



## International Comparisons: A Focus on Diabetes

The page features decorative wavy lines in grey and teal that sweep across the background, framing the central content area.

## Our Vision

Better data. Better decisions.  
Healthier Canadians.

## Our Mandate

To lead the development and maintenance of comprehensive and integrated health information that enables sound policy and effective health system management that improve health and health care.

## Our Values

Respect, Integrity, Collaboration,  
Excellence, Innovation

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Please note that the analyses and conclusions in this report do not necessarily reflect those of the individuals or organizations mentioned above.

# Executive summary

There is increasing interest in international comparisons of health system performance. Although there are methodological challenges in terms of having consistent and comparable data, there is much to be gained by understanding how Canada compares internationally. International comparisons can enhance accountability, improve benchmarking and support mutual learning.

Relative to other countries in the Organisation for Economic Co-operation and Development (OECD), there is considerable variation in Canada's performance across a variety of health indicators. For most indicators, Canadian results are similar to those of other countries, but there remain areas where Canada performs particularly well or poorly. Similarly, there is variation in provincial results across the country, as can be seen in [CIHI's new interactive web tool](#).

Comparing Canada internationally can highlight areas of health care that need to be improved and offers an opportunity to learn from high-performing countries. Data from the OECD, combined with additional international indicators, can be applied to health challenges — such as diabetes — and point to potential strategies for improvement.

Canada has one of the highest prevalence rates of diabetes among OECD countries, with more than 3 million people estimated to have the condition in 2014.<sup>1</sup> Examining Canada's performance on risk factors and management of diabetes demonstrates the actionability and relevance of international comparisons for health policy and promotion. Looking to countries that are performing well in these areas, we find a number of policies that show promising results in reducing risk factors for diabetes and improving its management. A selection of these policies is highlighted in this report.

## Methodology

### Data sources

International data in this report is primarily derived from the OECD's *Health at a Glance 2015*,<sup>2</sup> a large study of international health comparisons. Where necessary, additional data from previous *Health at a Glance* reports, Statistics Canada, the World Health Organization and other sources is used to help create a complete picture of Canada's performance. When non-OECD sources are used, OECD averages are still calculated using data from all participating OECD countries. Throughout this report, the term *average performance* refers to performance between the 25th and 75th percentiles for all OECD data. Performance above the 75th percentile is considered *above-average performance*, while performance below the 25th percentile is considered *below-average performance*.

### Comparing Canada internationally

When comparing Canada internationally, this report examines Canada's performance among all [34 OECD countries](#), with a focus on countries that are the most similar to Canada. Canada's health system is most often compared with those in Australia, France, Germany, the Netherlands, New Zealand, Sweden, the United Kingdom and the United States. Like Canada, these countries have large and developed economies, with similar levels of resources to devote to health care.<sup>3</sup> These countries are collectively referred to as *peer countries* throughout the report. Canada's performance is compared across five dimensions of care: Health Status, Non-Medical Determinants of Health, Access to Care, Quality of Care and Patient Safety. For details on these five dimensions, please see Figure 1.

(cont'd on next page)

## Comparing Canadian provinces internationally

Canada's health care system is decentralized, with responsibility for organizing, paying for and delivering health care falling mainly on provincial and territorial governments. Previous research by CIHI and other organizations has shown large variations between jurisdictions across a variety of indicators, such as those of quality of care and cost.<sup>4</sup> International comparisons provide broader context for benchmarking and peer learning for Canadian provinces. As a companion product to this report, an interactive tool is available where users can compare results for Canada's provinces with those of other countries.

All provincial results were calculated using a comparable methodology. The interactive tool is available [here](#) or by clicking the provincial data icon throughout the report.






This report is divided into two main sections. The first, Canada's performance in context, focuses on the Canadian results for a selection of OECD indicators and identifies specific areas where Canada performs well and where performance could be improved. This report presents performance profiles for five dimensions modified from the OECD's health system framework: Health Status, Non-Medical Determinants of Health, Access to Care, Quality of Care and Patient Safety (Figure 1). These dimensions were chosen because they contain directional indicators; that is, we can state that higher values (as in the case of influenza vaccinations) or lower values (as in the case of mortality) reflect better performance. Also, for these dimensions, Canada's results are available and reported for all indicators presented. The second section, Diabetes in Canada: An international perspective, highlights an area of health care where Canada can learn from peer countries to improve performance. Canada's performance on diabetes prevalence and management is explored in detail, using indicators from the OECD and other sources to provide insight into diabetes prevention and management in Canada.

## Canada's performance in context



This section will explore Canada's performance internationally, updating CIHI's 2013 report on Canada's performance, *Benchmarking Canada's Health System: International Comparisons*.<sup>3</sup> Overall, there is no consistent pattern to Canada's results. For many indicators, Canada's results are within the band of average performers (between the 25th and 75th percentiles). But for certain indicators, Canada performs well or poorly. Results for other OECD countries also vary, and no country outperforms Canada across all indicators. Provincial results are also mixed, with no province having consistently higher or lower results than OECD countries across five dimensions of care. For standardized graphs providing an overview of all indicators across the five dimensions, see the appendix.

Figure 1: Dimensions of care

 <b>Health Status</b> How healthy are Canadians?	Measures of health status range from measures of self-perceived health to measures of chronic disease mortality, such as deaths due to cancer.
 <b>Non-Medical Determinants of Health</b> Are Canadians living healthy lifestyles?	Non-medical determinants of health are those that are outside the direct control of the health system. They cover the behavioural, economic, social, lifestyle and environmental factors that have a significant impact on the health of individuals.
 <b>Access to Care</b> Can Canadians get the health services they need?	Access to Care indicators reflect the availability of the right care, where and when it is needed. This is a complex concept that is difficult to measure and compare across countries.
 <b>Quality of Care</b> Are Canadians receiving high-quality care?	Quality of Care is a broad category of indicators that reflect the effectiveness and efficiency of care. Even in countries like Canada and its peers, where health systems are well developed and resourced, quality is still a concern.
 <b>Patient Safety</b> Are Canadians receiving care that is safe?	Patient safety remains an important issue for health policy. Although not all patient safety events can be prevented, many can be reduced or eliminated through the use of best practices.

## Health Status



Canada has lower overall *stroke mortality rates* (38 per 100,000 people) than most OECD countries, and the lowest among peer countries. Despite Canada's lower rates of overall stroke mortality, in-hospital mortality among patients with ischemic stroke is higher than in other OECD countries (reported in the Quality of Care dimension). This may be due to the fact that Canada's overall hospitalization rate is among the lowest of OECD countries.<sup>5</sup>



Canada's relative performance on *infant mortality* falls below the OECD average, and Canada's rates have not changed substantially over the past 10 years.<sup>5</sup> There is some evidence that births with very low birth weight and very early gestation age are more likely to be registered in Canada (as well as in the United States) than in other OECD countries, which would result in infant mortality rates that appear higher than those in countries that do not report these births.<sup>6</sup>



*Mortality due to heart disease* declined from 2008 to 2011 by almost 20 percentage points.<sup>5</sup> The decline was more prominent in males, who had nearly twice the mortality rate of females.<sup>5</sup> This decline may reflect reduced smoking rates and better diagnosis and treatment protocols.<sup>5, 7</sup>

## Non-Medical Determinants of Health



The percentage of Canadians who are *daily smokers* (15%) is lower than that in most OECD countries and similar to that in several peer countries, including Australia (13%) and the United States (14%).<sup>5</sup> Canadians are smoking less than they were 20 years ago (26%).<sup>5</sup> This improvement is expected to result in lowered mortality rates for lung cancer.<sup>3</sup>



Canada has among the highest *obesity rates* in adults (18%) across the peer countries, second to only the United States (29%). This is likely a contributing factor to Canada's poor performance in diabetes prevalence. These rates are based on self-reported height and weight, which tends to result in underestimates of body mass index; as such, measured obesity rates are even higher at 26%.<sup>5</sup>





Self-reported *obesity* has been on the rise over the past five years, from 16.6% of the population in 2008 to 18.2% in 2013.<sup>5</sup> This equates to nearly 500,000 more obese individuals over five years. This may reflect changing diets and lifestyles.

