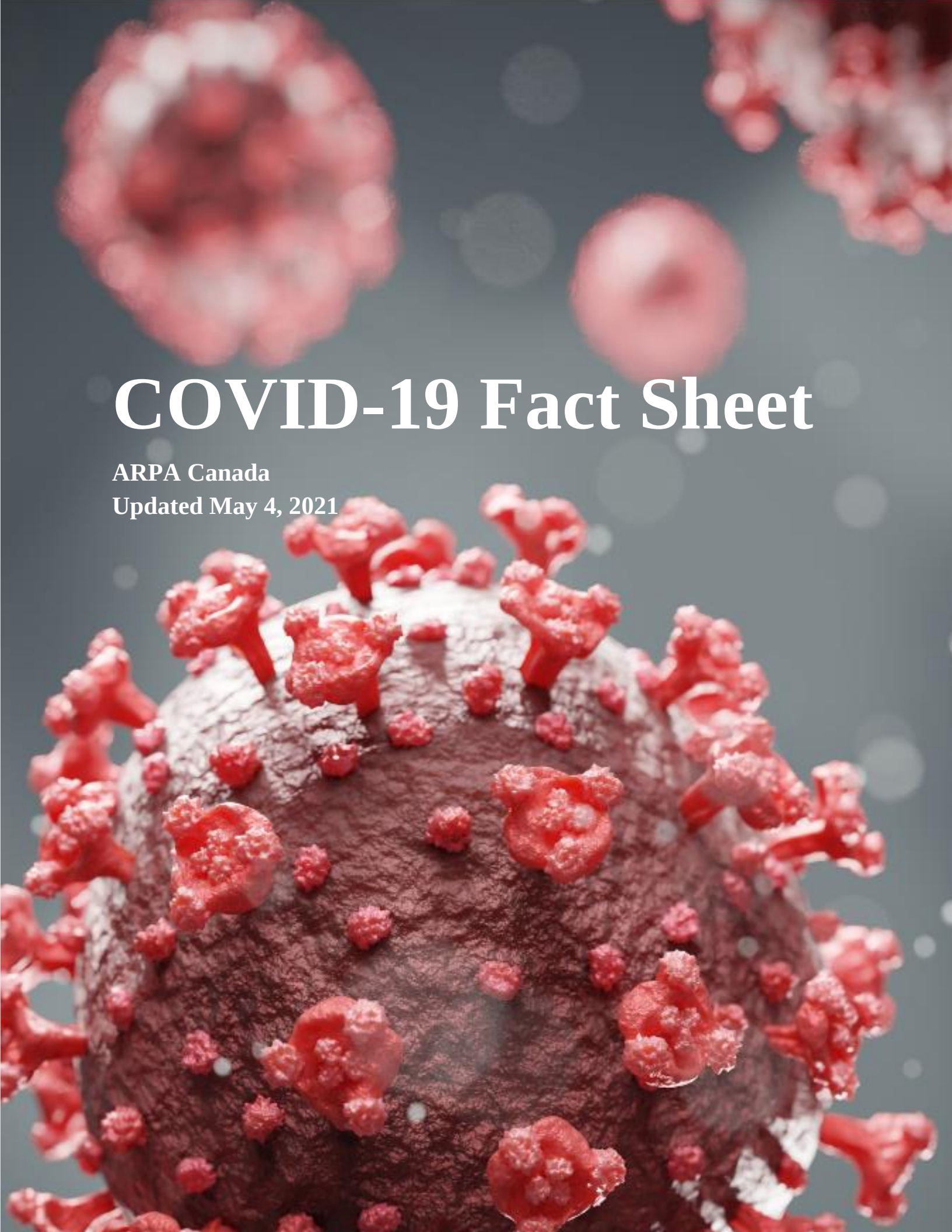


COVID-19 Fact Sheet

ARPA Canada
Updated May 4, 2021

Information about COVID-19 abounds. Whether you are perusing the local newspaper, scrolling through social media, or talking to friends, COVID-19 dominates discussions. 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 in response to the many questions around COVID-19. We hope it will be a helpful resource for individual supporters, parents, church councils, and business owners to inform their 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

