CANADIAN **PARTNERSHIP** AGAINST **CANCER**

PARTENARIAT CANADIEN CONTRE LE **CANCER**

SYSTEM
PERFORMANCE
REPORTS

Examining Disparities in Cancer Control

A SYSTEM PERFORMANCE SPECIAL FOCUS REPORT

FEBRUARY 2014

Examining Disparities in Cancer Control: A System Performance Special Focus Report

FEBRUARY 2014

This document has been made possible through a financial contribution from Health Canada, through the Canadian Partnership Against Cancer. The views expressed herein represent the views of the Canadian Partnership Against Cancer.

Suggested citation: Canadian Partnership Against Cancer (2014). *Examining Disparities in Cancer Control*: *A System Performance Special Focus Report*. Toronto, Canadian Partnership Against Cancer.

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Aussi offert en français sous le titre :
Examen des disparités en matière de lutte contre le cancer :
Rapport thématique spécial sur le rendement du système

Acknowledgments

The conceptualization and production of this report were made possible through the dedicated efforts of the members of the System Performance Steering Committee and Technical Working Group for System Performance and the considerable data collection efforts of staff from the 10 provincial cancer agencies and programs.

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The Canadian Partnership Against Cancer (the Partnership) would like to acknowledge Statistics Canada, in particular the Health Statistics Division, for providing access to data, vetting output and providing estimates of incidence, mortality and survival, as well as health determinants data from the Canadian Community Health Survey; the Canadian Breast Cancer Screening Initiative for providing screening program data; and the Canadian Institute for Health Information for providing and analyzing surgery data on mastectomy and colostomy.

The report was prepared by the System Performance and Surveillance team at the Partnership under the leadership of Dr. Heather Bryant, Vice-President, Cancer Control. The project lead for this report was Tonia Forte, Research Associate. The team included Rami Rahal, Director; Jose Hernandez, Program Manager; Kristen DeCaria, Research Associate; Sarah Zomer, Delivery Manager; Erna Mursel, Administrative Assistant; Gina Lockwood, Manager, Analytics & Surveillance and Senior Biostatistician; Cheryl Louzado, Specialist, Data Integration; Sharon Fung, Biostatistician; and analysts Julie Xu, Dan He and Jin Niu.

The System Performance team would like to thank Dr. Jon Kerner, Senior Scientific Lead for Population Health and Knowledge Management; Dr. Geoff Porter, Senior Scientific Lead for Diagnosis and Clinical Care and; the Cancer Control Directors at the Partnership for their review and input on drafts of this report. The System Performance team would like to thank Dr. Geoff Porter for the development of the technical specifications for the indicator on colostomy rates.

The System Performance team would also like to thank members of the Methodology Working Group for developing the methodology for the travel time analysis for the radiation treatment utilization and wait time indicators. Please see the Appendix for a list of members.

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Report Highlights

Examining Disparities in Cancer Control: A System Performance Special Focus Report *is part of the System Performance Special Focus Report series by the Canadian Partnership Against Cancer. The series focuses on specific topics or domains within the cancer control system, providing indicators and analyses that help highlight best practices and identify opportunities for system improvements across the country. This report focuses on equity by providing some objective, data-driven answers to the following question: To what extent are there disparities among Canadians in their risk of cancer, their access to cancer control services and their care outcomes, based on their income, whether they are immigrants or Canadian-born and whether they live in urban, rural or remote communities?*

Two of the pillars of the Canadian health-care system are *universality*, which according to the *Canada Health Act* requires that "all residents have access to public health care insurance and insured services on uniform terms and conditions," and *accessibility*, which according to the *Act* requires that "insured persons must have reasonable and uniform access to insured health services, free of financial or other barriers.[1] No one may be discriminated against on the basis of such factors as income, age, and health status." This report presents measurement and analysis of the impact of three factors commonly cited as barriers to access: low neighbourhood income level, residential rurality and remoteness, and individual immigrant status and neighbourhood immigrant density.

The goal of this report is to shed light on the extent to which indices of income, immigrant status and rurality/remoteness affect access to cancer control services in Canada. The report is not intended as a definitive treatise on this topic but rather as a source of objective data that can help in exploring some key questions. This report addresses the rates at which these populations get screened for cancer, get diagnosed at an early treatable stage, wait for treatment, receive treatment and are enrolled in clinical trials. In addition, the report examines the extent to which outcomes measured using incidence, mortality and survival vary across these sub-populations. Because potential factors for variations are not restricted to problems around access to health-care services, the report also examines the prevalence of risk factors such as smoking, alcohol consumption and obesity in the different population segments.

The results presented here confirm previous findings from similar studies both in Canada and other developed countries, but also highlight new information, including a number of novel and sometimes unexpected findings. As is the case with such studies, the results often lead to as many new questions as they answer. Some of the results highlights are provided below. Please note that owing to the different data sources for different indicators, some results are based on individual household income and immigrant status (CCHS-based indicators) while all others are based on area-level (neighbourhood) income and immigrant density.

Results Highlights

In a number of indicators, people from rural and remote areas do not have results that are different from those of people living in urban communities. One important example is in breast cancer and cervical cancer screening rates, which do not show an urban-rural trend. This finding may reflect efforts by provinces to focus promotion efforts in rural communities and, where feasible, to take mobile screening units to women living in remote areas. Another interesting finding is the limited variation in wait times for radiation therapy if radiation therapy is recommended: despite the fact that radiation treatment centres are typically located in large urban centres, the data presented in this report show that people in rural and remote communities do not wait longer to receive radiation therapy than their urban counterparts.

Similarly, there were no notable differences across neighbourhood income levels in wait times for radiation therapy, nor was there evidence that people living in lower-income neighbourhoods were less likely to receive radiation therapy than those living in higher-income neighbourhoods.

While the report presents evidence of equitable access in some indicators, there are many more examples pointing to important disparities. The report confirms that people with low household income and/or living in rural and remote areas start out at a disadvantage, with a higher cancer risk profile. This finding is reflected in the higher smoking rates and higher obesity rates (for women) among Canadians living in low-income households and in rural/remote areas.

While the established screening programs for breast and cervical cancer appear to have been successful in reaching rural communities, the colorectal cancer screening programs were too early in their implementation to be evaluated, given that 2008 was the latest available survey year at the time of data collection. In 2008, colorectal cancer screening rates were substantially lower for lower-income Canadians and for recent immigrants and marginally lower for those living in rural and remote communities. It will be interesting to see if future surveys begin to show a closing of those gaps as provincial programs are more fully rolled out.

Although wait times for radiation therapy did not vary across the population groups examined, the report suggests that women residing in low-income or rural/remote communities waited longer for their abnormal mammogram results to be resolved through subsequent diagnostics.

A prominent trend by neighbourhood income level and geography was the stage at diagnosis and relationship to mortality. The report's results suggest that people living in higher-income neighbourhoods are more likely to be diagnosed with breast and prostate cancer but that this does not seem to have a significant impact on mortality. While individuals living in higher-income neighbourhoods are more likely to be diagnosed with early-stage breast and prostate cancer, there was no difference across income levels in the rate of advanced-stage breast cancer. For prostate cancer, those from high-income neighbourhoods were slightly more likely to be diagnosed with advanced-stage disease. For prostate cancer, the data presented suggest that early detection through PSA testing does not seem to lower the likelihood of advanced-stage diagnosis or reduce mortality for men living in high-income neighbourhoods, who are also more likely to undergo PSA testing.

Results suggest disparities in radiation therapy utilization and cancer surgeries by geography. The percentage of rural/remote residents treated with radiation therapy is lower than that of urban residents. In addition, the radiation therapy utilization rate was lower among those who lived further from a radiation treatment facility. This finding is consistent with mastectomy rate patterns, which are higher in rural/remote areas, likely because of limited access to radiation therapy (typically required for breast-conserving therapy). While remoteness from radiation therapy centres may explain the geography variations, the income-level variations indicate that women from neighbourhoods with lower household incomes are more likely to have mastectomies than are women from higher-income neighbourhoods.

With respect to rectal surgery, people living in remote areas are more likely to receive a permanent colostomy than are those living in urban and rural communities. One possible explanation could be clinical decisions to avoid re-admissions associated with bowel dysfunction when opting against colostomies for people living far from the surgical centre.

No notable difference was seen in radiation therapy wait times and utilization by immigrant density; however, mastectomy and colostomy rates were lower among areas characterized as high immigrant density. The vast majority of new immigrants to Canada settle in larger metropolitan areas, where access to radiation therapy (for breast conserving therapy) and surgical centres is greatest.

The factors explaining differences in risk, access and outcomes between population groups are complex and multifaceted and may include age structure, employment rates, educational attainment, geographic barriers including distance, knowledge and awareness and personal health beliefs. Nevertheless it is hoped that the results presented in this report may help inform policy and healthcare system actions aimed at identifying strategies that can reduce disparities in access to quality health care, and reduce the burden of cancer for all in Canada, rich or poor, urban or rural dwelling, new immigrant or Canadian born.

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About the Canadian Partnership Against Cancer and System Performance

The Canadian Partnership Against Cancer (the Partnership) works with Canada's cancer community to reduce the burden of cancer through co-ordinated system-level change guided by the Canadian Cancer Control Strategy. Grounded in and informed by the experiences of those most affected by cancer, the organization plays a unique role, working with partners to support multi-jurisdictional uptake of the knowledge emerging from cancer research and best practices in order to optimize cancer control planning and drive improvements in quality of practice across the country. Partners include provincial and territorial cancer programs; federal organizations and agencies; First Nations, Métis, and Inuit organizations; national health and patient organizations; and individual experts who provide strategic cancer control insight and advice from both public and professional perspectives.

Through sustained effort and a focus on the full cancer continuum from prevention and treatment through to survivorship and end-of-life care, the Partnership supports the collective work of the broader cancer control community in achieving long-term outcomes that will directly affect the health of Canadians. This includes reduced incidence of cancer, less likelihood of Canadians dying from cancer and an enhanced quality of life for those affected by cancer.

Having objective measures of the performance of the cancer control systems across Canada helps identify best practices and opportunities for quality improvements. The Partnership's System Performance Initiative works with provincial/territorial and national partners to develop and report on pan-Canadian system performance indicators across the cancer control continuum. The System Performance Initiative produces annual reports that present performance indicators spanning the various dimensions of cancer control (prevention, screening, diagnosis, treatment, patient experience and end-of-life care, research and long-term outcomes), cancer sites and the Canadian population. In addition to the annual System Performance reports, the Partnership produces Special Focus and Spotlight reports that provide a detailed look at specific topics in cancer control. This report is part of the Special Focus series.

About this report

The *Canada Health Act* includes as two of its principles *universality*, which according to the *Act* requires that "all residents have access to public health care insurance and insured services on uniform terms and conditions," and *accessibility*, which according to the *Act* requires that "insured persons must have reasonable and uniform access to insured health services, free of financial or other barriers. No one may be discriminated against on the basis of such factors as income, age, and health status."[1]

A complete assessment of the effectiveness of the cancer control systems across Canada must include an evaluation of the extent to which these principles are upheld equitably across Canada and its diverse population. So what are the potential barriers that may hinder a Canadian's access to the same level of care that other Canadians receive? Three types of barriers have often been identified and studied when examining disparities in health-care access and outcomes in Canada:

- A person's socio-economic status, often measured as an individual's household income relative to that of the general population
- The location of a person's residence, particularly when that residence is in a rural or remote community that is distant from many specialized health-care services
- Immigration status, which involves a number of factors, including cultural and language barriers, lack of a family physician and limited knowledge of the workings of the Canadian health-care system, but also includes the health-care system's ability to respond effectively to the language and psychosocial needs of people from different cultural backgrounds

Examining Disparities in Cancer Control: A System Performance Special Focus Report provides measures of the extent to which income, immigrant status and rurality and remoteness affect access to cancer control services. The report also looks at variations in cancer risk and outcomes for the same population groups. Two factors influenced the decision to produce a system performance report on this topic. First, Health Canada has identified rural and remote health as a priority area and this work will support initiatives in that area.[2] Second, the Partnership's strategic plan for the next five years includes advancing cancer control for Canadians. Understanding variations among Canadian population groups is an important step in supporting this effort. Given these factors, the Steering Committee for System Performance, comprising representatives from the 10 provinces, identified the topic as the special focus for 2013.

This report is not meant to be a comprehensive review of the state of cancer control in Canada for low-income, rural and remote, and immigrant populations. Its primary objective is to present indicators that measure key aspects of quality and access for these populations where data are available. These indicators are meant to create a wider understanding of the extent of disparities in Canadian cancer care systems, shed light on opportunities for improvements and inform quality initiatives at the national and provincial levels. Indicators presented here for the first time at a pan-Canadian level for these populations include stage-specific incidence rates (estimated), radiation therapy utilization and wait times, surgery patterns for mastectomy and colostomy and clinical trial participation.

Why examine disparities in cancer control?

Canada ranks among the world's most prosperous nations[3] and the Canadian population is relatively healthy – almost two-thirds of Canadians (60%) report themselves to be in excellent or very good health.[4] Considerable progress has been made in cancer control in Canada over the past few decades, including a decline in the age-standardized[a] incidence and mortality rates of some of the most common cancers.[5] For example, the introduction of organized population-based screening programs for breast cancer has contributed to a reduction in breast cancer mortality,[5] largely as a result of earlier disease detection and more timely delivery of effective therapies. At the same time, tobacco control efforts in Canada have led to a drop in the prevalence of cigarette smoking, particularly in males, leading to declining lung cancer incidence and mortality rates.[6-7]

Despite this considerable progress, several studies have suggested that disparities in health outcomes and access to care persist among specific populations in Canada, including those living under conditions of low income, those residing in rural or remote areas and new immigrants. These disparities may arise across the cancer control continuum, from the prevalence of cancer risk factors to the use of cancer screening services to diagnosis and treatment. A number of factors may contribute to health disparities, presenting challenges unique to each population. For example, for Canadians living in rural or remote areas of the country, relative undersupply of primary care physicians may result in less screening.[8-10] For immigrant populations, language barriers and cultural beliefs and norms[11] may be barriers to access to care.[11]

Low income

Although the number of Canadians living below the low-income threshold[b] has fallen over the past decade, low income remains a significant challenge: three million Canadians (9.0%) had low incomes in 2010.[13] The association between socio-economic disadvantage and a number of health outcomes, including life expectancy, disability and hospitalization, and mortality, has been widely demonstrated in the scientific literature.[14-17] For example, a pan-Canadian report examining the link between socio-economic status (SES) and health among urban Canadians found that hospitalization rates for a range of acute and chronic conditions were higher in low-SES areas than in areas with average or high SES.[14]

A number of factors, including lack of education, poor living conditions, poor work environment and social exclusion,[18] can contribute to the poor health of low-income Canadians. Behaviours and lifestyle factors, such as smoking, heavy alcohol intake (alcohol binging) and physical inactivity, which have been shown to be more widespread among low-income individuals,[14] may also contribute to these disparities.

Rural and remote communities

Canadian data show that those who live in rural communities have, on average, poorer health than those who live in larger metropolitan areas.[19] Approximately nine million Canadians, or about 30% of the population, live in rural or remote areas.[20] A pan-Canadian report examining

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a) Age standardization is a method of eliminating the effect of differences in age when comparing information for different times, places or groups.

b) Statistics Canada's low-income cut-off is the income threshold below which a family will likely devote a larger share of its income to the necessities of food, shelter and clothing than the average family.[12]

the health of rural Canadians found that living in a rural area generally was a disadvantage for many health-related measures, compared with living in an urban area. For example, the prevalence of smoking and obesity were higher in rural than in urban areas and life expectancy at birth for males was significantly lower.[19]

A number of factors influence the health of rural or remote residents, including less access to primary care,[8] higher unemployment rates, lower levels of formal education and low SES.[20]

For Canadians living in rural or remote areas, the physical environment they live in can promote or encourage risky health behaviours and may account for some health disparities. For example, these residents may have less access to healthier foods and may consume fewer fruits and vegetables, which can lead to higher rates of overweight and obesity.[21] Distance to specialized health-care services may negatively affect access to care and influences the choice of cancer treatment.[22-23]

How are the territories addressed in this report?

Canada's three territories include an important proportion of Canadians defined as living in rural and remote communities. Wherever possible, data on Nunavut, the Northwest Territories and Yukon are included in the indicators in this report.

New immigrants

Another population in which disparities have been noted is new immigrants to Canada.[24] According to the 2006 census, one in five people in Canada (19.8%) was born outside Canada. Between 2001 and 2006, Canada's immigrant population increased by 13.6%, four times more than the Canadian-born population, which grew by 3.3% during the same period.[25]

Individuals newly immigrated to Canada have consistently shown a "healthy immigrant effect" – newly arriving immigrants are healthier than the native-born population.[26] The healthy immigrant effect has been attributed to a number of factors, including the medical screening that typically accompanies entry into a new country (because individuals are selected based on employability, education and language[27]) and the tendency of immigrants to have better health behaviours than already-resident Canadians, including typically lower rates of smoking and alcohol consumption,[28] although this can vary by gender.[29-30]

This health advantage appears to diminish the longer immigrants live here.[26] The decline has been attributed to persistent barriers to high-quality health-care services, particularly primary and preventive care, which may be due in part to the lack of the health-care system's ability to provide culturally and linguistically appropriate services essential in quality health care,[31] to environmental factors and to acculturation through the adoption of behaviours common in Canada that are deleterious to good health, such as smoking and drinking.[32]

Beyond this healthy immigrant effect, there are legitimate questions about the ability of newer immigrants to understand and successfully navigate the various parts of the health-care system. This may include, as examples, limited awareness of the availability and benefit of cancer screening programs and limited ability to understand prognosis and evaluate different treatment alternatives.

How are First Nations, Métis, and Inuit populations addressed in this report?

Improving First Nations, Métis, and Inuit cancer control with and for First Nations, Métis, and Inuit people is a strategic priority for the Canadian Partnership Against Cancer (the Partnership). Currently, there is no means to identify First Nations, Métis, and Inuit cancer patients in the cancer control system because this information is not recorded in cancer registries nor consistently in health care records.

In an effort to advance cancer control with and for First Nations, Métis, and Inuit populations, the Partnership is working with cancer and health systems, and their respective First Nations, Métis, and Inuit partners, to advance cancer control. An environmental scan and analysis of existing patient identification systems for First Nations, Métis, and Inuit peoples was completed in 2012. The Partnership will be supporting a network to advance improved uptake of people-specific identification processes to improve patient navigation, culturally responsive approaches to cancer control and understanding of the cancer experience.

For more information on the Partnership's efforts to advance the First Nations, Inuit and Métis Action Plan on Cancer Control, please visit http://www.cancerview.ca/.

How the report was informed

Work for this report was originally informed by a series of consultations across the country in early 2012. These sessions engaged experts and knowledge leaders as well as patient and survivor representatives, seeking their advice and input on the planned directions for cancer system performance measurement in the topic area. After the consultations, a Working Group comprising of content experts, clinicians, researchers and policy and system leaders from across Canada was formed to oversee the production of this report. The Working Group provided input into the content and methodologies presented in this report and provided feedback on drafts and the interpretation of indicator results. A list of Working Group members is provided on page 2 of this report. Guiding the overall work of the System Performance Initiative is the System Performance Steering Committee and Technical Working Group, each comprising representatives from all 10 provinces (see page 1 for a list of members).

The methodology used in this report to assess how travel time to radiation treatment facilities affected utilization and wait times was developed by the Methodology Working Group (see Appendix for a list of members).

Data sources and methodology used in this report

The data collection and analysis used in this report are the result of a multi-partner collaborative effort. Provincial cancer agencies and programs provided detailed data on diagnosis, treatment and research to assist with the calculation of many indicators in this report. Nationally, the Partnership worked with Statistics Canada as the survey administrator and data steward for the Canadian Community Health Survey (CCHS); the report uses CCHS information on health-care utilization and health determinants for the Canadian population. Statistics Canada also houses the Canadian Cancer Registry (CCR) and the Vital Statistics Database, which were used to generate key measures of long-term outcomes such as cancer incidence, mortality and relative survival. The Partnership worked with the Canadian Institute for Health Information (CIHI) to develop indicators related to cancer surgery. The Canadian Breast Cancer Screening Initiative provided information on breast cancer screening practices from organized provincial and territorial programs.

The indicators examined in this report are presented on a national level. However, for several indicators, provincial data are provided in the Online Supplementary Tables.

Individual versus area-level measures of income and immigrant status

The measures used to define income and immigrant status in this report vary by the data source used. For indicators based on the CCHS, income and immigrant status are assigned based on information self-reported by the individuals surveyed. For all other data sources, including the provincial cancer registries, the CCR, the Vital Statistics Database, the Hospital Morbidity Database (CIHI), the National Ambulatory Care Reporting System (CIHI) and the Canadian Breast Cancer Screening Database, income and immigrant status were ecologically defined at the area or neighbourhood level.

The income variable used in the analyses of CCHS data is based on the self-reported household income and is a measure of the respondent's household income relative to the household income of all other respondents. It is the standardized ratio of total household income to the low-income cut-off corresponding to the number of persons in the household and the size of the community.[12] The distribution of income is divided into quintiles, with Canadians living in the lowest-income households comprising the bottom 20% of households and individuals from households with the highest incomes comprising the top 20% of households.

Immigrant status is ascertained in the CCHS by asking survey respondents whether they were born a Canadian citizen and if not, in what year they first came to Canada to live. In this report (and consistent with previous research), immigrant status is examined as those respondents who indicated they came to live in Canada fewer than 10 years ago (referred to as "recent immigrants" in this report), and those who indicated they came to live in Canada 10 or more years ago (referred to as "longer-term" immigrants in this report). Respondents who reported being born a Canadian citizen are referred to as "Canadian-born" in this report.[33]

The particular survey year of the CCHS used in this report varies by the indicator examined and is based on the most recent year that *national* data were available. Given that, for indicators related to alcohol consumption and self-reported screening, 2005 and 2008 data were used, respectively. For indicators examining smoking prevalence, smoking cessation and obesity, 2011 data were used.

For indicators based on data from the provincial cancer registries, the CCR, the Vital Statistics Database the Hospital Morbidity Database (CIHI), the National Ambulatory Care Reporting System (CIHI) and the Canadian Breast Cancer Screening Database, income and immigrant status were defined ecologically at the neighbourhood level. This approach uses the characteristics of the geographic area in which an individual lives to assign those characteristics to the individuals living in that area. Values at the neighbourhood level were derived using the Postal Code Conversion File (PCCF+) developed by Statistics Canada,[34] linking an individual's postal code to the standard Canadian census geographic area (such as dissemination areas, census tracts and census subdivisions) to extract area-level information, such as neighbourhood income quintile and immigrant density.[35]

Using this neighbourhood-level approach, income level was examined according to quintiles, with Canadians living in the lowest-income neighbourhoods comprising the bottom 20% of the distribution and those residing in the highest-income neighbourhoods comprising the top 20%. This measure of income takes into account differences in the cost of living across the province because income for a neighbourhood was measured relative to that of other neighbourhoods in a given census metropolitan area (CMA) or census agglomeration (CA), or areas outside a CMA or CA (i.e., quintiles are created within each CMA/CA and in the areas outside a CMA/CA). Neighbourhood income quintiles derived from linking postal codes to the census are less accurate in rural areas because rural postal codes cover larger geographic areas. Analyses using neighbourhood income quintiles were therefore restricted to urban areas,[17] where indicated.

Using a neighbourhood-level approach, immigrant status is measured as immigrant density, representing the percentage of immigrant and non-permanent populations living in a dissemination area (DA). To construct this measure, census information was used to characterize each census DA according to its percentage of combined immigrant and non-permanent resident populations. The census definition of immigrants includes individuals who self-reported that they held the legal designation of "immigrant" at some point in their lives. Non-permanent residents are defined as people from another country who, at the time of the census, held a work or study permit or who were refugee claimants, as well as family members living with them in Canada. The percentage of immigrants and non-permanent residents in any given DA was calculated as the number of people who reported ever having had landed immigrant status added to the number of people who identified as non-permanent residents on the census, divided by the DA's total population.

Using Statistics Canada's PCCF+ application, individuals' postal codes were mapped to a corresponding DA code. Density cut-points that divide the immigrant population into thirds (terciles) were determined and then applied to the whole Canadian population to designate areas as low (tercile 1), medium (tercile 2) or high density (tercile 3) for immigrant density. Note that because the immigrant groups were defined for Canada as a whole, provincial and regional subsets of data are unlikely to have one third of the immigrant population in each group.

The geographic definitions used in this report were adapted from Statistics Canada's census metropolitan area and census agglomeration influenced zones. This classification is based on population size and distance, but also considers the commuting flow between rural areas and small towns and larger centres. CMAs and CAs have a core population of 10,000 or more. Metropolitan influenced zones (MIZs) are assigned on the basis of the share of the workforce that commutes to any CMA or CA. The MIZ definition differentiates between populations with less access to the labour markets of larger urban centres and those with greater access using commuter flow as a proxy for the population's access to services such as health and education facilities, financial institutions, shopping centres, cultural centres and sports facilities.

Groupings used for geography is this report are as follows.

