



# Lung Cancer and Equity:

A Focus on Income and Geography

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Each week  
in Canada,  
560 people  
hear the words,  
“You have  
lung cancer.”



Lung cancer is the most commonly diagnosed cancer in Canada. It is responsible for more cancer deaths than breast, colorectal and prostate cancers combined.<sup>1,2</sup>

Unfortunately, the chance of being diagnosed with lung cancer and the chance of dying from it are much higher for some people in Canada than for others.

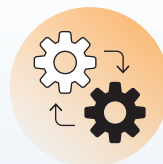


## This report provides information in two key areas:



1

It focuses on the social determinants of health and their impact on lung cancer risk, access to care and outcomes for two populations: people with **lower income** and people who live in **rural and remote** communities.



2

It describes system-level changes that need to happen to reduce related inequities.

We explain how systemic barriers put certain individuals at much higher risk for developing cancer and limit their ability to access much-needed care. These realities result in substantially worse outcomes for such people.

**Changes at the policy and system levels—such as culturally safe, organized lung cancer screening programs—are needed to reduce inequities and provide better care for everyone living in Canada.**

<sup>a</sup>The SDLE at Statistics Canada enables the linkage of administrative and survey data across multiple domains, including health, income, education and justice. Linking this data can contribute to a better understanding of the impact of various factors, including social determinants of health, on different populations in Canada. The data featured in this report was obtained by linking the Canadian Cancer Registry to multiple datasets (e.g. T1 Family File, Discharge Abstract Database, Canadian Vital Statistics Death Database), enabling us to better understand the impact of income and geography on lung cancer prevention, care and outcomes. Although First Nations, Inuit and Métis are more likely to experience disparities in income and geography, the datasets available lacked identifiers for these groups. Therefore, we were unable to describe the lung cancer journey for First Nations, Inuit and Métis.



### NEW DATA FOR A MORE COMPLETE PICTURE

For the first time, data are available to examine the extent of disparities in lung cancer among people with low income and those who live in rural and remote areas. We were able to use Statistics Canada's Social Data Linkage Environment (SDLE) to link cancer patient registry data to databases such as the income tax record.<sup>a</sup> This report is just a first step toward gathering more comprehensive data on the impact of a wide range of factors—such as First Nations, Inuit and Métis identity; immigration status; and race and ethnicity—on cancer care access and outcomes for people in Canada.

### How we use terminology in this report

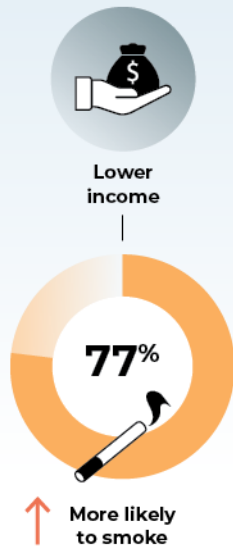
- When we speak of **income**, we recognize it is one dimension of socioeconomic status (SES), which refers to factors that shape someone's relative social advantage.<sup>4</sup> SES contributes to an individual's or group's access to resources (e.g. housing, schooling, nutrition), privilege, power and control in society.<sup>5</sup>
- When we speak of **rural and remote**, we do so with the understanding that such places of residence may have less access to health care services, educational facilities and government services.<sup>6</sup> These factors, and other social, economic and environmental factors, are interconnected and contribute to a person's health and well-being.



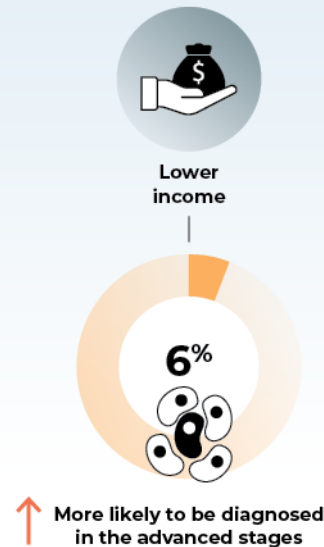
This report shows that people with lower income and people who live in rural and remote communities experience inequities in cancer risk, access to care and outcomes.

These inequities are largely the result of the different groups experiencing the social determinants of health in unequal ways. This reality creates barriers that affect some populations more than others:

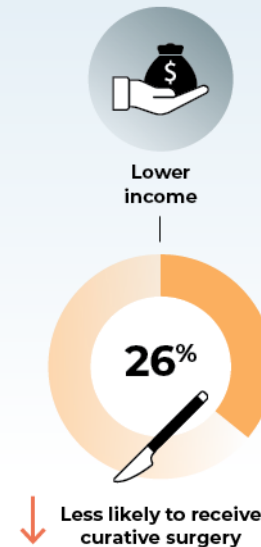
People with **lower income and people living in rural and remote communities are more likely to smoke**, resulting in a higher incidence of lung cancer.