## Access to Care



Canada performs well when compared with the 13 other countries with comparable wait time data for *cataract surgeries*, *hip replacements* and *knee replacements*. Canada is in the top 3 of all participating countries for cataract surgery and knee replacements, with median waits of 46 and 104 days, respectively. Canada's better results may reflect the fact that these indicators fall within the priority procedures set by the first ministers in 2004.<sup>8</sup>



Canada has among the longest wait times for specialist services, with 38% of Canadians able to see a specialist within four weeks of being referred. All provinces in Canada have longer waits than the international average (unpublished data, The Commonwealth Fund Survey, 2013, Canadian Institute for Health Information).



Wait times for specialist services have not improved over time. In 2010, 38% of Canadians age 55 and older reported waiting more than one month to see a specialist. This had increased to 56% by 2013.<sup>9</sup>

## Quality of Care



The *cancer survival* indicators measure the likelihood of a cancer patient surviving five years after diagnosis, compared with a member of the general population. Canada performs well on five-year relative survival for breast cancer. This could be due, in part, to early detection and effective treatment. Canada has high self-reported *screening rates* for breast cancer, which may lead to earlier detection and better prognoses.



Generally, Canada performs well on measures of quality care when compared internationally. However, only 79% of Canadians report that their doctors *spend enough time with them*, less than in the majority of countries (unpublished data, The Commonwealth Fund Survey, 2013, Canadian Institute for Health Information). Canada performs above average on other measures of patient experience, including *having time to ask questions*<sup>9</sup> and *being involved in decision-making* (unpublished data, The Commonwealth Fund Survey, 2013, Canadian Institute for Health Information).



The majority of Quality of Care indicators have remained consistent over the past five years.<sup>5</sup> There have been improvements in *30-day in-hospital fatality* for both acute myocardial infarction (AMI) and stroke patients over the past decade.<sup>5</sup> This may be due to better in-hospital treatment and care for these conditions, and improved best practices.<sup>2</sup>

## Patient Safety



Canada has above-average performance on *post-operative sepsis in abdominal surgeries* compared with the nine countries with comparable data. Only two of these countries are peer countries; consequently, caution is needed when interpreting this result.





Canada performs poorly on the majority of Patient Safety indicators, including *post-operative pulmonary embolism and deep vein thrombosis* (collectively known as venous thromboembolism) in hip and knee surgeries. Venous thromboembolism is a common and preventable complication of hospitalization, and identifying high-risk patients and implementing preventive measures is a Required Organizational Practice (an essential practice that organizations must have in place) for hospital accreditation.<sup>10</sup> When combined, Canada's rates of these incidents are the second highest of the nine comparable countries, after New Zealand.



Trending is not recommended, as the majority of these indicators are new and undergoing methodological changes.

## Diabetes in Canada: An international perspective

The following section will demonstrate how comparing Canada internationally can both highlight areas of health care that need to be improved and offer an opportunity to learn from high-performing countries. Using the topic of diabetes as an example, data from the OECD, combined with additional international indicators, can be applied to health challenges to provide context and point to strategies for improvement.

### Diabetes prevalence in Canada

Chronic diseases are the leading cause of death and disability worldwide, contributing to 60% of all deaths globally, a rate that is expected to rise to 73% by 2020.<sup>11</sup> 60% of Canadian adults have at least one chronic disease,<sup>12</sup> the three most common of which are cancer, diabetes and cardiovascular disease.<sup>13</sup> CIHI's 2013 report on international comparisons explored Canada's performance in regards to lung cancer.<sup>3</sup> This year, Canada's performance on diabetes prevalence and management will be explored, and the use of international comparisons for increasing mutual learning and informing policy will be highlighted.

### What is diabetes?

Diabetes is a chronic condition that is characterized by high blood sugar levels resulting from the body's inability to produce or respond to insulin — a hormone that signals to cells that there is sugar in the blood that needs to be absorbed and used as energy.<sup>14</sup> If left untreated or if improperly managed, diabetes can lead to disabilities such as blindness, kidney failure and amputations and, in some cases, premature death.<sup>15</sup>

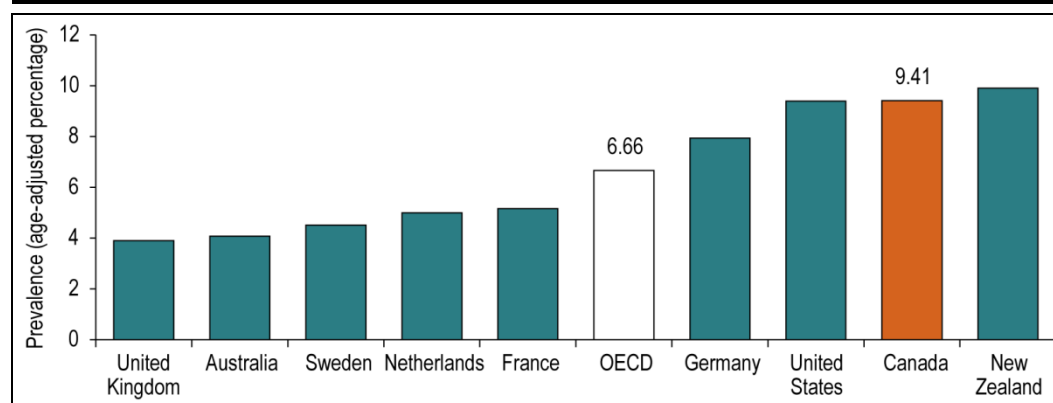
There are three main types of diabetes: type 1, type 2 and gestational diabetes. In type 1 diabetes, the body is unable to produce insulin. Type 1 diabetes is commonly diagnosed in childhood, but little is known about its causes and risk factors.<sup>16</sup> In type 2 diabetes, the body is not able to properly respond to insulin or does not produce enough. Type 2 diabetes generally develops more gradually over the lifespan and affects 90% of individuals living with diabetes.<sup>16, 17</sup> Gestational diabetes is diabetes that occurs during pregnancy and generally disappears upon delivery.<sup>16</sup>

### Type 1 diabetes in Canada

Canada has higher rates of type 1 diabetes in children than the majority of OECD countries, with 21.7 new cases per 100,000, compared with the OECD average of 17.2.<sup>18</sup> Generally, Canada's peer countries have higher type 1 diabetes incidence rates than non-peer OECD countries.<sup>18</sup>

Canada has one of the highest prevalence rates of diabetes among OECD countries, with 9.4%, or more than 3 million people, estimated to have the condition in 2014<sup>1</sup> (Figure 2). An additional 5.7 million Canadians have prediabetes, a state of above-normal blood sugar levels, which has a high chance of progressing to full diabetes.<sup>19</sup> This report will focus on type 2 diabetes, which affects 90% of individuals living with diabetes.<sup>17</sup> Thus from this point forward, “diabetes” will refer to type 2 diabetes only.

