LIFTING RESTRICTIONS FOR COVID-19: IMPLICATIONS FOR NEW BRUNSWICK
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INTRODUCTION

This rapid review is the second instalment of a 2-part series on lifting COVD-19 restrictions. The review of the literature in Part 1 served as an examination of the early measures being taken to rewind the strict COVID-19 restrictions implemented in different locations around the world. In this report (Part 2), we update the status of restrictions presented in Part 1 and discuss the implications of taking similar steps to scale back restrictions in New Brunswick. Based on the implications discussed herein, we provide a series of recommendations for decision makers as they consider the province's next steps forward in lifting more restrictions while managing and monitoring the spread of COVID-19. Finally, we also present quantitative metrics on COVID-19 indicators (such as incidence rates, morality rates, and more) from December 31, 2019 to April 26, 2020 for NB, other provinces, and select countries with similar experiences.

As a global health emergency, COVID-19 is unprecedented in recent history – not only in terms of its geographic scope and the magnitude of infection, but also in the range of restrictions implemented to suppress the spread of infection and the consequent economic fallout. Schools and businesses around the world have been temporarily shuttered, borders have been closed, and citizens have been issued stay-at-home orders in an attempt to mitigate spread and lower the burden on our health care systems. While these drastic public health measures are credited with saving millions of lives, their ongoing economic impacts have become the cause of growing concern.

At the end of March, the Parliamentary Budget Officer estimated that Canada's GDP is likely to decline by 5.2% if physical distancing requirements last until August 2020 – a stark contrast to pre-COVID projections of a 1.4% increase.[i] This would result in a predicted loss of output (and Canadian incomes) of $218 billion in 2020. If the existing restrictions continue beyond six months, the cost could be considerably higher. The economic situation is similarly dire around the world, with the Ifo economic institute in Germany estimating the country's output will decrease by 4.2%[ii] and France's central bank announcing that the country's economy shrank by 6% in the first quarter.[iii]

While it is still too early to accurately project the economic impact of COVID-19 restrictions in New Brunswick, the employment effects alone have been extreme. The restaurant industry, for one, is estimated to have shed 13,700 jobs due to the forced closure of restaurants,[iv] which is equal to about 6.1% of total employment in NB.[v] Further, approximately 60,000 people have applied to New Brunswick's Emergency Income Benefit,[vi] and numbers are still growing. There is an obvious need to continue easing restrictions in NB as soon as reasonably possible in order to fuel economic growth and recovery, while taking steps to prevent transmission of the disease.

As discussed in our earlier report (and further reviewed below), other countries around the world have begun lifting measures, in many cases starting with the gradual reopening of schools and select stores, easing bans on outdoor exercise, and allowing workers from certain industries (particularly construction and manufacturing) to return to work. While it is too soon to observe the outcomes for many of these measures, modelling studies and observations of case trajectories in Asia (explored in Part 1) suggest a COVID-19 resurgence is likely to occur as restrictions are eased **– but if appropriate measures are in place to monitor further infection and reinstate intermittent restrictions, future resurgence could be managed.**

By examining the measures, outcomes, case metrics, and recommendations from countries around the world and from other regions within Canada, NB decision makers can continue to make informed policies regarding how to continue opening the NB economy and how to best monitor and manage infection as sectors of society continue to ease measures.

To this end, this rapid response provides

- **An updated overview of COVID-19 restrictions being lifted globally,**
- **Resultant implications and recommendations for scaling back COVID-19 restrictions in New Brunswick, and**
- **Quantitative metrics, such as case incidence rates, at peak dates and leading up to and following the easing of restrictions.**

The experiences of other locations in the process of reopening their economies can provide valuable insights into factors this province may want to consider as it slowly lifts its own restrictions. However, the ways in which key measures could be realized in practice depend on the unique needs of this province, which we take into account below. For instance, although COVID-19 case numbers in NB are low (with only seven active cases identified as of April 26),[vii] this is not the case for all of our neighbours. Prince Edward Island has only one identified active case remaining,[viii] but cases continue to increase in Nova Scotia and Quebec – the latter being the province having the highest number of cases and deaths among all provinces.[ix] Therefore, the unique geographical location of NB is considered in the implications discussed below.

Finally, it should be noted that the material discussed herein reflects the evidence available at time of writing. As time passes and more information becomes available, further research will be able to reflect the changing situation.

Note: Due to the specific focus of this rapid response report, certain topics are beyond the present scope but should nonetheless be explored in future analyses. These include considerations of the economic outcomes related to the easing of restrictions and the targeting of resources and designing of new programs to aid recovery. We propose to examine these issues, and more, in future reports to guide specific recovery measures beyond the easing of restrictions.

OVERVIEW OF INTERNATIONAL MEASURES: UPDATE TO PART 1

In Part 1 of this 2-part report series, we presented an overview of key measures being implemented to lift COVID-19 restrictions around the world as of April 16, 2020). At that time, some measures were already in place, some had been assigned a start date in the near future, and others represented the first steps countries were planning to take when the timing was right. However, ten days have passed since the release of Part 1 in this series, and many changes have taken place during that time. Below, we provide updates on the status of various countries' movements to lift (or reinstate) restrictions.

Regions that Lifted Restrictions

In Table 1, we identify changes that have occurred since April 16 to the measures previously discussed, as well as new measures that have since been announced. As many of these countries and measures have already been examined in Part 1 of this series, the comments beneath the table highlight new, noteworthy instances that could produce different outcomes of interest.

Table 1: Updates to International Measures

Region	Previous Status (as of Apr. 16)	Status Change (if applicable)
China	Travel restrictions lifted, epidemic-free community statuses implemented / revoked	
Japan	Schools opened then closed as state of emergency reinstated	
Austria	Certain shops open, larger shops and service providers set to open May 1	Bars, restaurants, churches, schools set to reopen May 15
Czech Republic (Czechia)	Certain shops, training centres open, exercise/sports bans eased; justified travel allowed	More retailers open, outdoor markets, outdoor training sessions, weddings with up to 10 attendees allowed. Church services with max. 15 people set to begin April 27.
Denmark	Childcare/schools open	Hairdressers, tattooists, psychologists (and similar operations) also open
Finland	Pending: Non-essential regional traffic to be allowed April 19	Non-essential regional traffic allowed (but discouraged) in Uusimaa region
France	Pending: Schools to reopen May 11	
Germany	Pending: Small shops to open	Small shops and shops selling certain products open. Schools set to open May 4.
Italy	Certain stores open; exercise bans eased	Children allowed to gather in groups of three as of May 4
Norway	Pending: Schools to begin opening April 20	Schools open, hair and beauty salons open, domestic travel permitted
Poland	Pending: Restrictions to ease on shops April 20	Parks, forests open. Larger numbers of people allowed in shops

Spain	Construction and manufacturing workers return to work	Remaining lockdown measures extended to May 9, children allowed outside
Switzerland	Pending: border controls, school closures, gathering bans to be eased at the end of April	Schools and remaining retailers set to open May 11. Higher learning and public institutions set to open June 8.
United Kingdom	Recommendations to allow youngest age cohort to return to work first	
United States	Recommendations to implement return-to-work strategies	Restrictions lift in Georgia, South Carolina, and Tennessee; some pending
Iceland	(Not discussed)	As of May 4, gatherings of 50 people to be allowed, service providers to open, schools to reopen, outdoor sports to resume.
Iran	(Not discussed)	Government and businesses open, travel restrictions lifted
Luxembourg	(Not discussed)	Construction sites reopen. Secondary education to resume May 11. Remaining education and childcare to resume May 25.
New Zealand	(Not discussed)	Pending for April 27: Caregivers, cleaners to return to homes, schools to open in smaller capacity, certain industries to reopen, surfing allowed
South Korea	(Not discussed)	Parks, malls, restaurants, golf courses open, work from home policy eased.

Noteworthy Mentions:

Iran
On April 11 travel restrictions were lifted and government offices outside Iran's capital region began to reopen, with approximately one-third of employees continuing to work from home (women with young children were given priority in choosing whether to work remotely).[x] Businesses outside the capital were allowed to reopen the same day. Government offices and businesses in Tehran began to reopen the following week (April 18), with a similar proportion of government employees working remotely.[xi] This large-scale easing of restrictions in Iran is very different from the gradual, phased-in implementation of smaller changes in most European countries, and it will be interesting to compare the outcomes over time.

Poland
The government of Poland carried out its original plan to implement changes to some restrictions on April 19, despite record spikes in COVID-19 cases the day prior to and the day of the change. On April 20 – the day after the country reopened its parks and forests and lowered the number of shoppers allowed in a store at one time, 545 new infections were diagnosed – the highest daily number to that point. To date, no further measures to ease restrictions have been announced, and authorities state that a future timeline for lifting restrictions will be based on assessments of case incidence over the coming weeks.[xii] Comparing long-term outcomes in Poland to those of similar European countries that did not see a spike in cases when reopening could provide interesting insights into the impact of low (and high) incidence at the time measures are lifted.

United States
While many states were presenting plans and recommendations for eventual reopening as of April 16, at least three have begun implementing plans in the time since. Georgia, for one, opened bowling alleys, gyms, tattoo parlors, barber shops, beauticians, and massage therapists on April 24, with restaurants and movie theatres set to follow on April 27. In South Carolina, beaches, piers, and similar waterfront facilities opened on April 20, followed by the opening of select stores[1] the next day. Finally, Tennessee opened its state parks on April 24 and announced some businesses will be allowed to open on April 27.

Notably, Georgia was one of the last states to implement a "shelter-in-place" order and one of the first to lift restrictions. While businesses in Georgia are required uphold social distancing and hygiene requirements and monitor employees for respiratory illness or fever, the state's early move to reopen has been met with criticism from public health officials. It should be noted that neither Georgia nor South Carolina met the White House criteria to reopen, and it will be useful to track their outcomes and compare them to those of states that open later as time progresses.

Comparison: Countries that Delayed Restrictions

In Table 2, we present changes that have occurred since April 16 to the status of restrictions in regions that did not initially implement lockdown measures. As discussed in Part 1, these countries recently experienced large spikes in case numbers and accompanying mortality rates and could therefore serve as valuable sources of comparison to countries that implemented measures much earlier in their case trajectories. However, as noted below, the unique characteristics of different locations prevents direct comparison and should be considered when deriving insights from other areas around the world.

[1] This includes stores selling furniture, clothing, jewellery, luggage, sporting goods, books, crafts, music, and flowers, as well as department stores and flea markets. Interestingly, hardware stores were not allowed to open.

