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New Brunswick Institute for Research, Data and Training

UPDATE:
RAPID RESPONSE REPORT ON COVID-19 IN NEW BRUNSWICK APRIL 27, 2020

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PROJECT TITLE

Update: Rapid response report on COVID-19 in New Brunswick: April 27, 2020

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INTRODUCTION

This rapid response report is the third in a series of reports providing updated projections estimating the trajectory COVID-19 could follow in New Brunswick (NB) if the province has outcomes similar to those of other select countries and provinces. Studying the experiences of the locations presented below can help inform how the disease could continue to progress in NB.

In the first section of this report, we present updated projections to April 27 where the variables we consider include COVID-19 infections, hospitalizations, critical care cases, and cases requiring mechanical ventilation. The regions considered in our projection estimates include South Korea, New Zealand, Australia, Denmark, Nova Scotia (NS), and British Columbia (BC).

Following these updated projections, in the second section we provide estimates of what the total incidence of COVID-19 in NB might be if both symptomatic and asymptomatic cases were counted. It is necessary to estimate the number of asymptomatic cases since population testing has not yet been undertaken in NB. Currently, only those with potential symptoms and others at higher likelihood of being exposed to the disease are being tested, and this group is not a representative sample of the wider population. Since asymptomatic people with COVID-19 are also capable of transmitting the disease, estimates of total incidence can help decision makers prepare for a range of scenarios in which unmonitored transmission could be occurring despite low case counts.

As background to our projections and to motivate our choice of comparison group of countries, in the third section of this report we present data on a range of measures for NB and select countries, as well as the other Canadian provinces. Those measures include rates of infection, testing, critical care, mortality, and the number of daily new cases since preventive measures were first implemented. We examine how NB compares to South Korea, Germany, Denmark, Australia, Canada as a whole, and the individual Canadian provinces. We also include Iceland, as it was one of the first countries to conduct testing across a random sample of its entire population.

Our key conclusion is that NB's case levels will remain relatively low and within the health system's capacity to provide necessary treatment to those who need it. While this was the case for the "best-case scenario" in our previous projections, our current estimates show that NB will continue to have the capacity to meet hospitalizations, ICU beds, and mechanical ventilators required even at higher levels of case rates. However, in the worst-case scenario, the province will just meet capacity, with any additional, unexpected COVID-19 hospitalizations surpassing available resources.

Social distancing and related measures, tracking and quarantining of affected individuals, and NB's population density have resulted in an incidence rate that is predicted to remain among the lowest in Canada, leading to a gradual relaxation of restrictions. As data on other countries who have eased restrictions become available, our forecasts for NB will be similarly updated.

The original report containing projections from March 31, 2020 and a follow-up report with updated projections from April 14, 2020 are available online at https://www.nbirdt.ca/publications.

PROJECTIONS

Below, we examine COVID-19 outcomes in regions with healthcare systems and control measures similar to those in New Brunswick. Since the release of our first projections, it has become clear that worst-case scenarios like those in Italy and Spain are unlikely to apply to NB. As such, the projections included below are motivated by COVID-19 success stories so far, relatively speaking.

The countries in the tables below were chosen as comparable to NB for the following reasons:

- South Korea is included because it is the most advanced in terms of disease trajectory and continues to serve as an example of COVID-19 mitigation. Its test positivity rate (1.78%) is also similar to that of NB (0.97%)

- New Zealand is included because, like NB, its caseload has continued to remain low, and it is also beginning to ease restrictions. Moreover, its low test positivity rate (1.19%) is similar to that of NB.

- Australia is included because its case load has remained low relative to its population despite a high level of urbanization. Australia's test positivity rate (1.3%) is also similar to that of NB.

- Denmark is included for demographics similar to NB; and, like NB, Denmark has begun to slowly lift restrictions.

- Nova Scotia is included as our closest Maritime neighbour as a comparator.

- British Columbia is included as the Canadian province furthest along in its disease trajectory (and possibly the first Canadian success story in terms of COVID containment and management). Finally, the test positive rate in BC (2.5%) is similar to that in NB, like many of the other countries mentioned above.

Above all, each group chosen for comparison has practiced similarly rigorous social distancing and other measures. Based on this information, in Table 7, we present a range in which COVID-19 rates in NB *could* fall in the next ten days (i.e., May 7, 2020) if the province follows a trajectory similar to any of the countries below.

Table 1: 10-Day Projected Range of Outcomes for NB based on Outcomes in South Korea, New Zealand, Australia, Denmark, Nova Scotia, and British Columbia

Country / Province	Age groups	Cases	Hospitalized	ICU / Critical	Requiring mechanical ventilation
South Korea	<60	84	8	2	
	60+	50	15	4	
	All ages	134	23	6	1
New Zealand	<60	106	10	3	
	60+	63	19	5	
	All ages	169	29	7	1
Australia	<60	114	10	3	
	60+	67	20	5	
	All ages	181	31	8	2
Denmark	<60	146	13	4	
	60+	85	26	6	
	All ages	231	39	10	2
Nova Scotia	<60	205	19	5	
	60+	120	36	9	
	All ages	325	55	14	3
British Columbia	<60	121	11	3	
	60+	71	22	5	
	All ages	192	33	8	2

As of April 27, 2020

Similarly, in Table 8, we present a range in which COVID-19 rates could fall when New Brunswick reaches the highest case rate of the pandemic – based on the highest cases observed elsewhere as of April 27, 2020.

Table 2: Project Range of Highest Case Rate* Outcomes for NB based on Outcomes in South Korea, New Zealand, Australia, Denmark, Nova Scotia, and British Columbia

Country / Province	Age groups	Cases	Hospitalized	ICU / Critical	Requiring mechanical ventilation
South Korea	<60	101	9	3	
	60+	60	18	4	
	All ages	161	27	7	1
New Zealand	<60	114	10	3	
	60+	67	20	5	
	All ages	181	31	8	2
Australia	<60	129	12	3	
	60+	76	23	5	
	All ages	205	35	9	2
Denmark	<60	724	66	18	
	60+	425	129	31	
	All ages	1149	195	49	10
Nova Scotia	<60	454	42	11	
	60+	266	81	19	
	All ages	720	122	31	6
British Columbia	<60	192	18	5	
	60+	112	34	8	
	All ages	304	52	13	3

**As of April 27, 2020*

The scenarios presented in the two tables above show projected potential outcomes for New Brunswick in terms of expected cases, hospitalizations, ICU/critical care admissions, and mechanical ventilation requirement if our case rate trajectory follows those of the regions listed – South Korea, New Zealand, Australia, Denmark, Nova Scotia, and British Columbia. The estimates presented in both tables have been standardized to the NB population.

In providing the above calculations, we incorporate revised estimates from the Public Health Agency of Canada (PHAC) in their projections.[i] As of April 27, PHAC estimated that

- 37% of COVID-19 cases are over 60 years old,
- 17% of all confirmed cases are hospitalized,
- 25% of all hospitalizations are admitted to the ICU, and
- 5% of all hospitalizations require mechanical ventilation.

Because no COVID-19 deaths have occurred in the province, we do not use PHAC estimates of case fatality rates (5.5%) to project mortality for NB.

Our calculations by age group further take into consideration PHAC's estimates that infected individuals over 60 years of age make up

- 66% of all hospitalizations,

- 63% of all ICU admissions, and
- 95% of deaths.

Based on the projections in Tables 1 and 2 above, we see that if the trajectory of COVID-19 cases in NB follows any of the scenarios above – even the worst-case scenario presented – our province will continue to be within its capacity to meet the required hospitalizations, ICU admissions, and mechanical ventilation expected.

While the ranges based on outcomes in South Korea, New Zealand, and Australia present best-case scenarios for NB, the trajectory based on outcomes in Denmark represents a worst-case scenario for the province. Interestingly, Denmark represented a "middle ground" for projections in the two previous rapid response reports, with outcomes similar to Australia and BC. However, in the time since Denmark began lifting COVID-19 restrictions (April 15), the country's incidence rate has increased slightly,[1] and the outcomes based on Denmark are now higher than even those based on NS. While other examined areas (such as New Zealand and NB) are also beginning to lift restrictions, Denmark began easing measures nearly two weeks ago – allowing enough time to start observing trends in the country's case rate following the expected incubation period.

If NB follows Denmark during its highest case rate, the province will meet capacity, as NB currently has 194 acute care beds reserved for COVID-19 patients, and this projection estimates the province will need 195. In this scenario, NB will be at, but not surpassing, capacity.

Over the coming weeks, it will be interesting to see how these projections progress, as NB, Australia, and New Zealand are now lifting their own restrictions, and BC and South Korea could be close behind. As we have opportunity to observe outcomes in these regions, we will be able to predict even more accurately how case numbers in NB are likely to change in the recovery phase.

It should be noted that the highest case rate refers to the highest observed rates *thus far*. It is possible the countries and provinces examined have not yet reached their peaks. If this is the case, it is possible NB could expect to surpass capacity as time goes on. These estimates will continue to be updated as newer data become available and maximum infection rates are estimated more accurately. Likewise, the hospitalization and ICU admissions presented above must be interpreted with caution, as the rates published by PHAC lag behind real-time data. This estimate will become more accurate as more data become available.

