COVID-19 Fact Sheet

ARPA Canada
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Information about COVID-19 abounds. Whether you are perusing the local newspaper, scrolling through social media, or talking to friends, COVID-19 dominates the discussion. However, all this information is rarely presented in a single place or presented in an easy-to-understand way. Sometimes, different friends or news stories may report very different facts.

We have created this fact sheet and background research in response to the many questions and requests we get in regard to COVID-19. We hope it will be a helpful resource for individual supporters, parents, church councils, and business owners to craft their own data-driven response to the virus. As epidemiology and health policy are not our areas of expertise, we welcome well-researched corrections and constructive criticism.

As much as possible, the information presented here comes directly from official, publicly available sources (such as the Government of Canada, Statistics Canada, and the Canadian Institute for Health Information) before it is filtered through media organizations and other institutions. This fact sheet attempts to provide comprehensive, relatively "raw" data in an easy-to-understand format, to allow people to draw their own conclusions from the data. This fact sheet primarily looks at COVID-19 from a national level rather than looking at every province and territory individually.

This fact sheet begins by providing some quick facts about COVID-19. The bulk of this fact sheet provides some explanation, data sources, and visualization of these quick facts. Finally, a handful of other helpful sources can be found at the very end of this fact sheet.

Quick Facts

- ✓ As of Canada's December 18, 2020, Epidemiological Update, 6.2% of confirmed COVID-19 cases have required hospitalization, 1.2% have required intensive care, and 3.1% have resulted in death.
- ✓ Young and healthy people who have a confirmed case of COVID-19 have a relatively low chance of requiring hospitalization, requiring critical care, or dying from COVID-19.
- ✓ Older people (particularly 70+) and those with co-morbidities (particularly dementia and pneumonia) who have a confirmed case of COVID-19 have an elevated chance of requiring hospitalization, requiring critical care, or dying from COVID-19.
- ✓ The vast majority (92%) of people who died *with* a confirmed case of COVID-19 were medically determined to have died *from* COVID-19. Only 8% of people who died with a confirmed case of COVID-19 were deemed to have died from other causes and were not counted as a COVID-19 death.
- ✓ The majority of unexpected deaths (the number of deaths outside the natural and statistical year-to-year variation) in Canada in 2020 seem to have been directly due to COVID-19.

✓ The Public Health Agency of Canada's short-term projections have proved to be largely accurate; the accuracy of their longer-term projections and modelling is more difficult to evaluate due to varying provincial policies, timelines, and scenarios.

✓ In the early months of the pandemic, provincial health care systems were not overwhelmed; by cancelling elective and non-urgent surgeries, the health system ran under normal capacity by 20-40%. More current, comprehensive, public information is not yet available.

What is COVID-19?

COVID-19 is a contagious respiratory virus. Key symptoms of COVID-19 include a cough, difficulty breathing, and a fever, although many people who contract COVID-19 do not show symptoms (asymptomatic). Although people typically recover from COVID-19 after two to six weeks, depending on the severity of the case, lingering or longer-term effects may persist. Common lingering symptoms include fatigue, cough, congestion, shortness of breath, or a loss of taste or smell.

COVID-19 primarily spreads through respiratory droplets exhaled through the nose or mouth by a cough, sneeze, or breath. Like any contagious disease, COVID-19 can spread exponentially through a population. The speed and extent to which a virus like COVID-19 spreads through a population depends on the number of people the average COVID-19 positive person infects. This rate is known as the reproduction rate (R_0). Although the reproduction rate of COVID-19 has been influenced by various public health measures, Infection Prevention and Control Canada estimates that the reproduction rate of COVID-19 before public health measures is 2.0 to 3.0, which is significantly higher than the estimated reproduction rate of the common flu (1.3).

Chart 1: Confirmed COVID-19 Cases in Canada (7-Day Moving Average) from March 2020 to January 2021

Source: Government of Canada. (January 9, 2021). *Coronavirus disease 2019 (COVID-19): Epidemiology update as of December 18, 2020.*

How does COVID-19 impact human health?

COVID-19 does not impact every person the same. Some people experience no symptoms or mild symptoms. Others may require general hospital care or even intensive care. For some, COVID-19 can be lethal.

