0.718)
	F	4.04	3.59	3.11	0.888 (0.835 - 0.945)	0.771 (0.723 - 0.821)
Central West	M	6.52	4.27	3.85	0.655 (0.605 - 0.709)	0.590 (0.546 - 0.637)
	F	3.67	2.92	2.78	0.797 (0.722 - 0.880)	0.759 (0.690 - 0.835)
Mississauga Halton	M	6.53	4.20	3.38	0.643 (0.602 - 0.686)	0.518 (0.484 - 0.553)
	F	3.76	3.01	2.30	0.800 (0.739 - 0.866)	0.612 (0.564 - 0.664)
Toronto Central	M	7.37	5.39	4.38	0.732 (0.696 - 0.770)	0.595 (0.564 - 0.628)
	F	4.09	3.18	2.67	0.779 (0.729 - 0.831)	0.653 (0.609 - 0.699)
Central	M	5.80	4.13	3.30	0.713 (0.675 - 0.753)	0.569 (0.539 - 0.602)
	F	3.48	2.57	2.18	0.739 (0.691 - 0.791)	0.626 (0.585 - 0.669)
Central East	M	7.57	5.09	4.39	0.673 (0.641 - 0.706)	0.579 (0.551 - 0.609)
	F	4.24	3.39	3.08	0.800 (0.754 - 0.850)	0.726 (0.684 - 0.772)
South East	M	9.30	6.70	5.83	0.721 (0.669 - 0.776)	0.627 (0.581 - 0.676)
	F	5.28	4.31	4.21	0.815 (0.743 - 0.893)	0.798 (0.728 - 0.873)
Champlain	M	7.39	5.35	4.29	0.723 (0.686 - 0.763)	0.580 (0.549 - 0.614)
	F	4.02	3.53	2.97	0.879 (0.822 - 0.939)	0.740 (0.691 - 0.792)
North Simcoe Muskoka	M	7.88	6.30	5.53	0.799 (0.732 - 0.873)	0.702 (0.642 - 0.767)
	F	4.46	3.79	3.68	0.850 (0.759 - 0.953)	0.824 (0.738 - 0.921)
North East	M	9.45	7.18	6.19	0.760 (0.714 - 0.810)	0.656 (0.614 - 0.700)
	F	4.84	4.16	4.09	0.859 (0.789 - 0.934)	0.845 (0.776 - 0.919)
North West	M	8.13	6.09	5.09	0.750 (0.675 - 0.833)	0.627 (0.561 - 0.700)
	F	3.68	3.63	3.09	0.985 (0.852 - 1.139)	0.840 (0.722 - 0.978)
All Ontario	**M**	**7.48**	**5.39**	**4.53**	**0.721 (0.709 - 0.733)**	**0.606 (0.596 - 0.616)**
	F	**4.07**	**3.40**	**3.01**	**0.836 (0.818 - 0.853)**	**0.740 (0.724 - 0.755)**

[1]Relative risks use the 1992-1998 era as a reference period. For methodology, refer to the technical appendix.

Table 3.2.5. Cumulative external cause (injury & poisoning) mortality rates (total deaths per 1000) by LHIN, sex and era, Ontario, 1992-2012.

		Total external cause deaths per 1000			Relative mortality risk (95%CI)[1]	
LHIN	**Sex**	**1992-1998**	**1999-2005**	**2006-2012**	**1999-2005**	**2006-2012**
Erie St. Clair	M	4.84	4.26	4.57	0.882 (0.811 - 0.959)	0.945 (0.871 - 1.026)
	F	1.98	1.89	2.14	0.955 (0.842 - 1.084)	1.080 (0.957 - 1.220)
South West	M	5.16	4.88	4.66	0.944 (0.883 - 1.010)	0.902 (0.844 - 0.964)
	F	2.26	2.16	2.40	0.956 (0.866 - 1.056)	1.061 (0.965 - 1.167)
Waterloo Wellington	M	4.17	3.68	3.95	0.882 (0.805 - 0.965)	0.946 (0.868 - 1.032)
	F	1.95	1.69	1.82	0.865 (0.759 - 0.987)	0.930 (0.821 - 1.055)
Hamilton Niagara Haldimand Brant	M	4.50	4.34	4.91	0.966 (0.911 - 1.024)	1.093 (1.033 - 1.156)
	F	2.16	2.00	2.37	0.926 (0.851 - 1.007)	1.097 (1.013 - 1.187)
Central West	M	3.86	3.48	3.32	0.903 (0.821 - 0.992)	0.859 (0.784 - 0.941)
	F	2.02	1.67	1.55	0.829 (0.726 - 0.946)	0.767 (0.675 - 0.872)
Mississauga Halton	M	3.35	2.92	2.93	0.871 (0.800 - 0.947)	0.873 (0.805 - 0.947)
	F	1.87	1.59	1.66	0.853 (0.763 - 0.952)	0.889 (0.799 - 0.988)
Toronto Central	M	4.79	4.04	4.06	0.844 (0.795 - 0.896)	0.848 (0.798 - 0.901)
	F	2.25	1.97	2.03	0.878 (0.806 - 0.957)	0.901 (0.828 - 0.980)
Central	M	3.32	2.86	2.82	0.862 (0.805 - 0.924)	0.851 (0.796 - 0.909)
	F	1.73	1.42	1.46	0.822 (0.749 - 0.903)	0.847 (0.775 - 0.926)
Central East	M	3.99	3.57	3.91	0.897 (0.843 - 0.954)	0.980 (0.923 - 1.040)
	F	1.84	1.79	1.82	0.968 (0.888 - 1.057)	0.988 (0.908 - 1.076)
South East	M	5.04	4.88	4.80	0.968 (0.882 - 1.063)	0.953 (0.869 - 1.045)
	F	2.21	2.12	2.28	0.958 (0.836 - 1.097)	1.029 (0.901 - 1.174)
Champlain	M	4.27	3.46	3.69	0.811 (0.758 - 0.868)	0.865 (0.810 - 0.923)
	F	1.80	1.58	1.74	0.880 (0.797 - 0.972)	0.966 (0.878 - 1.063)
North Simcoe Muskoka	M	4.91	4.23	5.19	0.861 (0.771 - 0.961)	1.057 (0.954 - 1.171)
	F	1.96	2.06	2.16	1.054 (0.895 - 1.241)	1.103 (0.942 - 1.291)
North East	M	6.94	6.08	5.88	0.876 (0.817 - 0.941)	0.848 (0.790 - 0.910)
	F	2.55	2.53	2.95	0.990 (0.885 - 1.107)	1.153 (1.035 - 1.285)
North West	M	7.52	6.93	7.70	0.921 (0.831 - 1.021)	1.023 (0.925 - 1.132)
	F	2.80	2.78	3.37	0.994 (0.842 - 1.174)	1.205 (1.028 - 1.413)
All Ontario	**M**	**4.48**	**3.95**	**4.07**	**0.882 (0.864 - 0.900)**	**0.909 (0.892 - 0.927)**
	F	**2.04**	**1.85**	**1.98**	**0.908 (0.882 - 0.935)**	**0.970 (0.943 - 0.997)**

[1]Relative risks use the 1992-1998 era as a reference period. For methodology, refer to the technical appendix.

Table 3.3.1. Cumulative premature mortality rates (total deaths per 1000) by LHIN, sex and era, Ontario, 1992-2015.

		Total premature deaths per 1000			Relative premature mortality risk (95%CI)[1]	
LHIN	**Sex**	**1992-1999**	**2000-2007**	**2008-2015**	**2000-2007**	**2008-2015**
Erie St. Clair	M	47.4	38.9	38.5	0.822 (0.800 - 0.844)	0.813 (0.791 - 0.835)
	F	29.5	26.4	26.3	0.895 (0.865 - 0.927)	0.893 (0.863 - 0.924)
South West	M	44.9	38.2	37.3	0.851 (0.831 - 0.871)	0.830 (0.811 - 0.850)
	F	27.9	25.6	24.8	0.919 (0.892 - 0.947)	0.891 (0.865 - 0.917)
Waterloo Wellington	M	36.3	29.4	28.1	0.809 (0.784 - 0.835)	0.773 (0.750 - 0.798)
	F	22.8	20.2	19.6	0.887 (0.854 - 0.923)	0.860 (0.828 - 0.894)
Hamilton Niagara Haldimand Brant	M	46.0	38.9	38.0	0.846 (0.830 - 0.862)	0.826 (0.810 - 0.842)
	F	29.5	26.2	25.2	0.887 (0.866 - 0.908)	0.855 (0.835 - 0.875)
Central West	M	27.9	23.1	22.1	0.830 (0.801 - 0.859)	0.792 (0.765 - 0.819)
	F	17.9	15.2	14.5	0.849 (0.813 - 0.888)	0.813 (0.779 - 0.849)
Mississauga Halton	M	28.0	21.9	20.1	0.780 (0.757 - 0.804)	0.718 (0.697 - 0.739)
	F	18.4	15.0	13.5	0.815 (0.787 - 0.845)	0.737 (0.711 - 0.764)
Toronto Central	M	41.4	30.6	26.7	0.739 (0.723 - 0.755)	0.645 (0.631 - 0.659)
	F	23.7	18.7	16.0	0.787 (0.765 - 0.809)	0.674 (0.655 - 0.694)
Central	M	29.7	22.9	19.7	0.771 (0.753 - 0.789)	0.663 (0.648 - 0.679)
	F	19.0	15.0	13.0	0.790 (0.768 - 0.814)	0.687 (0.667 - 0.707)
Central East	M	36.7	30.6	29.2	0.833 (0.816 - 0.850)	0.794 (0.778 - 0.811)
	F	23.5	20.8	19.7	0.885 (0.863 - 0.908)	0.842 (0.821 - 0.864)
South East	M	52.7	46.0	44.6	0.873 (0.847 - 0.899)	0.847 (0.822 - 0.872)
	F	32.9	28.8	28.8	0.874 (0.842 - 0.908)	0.875 (0.843 - 0.908)
Champlain	M	37.5	31.4	28.9	0.838 (0.819 - 0.857)	0.771 (0.753 - 0.788)
	F	24.1	21.0	19.8	0.872 (0.848 - 0.897)	0.822 (0.799 - 0.845)
North Simcoe Muskoka	M	49.5	40.0	38.9	0.810 (0.782 - 0.839)	0.787 (0.760 - 0.814)
	F	29.6	25.9	25.9	0.875 (0.836 - 0.915)	0.877 (0.839 - 0.916)
North East	M	53.4	49.9	49.2	0.936 (0.913 - 0.960)	0.922 (0.899 - 0.946)
	F	31.8	31.4	32.7	0.988 (0.956 - 1.021)	1.030 (0.997 - 1.064)
North West	M	47.3	43.4	45.0	0.917 (0.880 - 0.956)	0.950 (0.912 - 0.990)
	F	28.9	28.6	29.5	0.988 (0.937 - 1.043)	1.021 (0.968 - 1.077)
All Ontario	**M**	**39.6**	**32.4**	**30.3**	**0.818 (0.812 - 0.824)**	**0.765 (0.760 - 0.770)**
	F	**24.7**	**21.3**	**20.0**	**0.862 (0.854 - 0.869)**	**0.810 (0.803 - 0.817)**

[1]Relative risks use the 1992-1999 era as a reference period. For methodology, refer to the technical appendix.

Table 3.3.2: Annual premature mortality rates (deaths per 1000 per year) by LHIN and sex, Ontario, 1992 to 2015.