Table 2: Updates to Countries for Comparison

Region	Previous Status (as of Apr. 16)	Status Change (if applicable)
Singapore	Schools/workplaces closed, partial lockdown declared April 7 until May 4	Lockdown measures extended until June 1
Sweden	Gatherings >50 people banned, high schools and universities closed	Production at Volvo plants to resume April 27

Singapore

As discussed in Part 1, the country of Singapore had initially experienced a good deal of success in controlling the spread of COVID-19 through sophisticated testing, contact-tracing, and quarantining methods. While certain restrictions were in place, schools and workplaces remained open for the most part, only closing when partial lockdown measures were implemented on April 7 following a surge in cases, diagnosed primarily in migrant workers living in crowded dormitories. Since then, case numbers in Singapore have risen from less than a dozen a day in February to over 900 cases diagnosed on April 26 alone.[xiii] Singapore now has the highest number of confirmed COVID-19 cases (over 13,000) among Southeast Asian countries; and since our April 16 report, lockdown measures have been extended until June 1.[xiv]

Sweden

As of April 16, the situation in Sweden appeared to be worsening at a quick pace. Following an early strategy of self-responsibility, rather than enforced lockdown measures, Sweden began to experience a larger number of infections (and expected deaths) relative to neighbouring countries. A set of measures was implemented at that time to suppress spread, including bans on gatherings of more than 50 people and the closure of high schools and universities – fairly relaxed measures compared to those elsewhere in Europe. Since then, leading epidemiologist Anders Tegnell claims the country's curve has flattened – though more time may be required to tell if this is indeed the case.

The current trend in Sweden should be interpreted with caution, however, as Sweden possesses some distinct characteristics that may be helping it weather the pandemic. For instance, although physical distancing and work-from-home policies were not officially implemented throughout the country, over 50% of Swedish households are single-person homes, and more people in Sweden already work from home than anywhere else in Europe. Moreover, Sweden has what is arguably one of the world's "best-functioning health-care systems" and was therefore better equipped to deal with an influx of COVID-19 patients than health care systems in the hardest hit locations across Europe.[xv]

THE CHANGING SITUATION IN NEW BRUNSWICK

While the federal government is working to produce a set of guidelines and principles for reopening the country, Prime Minister Justin Trudeau says restrictions will be eased on a "province-by-province" basis, with provincial leaders making decisions about how and where to start easing measures.[xvi] As other provinces, such as Saskatchewan (SK) and Prince Edward Island (PEI), announced their plans to begin reopening in early May,[xvii] New Brunswick took the lead by launching its plan to reopen on Friday (April 24). Initial measures include

- allowing households to form an exclusive "two-family bubble,"
- opening outdoor recreation areas (such as parks and beaches),
- lifting the delay on fishing and hunting seasons,
- permitting two-person carpooling if the passenger sits in the back seat,
- permitting drive-in church services if attendees remain in their vehicles, and
- enabling a return to campus for post-secondary students who require access to hands-on components to fulfil course requirements.[xviii]

These new measures represent a first step forward in the province's phased plan to lift restrictions, which relies on a colour-coded system (red, orange, yellow, and green) representing public health alert levels.[xix] If three unrelated outbreaks are diagnosed within a six-day period, or cases are linked to a gathering and cannot be traced, the province will move backward to phase "red," with accompanying restrictions re-imposed.[xx] However, if there is no "significant acceleration of disease curve" over the next 2-4 weeks, the orange phase will commence, with gatherings of ten or less allowed, and the progressive opening of businesses and activities with strict controls in place. Elective surgeries and priority health services will also resume, along with childcare services.

In the yellow phase, family and friends beyond the "two-family bubbles" will be able to socialize, and gatherings of up to 50 people will be permitted. Controls in workplaces will begin to ease, schools will reopen, and border control will vary according to risk. At this time, hairstylists, dentists and related services, churches, and fitness facilities will resume business.

In the final, green phase, physical distancing requirements will be lifted, with borders, schools, businesses, and public spaces open and operating without the strict controls that were required to suppress the spread of COVID-19.[xxi]

NB appears to have quite successfully managed the spread of COVID-19 within its borders. With a total case count of 118 as of April 26, the province is reported to only have seven active cases remaining. This suggests that NB's early implementation of strict lockdown regulations (in addition to comparatively low population density and the absence of a major metropolitan area) may have effectively 'flattened the curve' and positioned the province well for these new measures.

However, New Brunswick is only in the first stages of a multi-phased relaxation of restrictions, and the pace and nature of the steps NB takes during later phases of reopening are certain to be subject to reconsideration and change. To this end, the recommendations and discussion provided below aim to help guide decision makers as the province gradually moves through the various phases of reopening.

SUMMARY OF RECOMMENDATIONS

- Flexible, nimble, multi-phase plan that allows backward and forward progression (tightening and easing of restrictions as necessary with clearly defined trigger metrics)
- COVID monitoring strategy - Monitoring plan that expands on current COVID testing recommendations (focus on community transmission, asymptomatic cases, and increasing testing capacity)
- Patterns of healthcare use - The case count criteria for re-instituting protective measures should take into account changes in healthcare capacity over the coming weeks (e.g. hospital capacity may decrease as deferred surgeries and other procedures resume and as patients feel more comfortable accessing health services)

RECOMMENDATIONS: DEEP DIVE

Guiding Principles for a COVID Maintenance Program

Modelling studies based on the progression of COVID-19 in China (see Part 1) suggest that a level of resurgence will inevitably result from the lifting of restrictions and should therefore be expected. Thus, it is highly recommended that countries closely monitor the case reproduction number and be prepared to reinstate intermittent measures if necessary – especially if outbreaks are present in neighbouring regions (as is the case in Quebec). As risk cannot be avoided entirely, there must be a heavy focus on ways to manage the risk.

On this front, the key message emerging from the WHO, health policy experts, government officials, and researchers worldwide is that societies should reopen very gradually, and only after transmission has been controlled and measures are in place to monitor and manage further infection. Lifting restrictions too early could result in deadly resurgence; and while lifting restrictions at the appropriate time is also likely to result in transmission, the increase should not prove catastrophic – given appropriate measures are in place to observe and manage the spread.

When is the Right Time to Reopen?

Decisions regarding which measures should begin the process of reopening are largely left to the discretion of government leaders – whether national or provincial. However, a number of more general guidelines have been produced to guide decision makers in choosing when to begin the process of reopening.

According to the WHO, countries should only consider lifting restrictions once they have confirmation that transmission has been controlled and are ensured their health systems are capable of detecting, testing, isolating, and treating every case, along with tracing every contact.[xxii] Similar, but more specific, requirements have been issued for the UK by the British Foreign Secretary, including the need to see a consistent fall in daily death rates from COVID-19 along with data showing a decrease in the rate of infection to a level that is manageable across the board in terms of hospital capacity, and more general health care and testing capacity.[xxiii]

In the US, the White House's criteria for regional reopening include downward trajectories of both symptoms and confirmed cases over a 14-day period, accompanied by hospital capacity to treat all patients without crisis care and a robust program in place for testing at-risk medical workers. At the individual level, states are also required to ensure they have sufficient testing and tracing abilities, health care system capacity (including PPE), and plans to not only protect workers but also advise citizens of protocols and mitigate outbreaks by reinstating restrictions.[xxiv]

Australia has adopted similar measures comprised of three criteria for easing restrictions: (1) an increased capacity for testing, including a more extensive "sentinel testing regime" that involves testing asymptomatic persons; (2) the improvement of contact tracing to an "industrial" level; and (3) local capabilities to lock down hotspots when they occur.[xxv]

As is apparent in the metrics provided at the end of this report, New Brunswick has successfully managed to control transmission to date, with no new cases diagnosed in the last eight days and only two cases identified since April 14 – nearly two weeks ago. The province has further implemented criteria for re-imposing restrictions. As mentioned above, the measures lifted on April 24 will be reinstated if three unconnected cases, or cases from a large untraceable gathering, emerge in the following days. Insofar as NB has 'flattened the curve' and presented criteria for further restrictions, the province positioned itself well to lift restrictions when it did. However, while NB officials have announced that testing and tracing are also central to the phased plan for re-opening, specific details regarding testing and tracing strategies have not yet emerged. To this end, it could be helpful to review other regions' approaches to managing and monitoring spread and determine if methods elsewhere could be implemented in NB to strength this aspect of its COVID-19 maintenance plan going forward.

Managing and Monitoring Spread

Official recommendations and outcomes in countries around the world emphasize the need for testing and tracing capabilities when monitoring and managing the spread of infection following the lifting of restrictions.

The importance of this strategy is apparent in the case of Japan. While Japan's testing and tracing tactics were fairly successful when first implemented early during its COVID trajectory, the country is now in a national state of emergency – less than one month after beginning to lift restrictions. It is believed that a main flaw in Japan's plan to test, trace, and isolate was the country's underestimation of how contagious COVID-19 actually is.[xxvi] Japanese officials did not prepare quarantine facilities or transportation for people with moderate and asymptomatic cases of COVID-19; and non-critical individuals were encouraged to go home (even when using public transport) and self-isolate themselves – leading to family infection. Certain prefectures are now turning hotels into isolation centres for non-critical cases, and Japan's Prime Minister Abe plans to increase testing to 20,000 per day, a large increase from the recent amount of 5,000 tests per day,[2] and to administer tests more broadly, beyond people with connections to identified cases.

The need to improve tracing procedures is also being recognized worldwide (Belgium, for one, has hired and is in the process of training 2,000 "contact tracers")[xxvii] and is starting to be addressed in North America through the recruitment of COVID-19 tracers in Massachusetts[xxviii] and through the Government of Canada's COVID-19 Volunteer Recruitment Campaign[xxix] and Public Health Ontario's Contact Tracing Initiative.[xxx] These initiatives could be extremely relevant to NB when it decides to open its provincial borders and when Canada decides to open the NB border with the US. According to the CBC, Health Canada has already recruited over 44,000 volunteers to help trace contacts of infected cases; however, according to epidemiologist Dr. Brenda Coleman, the country will likely have to double its capacity once restrictions begin to lift.[xxxi]

A peer-reviewed study published in the journal *Science* suggests that the viral spread of COVID-19 is too fast to be contained by "manual contact tracing," but it could be controlled by a faster process that happened at scale – such as through a "contact-tracing App which builds a memory of proximity contacts and immediately notifies contacts of positive cases."[xxxii]

[2] Standardized to the NB population, this would be the equivalent of conducting only 31 tests a day in NB.

In Norway, the government has launched such a voluntary "virus-tracking" app called Smittestopp to alert users if they have been in contact with a confirmed or suspected case or have been to an infection hotspot. While privacy is certainly a concern, media reports on population polling suggest that around 50% of Norwegians would be willing to download the app.[xxxiii] A similar app (modelled on Singapore's TraceTogether App) is in production in Australia and forms a key facet of the country's criteria for lifting restrictions.[xxxiv] However, as French officials have pointed out, the elderly are the most likely group to need such a tool and are also the least likely to use mobile phones.[xxxv]

Digital tracking approaches are being considered federally and provincially across Canada – though, it should be noted that the job of tracking falls within provincial jurisdictions. Ontario and British Columbia have begun to talk to various vendors about purchasing an app, with other provinces evaluating options. However, as the CBC further points out, a patchwork of apps across the country could lead to "low uptake numbers and poor data."[xxxvi] Dr. Aspuru-Guzik at the University of Toronto is advocating on behalf of using one dedicated app across provinces (he proposes "MyTrace"); and Dr. Bengio at the Mila Institute likens tracing apps to vaccinations, stating that the more people that have the same app, the larger the percentage of the population that is protected.[xxxvii]

However, even if Canadians use the same phone app for tracing, the literature suggests a participation rate of at least 60% is needed before the method is effective. Moreover, along with privacy issues and a probable lack of uptake among the senior population, not all Canadians have cell phones or would consider themselves "tech-savvy" enough to set up a tracing app. Finally, for digital tracing methods to work well, testing levels in Canada would need to improve.[xxxviii]

According to Theresa Tam, Chief Public Health Officer of Canada, the country should be testing 60,000 people a day – three times more than ~20,000 tests being administered daily.[xxxix] Standardized to the NB population, this would mean conducting 1,237 tests daily. According to NB officials, the province has the capacity to conduct 1,000 tests a day. Lately, test numbers have consistently been under 500 a day – less than half the province's capacity. While low test numbers have been attributed to reduced demand,[xl] it is likely demand will increase in the weeks following the easing of restrictions. Moreover, as more provinces begin lifting restrictions, resurgences are expected, and the number of daily tests recommended by Dr. Tam is also likely to increase at that time.