While this range of outcomes presents potential situations for which New Brunswick should prepare, the existing literature suggests that differences in COVID-19 outcomes depend on a number of factors – many of which could impact (either increase or decrease) the trajectory of COVID-19 in our province. These factors are discussed in the original March 31 report.[2]

[1] These statistics are presented in a forthcoming report: Bhuiyan, E.M., Boco, E., Christensen, E., Daigle, B., McDonald, T., McRae, S., Miah, P., & Somayaji, C. (2020). Lifting restrictions for COVID-19: Implications for New Brunswick April 26, 2020. Fredericton, NB: New Brunswick Institute for Research, Data and Training.
[2] Bhuiyan, E.M., Christensen, E., Daigle, B., Magalhaes, S., McDonald, T., Miah, P., & Somayaji, C. (2020). Rapid response report on COVID-19 in New Brunswick: March 31, 2020. Fredericton, NB: New Brunswick Institute for Research, Data and Training. Retrieved from https://www.nbirdt.ca/post/nb-irdt-covid-projections-show-good-news-for-nb.

TRUE INCIDENCE

The incidence of COVID-19 infection in the general population is largely unknown. The current published estimates of the number of COVID cases in most regions are based solely on those who have been tested for the virus; thus, these case numbers represent only a fraction of the total population. For instance, the WHO estimates that as many as 85% of people infected experience mild to moderate symptoms that do not require clinical intervention, and symptom-based screening would not capture many of these people.[ii] To this end, we present estimates of the true but unknown incidence of COVID-19 in NB based on a variety of scientific methods. Following this we include a discussion of test positivity rates as a means of assessing test program adequacy.

Estimates derived below compare NB to regions with low mortality rates, high doubling rates, and low test positivity rates. At the lower end, estimates from Methods 1, 2, and 3 suggest the true number of cases in NB could range from 120 to 198. At the higher end, estimates (based on Methods 1 and 3) suggest the number of true cases could range from 857 to 3,823.[3] [iii]

Methods to Estimate True Incidence

Studies suggest that anywhere between 5% and 80% of those who test positive may be asymptomatic.[iv] However, such estimates (especially the suggestion that one in five New Yorkers may have had the virus[v]) may be inaccurate because of issues with the methodology and the need for further validation of the accuracy of rapid tests detecting antibodies.[vi]

Ideally, the true number of infected cases would be determined via a large-scale serosurvey to test for antibodies against COVID-19. Since such a survey is potentially months away from being a feasible undertaking, we present some methods here to estimate the true incidence of COVID-19 in NB. We use three different methods to estimate the numbers below, with a possible fourth method to be explored in future work. The selected methods are outlined below.

Method 1

Calculate true incidence using the case rates of other regions where there has been more widespread testing to compare with NB.

Assuming rates of cases in such regions are the same as in NB, the possible number of asymptomatic cases can be determined. That is, we would assume

$$\frac{A_C + S_C}{Pop_C} = \frac{A_{NB} + S_{NB}}{Pop_{NB}}$$

where A_C and A_{NB} are the number of asymptomatic cases in the comparison region and NB, S_C and S_{NB} are the number of symptomatic cases, and Pop_C and Pop_{NB} are populations.

Given the above assumption, the number of asymptomatic cases in NB can be calculated as

$$A_{NB} = \frac{Pop_{NB}}{Pop_C}(A_C + S_C) - S_{NB}$$

[3] A study just released in Austria (see endnote iii) estimates a country-wide prevalence rate for COVID-19 of 0.33%. If this were also the case in NB then the total number of infections in NB would be about 2500 people.

Ideally, true incidence of the disease would come from testing 100% of the population (assuming those recovered would still have COVID antibodies present) or a random sample of it. To that end, we examine countries with the highest testing rates per 1 million population, including Iceland, Luxembourg, and San Marino.

As of April 27, Iceland had 1,792 confirmed cases of COVID-19, and NB had 118. Given the population of Iceland is 364,134, and the population of NB is 776,827, and all confirmed cases in NB have been symptomatic, the number of asymptomatic cases in NB would be about **3,705** according to this method.

Below, the number of asymptomatic cases for NB is similarly calculated in comparison to other countries, assuming they have all tested asymptomatic cases as well. Table 4 shows the estimated number of asymptomatic cases for NB compared to other provinces that have test positivity rates (discussed below) similar to NB.

Table 3: Estimate of Cases in NB if $NB_{Confirmed} = Country_{Confirmed}$

Country	Confirmed cases	Population	A_{NB*}
Iceland	1,792	364,134	3,705
San Marino	538	33,785	12,252
Luxembourg	3,729	613,894	4,601
South Korea	10,752	51,260,706	45
Germany	158,758	83,732,333	1,355
Italy	199,414	60,478,858	2,443
Spain	232,128	46,751,301	3,739
Denmark	8,851	5,788,271	1,070
Singapore	14,951	5,841,430	1,870
Portugal	24,322	10,202,395	1,734
Austria	15,357	8,996,470	1,208
Czech Republic	7,449	10,705,160	423
Australia	6,713	25,437,325	87
New Zealand	1,122	4,815,234	63

**The "A" in this column refers to asymptomatic cases.*

Table 4: Estimate of Cases in NB if $NB_{Confirmed} = Province_{Confirmed}$

Province	Confirmed cases	Population	A_{NB*}
MB	272	1,369,470	36
SK	353	1,174,460	115
BC	1,998	5,071,340	188

**The "A" in this column refers to asymptomatic cases.*

Method 2

Estimate true incidence using the doubling rate and number of days it is expected to take for a COVID-19 case to die.[vii] In this method, the number of true cases is estimated to be the number of current confirmed cases multiplied by

$$2^{\frac{\#days\ for\ a\ person\ to\ die\ from\ disease}{doubling\ rate\ of\ cases}}$$

Since NB has not had any reported deaths due to COVID-19, we use the global median number of days to die,[viii] which is 14. The doubling rate for NB could be assumed to be close to South Korea's current doubling rate, which is 19. Given the current number of confirmed cases is 118, the number of true cases in NB using the above estimation would be approximately **196**.

Method 3

Estimate true incidence based on the Case Fatality Rate (CFR) of countries with low numbers of COVID-19 deaths (such as South Korea, Iceland, Taiwan, New Zealand, and Singapore). In this method, we draw on work by Verity et al. (2020)[ix] and Bommer & Vollmer (2020).[x] However, while their works base incidence on CFR, New Brunswick has no reported deaths related to COVID-19. Therefore, countries with low mortality rates, widespread testing, and low test positivity rates could be more appropriate comparisons with which to estimate true incidence in the province.

This method assumes it would take on average two weeks for a confirmed case to die, suggesting a two-week lag between confirmed cases and deaths. Thus, by calculating latest Case Fatality Rate (e.g. April 27) for each country

$$CFR = \frac{Death}{(Death + Recovered)}$$

and the most recent number of deaths (April 27), we can estimate the number of expected cases for April 13.

$$Expected\ Number\ of\ Cases\ (April\ 13) = \frac{Latest\ number\ of\ Deaths}{CFR}$$

The expected number of cases for each country is then standardized to the NB population to determine the number of true cases for NB on April 13th.

For example,

$$Expected\ Cases\ in\ NB\ (April\ 13) = \left(\frac{Expected\ Cases\ in\ Iceland}{Iceland\ Pop}\right)\ X\ NB\ Pop$$

In Table 5, the estimated number of cases in NB based on other countries is presented, and Table 6 presents the number of estimated cases based on other provinces in Canada. On April 13, New Brunswick had 116 confirmed cases.

Table 5: Estimated Cases in NB Based on Expected Case of Country CFR

Country	Estimated Infections on April 13	Estimated Total Cases in NB (April 13)

Australia*	**5,669**	**173**
Canada	20,975	433
Denmark	6,386	857
Finland	2,693	378
Germany	120,626	1,119
Iceland*	**1,634**	**3,725**
Italy	93,601	1,202
Luxembourg	3,211	4,104
New Zealand*	**1,199**	**193**
South Korea*	**9,007**	**136**
Switzerland	23,865	2,177

**Countries with low CFR and low test positivity rates*

Table 6: **Estimated Cases in NB Based on Expected Case of Province CFR**

Province	Estimated Infections (April 13)	Estimated Total Cases in NB (April 13)
NFLD	224	334
NS	533	426
QC	7,116	651
MB*	**211**	**120**
SK*	**293**	**194**
AB	1,739	309
BC	1,293	198
Ontario	9,915	529

**Provinces with low CFR and low test positivity rates*

Method 4

As a final option that could be explored in future work, we suggest using the method developed by Jagodnik et al. (2020)[xi] to estimate the true scale of the pandemic in NB. In this method, we would use South Korea as the benchmark for a country with near-optimal testing coverage, taking into consideration population demographics. This fourth method incorporates the population demographics of the target region to compute a *Vulnerability Factor*, the CFR of South Korea, and predicted deaths at future time-points to estimate adjusted cumulative case numbers.

This study finds that reporting of COVID-19 cases significantly underestimates the true incidence of the outbreak. For instance, the adjusted estimate of true incidence for Spain is 94% higher than the number of reported cases: 1,421,505 estimated cases opposed to 87,956 reported cases (as of March 30). Even at its the smallest, the gap between estimated and confirmed cases is still 70% – this is the case in Germany, where we estimate a true count of 222,068 cases, compared to the confirmed count of 66,885 (as of March 30).

Test Positivity Rates

There is a general agreement that more testing and broader testing criteria are required in NB and in Canada more generally, as testing only symptomatic individuals will leave asymptomatic cases undiagnosed and any resultant spread unmonitored. According to Theresa Tam, Chief Public Health Officer of Canada, the country should be testing 60,000 people a day – three times more than the approximately 20,000 daily tests currently being administered.[xii] To help us understand

how the adequacy of testing in NB and Canada compares to that of other countries and provinces, we turn to test positivity rates.

Test positivity, defined as the percentage of confirmed cases of all tests conducted, is a key metric that helps measure the severity of an outbreak. Knowing the proportion of tests that are positive allows us to take a broader and more detailed view of the pandemic and, in turn, can be used as an indicator of insufficient testing. A high percentage of positivity could mean a higher number of unconfirmed, or true, cases.