People with lung cancer who have **lower income are more likely to be diagnosed in the advanced stages** of the disease, when curative treatments like surgery are less helpful.



Even when diagnosed at an earlier stage, people with **lower income are less likely to receive curative surgery**, which contributes to a lower rate of survival for lung cancer.

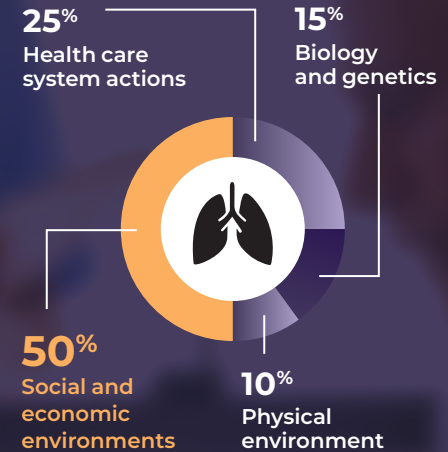


**13%–25%**  
less likely to survive 3 years,  
depending on stage at diagnosis

These numbers compare the lowest vs. highest income level (quintile)



### WHAT DETERMINES THE HEALTH OF A POPULATION?<sup>3</sup>



When we assess a person's chances of being diagnosed with lung cancer or dying from it, we need to look beyond physiological factors and individual behaviours. Although some people's cancer risk is due to biology and genetics (and behaviours such as smoking), lung cancer care and outcomes are largely affected by social and economic environments, which affect some populations more than others.

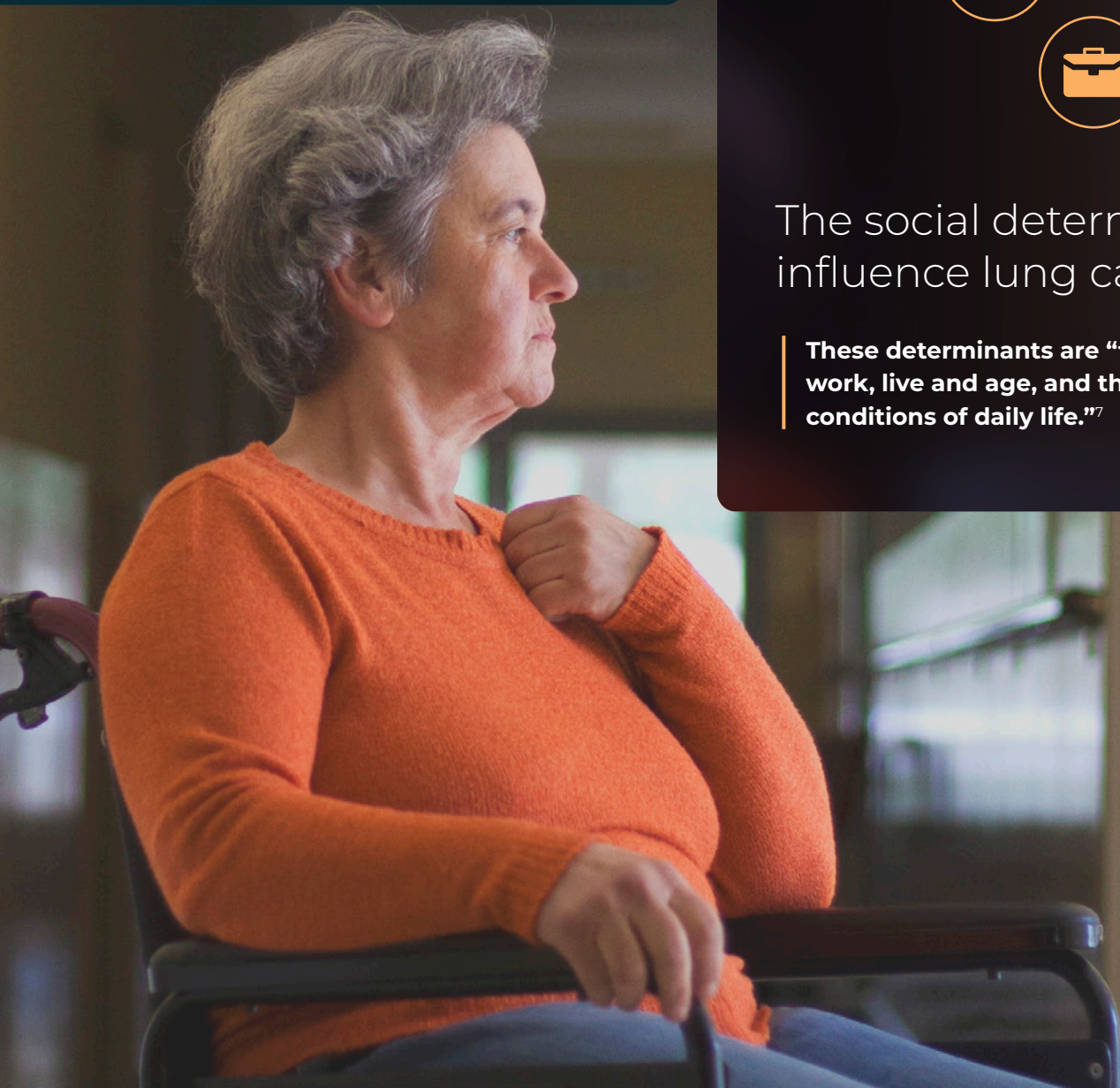
The social and economic environments that drive 50 percent of population health differences can often be measured by looking at people's family incomes and where they live (e.g. urban vs. rural communities).