Based on this information, we recommend increasing testing capacity in NB to at least 1,300 tests a day, with plans in place to further increase capacity if resurgence leads to growing demand.

We also recommend the implementation of a digital contact-tracing strategy in New Brunswick. If this is accomplished in the form of a mobile app, it should be the same app used at least by neighbouring provinces – if not nationwide (should such an app exist). To this end, we recommend collaboration and cooperation with other provinces in choosing an effective tracing strategy.

However, because an app is unlikely to be used universally – particularly among the elderly, most vulnerable, population – we suggest adopting this strategy only as a supplementary measure that should not constitute the sole method of contact-tracing. To this end, we recommend NB also recruit case trackers and contact tracers – if the province follows the guidelines of Dr. Coleman, it should aim to find 1,814 workers to stem the spread of resurgence. While Health Canada has primarily advertised to find volunteers, NB could consider hiring NBers who were rendered unemployed because of COVID-19 restrictions, thus mitigating some of the economic effects being felt throughout the province.

Phased Re-openings

Once criteria for monitoring and managing spread have been implemented, WHO recommends that the process of reopening be gradual; and the majority of countries and smaller regions around the world appear to be following this guideline. As delineated above, New Brunswick's plan for a phased reopening is comprised of four stages, each corresponding with a colour representing the public health status of NB. If NB diagnoses three unrelated outbreaks within a six-day period, or cases are linked to a gathering and cannot be traced, the province will move backward to phase "red," with accompanying restrictions re-imposed. However, If the case trajectory remains low during the 2-4 weeks following the lifting of measures as of April 24, NB will progress to the "orange" phase of reopening.[xli]

While different regions tend to share the same criteria that must be met before restrictions can be lifted, actual phases of reopening themselves tend to differ. To allow comparison between the order in which NB plans to gradually reopen, and plans for reopening in other regions, we describe below the processes in place in another province, and other countries.

Saskatchewan

May 4 marks the start data of Phase One of Saskatchewan's five-phase plan, at which time restricted medical services will reopen and low-risk outdoor recreational activities will resume. Fishing and boat launches will be the first activities allowed, followed by golfing (May 15) and eventually parks and campgrounds (June 1). Gatherings of up to ten people will be allowed. Phase Two (scheduled for May 19) involves the reopening of select retail and personal services.

Phases Three through Five have not yet been assigned start dates and will be determined according to the outcomes of Phases One and Two. In Phase Three, remaining personal services will reopen, along with restaurants, gyms, childcare, and related services. Physical distancing requirements remain in place at this time, though gatherings will be allowed for up to 15 people. In Phase Four, indoor and outdoor recreation and entertainment facilities will open, and the permissible size of gatherings will increase to 30 people. Finally, in Phase Five, remaining long-term restrictions will be lifted.[xlii]

New Zealand

New Zealand authorities have implemented a four-level plan for re-opening the country, with the first move out of Level 4 (highest alert) into Level 3 scheduled to occur at midnight on April 27.[xliii] While New Zealanders were required during Level 4 to remain within their household "bubbles," they will be permitted to expand those bubbles to family and close friends, as well as cleaners and caregivers – provided they do not enter more than one household. Along with the easing of restrictions on "household bubbles," New Zealand will also allow some non-essential business, healthcare, and educational activities to resume. Although dates and measures associated with Levels 2 and 1 have not yet been announced, New Zealand's phased re-opening provides an interesting comparison for New Brunswick, given the initial step toward easing social restrictions as a first step.

Switzerland

Switzerland's plan for restoring normalcy involves three phases, with the first phase set to begin on April 27. In Phase One, businesses will begin to reopen if low levels of direct contact and precautionary measures can be maintained; this includes retailers and various salons and studios. Restrictions on the medical sector will begin to ease with outpatient practices, dentists, physiotherapists, and similar services reopening.

Phases Two and Three are scheduled to begin May 11 and June 8. Phase Two will involve the reopening of schools (elementary to high school). In Phase Three, higher education institutions will also reopen with face-to-face teaching; entertainment and leisure establishments (i.e., museums,

zoos) will reopen; and restrictions on gatherings could be relaxed. Further phases have yet to be determined.[xliv]

United States

In the US, the White House has released a three-phase plan for reopening once criteria (listed above) have been met.[xlv] Phase One involves allowing outdoor recreation, though no socialization in groups of ten or more people are allowed (vulnerable populations must continue to shelter in place). It also involves phased returns to work (with telework encouraged where possible), with the closing of common social areas in workplaces. In this phase, elective surgeries can resume, and gyms and large venues can reopen if physical distancing protocols are observed; bars, schools, and visits to medical and long-term care facilities remain closed/prohibited.

In Phase Two, schools and bars may reopen, with physical distancing procedures still in effect, and groups of up to 50 people may socialize. The vulnerable must continue to shelter in place, and visits to hospitals and care homes remain prohibited. In Phase Three, unrestricting staffing can resume at worksites, vulnerable populations can resume public interactions, and visits to care homes and hospitals are allowed – all with the requirement that individuals adhere to diligent hygiene practices.

Nashville, Tennessee

Tennessee is one of the first states to begin the process of reopening, and – supplementary to the White House's three-phase plan for reopening – the capital city of Nashville has adopted its own four-phase plan.

In Phase One, retail and commercial businesses and restaurants and bars reopen (at half capacity) with cloth masks and employee screening required. In Phase Two (14 days after Phase One, if trends remain flat), remaining retail and commercial businesses open; at this time, businesses, restaurants, and bars may increase to three-quarter capacity. Personal services (such as hairdressers) may also reopen.

Phase Three occurs after another 14 days of a flat trend and involves the resumption of elective healthcare activities, the movement of already-open businesses, restaurants, and bars to full capacity. Other cultural venues (i.e., bowling alleys) may open at half capacity; fitness centres and schools (K-12) reopen; and gatherings of up to 100 people will be allowed. In Phase Four (following another two weeks of flat case rates), previously mentioned venues increase to full capacity, with large venues (i.e., sports stadiums) reopening under physical distancing guidelines.

While NB is ahead of most provinces in easing restrictions, and there are broad similarities in the phased approach adopted across and within countries, the wide range of experiences and circumstances observed will provide a wealth of crucial data for policymakers. Continued monitoring and analysis of these data will support periodic revisions to the NB plan to ensure it is consistent with the latest science.

Education

In NB's phased plan for reopening, schools are scheduled to resume in September 2020 at the earliest – and this is wholly dependent on the province's COVID-19 trajectory and case rates at the time. However, beyond a tentative start date, no information has been released regarding what the resumption of school could look like for the province.

Countries around the world have taken various approaches to when, and how, to reopen schools. As discussed in Part 1 of this report, schools have been gradually reopening in Japan, Denmark,

China, Norway, France, and Switzerland, with physical distancing and hygiene requirements in place. Since that time, even more countries have moved toward reopening their schools.

In New Zealand, for instance, elementary and middle schools are scheduled to reopen on April 27 with the expectation that students who are able to continue with online learning at home will do so.[xlvi] In Luxembourg, schools are scheduled to undertake a gradual reopening. Interestingly, while the majority of other countries that reopened schools targeted the youngest age groups first, Luxembourg is opening classes to high school students first (on May 4) – due to the argument that they are mature enough to respect the measures in place to slow down the spread of infection. On May 11, secondary education and vocational training are scheduled to resume, followed by the opening of elementary education and childcare facilities on May 25. Further, classrooms are to operate on a rotating basis, with each class divided into two groups – with one group spending a week in classes followed by a week of revision at home or in childcare (teachers will teach the same material two weeks in a row for the alternating groups).[xlvii]

New Brunswick's proposal to reopen schools at a later phase is actually quite different from the order in which restrictions are being lifted elsewhere – particularly in Europe. As the review of the literature in Part 1 points out, many governments initially began lifting restrictions by reopening schools (along with daycares and nurseries) while citing the importance of providing childcare settings that will enable parents to return to work as the economy further opens. Moreover, children are believed to be at a low risk of suffering complications from COVID-19 (unless they have underlying conditions), and therefore opening these institutions is believed to be a relatively low-risk measure.

While it is possible that schools are scheduled to reopen later in NB's phased plan due to timing (with traditional summer vacation less than two months away), decision makers in NB may need to monitor the situation, as it is possible that parents will be required to return to work before schools reopen. This could potentially result in an overcrowding of childcare centres or the inability of some parents to procure adequate childcare to allow them to resume employment.

Recreation

New Brunswick's decision to begin reopening by lifting restrictions among outdoor recreational activities appears to be consist with steps taken elsewhere, as this is deemed a relatively simple, low-risk way to allow citizens a step toward resuming a "normal" lifestyle. Notably, allowing individuals to exercise further from their homes and participate in outdoor activities (such as swimming) represents some of the only instances in which restrictions have been lifted in hard-hit countries such as Italy.

For example, despite the recent decision to extend lockdown measures in Spain from April 25 through May 9 in light of increased case numbers, the government is allowing children under the age of 14 to leave their homes for one hour a day in the company of an adult – beginning April 26. Social distancing requirements will remain in place for children while they are outside, and they are not permitted to use play structures such as those in parks.[xlviii] Nonetheless, there is wide recognition that allowing access to the outdoors may be a good way to boost the mental and physical health of individuals as they attempt to cope with isolation requirements – and as long as physical distancing regulations are followed, spending time outside may be a low-risk activity.

Travel

With the introduction of guidelines easing restrictions in NB, it is essential to consider the ongoing trajectories in our neighbouring provinces, as these have the potential to impact our outcomes as well. Canada is a large country, and the national case rate does not reflect the unique COVID-

19 situations in various regions. PEI has successfully mitigated the spread and impact of COVID-19 to date, with only two identified cases remaining; and together, NB and PEI are the only provinces without any COVID-related deaths. Yet, cases in Nova Scotia and Quebec continue to rise with no sign of slowing. While only two new cases of COVID have been identified in NB since April 14, more than 200 have were diagnosed in NS, and over 1,000 were diagnosed in Quebec during the same timeframe.[xlix] In the state of Maine – our neighbour to the South – 1,015 cases of COVID-19 have been confirmed, with 47 deaths. Standardized to the population of NB, the number of cases in Maine would be about the equivalent of 586 cases in NB.

The Governor of Maine has acknowledged the need to gradually lift public health restrictions though planned phases guided by science and public health expertise – though, no dates for lifting restrictions have yet been announced.[l] Likewise, the chief medical officer in NS has suggested the province may not look at lifting restrictions until June.[li] Quebec, on the other hand, has proposed May 4 as the start date for the process of reopening the province, despite the number of daily new cases remaining high (i.e., over 800 new cases were diagnosed on April 23).