- **Urban** – CMAs and CAs with a core population of 10,000 or more; 50% or more of the population commutes to CMA/CA
- **Rural** – population of less than 10,000 and 30–49% of the population commutes to an urban area (strong MIZ)
- **Rural-Remote** – population of less than 10,000 and 5–29% of the population commutes to an urban area (moderate MIZ)
- **Rural/Very Remote** – populations of less than 10,000 and 0–5% of the population commutes to an urban area; includes non-urban parts of the territories (weak and no MIZ)

Confidence intervals and statistical significance

The indicators in this report were based on a number of data sources. The risk factor and screening indicators were based on the Canadian Community Health Survey (CCHS), which is a sample of the Canadian population. As such, the estimates from the survey come with confidence intervals that reflect the error margins inherent in any sample. Confidence intervals for indicators using the CCHS, and for all other indicators in this report (except wait times), were calculated and are provided in the Online Supplementary Tables at www.cancerview.ca/systemperformancereport.

Note that statistical significance is not always the same as clinical significance. There are often meaningful differences between indicator results even when their confidence intervals overlap. Conversely, differences between results whose confidence intervals do not overlap may sometimes not be clinically meaningful.

The importance of distance to a radiation treatment facility to radiation therapy utilization and wait times was also examined in this report. For this analysis, travel time was defined as the drive time (in minutes) from an individual's residence (at the time of diagnosis) to the closest radiation treatment facility *in the same province*. Statistics Canada's PCCF+ file was used to derive latitude and longitude co-ordinates from the patient's postal code at the time of diagnosis. This same approach was used to derive a latitude and longitude for Canada-wide radiation treatment centres.

To determine travel time, the latitudes and longitudes of the individual's residence and the provincial radiation treatment centre(s) were entered into Google Maps to calculate the travel time. Records were retained for the shortest driving time from the person's residence to the nearest radiation treatment centre in the same province. For records returning a missing travel time, provinces were encouraged to map latitudes and longitudes to help determine reasons for missing data.

Driving time was broken down into the following categories: 0–39, 40–89, 90–179 and 180+ minutes. For this analysis, the following records were excluded:

- Records with invalid postal codes
- Outside-province postal codes
- Partial assignment (partially matched postal codes)

The impact of distance to a treatment facility was also examined for indicators on cancer surgeries (mastectomy and colostomy). For information on the methodology for these analyses, please see the Online Technical Appendix, which can be viewed or downloaded at www.cancerview.ca/systemperformancereport.

Organization of the report

The main content of the report is organized into three sections.

Section 1. Risk Factors: This section examines the link between health behaviours that have been associated with cancer (e.g., smoking, overweight and obesity, alcohol consumption) and household income quintile, geography and immigrant status using self-reported data from the Canadian Community Health Survey. The indicators indirectly assess the effectiveness of prevention programs and related policies and interventions aimed at improving the relevant health behaviours.

Section 2. Access to Cancer Control Services: This section explores disparities in the utilization of cancer control services (as a proxy for access) and some of the implications of those disparities for stage at diagnosis and long-term outcomes. This exploration includes examining access to screening, radiation therapy and cancer surgeries for breast and rectal cancer according to neighbourhood income quintile, geography and immigrant status. The section also examines the impact of the distance between an individual's residence and a radiation treatment centre and a cancer surgery hospital on the utilization of radiation therapy and cancer surgeries, respectively.

Section 3. A Brief Look at Cancer Survival by Income: This section presents five-year relative survival by neighbourhood income quintile (in urban populations) for select cancer types.

Each section of the report is organized into the following sub-sections:

- A brief description introduces the indicators presented and data sources along with any methodological considerations, as appropriate. A summary table highlights key indicator results.
- ***Why are we reporting on this?*** This describes the rationale for the topic being assessed and the indicators presented.
- ***What do we already know?*** This sub-section provides an overview of what is known about the topic from a high-level review of the literature. Any comparator measures from other studies or jurisdictions are also provided here.
- ***What do the results show?*** This sub-section provides the indicator results along with a description of variations and other patterns and some interpretations and comparisons to similar measures from other sources, as available.

Detailed tables (with confidence intervals) are provided in the Online Supplementary Tables, which can be viewed or downloaded from www.cancerview.ca/systemperformancereport.

An Online Technical Appendix provides full details on indicator data and methodologies and can be viewed or downloaded at www.cancerview.ca/systemperformancereport.

Downloadable slides of all figures in this report are available at www.cancerview.ca/downloadableslides.

1. Risk Factors

Smoking prevalence and cessation 21

Alcohol consumption 23

Adult overweight and obesity 25

1. Risk Factors

This section presents indicators on three modifiable risk factors: smoking, alcohol consumption and overweight and obesity. Results presented use the most recent year for which national data are available from the Canadian Community Health Survey (CCHS). Analysis focuses on differences in smoking behaviour, alcohol consumption and levels of overweight and obesity by household income quintile, geography and immigrant status. Detailed data tables with confidence intervals are provided in the Online Supplementary Tables.

Summary of results for four personal modifiable risk factors by household income quintile, geography and immigrant status

Indicator	What the results show		
	Household income quintile	**Geography**	**Immigrant status**
Smoking prevalence Percentage of population aged ≥ 12 reporting daily or occasional smoking	Smoking prevalence is higher among people from low-income households (24.9%) than among those from mid-income (18.1–21.1%) and high-income households (15.2%)	Smoking prevalence is higher among rural residents (21.4–24.0%) than among urban residents (19.3%)	Smoking rates are lower among recent immigrants (12.5%) than among the Canadian-born (22.0%)
Smoking cessation Percentage of recent smokers aged ≥ 20 that quit smoking in previous 2 years	Smoking cessation is lower among adults from the lowest-income households (14.6%) than among those from the highest-income households (21.3%)	Smoking cessation is highest among residents of rural-very remote areas (20.4%), compared with 16.4% in rural and 17.8% in urban areas	Highest quit rate is among recent immigrants (20.7%), followed by the Canadian-born (18.3%) and longer-term immigrants (15.7%)
Alcohol consumption Percentage of population aged ≥ 18 reporting exceeding low-risk drinking guidelines* in previous 12 months (2005 data)	People from high-income households are more likely to exceed the low-risk drinking guidelines (14.2%) than are people from low-income households (5.7%)	No difference seen between rural (8.9–10.6%) and urban (9.2%) residents in likelihood of exceeding drinking guidelines	Fewer recent immigrants (2.3%) reported exceeding drinking guidelines than longer-term immigrants (5.0%) and the Canadian-born (10.7%)
Overweight & obesity Percentage of population aged ≥ 18 classified as overweight or obese	Men from low-income households are less likely to be overweight or obese (51.1%) than men from high-income households (65.9%), whereas the opposite pattern was found among women (46.9% vs. 38.8%, respectively)	Adults living in rural and remote areas are more likely (57.7–60.7%) to be overweight or obese than urban residents (50.7%)	Fewer recent immigrants are overweight or obese (35.6%) than longer-term immigrants (51.8%) and the Canadian-born (53.8%)

* World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) recommended low-risk drinking guidelines of no more than 2 drinks per day for males and no more than 1 drink per day for females.

Data source: 2011 and 2005 Canadian Community Health Survey

Why are we reporting on this?

Prevention is a key element of cancer control. Understanding the role and prevalence of risk factors in the population can help guide cancer prevention efforts. Many risk factors can be modified by adjusting health behaviours such as tobacco use or alcohol consumption, or by changing environments to reduce exposure to second-hand smoke.

What do we already know?

Previous Canadian and international studies have shown that the prevalence of modifiable cancer risk factors, such as smoking and overweight and obesity, tends to be higher in low-income populations and/or among residents of rural areas.[19, 36-41] Some association has also been found between income and obesity levels, with obesity greatest among men from high-income households and lowest among women from high-income households.[38, 42] When looking at immigrant status, a number of Canadian and international studies have shown that immigrants tend to have better health profiles than Canadian-born people, such as lower rates of alcohol consumption and obesity, with healthier profiles found among more recent immigrants.[43-45]

Differences between socio-demographic groups may exist for a number of reasons. Rates of physical activity and fruit and vegetable intake influence levels of overweight and obesity and are known to differ across income, geography and immigrant groups.[19, 42] The built environment – a global term that describes factors including access to healthy food and the walkability and bike safety of neighbourhoods – may also influence these factors in some way.[46] Furthermore, evidence from cities in and around Toronto suggests that immigrant status influences the relationship between income and health outcomes.[47]

Smoking prevalence and cessation

What do the results show?

More people from low-income households and rural and remote communities smoke. Recent immigrants smoke less than other Canadians.

Data from the 2011 CCHS show that 24.9% of individuals from low-income households reported daily or occasional smoking, compared with 15.2% of those from high-income households (Figure 1.1). Individuals from low-income households are also less likely to report quitting smoking than are people from high-income households. Of recent smokers aged 20 or older from the lowest-income households, 14.6% reported quitting in the past two years, compared with 21.3% of those from the highest-income households (see Online Supplementary Tables). This suggests a potential need for cessation programs targeted to low-income households to prevent the gap in smoking rates between those with higher incomes and those with lower incomes from continuing to widen.

When geography is considered, smoking rates are higher in rural and remote areas of the country (ranging from 21.4% to 24.0%) than in urban areas (19.3%); Figure 1.1). Individuals living in urban areas, however, are less likely to report quitting smoking than those living in very remote rural areas: 20.4% of recent smokers aged 20 or older living in very remote rural areas reported quitting in the past two years, compared with 17.8% of urban residents.

Smoking rates among Canadian immigrants tended to be lower than rates among Canadian-born residents (Figure 1.1). The 2011 CCHS data show that 12.5% of recent immigrants and 13.3% of long-term immigrants smoked daily or occasionally, compared with 22.0% of Canadian-born people. In addition, while smoking rates

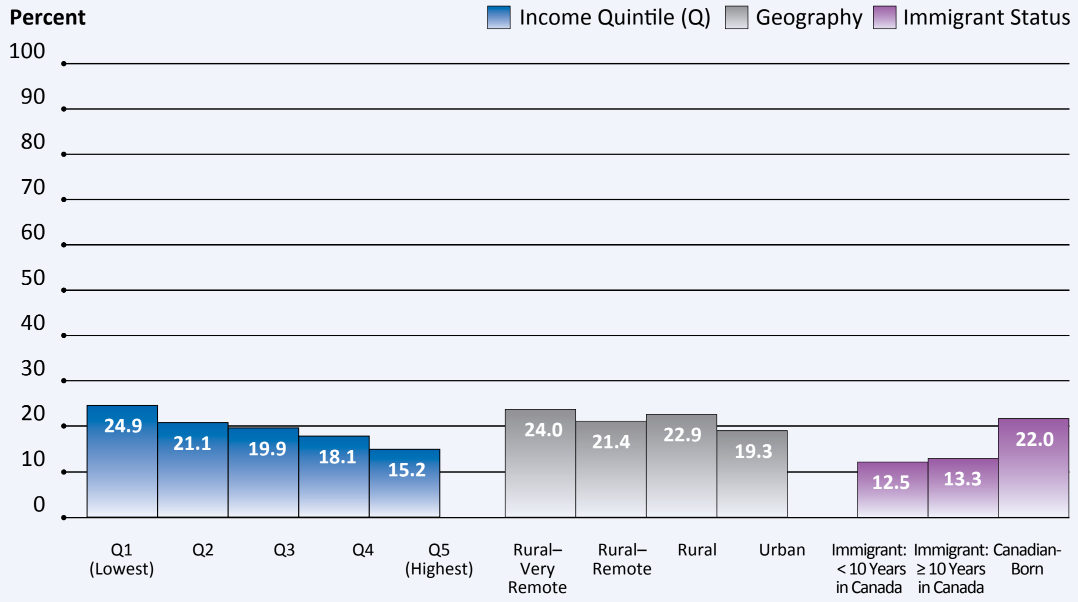
25%

of individuals from low-income households report smoking compared to 15% of those from high-income households.

among immigrants tended to vary only slightly by income level (for example, 11.3% of recent immigrants in the lowest income group reported daily or occasional smoking, compared with 14.5% of recent immigrants in the highest income group; Figure 1.2), the gradient in smoking rates among the Canadian-born was much more pronounced, with smoking decreasing as income increases: 31.5% of Canadian-born residents in the lowest income group reported daily or occasional smoking, compared with 16.1% in the highest income group (Figure 1.2).

FIGURE 1.1

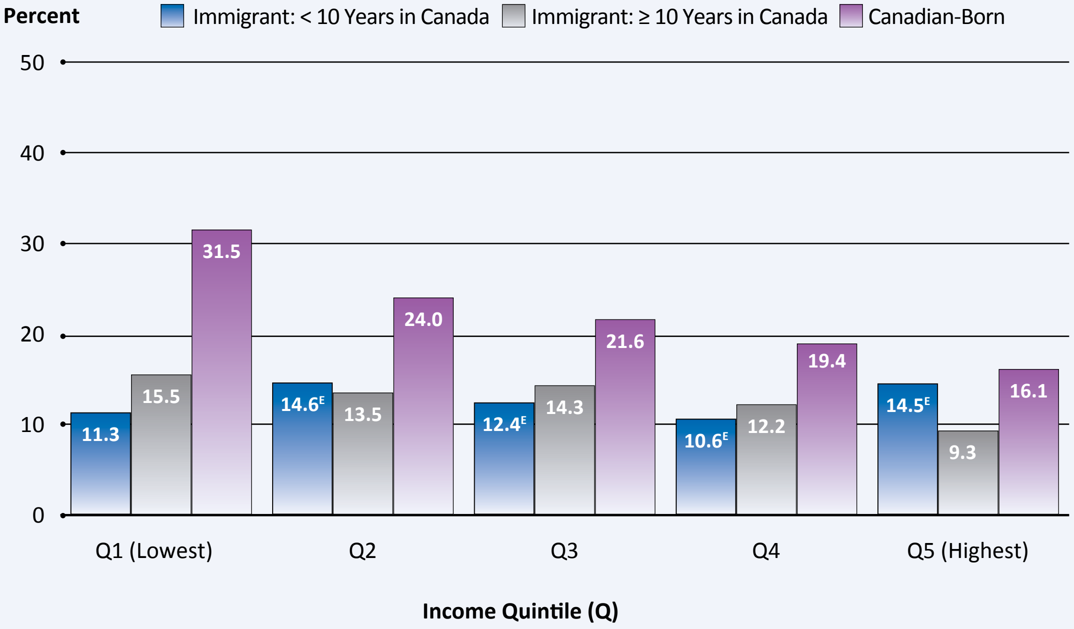
Percentage of population (age ≥ 12) reporting daily or occasional smoking, by household income quintile, geography and immigrant status, Canada – 2011



The territories are excluded from income analysis in the Canadian Community Health Survey.
Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.2

Percentage of population (age ≥ 12) reporting daily or occasional smoking, by immigrant status within household income quintile, Canada – 2011



E Interpret with caution due to large variability in the estimate. See Online Technical Appendix for more details.
The territories are excluded from income analysis in the Canadian Community Health Survey.
Data source: Statistics Canada, Canadian Community Health Survey

Alcohol consumption

People with higher incomes are more likely than those with lower incomes to drink excessively. Recent immigrants drink less than other Canadians.

Data from the 2005 CCHS show that Canadian households with higher incomes are more likely to exceed the WCRF/AICR low-risk drinking guidelines than are lower-income Canadians. Specifically, 5.7% of individuals aged 18 or older from low-income households reported excess drinking in the previous 12 months, compared with 14.2% of those from high-income households. This relationship was also found in 2011 CCHS data from five provinces, though the gradient by income was less pronounced (see Online Supplementary Tables).

Patterns of alcohol consumption did not vary significantly by geography, with 9.2% of those residing in urban areas reporting exceeding the low-risk drinking guidelines, compared with 10.6% of those living in rural areas and 8.9% of those living in very remote rural areas (see Online Supplementary Tables).

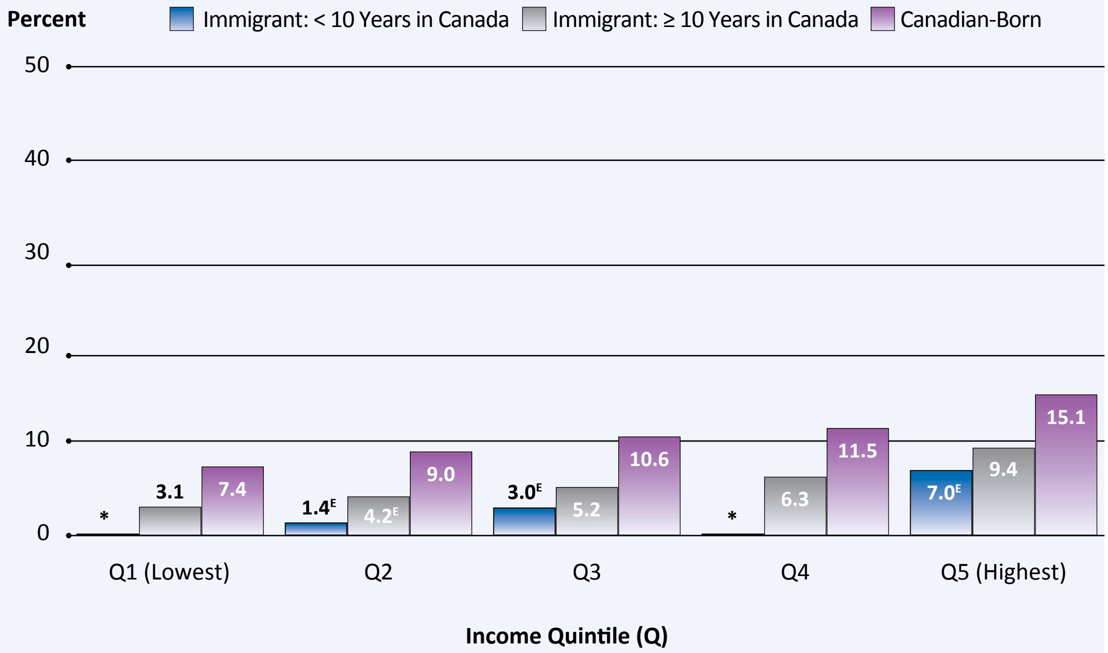
As with smoking prevalence, rates of alcohol consumption were lower among immigrants than among Canadian-born people, with 2.3% of recent immigrants and 5.0% of longer-term immigrants reporting excess drinking in the previous 12 months, compared with 10.7% of Canadian-born residents (see Online Supplementary Tables).

Alcohol consumption remains higher among Canadian-born residents than among immigrants, irrespective of income levels, suggesting that cultural factors are potentially more influential in alcohol consumption behaviour than economic factors (Figure 1.3).

Alcohol consumption remains higher among Canadian-born residents than among immigrants.

FIGURE 1.3

Percentage of population (age ≥ 18) reporting exceeding low-risk drinking guidelines in previous 12 months, by household income quintile and immigrant status, Canada – 2005



* Suppressed due to statistical unreliability caused by small numbers.
E Interpret with caution due to large variability in the estimate. See Online Technical Appendix for more details.
The territories are excluded from income analysis in the Canadian Community Health Survey.
Data source: Statistics Canada, Canadian Community Health Survey

Adult overweight and obesity

Men with low incomes are less likely to be overweight than men with high incomes, but the opposite is true for women. Adults in rural or remote areas are more likely to be overweight than urban residents. Recent immigrants are less likely to be overweight than other Canadians.

The 2011 CCHS data show that 51.1% of men aged 18 or older from low-income households were overweight or obese, compared with 65.9% of men from high-income households (Figure 1.4). However, in the same year, 46.9% of women aged 18 or older from the lowest-income households were classified as overweight or obese, compared with 38.8% of women from high-income households (Figure 1.5).

When looking at levels of overweight or obesity by geography, 60.7% of adults aged 18 or older living in very remote rural areas were overweight or obese, compared with 50.7% of urban residents. This relationship held true for both men and women (Figures 1.4 and 1.5).

Among adults aged 18 or older, 51.8% of longer-term immigrants and 53.8% of Canadian-born residents were overweight or obese, compared with 35.6% of recent immigrants. (see Online Supplementary Tables). When the pattern of obesity by immigrant status was examined within different income levels, the data consistently showed lower rates of obesity among recent immigrants than among the Canadian-born across all income levels (Figure 1.6). This suggests that Canadian immigrants progressively gain weight over time while living in Canada.

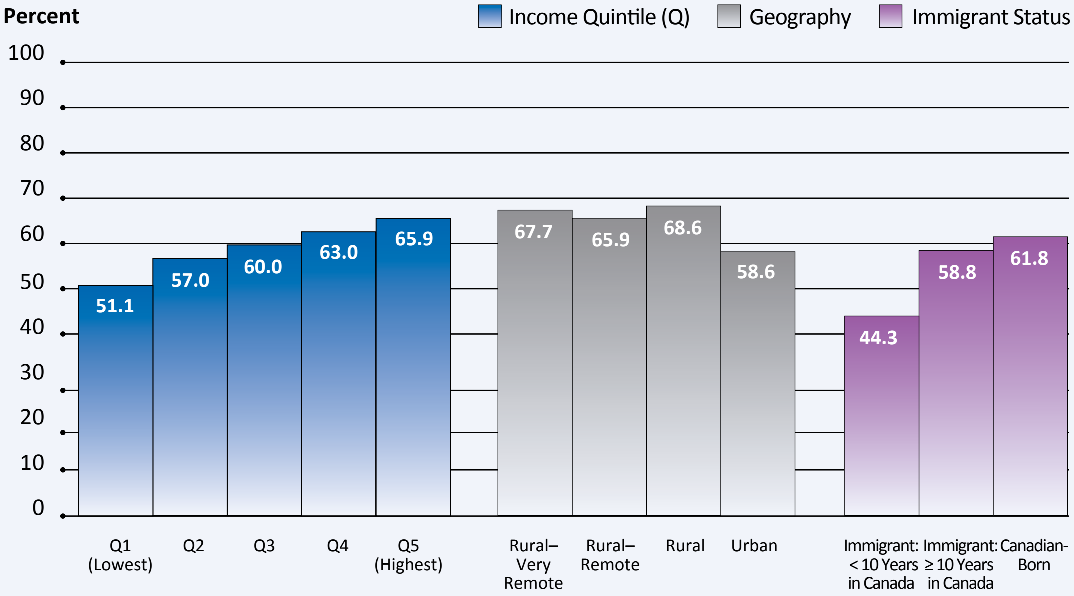
66%

of men from high-income households are overweight or obese compared to 51% of men from low-income households.

Immigrants progressively gain weight over time while living in Canada.

FIGURE 1.4

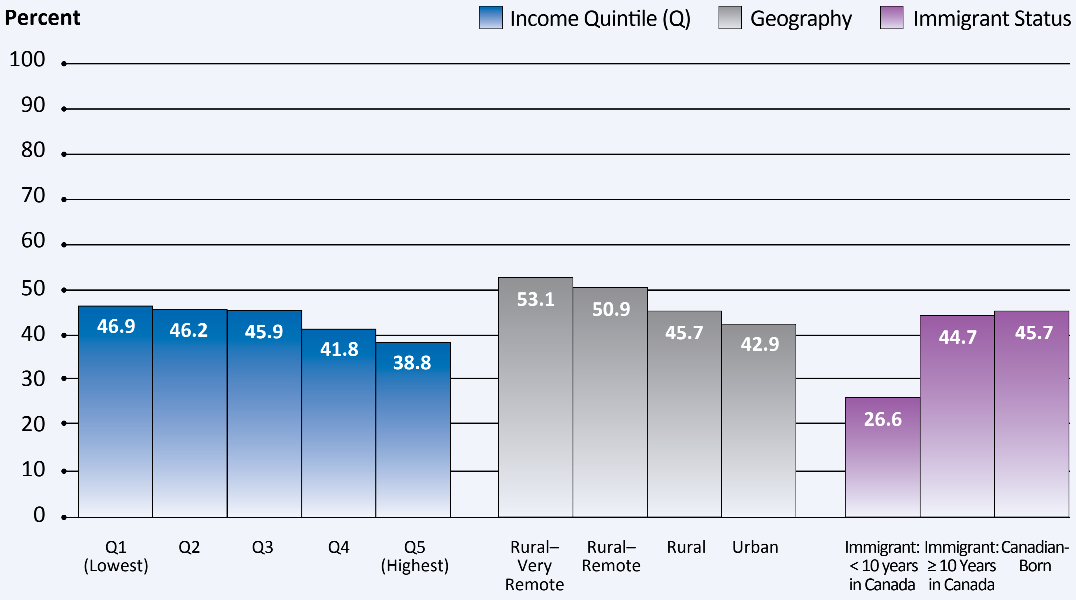
Percentage of men (age ≥ 18) classified as overweight or obese, by household income quintile, geography and immigrant status, Canada – 2011



The territories are excluded from income analysis in the Canadian Community Health Survey.
Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.5

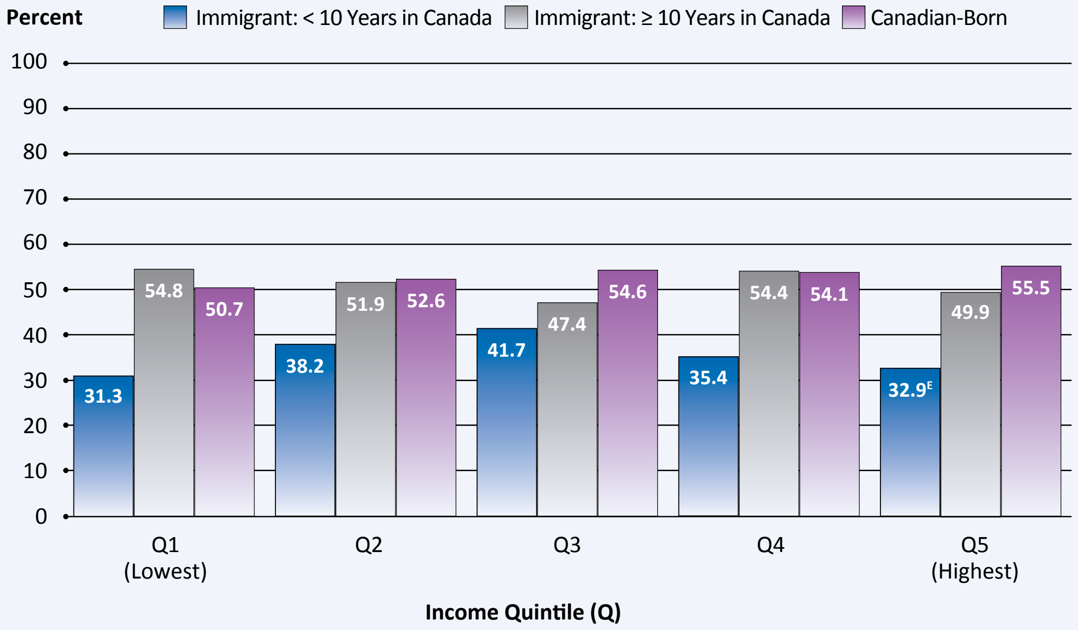
Percentage of women (age ≥ 18) classified as overweight or obese, by household income quintile, geography and immigrant status, Canada – 2011



The territories are excluded from income analysis in the Canadian Community Health Survey.
Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.6

Percentage of population (age ≥ 18) classified as overweight or obese, by immigrant status within household income quintile, Canada – 2005



E Interpret with caution due to large variability in the estimate. See Online Technical Appendix for more details.
The territories are excluded from income analysis in the Canadian Community Health Survey.
Data source: Statistics Canada, Canadian Community Health Survey

2. Access to Cancer Control Services

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2. Access to Cancer Control Services

Self-reported screening

Self-reported screening for cervical, colorectal and breast cancer

This section presents indicators for cervical, breast and colorectal cancer screening and is based on self-reported data from the Canadian Community Health Survey. It focuses on variations in screening rates for these three cancers by household income, geography and immigrant status. Given that income levels may differ across geographic regions and/or by immigrant status (for example, those living in rural and remote areas tend to have lower incomes than those living in urban areas), this section also examines screening rates by geography and immigrant status while accounting for income. Detailed data tables with confidence intervals for these indicators are provided in the Online Supplementary Tables.