**Figure 2: Diabetes (types 1 and 2) prevalence in Canada and OECD peer countries**



**Note**

OECD average includes 34 countries.

**Source**

International Diabetes Federation. *IDF Diabetes Atlas, Sixth Edition*. 2014.<sup>1</sup>

Without a shift in policies and priorities, the prevalence of diabetes is expected to continue to grow.<sup>17</sup> Children, in particular, are a population with an increasing prevalence of diabetes. While type 2 diabetes was once termed “adult-onset diabetes” due to its relationship with age, between 1999 and 2009 the prevalence of type 2 diabetes nearly doubled in children and adolescents younger than 20; increasing rates of overweight and obesity are thought to be a key contributor to this.<sup>20</sup>

Diabetes prevalence varies by age, gender, income group and ethnicity. For instance, in Canada, First Nations and Métis populations have particularly high rates of diabetes. Aboriginal groups in Australia, New Zealand and the United States have a much higher prevalence of diabetes than the general population.<sup>21–23</sup> Additionally, Canadians of South Asian descent are at an elevated risk of developing diabetes and are more likely to be diagnosed at a younger age than those of other ethnicities.<sup>24</sup>

This report looks at how Canada’s performance compares internationally in two areas: preventing new cases from developing and better managing existing diabetes to reduce complications and improve health.

## Provincial variation

The prevalence of diabetes is not consistent across Canada. Based on self-reported diabetes rates, prevalence is highest in Newfoundland and Labrador, followed by Prince Edward Island, New Brunswick and Nova Scotia. Alberta and British Columbia have the lowest diabetes rates.<sup>25</sup>

It is important to note that prevalence is influenced by a combination of incidence (the number of people newly diagnosed with diabetes) and survival (the length of time individuals live with diabetes). Thus improved management of diabetes, allowing individuals to live for longer with the condition, can contribute to increasing prevalence. For instance, research on diabetes prevalence in Ontario found that increasing prevalence between 1995 and 2005 was due to both an increase in incidence and a 25% reduction in mortality in individuals with diabetes.<sup>26</sup>

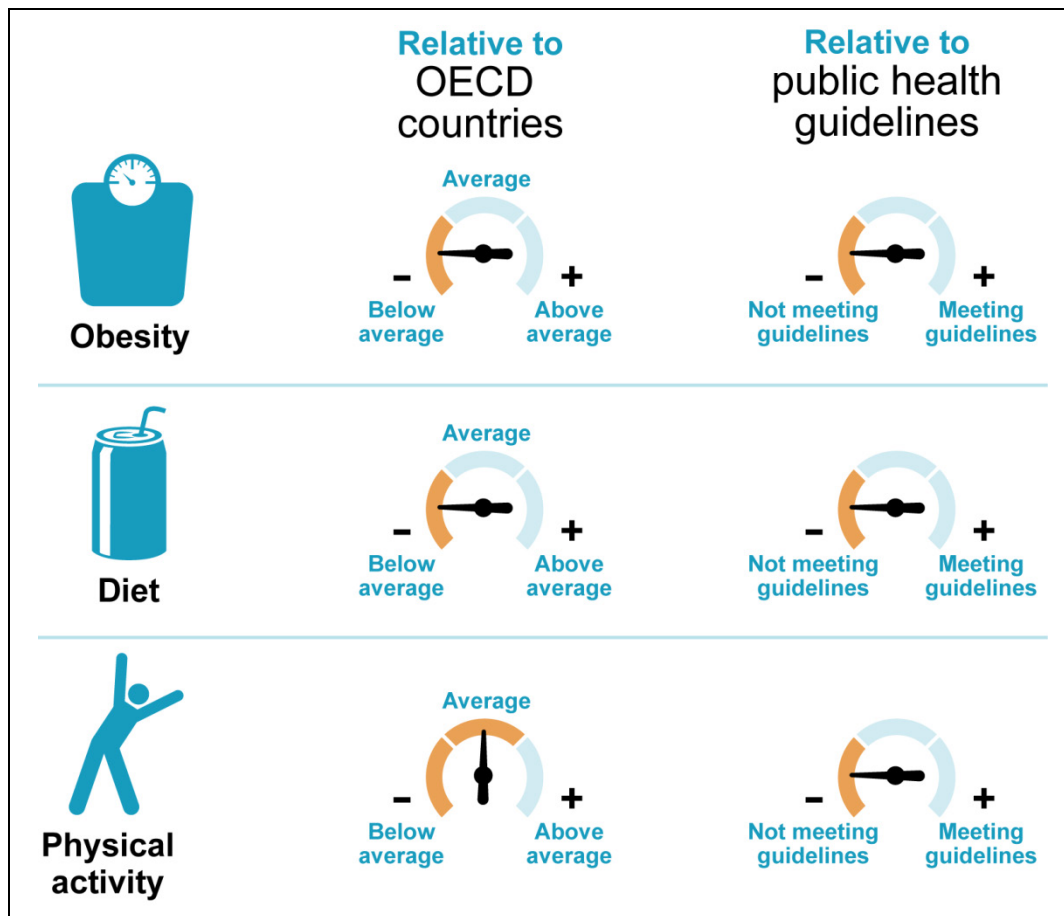
## Prevention

Prevention is often conceptualized at two key levels: individual and population. In individual-level prevention, the focus is often on high-risk individuals, whereas in population-level prevention, everyone's health is considered. It is important to consider the role of risk factors and interventions at both levels,<sup>27</sup> which are explored in further detail below.

## Individual-level factors

Diabetes shares several modifiable risk factors with other chronic diseases; these risk factors include obesity, poor diet and physical inactivity. An estimated 90% of diabetes cases<sup>28</sup> and 60% of complications<sup>17</sup> are preventable by modifying risk factors and better managing diabetes. Canada performs poorly on risk factors such as obesity and diet, particularly relative to countries with a low prevalence of diabetes, such as Sweden and the Netherlands. Even on indicators where Canada performs well internationally, performance is still below levels recommended by public health guidelines (Figure 3).

Figure 3: Canada's performance on diabetes risk factors, relative to other countries and public health guidelines, 2015



#### Notes

Above average: Above 75th percentile for OECD countries.  
Average: Between 25th and 75th percentiles for OECD countries.  
Below average: Below 25th percentile for OECD countries.

#### Sources

Organisation for Economic Co-operation and Development. [OECD Health Statistics](#). Accessed August 25, 2015.<sup>5</sup> (Obesity — self-report; diet — fruit and vegetable consumption, one per day, sugar consumption, total calorie consumption)  
Statistics Canada. [CANSIM table 105-0501](#). Accessed August 7, 2015.<sup>25</sup> (Obesity — self-report; diet — fruit and vegetable consumption, five per day; physical activity — percentage active during leisure time)  
Euromonitor International. [Soft Drinks: 2010 Trends and Future Directions](#). 2011. Cited by: Check D, Dodson M, Kirk C. [Americans drink more soda than anyone else](#). Accessed August 27, 2015.<sup>29</sup> (Diet — soda consumption)  
World Health Organization. [Global Health Atlas](#). Accessed August 10, 2015.<sup>30</sup> (Physical activity — percentage meeting WHO physical activity target)