Quebec's hospitals are reported to be below capacity, which has motivated government to move toward reopening. However, in spite of hospital capacity, the ongoing problem of inadequate measures and resultant COVID-19 cases in the province's long-term care homes area cause for concern. Specific details on the process of reopening have yet to be released, but Premier Legault has suggested the first phase will entail the gradual – possibly regional – reopening of schools and guidelines regarding wearing masks in public.[lii]

Due to the growing cases in QC and NS, and the likelihood that incidence in QC will increase as regulations ease, it is important that NB considers ways to not only monitor and manage community transmission but also mitigate the spread from neighbouring provinces as it begins to reopen. Testing and tracing are likely to be a key part of this process, and concerns over the trajectories in NS and QC could require more focused measures around New Brunswick's borders.

Businesses

WorkSafeNB has assembled a set of health and safety guidelines that NB workplaces must follow to ensure the safety of their employees during the COVID-19 pandemic. The three main requirements include

- Being "diligent in adopting a screening process for staff and visitors before they enter the workplace,"
- Taking "every reasonable step to ensure minimum interaction of people within 2 metres of each other," and
- Ensuring that "proper hand-washing and enhanced sanitation/cleaning practices are enforced in areas where multiple people handle tools, goods, supplies, equipment or other shared items."[liii]

Related guidelines from WorkSafeNB regarding the implementation of these requirements include considering installing physical barriers between workers, actively screening employees for symptoms of COVID-19 (such as through temperature checks at least every five hours), barring entry to persons exhibiting symptoms of COVID-19, and wearing non-medical fabric masks when required to work in close quarters.

While businesses are required to abide by WorkSafeNB guidelines as they reopen, decision makers could further consider measures being implemented around the world to decrease risk as

businesses slowly reopen – particularly for retail and commercial businesses that will have customers coming through their doors.

As required in NB, the majority of businesses that have reopened are subject to the continuation of physical distancing requirements. In the state of Georgia, for example, no more than ten people may gather within a single business location, and everyone must maintain 6 feet of separation. Further, businesses are required to uphold hand-washing guidelines, monitor employees for signs of respiratory illness and/or fever, and provide workers with any necessary personal protective equipment.[liv]

Similar measures are in place in South Carolina, where businesses that reopen must thoroughly sanitize surfaces and allow no more than five customers per 1,000 square feet of floor space (or 20% maximum capacity, as determined by the local fire marshal).[lv] In Germany, shops up to 8.600 square metres in size have been allowed to open.[lvi] And in Austria, newly opened shops must limit the number of customers allowed in, and customers (as well as public transport users) are required to cover their mouth and nose with a mask or with fabric.[lvii]

In South Korea, work-from-home policies have eased, but the impact on the workforce varies according to company. At SK Innovation, a battery-making firm, 80% of employees have returned to work and receive temperature checks at the main entrance to the building, followed by physical distancing once inside. Meanwhile, Naver Corp., which operates a web portal, is allowing less than half its employees to come to work and has installed thermal cameras, full-body sterilisers, and table partitions to both monitor and suppress spread of the virus. Meanwhile, employees at the mobile gaming firm Netmarble are only permitted in their office three days a week.[lviii]

Along with considering additional steps businesses can take to ensure physical distancing between customers and employees, it is also important to consider which businesses may be "less risky" to reopen than others. According to Dr. Thomsen, professor of virology at Copehnagen University, allowing hairdressers and dentists to resume business could be less risky than reopening cafés, given the smaller number of customers;[lix] yet, in NB's phased reopening plan, hairstylists and dentists are scheduled to open at least 2-4 weeks later than restaurants.

It may be too early at this time to determine which businesses pose less risk than others as they reopen, but as time passes and outcomes in other countries become visible, decision makers in NB can continue to re-evaluate the province's reopening plan and make desired changes (if applicable) to reflect best practices elsewhere.

Manufacturing

Canada lists manufacturing as an essential service,[lx] but individual provinces have varied in their interpretation of which manufacturing sectors should remain open. Quebec outlined a limited list of "priority manufacturing activities"[lxi] allowed to remain open, while Ontario kept its definition of "essential" manufacturing operations broad.[lxii] New Brunswick did not issue any command for manufacturers to close,[lxiii] leaving it up to individual firms to decide whether they could implement adequate safety measures immediately. Firms that decided to scale down or suspend operations may now be looking to implement measures to allow them to resume or ramp up production.

In a forthcoming report titled "COVID-19 protocols and considerations for New Brunswick manufacturers,"[lxiv] The Atlantic Institute of Policy Research (AIPR) has summarized guidance from WorkSafeNB, the WHO, and other Canadian provinces, as well as guidance from Canadian Manufacturers & Exporters (CME) and examples of case studies and best practices from manufacturers and processing plants around the world. AIPR's report includes case studies demonstrating best- and worst-case scenarios for how production can resume amid the COVID-

19 crisis. What follows in the rest of this section is a summary of findings from the AIPR report (forthcoming by AIPR).

One area of concern noted in the report is that case studies of outbreaks in food processing plants around North America suggest the close working conditions typical in these plants make it difficult to practice physical distancing. This is of particular importance, as fish and seafood processing companies around the Maritimes express concerns about starting work this spring, citing worries about their ability to implement measures to prevent the spread of COVID-19 in processing plants, as well as uncertainties about the availability of the temporary foreign workers normally employed in this sector.[lxv] In NB, the lobster fishing season has already been delayed one month.[lxvi]

The AIPR report notes that many New Brunswick manufacturers and processing plants may not be technologically and financially equipped to adopt all the existing best practices demonstrated by leading global firms. It recommends, however, that local firms still need to ensure they are adapting protocols to ensure fundamental health and safety requirements are being met.

Based on its review of available guidelines, best practices, and case studies, AIPR highlights a few key considerations emerge for manufacturers and processing plants when it comes to identifying safety protocols, which we also present as recommendations.

- **Adjust operations to allow for physical distancing and reduce contacts:** The most common recommendations revolve around adjusting operations to facilitate the requisite 2-metre distance between workers where possible, whether that means re-arranging floor plans, slowing production lines, or staggering shifts over a longer workday. Staggering shifts, ensuring staff stick to the same shift, and arranging staff into smaller workgroups can also reduce the number of potential contacts. For some firms, it may be feasible to resume operations incrementally and at a slower pace to allow for better distancing between workers and to allow for adjustments to safety protocols as needed.

- **Employ active screening and other safety measures when physical distancing isn't possible:** Some sectors, like food processing, must contend with work environments where physical distancing isn't feasible. Firms should do their utmost to ensure the safety of their workers, which may mean providing barriers between workers and/or face coverings or face shields. Currently the federal government is offering funding for PPE for workers at fish processing plants. Active screening is also an essential measure for employers who cannot ensure physical distancing. WorkSafeNB is recommending contactless thermal temperature reading when possible – but manufacturers may have to adopt interim verbal screening protocol until such technology is widely available.

- **Prepare for a fast and thorough response to outbreaks:** As demonstrated by the case of Cargill's meat processing plant in southern Alberta, one case of COVID-19 among workers can quickly turn into hundreds if a plant or factory doesn't intervene quickly and effectively to an outbreak. Manufacturers and processing plants should develop response plans for dealing with the early stages of an outbreak. Protocol should include plans for immediately isolating workers showing symptoms at the workplace, having arrangements for sectioning off contaminated areas and conducting a thorough disinfecting of the premises, and instructing team members who had contact with an infected person to self-isolate for 14 days before returning to work.

- **Form an education strategy to ensure clear and ongoing communication of expectations:** Given the abundance of information circulating about COVID-19 health and safety best practices in the workplace, it is essential that employers are aware of their responsibility to clearly articulate protocol and provide training for adhering to new expectations in the workplace. Public health may want to set clear expectations and

guidelines for ensuring employers educate their workers about how COVID-19 spreads, personal hygiene and why screening and contact tracing is important.

Further, employers should keep employees informed of protocol for what they must do if they show symptoms at or outside of work, as well as protocol for responding to a potential outbreak. In addition to training documents and signage, individual employees should be aware of what exactly is expected of them within the new guidelines – for example, employers may need to be specific in providing protocol for frequency of handwashing, how often specific surfaces need to be disinfected, expectations for shared spaces such as lunchrooms, and what to do about smoking breaks, carpooling, and any other instance that might result in close physical proximity. It is also essential that communication is ongoing and frequent verbal reminders may be required.

CHALLENGES IN PROMOTING RECOVERY

The road to recovery is unlikely to be short or easy, and along with the public health challenges associated with attempting to revive an economy during a pandemic, there are a select set of challenges New Brunswick will also have to deal with in the days ahead.

For one, the transition from provincial and federal aid back to regular paid employment may be difficult – especially in situations where employers are no longer able to schedule their employees as frequently as before. Some business owners in NB claim their employees don't want to return to work because they receive more money from the federal government (CERB) for staying home. The provincial government has replied that employers are not obligated to hold positions for employees who choose not to return due to the federal program – and if employers are able to provide workplaces and conditions that meet the standards required by Public Health, employees need to return to work if they want to keep their jobs.[lxvii] In situations where workplace conditions do not appear to meet Public Health standards, employees can contact WorkSafeNB to investigate.

Premier Higgs has stated that "federal funding is a short-term fix for everyone. But it's important for New Brunswickers who can return to work, to do so and rebuild the economy."[lxviii] Nonetheless, as businesses struggle to recover, and sales may be low due to decreased income and/or fears over virus spread, it is possible that employees may experience cuts in hours that reduce their income below that being offered by the CERB. Going forward, the provincial and federal governments may need to revisit this situation and brainstorm solutions to provide a stimulus package that supplements income lost due to fewer hours while encouraging employees to return to work.

Another potential challenge facing New Brunswick is the sense of ethical "unfairness" likely to be felt by vulnerable populations as groups less at-risk begin to resume social and economic activities. In Quebec, public health officials have been in discussion over the option of using the reopening of schools as a way to generate herd immunity among young people without underlying conditions. According to Jocelyn Maclure at Université Laval, controlled higher transmission rates may result in unequal freedoms, with more vulnerable members of the population required to remain home while their healthier counterparts are able to enjoy the lifting of restrictions. One option to mitigate this sense of unfairness – Maclure suggests – could be the continuation of financial benefits for citizens whose freedoms will remain curtailed due to health concerns.[lxix]

Although this situation is not directly applicable to NB, as schools are scheduled to open later here, it is extremely likely that at-risk individuals will be compelled by personal health concerns to continue sheltering in place long after their healthier counterparts start to recover from the physical and mental impacts of isolation. Thus, along with Maclure's recommendation of

continued financial benefits, it could be beneficial for decision makers in NB to also develop a strategy for monitoring and improving the wellbeing of this group. Of particular concern would be individuals with pre-existing mental and emotional health conditions, low income families, recent immigrants, and single parent families along with those for whom vulnerability to COVID-19 infection is known to be higher (older individuals and those with respiratory and immune conditions).