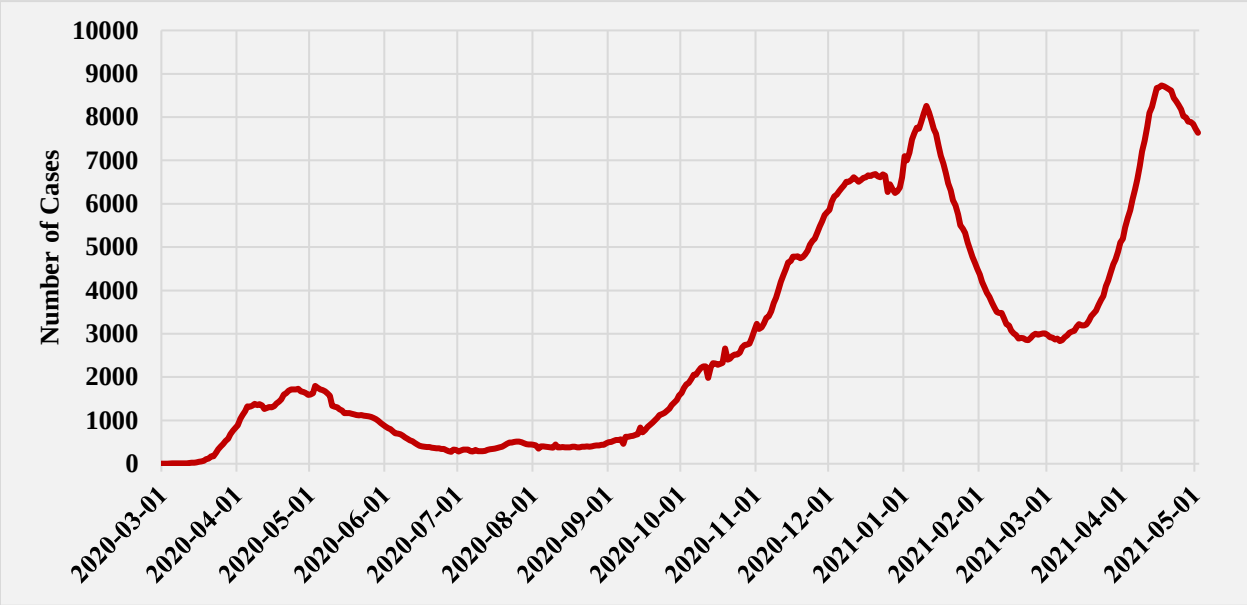
- ✓ As of Canada's April 30, 2021, Epidemiological Update, Canada had 1,219,418 confirmed cases of COVID-19; of the 1,194,800 cases for which age and status are available, 4.23% (50,529) required hospitalization, 0.95% (11,314) required intensive care, and 2.01% (24,029) resulted in death.
- ✓ Young and healthy people who have a confirmed case of COVID-19 have a relatively low chance of requiring hospitalization, requiring intensive 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 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 first wave 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 about hospital capacity and utilization rates 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 (i.e. are 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.

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



Source: Government of Canada. (May 2, 2021). *Coronavirus disease 2019 (COVID-19): Epidemiology update*. Retrieved May 3, 2021.

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). New variants of the virus likely have a higher reproduction rate than the original virus. For example, British researchers estimate that the B.1.1.7 variant (the "UK variant") is 50-100% more transmissible than the original COVID-19 virus.

How does COVID-19 impact human health?