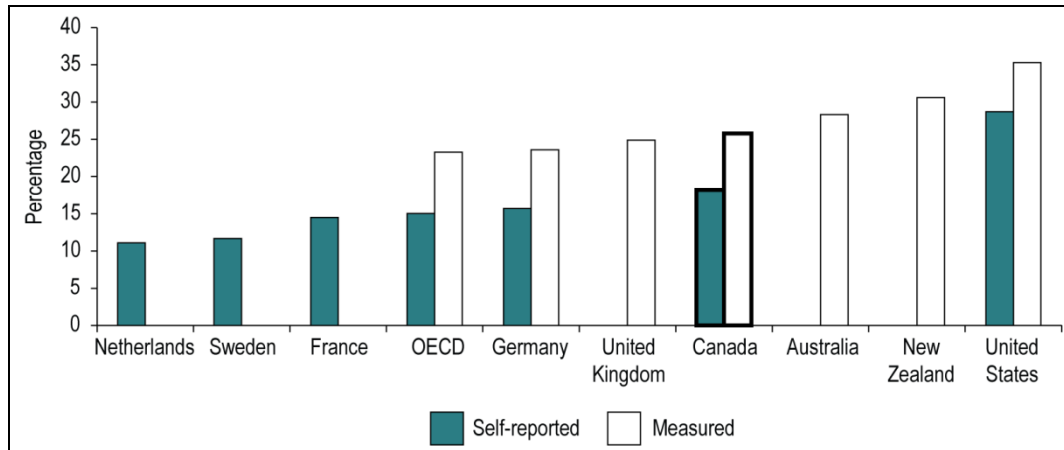
## Obesity

Obesity is a risk factor for diabetes and several other chronic diseases.<sup>31, 32</sup> Individuals with obesity (those with a body mass index higher than 30 kg/m<sup>2</sup>) are 3 to 7 times more likely to develop type 2 diabetes, and those who have severe obesity (body mass index higher than 35 kg/m<sup>2</sup>) have up to 20 times the risk of developing the disease compared with those of a healthy weight.<sup>33</sup>



The prevalence of adult obesity has increased worldwide over the last decade.<sup>5</sup> Canada has among the highest percentages of the adult population living with obesity: 25.8% when using measured height and weight, and 18.2% when using self-reported height and weight.<sup>5</sup> While self-reported height and weight tend to result in underestimations of the prevalence of obesity, many OECD countries collect only self-reported data. Canada has higher rates than peer countries with a low prevalence of diabetes, including the Netherlands, Sweden, France and Germany (Figure 4).

**Figure 4: Percentage of population living with obesity, self-reported and measured, age 15 and older, peer countries, 2015**



#### Note

OECD average includes 19 self-reported and 12 measured countries. The average for measured obesity is strongly affected by outlier countries like Japan and Korea, which have very low rates.

#### Source

Organisation for Economic Co-operation and Development. [OECD Health Statistics](#). Accessed August 25, 2015.<sup>5</sup>  
 Organisation for Economic Co-operation and Development. *Health at a Glance 2015*. 2015.<sup>2</sup>

In children and adolescents, overweight and obesity are defined relative to age- and sex-specific cut-offs developed by the International Obesity Task Force.<sup>18</sup> Compared with peer countries, Canada's prevalence of overweight and obesity — based on self-reported height and weight at age 15 — is among the highest. 17% of girls and 24% of boys are living with overweight and obesity, much higher than in peer countries, including Sweden (girls 7%, boys 17%), the Netherlands (girls 5%, boys 11%) and France (girls 7%, boys 13%).<sup>18</sup> Since 2001–2002, there has been very little change in the prevalence of *overweight and obesity* among Canadian 15-year-olds, whereas in the United Kingdom, for example, prevalence has decreased.<sup>18</sup>



## Provincial variation

Similar to the prevalence of diabetes, the prevalence of obesity is not consistent across the provinces. Newfoundland and Labrador has the highest prevalence, with 29% of the population living with obesity (self-reported), followed by the other Atlantic provinces. British Columbia has the lowest prevalence of individuals living with obesity. CIHI's interactive tool provides international–provincial comparisons (unpublished data, Canadian Community Health Survey, 2013, Statistics Canada).

## Diet



The association between diet and diabetes is well-established.<sup>34</sup> A well-balanced diet high in fruits and vegetables has been recommended to both prevent and manage diabetes.<sup>35</sup> In Canada, 69% of adults consume at least one fruit per day and 74% consume at least one vegetable, which is similar to or higher than the percentages seen in peer countries.<sup>5</sup> However, according to the Canadian Community Health Survey, only 41% of Canadians age 12 and older consume five or more servings of fruits and vegetables per day.<sup>25</sup> As Health Canada recommends even more servings per day (7 to 10 for adults),<sup>36</sup> true compliance rates with fruit and vegetable recommendations are likely below 40%. Additionally, the percentage of adults consuming five or more fruits and vegetables per day has decreased over the past decade.<sup>25</sup>

Canadians also consume more sugar annually than people in peer countries with low rates of diabetes.<sup>5</sup> Both the World Health Organization<sup>37</sup> and the Canadian Heart and Stroke Foundation<sup>38</sup> propose that intake of free sugars<sup>i</sup> should not account for more than 10% of daily energy intake. Added sugars in products such as soft drinks comprise an estimated 11% to 13% of Canadians' total calories.<sup>39</sup> As this rate does not include fruit juices, it is likely an underestimation of free sugar intake. Sugary beverages have been linked to increased risk of diabetes, with a recent review estimating that the risk of diabetes increases by 18% per beverage consumed each day.<sup>40</sup> Canadians consume more soft drinks (purchasing 101 L per person per year) than people in peer countries with a low prevalence of diabetes such as France (45 L), the Netherlands (73 L) and Sweden (71 L).<sup>29</sup> Soft drink consumption in Canada, however, has fallen over the past decade.<sup>41</sup>



## Provincial variation

Consistent with the results for diabetes and obesity, the Atlantic provinces have lower rates of fruit and vegetable consumption. In Newfoundland and Labrador, only 63% of adults consume at least one fruit per day, and only 44% at least one vegetable. There are similar rates for the other Atlantic provinces. Ontario and British Columbia have the highest rates (unpublished data, Canadian Community Health Survey, 2013, Statistics Canada).

## Physical inactivity

Physical inactivity is another common risk factor for diabetes, and an important component of managing diabetes.<sup>42</sup> Levels of physical inactivity are similar or better in Canada when compared with many peer countries, but both the Netherlands and Germany — countries with a lower prevalence of diabetes — have lower rates of inactivity (see Figure 5).<sup>30</sup> The World Health Organization recommends at least 150 minutes of moderate physical activity per week for adults; those who do not achieve this target are considered physically inactive.<sup>43</sup> The percentage of Canadians who report being moderately active or active during their leisure time has risen slightly over the last decade, from 52% to 55%.<sup>25</sup>

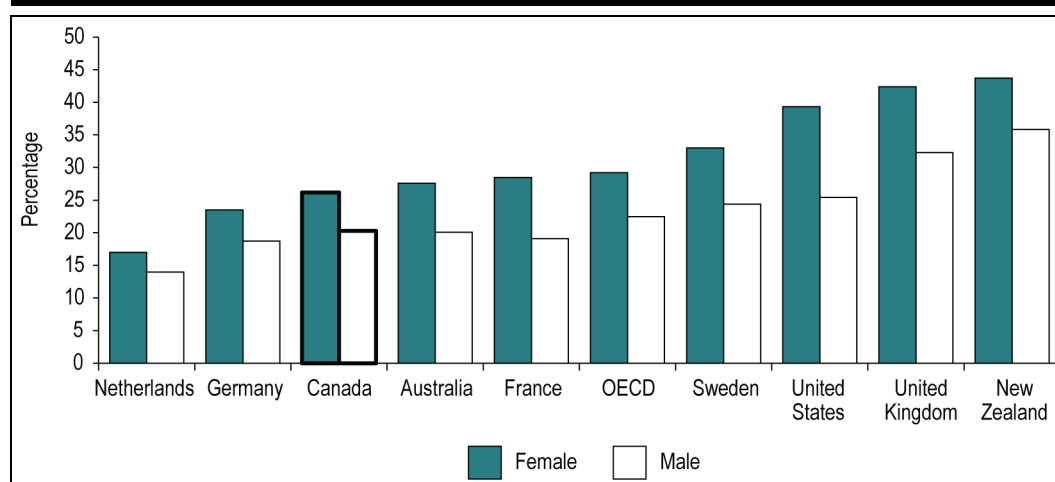
i. Free sugars refer to monosaccharides (e.g., glucose, fructose) and disaccharides (e.g., sucrose, a.k.a. table sugar) added to foods and drinks by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.