Based on the Government of Canada's Coronavirus disease 2019 (COVID-19): Epidemiology update as of December 18, 2020, 436,632 Canadians have had confirmed diagnoses of COVID-19, of which:

- ✓ 6.2% of total confirmed cases (27,274) required hospitalization,
- ✓ 1.2% of total confirmed cases (5,258) required intensive care, and
- ✓ 3.1% of total confirmed cases (13,579) resulted in death.

As the raw number of cases, hospitalizations, and deaths increase, the hospitalization rate and fatality rate will also fluctuate and should eventually decrease as high-risk Canadians receive the COVID-19 vaccine. Thus, the average Canadian who tests positive for COVID-19 has a **96.9%** chance of recovering from the virus and a similarly low chance of requiring hospitalization or intensive care. Lingering or long-term effects may still affect recovered people, however.

How does COVID-19 impact different demographics?

Specific populations have elevated or reduced risks of hospitalization, intensive care, or death from COVID-19.

Age is a significant risk factor. Young people who contract a confirmed case of COVID-19 have a relatively low chance of requiring hospitalization, requiring intensive care, or dying from the virus. The probability of these outcomes rises with age. Approximately one in four Canadians aged 80+ will require hospitalization and a similar proportion are likely to die from COVID-19.

Table 2: Cases, Hospitalizations, Intensive Care Admissions, and Deaths by Age Cohort

Age group	Cases	Hospitalizations	Likelihood of Hospitalization	Intensive Care Admissions	Likelihood of Intensive Care	Deaths	Likelihood of Death
≤19	68,871	425	0.6%	59	0.09%	3	0.004%
20-29	81,122	870	1.1%	152	0.19%	18	0.02%
30-39	67,776	1,404	2.1%	251	0.37%	33	0.05%
40-49	63,457	1,963	3.1%	464	0.73%	90	0.14%
50-59	58,253	3,425	5.9%	971	1.67%	341	0.59%
60-69	37,148	4,535	12.2%	1,371	3.69%	995	2.68%
70-79	22,739	5,691	25.0%	1,289	5.67%	2,518	11.07%
80+	37,266	8,961	24.0%	701	1.88%	9,581	25.71%

Source: Government of Canada. (January 9, 2021). *Coronavirus disease 2019 (COVID-19): Epidemiology update as of December 18, 2020.*

The presence of co-morbidities (other pre-existing health concerns) also impacts the likelihood of hospitalization or death from COVID-19. For example, approximately 38% of people who died of COVID-19 in 2020 also had dementia and approximately 32% had pneumonia.

Chart 2: Common Co-Morbidities Associated with COVID-19 Deaths
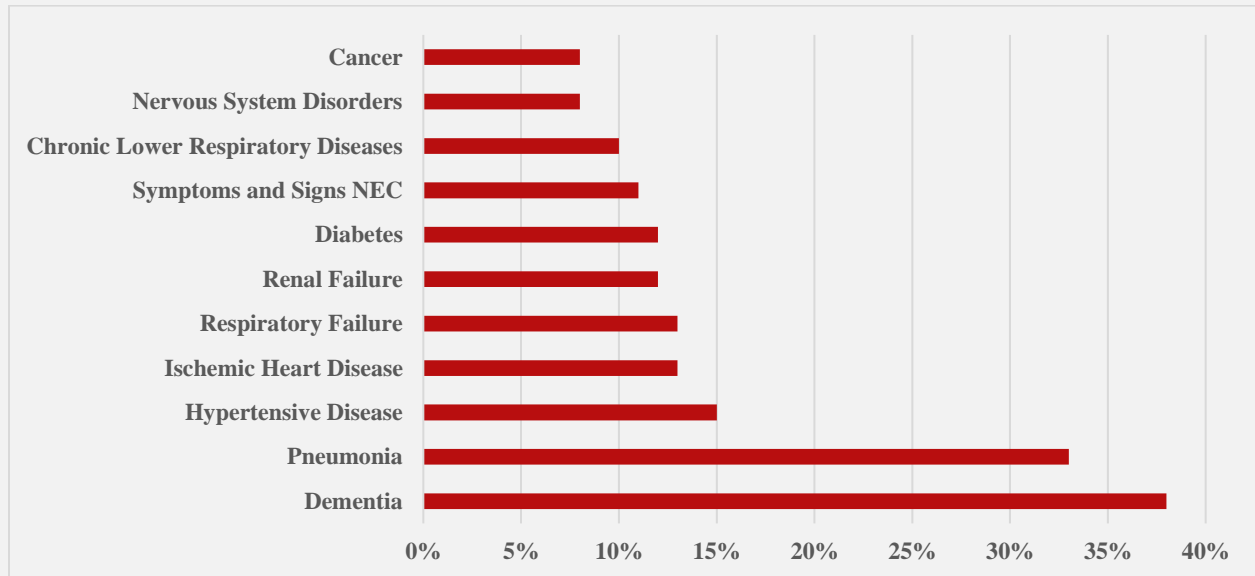
Source: Statistics Canada. (November 16, 2020). *COVID-19 death comorbidities in Canada between March 1 and July 31.*