Finally, along with challenges that could slow the economic and social recovery of the province are those that will have a large impact on NB's health care system. To ease the burden and improve medical capacity to care for hospitalized COVID-19 patients, elective surgeries and various outpatient services were cancelled across Canada as part of provinces' lockdown measures. According to an estimate released by CBC News, approximately 100,000 Canadian patients have had surgical procedures delayed; and further information from the Canadian Cardiovascular Society estimates 15,000-20,000 Canadians have had cardiac procedures delayed.[lxx]

As New Brunswick moves toward the next phase of its strategy for lifting restrictions, elective surgeries and other services (such as dentistry, physiotherapy, and others) will resume, and the province will likely need a plan to increase capacity to handle the backlog of cases and prevent staff burnout while dealing with new patients coming in. Health ministers and doctors suggest surgeries nationwide will resume using a triage system, though the backlog will continue to grow. According to Dr. Keshavjee at University Health Network in Toronto, hospitals will need specific resources in place in order to get back on their feet, including government funding to pay for surgical overtime; enough kits to test every patient for infection before surgery, and a reliable supply of PPE for surgical and other medical staff.[lxxi]

While New Brunswick is also likely to require funding and resources to handle the backlog of patients, it should be noted that NB health care facilities were operating at (and in many cases above) capacity even before the COVID-19 pandemic began. Therefore, the backlog in NB is likely to be even larger relative to resources than in many other provinces. To meet the large and growing demand for services that is expected to re-emerge as COVID-19 measures are lifted, decision makers in NB may need to invest in temporary increased capacity and more actively triage patients based on medical need.

LOOKING FORWARD

So much about the COVID-19 virus remains unknown, but as research and studies are being conducted, our ability to understand and respond to the threat of infection increases. In the UK and the Czech Republic in particular, research on immunity is currently underway, with results scheduled to become available as early as May. As we learn more about infection and community immunity rates around the world, we may be able to make inferences about these outcomes in New Brunswick until local studies are completed.

While the number of COVID-19 cases in NB has been relatively low, the consequences of physical distancing and bottlenecks in important social services is an "all-or-none" situation – the magnitude of effect would be expected to be similar because everyone is locked down in a similar fashion. The consequences of this unprecedented period of restrictions on the lives of individuals and families are only just starting to be studied,

Around the world, reports are emerging of societal implications, such as an increased divorce rates in China post-lockdown.[lxxii] Similarly – psychologists have identified that stress resulting from a crisis like COVID-19 is expected to increase domestic violence and child abuse, as potential

victims find themselves lacking much needed support and being forced to shelter with potential abusers. In fact, reports of spousal abuse are higher where shelter-in-place orders are in effect and children who require social services from schools (e.g., meal programs, wellness checks) have been cut off.[lxxiii]

Other areas of concern include reports that alcohol sales (and presumably consumption) have increased significantly (40% in Canada in March); there is decreased screening for cancers; and monitoring of chronic health conditions has worsened.[lxxiv]

Taken together, all of these societal health implications will require study to understand their full effects for the province of New Brunswick going forward.

QUANTITATIVE METRICS (DECEMBER 23, 2019 – APRIL 26, 2020)

In this section, we present quantitative metrics that enable comparison between the case trajectories of countries that have lifted restrictions and countries that have not yet lifted them (or have re-imposed them), as well as between New Brunswick and its neighbours (i.e., Nova Scotia, Quebec, and Maine) and provinces with similar case trajectories and which are likely to lift their own restrictions soon (Saskatchewan and Manitoba).

Below, we provide comparisons based on

- Case incidence,
- Declines in active cases,
- 3-day averages of daily new cases,
- Critical care rates,
- Recovery rates,
- Mortality (case fatality) rates,
- Doubling rates of infection, and
- Testing rates.

In reviewing these statistics, readers may be better able to discern where Canada and NB are in their case trajectories compared to other regions, as well as visualize the levels of success various regions have experienced in managing the spread and impact of COVID-19.

Incidence

In the table below, we depict the number of daily new cases for NB and its neighbours (NS, QC, and Maine), as well as two other provinces planning to begin lifting restrictions near the beginning of May (SK and MB).

We have identified the peak day for select regions (i.e., the day with the highest number of new cases) and compare the number of peak day cases to the numbers from April 19 to April 25.

Table 3: Number of Daily New Cases in NB, its neighbours, and provinces planning to lift restrictions

	Peak Day	Peak Day Number of Cases	19-Apr	20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr
New Brunswick	2020-03-29	15	0	0	0	0	0	0	0
Nova Scotia	2020-04-22	55	46	16	35	55	23	15	8
Quebec	2020-04-15	997	962	807	839	873	778	651	840
Maine	2020-04-13	65	20	8	13	19	30	28	25
Saskatchewan	2020-03-27	30	1	4	6	5	10	8	4
Manitoba	2020-04-01	33	1	1	0	2	1	2	4

Notably, NB had the lowest number of cases at its peak and is the only province with no cases diagnosed from April 19 onward.

Decline in Active Cases

In the tables below, we present the percentage of decline in active cases from a region's peak date to the date when restrictions were first lifted (with cases on April 25 also included to provide a benchmark). Table 1 below depicts the percentage of case decline for countries that have lifted restrictions.

Table 4: % Decline from Peak, Countries that Lifted Restrictions

	Austria	Czech Republic	Denmark	Germany	Norway	Spain
Peak Day Daily New Cases	1141	408	390	6294	425	9222
Daily New Cases when first restriction lifted	106	115	193	1775	84	4167
Daily New Cases on 25 April	83	85	137	2055	63	6740
% Decline from Peak to when first restriction lifted	90.7	71.8	50.5	71.8	80.2	54.8
% Decline from Peak to 25 April	90.3	73.8	64.9	67.3	85.2	26.9
Days since restrictions lifted as of April 25	11	19	10	5	5	12
Days since Peak	29	29	20	30	30	27
Date in which restriction was lifted	14 April	6 April	15 April	20 April	20 April	13 April
Peak Day	27 March	27 March	8 April	28 March	28 March	1 April

We see above that most countries experienced at least a 50% decline in cases between the peak date and the date of lifting restrictions. Interestingly, Germany, Spain, and Denmark experienced an increase in cases since lifting measures (12%, 24.9%, and 1.6%, respectively). It is difficult to determine at this early stage what may have led to these increases, though it should be noted that the types of restrictions lifted vary by country and therefore are not directly comparable. Further, more time may be needed to ascertain if cases in these countries are indeed on an upward trend.

Table 5: % Decline from Peak to most recent day, Selected Countries

	Peak Day	Peak Day New Cases	Daily New Cases 25 April	% Decline from Peak Day to 25 April
China	14-Feb	4156	15	99.6
Japan	12-Apr	1401	652	53.5
Finland	05-Apr	267	111	58.4
Italy	22-Mar	6557	3021	53.9
France	01-Apr	7578	1773	76.6
Switzerland	28-Mar	1390	181	87
UK	12-Apr	8719	5386	38.2
Canada	21-Apr	2046	1778	13.1
NB	29-Mar	15	0	100

Table 5 depicts the percentage of decline in cases from the peak day to April 25 – the date of most recent data available. The regions presented in this figure represent countries that have re-imposed restrictions (China and Japan), countries that have lifted measures only regionally, countries that are planning to lift restrictions, and New Brunswick.

We see above that most countries experienced a substantial decline in the number of daily new cases between their peak dates and April 25. While Canada's decline is much smaller (13.1%), its peak date occurred only four days before the most recent date, while countries that experienced their peaks much earlier during the pandemic show a larger decline in cases. New Brunswick shows the largest decline in new daily case of all (100%) – though, its small size should be taken into account when considering these figures.

Table 6: % Decline from Peak Day to 25 April in NB, its neighbours, and provinces considering lifting restrictions

	New Brunswick	Nova Scotia	Quebec	Saskatchewan	Manitoba	Maine
Peak Day New Cases	15	55	997	30	33	65
Daily New Cases on 25 April	0	8	840	4	4	25
% Decline	100	85.5	15.7	86.7	87.9	61.5

In Table 6, we present the percentage of decline in daily new cases for NB, neighbouring regions, and SK and MB. Once more, NB shows the largest decline case rates (100%), while Quebec has seen the smallest percentage of decline (15.7%).

Daily Cases: 3-Day Averages

By presenting 3-day averages below, we attempt to smooth out daily fluctuations in case numbers to allow for more accurate comparisons. In Table 7, we present the 3-day averages for cases at their peaks, the dates restrictions were lifted, and the most recent three days.

To calculate the peak 3-day average, for instance, we take the peak day new cases + new cases the previous day + new cases the following day, dividing the result by three. The 3-day averages for the date restrictions were lifted and the most recent date are computed in the same way.

Table 7: 3-Day Average Daily New Cases, Countries that Lifted Restrictions

	Austria	Czech Republic	Denmark	Germany	Norway	Spain
Peak	805	295	344.3	5346.3	309.7	7779.7
When first restriction was lifted	142.3	210.7	169	2006	107.3	4158
Most Recent 3 days	78.3	77.3	171.7	2248	80.7	5195.3
Date in which restriction was lifted	14 April	6 April	15 April	20 April	20 April	13 April

Above, we see that the 3-day average for daily new cases has been declining for Austria, the Czech Republic, and Norway. However, increases are apparent for Denmark, Germany, and particularly for Spain.

Table 8: 3-Day Average Daily New Cases, Selected Countries

	Peak	Recent
China	7278	12
Japan	863	465
Finland	136	127
Italy	6034	3012
France	5605	1751
Switzerland	1146	205
UK	6401	4807
Canada	1691	1821
NB	7	0

Table 8 shows a substantial decrease in the 3-day average of daily new cases in most jurisdictions. While there has been an increase in Canada's 3-day average, it should be noted once more that Canada's peak date was extremely recent (April 21), and the most recent date is based on April 25. This allows very little time for cases to decrease.

Table 9: 3-Day Average Daily New Cases in NB, its neighbours, and provinces considering lifting restrictions

	New Brunswick	Nova Scotia	Quebec	Saskatchewan	Manitoba	Maine
Peak	7	37.7	850	20.3	25.3	39.3
Recent	0	15.3	756.3	7.3	2.3	27.7

In Table 9, we see the 3-day average for daily new cases in NB and neighbouring/similar regions. Once more, there is a fairly substantial decline in new cases in all regions except Quebec – though, the decline in Maine is not as significant as in the Canadian provinces above (Quebec excluded).

In the figures below (Figures 1-3), the percentage of decline in daily new cases (based on the 3-day averages in the tables above) is depicted. As expected based on the numbers of new cases presented in Tables 7-9, we see below that Germany, Denmark, Spain, and Canada experienced an increase in case rates (3-day averages). Further, the numbers in Figure 3 (NB and its neighbours) are volatile, given the low number of cases in all regions excepting Quebec. When cases are low (as is the case in NB) even small fluctuations in numbers can lead to a large change in percentage.