Regions with broad testing criteria (e.g. those who test people with mild or no symptoms) are likely to test a larger number of people who are not infected, resulting in a low test-positivity rate. The WHO suggests that a 10% positivity rate or lower is a good benchmark for an adequate testing program.[xiii]

The tables below suggest that, when estimating test positivity rates by country, Australia, New Zealand, South Korea, and Taiwan are comparable to NB. When estimating test positivity rates according to province, the rates in PEI, Manitoba, Saskatchewan, and BC are comparable to NB. Regions with test positivity rates comparable to New Brunswick can be used to further estimate the true incidence rate in the province using Methods 1 and 3 below.

While Canada's test positivity rate (6.76%) falls below the 10% rate suggested by the WHO to indicate a good program, it still falls near the middle of the range depicted in Table 1. Though much lower than the 11.14% and 11.89% rates in Italy and Switzerland, respectively, Canada's test positivity rate is also much higher than those in Australia, New Zealand, and South Korea – all countries whose outcomes present best-case scenarios for NB in the projections in the previous section.

When Canada's test positivity rate is broken down by province, we see that NB has the second lowest rate in the country (0.97%), following only PEI (0.94%) – an extremely positive sign for the province. As mentioned above, Dr. Tam has recommended that Canada increase testing to 60,000 people a day. Standardized to the NB population, this would mean conducting 1,237 tests daily.

According to NB officials, the province already has the capacity to conduct 1,000 tests a day, which is extremely close to the recommended amount. However, test numbers have consistently been under 500 a day – less than half NB's capacity. While low test numbers have been attributed to reduced demand,[xiv] it should be noted that asymptomatic cases do not consistute this demand and therefore are probably not being detected by current testing practices.

Table 7: Test Positivity Rate by Country (as of April 27)

Country	Tests	Positive Cases	Test Positivity Rate
Australia	517,063	6,720	1.30%
Canada	**717,451**	**48,500**	**6.76%**
Denmark	155,810	8,698	5.58%
Finland	82,437	4,695	5.70%
Germany	2,072,669	158,758	7.66%
Iceland	46,377	1,792	3.86%
Italy	1,789,662	199,414	11.14%
Japan	150,692	13,614	9.03%
Luxembourg	39,102	3,729	9.54%
New Zealand	123,920	1,469	1.19%
Norway	164,316	7,599	4.62%
South Korea	601,660	10,738	1.78%
Switzerland	245300	29164	11.89%
Taiwan	61684	429	0.70%

Table 8: Test Positivity Rate by Province (as of April 27)

Province	Tests	Positive Cases	Test-Positivity Rate
NFLD	7,622	258	3.38%
NS	900	27,231	3.31%
PEI	2,773	26	0.94%
NB	**12,599**	**118**	**0.97%**
QC	175,190	24,982	14.26%
MB	23,543	272	1.16%
SK	27,884	353	1.27%
AB	1,354,42	4,696	3.47%
BC	78,665	1,998	2.54%
ON	253,040	15,381	6.08%

COVID-19 INFECTIONS, TESTS, CRITICAL CARE, AND MORTALITY RATES

By Country

The mitigation of COVID-19 is a combination of different measures, such as screening, isolating vulnerable populations, and other preventive measures, including social controls and the timing of their implementation. In the figures below, the infections, screenings, critical care cases, and mortality rates of various countries are provided per 1,000 population.

Iceland continues to conduct the highest number of tests per 1,000 population, showing an increase from 35,253 tests (in the previous report, April 14) to the cumulative amount of 46,377 (as of April 27). In spite of having a relatively high number of infections per 1,000, the total number of infections in Iceland has risen only slightly over the previous two weeks, from 1,711(April 14) to 1,792 (April 27).

The number of tests per 1,000 population has risen in Canada compared to the rate two weeks ago (April 14 report). However, mortality rates (Figure 4) have also slightly increased and seem to be on par with Germany and Denmark. Canada's case fatality rate (Figure 5) is currently the highest of the countries examined.

It should be noted that while Iceland has the highest number of tests and identified infections per 1,000 population, it also has the lowest rates of critical care and case fatality (Figures 3 and 5). Because Iceland has undertaken mass testing of both symptomatic and asymptomatic individuals, it is likely the higher rate of identified infections is closer to true case incidence than the other countries examined below.