# Understanding Equity



The social determinants of health heavily influence lung cancer outcomes.

**These determinants are “the conditions in which people are born, grow, work, live and age, and the wider set of forces and systems shaping the conditions of daily life.”<sup>77</sup>**





## What are social determinants of health?

Examples of a person's social determinants of health include:



Whether resources are available to meet the person's daily needs (e.g. safe housing, food markets)



The person's access to quality health care services



Access to educational and job opportunities



Historical trauma and ongoing racism and discrimination

The social determinants of health provide context to explain the interconnectedness of social, economic and environmental factors that affect health.

**These determinants play a role in how people with lower income and people living in rural and remote areas are affected by lung cancer, and the journey they take when they have lung cancer.**



## Why do health inequities exist?

People in Canada are generally a healthy population. On average, we live relatively long lives, feel healthy and have access to high-quality care.<sup>8</sup> But when you look beyond the averages, it is clear that some people do not benefit as much as others and do not have the same opportunity for good health.

**This unequal distribution of power and resources has led to differences in health and wellness—also called “health inequities.” Health inequities are unfair and unjust systemic differences in health that can be avoided if appropriate interventions are made at the policy and system levels.<sup>9</sup>**

These inequities create the following barriers, which affect some populations more than others:



### Systemic barriers

- Structural racism and discrimination experienced by First Nations, Inuit and Métis, and people of colour have resulted in mistrust toward the medical system and a lack of culturally appropriate services. This may cause people to delay seeking care or refuse recommended services.<sup>10,11</sup>
- The COVID-19 pandemic has amplified challenges in the health system's capacity to deliver care to underserved populations, who are more likely than the general Canadian population to develop COVID-19. This has magnified systemic barriers by increasing existing health inequities, such as unequal access to culturally safe care.<sup>18</sup>



### Economic barriers

- As income levels increase, so too does the health of individuals. In Canada, certain populations are more likely to have low incomes, including First Nations, Inuit and Métis, recent immigrants, people living with disabilities and single parents.<sup>12</sup>
- People with lower income are affected by various factors that put them at greater risk of cancer. For example, people from lower socioeconomic groups report having difficulties making appointments with family doctors for urgent health needs, and are most likely to report that they haven't seen a health care provider in 12 months.<sup>13</sup> Individuals from those groups may have more difficulty accessing regular, consistent care from health care providers.



### Geographic barriers

- With a shortage of rural physicians and specialists, rural residents have limited access to health care services and options for care, and must travel further to see a physician or receive specialized care.<sup>14</sup> The financial, emotional and mental costs associated with travel create barriers for individuals who may not have the time or money to travel.<sup>15</sup>
- First Nations, Inuit and Métis are especially affected by these barriers given that four in 10 live in rural or remote communities.<sup>16</sup> For Inuit, seven in 10 live in Inuit Nunangat,<sup>b</sup> where most communities are accessible only by air.<sup>18</sup> Without regular access to health care, the overall health of individuals living in rural or remote areas is affected over time, and their care is delayed—all of which puts them at greater risk of cancer.