LHIN[1] and sex		Premature deaths per 1000 per year																							
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	M	6.23	6.76	6.02	5.97	5.97	5.81	5.48	5.54	5.31	5.02	4.98	4.93	4.91	4.79	4.67	4.78	4.82	4.85	4.77	4.90	5.03	4.72	4.76	4.76
	F	3.91	3.96	3.87	3.42	3.85	3.60	3.55	3.52	3.29	3.40	3.43	3.31	3.28	3.18	3.25	3.56	3.30	3.43	3.33	3.22	3.18	3.25	3.32	3.41
2	M	5.88	5.88	6.00	5.81	5.55	5.64	5.27	5.23	5.00	4.86	4.93	5.10	4.55	4.67	4.67	4.73	4.60	4.83	4.58	4.68	4.59	4.87	4.74	4.70
	F	3.41	3.53	3.67	3.64	3.60	3.31	3.36	3.45	3.30	3.07	3.28	3.29	3.13	3.28	3.14	3.33	3.21	3.05	3.13	2.93	3.01	3.11	3.28	3.30
3	M	4.50	5.01	4.63	4.65	4.69	4.45	4.43	4.21	4.13	3.96	3.92	3.76	3.74	3.39	3.49	3.61	3.55	3.61	3.67	3.51	3.47	3.60	3.47	3.52
	F	3.02	2.87	3.01	2.96	2.71	2.75	2.78	2.81	2.59	2.82	2.72	2.63	2.63	2.39	2.48	2.32	2.43	2.50	2.42	2.47	2.53	2.40	2.44	2.60
4	M	6.09	6.12	6.14	5.80	5.62	5.72	5.24	5.51	5.14	4.96	4.89	5.01	4.81	4.80	4.65	5.08	4.97	4.78	4.73	4.85	4.68	4.82	4.75	4.66
	F	3.83	3.75	3.84	3.70	3.66	3.74	3.58	3.48	3.55	3.40	3.35	3.45	3.15	3.28	3.15	3.13	3.20	3.26	3.13	3.16	3.19	3.03	3.14	3.29
5	M	3.39	3.98	3.60	3.59	3.50	3.38	3.33	3.38	3.08	3.04	3.06	3.11	2.96	2.72	2.80	2.83	3.06	2.75	2.77	2.89	2.70	2.72	2.77	2.68
	F	2.32	2.40	2.24	2.28	2.16	2.26	2.25	2.19	2.09	1.87	2.02	2.06	1.93	1.88	1.82	1.83	2.01	1.77	1.76	1.88	1.88	1.80	1.87	1.74
6	M	3.62	3.68	3.88	3.70	3.52	3.51	3.29	3.19	3.00	3.03	2.85	2.93	2.74	2.63	2.52	2.69	2.76	2.58	2.49	2.49	2.56	2.55	2.57	2.43
	F	2.50	2.42	2.42	2.43	2.24	2.29	2.23	2.13	2.09	1.97	1.90	2.05	1.82	1.88	1.78	1.84	1.84	1.80	1.67	1.80	1.68	1.64	1.76	1.55
7	M	5.57	5.97	5.49	5.64	5.41	4.72	4.54	4.13	4.24	4.01	4.01	3.90	3.59	3.72	3.59	3.74	3.65	3.48	3.53	3.36	3.37	3.25	3.21	3.20
	F	3.00	3.18	3.04	3.04	3.00	2.86	2.95	2.73	2.54	2.48	2.42	2.35	2.33	2.32	2.12	2.23	2.31	2.18	2.03	1.96	1.99	2.00	1.85	1.91
8	M	4.00	3.86	4.02	3.90	3.75	3.60	3.61	3.21	3.18	3.18	3.01	3.10	2.83	2.82	2.74	2.60	2.60	2.57	2.50	2.50	2.43	2.43	2.59	2.40
	F	2.57	2.46	2.55	2.42	2.50	2.36	2.12	2.22	2.17	2.03	1.93	1.92	1.90	1.88	1.71	1.82	1.75	1.66	1.69	1.56	1.63	1.59	1.70	1.68
9	M	4.70	4.84	4.74	4.80	4.57	4.48	4.50	4.40	4.18	3.93	3.84	3.92	3.92	3.82	3.62	3.80	3.63	3.81	3.73	3.62	3.52	3.79	3.75	3.63
	F	2.86	3.15	3.09	3.08	3.04	2.77	2.89	2.79	2.79	2.75	2.65	2.70	2.61	2.56	2.49	2.50	2.61	2.50	2.56	2.38	2.48	2.48	2.45	2.52
10	M	6.70	6.60	6.92	6.99	6.54	6.49	6.01	6.78	6.31	5.87	5.88	5.96	5.75	5.52	5.61	5.82	5.62	5.72	5.82	5.50	5.66	5.60	5.64	5.43
	F	4.23	4.14	4.32	4.31	3.97	3.89	4.05	4.13	3.82	3.97	3.68	3.47	3.68	3.65	3.27	3.71	3.52	3.58	3.64	3.52	3.61	3.77	3.82	3.51
11	M	5.17	4.90	4.84	4.73	4.71	4.36	4.64	4.33	4.13	3.98	4.14	3.89	3.99	3.96	3.82	3.92	3.92	3.58	3.56	3.52	3.71	3.64	3.71	3.59
	F	3.14	3.20	3.10	3.29	2.87	2.93	2.85	2.76	2.82	2.65	2.79	2.63	2.60	2.59	2.58	2.61	2.49	2.55	2.54	2.47	2.43	2.42	2.53	2.56
12	M	6.45	6.32	6.83	6.29	6.26	6.15	5.79	5.84	5.58	5.45	5.07	5.26	4.87	4.96	4.99	5.03	4.93	4.86	5.17	4.76	4.99	4.81	4.77	4.97
	F	3.68	3.88	3.83	3.87	3.77	3.73	3.55	3.54	3.50	3.56	3.43	3.38	2.95	3.29	3.33	3.09	3.21	3.27	3.40	3.06	3.16	3.22	3.41	3.39
13	M	7.01	6.84	6.85	6.76	6.99	6.21	6.28	6.74	6.48	6.23	6.28	6.28	6.62	5.79	5.94	6.26	6.35	6.34	5.87	6.08	6.12	6.30	6.38	6.11
	F	3.87	4.08	4.02	4.28	4.20	3.86	3.86	3.74	3.78	3.93	3.81	4.05	3.96	4.09	3.84	3.92	4.09	4.14	4.05	4.25	3.78	4.26	4.03	4.28
14	M	6.02	6.26	6.14	5.77	6.17	5.96	5.46	5.83	5.75	5.32	5.29	5.83	5.85	5.18	5.28	5.28	5.23	5.29	5.90	5.90	5.38	5.75	5.96	5.89
	F	3.61	3.40	3.73	3.84	3.97	3.50	3.34	3.71	3.58	3.69	3.56	3.89	3.37	3.55	3.79	3.34	3.54	3.43	3.70	3.85	3.66	3.75	4.06	3.74
ON	**M**	**5.18**	**5.31**	**5.22**	**5.13**	**5.00**	**4.80**	**4.65**	**4.60**	**4.41**	**4.24**	**4.18**	**4.21**	**4.05**	**3.94**	**3.87**	**4.00**	**3.95**	**3.89**	**3.84**	**3.81**	**3.78**	**3.82**	**3.83**	**3.74**
	F	**3.16**	**3.23**	**3.23**	**3.20**	**3.13**	**3.02**	**2.98**	**2.93**	**2.86**	**2.79**	**2.75**	**2.76**	**2.64**	**2.65**	**2.55**	**2.61**	**2.61**	**2.57**	**2.54**	**2.49**	**2.49**	**2.48**	**2.54**	**2.54**

[1]*LHIN numbers:* **1)** Erie St. Clair; **2)** South West; **3)** Waterloo Wellington; **4)** Hamilton Niagara Haldimand Brant; **5)** Central West; **6)** Mississauga Halton; **7)** Toronto Central; **8)** Central; **9)** Central East; **10)** South East; **11)** Champlain; **12)** North Simcoe Muskoka; **13)** North East; **14)** North West. **ON** = all Ontario.

Table 3.3.3. Cumulative age-standardized premature mortality rates (total deaths per 1000) by LHIN, sex and era, Ontario, 1992-2015.

		Total premature deaths per 1000 (age-standardized)			Relative premature mortality risk (95%CI)[1]	
LHIN	**Sex**	**1992-1999**	**2000-2007**	**2008-2015**	**2000-2007**	**2008-2015**
Erie St. Clair	M	47.5	38.3	32.4	0.806 (0.785 - 0.829)	0.684 (0.664 - 0.703)
	F	26.7	24.4	21.3	0.912 (0.880 - 0.945)	0.797 (0.768 - 0.827)
South West	M	44.7	36.5	31.5	0.818 (0.799 - 0.838)	0.706 (0.689 - 0.724)
	F	25.4	23.0	20.0	0.905 (0.877 - 0.933)	0.788 (0.763 - 0.813)
Waterloo Wellington	M	40.6	31.8	27.3	0.783 (0.760 - 0.807)	0.671 (0.651 - 0.691)
	F	23.3	20.8	18.2	0.892 (0.858 - 0.927)	0.781 (0.751 - 0.811)
Hamilton Niagara Haldimand Brant	M	43.7	36.6	32.2	0.839 (0.822 - 0.855)	0.738 (0.723 - 0.753)
	F	25.7	23.1	20.3	0.896 (0.874 - 0.919)	0.791 (0.771 - 0.812)
Central West	M	34.1	26.3	21.9	0.770 (0.745 - 0.795)	0.642 (0.621 - 0.663)
	F	21.0	16.9	14.3	0.806 (0.774 - 0.840)	0.682 (0.655 - 0.711)
Mississauga Halton	M	32.1	23.9	19.6	0.745 (0.725 - 0.766)	0.610 (0.593 - 0.628)
	F	19.8	15.8	12.9	0.797 (0.769 - 0.825)	0.651 (0.629 - 0.675)
Toronto Central	M	45.8	33.7	27.2	0.737 (0.722 - 0.752)	0.594 (0.581 - 0.607)
	F	23.7	19.3	15.8	0.812 (0.790 - 0.835)	0.664 (0.645 - 0.684)
Central	M	31.2	23.7	18.8	0.760 (0.743 - 0.778)	0.601 (0.587 - 0.616)
	F	18.9	15.0	12.0	0.791 (0.768 - 0.814)	0.636 (0.617 - 0.655)
Central East	M	37.9	30.1	25.8	0.794 (0.777 - 0.810)	0.681 (0.667 - 0.696)
	F	22.5	19.4	16.8	0.860 (0.838 - 0.883)	0.745 (0.726 - 0.765)
South East	M	47.6	39.3	34.2	0.825 (0.799 - 0.852)	0.718 (0.695 - 0.742)
	F	28.2	24.1	21.6	0.855 (0.821 - 0.891)	0.766 (0.735 - 0.798)
Champlain	M	40.5	31.9	25.5	0.787 (0.770 - 0.805)	0.630 (0.616 - 0.645)
	F	24.1	20.5	17.1	0.852 (0.828 - 0.876)	0.711 (0.691 - 0.732)
North Simcoe Muskoka	M	45.9	36.3	31.8	0.792 (0.764 - 0.822)	0.694 (0.669 - 0.720)
	F	26.2	22.8	20.4	0.871 (0.830 - 0.913)	0.781 (0.744 - 0.819)
North East	M	51.8	43.5	39.0	0.841 (0.819 - 0.863)	0.754 (0.733 - 0.774)
	F	29.5	26.6	25.1	0.901 (0.870 - 0.934)	0.850 (0.821 - 0.881)
North West	M	49.3	43.0	39.6	0.872 (0.837 - 0.909)	0.802 (0.768 - 0.836)
	F	28.8	27.6	25.6	0.959 (0.908 - 1.012)	0.888 (0.840 - 0.938)
All Ontario	**M**	**41.2**	**32.5**	**27.2**	**0.787 (0.782 - 0.793)**	**0.66 0(0.656 - 0.665)**
	F	**23.9**	**20.4**	**17.4**	**0.854 (0.847 - 0.862)**	**0.730 (0.723 - 0.736)**

[1]Relative risks use the 1992-1999 era as a reference period. For methodology, refer to the technical appendix.