Summary of results for screening indicators by household income quintile, geography and immigrant status

Indicator	What the results show		
	Household income quintile	**Geography**	**Immigrant status**
Breast cancer screening Percentage of women aged 50–69 reporting mammography in past 2 years	Screening rates are lower in women from low-income households (61.1%) than in women from mid- and higher-income households (about 77%)	There was no distinct pattern in screening rates according to urban and rural residence	Screening rates are lower in recent immigrant women (40.6%) than in longer-term immigrants (70.0%) and Canadian-born women (74.2%)
Cervical cancer screening Percentage of women aged 21–69 who had at least 1 Pap test in past 3 years	Screening rates are lower in women from lower-income households (72.0%) than in women from higher-income households (88.0%)	Little variation in screening rates across women living in urban, rural and remote areas	Screening rates are lower in recent immigrant women (63.7%) than in longer-term immigrants (75.2%) and Canadian-born women (83.1%)
Colorectal cancer screening Percentage of population aged 50–74 who were up to date on their colorectal cancer screening (FOBT in past 2 years and/or sigmoidoscopy/colonoscopy in past 5 years)	Screening rates are lower in people from lower-income households (25.2%) than in people from higher-income households (37.7%)	Screening rates are marginally lower in very remote areas (29.2%) and remote areas (27.7%) than in urban areas (33.0%)	Screening rates are lower in recent immigrants (19.2%) than in longer-term immigrants (35.0%) and the Canadian-born (31.7%)

FOBT = fecal occult blood test

Data source: 2008 Canadian Community Health Survey

Why are we reporting on this?

Of an estimated 187,600 new cancer cases diagnosed in Canada in 2013, one-quarter (26%) were breast, colorectal and cervical cancer, the same three cancers for which there are organized population-based screening programs in Canada.[48] Regular screening has been shown to reduce both incidence and mortality rates for cervical cancer[49-52] and mortality from colorectal cancer[53-56] and breast cancer[57-62] through early detection, thus allowing for more effective treatment of earlier-stage cancers and pre-cancerous lesions. Despite the success of screening in reducing the mortality and incidence of these cancers, studies show that screening rates remain lower for some populations.

What do we already know?

Previous Canadian studies have shown lower cancer screening rates among people with lower socio-economic status (SES) than among those with higher SES.[63-66] Previous research based on Ontario data has shown that women with lower incomes were less likely than women with higher incomes to undergo screening, including the Pap test, clinical breast examination and mammography.[65] Some of the reasons that may contribute to socio-economic disparities are less awareness of current cancer screening programs and lack of resources to enable use of screening services among those with lower incomes.[67]

Some studies have found that those residing in rural areas of Canada are less likely to undergo cancer screening than those residing in urban areas,[64, 68] while other studies have found no differences in screening across urban and rural areas in Canada.[69] Differences across studies in data sources and the definition of urban and rural used may, in part, explain the variation in findings across studies. Because screening may require a physician referral, barriers to access may arise from the lack of primary care physicians in rural areas.[8, 15] Programs targeting rural and remote populations in an effort to increase screening participation lead to more equitable access. In Manitoba, the use of mobile screening vans has helped to address barriers of distance and transportation for rural residents and increased breast screening participation from 12.6% to 52.7% between 1991 and 1999.[70]

Previous research has shown lower screening rates among immigrants to Canada than among Canadian-born people.[63, 71-73] Lower screening rates among immigrants may reflect the lack of culturally appropriate screening services. A recent review showed that interventions aimed at immigrant and minority women, such as the use of screening invitation letters translated into various languages, helped increase participation in breast cancer screening.[11] Other barriers include lack of education and awareness of screening, including health literacy (for example, an understanding of what cancer is, why screening is important and how to access these services).[74]

Across the country, a number of community and health agencies have developed a wide range of innovative and effective practices to reach under-screened or never-screened groups, including low-income, rural and remote, and immigrant Canadians. The *Pan-Canadian Best and Promising Practices to Engage Seldom or Never Screened Women in Cancer Screening* project has compiled these initiatives into a compendium to help provincial and territorial screening programs, community and health agencies, policy-makers, governments, decision-makers and funders increase screening among under- or never-screened populations.[75]

What do the results show?

Low-income Canadians are less likely to get screened for cancer than higher-income Canadians.

Canada-wide data from the 2008 Canadian Community Health Survey show lower screening rates for breast, colorectal and cervical cancer among those living in lower-income households.

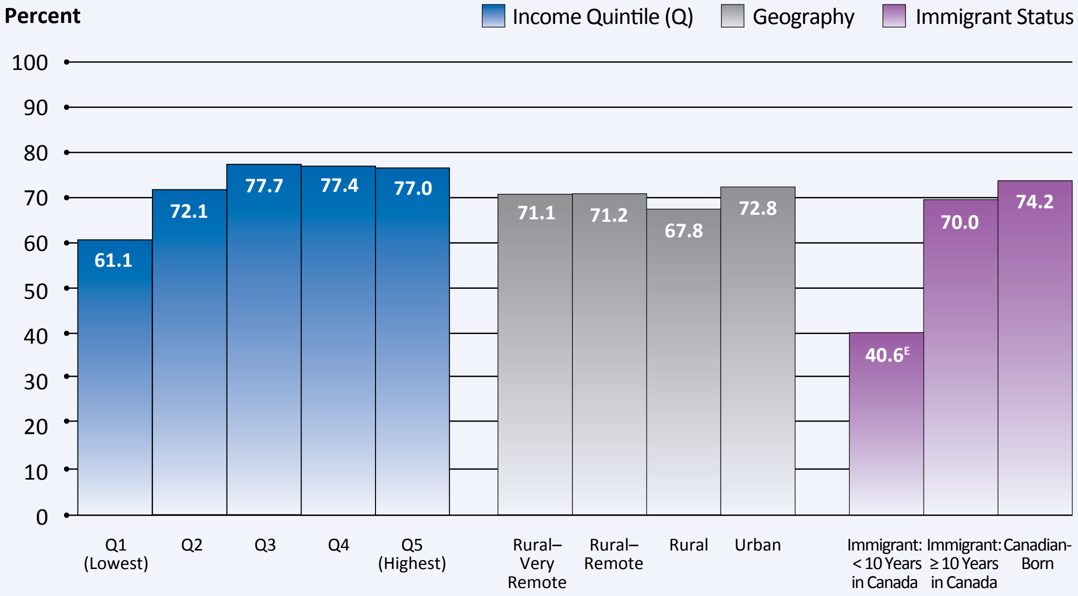
Figure 2.1 shows that about 77% of women living in high- and middle-income households reported having screening mammography in the past two years, compared with 61.1% of those in the lowest-income households. A similar pattern was seen for self-reported screening for cervical and colorectal cancer, with a difference between the bottom and top income quintiles of 16.0 percentage points for cervical cancer and 12.5 percentage points for colorectal cancer (Figures 2.2 and 2.3).

77%

of women living in high- and middle-income households had screening mammography in the past two years compared to 61% of women in the lowest income households.

FIGURE 2.1

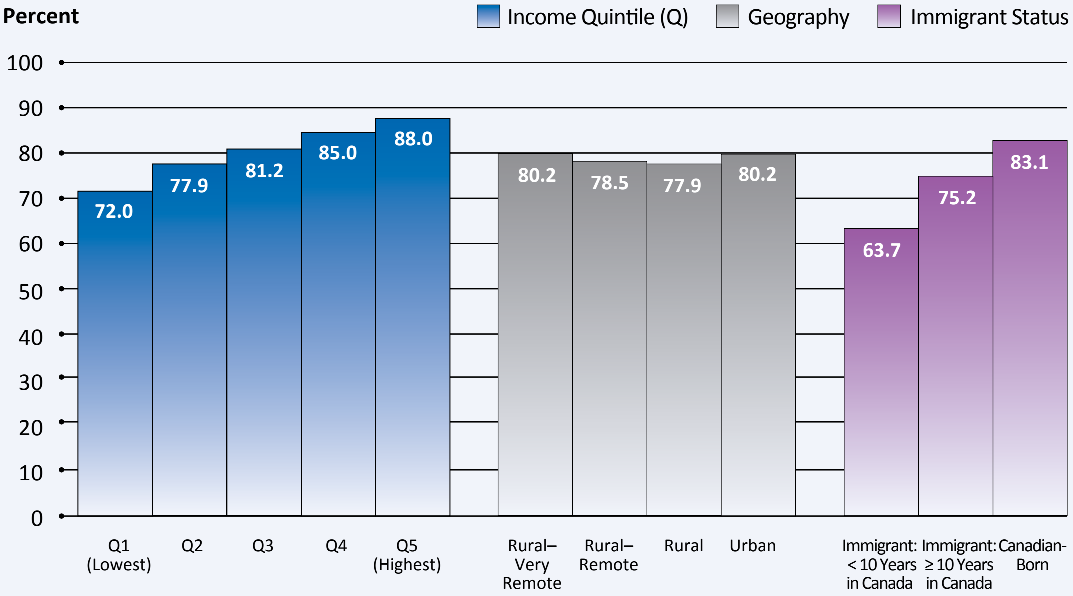
Percentage of eligible* women (aged 50 to 69) reporting having had a screening mammogram in the past two years, by household income quintile, geography and immigrant status, Canada – 2008



* Eligible women are those who have not had a previous lump, are not being followed up after breast cancer treatment and are not having a mammogram because of a breast problem or other specified reasons.
ᴱ Interpret with caution due to large variability in the estimate. See Online Technical Appendix for more details.
The territories are excluded from income analysis in the Canadian Community Health Survey.
Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 2.2

Percentage of women (aged 21 to 69) reporting having had at least one Pap test in the past three years, by household income quintile, geography and immigrant status, Canada – 2008



The territories are excluded from income analysis in the Canadian Community Health Survey.
Data source: Statistics Canada, Canadian Community Health Survey

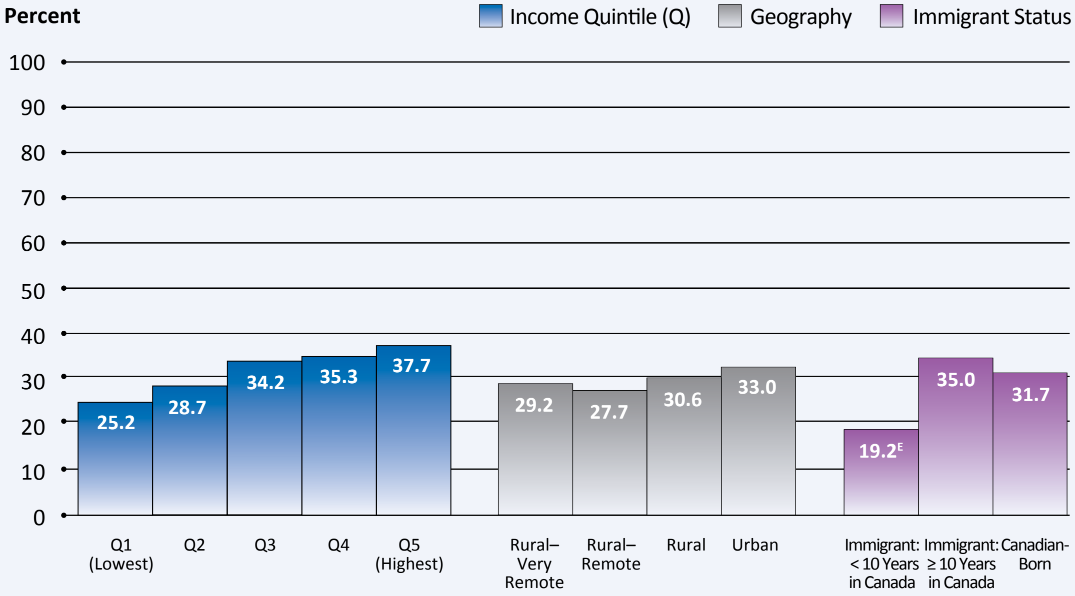
People living in rural and remote communities are as likely to be screened for cancer as those living in cities.

Data from 2008 show that breast cancer screening rates were similar for women in urban, rural and remote areas. Similarly, place of residence (rural vs. urban) had little effect on cervical screening in Canada, as shown by the similarity in Pap testing rates among women living in urban, rural and remote areas (Figures 2.1 and 2.2). The absence of a gap between urban and rural breast screening rates may reflect the success of mobile screening programs and other initiatives aimed at taking screening services closer to women in rural and remote communities. In addition, breast and cervical cancer screening tests have been in existence for many years and have been widely adopted.

Although colorectal cancer screening rates in Canada have increased in recent years,[76] the data show disparities across geographic areas, with rates lower in rural-remote and rural/very remote areas than in urban areas. In 2008, 29.2% of Canadians living in very remote areas and 27.7% of those residing in remote areas reported being up to date with their colorectal cancer screening, compared with 33.0% of urban Canadians (Figure 2.3). Lower colorectal cancer screening rates in rural areas have also been shown by population-based surveys in the U.S., even after taking into account a number of

FIGURE 2.3

Percentage of the population (aged 50 to 74) who are up-to-date* on colorectal cancer screening for asymptomatic† reasons, by household income quintile, geography and immigrant status, Canada – 2008



†Excludes patients being investigated for symptoms.
E Interpret with caution due to large variability in the estimate. See Online Technical Appendix for more details.
The territories are excluded from income analysis in the Canadian Community Health Survey.
*Up-to-date is defined as having had an FOBT in the past two years and/or sigmoidoscopy/colonoscopy in the past five years.
Data source: Statistics Canada, Canadian Community Health Survey

socio-demographic characteristics that differ between urban and rural residents (such as age, education and income).[77]

When the data are examined according to the type of test used to check for colorectal cancer, some differences emerge. While fecal occult blood test (FOBT) rates do not appear to vary significantly by geography, residents of rural/very remote parts of the country were less likely to report having endoscopy to screen for colorectal cancer than were urban residents (18.3% and 22.8%, respectively; see Online Supplementary Tables).

Recent immigrants are screened less for breast, cervical and colorectal cancer than longer-term immigrants and Canadian-born individuals.

The association between duration of residence, or length of stay in Canada, and improved access to primary and preventive health care among immigrants is well documented.[26, 72, 78] Self-reported screening rates for 2008 show that recent immigrants (living in Canada for less than 10 years) were less likely to report screening for breast, cervical or colorectal cancer than were longer-term immigrants (in Canada for 10 or more years) and Canadian-born residents (Figures 2.1, 2.2 and 2.3). For example, 63.7% of recently immigrated women reported having at least one Pap test for cervical screening in the past three years, compared with 75.2% of longer-term immigrants and 83.1% of Canadian-born women. For colorectal cancer screening, 19.2% of recent immigrants reported screening, compared with 31.7% of the Canadian-born population.

Differences in screening rates by immigrant status and geography persist for cervical and colorectal cancer, respectively, even after adjusting for income level.

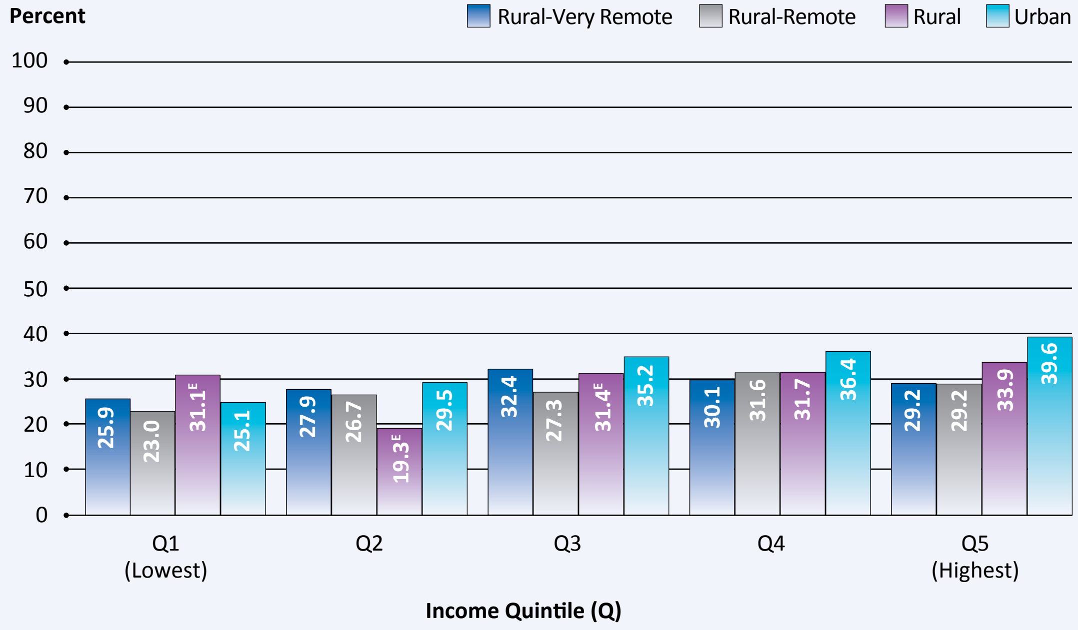
In general, there are correlations between income, immigrant status and geography (urban, rural or remote residence). For example, rural and remote populations generally have lower incomes than do urban populations.[79] Because of that, further analyses were conducted to examine whether screening rates differed by geography and immigrant status after accounting for income.

The data show differences in cervical screening by immigrant status among those in the lowest 20% of income only: cervical screening rates for women at that income level were 55% among recent immigrants, compared with 74% among longer-term immigrants and 75% among Canadian-born women. This suggests that immigrants in higher income brackets were able to overcome any barriers to screening that may be related to their immigrant status. The number of recent immigrants in separate income levels was too small to draw any firm conclusions for breast and colorectal cancer screening.

The data show that after adjustment for income, differences in colorectal screening rates by

FIGURE 2.4

Percentage of population (aged 50 to 74) who are up-to-date* on colorectal cancer screening for asymptomatic[†] reasons, by geography within household income quintile, Canada – 2008



[†] Excludes patients being investigated for symptoms.

[E] Interpret with caution due to large variability in the estimate. See Online Technical Appendix for more details.

The territories are excluded from income analysis in the Canadian Community Health Survey.

*Up-to-date is defined as having had an FOBT in the past two years and/or sigmoidoscopy/colonoscopy in the past five years.

Data source: Statistics Canada, Canadian Community Health Survey

geography persist for the highest income group. Among Canadians in the top 20% of income, screening rates were lower among rural, remote and rural/very remote Canadians, with 29.2% of rural and remote residents reporting having an FOBT in the past two years and/or endoscopy in the past five years, compared with 39.6% of urban Canadians (Figure 2.4).

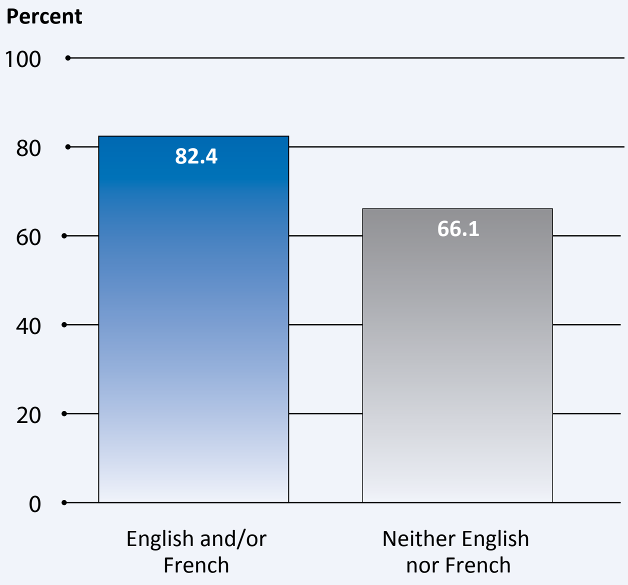
The data for cervical and breast cancer screening continued to show no difference in screening rates by geography after adjustment for income.

The importance of language

Language proficiency has been shown to be a potential barrier to access to and use of health-care services among new immigrants.[64, 78, 80-82] When the association between language and the likelihood of undergoing cancer screening was examined in the Canadian Community Health Survey, the results showed that screening rates tended to be lower among Canadians who indicated they spoke neither English nor French at home than among those who spoke one of the official languages. For example, 66.1% of women speaking neither English nor French at home reported having a Pap test in the past three years, compared with 82.4% of women who spoke English or French (Figure 2.5).

FIGURE 2.5

Percentage of women (aged 21 to 69) who reported having had at least one Pap test in the past three years, by language spoken at home, Canada – 2008



Data source: Statistics Canada, Canadian Community Health Survey

Diagnosis and outcomes

This section examines differences in wait times from abnormal breast screen to resolution (definitive confirmation of the diagnostic result as negative or positive) using 2007–08 data from the Canadian Breast Cancer Screening Database (CBCSD). Results are presented by neighbourhood income quintile and geography. Information by immigrant status was not available for this indicator. Please see the Online Supplementary Tables for indicator results by province and territory.

Summary of results for indicator examining wait time* from abnormal breast screen to resolution by neighbourhood income quintile and geography

Indicator	What the results show	
	Neighbourhood income quintile	**Geography**
Wait time from breast screen to resolution Wait time from abnormal breast screen to resolution for women aged 50–69	Among women not requiring tissue biopsy, 80.1% of those living in the lowest-income neighbourhoods were treated within the target wait time, compared with 83.2% of women in the highest-income neighbourhoods; percentages were 53.4% and 56.7% for women requiring biopsy, respectively)	Among women not requiring tissue biopsy, 70.4% of those living in rural-very remote areas were treated within the target wait time, compared with 82.1% of women in urban areas; percentages were 38.2% and 54.9% for women requiring biopsy, respectively)

*The target wait time is seven weeks for women requiring a tissue biopsy and five weeks for women not requiring a tissue biopsy.

Wait time from abnormal breast screen to resolution

Why are we reporting on this?

Timely resolution (through a positive or negative diagnosis) of an abnormal screening result helps avoid unnecessary stress for the individual and can also lead to better outcomes when cancers are diagnosed more quickly. Delays in diagnosis as short as three months have been associated with increased rates of advanced stages of disease, greater recurrence and poorer survival.[83-84]

Guidelines identifying target wait times from abnormal breast screen to resolution were established by the Canadian Breast Cancer Screening Initiative's Working Group on the Integration of Screening and Diagnosis in 2000.[85]

The target wait time is seven weeks for women requiring a biopsy and five weeks for those diagnosed by other means. These guidelines apply to asymptomatic women aged 50 to 69 with no prior diagnosis of breast cancer.

What do we already know?

Studies conducted in the U.S. have shown that women in rural areas and those with lower SES are at greater risk of delays in breast cancer diagnosis following an abnormal mammogram.[84, 86-87]

The relationship between diagnostic delays and immigrant status is not well documented in the literature. A systematic review identified several types of barriers causing diagnostic delays after an abnormal breast screen in different populations, including personal barriers (such as lack of childcare, negative mammography experiences or poor understanding of a diagnosis), provider barriers (such as lack of meaningful communication about a diagnosis) and system barriers (unavailability of reports in an individual's first language).[84, 88]

What do the results show?