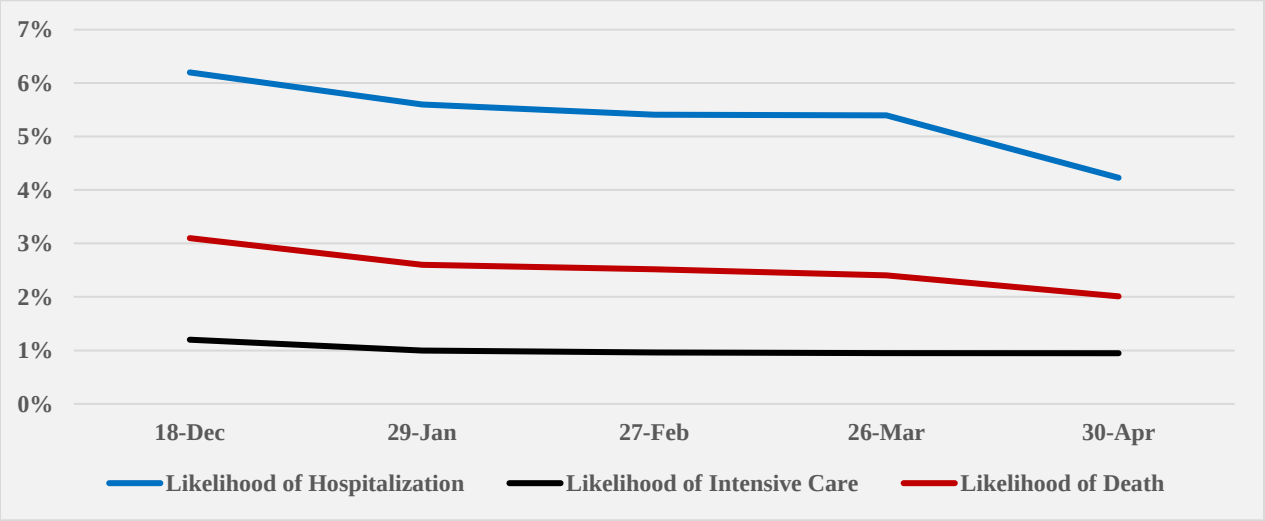
COVID-19 does not impact every person the same. Some people experience no symptoms or mild symptoms. Others may require general hospital care or even intensive care. For some, COVID-19 can be lethal. Additionally, variants of the COVID-19 virus may be more harmful to human health than was the original strain of the virus. For instance, the B.1.1.7 variant (the "UK variant") is estimated to be 64% more deadly than the first strain of the virus.

Based on the Government of Canada's Coronavirus disease 2019 (COVID-19): Epidemiology update as of April 30, 2021, Canada had 1,219,418 confirmed cases of COVID-19; of the 1,194,800 cases for which age and status are available:

- ✓ 4.23% of total confirmed cases (50,529) required hospitalization,
- ✓ 0.95% of total confirmed cases (11,314) required intensive care, and
- ✓ 2.01% of total confirmed cases (24,029) resulted in death.

Although lingering or long-term effects may still affect those who recover from COVID-19, the average Canadian who tests positive for COVID-19 has a **98.0%** chance of recovering from the virus and a similarly low chance of requiring hospitalization or intensive care.

Chart 2: Cumulative Likelihood of Hospitalization, Intensive Care, or Death by Selected Dates



Source: Government of Canada. (April 30, 2021). *Coronavirus disease 2019 (COVID-19): Epidemiology update*. Retrieved May 3, 2021.

Due to a variety of factors (e.g. better health measures, the transmission rate among various age cohorts, and the rate of vaccination), the cumulative likelihood of requiring hospitalization due to COVID-19 and the cumulative likelihood of dying from COVID-19 has dropped in the past several months. The cumulative likelihood of requiring intensive care due to COVID-19, however, has remained relatively steady. (These *cumulative likelihoods* are the rate of hospitalization, intensive care, and death presented in each iteration of this COVID-19 fact sheet.)

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.

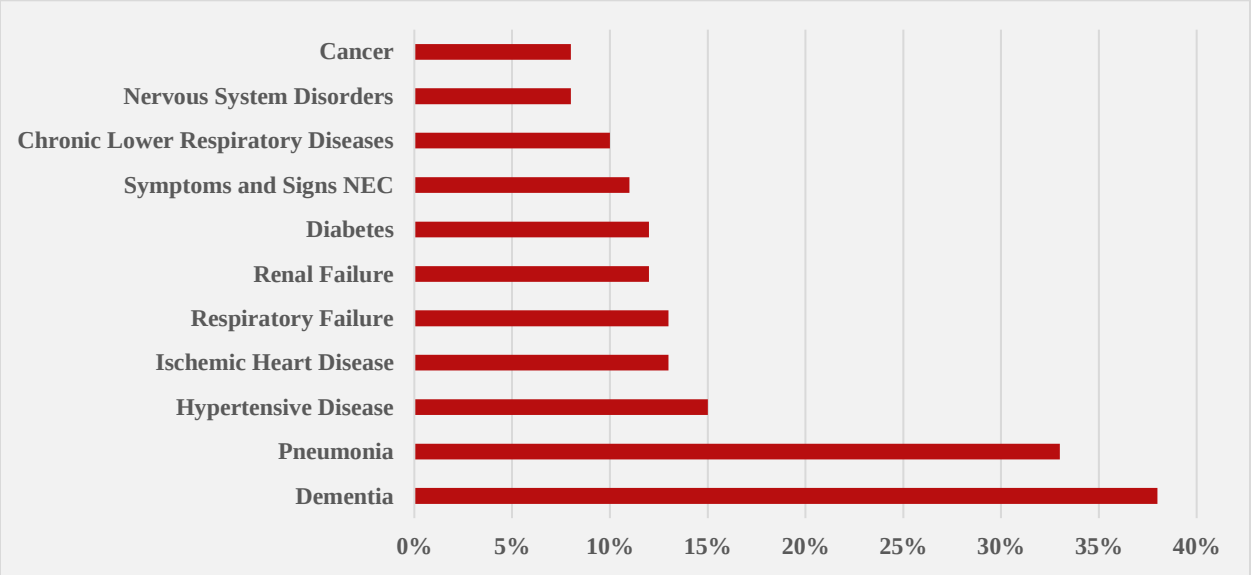
Table 1: Cases, Hospitalizations, Intensive Care Admissions, and Deaths by Age Cohort