Table 3.3.4: Annual age-standardized premature mortality rates (deaths per 1000 per year) by LHIN and sex, Ontario, 1992 to 2015.

LHIN[1] and sex		Premature deaths per 1000 per year (age-standardized)																							
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	M	6.36	6.80	6.01	5.99	5.98	5.81	5.47	5.53	5.32	5.02	4.95	4.87	4.82	4.68	4.48	4.49	4.41	4.38	4.19	4.21	4.22	3.92	3.84	3.73
	F	3.54	3.58	3.50	3.09	3.51	3.27	3.24	3.24	3.05	3.17	3.20	3.06	3.04	2.92	2.94	3.15	2.86	2.92	2.80	2.65	2.56	2.59	2.55	2.58
2	M	5.90	5.86	5.95	5.75	5.51	5.59	5.20	5.16	4.91	4.75	4.77	4.93	4.34	4.43	4.37	4.31	4.12	4.28	4.03	3.99	3.90	4.01	3.88	3.74
	F	3.15	3.24	3.34	3.30	3.28	3.01	3.06	3.15	3.01	2.79	2.97	2.96	2.81	2.92	2.79	2.90	2.74	2.57	2.60	2.42	2.46	2.46	2.51	2.48
3	M	5.19	5.71	5.24	5.21	5.27	4.95	4.88	4.64	4.55	4.34	4.29	4.10	4.03	3.65	3.74	3.76	3.65	3.65	3.69	3.44	3.37	3.42	3.19	3.20
	F	3.22	2.97	3.08	3.06	2.80	2.78	2.84	2.87	2.64	2.89	2.80	2.70	2.72	2.46	2.50	2.32	2.38	2.43	2.32	2.33	2.36	2.15	2.17	2.29
4	M	5.94	5.92	5.87	5.50	5.34	5.41	4.95	5.21	4.87	4.72	4.63	4.72	4.52	4.51	4.31	4.63	4.46	4.25	4.11	4.17	3.95	4.01	3.89	3.73
	F	3.45	3.31	3.34	3.22	3.17	3.24	3.12	3.07	3.12	2.99	2.95	3.05	2.77	2.86	2.74	2.71	2.73	2.74	2.61	2.58	2.55	2.38	2.44	2.51
5	M	4.48	5.04	4.55	4.46	4.33	4.12	3.96	4.04	3.64	3.57	3.56	3.55	3.37	3.04	3.10	3.04	3.28	2.87	2.85	2.92	2.68	2.64	2.64	2.54
	F	2.90	2.93	2.68	2.70	2.54	2.64	2.60	2.51	2.39	2.12	2.30	2.31	2.13	2.10	1.98	1.98	2.12	1.85	1.81	1.88	1.86	1.74	1.76	1.62
6	M	4.37	4.34	4.54	4.26	4.03	4.00	3.76	3.60	3.38	3.40	3.16	3.26	3.03	2.85	2.69	2.83	2.89	2.65	2.52	2.49	2.46	2.42	2.41	2.24
	F	2.81	2.69	2.64	2.64	2.42	2.46	2.38	2.27	2.24	2.10	2.02	2.17	1.92	1.97	1.85	1.89	1.85	1.81	1.65	1.74	1.60	1.54	1.60	1.40
7	M	6.40	6.76	6.15	6.21	5.99	5.26	5.04	4.62	4.74	4.52	4.49	4.35	3.94	4.07	3.88	4.01	3.92	3.67	3.68	3.44	3.44	3.25	3.17	3.12
	F	3.07	3.22	3.06	3.03	2.98	2.88	2.97	2.79	2.61	2.59	2.53	2.43	2.40	2.39	2.17	2.26	2.33	2.21	2.02	1.95	1.94	1.95	1.77	1.83
8	M	4.43	4.22	4.29	4.13	3.94	3.76	3.77	3.37	3.33	3.33	3.15	3.23	2.93	2.91	2.80	2.63	2.60	2.54	2.43	2.41	2.30	2.26	2.39	2.16
	F	2.69	2.53	2.58	2.42	2.48	2.35	2.10	2.20	2.16	2.05	1.94	1.92	1.89	1.88	1.69	1.78	1.69	1.59	1.61	1.46	1.49	1.43	1.51	1.47
9	M	5.12	5.18	4.97	4.99	4.72	4.58	4.57	4.44	4.20	3.94	3.82	3.87	3.84	3.73	3.51	3.64	3.40	3.54	3.42	3.25	3.11	3.28	3.19	2.99
	F	2.90	3.11	3.01	2.96	2.92	2.64	2.74	2.65	2.64	2.60	2.50	2.54	2.44	2.38	2.30	2.28	2.36	2.23	2.25	2.06	2.08	2.05	1.99	2.00
10	M	6.13	6.00	6.23	6.33	5.92	5.82	5.34	5.97	5.56	5.15	5.08	5.10	4.90	4.68	4.68	4.79	4.60	4.57	4.57	4.26	4.31	4.15	4.11	3.92
	F	3.70	3.59	3.73	3.73	3.37	3.29	3.42	3.51	3.23	3.39	3.13	2.93	3.07	3.07	2.70	2.95	2.81	2.82	2.81	2.71	2.72	2.80	2.72	2.42
11	M	5.75	5.47	5.30	5.14	5.09	4.68	4.96	4.61	4.38	4.19	4.30	4.02	4.02	3.97	3.76	3.78	3.71	3.33	3.24	3.18	3.27	3.16	3.14	2.95
	F	3.20	3.24	3.13	3.31	2.88	2.93	2.86	2.76	2.83	2.65	2.76	2.60	2.54	2.52	2.48	2.45	2.30	2.32	2.28	2.18	2.10	2.05	2.09	2.10
12	M	6.15	5.98	6.37	5.86	5.83	5.66	5.33	5.32	5.11	5.00	4.61	4.78	4.42	4.46	4.45	4.43	4.29	4.20	4.34	3.93	4.11	3.82	3.72	3.82
	F	3.24	3.41	3.33	3.44	3.36	3.31	3.17	3.12	3.11	3.17	3.03	2.97	2.59	2.86	2.90	2.63	2.71	2.71	2.75	2.42	2.49	2.50	2.58	2.51
13	M	7.11	6.86	6.78	6.65	6.78	5.99	5.91	6.28	5.94	5.64	5.60	5.57	5.75	5.01	5.06	5.24	5.22	5.23	4.78	4.84	4.86	4.94	4.88	4.56
	F	3.76	3.88	3.77	4.02	3.89	3.55	3.51	3.37	3.36	3.46	3.29	3.46	3.36	3.44	3.19	3.20	3.27	3.29	3.18	3.27	2.92	3.21	2.98	3.11
14	M	6.43	6.66	6.41	6.01	6.46	6.16	5.61	5.94	5.84	5.39	5.34	5.84	5.77	5.03	5.12	4.92	4.77	4.89	5.37	5.17	4.79	4.95	5.02	5.06
	F	3.64	3.40	3.71	3.80	3.95	3.44	3.32	3.64	3.53	3.65	3.50	3.77	3.25	3.41	3.54	3.08	3.18	3.08	3.35	3.28	3.12	3.24	3.55	3.09
ON	**M**	**5.60**	**5.67**	**5.50**	**5.36**	**5.21**	**4.97**	**4.79**	**4.72**	**4.52**	**4.33**	**4.25**	**4.25**	**4.05**	**3.93**	**3.81**	**3.86**	**3.76**	**3.66**	**3.55**	**3.47**	**3.39**	**3.36**	**3.31**	**3.16**
	F	**3.15**	**3.17**	**3.14**	**3.10**	**3.02**	**2.90**	**2.87**	**2.83**	**2.76**	**2.70**	**2.66**	**2.65**	**2.53**	**2.53**	**2.41**	**2.42**	**2.40**	**2.33**	**2.28**	**2.19**	**2.15**	**2.12**	**2.12**	**2.09**

[1]*LHIN numbers:* **1)** Erie St. Clair; **2)** South West; **3)** Waterloo Wellington; **4)** Hamilton Niagara Haldimand Brant; **5)** Central West; **6)** Mississauga Halton; **7)** Toronto Central; **8)** Central; **9)** Central East; **10)** South East; **11)** Champlain; **12)** North Simcoe Muskoka; **13)** North East; **14)** North West. **ON** = all Ontario.

Table 3.4.1. Cumulative premature mortality rates (total deaths per 1000), with relative risks and 95% confidence intervals, by LHIN, sex, socioeconomic status quintile (Q) and era, Ontario, 1992-2015.

			Total deaths per 1000			Relative premature mortality risk (95%CI)[2]	
LHIN	Sex	Q[1]	1992-1999	2000-2007	2008-2015	2000-2007	2008-2015
Erie St. Clair	M	1	36.5	30.7	28.1	0.842 (0.777 - 0.912)	0.771 (0.711 - 0.835)
		2	42.3	34.4	33.9	0.814 (0.762 - 0.868)	0.802 (0.751 - 0.855)
		3	46.9	42.1	35.7	0.897 (0.845 - 0.953)	0.760 (0.714 - 0.810)
		4	51.1	46.9	42.2	0.917 (0.866 - 0.971)	0.825 (0.778 - 0.876)
		5	55.7	38.7	47.7	0.695 (0.658 - 0.733)	0.856 (0.813 - 0.902)
	F	1	22.0	19.8	19.8	0.900 (0.812 - 0.996)	0.897 (0.812 - 0.991)
		2	24.8	24.5	20.6	0.988 (0.911 - 1.073)	0.830 (0.763 - 0.903)
		3	30.6	28.8	24.5	0.939 (0.871 - 1.013)	0.801 (0.740 - 0.866)
		4	30.8	31.3	28.9	1.017 (0.946 - 1.094)	0.938 (0.871 - 1.011)
		5	35.2	26.3	34.3	0.747 (0.698 - 0.800)	0.974 (0.913 - 1.039)
South West	M	1	33.2	26.7	28.2	0.805 (0.747 - 0.868)	0.852 (0.794 - 0.915)
		2	41.4	35.5	33.9	0.857 (0.811 - 0.905)	0.819 (0.776 - 0.865)
		3	44.0	40.2	37.0	0.913 (0.870 - 0.959)	0.840 (0.799 - 0.882)
		4	47.4	40.8	39.3	0.860 (0.821 - 0.901)	0.830 (0.792 - 0.869)
		5	49.8	41.7	46.8	0.837 (0.792 - 0.884)	0.940 (0.891 - 0.991)
	F	1	21.0	18.9	19.4	0.902 (0.823 - 0.989)	0.924 (0.846 - 1.008)
		2	24.9	22.8	22.1	0.913 (0.851 - 0.979)	0.888 (0.828 - 0.952)
		3	27.9	26.8	23.5	0.960 (0.903 - 1.020)	0.844 (0.793 - 0.899)
		4	30.1	27.2	27.0	0.901 (0.850 - 0.954)	0.896 (0.846 - 0.949)
		5	31.6	29.3	31.7	0.930 (0.868 - 0.995)	1.003 (0.938 - 1.073)
Waterloo Wellington	M	1	28.5	22.2	19.8	0.779 (0.725 - 0.838)	0.694 (0.647 - 0.744)
		2	34.5	29.4	26.2	0.853 (0.798 - 0.912)	0.758 (0.709 - 0.811)
		3	39.1	32.6	33.8	0.834 (0.780 - 0.893)	0.865 (0.810 - 0.925)
		4	41.4	32.8	34.7	0.790 (0.738 - 0.847)	0.837 (0.782 - 0.895)
		5	41.3	34.2	35.5	0.828 (0.765 - 0.896)	0.859 (0.795 - 0.928)
	F	1	18.1	14.8	13.8	0.820 (0.749 - 0.897)	0.767 (0.704 - 0.836)
		2	20.8	20.9	18.5	1.002 (0.923 - 1.087)	0.889 (0.819 - 0.966)
		3	25.4	22.0	23.6	0.864 (0.794 - 0.940)	0.928 (0.855 - 1.007)
		4	26.3	22.0	24.1	0.838 (0.769 - 0.914)	0.918 (0.844 - 0.999)
		5	25.1	24.6	25.0	0.979 (0.887 - 1.080)	0.994 (0.903 - 1.096)
Hamilton Niagara Haldimand Brant	M	1	32.3	25.8	24.4	0.799 (0.755 - 0.845)	0.756 (0.716 - 0.799)
		2	37.9	35.6	32.1	0.940 (0.897 - 0.985)	0.848 (0.809 - 0.89)
		3	45.1	39.6	35.7	0.878 (0.841 - 0.916)	0.790 (0.756 - 0.825)
		4	50.8	41.5	40.9	0.817 (0.782 - 0.853)	0.804 (0.770 - 0.839)
		5	58.3	47.7	52.6	0.818 (0.790 - 0.847)	0.902 (0.872 - 0.933)
	F	1	19.6	17.5	16.7	0.891 (0.831 - 0.956)	0.851 (0.795 - 0.911)
		2	24.0	23.6	22.6	0.985 (0.929 - 1.045)	0.942 (0.888 - 0.999)
		3	29.2	25.5	23.3	0.873 (0.827 - 0.921)	0.798 (0.756 - 0.843)
		4	33.0	29.4	27.3	0.890 (0.845 - 0.938)	0.827 (0.784 - 0.872)
		5	37.4	32.0	34.4	0.856 (0.820 - 0.894)	0.919 (0.881 - 0.958)