## Provincial variation

While Newfoundland and Labrador, Prince Edward Island and New Brunswick have lower-than-average rates of individuals reporting that they are physically active during their leisure time, Nova Scotia has rates similar to the Canadian average. British Columbia has higher-than-average rates of physical activity during leisure time.<sup>25</sup>

For children, the World Health Organization recommends at least 60 minutes per day of moderate to vigorous physical activity.<sup>43</sup> In Canada, only 14% of girls and 25% of boys meet this target.<sup>18</sup> While the percentage of active children is high relative to other OECD countries, including peer countries such as France and Sweden, it is clearly well below the recommended target.<sup>43</sup>

**Figure 5: Percentage of physically inactive adults, percentage of total population, age 18 and older, peer countries, 2010**



### Note

Physical inactivity is defined as less than 150 minutes of moderate physical activity per week.

### Source

World Health Organization. [Global Health Atlas](#). Accessed August 10, 2015.<sup>30</sup>

In addition to physical activity, sedentary behaviours, such as sitting at work and school or viewing screens during leisure time, are also risk factors for diabetes. In Canada, adults average 9.8 sedentary hours per day, while children average 8.5 hours.<sup>44</sup>

## Population-level factors

High levels of obesity, poor diet and physical inactivity, as described above, can often be traced to population-level factors: structural characteristics of society affecting health, such as income, education and housing; and environmental factors that encourage individuals to eat more and move less. These population-level factors also contribute to the risk of developing diabetes.



## Inequality in diabetes by income

Lower income or socio-economic status increases the risk of numerous chronic diseases, including diabetes.<sup>45</sup> Lower income contributes to increased stress, which can have a profound impact on both mental and physical health.<sup>46</sup> Additionally, an individual of lower income is more likely to have reduced access to various resources integral to health, such as housing and nutritious food.<sup>46</sup> In late November 2015, CIHI will release a new report — *Trends in Income-Related Inequalities in Canada* — that will further explore the unequal distribution of diabetes prevalence between income levels in Canada. Details on provincial variation in income inequality will be available in an interactive web tool.

Inequalities by income are also reflected in management of diabetes. One study showed that individuals with diabetes in the lowest income group received the least care, including blood and urine tests and foot and eye examinations.<sup>47</sup> Other research showed that among Canadians with below-average income, 20% reported that they did not have their health care needs met due to cost, meaning they did not visit a doctor, did not get recommended care or did not fill a prescription.<sup>2</sup> This is compared with only 8% of Canadians with above-average income. In countries with low diabetes prevalence, this discrepancy in unmet health care needs between income groups is smaller (United Kingdom, 5% versus 4%; Sweden, 11% versus 3%).

## Built environment

The built environment, which includes environments modified by humans (such as homes and workplaces) and accessibility to amenities, also plays an important role in the development of diabetes.<sup>48</sup> Walkable and bikeable neighbourhoods can help increase physical activity; nearby availability of healthy foods can influence food choice; access to public transportation, recreational facilities and green space can promote social interaction and community.<sup>48</sup> A recent study in Ontario found that neighbourhoods with the highest walkability also had the lowest rates of obesity.<sup>49</sup>

One marker of built environment is motor vehicle ownership and use, which is associated with increased physical inactivity, obesity and air pollution.<sup>50</sup> In Canada, there are 607 motor vehicles per 1,000 population, a rate higher than in countries with a low prevalence of diabetes such as Sweden (519), the Netherlands (522) and the United Kingdom (523).<sup>51</sup> Overall, however, built environment is difficult to compare internationally, as the majority of indices developed thus far focus on urban environments and are assessed at only the city or neighbourhood level.

## Management

Effective management of diabetes can improve the prognosis and quality of life of patients, as well as decrease the risk of complications, which account for approximately 80% of diabetes-associated costs.<sup>17</sup> Canada spends \$6,741 per person with diabetes, compared with the OECD average of US\$4,603.<sup>1</sup>

Complications of diabetes include heart attack, stroke, kidney failure, blindness and amputation.<sup>15</sup> In Canada, hospital admissions for diabetes are low relative to other OECD countries, with 95.3 avoidable hospital admissions per 100,000 population (Figure 10). However, Canada has similar results as peer countries on lower-extremity amputation, with 7.4 amputations per 100,000 general population and 49.6 amputations per 100,000 population with diabetes.<sup>2</sup> Canada also has an average rate of diabetes-related deaths (69 per 100,000 population,<sup>1</sup> similar to the average of OECD countries).



## Provincial variation

Similar to diabetes prevalence, there is a great deal of provincial variability in diabetes management. Saskatchewan has the highest rate of diabetes hospital admissions, with 186.5 admissions per 100,000 population. The Atlantic provinces, Manitoba and Alberta also have rates above the Canadian average. On the other hand, Quebec and British Columbia have rates below the Canadian and OECD averages (unpublished data, Discharge Abstract Database, 2013–2014, Canadian Institute for Health Information).

Access to medication is another important component of diabetes care. Many Canadians with diabetes take medications to control blood sugar levels and/or provide insulin. However, as the decision to list medications is made independently in each jurisdiction, there is variation in the availability of diabetes-related medications, as well as in financial support for these medications and for testing supplies.<sup>52, 53</sup> In Canada, only 45% of prescription drug funding is covered by public funds, much less than the OECD average of 73%.<sup>54</sup> In Canada, 35% of the remaining costs are covered by private insurance and 20% by out-of-pocket payments.<sup>54</sup> This latter percentage is similar to that in peer countries.

## Technological advances in diabetes self-management

Internationally, there have been large advances in diabetes self-management through the use of innovative technologies. Smartphone apps help users log and track food, physical activity, blood sugar and medications over time.<sup>55</sup> Continuous glucose (blood sugar) monitoring has also become increasingly popular; this uses a sensor under the skin to measure glucose levels every one to five minutes.<sup>56</sup> Telemedicine has also been shown to be useful in regards to monitoring and supporting care for individuals with diabetes,<sup>57</sup> especially those living in rural areas.

# Learning from others: Looking to peers to reduce diabetes in Canada

Comparing Canada internationally can highlight areas of health care that need to be improved and also offer an opportunity to learn from high-performing countries. As noted throughout this report, Canada's peer countries of the United Kingdom, Australia, Sweden, the Netherlands and France all have a low prevalence of diabetes. Looking to these countries as well as those performing highly in regards to diabetes risk factors — specifically obesity, poor diet and physical inactivity — and diabetes management, we see a number of policies that show promising results in reducing risk factors for diabetes (Figure 6).