Taken together, age and the presence of co-morbidities explain much of an individual's risk of hospitalization, intensive care, or death from COVID-19. As of July 31, 2020, at least one co-morbidity was present in 100% of COVID-19 deaths of people under the age of 45. In other words, young and healthy people have virtually zero chance of dying from COVID-19. Although they still have an elevated risk, even older yet healthy Canadians are unlikely to die from COVID-19. At least one co-morbidity was present in 89% of COVID-19 deaths in those over the age of 85.

What Counts as a COVID-19 Death?

The fact that people who are advanced in years or who have existing co-morbidities are most likely to die from COVID-19 raises questions about what is counted as a "COVID-19 death." Did someone die directly because of COVID-19, or did that person die for another reason but just happened to also have COVID-19?

Here is how deaths are classified in Canada, as outlined by Statistics Canada. (This process is the same during "normal" times as during the COVID-19 pandemic.) When a person in Canada dies, medical professionals, medical examiners, or coroners record the cause(s) of death on a medical certificate of cause of death. Multiple conditions may be recorded as the cause of death. Causes of death are recorded according to the World Health Organisation's International Statistical

Classification of Diseases and Related Health Problems (ICD-10). However, only a *single* cause is determined to be the *underlying* cause of death. The *underlying* cause of death is defined as the "(a) the disease or injury which initiated the train of events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury."

COVID-19 deaths counted in official and statistical reports are deaths for which COVID-19 is cited as the *underlying* cause of death, even if other health conditions contributed to death. Not all deaths of people who have contracted COVID-19 are counted as COVID-19 deaths, as other unrelated diseases or injuries may be the *underlying* cause of death. For all the deaths in which COVID-19 was listed as a cause of death, COVID-19 was identified as the *underlying* cause of death in 92% of cases. In the remaining 8% of cases, other conditions such as cancer, dementia, heart disease, and lung disease were reported as the *underlying* cause of death.

How many people have died from COVID-19?

Even though the individual risk of hospitalization, intensive care, or death from COVID-19 may be relatively low for individuals, the cumulative impacts of even low individual risks are significant when applied to a country of approximately 38,000,000 people. Between the weeks of March 7th and December 26th, 2020, 14,995 Canadians died from COVID-19, with total deaths per week peaking in April, May, and June 2020.

Chart 3: Number of COVID-19 Deaths Per Week across Canada from March - December 2020
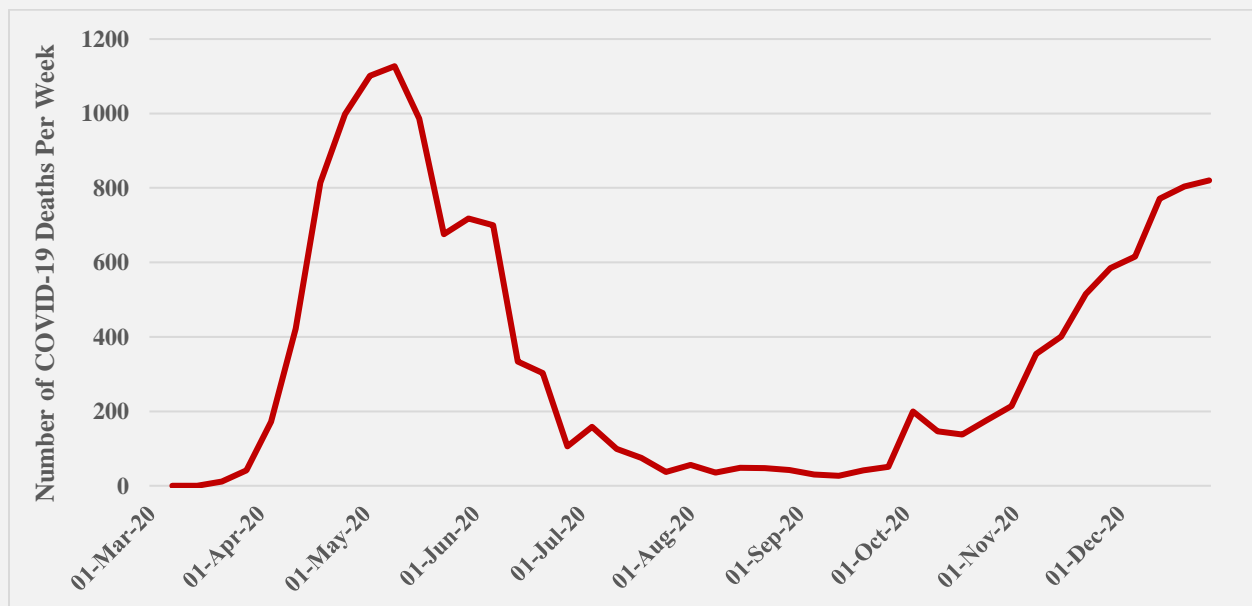
Source: Government of Canada. (January 9, 2021). *Coronavirus disease 2019 (COVID-19): Epidemiology update as of December 31, 2020.*