Figure 1: % Decline in 3-day averages, Countries that Lifted Restrictions

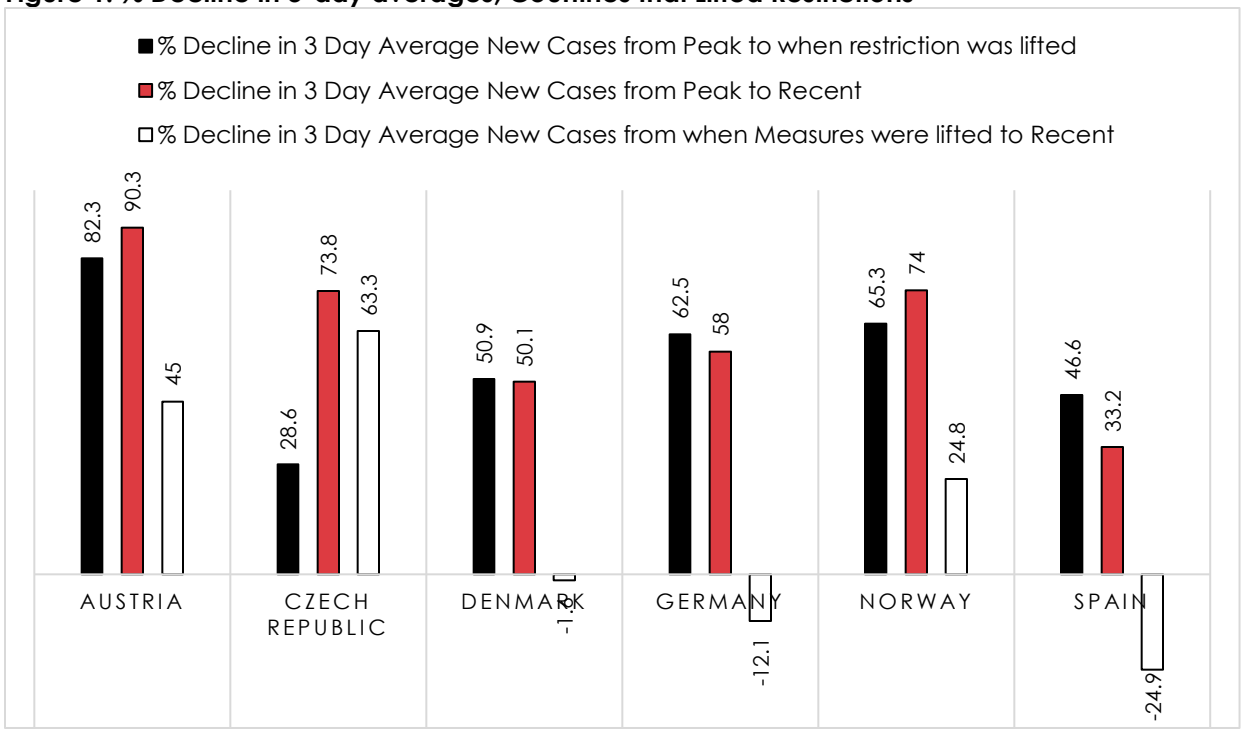


Figure 2: % Decline in 3-day averages, selected countries, from peak to recent

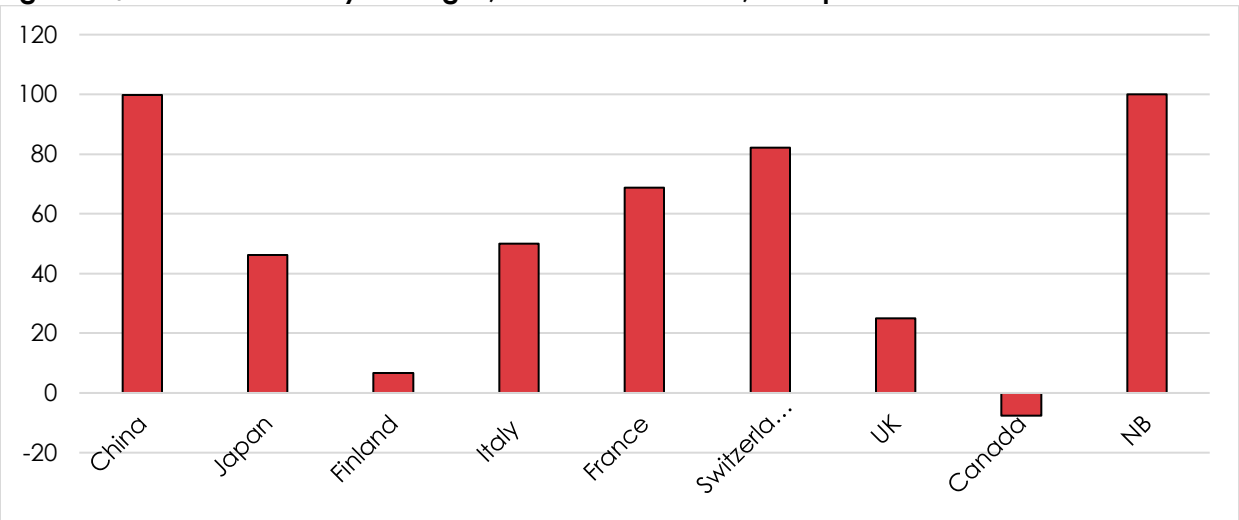
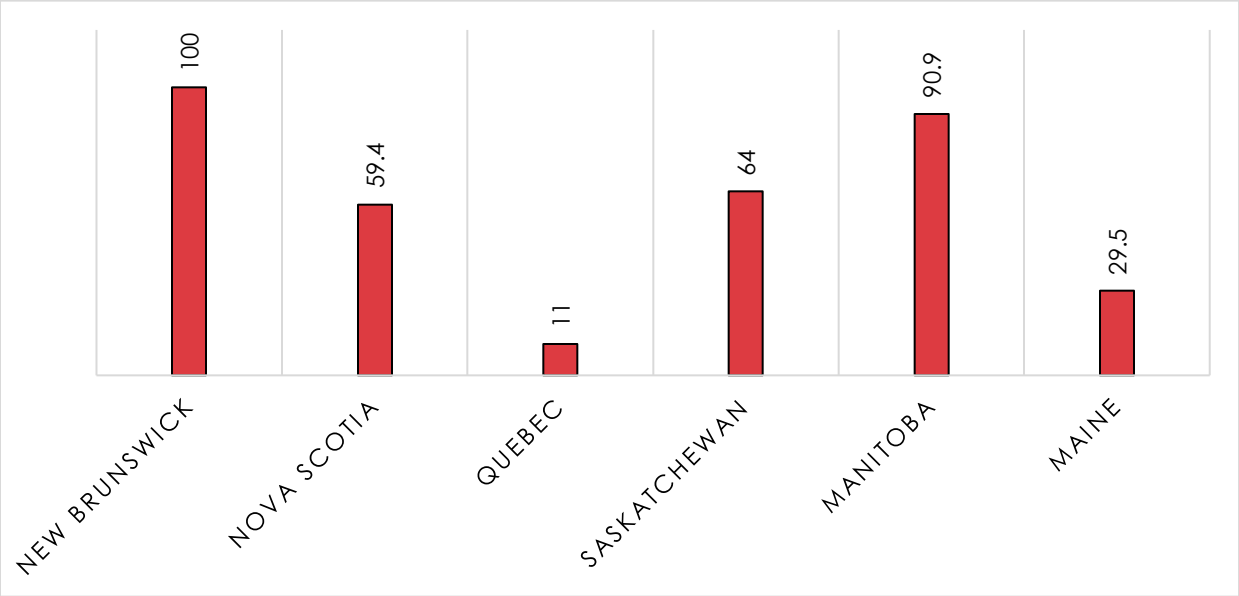


Figure 3: % Decline in 3-day averages in NB, its neighbours, and provinces considering lifting restrictions, from peak to most recent day



Figures 4-6 similarly show 3-day averages for the same three groupings of regions; however, in these cases, the average 3-day incidence rates are presented per 1 million population. The peak 3-day average incidence rate in the figures below is calculated as

Peak day new cases + new cases previous day + new cases following day, with the result divided by the population count and multiplied by 1 million.

The incident rate for the date restrictions were first lifted is calculated in the same manner, replacing the peak day with the date measures were first eased. The most recent incident rate is obtained by calculating the average of daily cases during the most recent three days.

The figures below show a substantial decline in the 3-day average incidence rate from peak to the lifting of first restrictions in most jurisdictions. The slight increase apparent in Canada (Figure 5) reflects the recent increase in cases.

While there is a substantial decrease in the incidence rate in all select provinces except Quebec, even the small decrease reflects that the case rate in Quebec is going down.

Figure 4: 3-day Average Incidence Rate per 1 million population, Countries that Lifted Restrictions