Figure 1: Total COVID-19 Infections per 1,000 (total population), by country

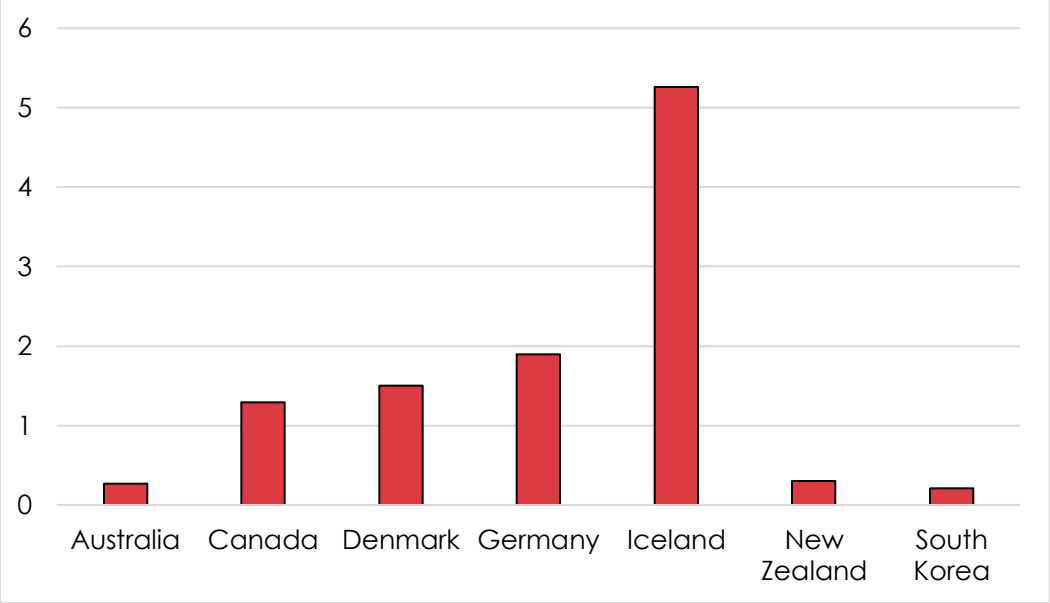


Figure 2: Tests per 1,000 (total population), by country

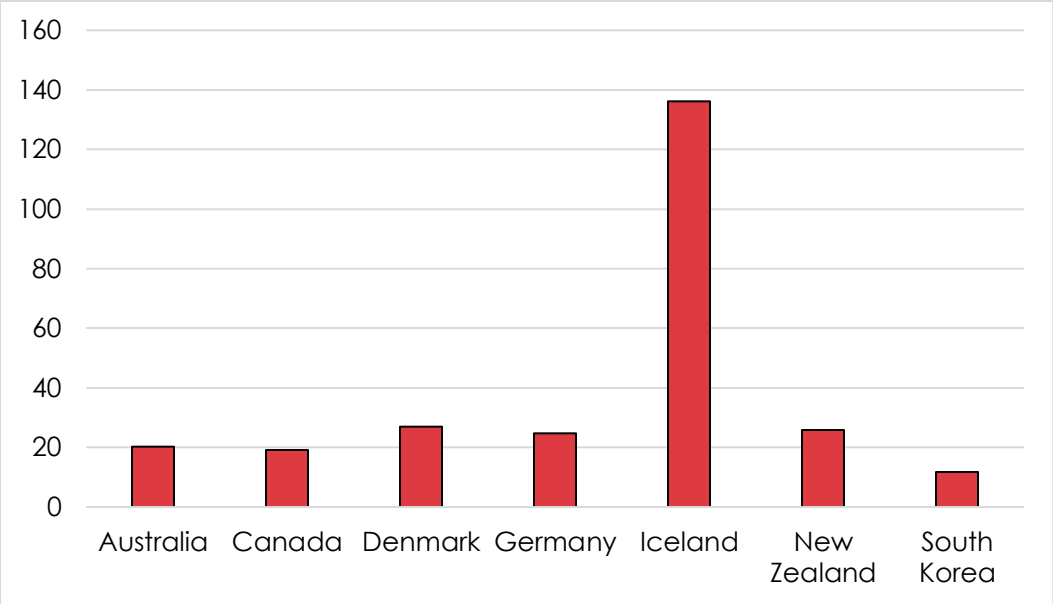


Figure 3: Critical Care per 1,000 (active infections), by country

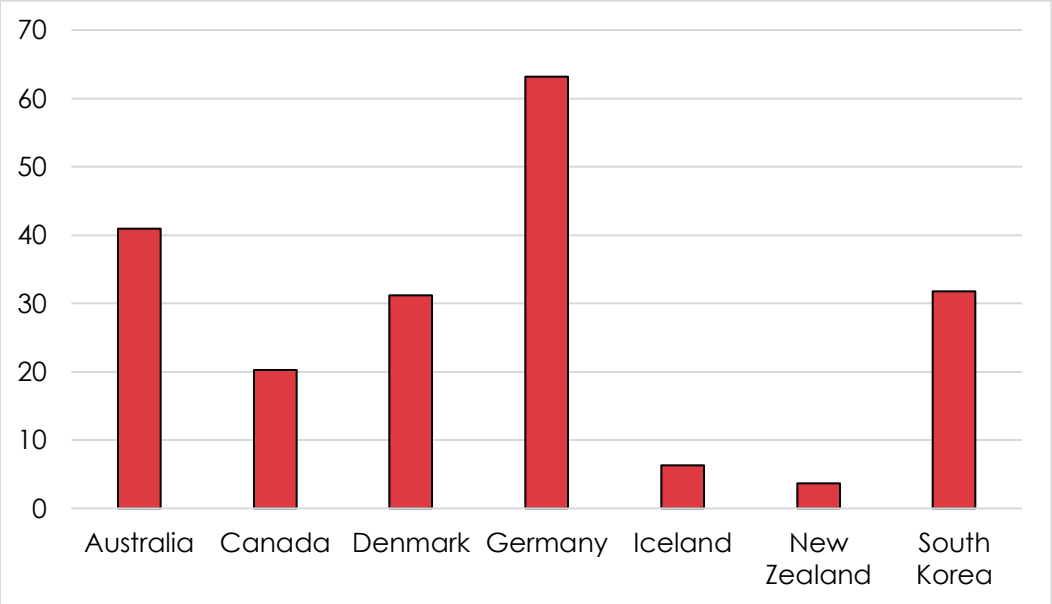


Figure 4: Mortality rate per 1,000 (total population), by country

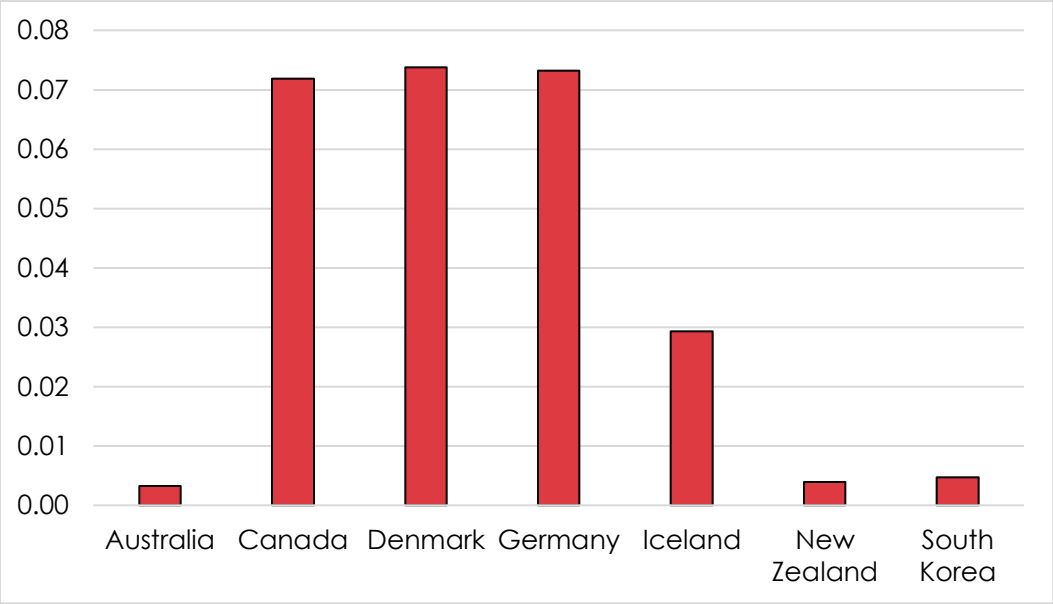
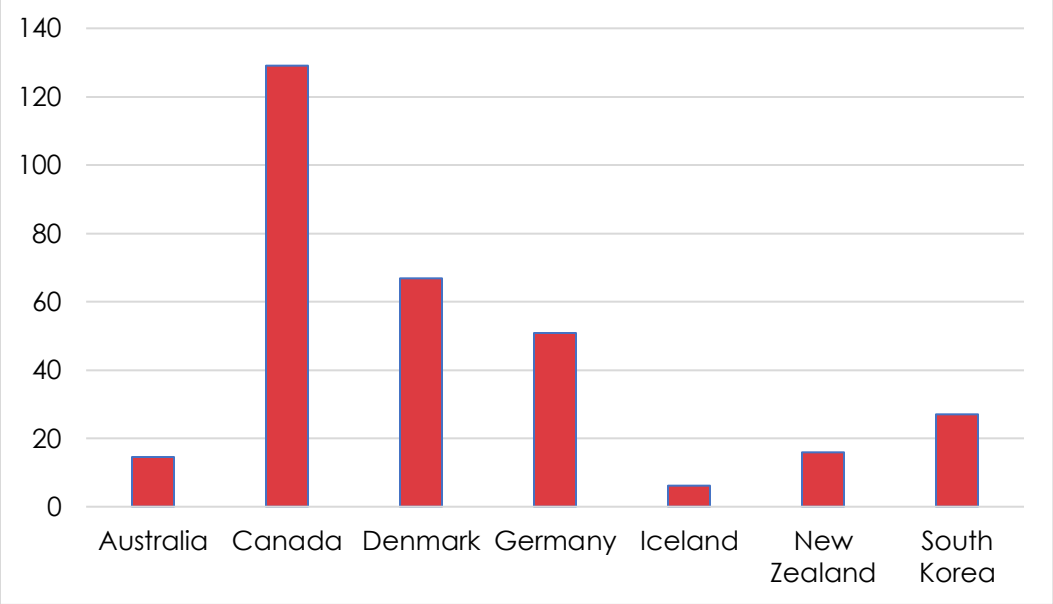


Figure 5: Mortality rate(CFR)[4] per 1,000 (infected people), by country



[4] Calculating mortality rates while an epidemic is ongoing is complicated, as the outcomes of current cases are not yet determined (i.e., individuals currently battling COVID-19 have neither died nor recovered). Therefore, the mortality rates presented above (Crude Fatality Ratio = Deaths/(Death + Recovered) reflect the outcomes of cases from a previous point in time – not the outcomes at present. The number of recoveries in various countries (e.g. Canada, Denmark) could be lagging in the data, whereas the number of cases and deaths is more readily available. For more information on calculating mortality rates, see https://www.worldometers.info/coronavirus/coronavirus-death-rate/#correct.

By Province

In the figures below, we see that Quebec exhibits relatively high numbers in terms of infections, mortality, and tests (per 1,000 population); in comparison, its critical care rates are low. In this case, it should be noted that the absolute number of critical care cases is second only to Ontario, and it is likely Quebec's rate is so low due to the province's large number of active cases.

The number of infections in Alberta has reached over 1 per 1,000 population (as of April 27), which is much higher than the less than 0.5 per 1,000 population reported in the previous update (April 14). This increase is likely due to recent outbreaks in the Cargill High River beef processing facility.

We find that New Brunswick conducted a number of tests similar to that of BC, Ontario, Manitoba and PEI (per 1,000 population). Along with PEI, there are no reported deaths or patients in critical care related to COVID-19 in New Brunswick. As of April 27, the total number of confirmed cases in the province stood at 118, with only seven active cases remaining and no new cases reported since April 18.

NB has since eased some restrictions, including allowing outdoor activities and social interaction within "two-family bubbles." NB is among the first provinces in Canada to begin easing restrictions, and PEI, Saskatchewan, and Manitoba are likely soon to follow. Thus, it will be interesting to compare these provinces' rates of infections, tests, critical care, and mortality at the time of our next update, which may reveal if easing restrictions have had an adverse effect on COVID-19 outcomes in applicable regions across Canada.