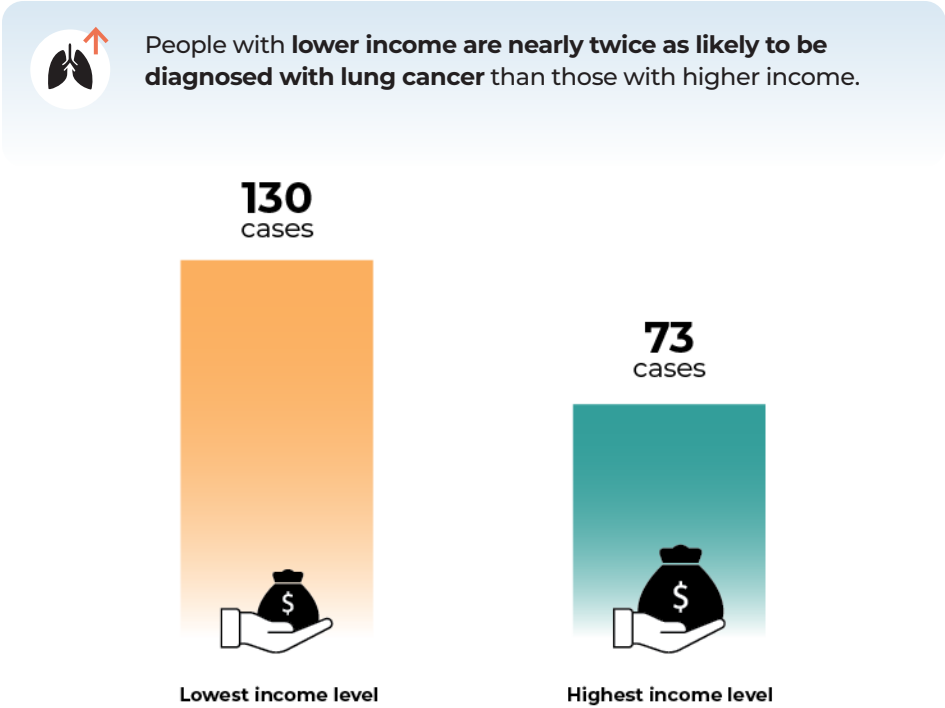
<sup>b</sup>Inuit Nunangat is the Inuit homeland encompassing the land claims regions of Nunavut, Nunavik, Nunatsiavut, and the Inuvialuit Settlement Region.<sup>17</sup>

# What does the inequity look like?

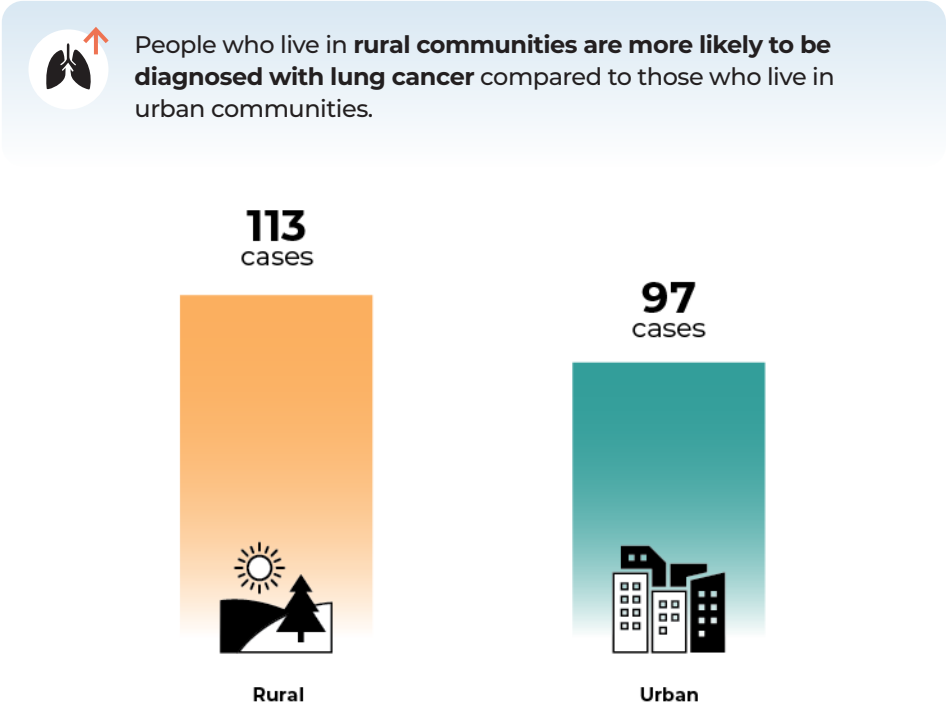
There are marked differences in lung cancer incidence and survival rates for people with lower income and people who live in rural or remote communities.

## Lung cancer incidence

### Income



### Geography



Age-standardized incidence rate (per 100,000 population)  
Data source: Statistics Canada, Canadian Cancer Registry (2013–2015) linked with T1 Family File

Age-standardized incidence rate (per 100,000 population)  
Data source: Statistics Canada, Canadian Cancer Registry (2013–2015) linked with T1 Family File

**Differences in lung cancer incidence largely reflect differences in commercial tobacco use and occupational exposure to carcinogens, which are influenced by the social determinants of health.** See *Prevention and Wellness*, page 10.