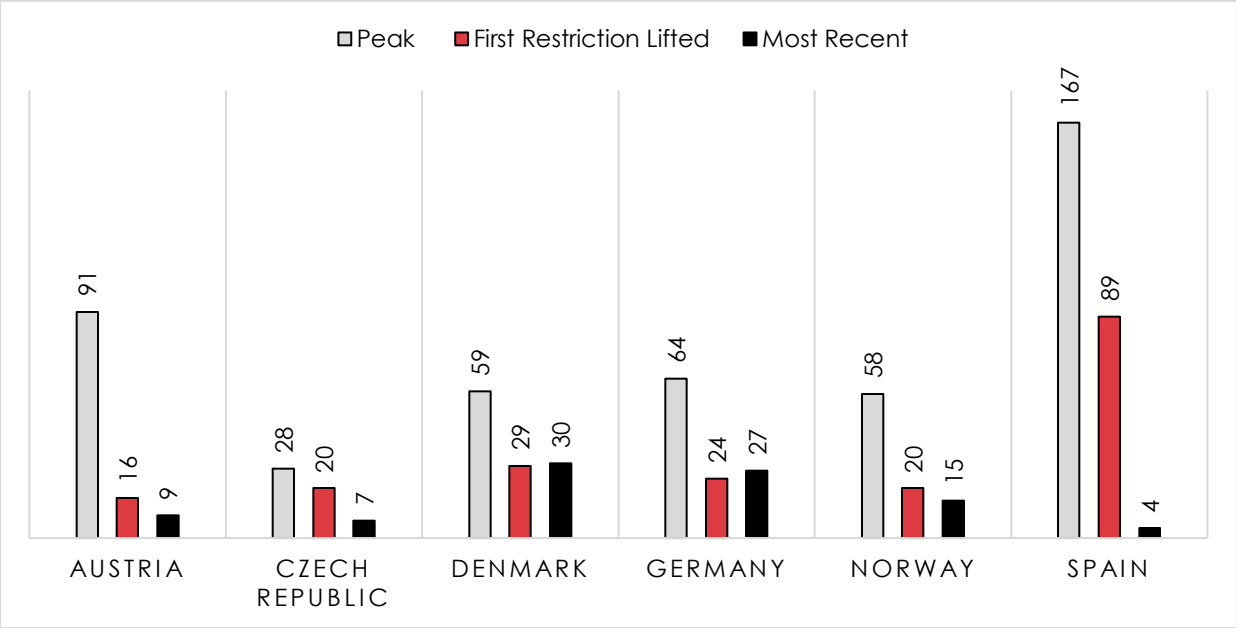


Figure 5: 3-day Incidence Rate (per 1 million population), selected countries

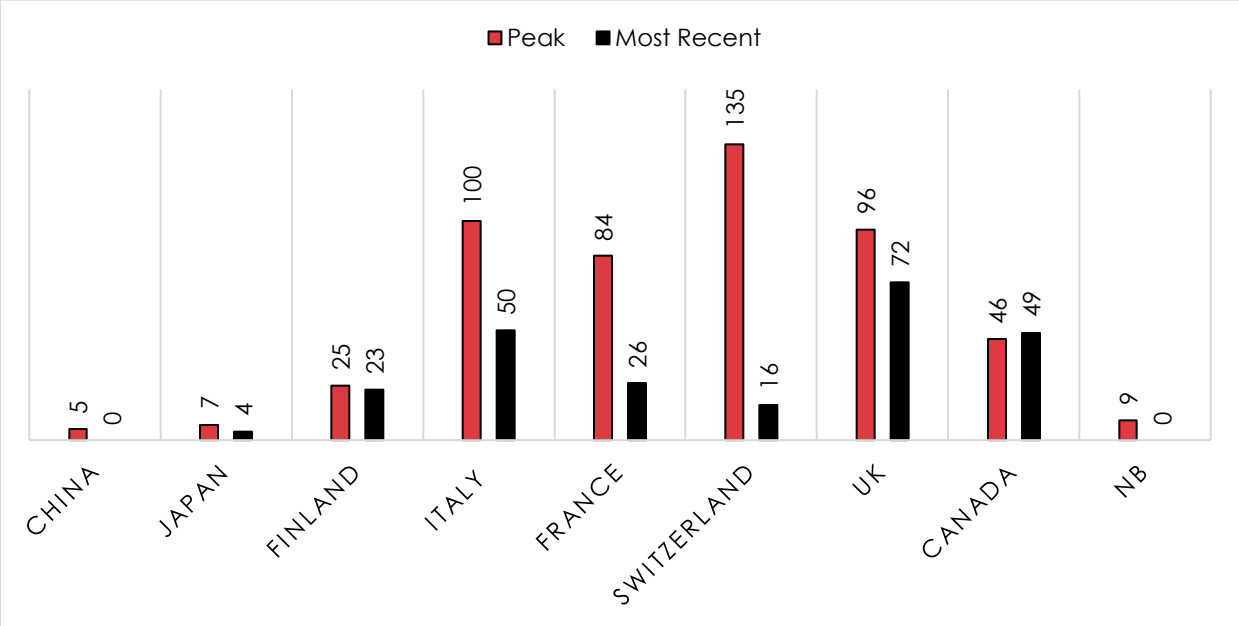
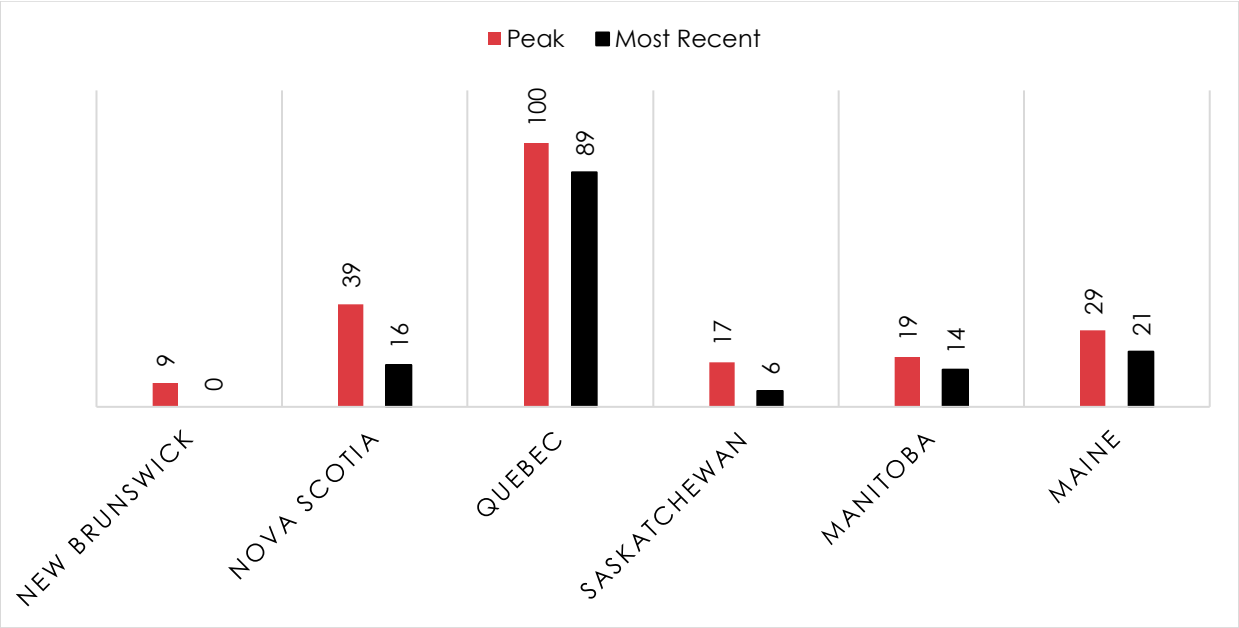


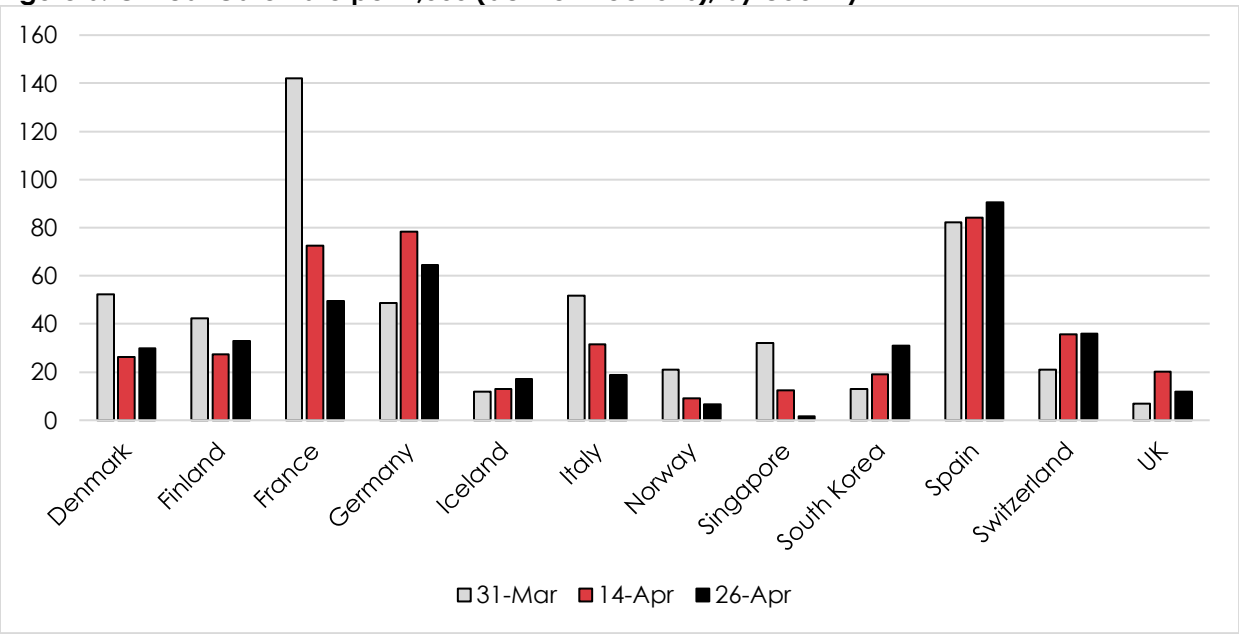
Figure: 3-Day Average Incidence Rate per 1 million population in NB, its neighbours, and provinces considering lifting restrictions



Critical Care

In the figures below, we depict differences in rates of critical care (as a proxy for rates of hospitalization) at various snapshots in time. It should be noted, however, that only the countries and provinces examined in Part 1 of this report series are included in the critical care figures below. Moreover, daily data for critical care is not available for all countries.

Figure 6: Critical Care Rate per 1,000 (active infections), by country



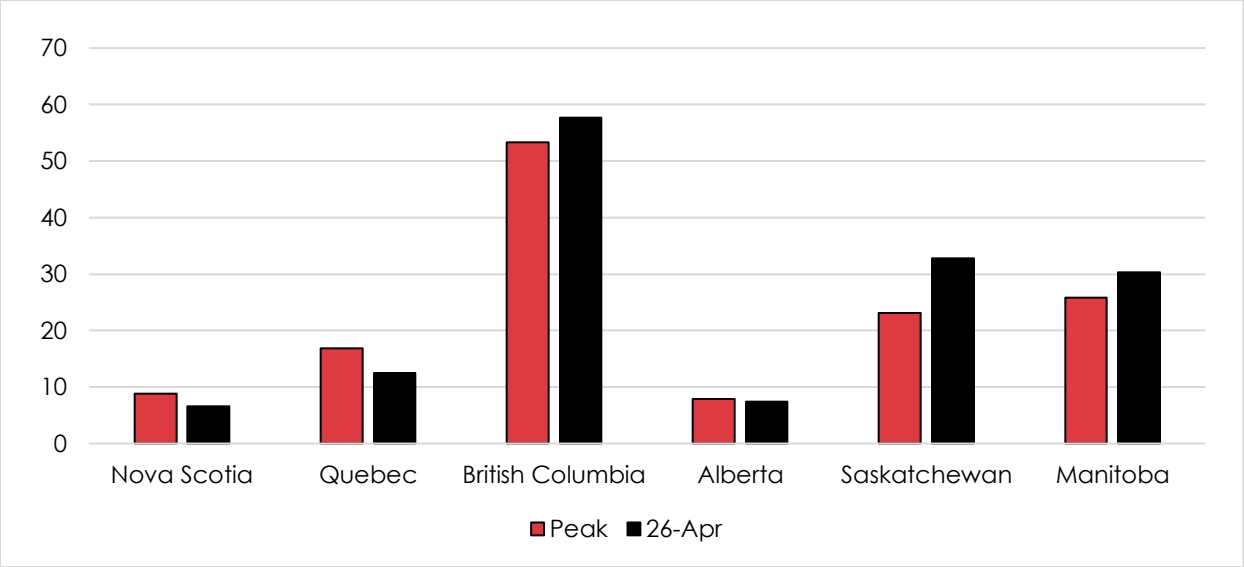
Since the critical care rate is calculated by dividing critical care by active infections, the most recent rates (as of April 26) in both figures may appear to have increased for some regions

because the number of newly active cases has declined and the disease may take a week or more to manifest symptoms.

For example, in Iceland (Figure 6), the number of total active cases between April 14 and April 26 declined significantly, from 770 active cases to 174 and the number of critical cases on April 14 stood at 10, as opposed to 3 active cases on April 27. Given the number of deaths in Iceland is low (29 as of April 26), the majority of those active cases from April 14 to April 26 have recovered.

For South Korea, the number of critical care patients remained the same; however, the number of active cases has dropped (by more than half), while deaths have not increased significantly. However, for countries like Spain, with a high number of infections and deaths, it appears as though the need for critical care resources has increased, indicating that infections in vulnerable populations have risen.