Figure 6: Total COVID-19 Infections per 1,000 (total population), by province

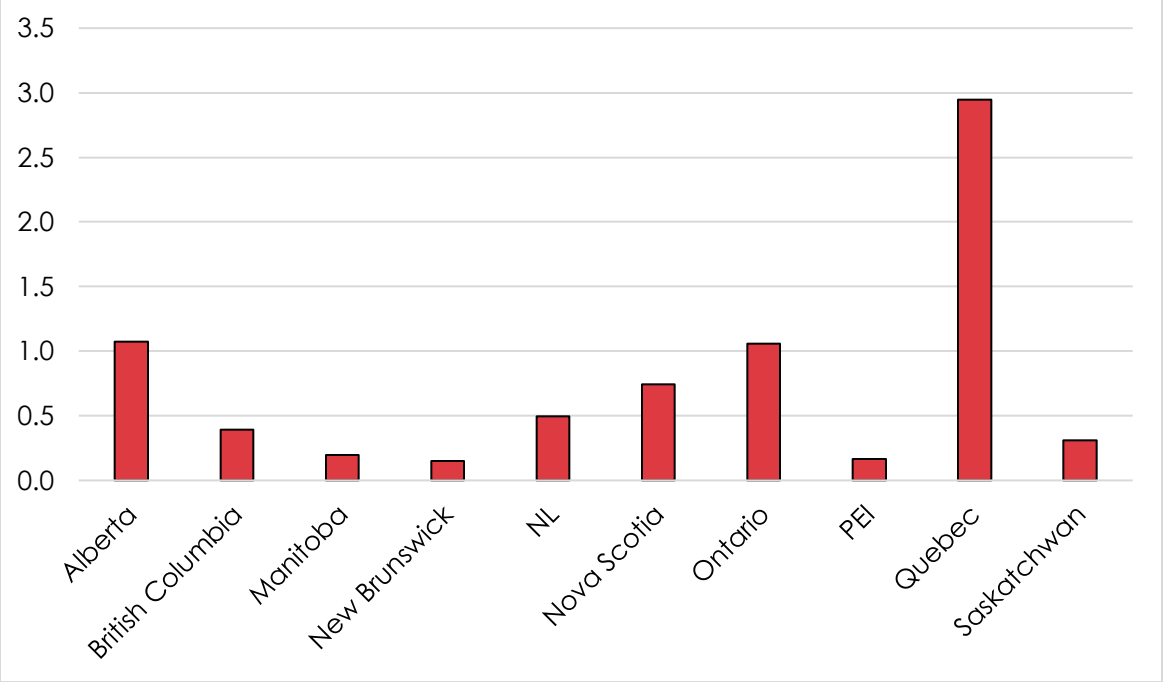


Figure 7: Tests per 1,000 (total population), by province

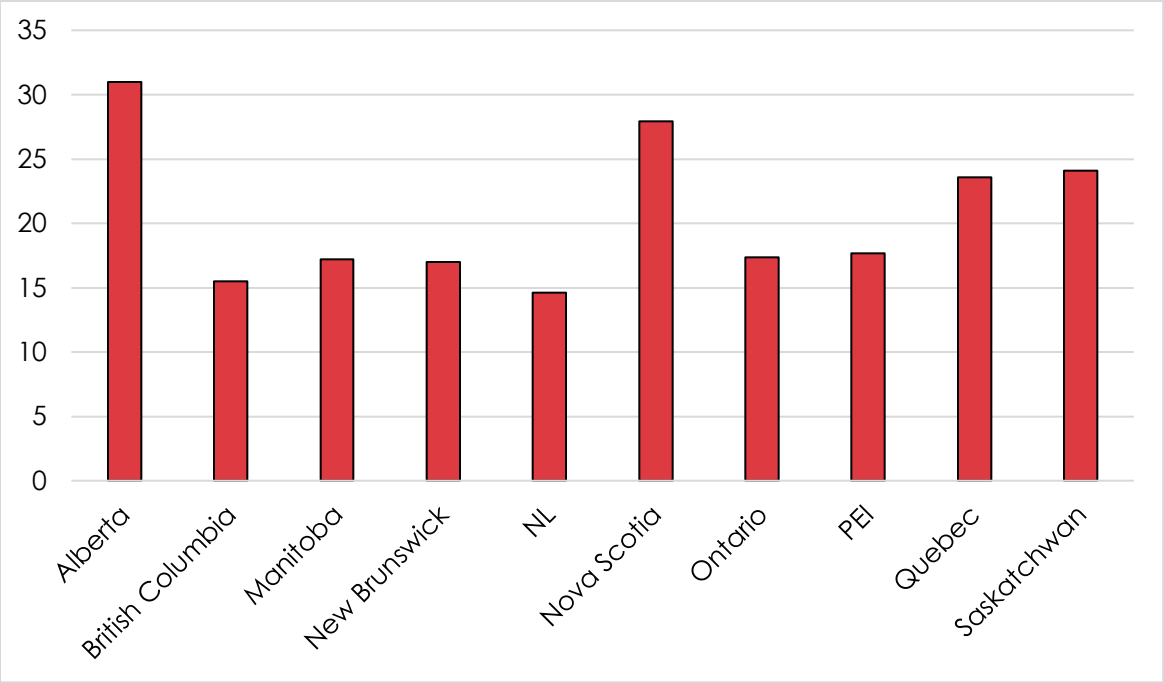


Figure 8: Critical Care per 1,000 (active infections), by province

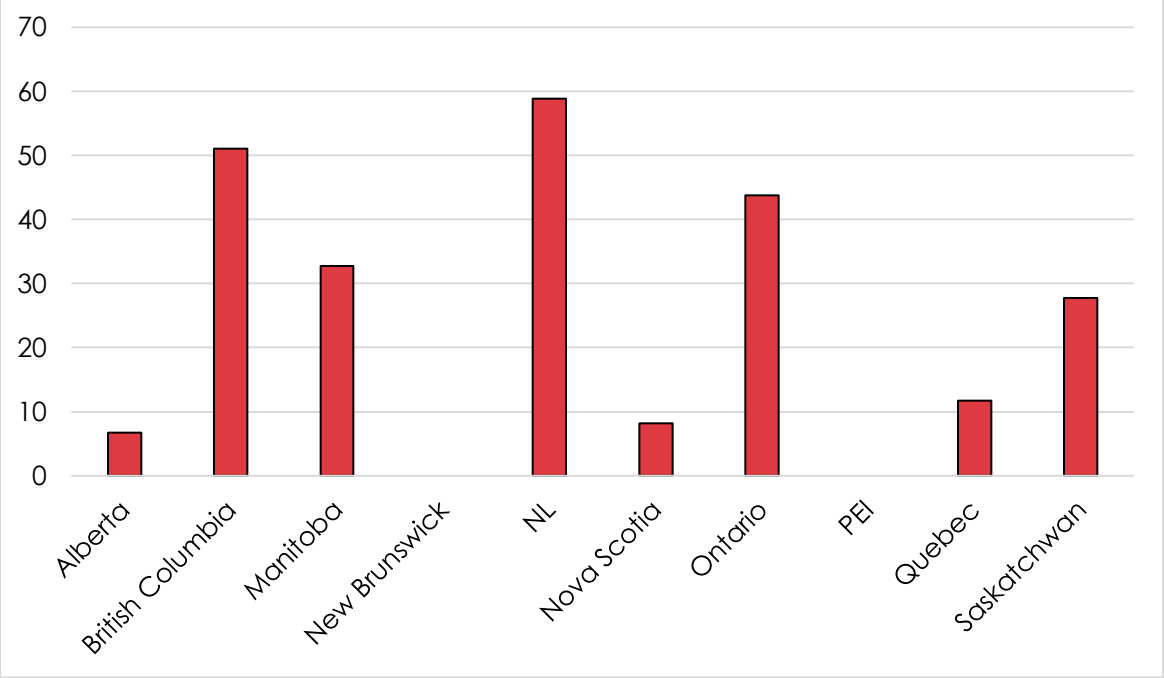


Figure 9: Mortality rate per 1,000 (total population), by province

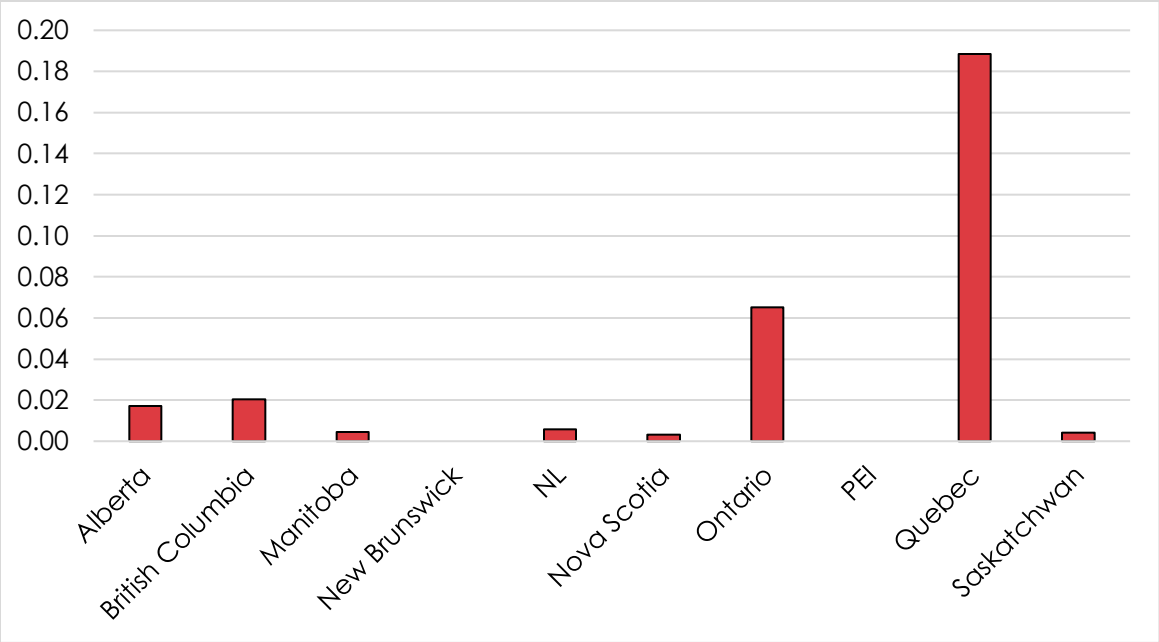
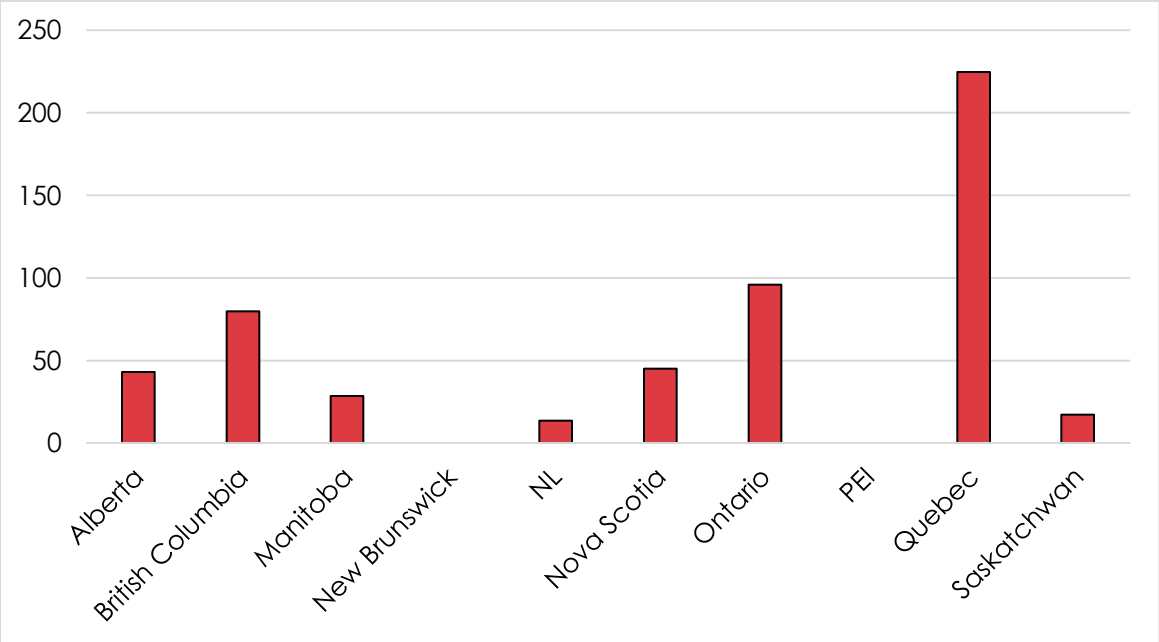


Figure 10: Mortality rate (CFR)[5] per 1,000 (infected people), by province



[5] Calculating mortality rates while an epidemic is ongoing is complicated, as the outcomes of current cases are not yet determined (i.e., individuals currently battling COVID-19 have neither died nor recovered). Therefore, the mortality rates presented above (Crude Fatality Ratio = Deaths/(Death + Recovered) reflect the outcomes of cases from a previous point in time – not the outcomes at present. The number of recoveries in various regions could be lagging in the data, whereas the number of cases and deaths is more readily available. For more information on calculating mortality rates, see https://www.worldometers.info/coronavirus/coronavirus-death-rate/#correct.