Generally in Canada, the time a woman waited for resolution following an abnormal breast screening result was longer for women living in low-income neighbourhoods than for those living in high-income neighbourhoods, and longer for women living in rural and remote areas of the country than for those living in urban areas. Among women not requiring a tissue biopsy, 80.1% of women in the lowest income group received resolution of an abnormal screen within the target wait time,

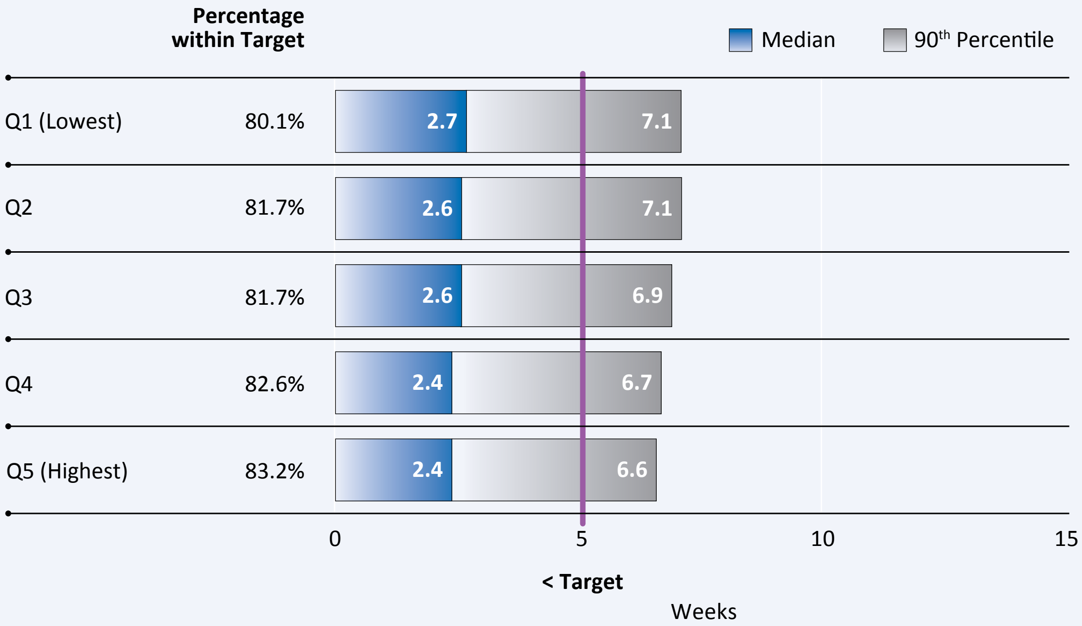
2.7

weeks median wait time from abnormal breast screen to resolution for the lowest income group compared to 2.4 weeks for women in the highest income neighbourhoods.

FIGURE 2.6

Median and 90th percentile wait times from abnormal breast screen to resolution *not* requiring tissue biopsy for women aged 50 to 69, by neighbourhood income quintile (urban population), Canada – 2007–08

Also shown is percentage of cases resolved within the five-week target time frame

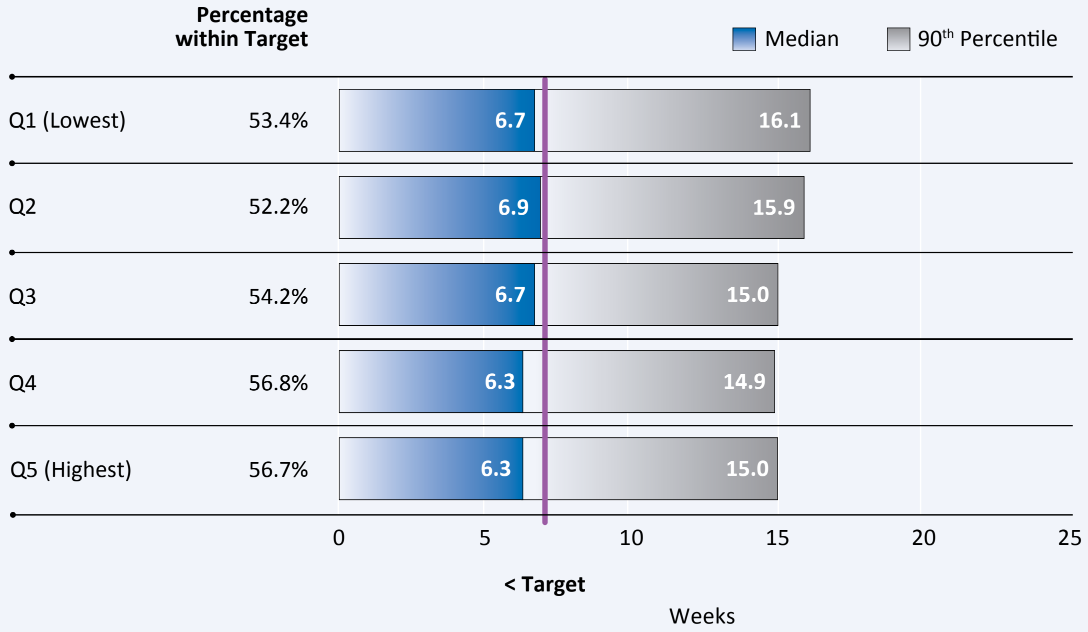


Includes only women living in urban centres as defined by Statistics Canada.
Alberta wait time data are from the Screen Test Program only.
Excludes Quebec because test date and date of diagnosis are not collected.
Excludes Yukon and Nunavut. Yukon does not submit records to the CBCSD and Nunavut has not developed an organized breast screening program but provides opportunistic screening.
Data source: Canadian Breast Cancer Screening Database (CBCSD)

FIGURE 2.7

Median and 90th percentile wait times from abnormal breast screen to resolution requiring tissue biopsy for women aged 50 to 69, by neighbourhood income quintile (urban population), Canada – 2007–08

Also shown is percentage of cases resolved within the seven-week target time frame



Includes only women living in urban centres as defined by Statistics Canada.
Alberta wait time data are from the Screen Test Program only.
Excludes Quebec because test date and date of diagnosis are not collected.
Excludes Yukon and Nunavut. Yukon does not submit records to the CBCSD and Nunavut has not developed an organized breast screening program but provides opportunistic screening.
Data source: Canadian Breast Cancer Screening Database (CBCSD)

compared with 83.2% of women in the highest income group. When the median and 90th percentile wait times were considered, the number of weeks a woman waited for resolution tended to be longer for women in low-income neighbourhoods than for those in high-income neighbourhoods (Figure 2.6). The same pattern was seen for women requiring a tissue biopsy (Figure 2.7), although wait times were longer overall.

When geography was considered, there was a noticeable gradient in wait times, with women residing in rural/very remote locations waiting longer for resolution of their abnormal breast screen results. For women not requiring a tissue biopsy, 70.4% of those living in rural/very remote areas received resolution within the target wait time, compared with 82.1% of women living in urban areas (Figure 2.8). This gap was wider for women undergoing a tissue biopsy, with 38.2% of women in rural/very remote areas receiving resolution within the target wait time of seven weeks, compared with 54.9% of those living in urban areas (Figure 2.9).

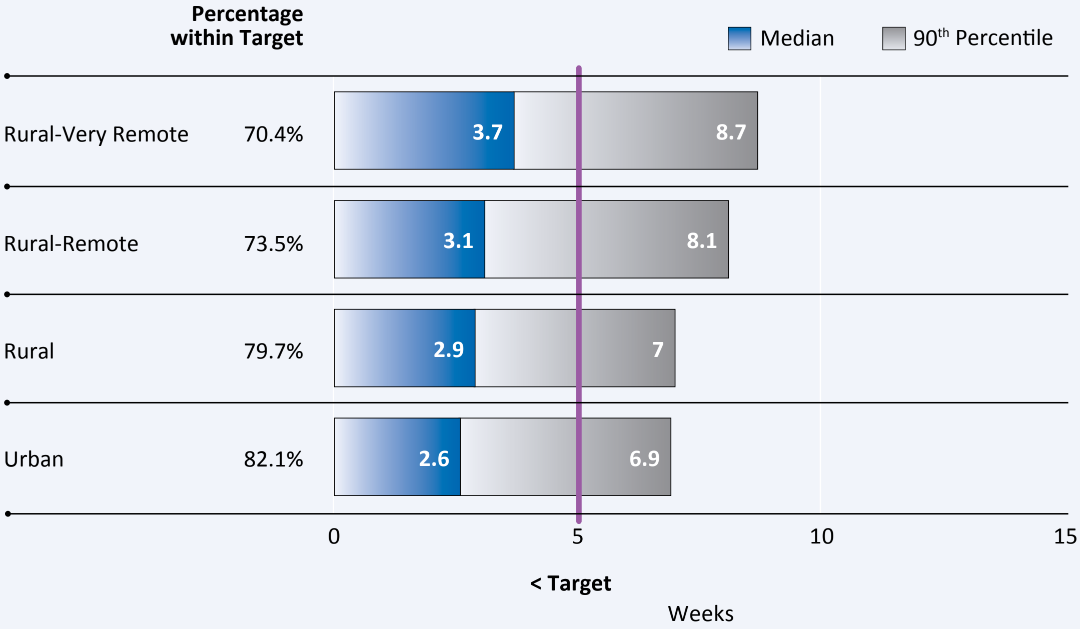
These data suggest that more efforts are needed to ensure all Canadian women have equitable access to timely resolution of abnormal breast screens irrespective of income or place of residence.

Women in rural/very remote locations wait longer for resolution of their abnormal breast screen results.

FIGURE 2.8

Median and 90th percentile wait times from abnormal breast screen to resolution *not* requiring tissue biopsy for women aged 50 to 69, by geography, Canada – 2007–08

Also shown is percentage of cases resolved within the five-week target time frame

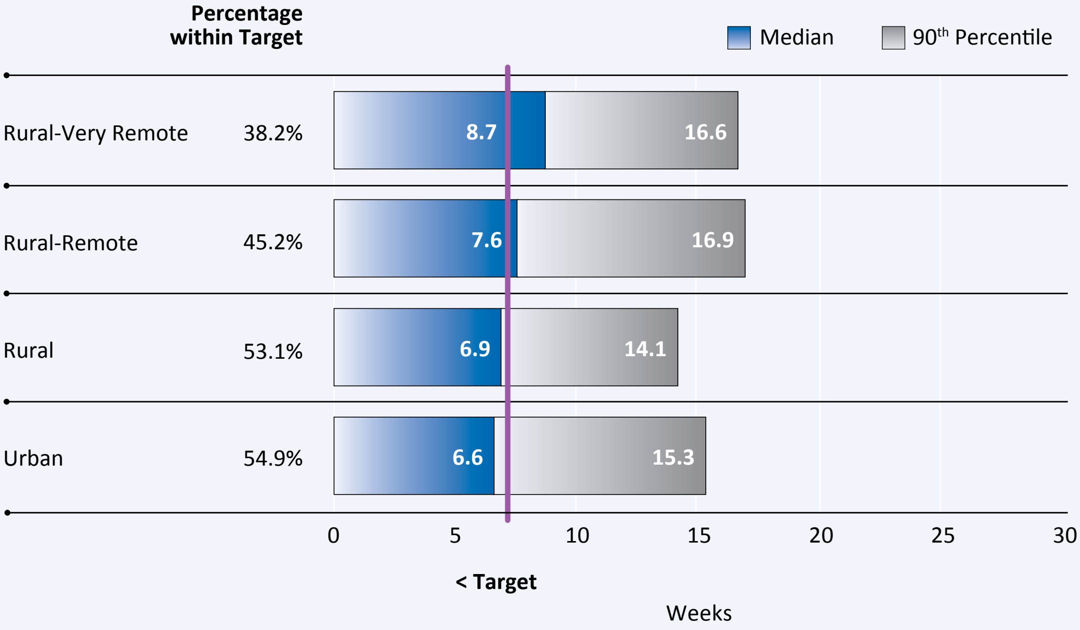


Alberta wait time data are from the Screen Test Program only.
Excludes Quebec because test date and date of diagnosis are not collected.
Excludes Yukon and Nunavut. Yukon does not submit records to the CBCSD and Nunavut has not developed an organized breast screening program but provides opportunistic screening.
Data source: Canadian Breast Cancer Screening Database (CBCSD)

FIGURE 2.9

Median and 90th percentile wait times from abnormal breast screen to resolution requiring tissue biopsy for women aged 50 to 69, by geography, Canada – 2007–08

Also shown is percentage of cases resolved within the seven-week target time frame.



Alberta wait time data are from the Screen Test Program only.
Excludes Quebec because test date and date of diagnosis are not collected.
Excludes Yukon and Nunavut. Yukon does not submit records to the CBCSD and Nunavut has not developed an organized breast screening program but provides opportunistic screening.
Data source: Canadian Breast Cancer Screening Database (CBCSD)

Estimated stage-specific incidence rates and age-standardized incidence and mortality rates

This section of the report examines estimated stage-specific incidence rates by neighbourhood income quintile and geography for breast, colorectal, lung and prostate cancer. This section also examines age-standardized incidence and mortality rates by income and geography for these same cancers. Stage-specific incidence rates were estimated using 2010–11 stage distribution data from the provincial cancer agencies and 2007 age-standardized incidence rates from the Canadian Cancer Registry. Stage-distribution data for breast, colorectal, lung and prostate cancer by neighbourhood income quintile and geography for provinces are available in the Online Supplementary Tables.

Stage-specific incidence rates were not available by immigration status. However, data on stage distribution for breast, colorectal, lung and prostate cancer by immigrant density are available in the Online Supplementary Tables.

Summary of results for estimated* stage-specific incidence rates and age-standardized incidence and mortality rates by neighbourhood income quintile and geography

	What the results show	
Indicator	**Neighbourhood income quintile**	**Geography**
Prostate cancer Age-standardized incidence and mortality	Incidence of prostate cancer is substantially higher among men from high-income neighbourhoods than among those from lower-income neighbourhoods but there is little variation across income groups for mortality	Mortality for prostate cancer is higher in rural and remote areas than in urban areas
Estimated stage-specific incidence rates	Men from higher-income neighbourhoods are more likely to be diagnosed with early- and intermediate-stage prostate cancers than are those from low-income neighbourhoods but they are also more likely to be diagnosed with advanced-stage disease	No clear pattern in stage-specific incidence by geography
Breast cancer Age-standardized incidence and mortality	Incidence of breast cancer is higher in women from higher-income households than in women from lower-income households, with little variation across income groups for mortality	Incidence of breast cancer is higher in urban areas than in rural and remote areas, with little variation across geography for mortality
Estimated stage-specific incidence rates	Women from higher-income neighbourhoods are more likely to be diagnosed with early- and intermediate-stage breast cancer, with little variation in advanced-stage cancer among women from high- and low-income neighbourhoods	Higher early-stage incidence rate in urban areas than in rural and remote areas; no clear geographic patterns for advanced-stage breast cancer
Lung cancer Age-standardized incidence and mortality	People from low-income neighbourhoods have higher incidence and mortality rates for lung cancer than do those from higher-income neighbourhoods	People living in rural, remote and very remote areas have higher incidence and mortality rates for lung cancer than do urban Canadians
Estimated stage-specific incidence rates	People from low-income neighbourhoods have higher rates of advanced-stage lung cancer than do those from high-income neighbourhoods	People living in rural and remote communities are more likely to be diagnosed with advanced-stage lung cancer than are those living in urban areas
Colorectal cancer Age-standardized incidence and mortality	People from low-income neighbourhoods have higher incidence and mortality rates for colorectal cancer than do people from higher-income neighbourhoods	People living in rural, remote and very remote areas have higher incidence and mortality rates for colorectal cancer than do urban Canadians
Estimated stage-specific incidence rates	Little variation in rates across neighbourhood income quintiles	Little variation in rates across urban, rural and remote areas

* Stage-specific incidence is estimated by multiplying the age-standardized incidence rate by the corresponding percent breakdown by stage for each income and geography category.

Site-specific stage distribution based on two or three groupings: early, intermediate and advanced stage. Breast cancer early (1), intermediate (2) and advanced stage (3, 4); lung cancer early (1, 2, 3A) and advanced stage (3B, 3, 4); colorectal cancer early (1, 2), intermediate (3) and advanced stage (4); and prostate cancer early (1), intermediate (2) and advanced stage (3, 4).

Data source: Canadian Cancer Registry and Provincial cancer registries

Why are we reporting on this?

Early diagnosis is critical to improving the prognosis for most cancer types. Disparities in access to screening and early detection services may lead to differences in the proportion of patients diagnosed with early versus advanced stages of cancer among the sub-populations.

As of the 2010 diagnosis year, population-level stage data are available for the first time for the four highest-incidence cancer sites from nine of 10 Canadian provinces. The availability of these data presents a new opportunity to use stage data to understand variations in screening and early detection and their subsequent effect on outcomes. Detection of cancer at an early or advanced stage may be considered a marker for inequities between different socio-demographic segments of the population in access to preventive health care and to early detection and diagnostic services.

Assessing stage distribution across socio-demographic groups by comparing the percentage of cases by stage can be problematic, however, because the percentage of advanced-stage cases at a specific income level or in a particular geography can be lower because *fewer late-stage cases are diagnosed* relative to other stages or because *more early-stage cases are diagnosed* than other stages. This fact could compromise our ability to understand the true impact of differences in screening and early detection.

To address this problem, this section uses information on cancer stage at diagnosis to estimate stage-specific incidence rates. These rates are estimated by multiplying the percentage of early-, intermediate- and advanced-stage cancers by the age-standardized incidence rates for each income quintile and geography. With the important caveat that different data sources and data years are used to estimate stage-specific incidence rates, this approach provides a preliminary look at how age-standardized incidence rates vary by stage at diagnosis by income and geography and how that variation relates to mortality rates.

Studies show that the incidence and mortality rates for several types of cancers vary by income and geography. Variations across income levels and geography in the prevalence of risk factors (e.g., smoking rates, alcohol consumption), screening, stage at diagnosis and utilization of and access to cancer treatments may all play a role in varying incidence and mortality patterns. Understanding patterns in cancer incidence and mortality by income level and geography is important in helping to identify population groups that are at greatest risk of cancer and who may therefore benefit from targeted interventions. This analysis also provides important insights into the impact of cancer control interventions, such as smoking cessation and other prevention programs, cancer screening, early detection and treatment.

What do we already know?

Canadian data show different incidence, mortality and survival patterns for different cancers across income levels and geography.[17, 38, 89-92] For example, data for lung cancer show that age-standardized incidence and mortality rates were highest for those at the lowest income level and followed a clearly decreasing trend from lowest to highest income quintile for both women and men. The same income pattern was shown for lung cancer survival in urban populations.[38, 89]

Incidence rates for breast cancer followed a reverse trend, with a lower incidence among women from lower-income neighbourhoods (although there was little difference in breast cancer mortality by income quintile).

Similarly, Canadian data show variability in the urban and rural incidence and mortality rates for specific cancers.[89, 92] For instance, lung cancer incidence and mortality rates were higher in rural and remote areas in Canada than in urban areas, whereas age-standardized incidence rates of breast cancer were higher in urban than in rural and remote areas.[89]

Stage at diagnosis is an important determinant of cancer mortality. Data from the U.S. show that people with cancer who reside in the lowest-income neighbourhoods and in rural and remote areas are more likely to be diagnosed with later-stage cancers than people from higher-income neighbourhoods and those residing in major cities.[93-95]

What do we know about disparities in stage distribution?

Disparities in cancer outcomes may be linked to a higher proportion of late-stage cancers diagnosed in groups with lower socio-economic status than the general population. In the U.S., several studies have demonstrated an association between cancer stage and income.[96-99] A few studies in particular showed that those living in areas with higher income levels were more likely to be diagnosed at an earlier stage of cancer across the major disease sites (breast, prostate and colorectal).[100-101] The connection was strongest for breast cancer.[102]

A population-based study in British Columbia showed significant differences in stage distribution for breast cancer, with a greater proportion of advanced-stage cancers being diagnosed in rural communities than in large urban areas.[103] Similarly, studies in the U.S. have shown that those who live in rural communities or are immigrants are at greater risk of being diagnosed with advanced-stage cancer.[104-109] A study in Kentucky found that longer travel distance from rural and remote communities to primary care facilities contributed to poorer breast cancer outcomes and later stage at diagnosis, owing to decreased access to and utilization of primary and diagnostic health-care services.[110]

As well, immigrant Hispanic women in the U.S. were more likely to present with unstaged cancer[107] and were staged with larger tumours at diagnosis than were U.S.-born women.[111] Several factors may contribute to late-stage diagnosis among immigrants, such as language barriers, awareness of screening guidelines, access to screening services and cultural beliefs.[112-115]

As noted in this section, stage distribution results should be interpreted with caution because over-detection of early-stage cancers through screening in certain populations may result in an apparent reduction in the proportion of advanced-stage cancers when in fact the incidence rates of advanced-stage cancers may be no different.

What do the results show?

Prostate cancer

Data from the CCR show that the age-standardized incidence rate of prostate cancer is lower in men from lower-income neighbourhoods than in men from higher-income neighbourhoods (110.3 per 100,000 and 140.5 per 100,000, respectively) (Figure 2.10). In contrast, the age-standardized mortality rates for prostate cancer are no different across neighbourhood income quintiles (Figure 2.11). Thus, while more men from high-income neighbourhoods than low-income neighbourhoods are being diagnosed with prostate cancer, the likelihood of dying from prostate cancer is quite similar for men from both high- and low-income neighbourhoods.

An examination of the stage-specific rates shows that men from high-income neighbourhoods are much more likely to be diagnosed with early- and intermediate-stage prostate cancer and even slightly more likely to be diagnosed with advanced-stage prostate cancer than are men from low-income neighbourhoods (Figure 2.12). For early-stage cancers, the estimated incidence rate increases with neighbourhood income quintile. It was 13.2 per 100,000 in low-income

The incidence of prostate cancer is lower in men from lower-income neighbourhoods.

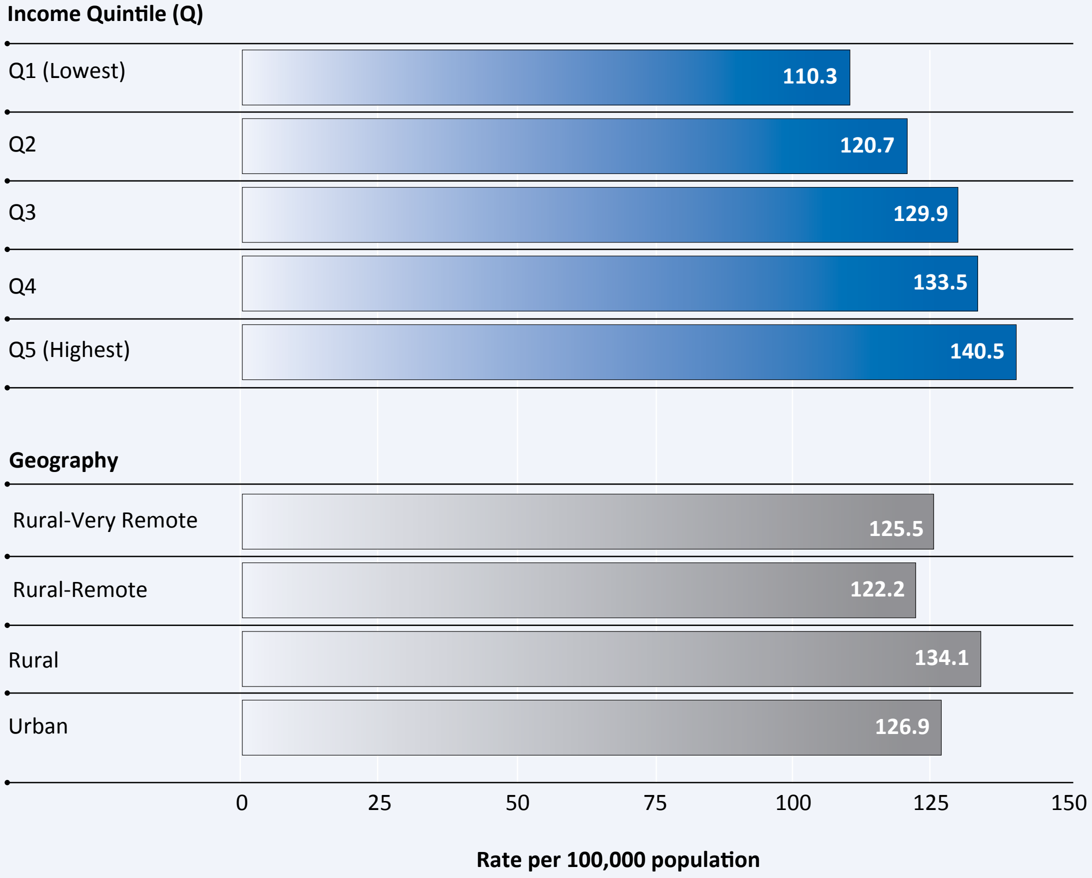
neighbourhoods, compared with 18.3 per 100,000 in high-income neighbourhoods. Men from high-income neighbourhoods were slightly more likely to be diagnosed with advanced-stage prostate cancer than were men from low-income neighbourhoods (26.3 per 100,000 in low-income neighbourhoods compared with 28.8 per 100,000 in high-income neighbourhoods).

These findings suggest that much of the income-related difference seen in the age-standardized incidence rates for prostate cancer is a result of more cancers being diagnosed at an early stage among men living in high-income neighbourhoods. This likely reflects higher use of PSA testing among men from high-income neighbourhoods relative to men from low-income neighbourhoods. Data from the Canadian Community Health Survey show that, among men aged 35 or older, 54.5% in the highest-income neighbourhoods reported ever having had a PSA test for asymptomatic reasons, compared with 43.8% of men in the lowest-income

Much of the income-related difference in incidence rates for prostate cancer is a result of cancers being diagnosed early in men from high-income neighbourhoods.