# What does the inequity look like?

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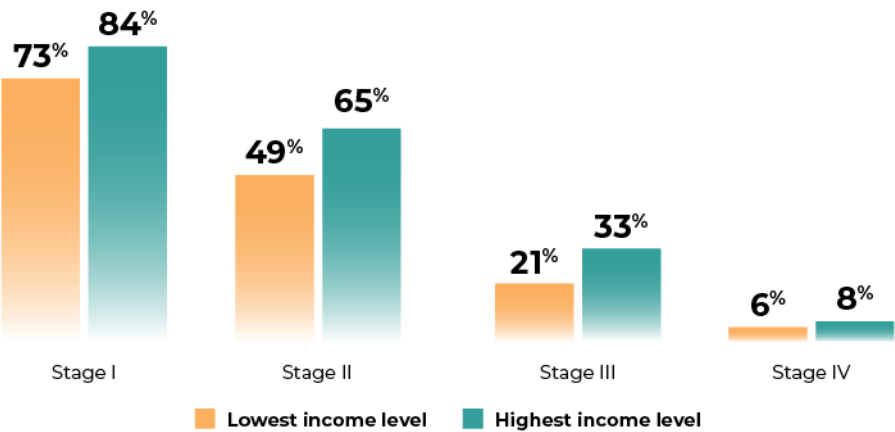
## Lung cancer survival

### Income



People with **lower income** are less likely to survive lung cancer than people with higher income.

Three-year survival rate



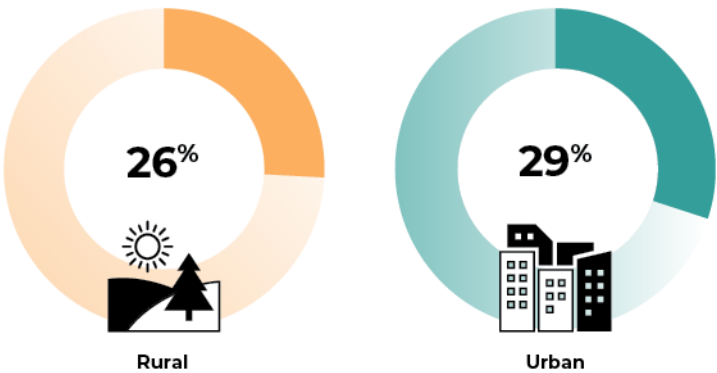
Data source: Statistics Canada, Canadian Cancer Registry (2010–2011) linked with Canadian Vital Statistics Death Database and T1 Family File

### Geography



Survival rates are **similar** among people living in urban and rural communities.

Three-year survival rate

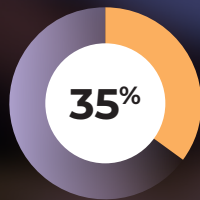


Data source: Statistics Canada, Canadian Cancer Registry (2010–2011) linked with Canadian Vital Statistics Death Database and T1 Family File

**Differences in lung cancer survival largely reflect differences in stage at diagnosis and access to treatment, which are influenced by the social determinants of health.<sup>7,19</sup> See *Diagnosis and Treatment*, page 12.**



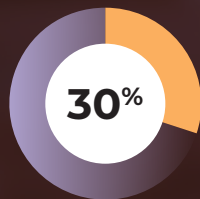
Given that First Nations, Inuit and Métis are more likely to have lower incomes and live in rural or remote communities, they likely make up a disproportionately high share of the population described in this report.<sup>12, 16</sup> However, like most health databases today, the Canadian Cancer Registry linked datasets used in this report do not contain First Nations, Inuit or Métis identifiers, and therefore cannot be used to draw conclusions about cancer outcomes for these groups. The data available from other sources, however, reveal significant inequities in health outcomes. For example, compared to the non-Indigenous population in Canada:



**First Nations adults are 35 percent less likely to survive lung cancer** five years after diagnosis even though they have similar lung cancer incidence rates.<sup>46</sup>

**x2**

**People living in Inuit Nunangat** (Inuvialuit Settlement Region, Nunavut, Nunavik and Nunatsiavut) are **more than twice as likely to be diagnosed with lung cancer.**<sup>47</sup>



**Métis adults are more likely to be diagnosed with lung cancer, and 30 percent less likely to survive it after five years.**<sup>48</sup>

**Given that First Nations, Inuit and Métis are more likely to have lower incomes and live in rural or remote communities, they likely make up a disproportionately high share of the population described in this report.**

Efforts to advance equity in lung cancer prevention, care and outcomes for First Nations, Inuit and Métis need to be supported. Part of this includes strengthening the availability of data.