Age group	Number of Cases	Number of Hospitalizations	Likelihood of Hospitalization	Number of ICU Admissions	Likelihood of ICU Admission	Number of Deaths	Likelihood of Death
0-19	218,750	851	0.39%	145	0.07%	9	0.00%
20-29	226,191	1,866	0.82%	296	0.13%	44	0.02%
30-39	193,726	3,035	1.57%	572	0.30%	98	0.05%
40-49	176,047	3,950	2.24%	1,062	0.60%	224	0.13%
50-59	159,251	6,263	3.93%	2,115	1.33%	712	0.45%
60-69	99,466	7,857	7.90%	2,983	3.00%	2,006	2.02%
70-79	54,008	9,916	18.36%	2,797	5.18%	4,741	8.78%
80+	67,361	16,791	24.93%	1,344	2.00%	16,195	24.04%

Source: Government of Canada. (April 30, 2021). *Coronavirus disease 2019 (COVID-19): Epidemiology update*. Retrieved May 3, 2021.

The presence of co-morbidities (other pre-existing health concerns) also impacts the likelihood of hospitalization or death from COVID-19. Statistics Canada examined the impact of co-morbidities during the first wave of the pandemic (March to July 2020) and found that the vast majority of those who died from COVID-19 had at least one co-morbidity. For example, approximately 38% of people who died of COVID-19 in the first wave also had dementia and approximately 32% had pneumonia. When age and co-morbidity were considered together, at least one co-morbidity was present in 100% of COVID-19 deaths of people under the age of 45 between March and July of 2020. 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.

Chart 3: 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.*

Newer data suggests, however, that a significant number of younger and healthier Canadians infected by COVID-19 also required hospitalizations or died from the disease. According to the Canadian Institute of Health Information, 12.5% of COVID-19 positive patients admitted to the hospital *without* any co-morbidities passed away from the disease. Comparatively, 28% of COVID-19 positive patients *with* co-morbidities admitted to the hospital died from the disease. Once they were hospitalized, those under 65 were also *more* likely to be admitted to the intensive care unit or require ventilation than those over the age of 65.

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 are 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