FIGURE 2.10

Age-standardized incidence rates of prostate cancer by neighbourhood income quintile and geography, Canada – 2007



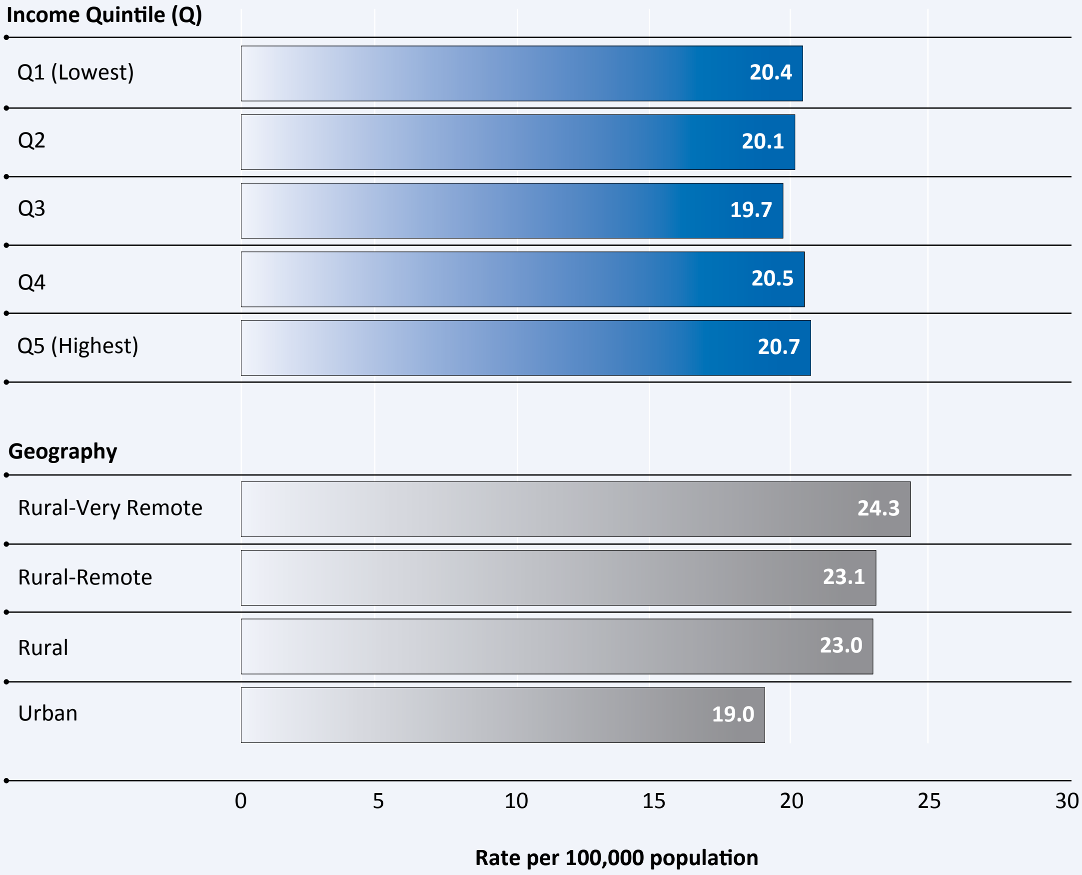
Data source: Statistics Canada, Canadian Cancer Registry

neighbourhoods (data not shown).[c] This fact suggests that more PSA testing among men from high-income neighbourhoods may be leading to an excess of detection of early-stage prostate cancers without a reduction in advanced-stage prostate cancers, and more importantly, without a reduction in mortality. This analysis suggests that men from high-income neighbourhoods may be over-diagnosed (and potentially over-treated) for prostate cancer.[116-117]

While there was no distinct pattern in the age-standardized incidence rates of prostate cancer by geography, there were notable differences when the age-standardized mortality rates were examined by geography: there were fewer deaths in men residing in urban areas than in men residing in rural and very remote areas. An examination of stage-specific incidence rates by geography showed no clear pattern in the estimated incidence rates of early-stage and

FIGURE 2.11

Age-standardized mortality rates of prostate cancer by neighbourhood income quintile and geography, Canada – 2007



Data source: Statistics Canada, Vital Statistics Death Database

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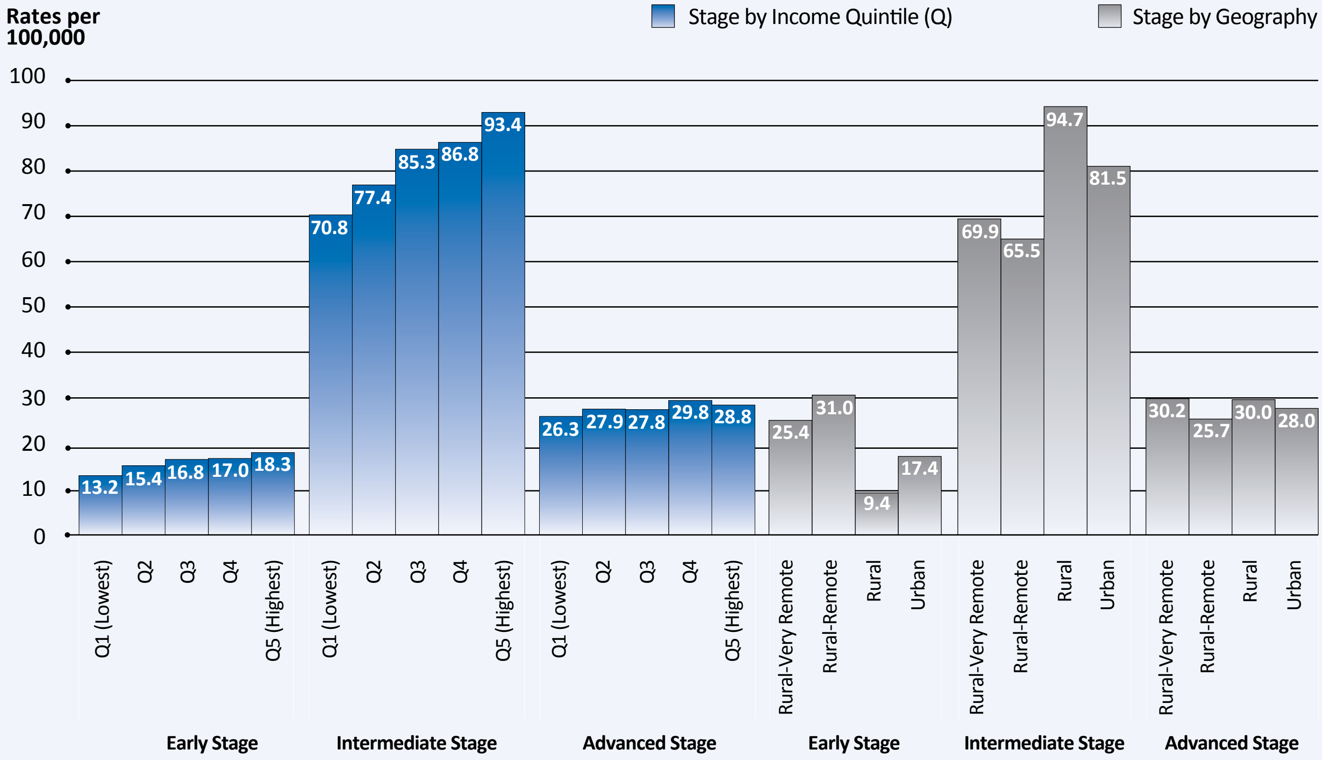
[c] Because PSA testing is optional content in the Canadian Community Health Survey, percentages include the following provinces/territories and data years: 2010 data from NL, PE and YT; 2011 data from NU; 2011 and 2012 data from ON; and 2010, 2011 and 2012 data from NS and NT.

FIGURE 2.12

Stage-specific incidence rates for prostate cancer, by neighbourhood income quintile and geography

Estimated* using stage distribution data from 2010 and 2011 diagnosis years (combined) and age-standardized incidence rates from 2007



Early includes Stage 1, intermediate includes Stage 2 and advanced includes Stages 3 and 4.
*See the Online Technical Appendix for more details
Data source: Provincial cancer agencies and Statistics Canada, Canadian Cancer Registry

advanced-stage prostate cancer, but more detailed analysis is required to confirm this.

Breast cancer

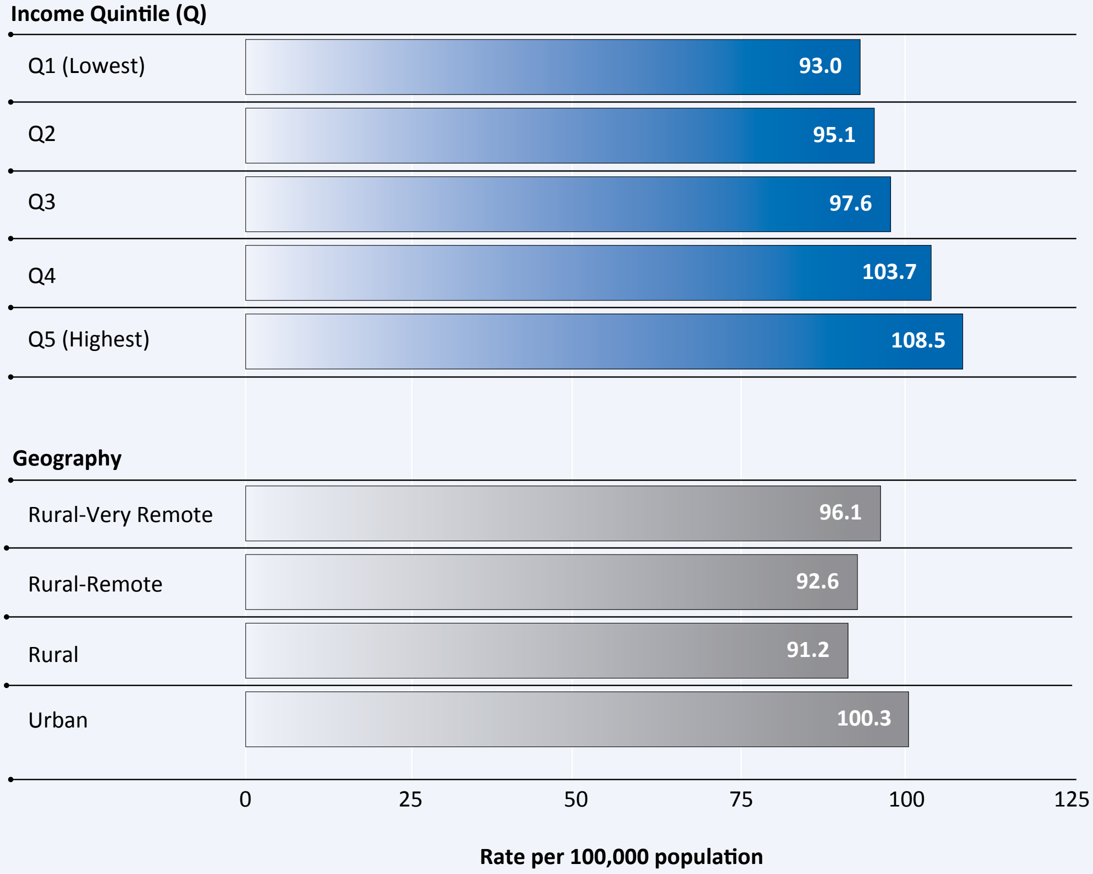
As with prostate cancer, the data for breast cancer show higher age-standardized incidence rates for women from high-income neighbourhoods (108.5 per 100,000) than for women from low-income neighbourhoods (93.0 per 100,000), with no corresponding difference in mortality rates by neighbourhood income quintile (about 22 per 100,000) (Figures 2.13 and 2.14).

Consistent with higher rates of breast cancer screening among women from high-income neighbourhoods (as shown in the self-reported screening section of this report), the estimated stage-specific incidence rate shows a higher rate of early-stage breast cancer among women from high-income neighbourhoods than among women from low-income neighbourhoods (Figure 2.15). However, the incidence rates of advanced-stage breast cancer were similar across neighbourhood income quintiles despite higher screening rates among high-income women: it was 18.8 per 100,000 among women living in the lowest-income neighbourhoods, compared with 18.4 per 100,000 among women living in the highest-income neighbourhoods. Further analyses are needed to confirm this finding. Although income was not examined, a recent U.S. study using population-based data from the Surveillance, Epidemiology, and End Results data in the U.S. examined trends in the incidence of early- and late-stage breast cancer after three decades of mammography screening and showed a marginal reduction in the rate of advanced-stage breast cancer from 1976 to 2008.[118]

When rates were examined by geography, the age-standardized incidence rate of breast cancer was slightly higher among women residing in urban areas and lower among women living in rural and remote areas (Figure 2.13). Mortality

FIGURE 2.13

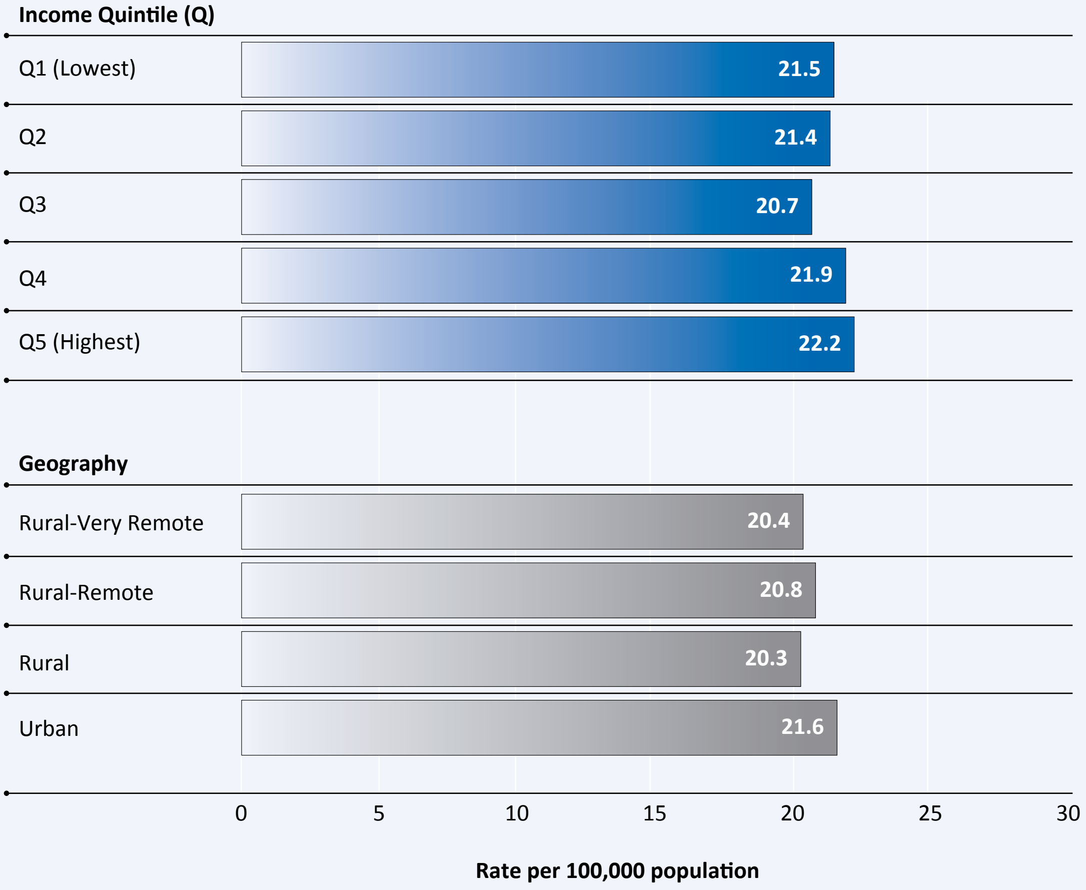
Age-standardized incidence rates of breast cancer by neighbourhood income quintile and geography, Canada – 2007



Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 2.14

Age-standardized mortality rates of breast cancer by neighbourhood income quintile and geography, Canada – 2007



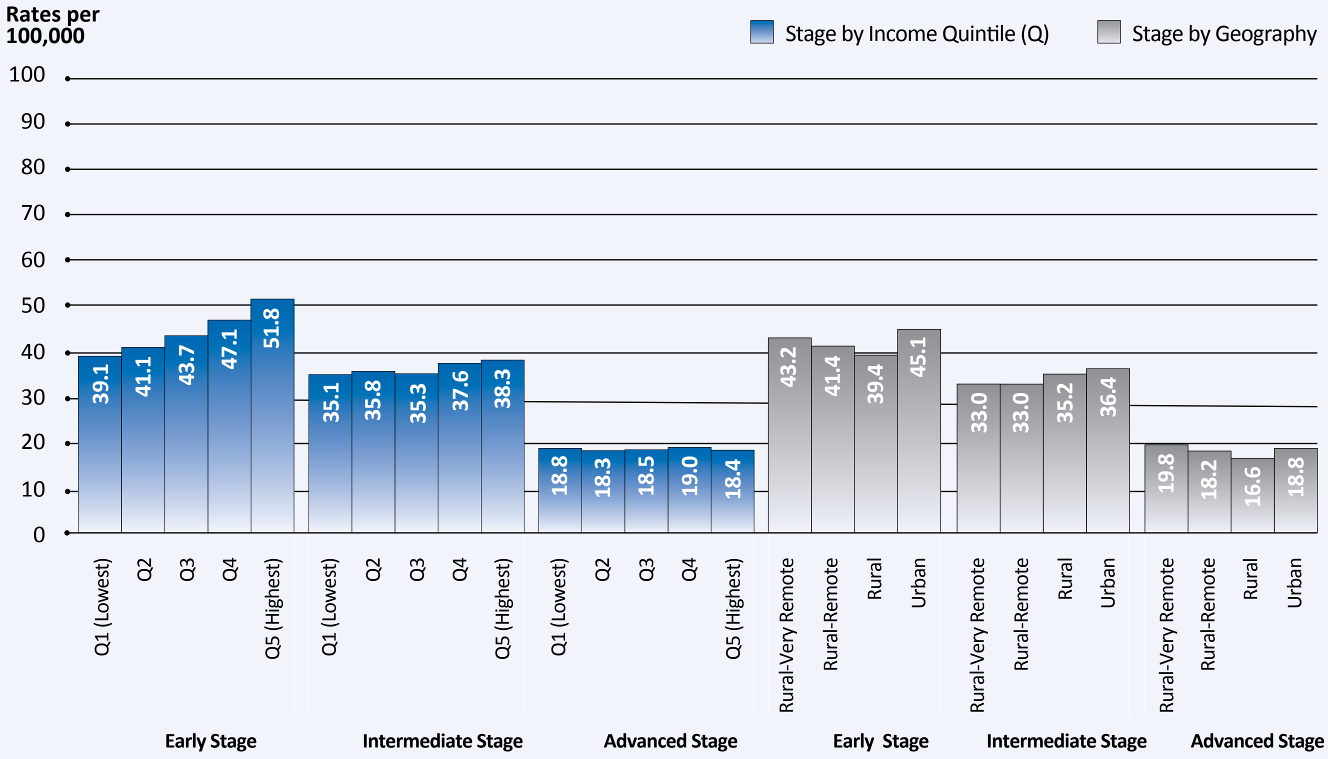
Data source: Statistics Canada, Vital Statistics Death Database

rates were marginally higher among women residing in urban areas (21.6 per 100,000) than among women living in rural-very remote areas (20.4 per 100,000) (Figure 2.14). Analysis of stage-specific incidence rates suggest a slightly higher rate of early-stage cancers among women residing in urban areas than among those living in rural and remote areas with little variation in advanced-stage breast cancer by geography (Figure 2.15). Given that stage-specific rates given here are estimates, however, more detailed analyses are needed to confirm this result.

FIGURE 2.15

Stage-specific incidence rates for breast cancer, by neighbourhood income quintile and geography

Etimated* using stage distribution data from 2010 and 2011 diagnosis years (combined) and age-standardized incidence rates from 2007



Early includes Stage 1, intermediate includes Stage 2 and advanced includes Stages 3 and 4.
*See the Online Technical Appendix for more details
Data source: Provincial cancer agencies and Statistics Canada, Canadian Cancer Registry

Lung cancer

The age-standardized incidence and mortality rates for lung cancer showed substantial differences across income levels and geography (Figures 2.16 and 2.17). Canadians living in lower-income neighbourhoods and those living in rural, remote or very remote areas had higher age-standardized incidence and mortality rates of lung cancer than Canadians living in higher-income neighbourhoods and urban Canadians, respectively. Household income and geographic differences in smoking likely contribute to some of the age-standardized incidence patterns shown here. Tobacco use is more prevalent among Canadians living in low-income households and rural and remote areas (although cessation rates are higher in rural and remote areas), as presented in the Risk Factors section of this report.

The incidence and mortality rates for lung cancer showed substantial differences across income and geography.

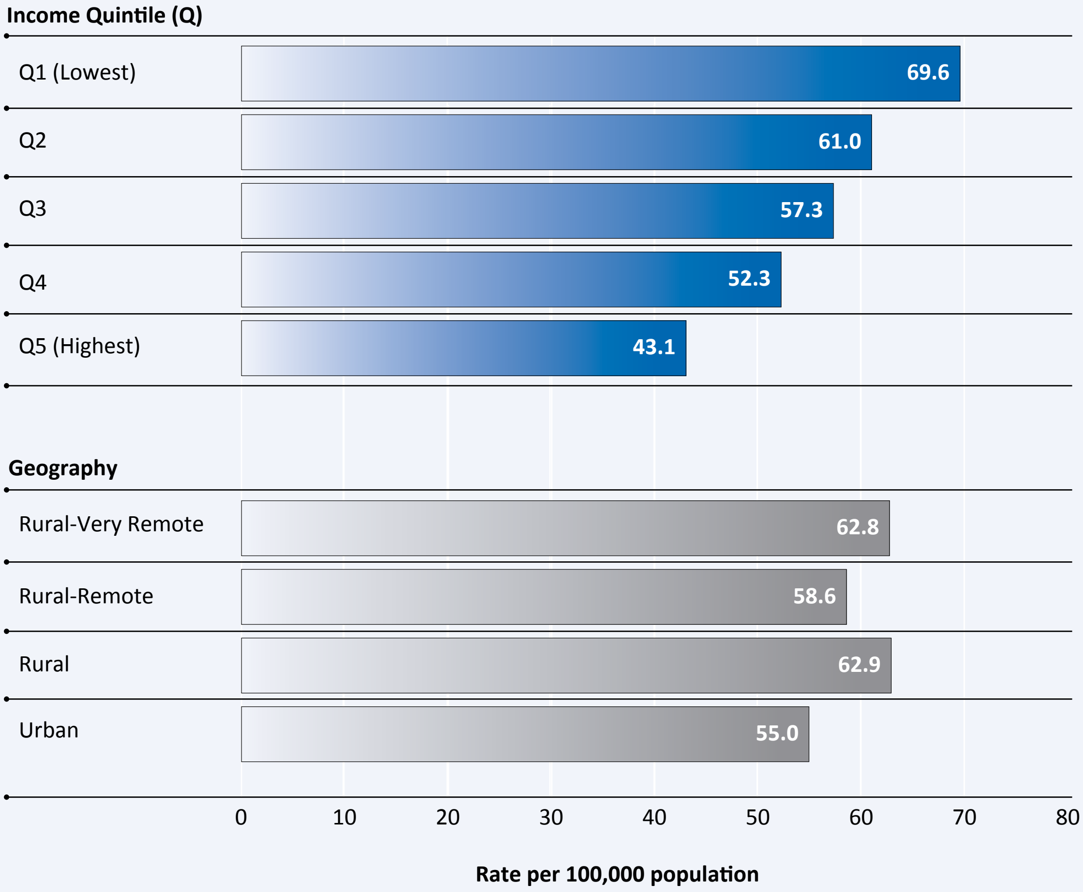
An examination of stage-specific incidence rates showed a similar pattern, with higher rates of both early- and advanced-stage lung cancer among those living in the lowest-income neighbourhoods (Figure 2.18).

There was no clear pattern when the rates of early-stage lung cancer were examined by geography. However, rates of advanced-stage lung cancer increased with increasing rurality, with rates highest among those residing in rural-very remote (39.5 per 100,000) and rural-remote (35.5 per 100,000) parts of the country. This suggests that those living in rural

Those living in rural and remote areas are more likely to have their lung cancer diagnosed at a later stage.