**Health organizations and data custodians need to support Indigenous governments and organizations with efforts to improve the availability, analysis and dissemination of Peoples-specific, self-determined data to better understand the First Nations, Inuit and Métis lung cancer journey.**

Although various sources of First Nations, Inuit and Métis health data exist in Canada, much of it has been determined outside of these communities and is not designed to meet their needs. First Nations, Inuit and Métis data also need to be better coordinated to ensure that wholistic information on health and wellness is accessible and standardized. This will enable progress on closing the health equity gaps experienced by First Nations, Inuit and Métis.





# Prevention and Wellness



Prevention plays an important role in reducing the risk of lung cancer.

**The ability to reduce risk factors is directly related to various social, economic and environmental factors that are often beyond an individual's control.**

*(See Why do health inequities exist?, page 6).*

## What does the inequity look like?

### Commercial tobacco use

The likelihood that someone will smoke is closely related to a complex interaction of social determinants of health and other factors, including tobacco industry influence, which results in higher smoking rates among lower income and rural populations.

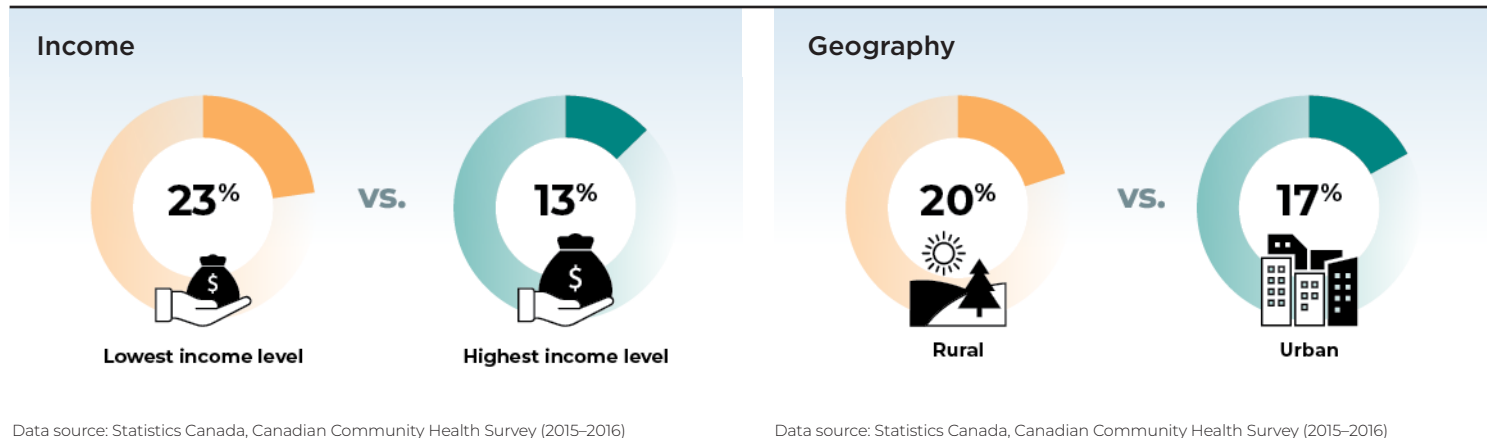
**Tobacco smoking is the leading cause of lung cancer. It is responsible for up to 72 percent of lung cancers in Canada.<sup>20</sup>**

### Environmental and workplace exposure to carcinogens

Exposure to carcinogens in the workplace is associated with up to 15 percent of lung cancers in Canada.<sup>24</sup> People who smoke in addition to being exposed to carcinogens have an even higher risk of developing lung cancer.<sup>25</sup> People who work in certain industries, such as mining, construction and transportation, are more likely to be exposed to carcinogens than people who work in other industries.<sup>26</sup>

Health inequities that result from employment are closely linked to other socioeconomic inequities, such as education and wealth.<sup>27</sup> For example, people who work in the industrial, manufacturing and service industries are more likely to have lower socioeconomic status, including lower levels of education and fewer employment opportunities.<sup>28</sup>

### Percentage of people who report smoking daily or occasionally



**People with lower income are more likely to smoke than people with higher income.** Research shows that low socioeconomic status often interacts with other social, environmental or psychological factors (e.g. race/ethnicity, geographic location, social marginalization, stress) to influence smoking behaviour.<sup>13, 22</sup>

**People living in rural areas are slightly more likely to smoke than people living in urban areas.** The literature suggests that people living in rural and remote areas have less access to education and employment opportunities. As a result, they generally have lower levels of education, higher rates of unemployment and lower incomes than urban populations.<sup>23</sup> These factors are exacerbated by less access to health care providers and prevention services, which influence smoking behaviour.