			Total deaths per 1000			Relative premature mortality risk (95%CI)[2]	
LHIN	Sex	Q[1]	1992-1999	2000-2007	2008-2015	2000-2007	2008-2015
Central West	M	1	25.2	26.0	20.2	1.031 (0.928 - 1.146)	0.799 (0.721 - 0.886)
		2	26.3	26.6	18.3	1.013 (0.938 - 1.093)	0.697 (0.646 - 0.752)
		3	26.7	18.9	20.4	0.709 (0.657 - 0.764)	0.765 (0.713 - 0.821)
		4	31.7	22.2	25.9	0.699 (0.651 - 0.751)	0.816 (0.762 - 0.873)
		5	29.0	24.7	27.1	0.853 (0.787 - 0.925)	0.933 (0.862 - 1.011)
	F	1	16.0	17.3	13.8	1.082 (0.949 - 1.232)	0.863 (0.76 - 0.980)
		2	16.5	17.1	11.6	1.035 (0.941 - 1.139)	0.705 (0.641 - 0.776)
		3	17.5	12.8	13.0	0.730 (0.665 - 0.801)	0.741 (0.678 - 0.809)
		4	18.7	13.4	17.0	0.716 (0.652 - 0.785)	0.907 (0.831 - 0.990)
		5	20.0	17.4	19.6	0.870 (0.789 - 0.959)	0.978 (0.889 - 1.076)
Mississauga Halton	M	1	24.3	21.4	15.7	0.879 (0.831 - 0.929)	0.647 (0.612 - 0.684)
		2	27.7	20.0	19.2	0.722 (0.680 - 0.766)	0.693 (0.654 - 0.735)
		3	29.7	21.2	22.4	0.712 (0.669 - 0.758)	0.753 (0.708 - 0.801)
		4	35.3	25.9	27.3	0.734 (0.679 - 0.794)	0.772 (0.715 - 0.834)
		5	30.0	23.6	27.4	0.787 (0.710 - 0.872)	0.914 (0.828 - 1.008)
	F	1	16.4	14.7	10.7	0.897 (0.839 - 0.959)	0.655 (0.613 - 0.700)
		2	17.9	13.5	12.9	0.756 (0.704 - 0.813)	0.723 (0.674 - 0.777)
		3	18.7	14.4	14.8	0.767 (0.710 - 0.829)	0.791 (0.733 - 0.853)
		4	22.6	17.4	17.6	0.771 (0.701 - 0.849)	0.780 (0.708 - 0.858)
		5	21.6	17.4	19.8	0.806 (0.717 - 0.906)	0.918 (0.821 - 1.026)
Toronto Central	M	1	36.1	23.3	18.5	0.644 (0.613 - 0.678)	0.512 (0.486 - 0.539)
		2	39.9	26.6	24.4	0.667 (0.626 - 0.710)	0.612 (0.574 - 0.653)
		3	40.9	30.3	25.2	0.742 (0.700 - 0.788)	0.618 (0.580 - 0.657)
		4	42.8	35.8	29.5	0.836 (0.798 - 0.877)	0.688 (0.654 - 0.724)
		5	42.7	33.3	32.9	0.780 (0.751 - 0.810)	0.769 (0.740 - 0.799)
	F	1	20.4	15.6	12.3	0.763 (0.716 - 0.812)	0.604 (0.566 - 0.643)
		2	22.8	15.7	14.6	0.690 (0.635 - 0.748)	0.642 (0.592 - 0.697)
		3	23.1	18.4	16.2	0.796 (0.737 - 0.860)	0.703 (0.649 - 0.761)
		4	24.5	21.6	17.0	0.883 (0.828 - 0.940)	0.695 (0.649 - 0.744)
		5	25.8	20.6	19.7	0.798 (0.760 - 0.838)	0.761 (0.723 - 0.800)
Central	M	1	26.5	22.1	15.7	0.834 (0.792 - 0.879)	0.594 (0.564 - 0.626)
		2	26.1	19.5	18.1	0.748 (0.709 - 0.790)	0.693 (0.657 - 0.730)
		3	30.1	21.1	19.3	0.701 (0.663 - 0.742)	0.643 (0.607 - 0.680)
		4	32.9	24.1	22.0	0.735 (0.696 - 0.775)	0.668 (0.633 - 0.706)
		5	33.4	27.6	27.6	0.824 (0.784 - 0.866)	0.825 (0.784 - 0.868)
	F	1	17.4	14.8	10.7	0.851 (0.799 - 0.906)	0.614 (0.577 - 0.653)
		2	16.5	13.2	12.2	0.797 (0.747 - 0.851)	0.735 (0.689 - 0.784)
		3	17.9	14.5	12.7	0.809 (0.754 - 0.867)	0.708 (0.660 - 0.760)
		4	21.6	15.6	14.5	0.724 (0.679 - 0.774)	0.674 (0.631 - 0.720)
		5	21.7	17.0	17.6	0.785 (0.738 - 0.835)	0.810 (0.762 - 0.861)

			Total deaths per 1000			Relative premature mortality risk (95%CI)[2]	
LHIN	Sex	Q[1]	1992-1999	2000-2007	2008-2015	2000-2007	2008-2015
Central East	M	1	28.0	27.8	21.1	0.992 (0.929 - 1.060)	0.753 (0.705 - 0.803)
		2	32.2	26.1	26.0	0.812 (0.770 - 0.855)	0.809 (0.769 - 0.852)
		3	36.7	33.5	29.6	0.914 (0.875 - 0.955)	0.808 (0.772 - 0.845)
		4	37.8	30.0	29.8	0.793 (0.761 - 0.827)	0.788 (0.755 - 0.821)
		5	43.1	31.4	36.5	0.728 (0.698 - 0.760)	0.848 (0.813 - 0.883)
	F	1	19.1	18.3	14.8	0.957 (0.883 - 1.037)	0.775 (0.717 - 0.838)
		2	19.4	17.8	17.4	0.921 (0.862 - 0.983)	0.899 (0.843 - 0.958)
		3	23.3	22.4	19.5	0.960 (0.909 - 1.013)	0.838 (0.793 - 0.886)
		4	24.5	20.2	20.7	0.827 (0.785 - 0.870)	0.844 (0.802 - 0.888)
		5	27.4	22.2	24.7	0.810 (0.770 - 0.853)	0.900 (0.856 - 0.946)
South East	M	1	43.4	29.7	36.5	0.684 (0.614 - 0.761)	0.843 (0.762 - 0.932)
		2	43.9	41.3	39.1	0.942 (0.876 - 1.012)	0.892 (0.830 - 0.958)
		3	47.6	41.9	43.6	0.881 (0.823 - 0.943)	0.916 (0.857 - 0.979)
		4	56.7	51.4	45.2	0.907 (0.854 - 0.964)	0.797 (0.749 - 0.848)
		5	61.9	56.8	56.5	0.917 (0.866 - 0.971)	0.912 (0.861 - 0.965)
	F	1	27.6	19.7	21.3	0.714 (0.627 - 0.814)	0.770 (0.679 - 0.874)
		2	28.0	25.9	25.6	0.927 (0.847 - 1.015)	0.914 (0.836 - 0.999)
		3	29.6	26.5	28.5	0.896 (0.823 - 0.976)	0.963 (0.886 - 1.047)
		4	32.9	33.2	28.1	1.008 (0.934 - 1.087)	0.855 (0.790 - 0.925)
		5	39.5	33.7	38.4	0.854 (0.795 - 0.918)	0.974 (0.909 - 1.044)
Champlain	M	1	26.7	22.6	21.6	0.847 (0.805 - 0.892)	0.809 (0.770 - 0.850)
		2	34.3	29.0	26.4	0.846 (0.803 - 0.892)	0.768 (0.728 - 0.810)
		3	37.3	31.1	30.2	0.832 (0.788 - 0.878)	0.808 (0.765 - 0.852)
		4	44.2	38.5	34.2	0.873 (0.827 - 0.921)	0.775 (0.733 - 0.819)
		5	49.7	43.0	42.1	0.865 (0.824 - 0.907)	0.847 (0.807 - 0.889)
	F	1	17.2	15.4	14.7	0.894 (0.840 - 0.951)	0.854 (0.805 - 0.907)
		2	23.0	19.3	18.0	0.840 (0.789 - 0.895)	0.785 (0.736 - 0.837)
		3	21.3	20.4	20.8	0.957 (0.893 - 1.025)	0.974 (0.910 - 1.042)
		4	28.0	26.0	23.8	0.928 (0.868 - 0.992)	0.849 (0.793 - 0.908)
		5	33.7	29.0	29.2	0.862 (0.813 - 0.914)	0.867 (0.818 - 0.919)
North Simcoe Muskoka	M	1	38.3	25.5	29.6	0.664 (0.578 - 0.764)	0.771 (0.678 - 0.878)
		2	43.8	35.2	35.7	0.802 (0.741 - 0.867)	0.814 (0.754 - 0.878)
		3	49.0	40.1	36.4	0.818 (0.764 - 0.877)	0.742 (0.692 - 0.795)
		4	50.5	45.7	45.4	0.903 (0.844 - 0.967)	0.898 (0.840 - 0.961)
		5	58.5	45.5	51.5	0.777 (0.708 - 0.853)	0.880 (0.804 - 0.962)
	F	1	20.3	14.4	18.0	0.711 (0.587 - 0.862)	0.885 (0.741 - 1.057)
		2	26.1	21.8	23.5	0.834 (0.753 - 0.924)	0.901 (0.818 - 0.994)
		3	29.7	26.2	26.8	0.882 (0.808 - 0.962)	0.902 (0.827 - 0.982)
		4	29.7	31.5	28.7	1.061 (0.974 - 1.156)	0.966 (0.886 - 1.053)
		5	37.7	29.2	36.0	0.776 (0.690 - 0.872)	0.955 (0.855 - 1.066)