FIGURE 2.16

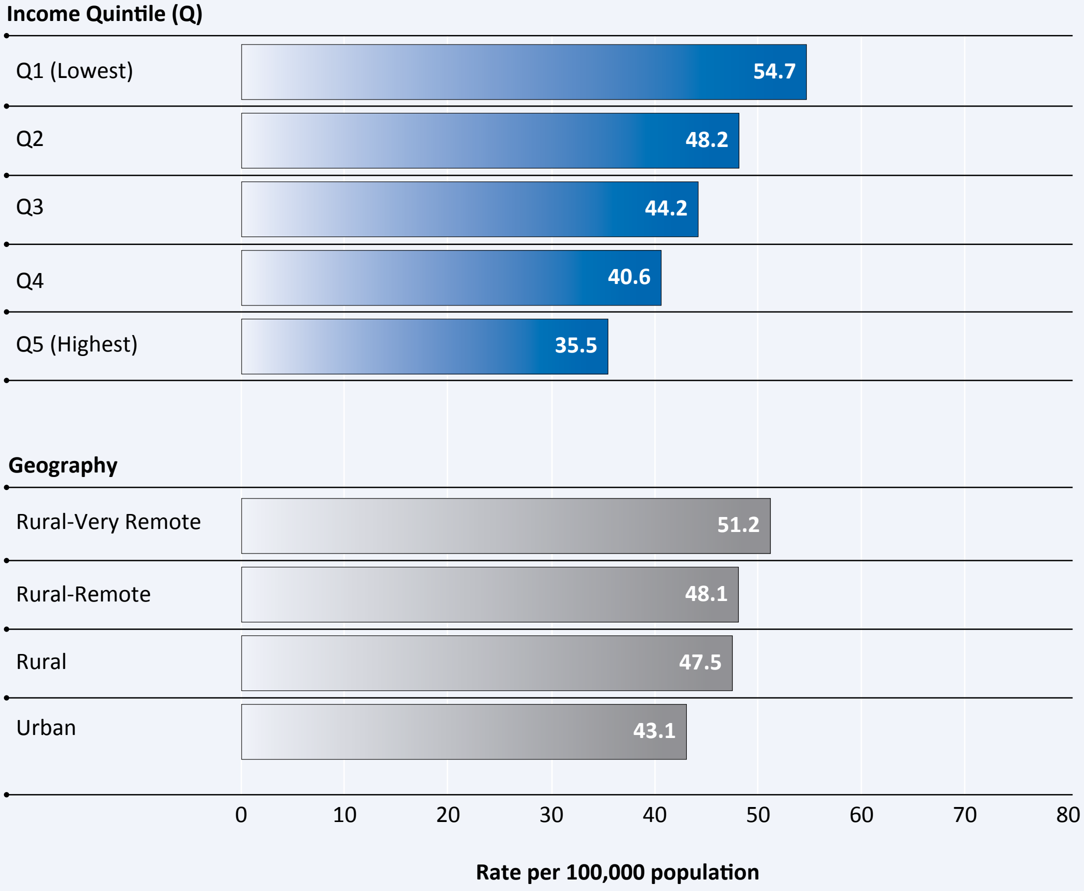
Age-standardized incidence rates of lung cancer by neighbourhood income quintile and geography, Canada – 2007



Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 2.17

Age-standardized mortality rates of lung cancer by neighbourhood income quintile and geography, Canada – 2007

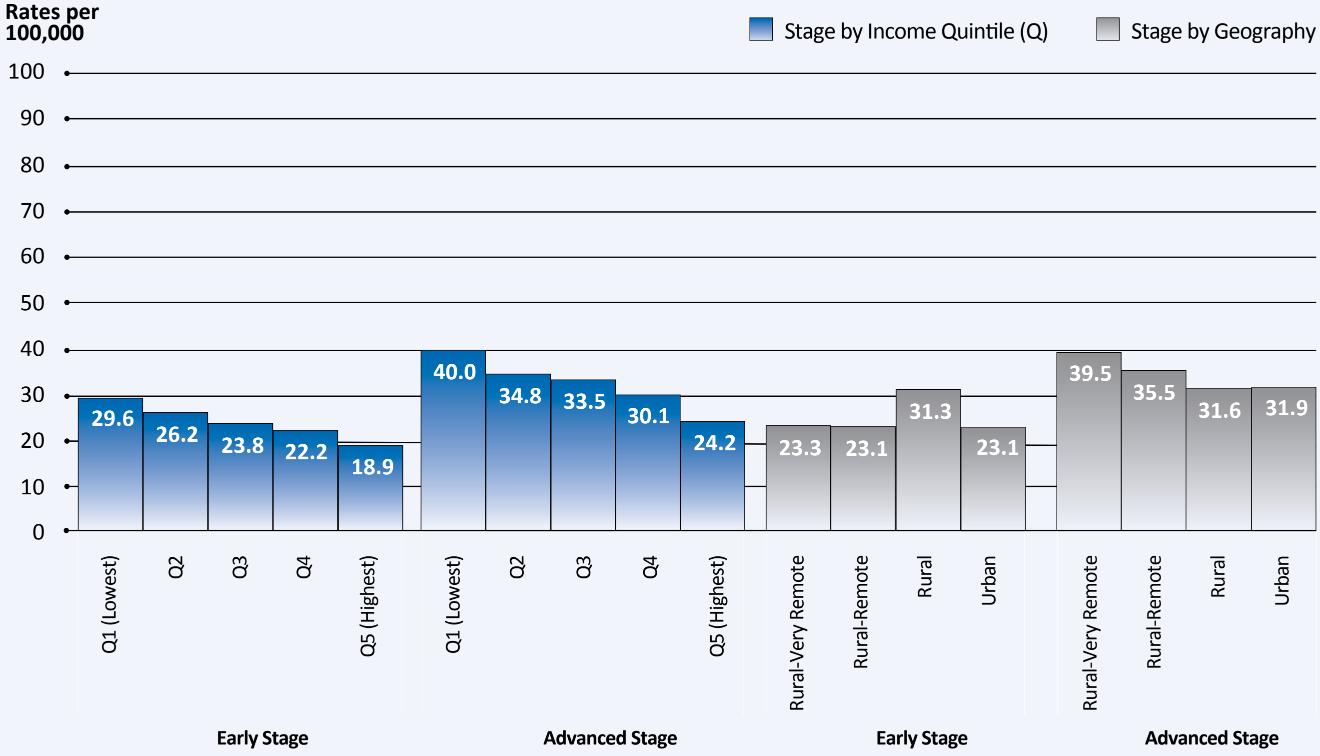


Data source: Statistics Canada, Vital Statistics Death Database

FIGURE 2.18

Stage-specific incidence rates for lung cancer, by neighbourhood income quintile and geography

Estimated* using stage distribution data from 2010 and 2011 diagnosis years (combined) and age-standardized incidence rates from 2007



Early includes Stages 1, 2 and 3A and advanced includes Stages 3B and 4.
*See the Online Technical Appendix for more details
Data source: Provincial cancer agencies and Statistics Canada, Canadian Cancer Registry

and remote areas are more likely to have their lung cancer diagnosed at a later stage, which in turn may partially account for the higher mortality rates seen among those residing in rural and remote locations, although treatment options for most lung cancers are quite limited.

Colorectal cancer

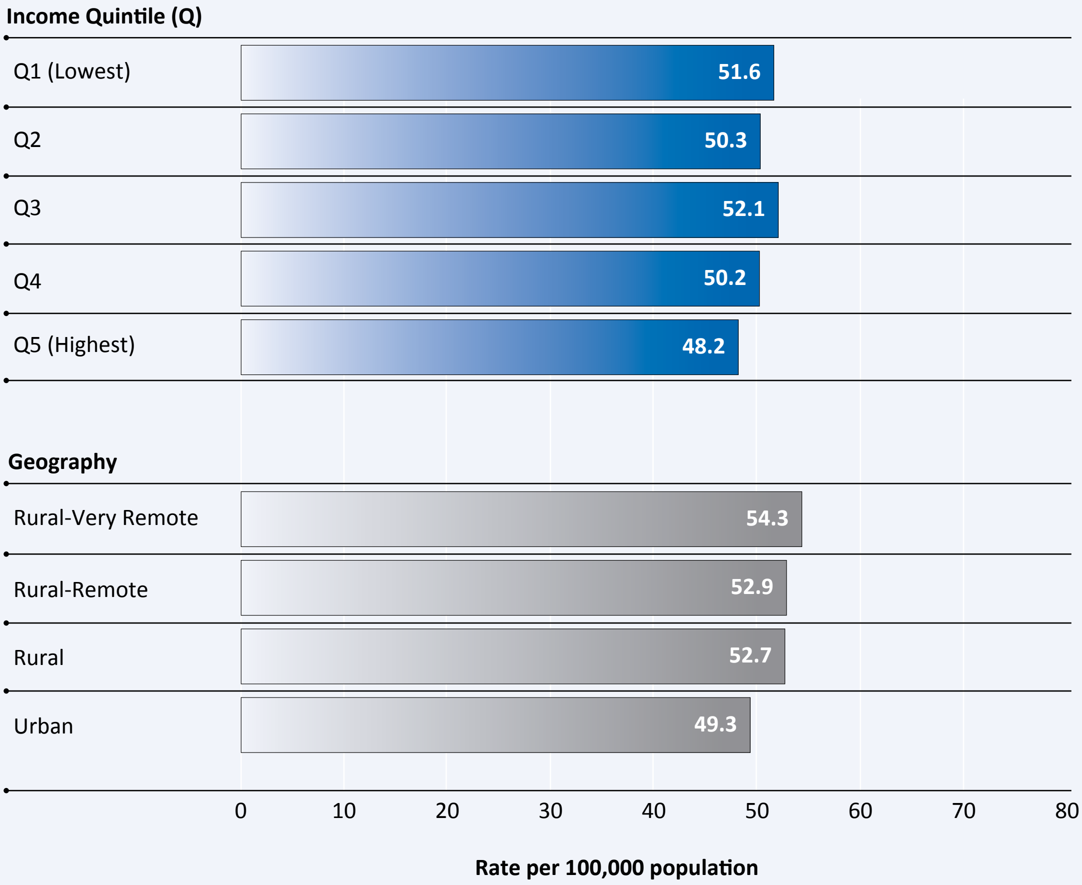
For colorectal cancer, the age-standardized incidence rates were slightly higher among Canadians at the lowest neighbourhood income quintile than among those at the highest income quintile. This relationship held true with age-standardized mortality rates, although only marginally (Figures 2.19 and 2.20). Preliminary data on stage-specific incidence rates show little variation in rates across income quintiles. (Figure 2.21). Because organized colorectal screening programs were not in place to have any impact on the results, any differences in incidence rates between income groups are at least partially due to varying risk profiles (e.g., obesity rates, diet, alcohol consumption) between income quintiles or access to non-programmatic colorectal cancer testing.

The age-standardized incidence rates for colorectal cancer were slightly higher among Canadians living in rural, remote and very remote areas than among urban residents (Figures 2.19 and 2.20). The mortality rate for colorectal cancer was higher in rural and remote parts of the country than in urban areas. However, stage-specific rates show little variation in the rate of advanced-stage colorectal cancer across geography (Figure 2.21). Rates of early-stage colorectal cancer were higher among those residing in rural and remote areas of the

The mortality rate for colorectal cancer was higher in rural and remote parts of the country.

FIGURE 2.19

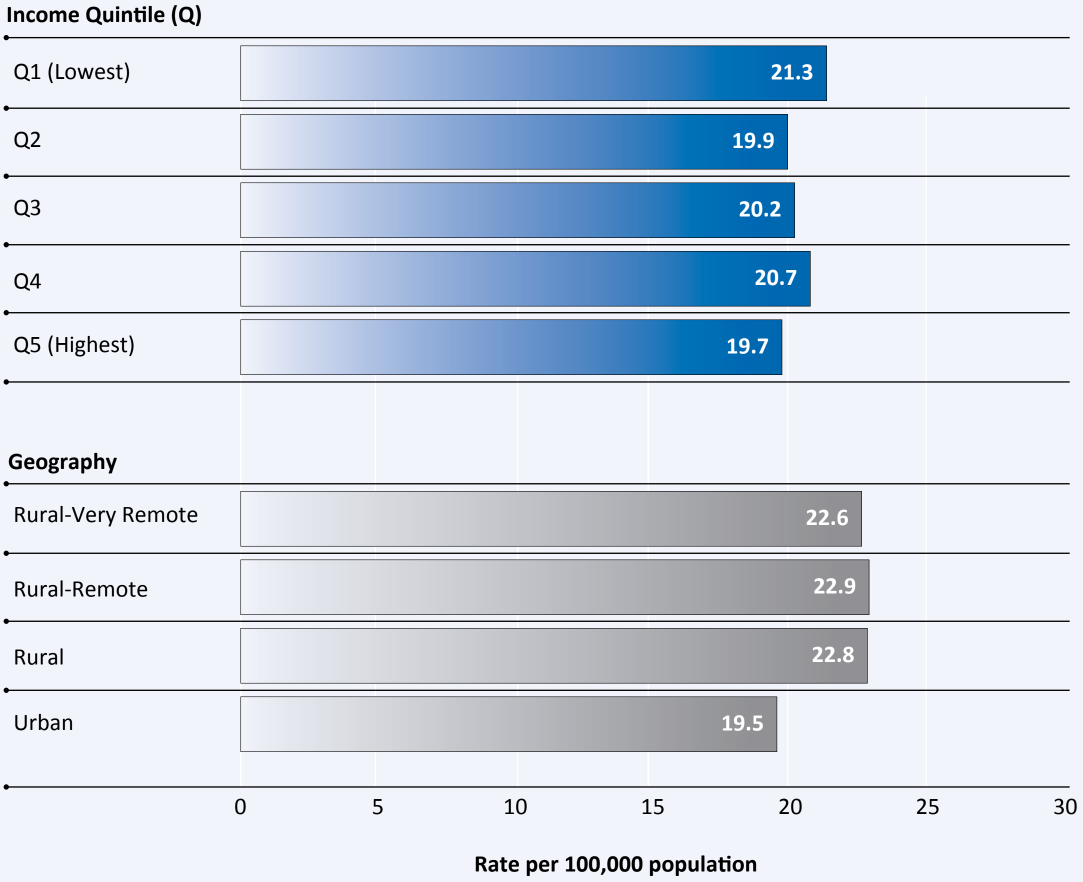
Age-standardized incidence rates of colorectal cancer by neighbourhood income quintile and geography, Canada – 2007



Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 2.20

Age-standardized mortality rates of colorectal cancer by neighbourhood income quintile and geography, Canada – 2007

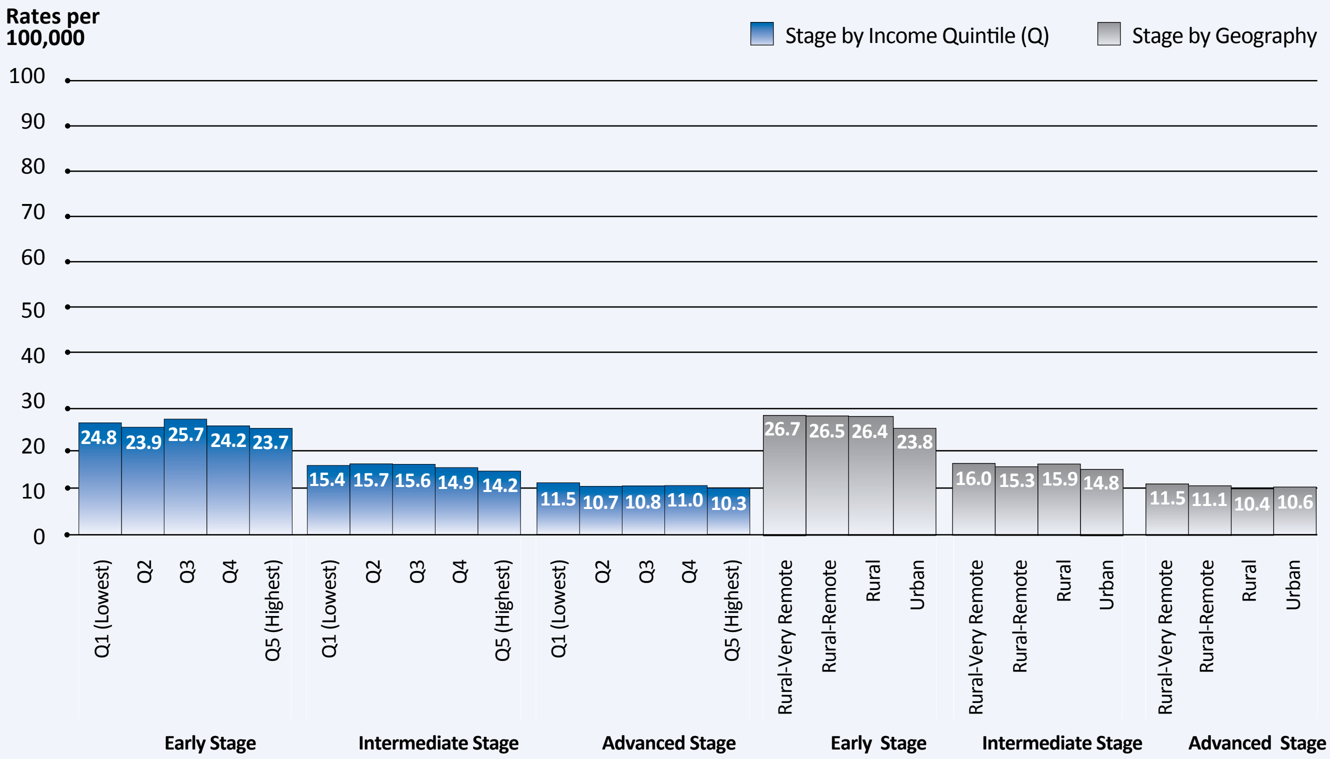


Data source: Statistics Canada, Vital Statistics Death Database

FIGURE 2.21

Stage-specific incidence rates for colorectal cancer, by neighbourhood income quintile and geography

Estimated* using stage distribution data from 2010 and 2011 diagnosis years (combined) and age-standardized incidence rates from 2007



Early includes Stages 1 and 2, intermediate includes Stage 3 and advanced includes Stage 4.
*See the Online Technical Appendix for more details
Data source: Provincial cancer agencies and Statistics Canada, Canadian Cancer Registry

country than in those residing in urban areas. These preliminary results suggest that the higher rates of mortality from colorectal cancer among those residing in rural and remote areas cannot be explained by later detection but possibly by access to and utilization of treatment (although the data available for this report have not demonstrated this to be the case).

Treatment

Timely access to effective treatment is a critical component of cancer control. Treatment is also usually the most resource-intensive part of the cancer control system from a system planning and service delivery perspective. Socio-demographic disparities in access to treatment (and subsequent outcomes) have been studied and reported on extensively in many developed countries. In Canada, a number of published studies have examined the influence of income, education, geography, age and sex on differences in access to cancer care services; a few Canadian studies have specifically examined access to treatment.[119]

This section examines variations in access to treatment by neighbourhood income quintile, immigrant status (measured through neighbourhood immigrant density) and geography (urban, rural or remote place residence) for three key system performance indicators in the treatment domain: radiation therapy wait times, radiation therapy utilization and rates of two types of cancer surgery. The radiation therapy indicators are based on data from the provincial cancer agencies and programs and where available, indicator results are presented by province in the Online Supplementary Tables. The cancer surgery indicators are based on hospital utilization data from the Canadian Institute for Health Information.

Summary of results for treatment indicators by neighbourhood income quintile, geography and immigrant density

Indicator	What the results show		
	Neighbourhood income quintile	**Geography**	**Immigrant density**
Radiation therapy wait times Percentage of cancer patients treated within radiation therapy wait time target	No difference in wait times across neighbourhood income quintiles	No notable difference in wait times across urban, rural and remote areas	No notable difference in wait times between areas characterized as high immigrant density and those characterized as low density
Radiation therapy utilization Percentage of cancer patients receiving radiation therapy within 2 years of diagnosis	No difference in radiation therapy rates across neighbourhood income quintiles	Radiation treatment rates are lower in rural/remote (30.4%) and rural/very remote (27.8%) communities than in urban areas (32.5%) and for patients living farther from a radiation treatment centre	No difference in radiation therapy rates between areas characterized as high immigrant density and those characterized as low density
Mastectomy Percentage of breast cancer resections that are mastectomies	Women from the lowest-income neighbourhoods are more likely (39.9%) than women from the highest-income neighbourhoods (35.6%) to have a mastectomy rather than breast-conserving surgery	Mastectomy rates were highest in rural/very remote communities (52.3%, compared with 37.5% in urban areas) and for patients living more than a 40-minute drive from nearest radiation treatment centre	Mastectomy rates were higher in low immigrant density areas (46.0%) than in the highest-density areas (36.0%).
Permanent colostomy/ ileostomy Percentage of patients diagnosed with rectal cancer who had permanent colostomy/ ileostomy	No difference in permanent colostomy rates by neighbourhood income quintile	Permanent colostomy rates are higher for patients living in rural/very remote communities (41.9%) than for those living in urban (35.9%) and rural (36.1%) communities	Permanent colostomy rates were lower for patients living in communities with the highest immigrant density (30.3%) than for those in the lowest-density areas (37.9%)

Data sources: Provincial cancer registries, Hospital Morbidity Database, National Ambulatory Care Reporting System, Alberta Ambulatory Care Reporting System

Radiation therapy wait times

Why are we reporting on this?

Wait times are among the most commonly cited measures of access to health-care services in general and in cancer specifically. Reducing radiation therapy wait times for cancer patients is a national health-care priority. National wait time targets have been set and provinces have implemented initiatives to reduce wait times.[120] A number of Canadian studies have examined disparities in timely access to radiation therapy for cancer patients, although most were limited to data from a single province and focused on a disease site, usually breast (see section below). A few studies have shown geographic disparities in radiation therapy wait times, typically showing longer wait times for people living farther away from treatment centres.[121-122]

The wait time indicators presented in this section examine wait times for all cancers combined and then looks separately at prostate and lung cancer as two disease sites with generally different urgency levels for timely access to treatment.

What do we already know?

Based on two recent systematic reviews,[22, 119] no Canadian studies have conclusively shown a significant relationship between radiation therapy wait times and income after adjusting for driving distance. No published studies were identified that examined differences in radiation therapy wait times between immigrant and Canadian-born communities at the jurisdiction level in Canada. A relationship between radiation therapy use and SES has been demonstrated in at least one U.K. study,[123] although variations in stage at diagnosis and other prognostic factors were not considered and could explain at least part of the radiation therapy rate gap.

What do the results show?

In 2012, there was no observed pattern in the percentage of cancer patients treated with radiation therapy within the wait time target (28 days) by neighbourhood income quintile, geography or immigrant density for all cancers combined (Figure 2.22) or for lung cancer alone (Figure 2.23). For prostate cancer, there was also no distinct pattern in radiation therapy waits across neighbourhood income quintiles, but the proportion of patients treated within the target in rural-remote and rural/very remote neighbourhoods (86.0% and 85.0%, respectively) was marginally higher than that for those residing in urban and rural areas (83.5% and 80.7%, respectively) (Figure 2.24).

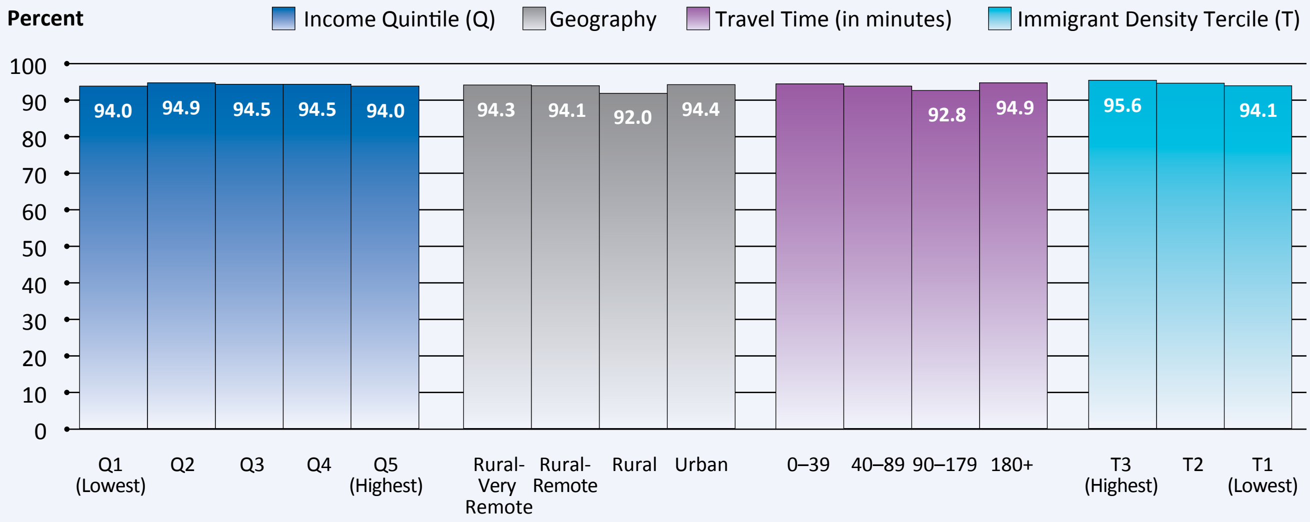
These results are reassuring in that they suggest that people living farther away from radiation treatment centres do not wait longer for access to therapy than those living closer to cancer centres (assuming that people in rural and remote communities have a case mix and therefore treatment urgency profile comparable with those of people in urban communities). For prostate cancer, those living in neighbourhoods characterized as having a higher immigrant density were slightly more likely to be treated within the wait time target (88.3%) than were those living in neighbourhoods characterized as having a lower immigrant density (83.4%) (Figure 2.24).

People living farther away from radiation treatment centres do not wait longer for access to therapy.

Figures 2.22, 2.23 and 2.24 shows the percentage treated within the wait time target by one-way travel time to the nearest radiation treatment centre. Wait time for radiation therapy were consistently not associated with travel time to radiation therapy centres for all cancers combined. Similarly, there was no distinct pattern linking driving distance and radiation therapy wait times for lung and prostate cancer (see the Online Supplementary Tables).