### HOW WE CHARACTERIZE TOBACCO USE

In this report, tobacco use or smoking refers to the use of commercial tobacco products and does not refer to the use of traditional or sacred tobacco by First Nations or Métis. Traditional or sacred tobacco differs from commercial tobacco in that it is used in ceremonial or sacred rituals for healing and purifying, which is of essential cultural value for many First Nations and Métis communities.<sup>21</sup>



# Diagnosis and Treatment



People whose lung cancer is detected early have a better chance of recovering than people who are diagnosed later.

However, in Canada, people with lung cancer are more likely to be diagnosed at an advanced stage (stage III or IV) than people diagnosed with breast, prostate or colorectal cancer.

### Percentage of cancers diagnosed at stage III or IV in Canada



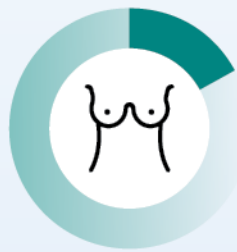
Lung  
**70%**



Colorectal  
**50%**



Prostate  
**26%**



Breast  
**18%**

Lung cancer may cause few symptoms for months or even years. Screening people who are at high risk (e.g. based on factors such as age and smoking history) can help ensure the disease is caught in the early stages, before symptoms arise, and when chances of cure and survival are higher.<sup>29</sup>

Organized, jurisdiction-wide lung cancer screening programs are not yet available in Canada. When symptoms do arise, they can be general, making early detection and diagnosis challenging. There are also barriers to early presentation and diagnosis of lung cancer, which are often complex and multifaceted.

Data source: Statistics Canada, Canadian Cancer Registry (2012–2016)



## What does the inequity look like?

### Stage at diagnosis

Surviving cancer is strongly associated with the stage at which the disease is diagnosed. Unfortunately, research suggests that people with lower incomes are less likely to have their symptoms recognized and investigated early, resulting in a more advanced stage of cancer at diagnosis.<sup>30</sup>

This income-based disparity is largely due to factors outside an individual's control. For example, people with lower income may live and work in environments that increase their risk of cancer, and face barriers to accessing cancer screening, diagnosis and high-quality treatment (e.g. difficulty making appointments, less secure or flexible employment, poor experience with health care providers).<sup>31, 32</sup>

There is no difference in the proportion of advanced lung cancer diagnosis for people living in urban or rural communities: for both, it is 70 percent. Although this finding is positive, rural and remote communities face numerous social and economic challenges that make it more difficult to access cancer diagnostic and treatment services.

**There is no difference in the proportion of advanced lung cancer diagnosis for people living in urban or rural communities: for both, it is 70 percent.**

### Percentage of lung cancers diagnosed at stage III or IV in Canada



**People with lung cancer are more likely to be diagnosed with advanced disease if they have lower income.**

Data source: Statistics Canada, Canadian Cancer Registry (2013–2015) linked with T1 Family File



## What does the inequity look like?

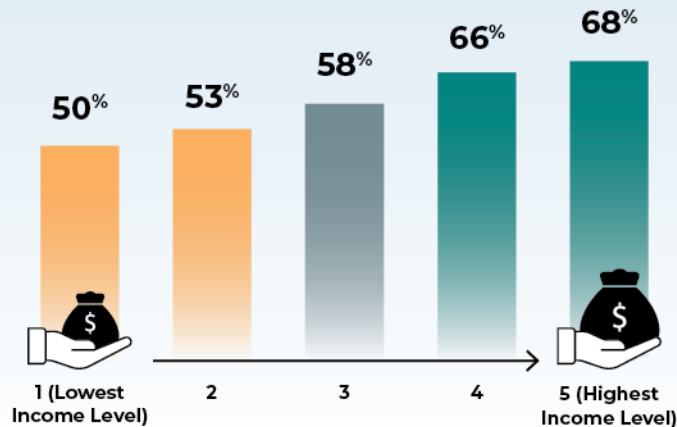
### Access to treatment

Early detection gives people more treatment options, including the most effective treatment: surgery to remove the tumour.<sup>33</sup> Surgical removal is the mainstay of treatment at stages I and II of lung cancer, as it increases the chances of survival and can be curative.<sup>34-36</sup>

#### Percentage of stage I or II lung cancer patients receiving curative surgery

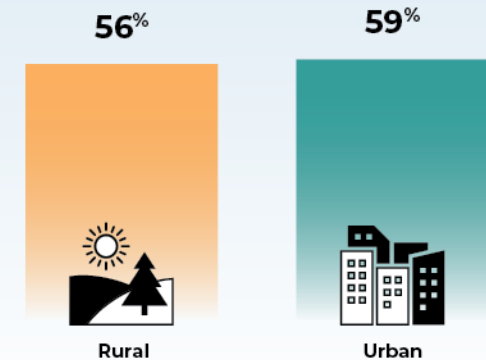


People diagnosed with stage I or II non-small cell lung cancer, and who are at the **highest income level**, are more likely to receive curative surgery than patients in the **lowest income level**.