			Total deaths per 1000			Relative premature mortality risk (95%CI)[2]	
LHIN	Sex	Q[1]	1992-1999	2000-2007	2008-2015	2000-2007	2008-2015
North East	M	1	37.8	34.0	32.9	0.901 (0.793 - 1.025)	0.870 (0.766 - 0.989)
		2	41.6	29.1	36.9	0.698 (0.627 - 0.777)	0.887 (0.802 - 0.982)
		3	46.6	43.0	42.6	0.923 (0.860 - 0.991)	0.913 (0.851 - 0.980)
		4	51.2	47.3	48.5	0.923 (0.877 - 0.971)	0.947 (0.901 - 0.996)
		5	59.0	61.3	58.3	1.039 (1.001 - 1.079)	0.987 (0.950 - 1.026)
	F	1	24.7	17.0	22.9	0.687 (0.578 - 0.816)	0.929 (0.794 - 1.087)
		2	25.8	20.8	27.9	0.808 (0.707 - 0.922)	1.081 (0.954 - 1.224)
		3	26.4	29.4	27.3	1.115 (1.019 - 1.221)	1.036 (0.945 - 1.136)
		4	29.1	29.2	31.0	1.003 (0.938 - 1.073)	1.067 (0.999 - 1.140)
		5	36.7	38.4	39.5	1.044 (0.994 - 1.096)	1.076 (1.025 - 1.130)
North West	M	1	31.1	31.1	28.7	1.000 (0.811 - 1.233)	0.922 (0.748 - 1.137)
		2	31.5	29.6	35.8	0.940 (0.814 - 1.086)	1.139 (0.992 - 1.308)
		3	42.4	40.2	43.1	0.947 (0.860 - 1.044)	1.016 (0.923 - 1.118)
		4	48.6	44.4	43.0	0.914 (0.843 - 0.991)	0.884 (0.814 - 0.960)
		5	60.5	51.2	54.7	0.847 (0.784 - 0.914)	0.903 (0.838 - 0.974)
	F	1	18.4	15.6	15.7	0.849 (0.635 - 1.133)	0.854 (0.643 - 1.134)
		2	20.0	19.0	21.7	0.949 (0.789 - 1.141)	1.085 (0.907 - 1.297)
		3	25.2	27.6	27.1	1.097 (0.970 - 1.241)	1.076 (0.949 - 1.218)
		4	29.5	30.2	31.3	1.023 (0.922 - 1.134)	1.059 (0.956 - 1.174)
		5	38.2	33.8	37.1	0.887 (0.804 - 0.978)	0.972 (0.883 - 1.070)
All Ontario	**M**	**1**	**29.7**	**24.3**	**20.9**	**0.818 (0.803 - 0.833)**	**0.704 (0.691 - 0.717)**
		2	**34.5**	**28.0**	**26.1**	**0.812 (0.799 - 0.826)**	**0.757 (0.744 - 0.77)**
		3	**39.2**	**31.9**	**29.8**	**0.815 (0.802 - 0.828)**	**0.760 (0.749 - 0.772)**
		4	**43.7**	**35.4**	**34.2**	**0.810 (0.798 - 0.822)**	**0.781 (0.770 - 0.793)**
		5	**47.6**	**39.1**	**41.5**	**0.821 (0.810 - 0.833)**	**0.873 (0.861 - 0.885)**
	F	**1**	**18.7**	**16.2**	**14.1**	**0.865 (0.845 - 0.885)**	**0.754 (0.738 - 0.771)**
		2	**21.4**	**18.5**	**17.4**	**0.867 (0.849 - 0.886)**	**0.812 (0.795 - 0.829)**
		3	**24.2**	**21.1**	**19.6**	**0.870 (0.853 - 0.887)**	**0.812 (0.796 - 0.828)**
		4	**27.0**	**23.3**	**22.6**	**0.865 (0.849 - 0.881)**	**0.839 (0.823 - 0.854)**
		5	**30.3**	**25.7**	**27.7**	**0.849 (0.834 - 0.863)**	**0.913 (0.898 - 0.929)**

[2]Q = Socioeconomic status (SES) quintile. SES is derived from Ontario Marginalization Index (ON-MARG) material deprivation quintiles and assigned at dissemination area level. See technical appendix for more details.

[2]Relative risks use the 1992-1999 era as a reference period. For methodology, refer to the technical appendix.

Table 3.4.2: Annual premature mortality rates (deaths per 1000 per year) by LHIN, sex and socioeconomic status quintile (Q), Ontario, 1992 to 2015.

LHIN[1] and sex		Q[2]	Premature deaths per 1000 per year																							
			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	M	1	4.83	5.61	4.65	4.72	4.81	4.18	4.73	3.46	3.20	3.83	3.92	3.93	4.03	3.61	3.41	3.81	3.36	3.64	4.10	3.44	3.58	2.94	3.85	3.44
		2	5.31	6.32	4.93	5.12	6.40	4.95	4.96	4.75	5.24	4.01	4.17	4.18	4.13	4.13	3.74	3.87	4.87	4.52	4.03	4.07	4.29	3.84	3.88	4.38
		3	6.29	6.89	6.08	5.97	5.49	5.98	5.21	5.58	5.15	5.54	5.38	4.77	4.95	4.81	4.77	4.19	4.43	4.10	4.18	4.87	4.96	4.13	4.62	4.42
		4	7.43	6.99	6.42	6.34	6.53	6.18	5.64	5.93	6.40	5.39	5.43	5.33	5.82	5.05	4.66	5.18	4.81	5.65	5.43	5.42	5.18	5.52	5.24	4.99
		5	6.69	7.54	7.39	7.12	6.25	7.05	6.42	7.32	5.98	6.20	5.66	6.28	5.27	5.79	5.95	6.02	5.81	5.88	5.68	5.97	6.34	6.41	5.78	5.91
	F	1	2.95	2.85	2.75	2.70	2.69	2.98	2.38	2.95	2.32	2.40	2.45	1.93	2.47	2.51	2.44	2.77	2.49	2.59	2.43	2.42	2.31	2.47	2.53	2.68
		2	3.35	3.20	3.20	3.15	3.45	3.08	2.66	3.03	3.25	3.16	3.06	3.32	2.90	2.70	2.65	2.74	2.52	2.76	2.66	2.48	2.91	2.29	2.40	2.60
		3	3.97	4.09	4.08	3.43	4.19	3.67	4.08	3.32	3.85	3.36	3.33	3.71	3.37	2.78	3.36	3.31	2.90	3.03	3.24	3.24	3.03	3.07	2.90	3.14
		4	3.95	4.00	4.08	3.30	4.09	3.48	4.02	3.96	3.10	3.52	4.04	3.44	3.57	3.48	3.79	3.90	3.71	3.86	3.67	3.38	3.69	3.67	3.83	3.31
		5	4.62	5.08	4.72	4.02	4.52	4.32	4.16	3.96	3.66	4.46	4.00	3.93	3.77	3.92	3.69	4.59	4.36	4.40	4.14	4.19	3.70	4.37	4.50	4.73
2	M	1	4.55	4.20	4.05	4.41	4.14	4.19	4.12	3.76	3.50	3.52	3.63	3.94	3.35	3.74	3.78	3.70	3.68	3.75	3.64	3.57	3.23	3.52	3.95	3.16
		2	5.44	6.02	5.30	5.33	5.16	5.05	5.01	4.62	4.41	4.70	4.00	4.06	4.37	4.78	4.19	4.59	3.92	4.27	3.84	4.35	4.11	4.57	4.43	4.73
		3	5.56	5.43	5.92	5.82	5.23	6.05	4.90	5.26	5.36	5.02	5.21	5.24	4.72	4.31	4.16	4.10	4.43	5.10	4.47	4.90	4.77	4.58	4.57	4.58
		4	6.67	6.33	6.23	5.61	5.92	5.57	5.87	5.55	5.04	5.29	5.21	5.32	5.01	4.69	5.24	5.05	4.87	4.76	4.74	4.91	4.89	5.45	4.95	5.09
		5	6.15	5.89	6.95	6.87	6.58	6.59	5.30	5.83	5.77	4.70	5.73	6.28	4.96	5.75	5.75	6.15	5.81	6.15	6.08	5.47	5.92	5.96	5.57	5.96
	F	1	2.72	2.45	2.95	3.11	2.89	2.39	2.52	2.10	2.48	2.43	2.58	2.64	2.35	2.77	2.49	2.89	2.35	2.31	2.47	2.47	2.22	2.40	2.73	2.58
		2	3.07	3.10	3.08	3.25	3.58	3.07	3.03	2.95	3.07	2.68	2.98	2.70	2.48	2.73	2.90	3.00	3.07	2.75	2.82	2.61	2.73	2.80	2.60	2.95
		3	3.41	3.54	3.85	3.58	3.57	3.18	3.50	3.30	3.18	3.04	2.82	3.33	3.05	3.31	2.97	3.47	3.07	2.52	2.98	2.76	2.79	3.08	3.26	3.28
		4	3.68	3.90	3.86	3.69	3.56	3.86	3.64	4.01	3.43	3.17	3.68	3.40	3.61	3.43	3.42	3.19	3.49	3.41	3.49	3.39	3.29	3.30	3.38	3.47
		5	3.93	3.76	4.14	4.37	3.87	3.45	3.78	4.16	4.05	3.70	4.01	4.10	3.96	4.04	3.86	4.07	3.92	4.36	3.80	3.30	3.91	3.89	4.33	4.27
3	M	1	3.84	3.63	3.63	3.99	3.47	3.29	3.37	3.53	3.16	3.17	2.81	3.06	2.72	2.67	2.72	2.83	2.18	2.62	2.73	2.30	2.29	2.61	2.65	2.65
		2	4.14	4.66	4.10	5.01	4.52	4.07	4.16	3.99	3.77	3.67	3.74	3.57	3.33	2.67	3.17	3.22	3.41	3.31	3.64	2.89	3.65	3.23	3.45	2.91
		3	4.78	5.47	5.12	4.57	4.98	5.06	4.85	4.50	4.85	4.63	4.53	4.18	4.45	3.43	3.74	4.24	4.65	3.98	4.15	4.31	3.92	4.09	3.96	4.86
		4	4.96	6.19	5.29	5.14	5.43	5.06	5.24	4.45	4.73	4.60	4.87	4.36	4.28	4.55	4.21	4.35	4.24	4.44	4.33	4.60	4.40	4.99	4.04	4.09
		5	5.02	5.71	5.55	4.60	5.69	5.46	4.87	5.04	4.65	4.24	4.48	4.36	4.73	4.55	4.30	4.26	4.61	5.01	4.57	4.86	4.30	4.21	4.18	4.24
	F	1	2.80	2.35	2.37	2.35	1.89	1.92	2.27	2.26	1.92	2.27	2.13	1.78	2.04	1.65	1.86	1.74	1.67	1.80	1.70	1.80	1.71	1.87	1.68	1.79
		2	2.73	2.68	2.78	2.59	2.69	2.72	2.30	2.51	2.43	2.73	2.42	2.64	2.53	2.13	2.37	2.09	2.53	2.19	2.39	2.21	2.48	1.85	2.48	2.62
		3	3.26	3.06	3.14	3.63	3.05	3.04	3.09	3.28	2.73	2.79	2.93	3.02	3.28	2.63	2.79	2.43	2.92	2.81	2.97	2.73	3.12	2.98	2.94	3.16
		4	3.38	3.54	3.34	3.05	3.52	3.41	3.22	3.06	2.85	3.16	3.05	2.93	3.02	3.05	2.91	3.01	3.01	3.26	2.64	3.43	2.92	2.84	2.98	3.24
		5	2.91	2.99	3.83	3.39	2.41	2.79	3.71	3.35	3.49	3.52	3.59	3.32	2.59	3.21	3.00	3.03	2.75	3.36	3.24	2.98	3.48	3.33	3.06	3.19