FIGURE 2.22

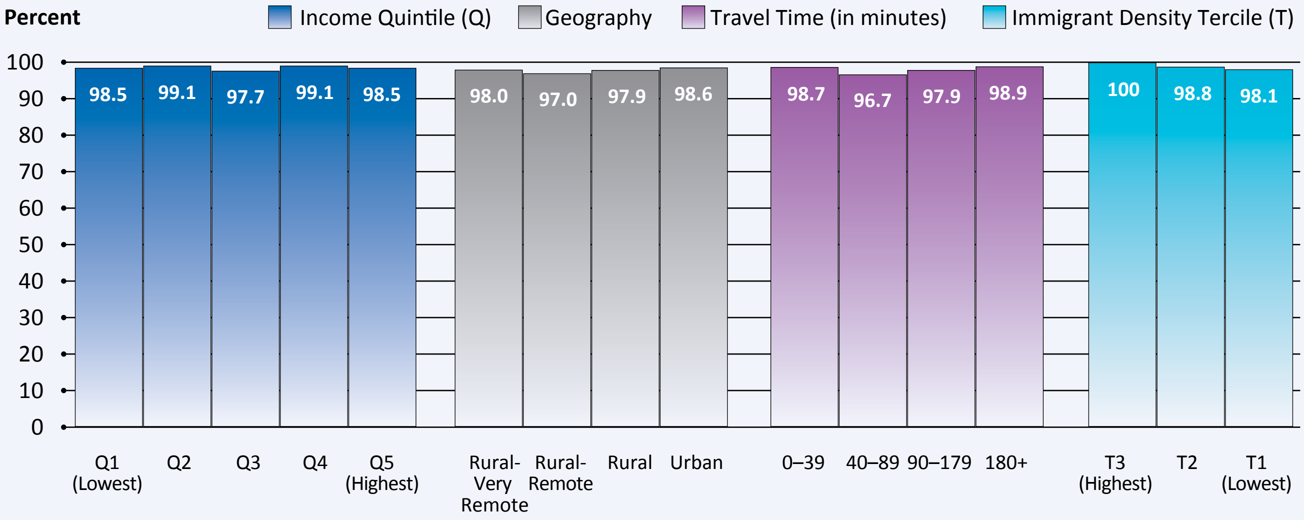
Percentage of cancer patients treated within radiation therapy wait time target, by neighbourhood income quintile (urban population), geography, travel time to nearest radiation treatment facility and immigrant density – all cancers combined, 2012



Excludes NL, ON, QC and the territories.
Income quintiles include only people living in urban centres as defined by Statistics Canada.
Radiation therapy wait time target is 28 days from ready to treat to start of treatment.
Data source: Provincial cancer agencies

FIGURE 2.23

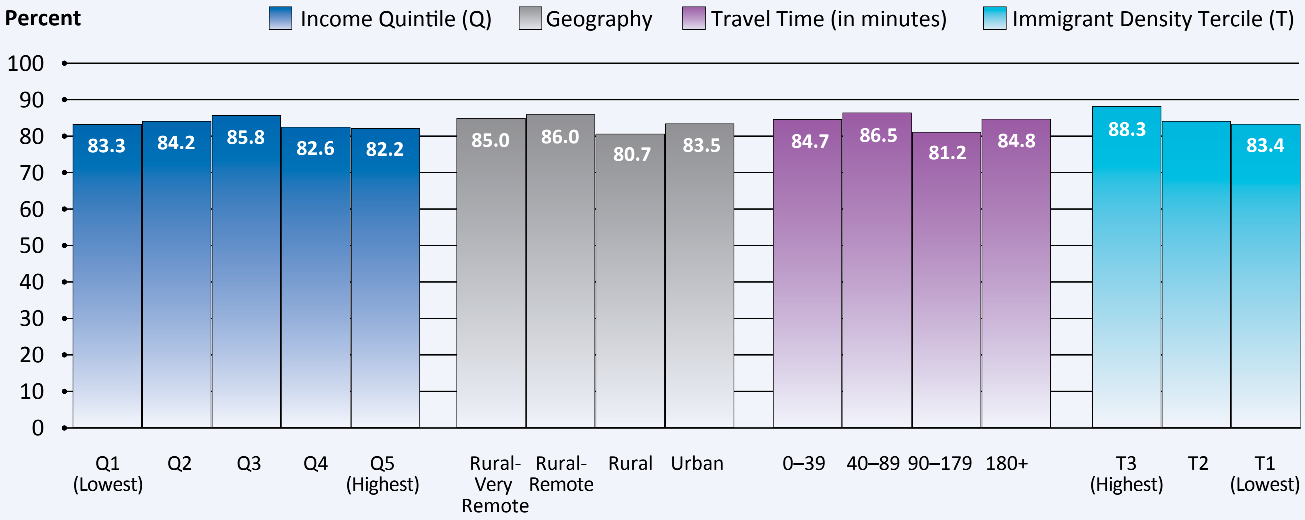
Percentage of lung cancer patients treated within radiation therapy wait time target, by neighbourhood income quintile (urban population), geography, travel time to nearest radiation treatment facility and immigrant density – 2012



Excludes NL, ON, QC and the territories.
Income quintiles include only people living in urban centres as defined by Statistics Canada.
Radiation therapy wait time target is 28 days from ready to treat to start of treatment.
Data source: Provincial cancer agencies

FIGURE 2.24

Percentage of prostate cancer patients treated within radiation therapy wait time target, by neighbourhood income quintile (urban population), geography, travel time to nearest radiation treatment facility and immigrant density – 2012



Excludes NL, ON, QC and the territories.
Income quintiles include only people living in urban centres as defined by Statistics Canada.
Radiation therapy wait time target is 28 days from ready to treat to start of treatment.
Data source: Provincial cancer agencies

Radiation therapy utilization

Why are we reporting on this?

Typically, radiation treatment is provided at larger, more specialized facilities in urban centres. Given the large size of most Canadian provinces, it is not feasible to place radiation services in close proximity to all rural and remote communities. Equitable access to radiation therapy treatment (beyond wait times) is therefore an important consideration. System planners often face the challenge of balancing the efficiency and quality that come from centralized delivery of complex and resource-intensive services with the need to ensure all Canadians have equitable access to essential cancer treatment services. Reporting on indicators that measure disparities in access to radiation therapy is intended to inform these difficult decisions.

What do we already know?

The Partnership's *Breast Cancer Control in Canada: A System Performance Special Focus Report*[23] presented data suggesting a lower rate of breast-conserving therapy (requiring radiation) and a higher rate of mastectomy (not usually requiring radiation) in women living more than two hours' drive from the nearest radiation treatment centre. Other Canadian studies have suggested similar relationships between driving distance and radiation therapy utilization rates.[124-126]

The relationship between income and radiation treatment rates is less well-established in Canadian studies. While several studies have suggested a correlation between household income and radiation consultation and treatment rates, this relationship was found not to be statistically significant after accounting for other factors (including geography) through analysis using a number of variables.[22]

What do the results show?

There were notable differences in radiation treatment utilization by geography, with cancer patients residing in urban areas more likely to receive radiation therapy (32.5%) than were those residing in rural/very remote areas (27.8%) (Figure 2.25). The data suggest that driving distance to a radiation treatment centre is a potential barrier to accessing radiation treatment. The percentage of cancer patients treated with radiation decreased from 32.7% when one-way travel time to the nearest radiation treatment centre was less than 39 minutes to 28.9% when travel time reached three hours or longer (Figure 2.25).

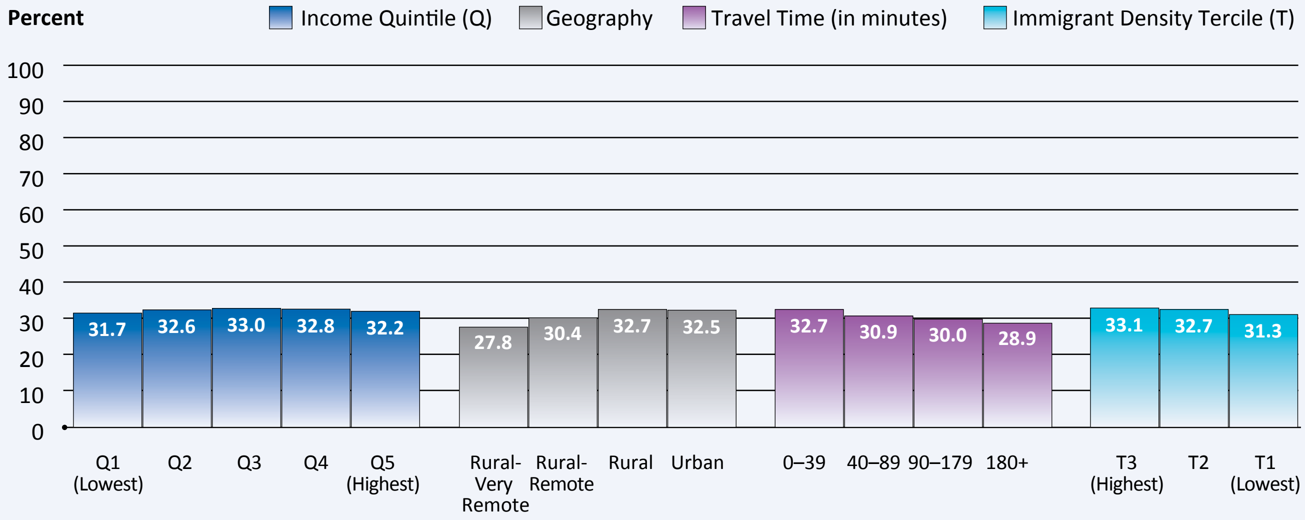
It is not clear if these patterns are the result of barriers due to travel distance or other factors associated with living in a rural or remote area, such as clinical practice patterns. For example, earlier Canadian research found lower referral rates for radiation therapy in remote locations.[22] Also, the analysis conducted did not examine variations by disease site. Radiation therapy is sometimes a part of one of two or more treatment options, such as with early-stage breast cancer, but can also be used for palliation of bone metastases. It is unclear whether the difference in utilization rate reflects situations in which rural or remote patients who need radiation therapy are not getting it or situations, as in early-stage breast cancer, in which rural or remote patients tend to choose the treatment alternatives that exclude radiation therapy.

There was little variation in radiation therapy utilization across income quintiles and neighbourhood immigrant density (Figure 2.25). In relation to household income, there was no discernible trend, suggesting Canadians have the same access to radiation therapy irrespective of their income. There was a very small trend by immigrant status, with radiation treatment rates being slightly higher in areas where immigrant density was highest (33.1%) relative to areas with the lowest immigrant density (31.3%).

Cancer patients in urban areas are more likely to receive radiation therapy than those in remote areas.

FIGURE 2.25

Percentage of cancer patients receiving radiation therapy,* by neighbourhood income quintile (urban population), geography, travel time to nearest radiation treatment facility and immigrant density, 2010



*Includes radiation treatment started within 2 years of diagnosis.
Excludes ON, QC and the territories.
Data source: Provincial cancer agencies

Surgeries (mastectomy and colostomy)

Why are we reporting on this?

Surgical removal of the tumour is often the curative treatment for non-metastatic cancers manifesting as solid tumours. Cancer surgeries vary substantially, from procedures that can be performed in a doctor's clinic or office (as for some small melanomas) to very complex surgeries that can be done only in major tertiary-care facilities (such as pancreatic cancer resections). Several provinces have attempted to regionalize the delivery of complex cancer surgeries, such as thoracic and hepato-biliary surgeries, to tertiary-care centres.

Regionalization is based on the premise that higher quality comes with higher volumes and concentration of expertise. The trade-off for this potential quality dividend can be longer travel times to surgical centres for some people. The extent to which increased travel influences access, and therefore surgical treatment rates, needs to be examined. Beyond geography, the question of whether Canadians have equitable access to needed cancer surgery irrespective of their income level or how long they have been in the country (i.e., whether they are recent immigrants or Canadian-born) also needs to be answered.

This section examines cancer surgery patterns by neighbourhood income quintile, geography and neighbourhood immigrant density. Two types of cancer surgery are examined: breast resections (low complexity) and rectal resections (intermediate complexity). For both types of surgery, a different aspect of practice is examined.

For **breast cancer resections**, the indicator examined is the proportion of surgeries that are mastectomies versus breast-conserving surgeries. Mastectomies are examined because of their apparent relationship to a lack of access to radiation treatment. A woman with early-stage breast cancer requiring surgery usually has the choice between a mastectomy or breast-conserving surgery followed by several weeks of radiation therapy to the breast; both treatment alternatives have comparable outcomes.[127] Restricted access to radiation therapy may influence a patient's decision in favour of a mastectomy [d] to avoid traveling long distances to the radiation treatment facility or having to be away from home for an extended period of time.

For **rectal surgery**, the indicator examined is the percentage of rectal resections that involve permanent colostomies. Permanent colostomies are typically performed when the entire anal sphincter is removed during a rectal tumour resection (usually when the tumour is located low, below the anal verge). There is some evidence of an inverse relationship between hospital size and the percentage of rectal resections that involve a colostomy. A study from California found that rectal cancer patients who underwent surgery at high-volume hospitals were less likely to have permanent colostomies and had better survival rates than those treated in low-volume hospitals.[128] The same study suggested a link with income (higher colostomy rates for people with lower incomes), but that link was likely correlated with hospital size and location.

While colostomies are generally considered to have negative quality of life implications, patients receiving anal sphincter–preserving operations may experience other symptoms affecting their quality of life.[129] Variation in the use of permanent colostomy may also be related to variable use of neoadjuvant chemo-radiation – permanent colostomies are more common among patients with Stage 2 and 3 rectal cancer who do not undergo such preoperative therapy.[130]

What do we already know?

The report *Breast Cancer Surgery in Canada 2006/7 to 2008/09*[131] identified variations in mastectomy rates (versus breast-conserving surgery) by province, urban or rural residence, distance from a radiation treatment centre and household income. While numerous U.S. studies have reported socio-economic disparities in access to cancer surgery, these differences are usually attributed to variations in insurance coverage. Studies comparing American and Canadian surgical patterns have not found such disparities in Canada.[132]

What do the results show?

Mastectomy rates

As shown in the Partnership's special focus report on breast cancer control in 2012,[23] mastectomy rates increase (compared with breast-conserving surgery rates) as the distance between a woman's residence and the nearest radiation treatment centre increases. The updated analysis in this report (including the years 2007-08 to 2011-12) again shows a significant increase in mastectomy rates with longer driving time, going from 40.3% for people living within 39 minutes of a radiation centre to 55.9% for people living over three hours away (Figure 2.26).

The same pattern can be seen with the residential geography analysis: the mastectomy rate goes from 37.5% for women living in urban communities to 52.3% for those living in rural/

Mastectomy rates increase as the distance between a woman's residence and the nearest radiation treatment centre increases.

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[d] Mastectomy followed by breast reconstruction is an alternative method of breast "conservation" but is not examined specifically here.

very remote communities (Figure 2.26). These results suggest that the additional travel time and other inconveniences associated with post-operative radiation treatments may be a disincentive for women in rural or remote communities to opt for breast conservation over mastectomy. This does not preclude the possibility of clinical practice pattern differences between surgeons working in small rural communities and large urban centres.

The rationale for the relationship between a woman's household income and her likelihood of opting for a mastectomy rather than breast-conserving surgery is arguably less intuitive. Nonetheless, analysis of mastectomy rates by income level shows a clear difference, with rates of 39.9% for women in the lowest-income neighbourhoods, compared with 35.6% for women in the highest-income neighbourhoods. When examining immigrant status, the disparity is even wider, with the mastectomy rate at 36.0% for the top third of communities in terms of immigrant density, compared with 46.0% for the bottom third. Because newer immigrants tend to concentrate

36%

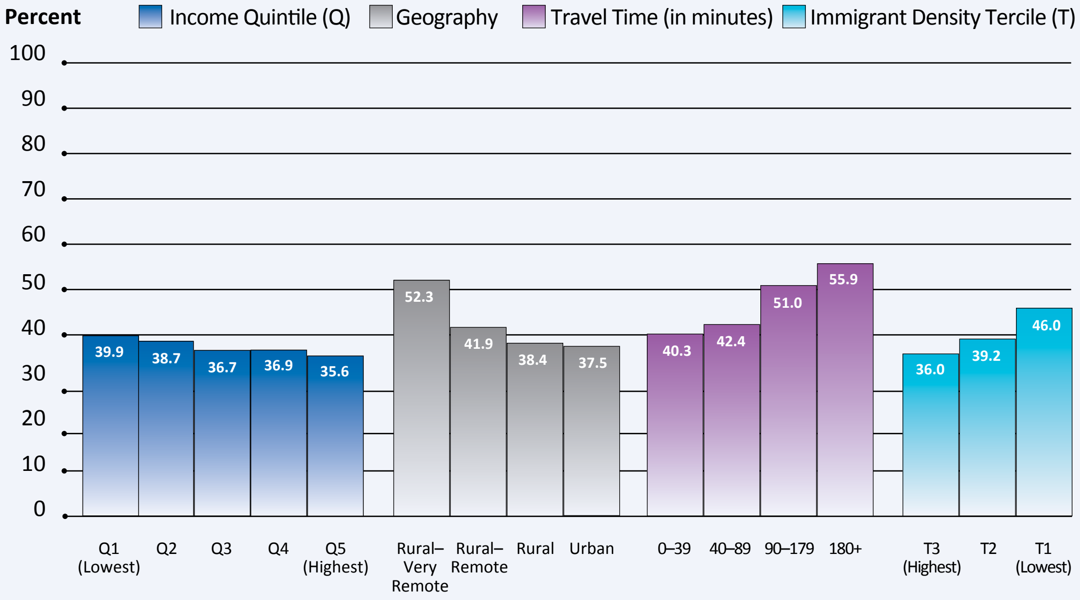
Mastectomy rate for highest immigrant density communities.

46%

Mastectomy rate for lowest immigrant density communities.

FIGURE 2.26

Percentage of breast cancer resections that are mastectomies, by neighbourhood income quintile (urban population), geography, travel time to nearest radiation treatment facility and immigrant density, Canada – 2007/08 to 2011/12 combined



Mastectomy rates includes women who receive mastectomy first and women who receive breast-conserving surgery first followed by mastectomy within 1 year.
The territories are excluded from the income analysis due to small sample size
QC is excluded from the immigrant density and travel time analysis.
Data for AB are for 2007/08 to 2009/10
Data source: Hospital Morbidity Database, Canadian Institute for Health Information
National Ambulatory Care Reporting System, Canadian Institute for Health Information
Fichier des hospitalisations MED-ÉCHO, ministère de la Santé et des Services sociaux du Québec
Alberta Ambulatory Care Reporting System

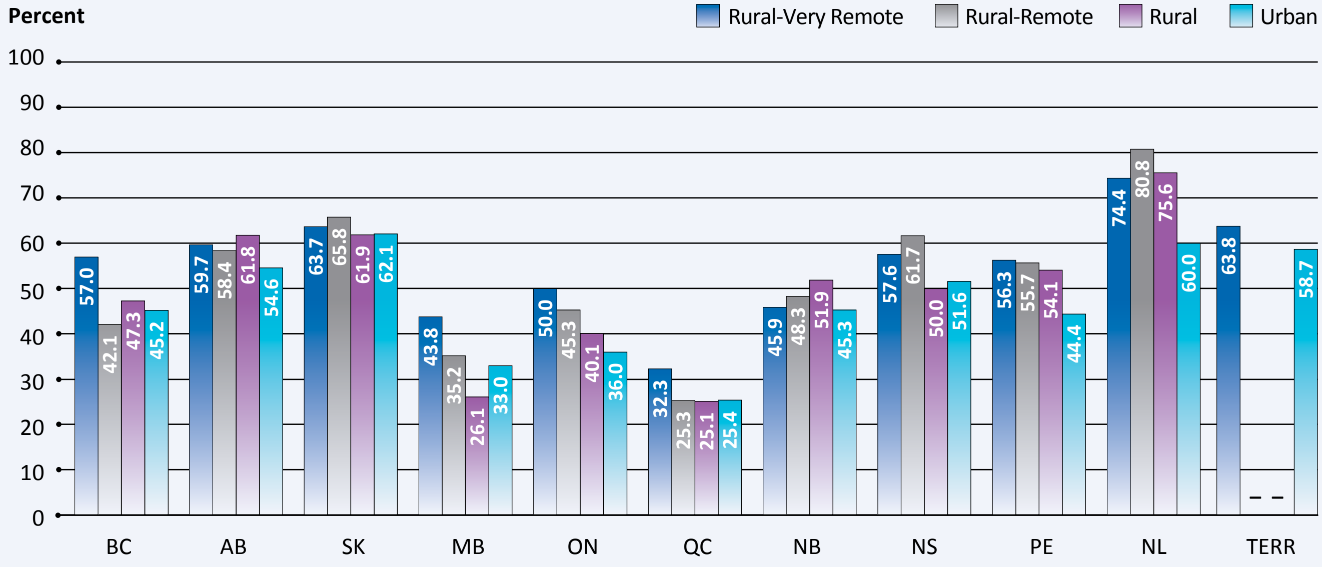
in urban communities, these results may simply reflect urban/rural/remote patterns rather than factors specific to immigrant status.

When examining the varying mastectomy rates by geography, income and immigrant status, the question that arises is, do some provinces do better than others at minimizing the disparities? Figure 2.27 shows mastectomy rates by geography and province. From the data, it appears that some provinces have less of an urban/rural/remote disparity in mastectomy rates than others do. In Saskatchewan, for example, women living in rural and remote communities appear as likely to undergo a mastectomy as those living in urban communities, although the mastectomy rate overall is the second highest in the country. This is in contrast to Ontario, where there is a 14 percentage point difference between urban and rural/very remote communities. In British Columbia and Quebec, mastectomy rates are similar for urban, rural and rural-remote residents; the mastectomy rate jumps only for women in very remote communities.

The differences among provinces in the breakdown of their population between urban and rural areas, the extent of geographic remoteness and the distribution of radiation treatment centres need to be factored in when comparing the provincial results below.

FIGURE 2.27

Percentage of breast cancer resections that are mastectomies by geography within provinces — 2007/08 to 2011/12 combined



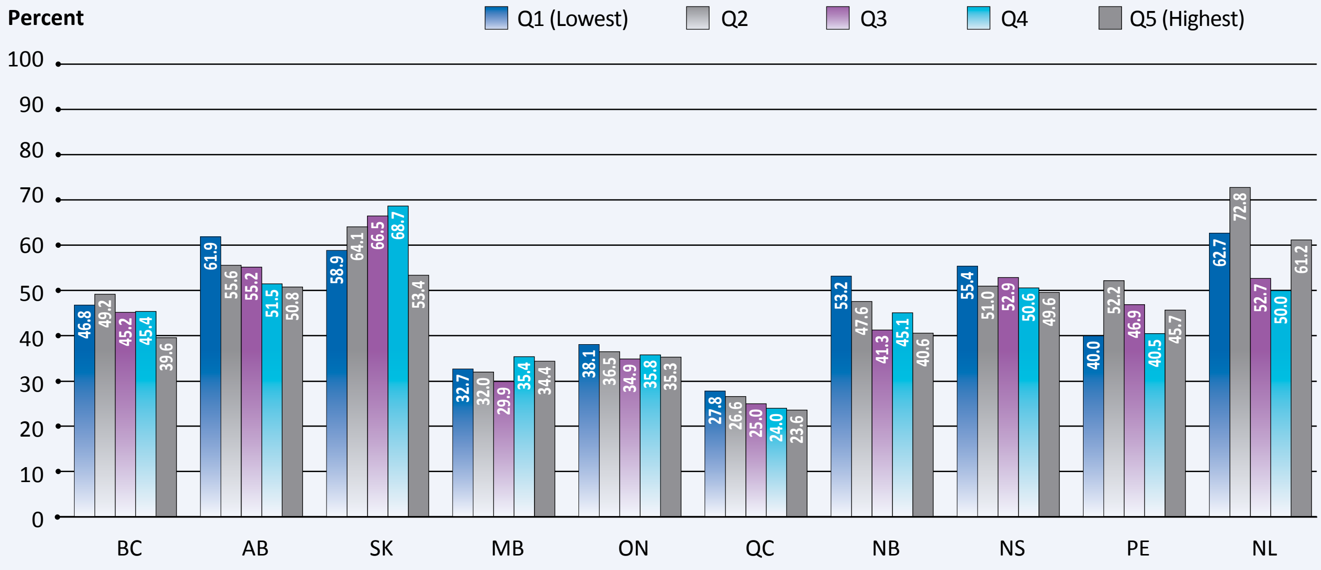
Mastectomy rates include women who receive mastectomy first and women who receive breast-conserving surgery first followed by mastectomy within 1 year.
–: No cases.
Data for the territories were combined due of small sample size.
Data for AB are for 2007/08 to 2009/10
Data source: Hospital Morbidity Database, Canadian Institute for Health Information
National Ambulatory Care Reporting System, Canadian Institute for Health Information
Fichier des hospitalisations MED-ÉCHO, ministère de la Santé et des Services sociaux du Québec
Alberta Ambulatory Care Reporting System

A similar inter-provincial comparison can be done for income level (Figure 2.28). Most provinces with a volume of cases sufficient to make the comparison by neighbourhood income quintile meaningful showed a clear pattern of mastectomy rates steadily decreasing with higher incomes. One exception is Manitoba, where there was no clear trend in the rates by neighbourhood income quintile. Another is Saskatchewan, where the mastectomy rate actually increases with increasing income until the top income quintile, where the rate drops substantially.

It is not clear whether these exceptions reflect differences in service delivery or measurement uncertainties due to lower numbers of cases in these provinces and the consequent difficulty of inferring individual information from neighbourhood data. Overall, however, the magnitude of inter-provincial variations in mastectomy rates is substantially larger than the variations between neighbourhood income levels within provinces.