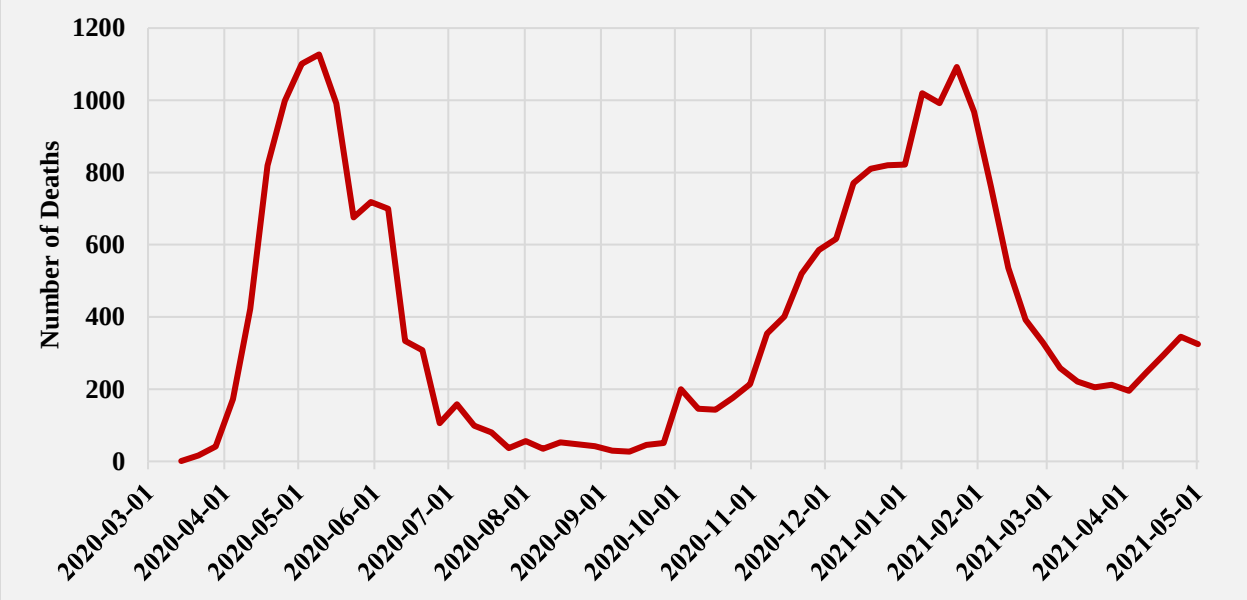
defined as the "(a) the disease or injury which initiated the train of events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury."

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 collective risk is still significant when the individual's risks of Canada's entire population (approximately 38,000,000 people) are pooled. Between March 1, 2020, and April 5, 2021, 23,118 Canadians died from COVID-19, with total deaths per week peaking in the first wave in May of 2020 and in the second wave in January 2021.

Chart 4: Number of COVID-19 Deaths Per Week from March 2020 - May 2021



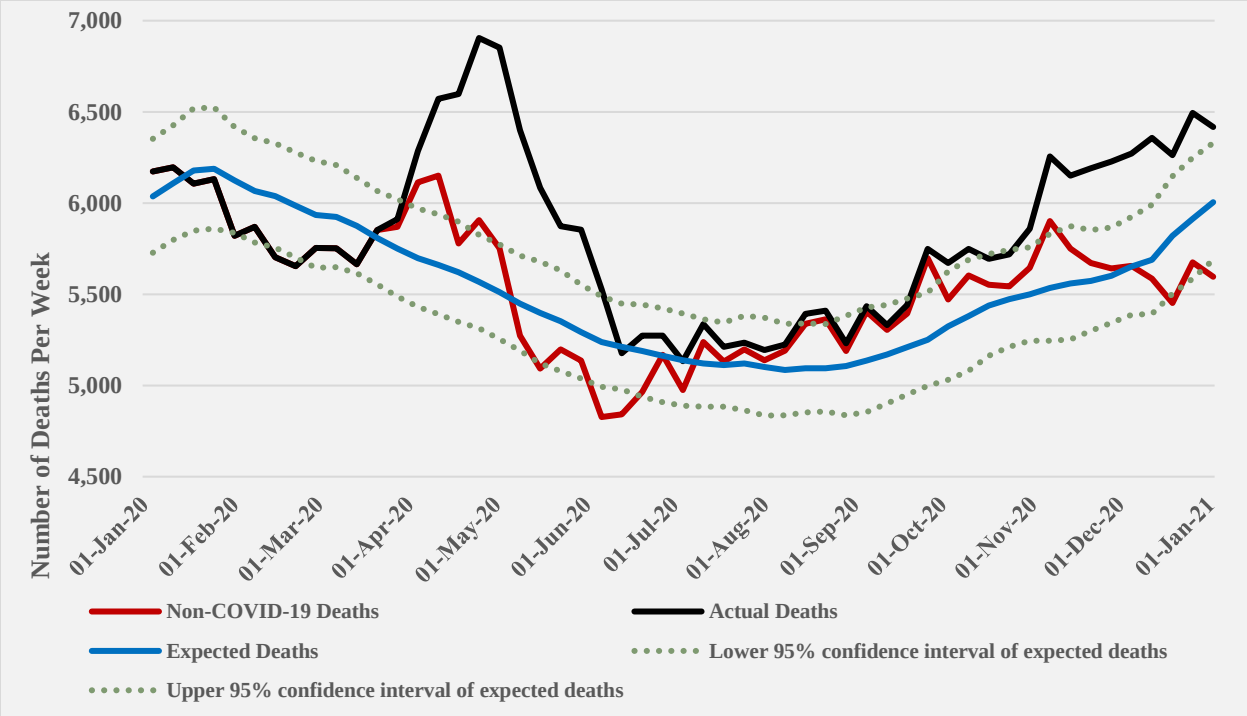
Source: Government of Canada. (May 2, 2021). *Coronavirus disease 2019 (COVID-19): Epidemiology update as of May 3, 2021.*