LHIN[1] and sex		Q[2]	Premature deaths per 1000 per year																							
			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
4	M	1	4.20	3.54	4.55	4.24	3.85	4.06	3.97	4.08	3.75	3.27	3.30	3.23	3.50	3.34	3.02	3.36	3.08	3.30	3.19	3.01	3.06	2.80	3.18	2.96
		2	5.40	4.87	4.88	5.16	4.67	4.49	4.17	4.50	4.49	4.39	4.00	4.52	4.07	4.10	4.09	4.24	4.38	3.98	3.64	3.90	3.95	4.23	4.33	3.84
		3	5.76	5.69	6.07	5.84	5.33	5.94	5.46	5.27	5.07	4.84	4.96	4.71	4.99	4.72	4.46	4.88	4.25	4.61	4.36	4.94	4.35	4.60	4.36	4.45
		4	6.55	7.07	7.13	5.94	6.19	6.11	6.04	6.05	5.55	5.61	5.64	5.38	5.27	4.87	5.01	5.48	5.68	4.97	5.12	5.32	5.09	5.05	4.94	5.14
		5	7.67	8.28	7.49	7.02	7.36	7.28	6.16	7.14	6.31	6.19	6.18	6.65	5.72	6.23	6.08	6.83	6.84	6.33	6.70	6.69	6.45	6.86	6.40	6.58
	F	1	2.81	2.45	2.73	2.30	2.52	2.32	2.36	2.33	2.34	2.58	2.13	2.36	2.29	2.19	2.14	2.14	1.96	2.14	2.31	2.18	2.10	2.09	2.01	2.06
		2	2.92	2.91	3.41	3.24	3.02	3.11	2.54	2.85	3.02	2.88	2.73	2.65	2.41	2.83	2.90	3.01	2.97	2.82	2.77	2.78	2.65	2.83	2.77	3.09
		3	3.77	4.08	3.60	3.41	3.73	3.75	3.31	3.59	3.25	3.23	3.26	3.56	2.98	3.18	2.76	2.67	2.78	2.96	2.96	3.04	3.03	2.83	2.78	2.99
		4	4.21	4.07	4.18	4.45	4.02	4.13	4.39	3.53	4.32	4.01	3.75	3.91	3.41	3.96	3.53	3.47	3.90	3.89	2.91	3.33	3.49	3.08	3.32	3.54
		5	4.83	4.57	4.74	4.58	4.39	4.81	4.76	4.70	4.45	4.08	4.39	4.52	4.20	3.92	4.04	4.03	4.23	4.25	4.33	4.19	4.36	4.15	4.56	4.51
5	M	1	3.03	4.12	3.36	3.16	2.80	2.88	3.21	2.85	2.34	2.51	3.04	2.41	2.57	2.09	2.54	2.68	2.72	2.51	2.77	2.21	2.25	2.77	2.68	2.44
		2	3.14	3.65	3.79	3.67	3.27	3.01	3.00	3.07	3.28	2.67	2.97	2.70	2.56	3.01	2.55	2.29	2.48	2.27	2.32	2.52	2.29	2.34	2.17	2.30
		3	3.38	3.57	3.10	3.41	3.66	3.45	3.19	3.23	3.24	2.80	2.96	3.19	2.65	2.41	2.27	2.40	2.83	2.46	2.51	2.69	2.73	2.26	2.71	2.42
		4	3.61	4.38	4.46	3.81	4.07	3.95	3.55	4.02	3.02	3.88	3.34	4.15	3.51	2.71	3.47	3.21	3.77	3.05	3.10	3.61	3.02	3.12	3.02	3.49
		5	3.75	4.26	3.17	3.85	3.49	3.59	3.68	3.61	3.27	3.36	3.10	3.26	3.21	3.35	3.15	3.79	3.46	3.74	3.39	3.33	3.09	3.64	3.61	3.00
	F	1	1.85	2.05	2.00	1.89	1.89	2.07	2.19	2.00	2.14	1.46	1.79	1.71	1.38	1.54	1.62	1.79	1.82	1.48	1.35	1.78	1.93	1.83	1.94	1.79
		2	2.27	1.85	2.44	2.28	1.87	1.89	2.09	2.02	1.85	1.84	1.79	1.79	1.77	1.80	1.60	1.81	1.45	1.14	1.36	1.70	1.64	1.46	1.70	1.34
		3	2.03	2.57	1.97	2.34	1.99	2.41	2.33	2.09	2.10	1.83	1.72	2.52	1.85	1.74	1.60	1.60	1.79	1.79	1.65	1.67	1.64	1.67	1.45	1.47
		4	2.78	2.46	2.05	2.19	2.65	2.41	2.12	2.29	2.13	2.16	2.31	2.18	1.96	1.83	1.96	1.92	2.33	2.00	2.04	2.06	2.14	2.14	2.30	2.14
		5	2.47	2.99	2.74	2.56	2.38	2.46	2.35	2.46	2.14	1.93	2.62	2.23	2.51	2.52	2.36	2.21	2.93	2.53	2.58	2.51	2.39	2.10	2.38	2.42
6	M	1	3.09	3.32	3.49	3.15	2.97	2.93	2.84	2.86	2.47	2.78	2.47	2.41	2.37	2.28	2.22	2.15	2.05	2.06	1.94	1.88	2.25	2.02	2.02	1.81
		2	3.65	3.28	3.99	3.87	3.54	3.34	3.40	3.03	2.87	3.12	2.57	2.87	2.65	2.48	2.54	2.63	2.63	2.57	2.44	2.54	2.26	2.35	2.22	2.53
		3	3.74	3.90	4.09	3.84	4.13	4.11	3.18	3.08	3.38	3.10	3.01	3.27	2.88	2.84	2.58	2.94	3.04	2.53	2.98	2.61	2.83	2.93	3.18	2.50
		4	4.45	4.54	4.45	4.73	4.18	4.50	4.44	4.08	3.85	3.35	4.05	3.96	3.18	3.58	2.85	3.75	3.68	3.71	3.27	3.66	3.07	3.29	3.29	3.76
		5	3.91	4.91	3.99	3.42	3.18	3.71	3.30	4.30	3.64	3.48	3.70	3.44	3.27	2.46	3.06	2.85	4.28	3.53	2.74	3.15	3.55	3.64	3.64	3.14
	F	1	2.32	2.25	2.07	2.46	2.04	1.98	1.78	1.78	1.82	1.73	1.74	1.79	1.59	1.54	1.53	1.43	1.56	1.47	1.39	1.51	1.33	1.20	1.27	1.22
		2	2.12	2.24	2.41	2.22	2.01	2.20	2.56	2.37	2.13	1.85	1.77	1.98	1.68	1.74	1.82	1.74	1.81	1.64	1.65	1.59	1.59	1.68	1.77	1.38
		3	2.46	2.21	2.39	2.55	2.22	2.45	2.31	2.31	2.34	2.30	1.92	2.24	1.86	2.02	1.63	1.97	1.82	1.86	1.78	2.05	1.89	1.83	1.99	1.75
		4	3.42	2.98	3.12	2.74	2.79	2.93	2.46	2.45	2.41	2.27	2.37	2.69	2.26	2.48	2.39	2.37	2.30	2.38	2.01	2.15	2.16	2.07	2.46	2.24
		5	3.20	3.65	2.97	2.21	2.98	2.59	2.70	2.00	2.31	2.21	2.42	2.31	2.34	2.28	2.14	2.71	2.51	2.89	2.16	2.64	2.41	2.47	2.50	2.45