FIGURE 2.28

Percentage of breast cancer resections that are mastectomies, by neighbourhood income quintile (urban population) within provinces – 2007/08 to 2011/12 combined



Mastectomy rates include women who receive mastectomy first and women who receive breast-conserving surgery first followed by mastectomy within 1 year.
The territories are excluded from the income analysis due to small sample size.
Income quintiles include only patients living in urban centres as defined by Statistics Canada.
Data for AB are for 2007/08 to 2009/10
Data source: Hospital Morbidity Database, Canadian Institute for Health Information
National Ambulatory Care Reporting System, Canadian Institute for Health Information
Fichier des hospitalisations MED-ÉCHO, ministère de la Santé et des Services sociaux du Québec
Alberta Ambulatory Care Reporting System

Colostomy rates for rectal resections

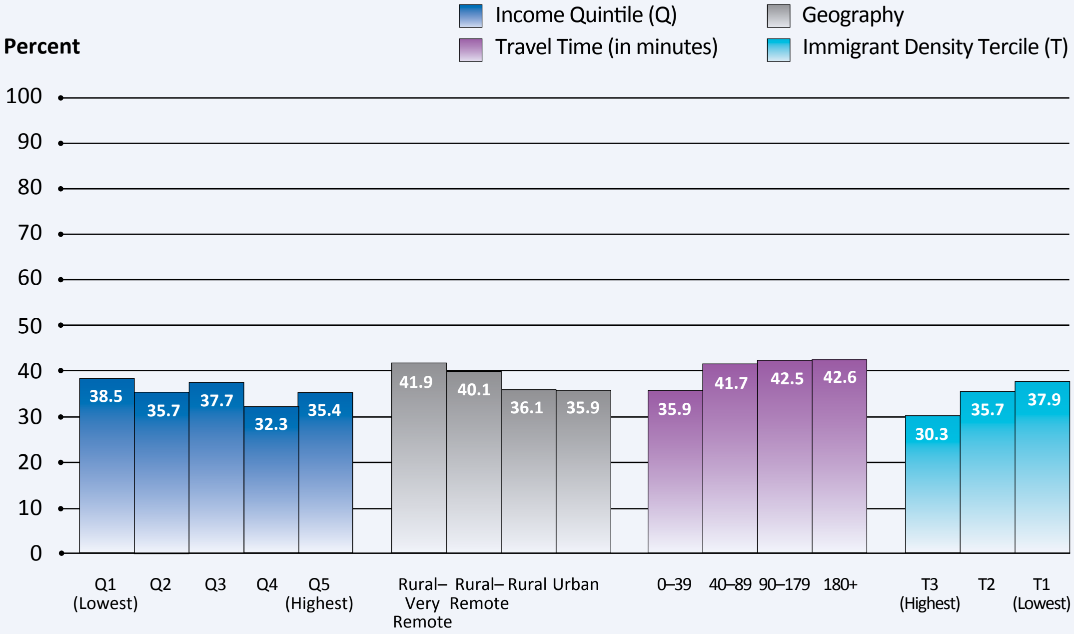
Figure 2.29 shows that the percentage of rectal cancer resections that involve a permanent colostomy does not vary by neighbourhood income quintile. There does, however, appear to be a relationship between where an individual lives and their chance of receiving a permanent colostomy as part of their rectal cancer resection. The permanent colostomy rate increases from 35.9% for patients living in urban and to 36.1% in rural communities to 40.1% and 41.9% for patients living in remote and very remote communities, respectively (Figure 2.29).

In looking at driving time between a patient's residence and the nearest hospital that performs rectal cancer resections, the permanent colostomy rate increases from 35.9% for patients who live less than 40 minutes' drive away to 41.7% to 42.6% for patients living farther away.

As previously cited, U.S. studies have proposed that smaller-volume hospitals have higher colostomy rates than higher-volume (larger) hospitals do. If this holds true for Canada, it is possible that the colostomy rates in rural and remote communities are higher because people

FIGURE 2.29

Percentage of rectal cancer resections that include permanent colostomy, by neighbourhood income quintile (urban population), geography, travel time to nearest hospital performing surgery and immigrant density, Canada – 2007/08 to 2011/12 combined



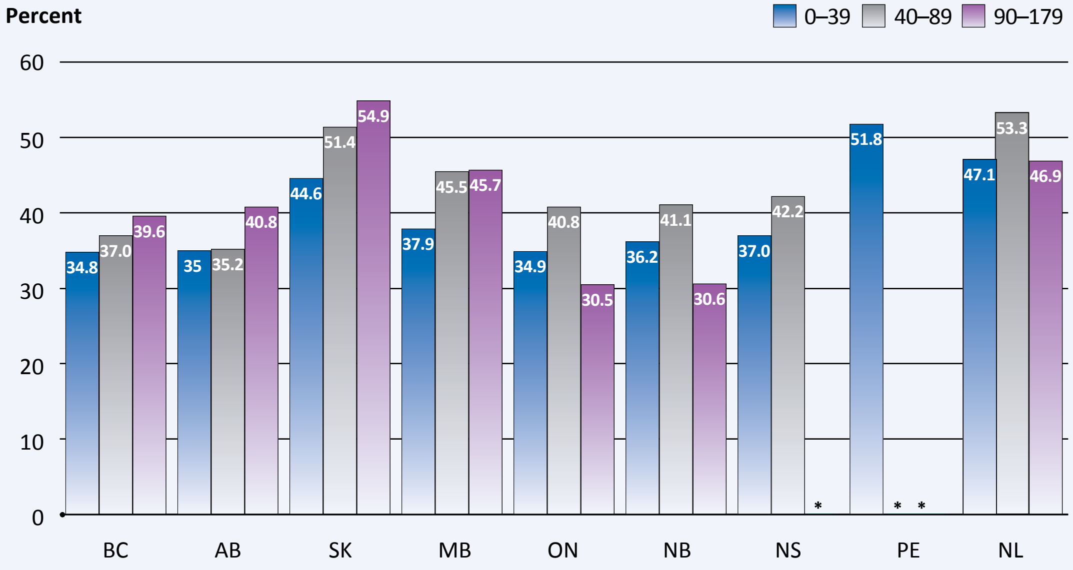
The territories are excluded from the income, geography and travel time analyses due to small sample size.
QC is excluded from analyses by immigrant density and travel time.
Income quintiles include only patients living in urban centres as defined by Statistics Canada.
Data source: Hospital Morbidity Database, Canadian Institute for Health Information
National Ambulatory Care Reporting System, Canadian Institute for Health Information
Fichier des hospitalisations MED-ÉCHO, ministère de la Santé et des Services sociaux du Québec
Alberta Ambulatory Care Reporting System

from those communities are more likely to have their surgery at regional community hospitals rather than large urban tertiary-care centres. The results also indicate that colostomy rates are lower in areas with higher immigrant density, which may reflect the fact that new immigrants tend to reside in larger urban and suburban communities, where colostomy rates are lower.

When examining the colostomy rates by province, smaller volumes mean greater uncertainty in the measures, particularly for the smaller provinces, but analysis by driving time lends itself best to the provincial comparison because it has the lowest suppression due to small case volumes. The colostomy rates by driving time show patterns for British Columbia, Alberta, Saskatchewan and Manitoba that are similar to the national results. Ontario's results are somewhat different in that the people who live 90 minutes or more from the nearest hospital performing rectal resections have the lowest colostomy rates: 30.5%, compared with 34.9% for those living less than 40 minutes away (Figure 2.30). Additional analysis is required to explain why Ontario's patterns are different.

FIGURE 2.30

Percentage of rectal cancer resections that include permanent colostomy, by travel time (to nearest hospital performing surgery), by province – 2007/08 to 2011/12 combined



*Suppressed to meet the confidentiality criteria.
The category "180+" is not shown either because numbers were suppressed to meet confidentiality requirements or the numbers were not available.
The territories are excluded due to small sample size.
Data source: Hospital Morbidity Database, Canadian Institute for Health Information
National Ambulatory Care Reporting System, Canadian Institute for Health Information
Fichier des hospitalisations MED-ÉCHO, ministère de la Santé et des Services sociaux du Québec
Alberta Ambulatory Care Reporting System

Research

Clinical trial participation

This section presents the results for indicators measuring the ratio of new enrolments in cancer treatment clinical trials to cancer incident cases by neighbourhood income quintile, geography and immigrant density. The analysis uses the most recently available data (2012) from the provincial cancer agencies. Indicator results are presented by province (where available) in the Online Supplementary Tables.

Summary of results for clinical trial participation by neighbourhood income quintile, geography and immigrant density

	What the results show		
	Neighbourhood income quintile	**Geography**	**Immigrant density**
Clinical trial participation Ratio of patients enrolled in clinical trials to cancer incident cases	Clinical trial enrolment is higher among those residing in the highest-income neighbourhoods (4.1%) than among those residing in lower-income neighbourhoods (2.3%)	Clinical trial enrolment is higher among residents of urban areas (3.4%) than for those residing in rural/very remote areas (2.1%)	No consistent pattern in the clinical trial ratio in areas characterized as high immigrant density or those with low density

Data source: Provincial cancer agencies

Why are we reporting on this?

Clinical trials are a crucial component of cancer research and allow for the introduction of many new therapies. To enable the results of clinical trials to be generalized, it is important that people participating in the trials represent the general population at which the intervention being tested is aimed. Also, because clinical trial therapies are considered the state-of-the-science treatment protocols and may lead to better outcomes than prevailing conventional therapies, equitable access to clinical trial participation may help ensure that all Canadians have an opportunity to access the latest treatment innovations.

The Canadian Cancer Research Alliance Clinical Trials Working Group, established in 2010, is examining trends in clinical cancer research in Canada and is tasked with examining models of international trials support. In addition, the Working Group is developing recommendations and opportunities for cancer patients to be enrolled in clinical trials. Reporting on trial participation rates by neighbourhood income quintile, immigrant density and residential geography may help inform efforts aimed at ensuring equitable access to clinical trials for all Canadians.

Equitable access to clinical trials may help ensure that all Canadians have an opportunity to access the latest treatment innovations.

What do we already know?

Several studies conducted in the United States have found that people from neighbourhoods with lower SES are less likely to be included in clinical trials.[133-137] A study in the United Kingdom found that cancer patients with a higher deprivation index (or lower income) were less likely to be referred to trials than were those with higher incomes. However, once the individual was being considered for recruitment, deprivation status was not an independent predictor of trial enrolment.[138] It has also been suggested that SES may be a marker for trial eligibility. Lower SES is likely correlated with a more advanced cancer stage at diagnosis, more co-morbidities, access or logistic problems and communication difficulties,[135] all of which may be barriers to clinical trial participation.

Research shows that rural dwellers are less likely to enrol or be recruited for a trial.[139] Generally, clinical trials are conducted in large metropolitan areas where resources and various treatment modalities are readily available. Research shows that those who lived closer to a research centre were more likely to enrol in a trial.[135] Thus, for those in rural and remote areas, frequent travel, participation-related costs, time spent away from home or work and the need to co-ordinate schedules with family and friends may be barriers to trial participation.[140] For those residing in rural communities, lack of awareness of trials may also prevent enrolment or recruitment.[141] Strict eligibility criteria can also prevent trial participation.[142]

Several U.S. studies have shown that immigrants and ethnic minorities may have less awareness of clinical trials.[143-144] Cultural beliefs, language barriers and trust in referring community doctors were identified as the main cultural barriers to trial participation.[145] It has been suggested that the keys to increasing participation are not only increasing awareness but providing information and referrals in a culturally appropriate manner.[143] In addition to patient choice (intent or willingness) to participate in trials, system-level issues such as insurance coverage, provision of additional health care and follow-up care can impede participation in clinical trials.[139]

What do the results show?

People from low-income neighbourhoods and remote areas are less likely to enrol in clinical trials.

The indicator results suggest that the higher a person's neighbourhood income level, the more likely they are to enrol in a clinical trial (Figure 2.31). The ratio[e] of adult patients enrolled in clinical trials to new cancer cases ranged from 4.1% in the highest-income neighbourhoods to 2.3% in the lowest-income neighbourhoods, based on 2012 provincial cancer agency data. Barriers among residents of low-income neighbourhoods may include decreased access to care, lower education levels and expenses required for participation in clinical trials.

In terms of the geographic component of the analysis, the data show that people living in remote communities are less likely to enrol in clinical trials than are urban and rural (non-remote) dwellers. The ratio of enrolment to incident cancer cases was 3.1% and 3.4% among those residing in rural and urban areas, respectively, compared with 2.1% among those residing in rural/very remote areas of the country (Figure 2.31). These disparities point to opportunities to examine participation barriers such as lack of trial availability, inability to return at scheduled protocol times, managing treatment side effects from afar, costs associated with transportation and distance to a research centre.

These disparities point to opportunities to examine participation barriers.

The data available suggest that people living in mid- and high immigrant density communities have a higher clinical trial participation ratio than do those in the lowest immigrant density areas (Figure 2.31). This finding could be confounded by the fact that immigrants, including recent immigrants, tend to live in Canada's largest urban centres.[146] These results cannot be considered definitive, however, because of the small sample size resulting from the limited number of provinces able to provide data.

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e) Although this indicator is based on a ratio and not a rate, the results are expressed in as percentages to facilitate interpretation.

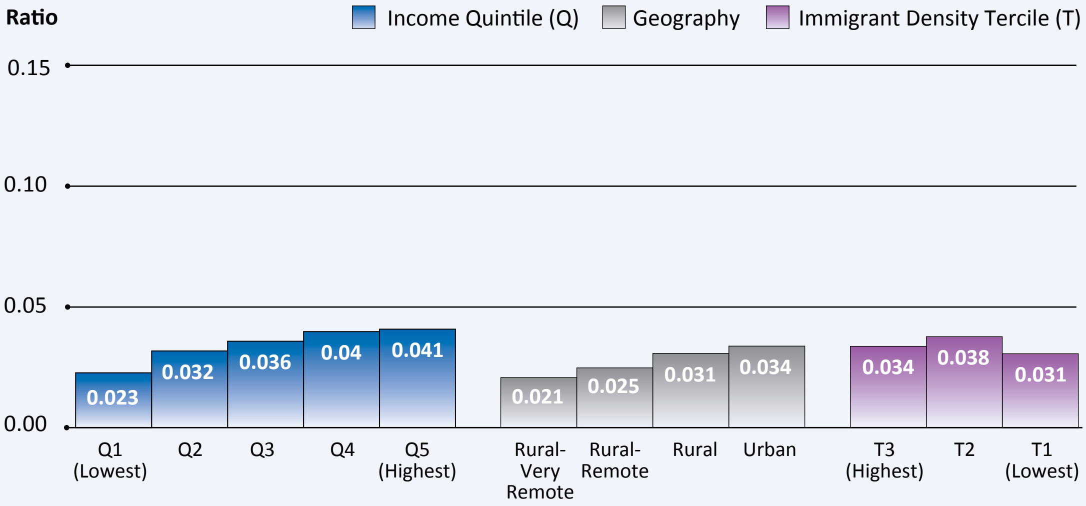
Further research is required to better understand the specific factors that lead to gaps in participation among under-represented populations. This is important to ensure that all the intended populations are represented in clinical trials and benefit from the efficacy of new treatment interventions.

Methodological notes

- It is important to note that clinical trials are both new cancer cases and recurrent/metastatic disease. The indicator available for this analysis, however, is based on new cancer cases only.
- Neighbourhood income and place of residence are highly correlated and while one variable might be the most important in terms of clinical trial participation, this cannot be determined from the available data.
- It is important to note that this indicator is based on only six provinces that represent approximately 30% of the cancer patient population.[147]

FIGURE 2.31

Ratio of adult patients enrolled in clinical trials to incident cases by neighbourhood income quintile (urban population), geography and immigrant density, 2012



Includes BC, AB, SK, MB, NB and PE.
Numerator includes only clinical trials for cancer treatment and denominator is all cancer incident cases age 18+.
Data source: Provincial cancer agencies

3. A Brief Look at Cancer Survival by Income

3. A Brief Look at Cancer Survival by Income

Much of this report has focused on differences in cancer risk and access to cancer control services. Outcomes were examined briefly in the analysis, comparing stage-specific incidence and mortality rates. This section compares relative survival by income quintile for all cancers and for all cancers excluding prostate cancer and lung cancer. Survival is an important outcome indicator in cancer and is the key outcome indicator for the effectiveness of treatment and other management strategies. Socio-economic differences in survival may reflect differences in access to treatment.

Why are we reporting on this?

The relative survival ratio (RSR) is the ratio of the observed survival for a group of people with cancer (malignant neoplasms) to the expected survival for members of the general population who have the same main factors affecting survival (sex, age, place of residence) as the people with cancer (referred to as the comparison population).

Two separate analyses are presented. The first examined the relative survival by neighbourhood income level (quintile) for all cancers combined, and the second examined the relative survival of all cancers excluding prostate and lung. The latter analysis was conducted because lung cancer is known to have a low five-year RSR and incidence is strongly related to income, with risk being highest among those at low income quintiles.[148] Similarly, prostate cancer is known to have a high five-year RSR and men living in higher-income neighbourhoods are more likely to be diagnosed with the disease.[149]

Several factors can influence the likelihood of surviving cancer, including stage at diagnosis, the availability of early detection and access to and utilization of diagnostic and treatment services. Identifying populations with better or worse survival outcomes may reflect access to care and quality of care and can help identify important factors underlying survival disparities.

Identifying populations with better or worse survival outcomes may reflect access to and quality of care and can help identify important factors underlying survival disparities.

Methodological notes

This section of the report uses data from Statistics Canada's Canadian Cancer Registry linked to the Canadian Vital Statistics Death Database to calculate the five-year relative survival rate by income. Life tables by neighbourhood income quintile were used to calculate the RSR for all cancers, including people aged 15 to 74 diagnosed with cancer during the years 2004–06. This analysis is restricted to urban Canada because life tables by socio-economic status are not available for rural Canada or other populations examined in this report.

What do we already know?

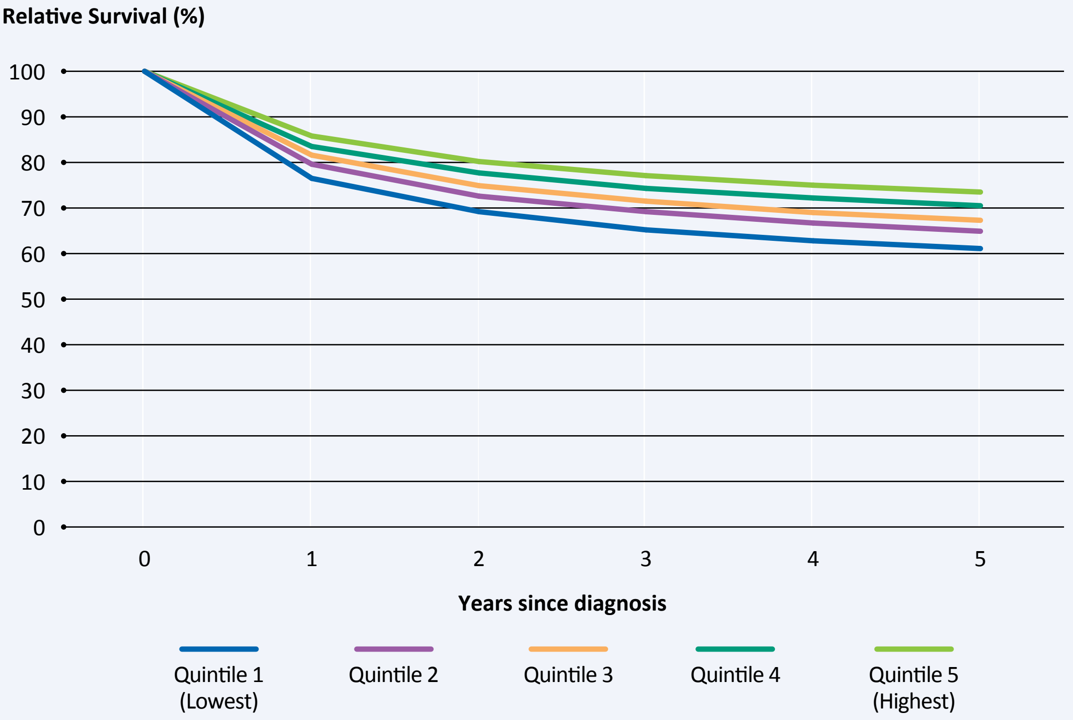
Canadian data show that the five-year RSR for people diagnosed with cancer during the years 2004–06 was 62% for all cancers combined, with RSRs varying by cancer type.[150] A meta-analysis comparing breast cancer survival of Canadian women with their U.S. counterparts found that although neighbourhood income did seem to show a consistently strong relationship to breast cancer survival across the U.S. studies, Canadian data showed very little or no overall survival disadvantage among women with breast cancer from the lowest-income neighbourhoods, compared with those in the highest-income neighbourhoods.

In contrast, data from Australia, which like Canada has comprehensive health-care coverage, showed variations in the five-year RSR by socio-economic status and geography. For instance, men living in rural and remote areas had an RSR below the national average for lung cancer, prostate cancer and melanoma and women had an RSR below the national average for lung and cervical cancer.[151] This same report showed better relative survival outcomes for those living in high-SES areas than for those living in low-SES areas. For instance, men residing in areas in the top segment of SES had higher five-year relative survival for lung and prostate cancer. Women in the top segment showed better survival for breast cancer.

The five-year relative survival rate for people diagnosed with cancer during 2004–06 was 62% for all cancers combined.

FIGURE 3.1

Relative survival ratios for urban Canada for all cancers, by neighbourhood income quintile, 2004–06



Data include only people living in urban centres as defined by Statistics Canada.
Excludes QC.
Data source: Statistics Canada, Canadian Cancer Registry

What do the results show?

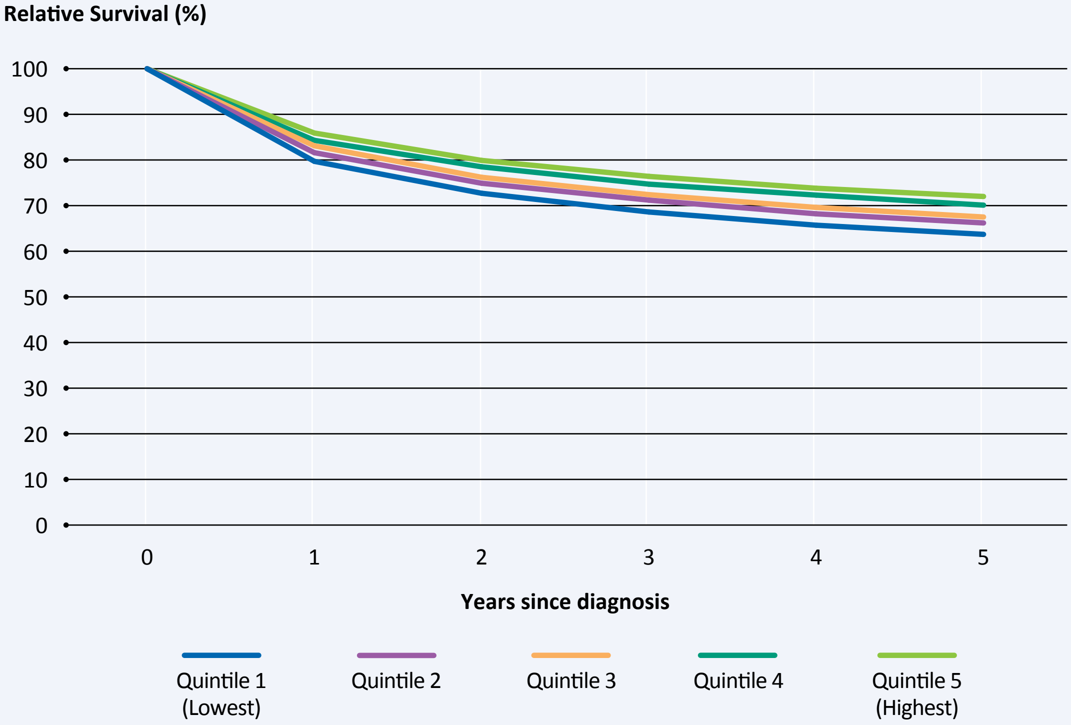
The data show that the relative survival for urban Canada shows a clear pattern by income, with a 12.4% gap in five-year survival between the highest- and lowest-income neighbourhoods (Figure 3.1). The five-year RSR for people diagnosed with any cancer was 61.1% in the lowest-income neighbourhood, compared with 73.5% in the highest-income neighbourhood. When lung and prostate cancer were excluded (as lung cancer is known to have a low five-year RSR and incidence is strongly related to income, and prostate cancer is known to have a high five-year RSR and incidence is also related to income), the five-year RSR was 63.7% in the lowest-income neighbourhood, compared with 72.0% in the highest-income neighbourhood, a gap of just over eight percentage points (Figure 3.2).

The narrowing of the survival gap by almost 4.1% percentage points when excluding prostate and lung cancer implies that the two disease sites that tend to have the greatest differences in burden by income are important contributors to the survival gap. However, the fact that there remains an 8.3% residual survival difference by income even when excluding prostate and lung cancer points to potentially broader disparities in cancer control outcomes between low- and high-income Canadians.

There is a 12.4% gap in five-year survival between the highest- and lowest-income neighbourhoods.

FIGURE 3.2

Relative survival ratios for urban Canada for all cancers excluding lung and prostate cancer, by neighbourhood income quintile, 2004–06



Data include only people living in urban centres as defined by Statistics Canada.
Excludes QC.
Data source: Statistics Canada, Canadian Cancer Registry

Appendix

Members of the Methodology Working Group

The methodology for calculating travel time for the radiation utilization and wait time indicators was developed by the Methodology Working Group, comprising the following members.

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