Data source: Statistics Canada, Canadian Cancer Registry (2012–2014) linked with T1 Family File and Discharge Abstract Database

People living in rural and urban areas have **similar rates of curative surgery** when diagnosed with stage I or II non-small cell lung cancer.



Data source: Statistics Canada, Canadian Cancer Registry (2012–2014) linked with T1 Family File and Discharge Abstract Database

#### Income can contribute to challenges accessing treatment and care. For example:

- People with lower income may face more barriers to surgery as a result of less secure or flexible employment. They might not be able to take time off work, pay for travel to a treatment centre or cover out-of-pocket treatment costs.<sup>37</sup>
- Comorbidity is common among people with cancer, but consensus is limited on how to manage cancer and comorbid conditions. Evidence suggests that some cancer patients with comorbidity may have their treatment unnecessarily modified, which can compromise optimal care.<sup>38</sup> People with lower income have a higher prevalence of comorbidities than those with higher income. Therefore, they may be less likely to receive curative treatment.<sup>38-41</sup>
- A small proportion of patients may decline recommended treatment.<sup>42,43</sup> Although reasons have not been well researched, certain supports may help manage patients' uncertainty around health outcomes and better assist them in making an informed choice. These supports include the quality of information provided to patients on what to expect in relation to treatment, and having a trusting and established relationship between physician and patient.<sup>44, 45</sup>

While the proportions may be similar, the cancer experiences of individuals living in rural and urban areas may differ considerably. Numerous barriers make the experience of living with lung cancer and accessing care more complex for individuals living in rural areas.



# A Path Forward



To achieve equity in lung cancer outcomes, significant action is needed at the policy and system levels to ensure underserved communities can access advances in cancer prevention, diagnosis and care.

To do this, health care services and supports along the cancer continuum—from prevention to diagnosis and treatment to survivorship—need to be specifically designed from the start to meet the needs of underserved communities.

**As part of implementing the Canadian Strategy for Cancer Control, in which equity is both a priority and an overriding value embedded in all recommended actions, the Canadian Partnership Against Cancer will work with partners across the country to develop and implement plans that eliminate barriers and support people in getting the care that they need. This will include contributing to the advancement of the calls to action outlined in this report.**

Cancer agencies and programs should accomplish the following goals by working with governments and organizations that represent underserved communities:



- **Ensure that culturally appropriate smoking-cessation supports are available for underserved communities.** Evidence-based smoking cessation programs, which incorporate culturally safe approaches and include subsidized or free nicotine replacement therapies and other stop-smoking medications, are essential to prevent lung cancer and other cancers in the first place.



- **Plan and implement an organized lung cancer screening program, designing it to ensure that the needs of underserved populations—including people with lower incomes, people who live in rural and remote communities, and First Nations, Inuit and Métis—are being addressed.** It is important to focus on specific approaches to make these programs more accessible.



- **Provide smoking cessation supports, including culturally appropriate supports, as part of organized lung cancer screening programs.** This would further prevent lung cancer deaths and significantly improve the cost-effectiveness of lung cancer screening.





## More and better data are needed

This report highlights inequities in lung cancer prevention, care and outcomes for people with low income and people who live in rural and remote communities. However, more and better data are needed to gain a fuller picture of the state of health equity in Canada.

**Canada's health system leaders, decision-makers and data custodians, should do the following:**



- **Collaborate with organizations that represent underserved groups** to ensure

- the approach to indicator development, data collection and reporting is co-created with these groups, and
- analyses and reports highlight the social determinants of health, the interconnectedness of social, economic and environmental factors and their impact on health and well-being.



- **Improve timely access to health, socioeconomic and environmental data and record linkages** for research and health system innovation (e.g. timely access to administrative and survey data linkage through the Social Data Linkage Environment at Statistics Canada).



- **Develop and implement standardized and validated identifiers of race and ethnicity** in all population and health care datasets to enhance data collection and linkage, and improve the availability of data to better understand the state of health equity in Canada.



- **Support national and regional First Nations, Inuit and Métis governments and organizations** to advance First Nations, Inuit and Métis-governed research and data systems.

**These actions will provide insight into the inequities and barriers that exist in preventing lung cancer and accessing treatment. Understanding and eliminating these inequities and barriers will help the health care system deliver better services and care designed to meet the specific needs of underserved groups.**

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