NEW CASES SINCE RESTRICTIONS WERE FIRST IMPLEMENTED

Since its state of emergency was first declared on March 19, 2020, NB proceeded to experience a peak number of new cases on March 29 (as of April 27, 2020, that is). Since March 29, however, the number of new cases has dropped steadily in the province, and no new cases have been diagnosed over the past nine days.

Overall, it appears as though NB continues to follow the same patterns as Australia and New Zealand in the sense that it experienced a rise in the daily number of new cases after declaring a state of emergency, which could be attributed to the time lag between developing symptoms and detection. After that, however, NB saw a fairly consistent decline.

Figure 11: New cases in New Brunswick

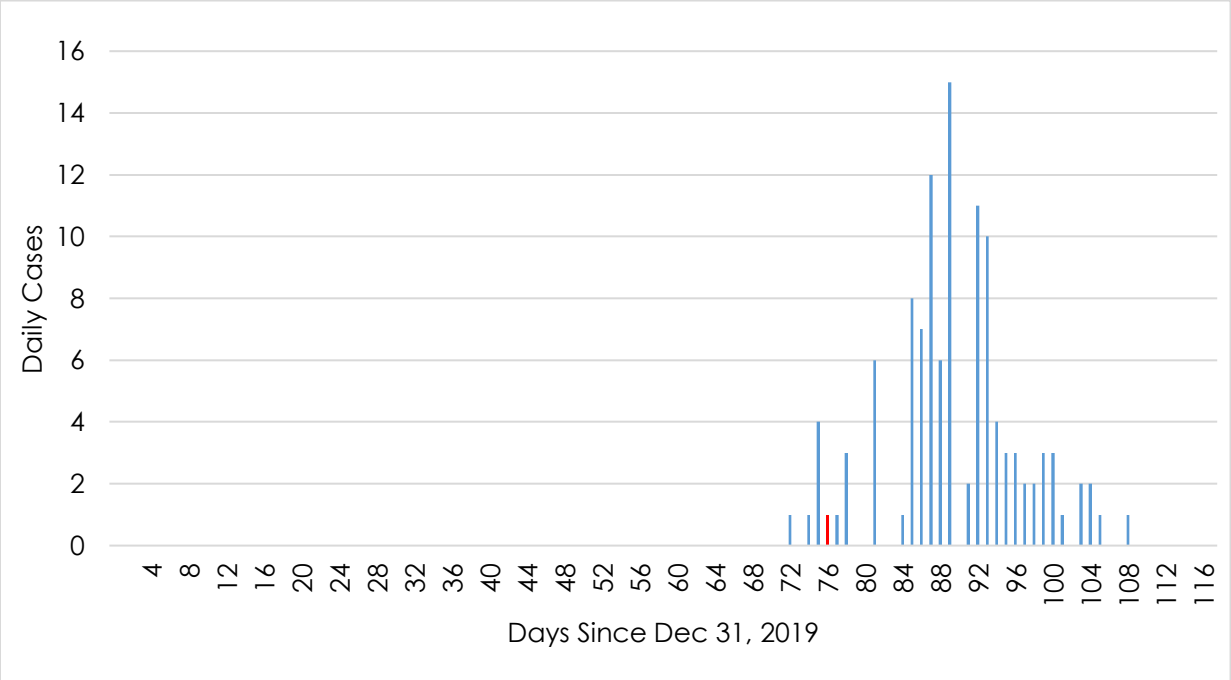


Figure 12: New cases in Nova Scotia

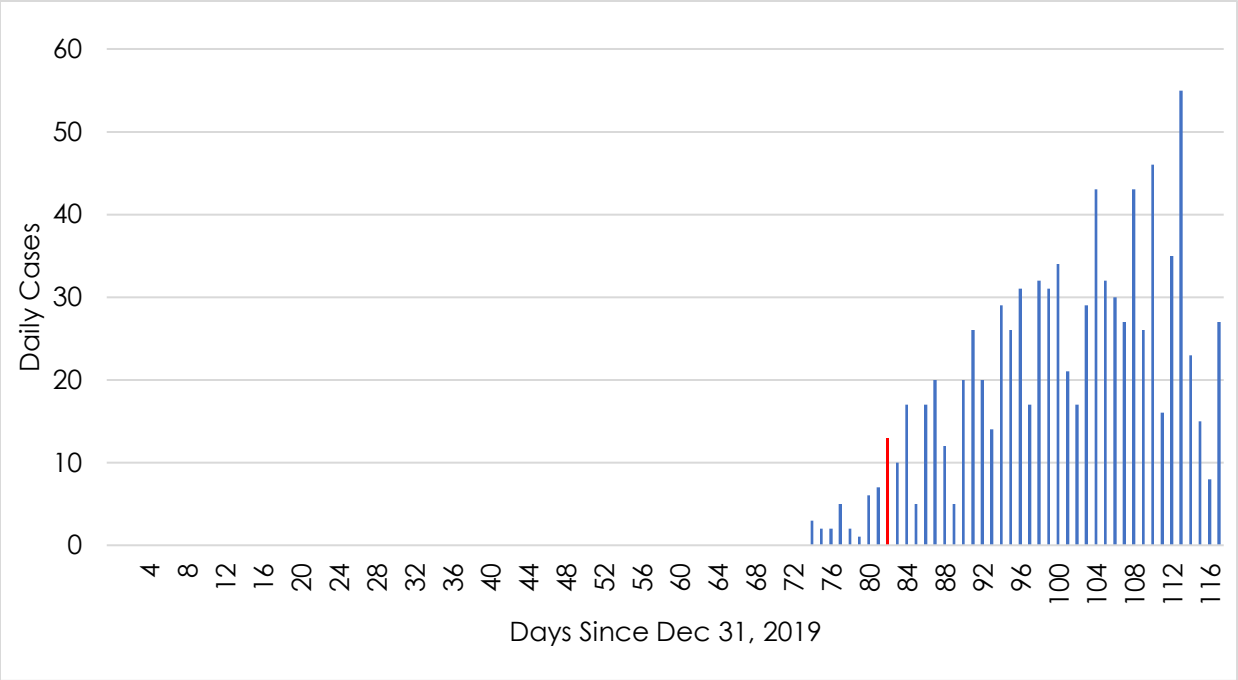


Figure 13: New cases in Canada