It is important to note that this national trend obscures trends in specific provinces. The vast majority of COVID-19 deaths between March and July of 2020 occurred in Quebec and, to a lesser extent, Ontario. Relatively few COVID-19 deaths occurred in the remaining provinces in the first wave of the pandemic.

These COVID-19 mortality rates can be compared to expected mortality rate to understand how significant or insignificant COVID-19 is. The number of weekly expected deaths, measured by Statistics Canada, is calculated based on how many deaths occurred in the same week in previous years. These expected deaths encompass every cause of death in a typical month in Canada: motor vehicle accidents, suicides, old age, heart attacks, etc. Because there is natural variability in the number of deaths in the same week of every year, Statistics Canada estimates a 95% confidence interval (or margin of error) for the number of expected deaths.

The graph below compares the weekly number of expected deaths (the blue line), the upper and lower 95% confidence interval around the number of expected deaths (the dotted grey lines), the number of actual deaths (the black line), and the number of non-COVID-19 deaths (the red line) in Canada from January to December of 2020. Fluctuations between the 95% confidence interval (the dotted grey lines) can be considered normal year-to-year variation in the weekly number of deaths. When the black line ventures outside this confidence interval, it is likely that some factor(s) (such as COVID-19) are significantly impacting mortality rates. When the red line ventures outside this confidence interval, it is likely that some factor(s) other than COVID-19 (such as COVID-19 restrictions) are influencing the weekly number of deaths. The spread between the black line and the red line illustrates the number of deaths directly attributed to COVID-19.

Chart 5: Actual, Expected, and Non-COVID-19 Weekly Deaths in Canada from January 2020 - January 2021



Source: Statistics Canada. (May 3, 2021). *Table 13-10-0784-01: Adjusted number of deaths, expected number of deaths and estimates of excess mortality, by week.*

During the months of April, May, and June (the first wave of the pandemic), the number of actual weekly deaths significantly surpassed the upper confidence interval, yet the majority of these unexpected deaths were due to COVID-19 rather than other factors (represented by the red line). Over the summer and early fall, the number of actual deaths and non-COVID-19 deaths mostly fluctuated within the confidence interval, suggesting that neither the COVID-19 disease nor the COVID-19 restrictions were leading to a significant number of unexpected deaths. During the late fall and early winter, the number of actual deaths surpassed the upper confidence limit of expected deaths, but the number of non-COVID-19 deaths began falling. This suggests that COVID-19 may have been responsible for the deaths of many people whose death was already imminent in the final months of 2020 and early 2021.

When considered all together, the number of expected deaths between the first week of COVID-19 deaths (March 21) until the end of the available data (January 2) at 227,117 deaths was very close to the number of non-COVID-19 during the same time period (229,234). This suggests that most of the unexpected deaths for the entire 2020 year were due to COVID-19.

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 number of deaths published later. The non-COVID-19 deaths in mid-March and April exceeded the expected number of deaths and also briefly passed the threshold of expected variation in the number of deaths (the dotted grey lines). However, the driving factor of excess mortality during these months was COVID-19.

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. Since April of 2020, the Public Health Agency of Canada issued 14 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 11 out of the 15 times. On three occasions the Agency *underestimated* the number of confirmed COVID-19 cases. On one occasion the Agency *overestimated* the number of confirmed COVID-19 cases. The actual number of deaths was within the Agency's confidence interval 10 out of the 15 times. On five occasions more COVID-19 deaths actually occurred than the Agency had forecasted, but they the Agency has never overestimated the number of COVID-19 deaths. Thus, these short-term forecasts have proved to be largely accurate.