To put the weekly number of COVID-19 deaths into perspective, Statistics Canada expects a certain number of deaths each week based on how many deaths occurred in the same week in previous years. These expected deaths are due to every cause of death in a typical month in Canada: motor vehicle accidents, suicides, old age, etc. The black line in the graph below depicts the number of weekly expected deaths in Canada from January to October of 2020. The grey dotted lines illustrate the 95% confidence intervals for this number of expected deaths; any movement above or below the expected number of deaths (the black line) can be considered normal year-to-year variation in the weekly number of deaths. The red line depicts the actual weekly number of deaths during these weeks.

Chart 4: Actual (Adjusted) Number of Weekly Deaths in Canada from January - October 2020
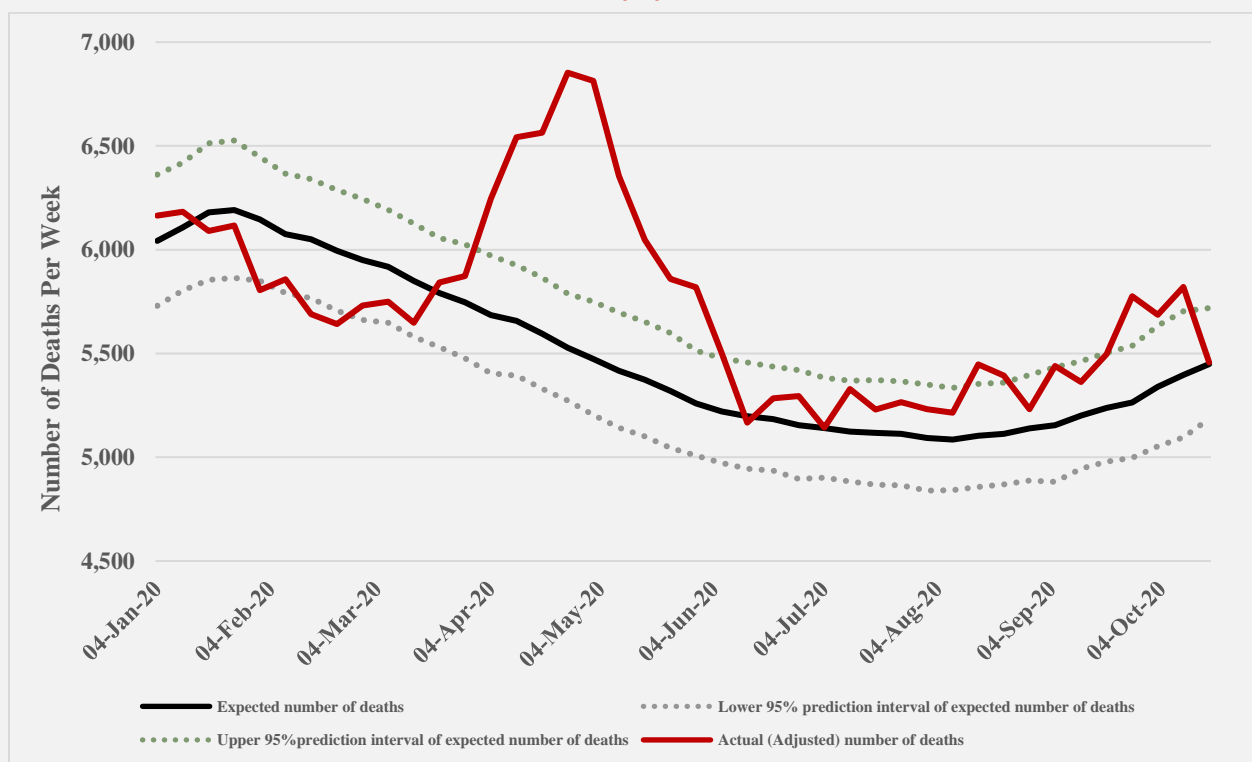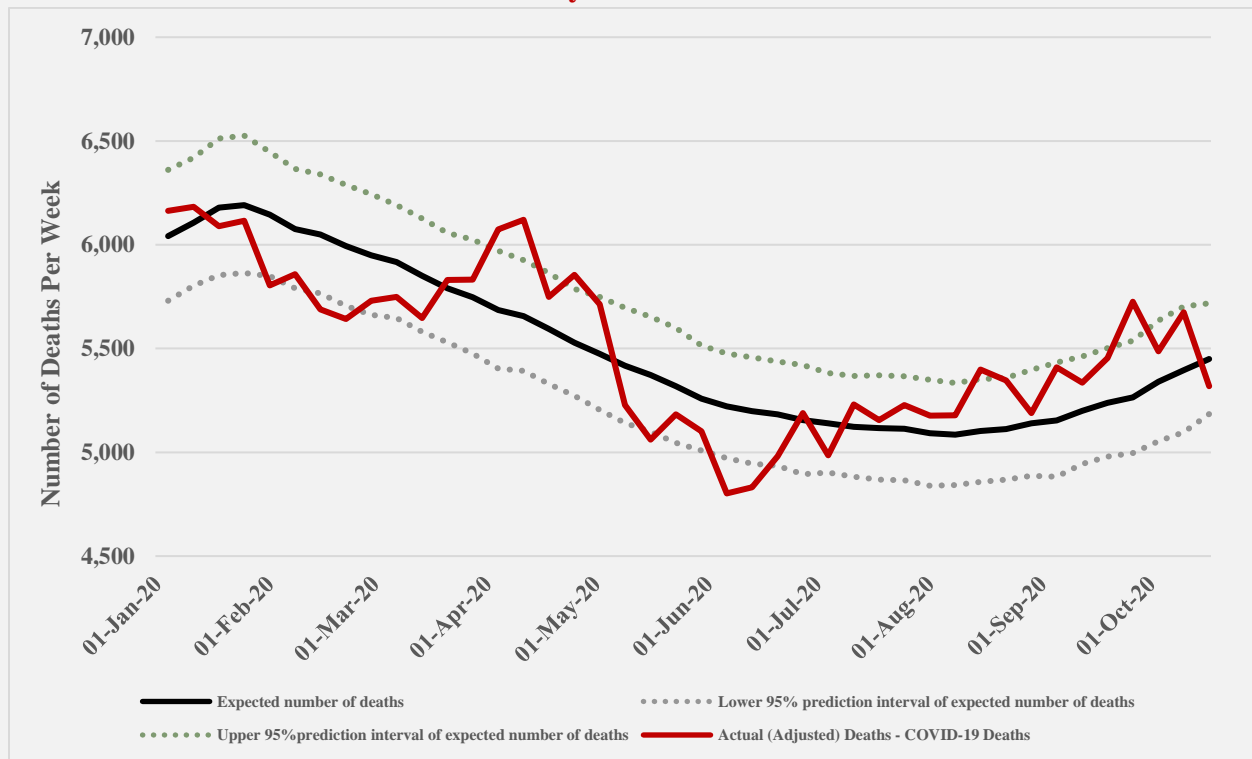

Source: Statistics Canada. Table 13-10-0784-01: Adjusted number of deaths, expected number of deaths and estimates of excess mortality, by week.

The actual number of weekly deaths rose during the months with the greatest number of weekly COVID-19 deaths – April, May, and June – and fell when the number of COVID-19 deaths fell. It remained only slightly above expected during the summer and early fall when the number of COVID-19 deaths remained low.