Interventions and policy changes can address both individual (i.e., diet, physical activity) and population-level (i.e., inequalities, built environment) factors. While some programs focus on high-risk groups like those of Aboriginal, Hispanic, South Asian, Asian or African descent, others encourage broad societal changes. Each individual intervention or policy may not be enough to affect the prevalence of diabetes in Canada; however, taken together, a multifaceted approach with policies targeting financial incentives, health information and education, built environment, inequalities in access, and diabetes management and care may help to reduce diabetes prevalence and outcomes in Canada.<sup>58</sup>

Figure 6: Example international policies for diabetes prevention and management

 <b>Financial incentives</b>	 In 2012, France introduced a tax on sugar-sweetened drinks. Within four months, sales of sugar-sweetened drinks had declined by 3.3%. <sup>59</sup>
	 In 2009, the European Commission started a program that provides young pupils with free fruits and vegetables, which successfully increased students' fruit and vegetable consumption. <sup>60, 61</sup>
 <b>Health information and education</b>	 Change4Life is a social media-based health campaign in the United Kingdom that is aimed at families with children younger than 12 and helps individuals to eat less and move more. Research shows that Change4Life has contributed to increased life expectancy in the United Kingdom. <sup>62</sup>
	 The Dutch recognition system for health promotion interventions is a registration system that centrally gathers and evaluates the effectiveness of successful health promotion interventions throughout the country. <sup>63</sup>
 <b>Built environment</b>	 In Germany, the National Cycling Plan was introduced in 2002 with great success. The plan focuses on capacity-building in urban centres to promote bicycling as a means of transportation. This project has proven successful in other countries as well, with a 3% increase in biking trips noted in Beijing. <sup>64, 65</sup>
	 In 2012, the city of Stockholm developed the Urban Mobility Strategy, with a focus on sustainable development of transport infrastructure, including increasing the number of bike lanes and bicycle parking spots throughout the city. Stockholm is one of the highest-ranking cities in the world on an independently developed scale of urban mobility and maturity. <sup>66, 67</sup>
 <b>Inequalities in access</b>	 In the United Kingdom, the Wii Fit Programme targeting the older population of Manchester used Wii Fit software to encourage activity. Simulations of bowling, tennis and exercises were used to improve balance and coordination. <sup>68</sup>
	 The Outback Stores initiative in Australia assists remote indigenous community stores with improving storage and decreasing costs of perishable foods like fruits and vegetables. Food subsidy programs have been shown to increase fruit and vegetable consumption. <sup>69, 70</sup>
 <b>Management and care</b>	 The Danish General Practice Quality Unit uses data from diagnoses, procedures, prescribed drugs and laboratory results in primary care to monitor quality of care for physicians. This has improved adherence to guidelines for diabetes care. <sup>71</sup>
	 In France, a health network targeting diabetes offers patients educational sessions, dietary counselling, supervised weight loss and exercise programs. These networks were shown to lead to improved blood sugar control and weight loss. <sup>72</sup>

## Canadian initiatives

Announced in 1999 and renewed in 2005, the Canadian Diabetes Strategy was designed to provide a framework for improved surveillance, prevention and management of diabetes.<sup>73</sup> Components included increased awareness and surveillance of diabetes in Aboriginal populations; prevention of chronic diseases, including diabetes, by focusing on reducing risk factors for those at high risk; and support for and implementation of community-based programs.<sup>73</sup> In 2013, the Canadian Diabetes Strategy came under criticism by the auditor general for a lack of strategic priorities and concrete deliverables.<sup>74</sup> However, some areas of national collaboration were highlighted, including the Curbing Childhood Obesity Framework developed in 2010. The framework outlines strategies for promoting healthy weights, including increased availability and affordability of nutritious foods, protection of children from marketing of unhealthy foods and supportive design of communities to encourage healthy living.<sup>75</sup> Some programs are also beginning to focus on high-risk populations such as Aboriginal communities.<sup>76</sup>

At the local level, organizations have begun to build on best practices seen in peer countries. EPODE (Ensemble, prévenons l'obésité des enfants / Together Let's Prevent Childhood Obesity) Canada<sup>77</sup> is using a capacity-building approach for community-based programs developed by the EPODE International Network, the world's largest network of childhood obesity prevention programs. The EPODE methodology informs the framework for Canadian programs such as the Healthy Kids Community Challenge, which promotes healthy lifestyles for children in 45 communities across Ontario.<sup>78</sup> The EPODE methodology includes broad strategies for involving multiple stakeholders, public-private partnerships, social marketing and political commitment.<sup>79</sup> The goal is to transform environments into ones that promote healthy, active living. Evaluation of this methodology has shown significant decreases in the prevalence of obesity and overweight in Belgium<sup>80</sup> and France.<sup>81</sup>

In some instances, policies in Canada have been influential internationally. In Quebec, commercial advertising to children younger than 13 has been prohibited since 1980.<sup>82, 83</sup> Marketing to children is known to influence food preferences and consumption patterns, and the World Health Organization recommends reducing the exposure of children to the "marketing of foods high in saturated fats, trans-fatty acids, free sugars or salt."<sup>84</sup> The consumer ban in Quebec is estimated to have decreased fast food consumption by 13% in French-speaking households with children.<sup>83</sup> Similar bans have since been implemented in the United Kingdom, Sweden and Norway.<sup>85</sup>

While Canada has recognized the importance of addressing diabetes and its risk factors through frameworks such as the Canadian Diabetes Strategy, the Curbing Childhood Obesity Framework and the Preventing Chronic Disease Strategic Plan, there is still more to be done. Looking to high-performing peer countries creates an opportunity for Canada to draw on interventions and policies that have been proven successful internationally. Applying such policies locally can help to further improve diabetes prevalence and management in Canada.

## Conclusion



International comparisons can enhance accountability, improve benchmarking and support mutual learning. Relative to other OECD countries, there is considerable variation in Canada's performance. For most indicators, Canada performs similarly to other countries, but there remain areas where Canada performs particularly well or poorly. Similarly, there is variation in provincial performance across the country, as seen in [CIHI's new interactive web tool](#).

A close examination of the high prevalence of diabetes in Canada offers an opportunity to learn from peer countries to better address a complex health care challenge in Canada. Canada's performance on diabetes risk factors — obesity, poor diet and physical inactivity — is low to average when compared internationally, and poor relative to public health guidelines. A consideration of population-level risk factors, such as income inequality and built environment, also suggests that there are opportunities for improvement on diabetes prevalence and risk factors.