Table 2: Reliability of Short-Term COVID-19 Case and Death Projections by the Public Health Agency of Canada

Date of Two-Week Forecast	Forecasted Lower Bound of Cases	Forecasted Upper Bound of Cases	Actual Number of Cases	Forecasted Lower Bound of Deaths	Forecasted Upper Bound of Deaths	Actual Number of Deaths
06-Apr	22,580	31,850	30,081	500	700	1,193
24-Apr	53,196	66,835	62,035	3,277	3,883	4,043
30-May	97,990	107,454	99,136	7,700	9,400	8,175
26-Jun	103,940	108,130	107,579	8,545	8,865	8,783
02-Jul	106,015	111,260	109,658	8,560	8,900	8,839
08-Aug	121,650	127,740	124,896	8,980	9,115	9,073
17-Sep	150,780	155,795	162,659	9,220	9,300	9,409
02-Oct	188,150	197,830	196,321	9,690	9,800	9,746
24-Oct	251,800	262,000	264,649	10,285	10,400	10,522
14-Nov	366,500	378,600	378,139	11,870	12,120	12,130
05-Dec	531,300	577,000	539,242	14,410	14,920	14,792
09-Jan	752,400	796,630	748,381	18,570	19,630	19,094
13-Feb	841,650	878,850	867,694	21,510	22,420	21,994
20-Mar	973,080	1,005,020	1,008,106	22,875	23,315	23,075
17-Apr	1,209,780	1,281,040	1,234,180	24,000	24,570	24,300

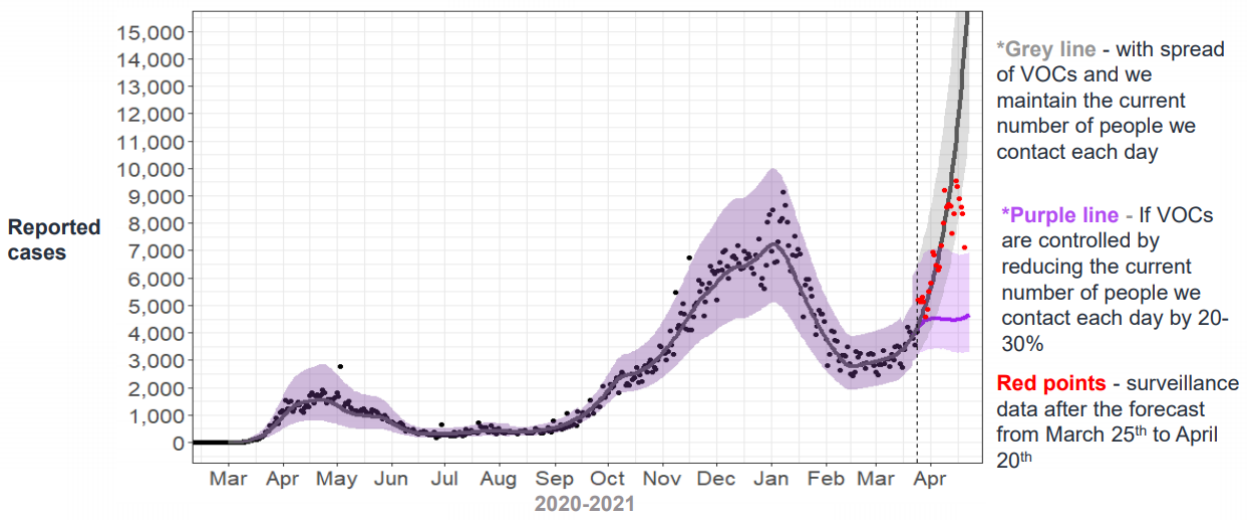
Source: Government of Canada. (April 9, April 28, June 4, June 29, July 8, August 14, September 22, October 9, October 30, November 20, December 11, January 15, February 19, March 26, April 23). *COVID-19 in Canada: Epidemiology and modelling presentations*.

Beginning on September 22nd, the Public Health Agency began issuing longer-term forecasts with a time horizon of about two months. Unlike their 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 in under three different scenarios. These three scenarios are based upon assumptions around whether Canadians maintain, increase, or reduce their current rate of contacts.