If the number of COVID-19 deaths is subtracted from the number of actual (adjusted) deaths (i.e. when you count all deaths in Canada *except for* COVID-19 deaths), the actual number of deaths mostly fluctuates within the margin of expected variability around the expected number of deaths. In fact, the number of expected deaths between the first week of COVID-19 deaths

(March 21) until the end of the available data (October 17) at 164,667 deaths is very close to the number of actual (adjusted) deaths minus COVID-19 during the same time period (166,844). This suggests that most of the unexpected deaths in 2020 are due to COVID-19.

Chart 5: Actual (Adjusted) minus COVID-19 Number of Weekly Deaths in Canada from January - October 2020

Source: Statistics Canada. Table 13-10-0784-01: Adjusted number of deaths, expected number of deaths and estimates of excess mortality, by week.

This data provides an update to an earlier ARPA article (published in August of 2020) that asked Are COVID-19 Restrictions the Cause of "Excess Deaths"? That article cited data from March and April that suggested that there were hundreds of "excess deaths" (deaths above the expected number of deaths) during these months. In the graph above, we see this reflected in the actual (adjusted) number of deaths published later. The number of deaths in mid-March and April (minus COVID-19 deaths) exceeded the expected number of deaths and also briefly passed the threshold of expected variation in the number of deaths (the grey line).

Are COVID-19 Models Accurate?

Starting on April 9th, the Public Health Agency of Canada released short-term projections (projections for the next two weeks or so) of the number of COVID-19 cases and deaths. The projections also include 95% confidence intervals which provide a range of likely case numbers and deaths. Over the course of 2020, the Public Health Agency of Canada issued 11 such short-

term forecasts. When these forecasts are compared to the actual number of COVID-19 cases and deaths, the number of cases was within the Public Health Agency confidence interval 9 out of the 11 times. On two occasions more COVID-19 cases were diagnosed than the Agency had forecasted. The actual number of deaths was within the Agency's confidence interval 6 out of the 11 times. On five occasions more COVID-19 deaths actually occurred than the Agency had forecasted. In all of their short-term forecasts in 2020, the Agency did not over-estimate the number of COVID-19 cases or deaths a single time.

Table 2: Reliability of Short-Term COVID-19 Cases and Deaths by the Public Health Agency of Canada

Date of Two-Week Forecast	Forecasted Lower Bound of Cases	Forecasted Average of Cases	Forecasted Upper Bound of Cases	Actual Cases	Forecasted Lower Bound of Deaths	Forecasted Average of Deaths	Forecasted Upper Bound of Deaths	Actual Deaths
06-Apr	22,580	27,215	31,850	30,081	500	600	700	1,193
24-Apr	53,196	60,015	66,835	62,035	3,277	3,579	3,883	4,043
30-May	97,990	102,722	107,454	99,136	7,700	8,550	9,400	8,175
26-Jun	103,940	106,035	108,130	107,579	8,545	8,705	8,865	8,783
02-Jul	106,015	108,638	111,260	109,658	8,560	8,730	8,900	8,839
08-Aug	121,650	124,695	127,740	124,896	8,980	9,048	9,115	9,073
17-Sep	150,780	153,288	155,795	162,659	9,220	9,260	9,300	9,409
02-Oct	188,150	192,990	197,830	196,321	9,690	9,745	9,800	9,746
24-Oct	251,800	256,900	262,000	264,649	10,285	10,343	10,400	10,522
14-Nov	366,500	372,550	378,600	378,139	11,870	11,995	12,120	12,130
05-Dec	531,300	554,150	577,000	539,242	14,410	14,665	14,920	14,792

Source: Government of Canada. (April 9, April 28, June 4, June 29, July 8, August 14, September 22, October 9, October 30, November 20, December 11). *COVID-19 in Canada: Epidemiology and modelling presentations*.

Beginning on September 22nd, the Public Health Agency began issuing longer-term forecasts depicting the next two months or so. Unlike the short-term forecasts, these longer-term forecasts do not provide specific projections about the number of expected cases or deaths. Instead, they provide general trends of where COVID-19 cases are heading. These longer-term forecasts also provide scenarios based on COVID-19 policies that maintain, increase, or reduce the current rate of contacts. Because these projections do not forecast specific numbers and because different provinces enacted different policies at different times towards the end of 2020, the accuracy of these longer-term forecasts is not as easy to verify. However, these longer-term models in September, early October, late October, November, and December tended to *overestimate* the number of cases in the scenario that assumes we maintain the number of people with whom we have contact each day but *underestimate* the number of cases in the scenario that assumes that we reduce the number of people with whom we have contact each day.