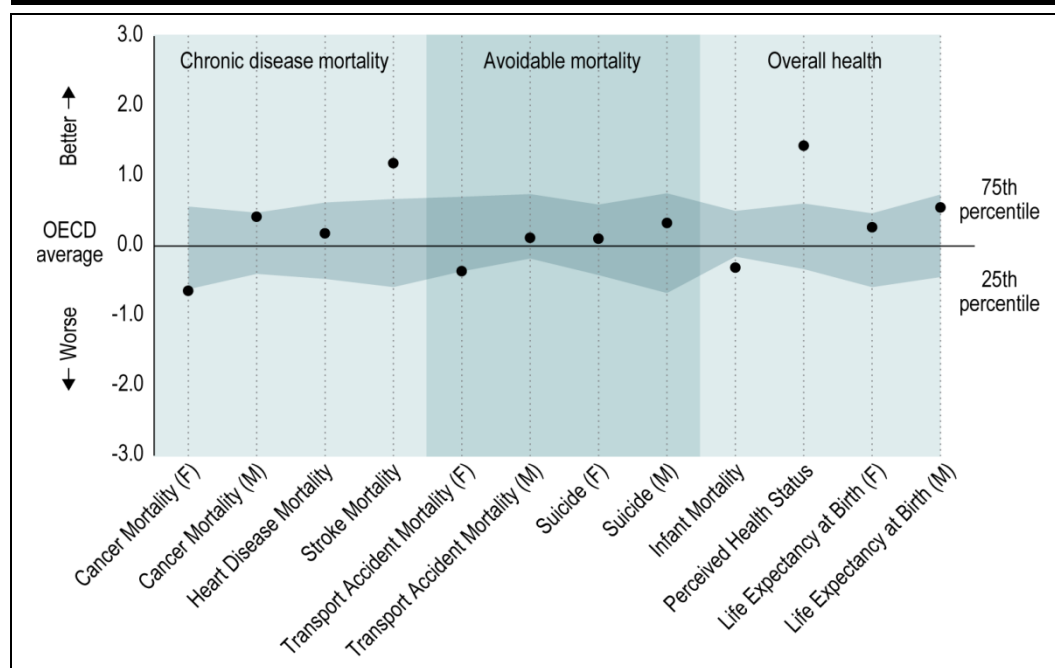
Successful policies and programs in high-performing countries can help in the development of policies, strategies and programs aimed at reducing the prevalence and improving the management of diabetes in Canada. Although reducing the burden of chronic disease is challenging, using international comparisons for mutual learning may lead to healthier populations across the globe.

## Appendix: Standardized graphs for each dimension of care

### Interpreting the standardized graphs

The performance profiles (figures 7 to 11) for each dimension (group of indicators) show Canada's results for each indicator in relation to the OECD average, as well as to the lowest- and highest-performing OECD countries (25th and 75th percentiles). The vertical scale is a standardized score, representing the relative distance from the OECD average (0.0) for each indicator. For example, a standardized score of 1.5 would represent a result that is three times further away from the OECD average than a score of 0.5. Indicators above the OECD average line denote higher performance than the OECD average, and those below the line indicate lower performance than the average. The shaded band indicates the distance between the 75th and 25th percentiles, or the performance range for 50% of OECD countries, so a point above this area indicates that Canada is in the top quarter of all OECD countries.

Figure 7: Health Status performance profile, Canada

**Notes**

F: Females; M: Males.

Infant Mortality: Some of the international variation in infant and neonatal mortality rates may be due to variations among countries in registering practices of premature infants.<sup>6</sup>

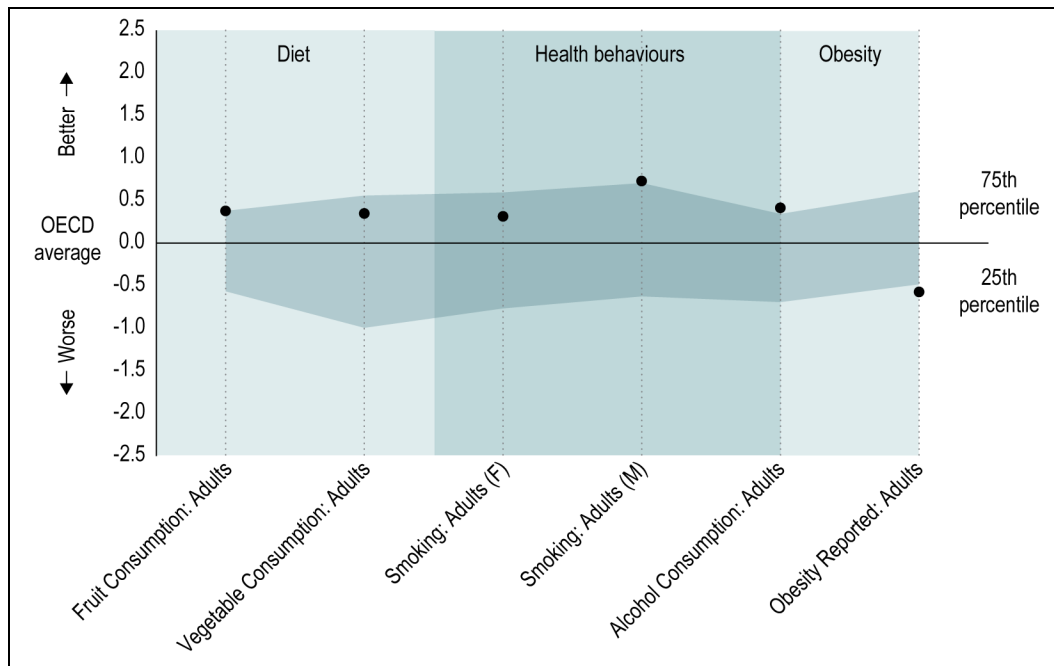
Perceived Health Status: Due to differences in survey design, Canada's scores (as well as those of Chile, the United States, New Zealand and Australia) are biased upward.<sup>3</sup>

**Source**

Organisation for Economic Co-operation and Development. [OECD Health Statistics](#). Accessed August 25, 2015.<sup>5</sup>



Figure 8: Non-Medical Determinants of Health performance profile, Canada



**Notes**

F: Females; M: Males.

Obesity Reported: Adults: Obesity rates are based on self-reported height and weight. Self-reported rates, rather than measured ones, were used because measured rates of adult obesity are available for only a limited number of countries.

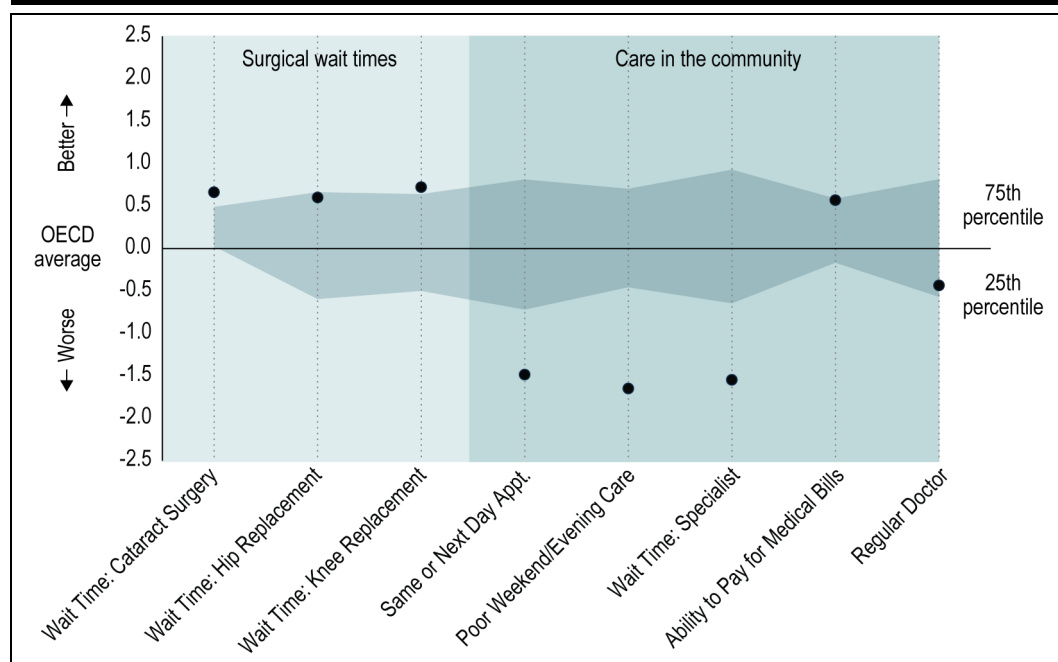
Smoking: Adults: Smoking rates are based on self-report; some variation exists in the measurement of smoking habits in health interview surveys across OECD countries.