LHIN[1] and sex		Q[2]	Premature deaths per 1000 per year																							
			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
7	M	1	4.83	5.78	4.90	4.81	4.78	4.02	3.57	3.24	3.39	3.32	2.97	3.13	2.92	3.03	3.06	2.55	2.70	2.47	2.32	2.34	2.35	2.13	2.41	2.09
		2	5.53	5.79	5.33	5.13	4.85	4.46	4.56	4.08	3.99	3.70	3.98	3.88	3.18	3.23	3.29	3.38	3.44	3.10	3.31	3.23	2.97	3.05	2.99	2.71
		3	5.62	5.84	5.66	5.69	5.48	4.47	4.65	3.67	4.04	4.20	3.85	3.54	3.63	3.59	3.03	3.44	3.45	3.41	3.50	3.26	3.33	3.14	2.82	2.76
		4	5.73	5.60	5.42	6.11	5.50	5.12	5.09	4.34	4.51	4.21	4.35	4.18	3.34	3.62	3.85	4.12	3.90	3.93	3.96	3.56	3.54	3.56	3.58	3.69
		5	5.72	6.32	5.70	5.65	5.40	4.92	4.59	4.66	4.70	4.22	4.46	4.35	4.21	4.34	4.05	4.53	4.25	4.05	4.32	4.15	4.25	4.05	3.79	4.24
	F	1	2.62	2.99	2.35	2.49	2.52	2.53	2.44	2.45	2.38	2.27	2.21	1.83	1.86	1.78	1.83	1.92	1.89	1.69	1.48	1.57	1.52	1.72	1.36	1.35
		2	2.94	2.63	2.86	3.14	3.10	2.54	2.80	2.77	1.93	2.30	2.02	2.17	2.32	2.18	1.77	2.03	1.96	2.05	1.78	1.96	1.80	1.71	1.80	1.80
		3	3.08	2.67	3.09	2.92	3.21	2.78	2.96	2.43	2.67	2.07	2.07	2.25	2.34	2.18	2.13	2.32	2.31	2.10	2.14	1.97	1.97	1.94	2.05	1.96
		4	3.27	3.35	3.11	3.07	2.84	2.98	3.22	2.66	2.57	2.34	2.57	2.39	2.35	2.55	2.25	2.56	2.46	2.31	2.45	2.06	2.01	2.16	1.88	1.90
		5	3.03	3.68	3.49	3.25	3.14	3.18	3.16	3.08	2.82	2.92	2.78	2.85	2.64	2.78	2.40	2.39	2.64	2.68	2.44	2.30	2.53	2.35	2.27	2.55
8	M	1	3.29	3.27	3.46	3.34	3.43	3.22	3.27	2.96	2.68	2.70	2.50	2.67	2.23	2.54	2.23	2.11	2.11	2.07	1.92	1.95	2.01	2.07	2.19	1.85
		2	3.49	3.73	3.70	3.62	3.28	3.16	2.96	2.61	2.73	2.66	2.64	2.87	2.71	2.57	2.52	2.27	2.26	2.34	2.34	2.26	2.42	2.37	2.31	2.05
		3	4.45	3.72	4.15	4.11	3.71	3.64	3.65	3.13	3.27	2.97	2.81	2.90	2.51	2.57	2.52	2.56	2.64	2.42	2.36	2.51	2.05	2.43	2.52	2.62
		4	4.37	4.26	4.27	4.44	4.38	3.77	3.94	3.67	3.79	3.74	3.42	3.68	3.24	2.96	3.00	2.94	2.78	2.91	2.76	2.62	2.68	2.67	2.81	2.87
		5	4.53	4.39	4.62	4.03	4.13	4.13	4.29	3.75	3.62	4.00	3.95	3.70	3.59	3.62	3.72	3.52	3.64	3.55	3.65	3.73	3.42	2.95	3.64	3.32
	F	1	2.22	2.38	2.46	2.06	2.22	2.03	1.99	2.07	1.90	1.77	1.64	1.58	1.74	1.53	1.45	1.57	1.55	1.34	1.34	1.35	1.33	1.27	1.41	1.33
		2	2.28	2.14	2.35	2.04	2.35	2.08	1.65	1.91	2.13	1.98	1.74	1.82	1.84	1.66	1.48	1.63	1.71	1.63	1.53	1.39	1.49	1.48	1.60	1.52
		3	2.55	2.45	2.28	2.48	2.32	2.02	2.08	2.01	2.04	1.81	2.04	2.01	1.78	1.92	1.73	1.86	1.57	1.67	1.69	1.42	1.64	1.45	1.68	1.70
		4	2.73	2.55	2.88	3.09	3.02	2.68	2.27	2.54	2.36	2.37	2.30	2.28	2.03	2.09	1.92	1.94	1.88	1.75	1.88	1.72	1.80	1.80	1.77	2.02
		5	2.99	2.78	2.78	2.59	2.63	2.97	2.66	2.57	2.50	2.33	2.16	2.22	2.21	2.36	2.17	2.28	2.19	2.13	2.34	2.15	2.15	2.27	2.34	2.21
9	M	1	3.34	3.60	3.76	3.32	3.67	3.49	3.56	3.57	3.23	2.94	3.12	3.21	3.37	3.33	2.70	3.12	2.66	2.72	3.19	2.76	2.48	2.67	2.64	2.41
		2	4.03	4.13	3.94	4.47	4.05	4.26	3.61	4.04	3.58	3.44	2.98	3.25	3.67	3.08	3.36	3.40	3.19	3.64	3.29	3.19	3.05	3.47	3.22	3.36
		3	4.42	4.75	4.90	5.02	4.79	4.26	4.62	4.06	4.56	3.82	3.98	3.88	4.08	4.10	4.14	3.80	3.77	3.84	3.47	3.66	3.71	3.70	3.81	3.96
		4	5.25	4.79	4.84	4.97	4.60	4.64	4.57	4.50	4.58	4.19	4.28	4.18	3.76	3.79	3.61	3.88	3.73	3.82	3.56	3.70	3.50	4.10	4.00	3.66
		5	5.60	6.18	5.39	5.38	5.14	5.07	5.56	5.11	4.14	4.59	4.32	4.46	4.36	4.48	3.90	4.52	4.40	4.66	4.83	4.50	4.51	4.66	4.76	4.47
	F	1	2.23	2.45	2.25	2.37	2.69	2.40	2.53	2.26	2.25	1.84	2.01	2.19	2.03	2.07	2.08	2.12	1.78	1.89	1.81	2.11	1.93	1.76	1.97	1.85
		2	2.43	2.49	2.38	2.63	2.40	2.27	2.55	2.44	2.44	2.34	2.52	2.23	2.09	2.31	2.17	2.16	2.33	2.11	2.28	2.05	2.24	2.24	2.23	2.15
		3	2.73	2.80	2.92	3.25	3.11	2.86	3.02	2.79	3.03	2.80	2.75	2.63	2.61	2.58	2.39	2.74	2.63	2.32	2.58	2.29	2.42	2.39	2.50	2.61
		4	2.94	3.65	3.39	3.09	3.15	2.70	2.84	2.94	2.69	2.92	2.82	3.08	2.62	2.64	2.54	2.34	2.84	2.62	2.66	2.39	2.52	2.62	2.42	2.74
		5	3.50	3.80	3.87	3.47	3.41	3.28	3.16	3.20	3.15	3.33	2.84	3.04	3.28	2.92	3.01	2.97	3.13	3.30	3.22	2.97	3.05	3.14	2.99	3.04

LHIN[1] and sex		Q[2]	Premature deaths per 1000 per year																							
			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
10	M	1	6.35	5.14	6.12	5.69	5.63	5.18	4.55	5.45	4.83	4.51	4.56	6.07	4.86	5.05	4.45	4.22	5.27	3.78	4.83	4.38	4.45	4.77	4.29	4.87
		2	5.33	5.61	5.65	5.94	5.23	5.10	5.06	6.03	5.61	5.01	5.55	5.08	4.62	4.28	4.62	5.70	4.50	4.37	5.26	5.12	5.33	4.78	5.01	4.99
		3	5.82	6.40	5.98	6.34	6.57	6.00	4.94	5.88	5.68	5.24	4.93	5.15	5.83	5.83	5.39	5.50	5.54	5.94	5.58	4.82	5.31	5.38	6.14	5.43
		4	7.24	7.10	7.83	7.86	6.97	7.00	5.87	7.03	6.28	6.10	6.34	5.71	5.62	5.30	5.21	5.53	5.18	6.12	6.29	6.17	6.11	5.41	5.09	5.14
		5	7.91	7.39	7.77	7.88	7.26	7.78	8.30	8.19	7.64	7.27	6.92	7.69	7.35	6.75	7.76	7.58	7.41	7.69	6.94	6.80	6.85	7.54	7.07	6.64
	F	1	3.97	3.62	3.77	3.18	2.53	3.55	3.12	4.07	3.38	3.20	2.66	2.71	3.28	2.74	3.19	3.70	2.41	2.39	3.19	2.72	2.73	2.77	2.35	2.88
		2	3.25	3.47	3.66	3.74	3.62	3.30	3.01	3.94	3.35	3.32	2.93	3.25	2.70	3.36	2.92	3.51	3.60	3.18	3.10	3.27	3.31	3.31	2.95	3.07
		3	3.84	3.22	4.19	4.33	3.39	3.41	3.76	3.70	3.60	3.83	3.69	3.03	3.44	3.74	2.96	3.44	3.78	3.50	3.62	3.92	3.32	3.39	3.47	3.70
		4	4.42	4.45	4.23	4.34	3.89	3.63	4.17	4.01	3.80	4.05	3.88	3.67	4.38	3.86	3.00	3.34	3.38	3.88	3.45	3.47	3.60	3.54	4.32	2.68
		5	5.05	5.16	5.07	4.68	4.91	5.06	5.17	4.51	4.40	4.68	4.30	4.16	4.49	4.30	4.22	4.42	4.25	4.63	4.58	4.02	4.85	5.56	5.72	5.03
11	M	1	3.80	3.58	3.28	3.35	3.75	3.21	3.08	2.96	2.77	2.85	2.88	2.75	3.14	3.22	3.09	2.97	2.93	2.71	2.65	2.58	2.80	2.78	2.84	2.61
		2	4.59	4.35	4.64	4.60	4.00	4.05	4.18	3.97	3.45	3.66	3.66	3.58	3.91	3.27	3.66	3.33	3.74	3.25	3.28	3.33	3.26	3.38	3.21	3.25
		3	4.83	4.91	5.23	4.46	4.74	4.06	4.68	4.64	4.26	3.73	4.08	4.00	3.80	4.12	3.86	4.02	4.03	3.55	3.90	3.59	4.12	3.57	3.92	3.70
		4	6.13	5.66	5.55	5.67	5.37	5.44	5.47	5.00	5.04	4.75	5.41	4.71	4.53	4.67	4.23	4.68	4.74	3.87	3.94	4.23	4.90	4.31	4.19	4.36
		5	6.97	6.56	6.09	5.94	6.02	5.65	6.60	5.80	5.75	5.43	5.50	5.26	5.47	5.48	4.87	5.84	5.24	5.64	5.18	5.14	4.88	5.37	5.61	5.54
	F	1	2.12	2.32	2.26	2.52	2.20	1.92	1.97	2.00	2.05	1.92	1.95	1.94	2.05	2.14	2.03	2.00	2.00	1.92	1.87	1.64	1.93	1.84	1.80	1.92
		2	2.82	3.21	3.17	2.98	2.85	2.86	2.58	2.62	2.61	2.39	2.53	2.37	2.32	2.22	2.32	2.31	2.30	2.32	2.19	2.29	2.21	2.12	2.33	2.44
		3	2.83	3.04	2.86	2.69	2.57	2.34	2.69	2.43	2.62	2.61	2.63	2.69	2.70	2.39	2.76	2.63	2.22	2.73	2.87	2.69	2.69	2.71	2.56	2.45
		4	3.76	3.71	3.55	3.77	2.91	3.60	3.52	3.18	3.22	3.04	3.52	3.05	2.90	3.27	3.15	3.13	3.15	2.82	3.00	3.25	2.86	2.62	3.20	3.07
		5	4.58	4.12	3.94	4.58	3.93	4.42	4.00	3.93	3.87	3.84	3.80	3.55	3.64	3.62	3.36	3.79	3.45	3.89	3.74	3.81	3.07	3.55	3.98	3.98
12	M	1	4.70	5.54	6.29	5.16	4.38	4.19	4.40	3.59	3.35	3.84	2.95	3.62	3.76	3.65	4.26	3.71	4.24	3.53	3.87	3.41	4.08	3.67	3.68	3.52
		2	6.98	5.79	5.87	5.24	5.26	5.04	5.12	5.02	4.54	4.96	4.06	4.42	4.12	4.45	4.48	4.82	4.61	4.28	5.34	4.72	4.35	4.25	4.17	4.30
		3	5.78	5.60	7.31	6.06	7.27	6.26	5.85	5.36	5.43	5.80	5.37	4.87	5.03	5.37	4.80	4.40	4.09	4.40	4.75	4.22	4.47	4.77	4.92	4.97
		4	6.59	6.97	6.65	6.50	6.03	6.42	5.75	6.67	6.53	5.77	5.04	6.20	5.79	5.02	5.57	5.38	5.93	5.48	5.65	6.03	5.95	5.40	5.47	5.84
		5	6.68	8.31	7.95	8.04	6.69	7.96	6.44	6.92	5.54	6.12	7.52	7.19	5.67	6.44	6.01	7.28	6.51	7.51	6.16	5.31	7.03	6.41	5.86	7.24
	F	1	1.47	2.81	2.07	3.29	3.36	1.72	2.87	2.16	1.71	2.36	2.49	2.09	1.70	1.69	2.30	2.28	2.00	1.98	2.39	2.25	2.43	2.36	2.44	2.31
		2	3.22	3.43	3.25	3.00	3.45	3.86	3.00	3.00	2.98	2.92	2.35	2.83	2.59	3.06	3.09	2.35	2.66	3.15	3.13	2.65	2.85	2.79	3.12	3.31
		3	4.00	4.17	3.75	4.03	3.67	3.54	3.35	3.51	3.68	3.53	3.40	3.15	3.09	3.46	3.48	2.98	3.43	3.65	3.80	3.00	3.04	3.08	3.30	3.59
		4	3.43	4.12	4.36	3.92	3.73	3.78	3.47	3.70	3.48	4.27	4.30	3.81	3.69	3.89	3.40	4.12	4.00	3.59	3.24	3.64	3.23	3.49	4.14	3.67
		5	4.80	3.64	4.21	4.96	4.36	5.00	5.56	4.89	5.00	3.82	3.94	4.36	3.29	4.36	4.54	3.97	4.12	4.04	4.80	3.87	5.10	5.18	4.48	4.54