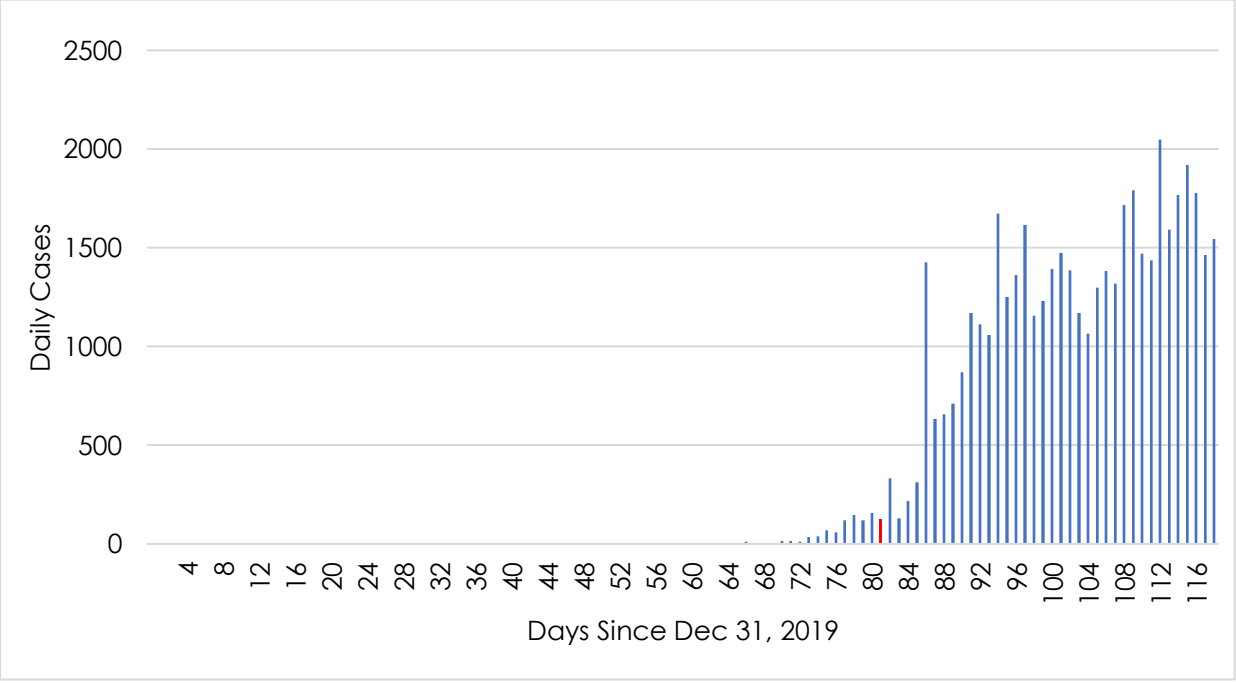


Figure 14: New cases in South Korea

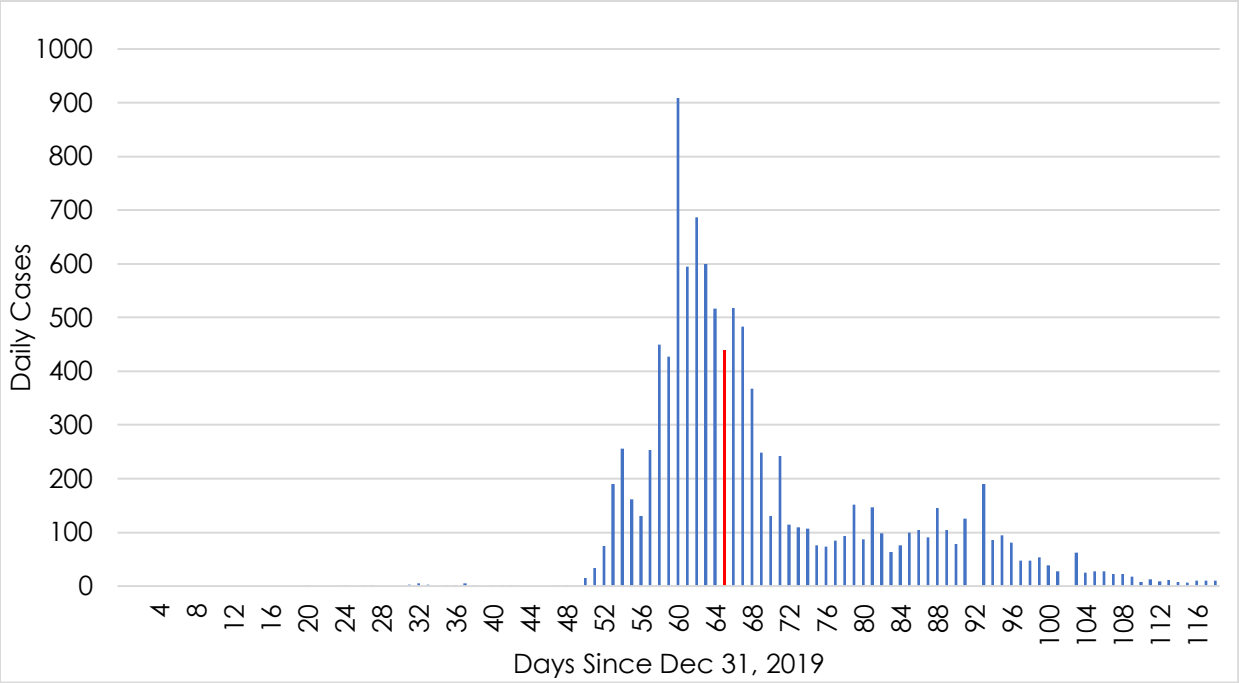


Figure 15: New cases in Iceland

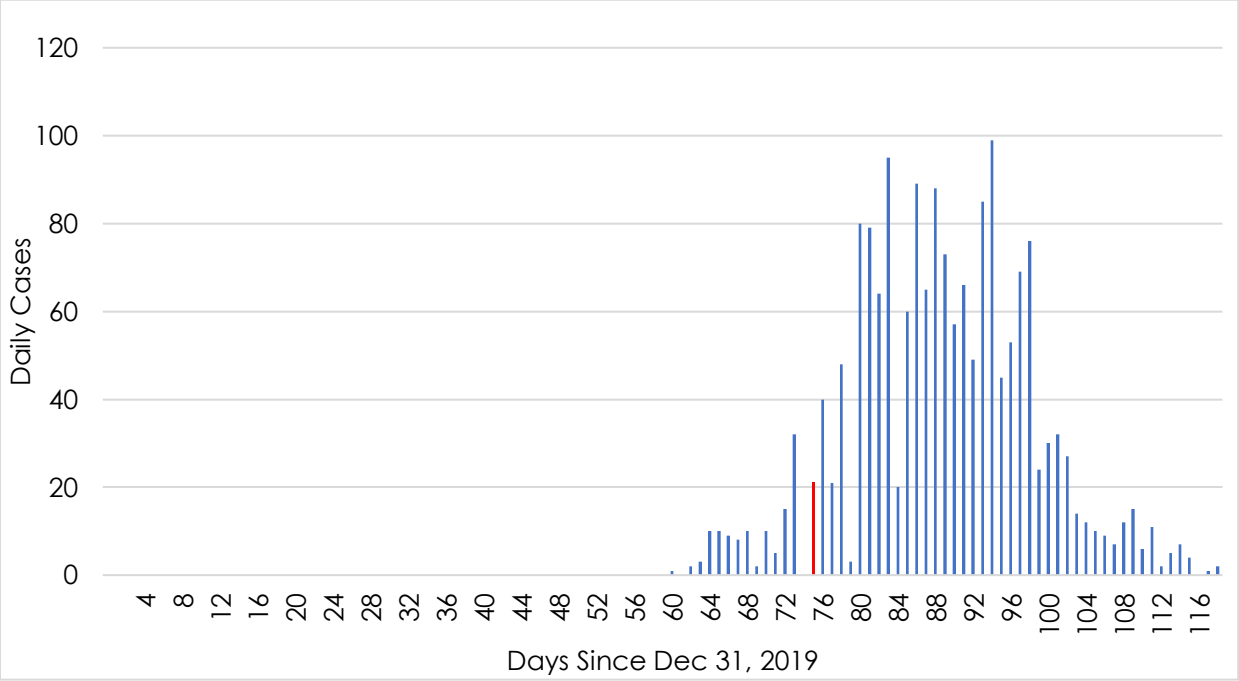


Figure 16: New cases in Germany

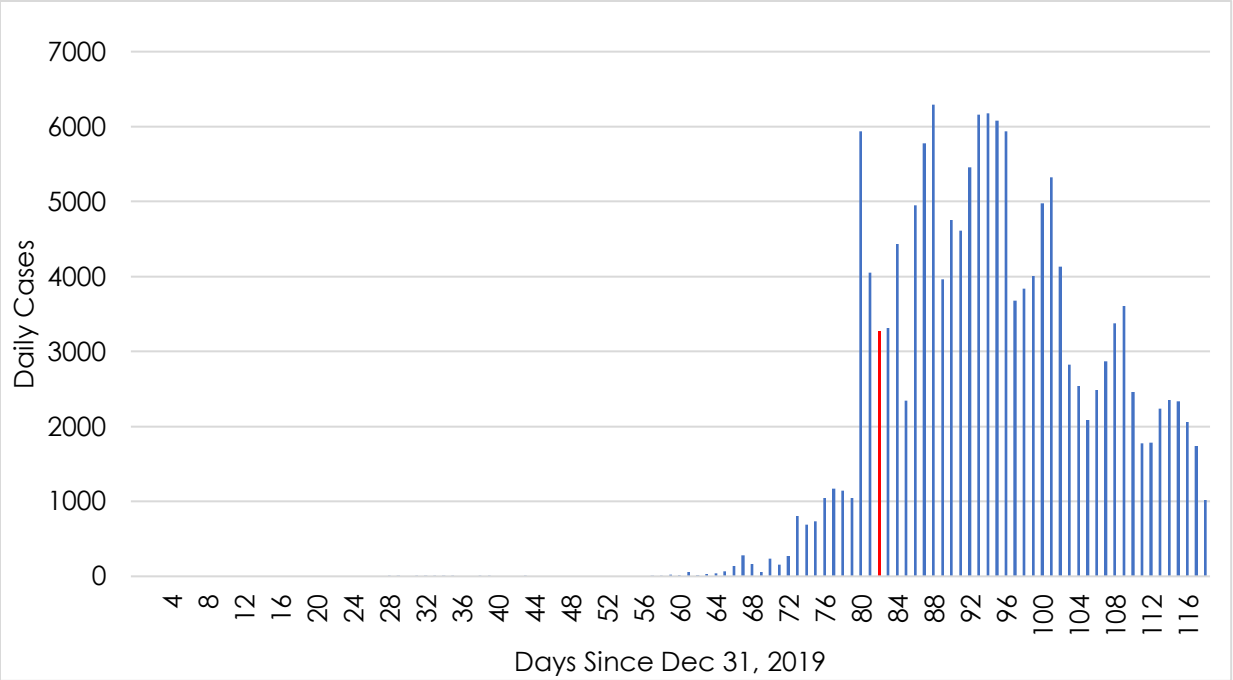


Figure 17: New cases in Denmark

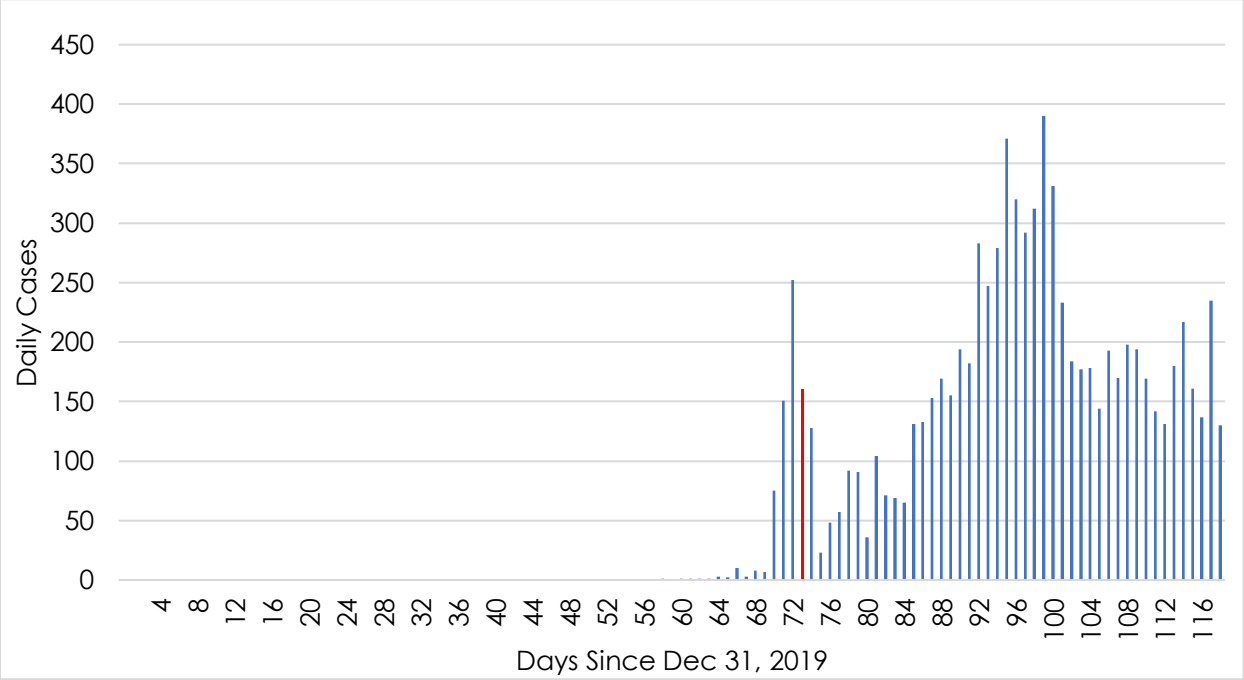


Figure 18: New cases in Australia

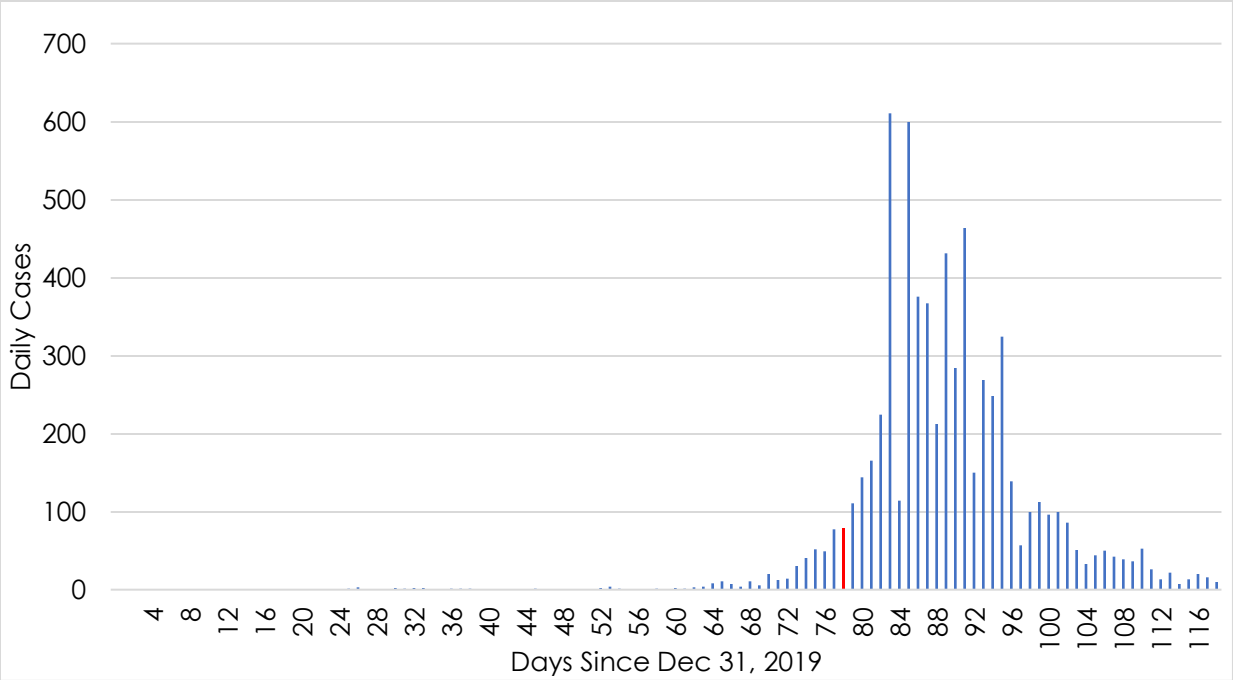
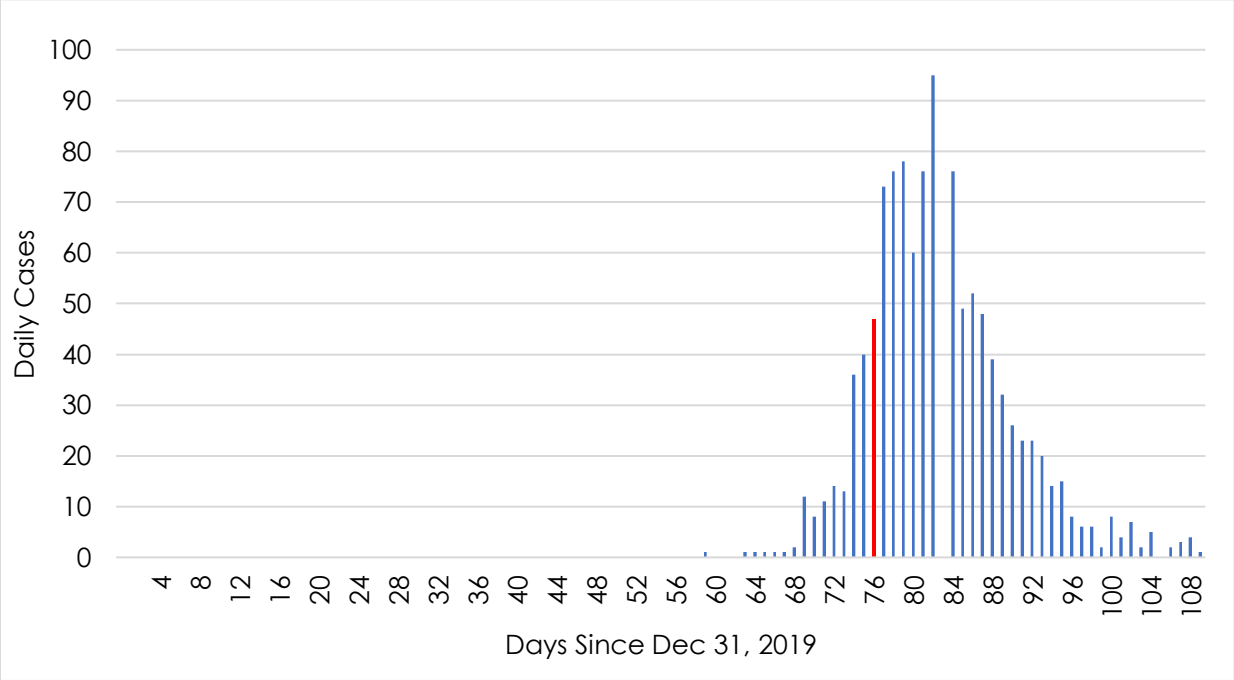


Figure 19: New cases in New Zealand



[i] https://www.canada.ca/content/dam/phac-aspc/documents/services/diseases/2019-novel-coronavirus-infection/surv-covid19-epi-update-eng.pdf

[ii] https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf?sfvrsn=5ae25bc7_2

[iii] https://www.sora.at/uploads/media/Austria_COVID-19_Prevalence_BMBWF_SORA_20200410_EN_Version.pdf

[iv] https://www.cebm.net/covid-19/covid-19-what-proportion-are-asymptomatic/

[v] https://www.nytimes.com/2020/04/23/nyregion/coronavirus-antibodies-test-ny.html

[vi] https://www.who.int/news-room/commentaries/detail/immunity-passports-in-the-context-of-covid-19

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[viii] https://www.worldometers.info/coronavirus/coronavirus-death-rate/#days

[ix] https://www.thelancet.com/pdfs/journals/laninf/PIIS1473-3099(20)30243-7.pdf

[x] https://www.thelancet.com/pdfs/journals/laninf/PIIS1473-3099(20)30243-7.pdf

[xi] https://www.medrxiv.org/content/10.1101/2020.03.14.20036178v2.full.pdf

[xii] https://nationalpost.com/news/canada-could-soon-conduct-60000-covid-19-tests-per-day-as-provinces-consider-relaxing-restrictions

[xiii] https://www.npr.org/sections/health-shots/2020/04/22/840526338/is-the-u-s-testing-enough-for-covid-19-as-debate-rages-on-heres-how-to-know

[xiv] https://www.cbc.ca/news/canada/new-brunswick/coronavirus-covid-19-pandemic-1.5524408