Health Care System Capacity

Public health officials have stated that a major concern throughout the COVID-19 pandemic and a central reason for lockdowns in every province has been to ensure that our health care system is not stretched far beyond its normal capacity. Although the vast majority of those who contract COVID-19 will not require hospitalization or intensive care, many will, particularly older Canadians and those with co-morbidities.

A simple way to measure the capacity of the health system to deal with COVID-19 hospitalizations and intensive care needs is to measure the number of hospital and intensive care beds staffed and in operation throughout Canada. Acute care beds are "typical" hospital beds that have the technology required to care for a "typical" patient recovering from pneumonia, giving birth, or having surgery. Intensive care unit (ICU) beds are a subset of acute care beds that have the technology required to care for patients in the most critical condition. In 2018-2019 (the latest available year of data) Canada had a total of 4,513 intensive care beds and 91,325 total acute care hospital beds throughout the country. Notably, only a third of all hospitals – mostly larger hospitals in urban centers – in Canada have intensive care units, so vast areas of Canada do not have a local hospital with ICU capacity.

Table 3: Number of Intensive Care and Acute Care Beds by Province in 2018-2019

| Province	Intensive Care Beds	Acute Care Hospital Beds
Alberta	400	10,833
British Columbia	478	12,223
Manitoba	165	4,209
New Brunswick	144	2,818
Newfoundland & Labrador	96	2,373
Nova Scotia	128	3,115
Ontario	1,751	32,283
Prince Edward Island	24	489
Quebec	1,216	19,677
Saskatchewan	107	3,184
Territories	4	121
Total	**4,513**	**91,325**

Source: Canadian Institute of Health Information. (December 10, 2020). Hospital Beds Staffed and In Operation, 2018-2019.

Prior to the pandemic, the utilization rate of hospital beds in Canada was already high. According to the Organization of Economically Developed Countries (OECD), the utilization of acute care hospital beds in Canada was 91.6% in 2015. The utilization rate of acute care hospital beds in individual provinces and individual hospitals fluctuated around this national average. For example, the Ministry of Health in British Columbia reported that the utilization rate of acute care beds within the province between 2012-2017 was approximately 89% and that the

utilization rate of all beds (acute + alternate level of care) was approximately 102%. (Alternate level of care beds are used to care for people who are in the hospital for a very short period of time for relatively minor needs, such as a few stitches. Most alternate level of care beds are found in emergency room departments.) Individual hospitals in British Columbia had even greater levels of variation. In 2018-2019, almost six out of ten local hospitals had a total bed utilization rate of over 100%. A further one in ten local hospitals had a bed utilization rate above the recommended maximum of 95%. In short, even in the absence of a pandemic, hospitals in Canada were regularly near or over capacity and had relatively little capacity to handle a large influx of patients.

Due to the relatively low number of available acute care beds at the onset of the pandemic, provincial health care systems across Canada cancelled elective or non-urgent surgeries to free up hospital beds starting in March. According to hospital officials, "The initial response of the health care system was to prepare for the worst-case scenario. We based our modelling primarily on the experiences in Italy and Wuhan, China, which saw extreme levels of COVID-19 in their populations." Canada never approached the case rate, hospitalization rate, or death rate of Italy or Wuhan province, leading to a surplus of available hospital beds. According to the Canadian Institute of Health Information, the utilization rate of all hospital beds and intensive care beds declined by 20-40% between mid-March and June compared to pre-pandemic.