Because these projections do not forecast specific numbers and because different provinces enacted different policies at different times throughout the pandemic, 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 maintain contact rate scenario but *underestimate* the number of cases in the reduce contact rate scenario. By January, all of the largest provinces had implemented policies that reduced contact rates. The Agency's forecast under this scenario closely matched the actual number of new COVID-19 cases. In their latest longer-range projection on March 26, the Public Health Agency of Canada warned that, in either the maintain or reduce contact scenario, the number of cases would rise significantly. Over the next four weeks, this most recent long-term

forecast has proved to be accurate, as visualized by the grey line and red points in their April 23 briefing (reproduced below).

Chart 6: Public Health Agency of Canada's March 26 Projected and Reported Cases



Source: Government of Canada. (April 23). *COVID-19 in Canada: Epidemiology and modelling presentations*.

Health care system capacity

Public health officials have stated that a central concern throughout the COVID-19 pandemic and a major justification for lockdowns in every province is to ensure that health care systems are not stretched far beyond their 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" overnight patient. 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.

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.

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

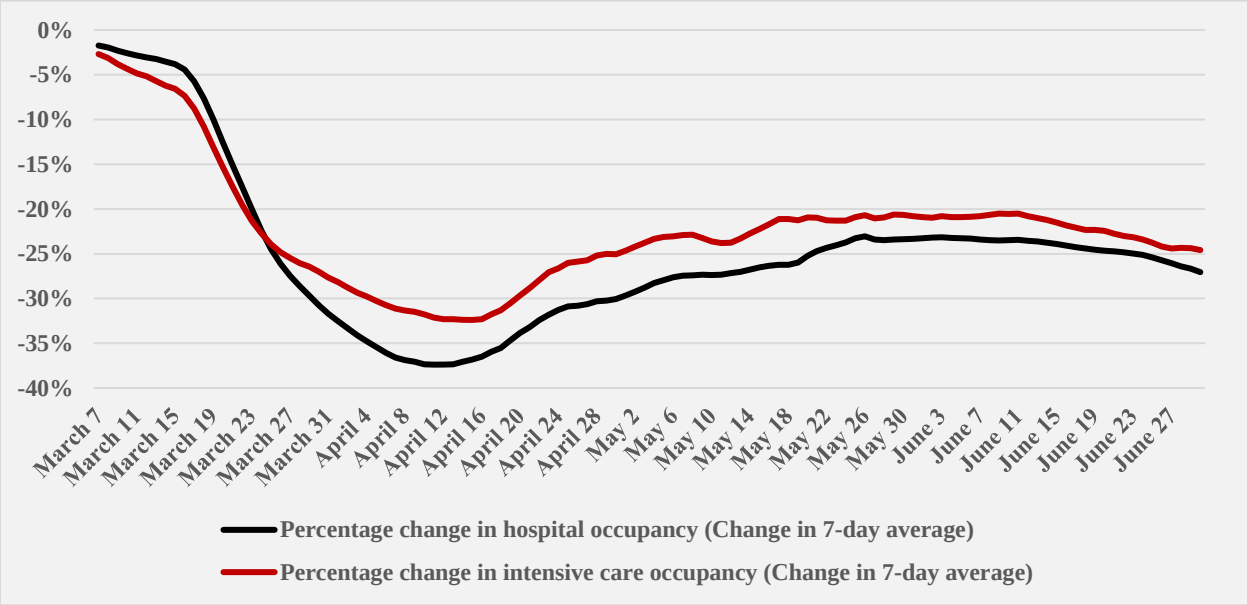
Province	Intensive Care Beds	Acute Care Beds
Alberta	400	10,833
British Columbia	478	12,223
Manitoba	165	4,209
New Brunswick	144	2,818
Newfoundland & Labrador	96	2,373
Nova Scotia	128	3,115
Ontario	1,751	32,283
Prince Edward Island	24	489
Quebec	1,216	19,677
Saskatchewan	107	3,184
Territories	4	121
Total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

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

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 overnight patients who need less care than the "typical" patient; they are the opposite of intensive care beds.) 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%. An additional 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." However, Canada never approached the case rate, hospitalization rate, or death rate of Italy or Wuhan province in the first wave of the pandemic, 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 7: 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 required by 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 are 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