**Source**

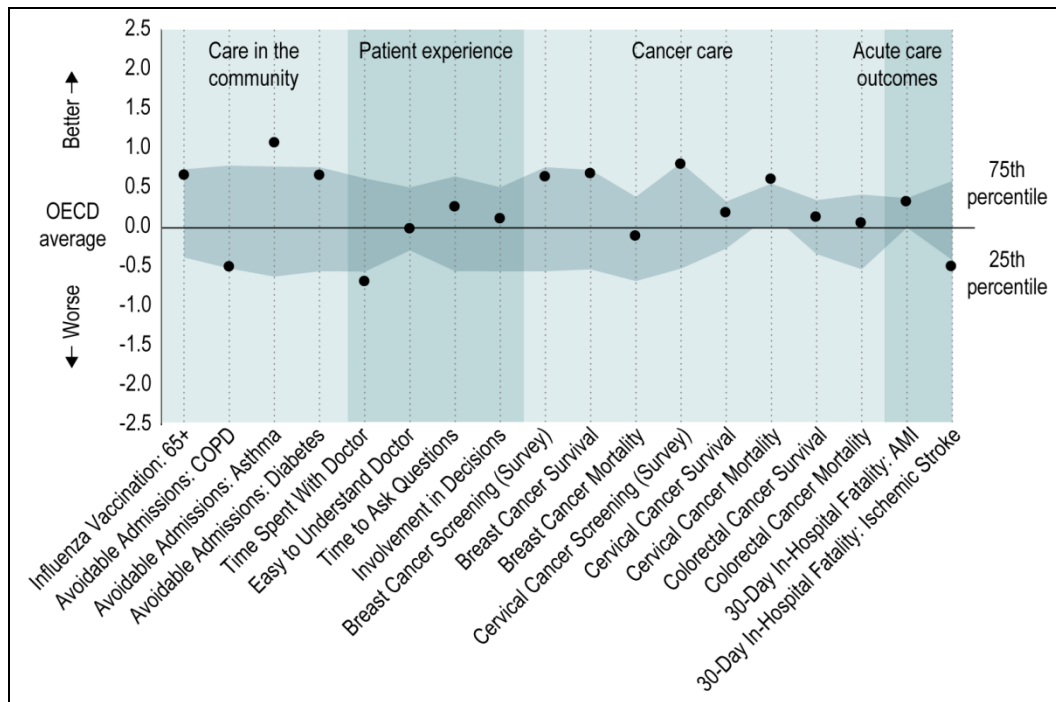
Organisation for Economic Co-operation and Development. [OECD Health Statistics](#). Accessed August 25, 2015.<sup>5</sup>



Figure 9: Access to Care performance profile, Canada

**Source**

Organisation for Economic Co-operation and Development. [OECD Health Statistics](#). Accessed August 25, 2015.<sup>5</sup>

**Figure 10: Quality of Care performance profile, Canada**


#### Notes

F: Females; M: Males.

COPD: Chronic obstructive pulmonary disease.

AMI: Acute myocardial infarction.

Cancer screening: Results have been limited to self-reported survey data.

30-Day In-Hospital Fatality: AML/Stroke: Ideally, rates would be based on individual patients; however, only some countries have the ability to track patients across hospitals and capture deaths occurring outside of a hospital. As a result, rates are based on hospital admissions. Differences in practices in discharging and transferring patients may influence the findings.

Patient experience: Data for the patient experience indicators comes from The Commonwealth Fund's International Health Policy surveys in 2013 and 2014. Differences exist in the sample sizes, representativeness and response rates.

Caution is needed when interpreting patient experience outcomes across countries.

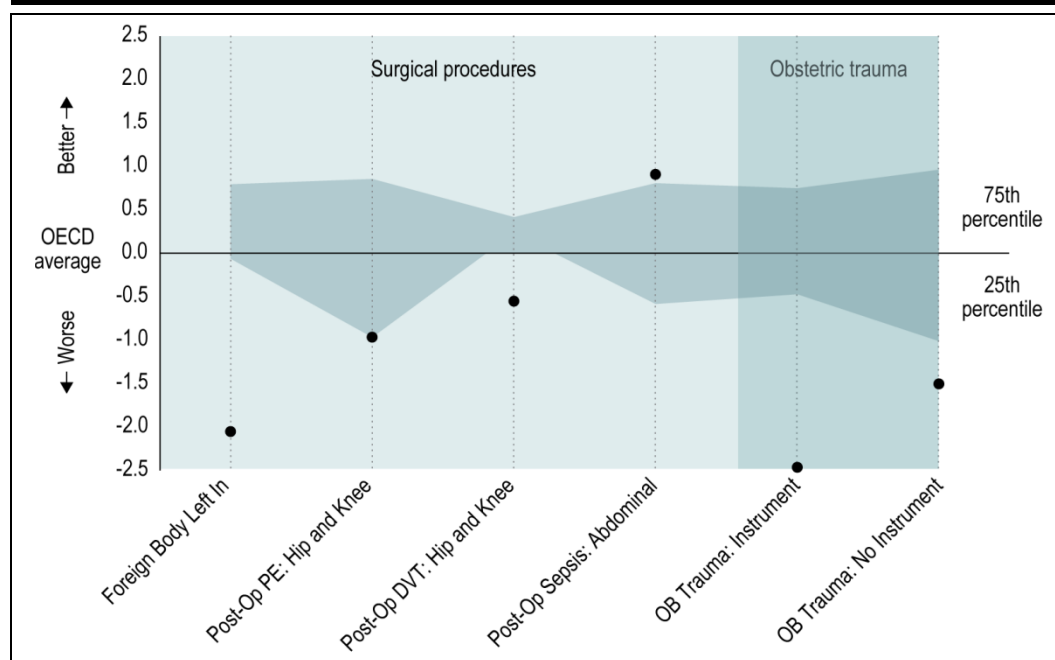
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Organisation for Economic Co-operation and Development. [OECD Health Statistics](#). Accessed August 25, 2015.<sup>5</sup>

The Commonwealth Fund Survey, 2013, Canadian Institute for Health Information (unpublished data).

Canadian Institute for Health Information. *How Canada Compares: Results From The Commonwealth Fund 2014 International Health Policy Survey of Older Adults*. 2015.<sup>9</sup>

Figure 11: Patient Safety performance profile, Canada

**Notes**

Post-op: Post-operative.

PE: Pulmonary embolism.

DVT: Deep vein thrombosis.

OB: Obstetric.

Post-operative indicators: Only countries using the same analytical methodology were included. As these are new indicators, there may be more inconsistencies in the way individual countries report results.

Obstetric indicators: Limitations exist when comparing country data due to differences in coding practices and data sources. For example, some countries report obstetric trauma rates based on administrative hospital data, and others report based on the obstetric register. Given that advanced maternal age is a strong determinant of obstetric trauma, age-standardizing would help improve the comparability of these indicators.

**Source**

Organisation for Economic Co-operation and Development. [OECD Health Statistics](#). Accessed August 25, 2015.<sup>5</sup>

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