Chart 6: Percentage Change in Hospital and Intensive Care Occupancy in Canada (excluding Quebec) from March - June 2020
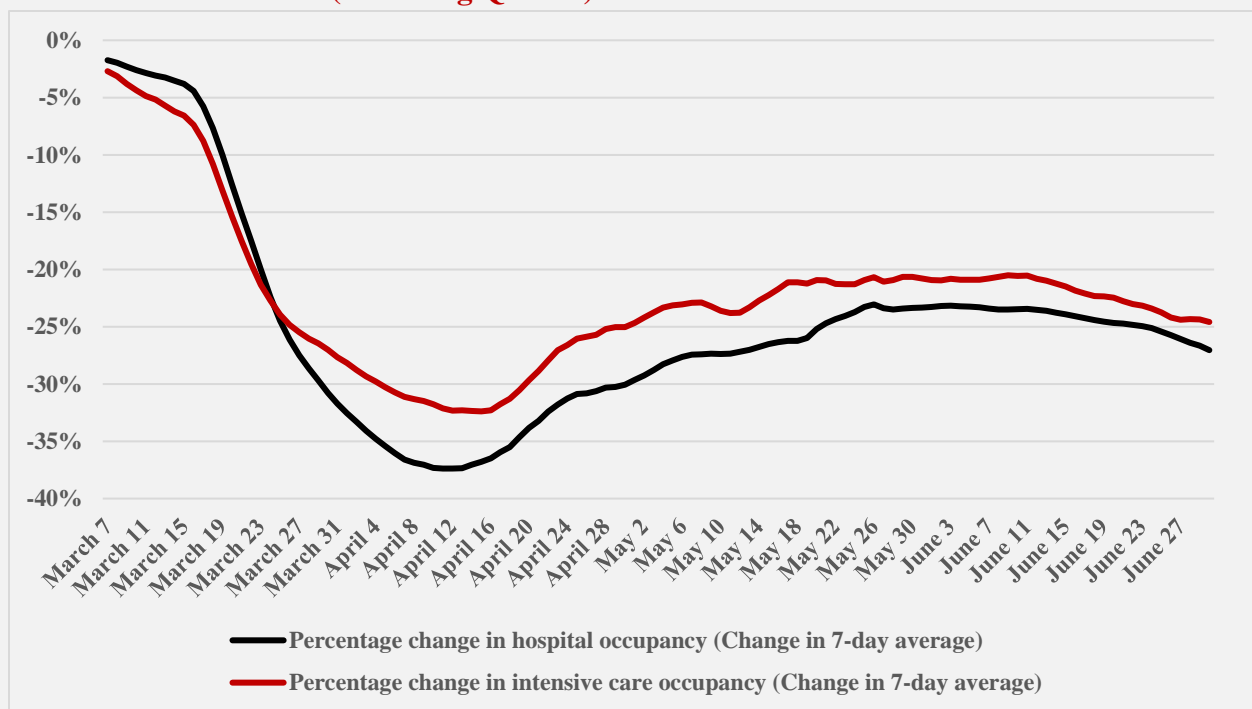
Source: Canadian Institute of Health Information. (November 19, 2020). *COVID-19's effect on hospital care services.*

Official data around the utilization rate of hospital beds is not yet publicly available after June of 2020. However, as provincial health care systems have resumed surgeries and have even tried to catch up on postponed surgeries, the occupancy rate of hospital beds and intensive care beds has likely risen. Daily occupancy data for Ontario's hospitals between September and early October, obtained by CBC through Freedom of Information requests, demonstrate that many hospitals were again approaching or had already exceeded maximum capacity. An update on Ontario's COVID-19 situation on January 12, 2021, revealed that a quarter of hospitals had no available intensive care beds and another quarter of hospitals had only one or two available intensive care beds.

As hospitals were already running close to capacity prior to COVID-19 and may now be bumping up against their capacity again, COVID-19 patients often displace patients who needed care, even if this care is less urgent than COVID-19. Limiting the number of COVID-19 hospitalizations means that people who need hospital care or surgery for other reasons can receive the care that they need in a timely manner.

Conclusion

We have tried to provide some objective data to help inform your understanding of COVID-19 and tried to refrain from drawing policy conclusions from this data. We hope that you can use this foundational data to form a reasoned opinion as to how governments should respond with policies to manage COVID-19.

Please note that there COVID-19 and its related restrictions have many more impacts on individuals and societies aside from hospitalization or death. Economic impacts, mental health impacts, and infringements on fundamental freedoms, for example, are also important. Complete data on all of these factors is unavailable and beyond the scope of this short factsheet. Just because factors like these are difficult to measure, however, does not mean that that they should not be factored into our evaluations of our response to COVID-19. Much more data and research is required by academic institutions, governments, and non-profits to make fully informed decisions around COVID-19.

Other Helpful Links

Visual Capitalist - Visualizing the History of Pandemics – a helpful visualization of the deadliness of pandemics over the course of human history

The Tyee - How BC's Medical Resources Stack Up – an interesting visualization of the capacity of one provincial health care system

Imperial College London – Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand – an early model projecting COVID-19 cases,

hospitalizations, and deaths that was extremely influential in shaping the responses of governments worldwide to COVID-19

Ari Joffe – COVID-19: Rethinking the Lockdown Groupthink – a data-driven (though not peer-reviewed) paper discussing how one epidemiologist switched from supporting lockdowns to opposing lockdowns