LHIN[1] and sex		Q[2]	Premature deaths per 1000 per year																							
			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
13	M	1	5.90	5.19	4.32	5.21	4.89	4.89	3.90	3.71	4.83	4.58	4.68	5.75	4.74	4.37	4.10	4.06	3.89	4.34	3.51	3.19	4.40	5.36	4.12	4.44
		2	5.05	5.11	5.85	5.71	4.96	4.79	5.06	5.88	3.87	5.55	4.51	3.89	4.62	4.49	3.74	5.48	5.15	4.72	4.43	5.19	4.59	5.06	4.25	4.27
		3	5.72	6.76	5.71	5.91	6.24	5.67	5.16	6.03	5.70	4.71	5.14	5.71	4.78	4.91	5.11	5.16	5.61	5.99	4.59	4.96	5.17	5.35	5.58	5.24
		4	6.14	6.39	6.75	6.73	6.67	5.90	5.74	6.92	6.17	5.87	6.13	5.91	6.48	5.89	5.49	5.54	6.23	6.15	5.50	6.31	5.99	6.02	6.34	6.06
		5	8.09	7.62	7.52	7.10	7.87	6.80	7.32	7.19	7.52	7.31	7.32	7.23	8.07	6.54	7.38	7.67	7.61	7.55	7.26	7.04	7.27	7.41	7.63	7.05
	F	1	3.65	3.00	3.18	2.84	3.10	2.82	3.15	2.89	2.54	2.36	2.11	2.97	1.76	2.04	2.73	1.94	2.65	3.67	3.08	2.56	2.68	2.32	3.59	2.58
		2	2.78	2.86	3.60	3.19	3.63	3.75	2.98	3.47	2.44	2.43	4.20	2.79	3.45	3.43	3.25	3.27	3.91	3.34	3.28	3.98	2.89	3.67	3.56	3.60
		3	2.85	3.58	3.12	3.55	3.76	3.09	3.44	3.15	3.35	3.89	3.37	3.86	3.28	3.28	3.33	3.64	3.11	3.68	3.21	3.31	2.74	3.67	3.86	3.74
		4	3.89	3.75	3.59	3.77	4.25	3.36	3.19	3.32	3.42	3.60	3.34	3.95	4.17	4.24	2.95	3.83	3.75	3.62	3.97	4.09	3.75	3.87	3.88	4.31
		5	4.29	4.71	4.66	5.15	4.60	4.65	4.61	4.26	4.51	4.40	4.38	4.58	4.58	4.75	4.98	4.78	4.99	4.99	4.84	5.20	4.77	5.35	4.51	5.05
14	M	1	5.09	3.71	3.23	2.91	5.25	4.32	3.77	3.32	6.30	4.75	3.52	3.44	4.44	4.51	3.86	4.44	2.02	4.56	2.96	3.21	3.82	2.83	4.18	5.27
		2	4.12	4.79	3.14	4.22	4.58	3.83	3.88	3.29	4.65	3.54	4.04	5.03	5.03	3.55	4.06	4.65	4.04	3.64	4.98	5.15	4.03	4.47	5.89	3.87
		3	4.77	5.37	6.22	4.55	4.89	5.62	4.81	6.23	4.69	4.93	4.14	5.55	5.37	4.30	5.52	4.56	4.95	5.52	5.50	6.42	4.85	5.40	5.84	5.10
		4	6.52	6.63	6.96	6.79	6.42	5.98	4.63	4.92	5.19	5.24	5.63	5.42	4.94	4.93	5.60	5.01	5.29	4.91	5.91	5.12	4.90	5.76	5.53	6.16
		5	7.79	8.47	6.91	6.66	7.91	7.70	7.26	8.18	7.50	6.88	7.00	6.78	7.88	7.09	5.86	6.56	6.64	6.34	6.97	6.99	7.26	6.84	6.92	7.06
	F	1	1.75	0.24	1.85	2.57	3.68	2.73	2.43	3.05	2.10	4.11	2.20	1.75	1.82	2.24	2.34	1.48	2.07	2.33	1.87	2.29	1.95	2.06	1.37	1.94
		2	2.71	2.45	3.46	2.15	3.41	1.47	2.39	2.17	2.65	2.61	2.10	2.59	2.86	3.97	2.89	2.14	3.43	2.82	2.23	3.74	2.06	2.80	2.53	2.34
		3	2.63	2.46	3.42	3.22	3.22	3.91	2.68	3.86	3.01	3.38	2.85	3.26	3.77	2.92	3.67	3.82	3.52	3.34	3.59	3.81	3.05	3.40	3.59	3.13
		4	4.37	3.86	3.66	4.42	3.59	3.41	3.11	3.31	3.64	3.23	3.78	3.92	2.71	3.53	3.70	3.52	3.32	3.59	4.51	3.33	4.52	3.84	4.72	3.68
		5	4.54	4.46	4.81	4.90	5.41	4.36	4.83	4.92	4.71	4.16	5.07	5.16	4.46	4.33	4.81	4.16	4.30	4.07	4.70	4.86	4.53	4.51	4.88	5.55
ON	**M**	**1**	**3.94**	**4.03**	**3.95**	**3.85**	**3.82**	**3.55**	**3.48**	**3.31**	**3.08**	**3.08**	**2.96**	**3.03**	**3.04**	**3.06**	**2.91**	**2.87**	**2.75**	**2.72**	**2.72**	**2.55**	**2.64**	**2.62**	**2.75**	**2.51**
		2	**4.58**	**4.65**	**4.53**	**4.65**	**4.34**	**4.12**	**4.02**	**3.96**	**3.80**	**3.70**	**3.52**	**3.62**	**3.53**	**3.35**	**3.36**	**3.45**	**3.43**	**3.33**	**3.31**	**3.32**	**3.26**	**3.33**	**3.27**	**3.21**
		3	**5.01**	**5.16**	**5.27**	**5.07**	**5.00**	**4.88**	**4.59**	**4.48**	**4.50**	**4.20**	**4.19**	**4.15**	**3.98**	**3.86**	**3.72**	**3.77**	**3.83**	**3.78**	**3.70**	**3.78**	**3.72**	**3.68**	**3.83**	**3.72**
		4	**5.80**	**5.79**	**5.76**	**5.65**	**5.49**	**5.28**	**5.12**	**5.11**	**4.95**	**4.76**	**4.82**	**4.76**	**4.39**	**4.19**	**4.21**	**4.39**	**4.41**	**4.30**	**4.23**	**4.37**	**4.23**	**4.37**	**4.24**	**4.32**
		5	**6.28**	**6.54**	**6.16**	**5.92**	**5.93**	**5.78**	**5.63**	**5.70**	**5.32**	**5.19**	**5.24**	**5.33**	**5.07**	**5.08**	**4.99**	**5.42**	**5.31**	**5.32**	**5.26**	**5.16**	**5.19**	**5.27**	**5.19**	**5.17**
	F	**1**	**2.47**	**2.49**	**2.42**	**2.44**	**2.36**	**2.23**	**2.22**	**2.21**	**2.13**	**2.06**	**2.00**	**1.94**	**1.98**	**1.93**	**1.94**	**1.97**	**1.87**	**1.82**	**1.80**	**1.80**	**1.78**	**1.76**	**1.77**	**1.76**
		2	**2.70**	**2.70**	**2.87**	**2.78**	**2.78**	**2.65**	**2.49**	**2.60**	**2.53**	**2.43**	**2.37**	**2.37**	**2.24**	**2.31**	**2.23**	**2.26**	**2.33**	**2.20**	**2.17**	**2.16**	**2.16**	**2.13**	**2.21**	**2.20**
		3	**3.08**	**3.12**	**3.12**	**3.16**	**3.09**	**2.93**	**2.99**	**2.87**	**2.88**	**2.75**	**2.68**	**2.85**	**2.61**	**2.58**	**2.46**	**2.57**	**2.48**	**2.47**	**2.55**	**2.45**	**2.42**	**2.43**	**2.48**	**2.50**
		4	**3.52**	**3.58**	**3.50**	**3.46**	**3.39**	**3.27**	**3.25**	**3.17**	**3.06**	**3.08**	**3.17**	**3.12**	**2.91**	**3.01**	**2.78**	**2.85**	**2.99**	**2.90**	**2.81**	**2.80**	**2.79**	**2.75**	**2.89**	**2.87**
		5	**3.86**	**3.97**	**3.96**	**3.86**	**3.69**	**3.77**	**3.74**	**3.61**	**3.52**	**3.46**	**3.44**	**3.47**	**3.37**	**3.39**	**3.30**	**3.40**	**3.45**	**3.56**	**3.47**	**3.35**	**3.39**	**3.50**	**3.53**	**3.61**

[1]*LHIN numbers:* **1)** Erie St. Clair; **2)** South West; **3)** Waterloo Wellington; **4)** Hamilton Niagara Haldimand Brant; **5)** Central West; **6)** Mississauga Halton; **7)** Toronto Central; **8)** Central; **9)** Central East; **10)** South East; **11)** Champlain; **12)** North Simcoe Muskoka; **13)** North East; **14)** North West.

[2]Q = Socioeconomic status (SES) quintile. SES is derived from Ontario Marginalization Index (ON-MARG) material deprivation quintiles and assigned at dissemination area level. See technical appendix for more details.

Table 3.4.3. Relative index of inequality (RII), by LHIN, sex and era, Ontario, 1992-2015.

		Relative Index of Inequality (RII)		
LHIN	**Sex**	**1992-1999**	**2000-2007**	**2008-2015**
Erie St. Clair	M	1.78	1.49	1.93
	F	2.01	1.53	2.21
South West	M	1.63	1.73	1.90
	F	1.78	1.81	1.97
Waterloo Wellington	M	1.75	1.92	2.26
	F	1.75	1.99	2.24
Hamilton Niagara Haldimand Brant	M	2.20	2.04	2.52
	F	2.31	2.11	2.36
Central West	M	1.48	1.21	1.96
	F	1.58	1.23	2.13
Mississauga Halton	M	1.67	1.51	2.30
	F	1.66	1.58	2.30
Toronto Central	M	1.23	1.56	1.91
	F	1.31	1.46	1.68
Central	M	1.53	1.64	2.01
	F	1.55	1.48	1.88
Central East	M	1.72	1.42	1.90
	F	1.76	1.53	1.86
South East	M	1.74	2.05	1.81
	F	1.70	1.91	2.02
Champlain	M	2.21	2.37	2.39
	F	2.27	2.37	2.42
North Simcoe Muskoka	M	1.72	2.06	2.04
	F	1.95	2.38	2.21
North East	M	1.77	2.54	2.06
	F	1.83	2.56	1.96
North West	M	2.65	2.14	2.06
	F	2.76	2.51	2.57
All Ontario	**M**	**1.94**	**2.09**	**2.43**
	F	**1.99**	**2.08**	**2.39**

Table 3.5.1. Cumulative amenable mortality rates (total deaths per 1000), by LHIN and sex, Ontario, 2006-2012.

		Total deaths per 1000	
LHIN	**Sex**	**Amenable to either public health or medical care**	**Amenable to neither public health nor medical care**
Erie St. Clair	M	16.9	17.2
	F	12.4	11.0
South West	M	15.5	17.3
	F	11.3	10.6
Waterloo Wellington	M	11.6	13.4
	F	8.75	8.43
Hamilton Niagara Haldimand Brant	M	16.3	17.6
	F	11.9	10.5
Central West	M	9.34	10.5
	F	6.50	6.44
Mississauga Halton	M	7.82	10.4
	F	6.09	6.31
Toronto Central	M	11.5	13.6
	F	7.28	7.69
Central	M	8.01	9.99
	F	5.75	6.05
Central East	M	12.0	13.9
	F	9.24	8.34
South East	M	19.7	20.2
	F	13.7	11.3
Champlain	M	12.4	13.8
	F	9.32	8.42
North Simcoe Muskoka	M	16.7	18.2
	F	12.3	10.3
North East	M	22.0	21.1
	F	15.7	12.5
North West	M	17.6	21.0
	F	13.4	12.1
All Ontario	**M**	**12.9**	**14.4**
	F	**9.30**	**8.62**