Figure 7: Critical Care Rate per 1,000 (active infections), by province



In the figure above, "peak" is defined as the date at which the province had its highest number of daily cases between December 31 and April 26. Some provinces may not have actually reached their peaks yet; and for others, the peak date could be close to April 26. The closer the peak date and most recent date, the more likely the two dates are to represent similar statistics.

Recently, Alberta's and Nova Scotia's peaks both changed from April 19 to the 23. Hence, the rates for the two provinces between (April 23 vs April 26) are quite similar. New Brunswick had no active cases in ICU/critical care during its peak (March 29); and, as of April 26, none of the 11 active cases in the province is in critical care.

Recovery

The recovery rates presented in the graphs below are calculated (as of April 26) by dividing cumulative recoveries by the cumulative number of confirmed cases (minus cumulative deaths).

Recovery Rate = Total Recoveries / (Total Confirmed Cases – Total Deaths)

Examining recovery rates allows us to learn more about where locations are at in the progression of the disease since it measures recoveries as a proportion of active cases at that point in time.

Further, it provides a measure of how well a society is coping with its infections. A high recovery rate indicates that a region, through a combination of preventive policies (e.g. social distancing) and thorough testing, can manage to mitigate the impact of the disease. Factors such as exposure of vulnerable individuals (who are less likely to recover quickly or are more likely to require hospitalization/critical care) and population density can also play a critical role in recovery.

Figure 8: Recovery Rate, for selected countries

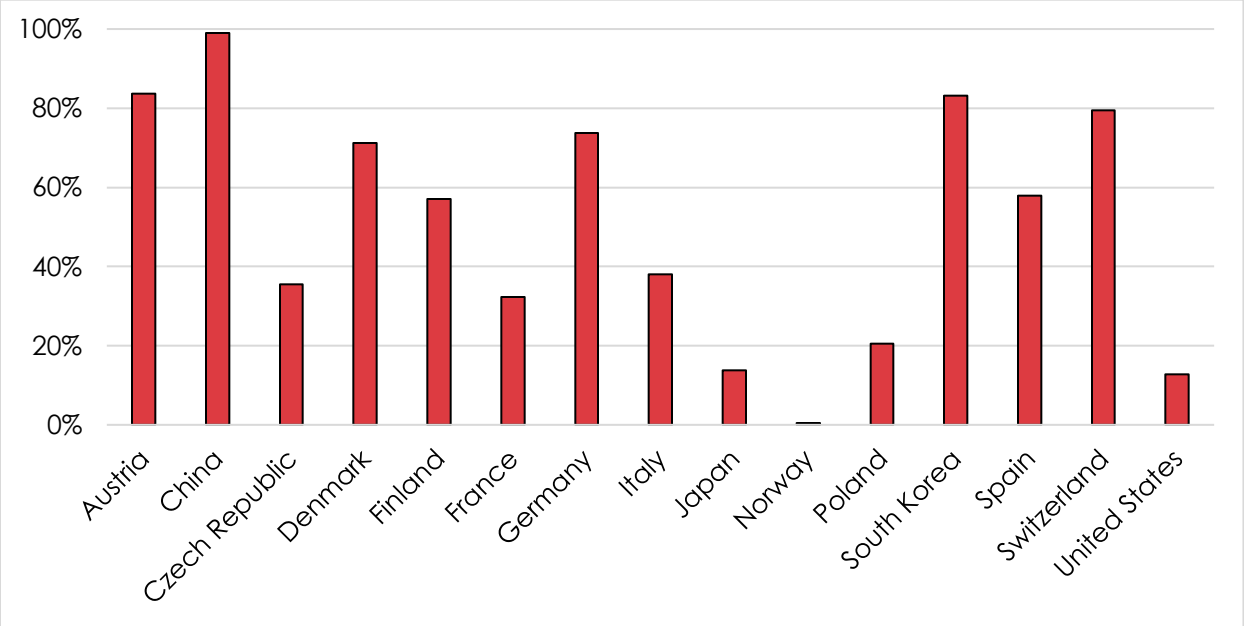
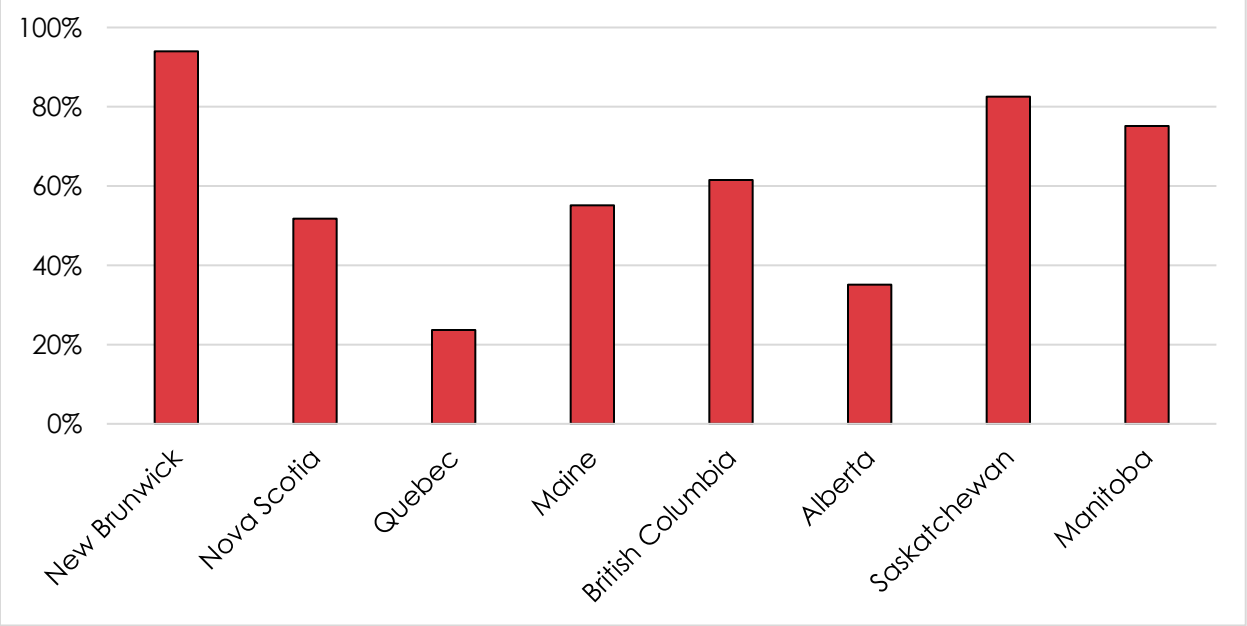


Figure 9: Recovery Rate, by province



In Figure 8 above, we see that countries such as Austria, China, South Korea, and Switzerland exhibit high recovery rates. Germany also has a higher recovery rate (approx. 74%) relative to other countries.

Figure 9 shows that, to date, 94% (111 out of 118) of confirmed cases in New Brunswick have recovered, which is the highest among all examined provinces (and Maine). Saskatchewan and Manitoba also have high recovery rates of 82.5% and 75%, respectively. Lower rates are apparent in the locations next to NB: Nova Scotia has a recovery rate of 52%, Quebec ha a rate of 24%, and Maine has a rate of 55%.[lxxv] These rates are indicative that these regions may be likely to have higher infection rates in future, and caution should be maintained when considering opening provincial borders.

Mortality (Case Fatality Rate)

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 reflect the outcomes of cases from a previous point in time rather than outcomes at present.

$$Crude\ Fatality\ Ratio = \frac{\text{Cumulative Deaths at Day X}}{\text{Cumulative Confirmed Cases at Day X} - \text{T}}$$

With a conservative estimate of T = 7 days as the average period from case confirmation to death, we estimate Case Fatality Rate (CFR) on April 26 by taking cumulative deaths as of April 26 and divide them by cumulative confirmed cases on April 19.[3]

Once more, peak is defined as the highest number of daily cases between December 31 and April 26. Some regions may not have reached their peak yet; and the peak can also be close to the most recent date (April 26). For example, the previous peak date in Japan was replaced more recently as the country experienced its highest number of cases after nearly a month of easing restrictions.

Therefore, some regions may exhibit higher mortality rates during periods of eased restrictions or at recent dates, as cases confirmed weeks ago could die at a more recent date. For instance, in the Czech Republic (Figure X), the peak and date of eased restrictions are about a week apart. Likewise, Poland experienced its highest number of cases the day after easing restrictions (peak at April 20, restrictions eased at April 19).[lxxvi]

As the pandemic comes slows, it may be possible to estimate mortality rates with total deaths/total cases.

[3] For more information on calculating mortality rates, see https://www.worldometers.info/coronavirus/coronavirus-death-rate/#correct.

Figure 10: Mortality Rate (CFR), by country (implemented eased restrictions)

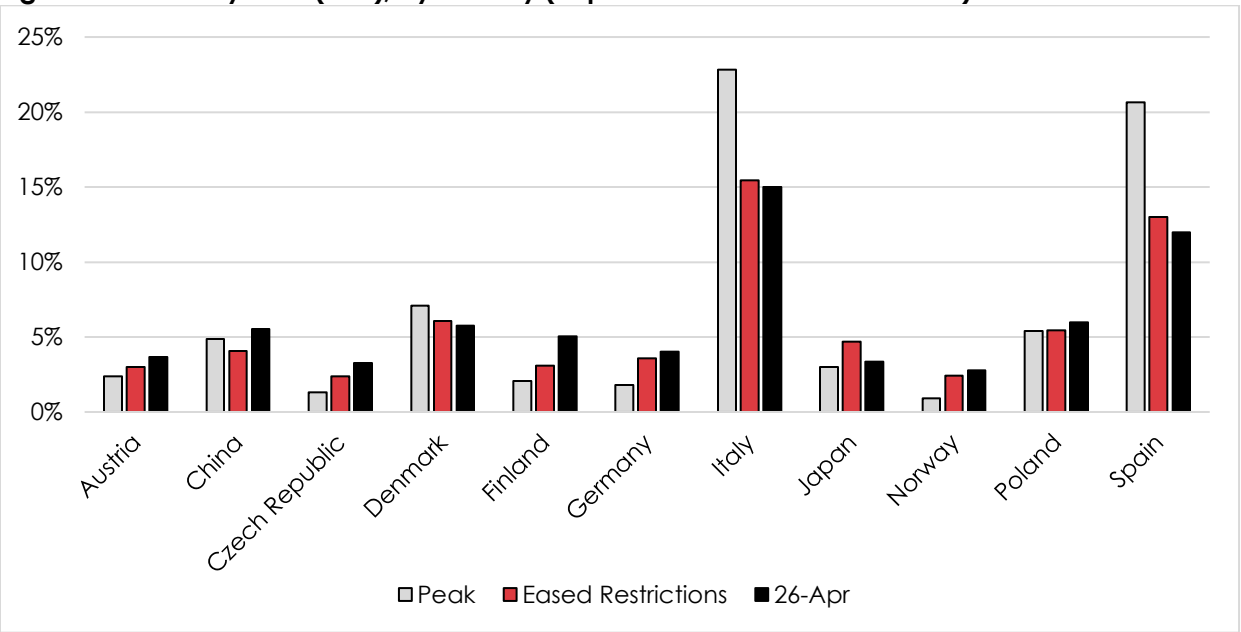


Figure 11: Mortality Rate (CFR), by country (without eased restrictions)

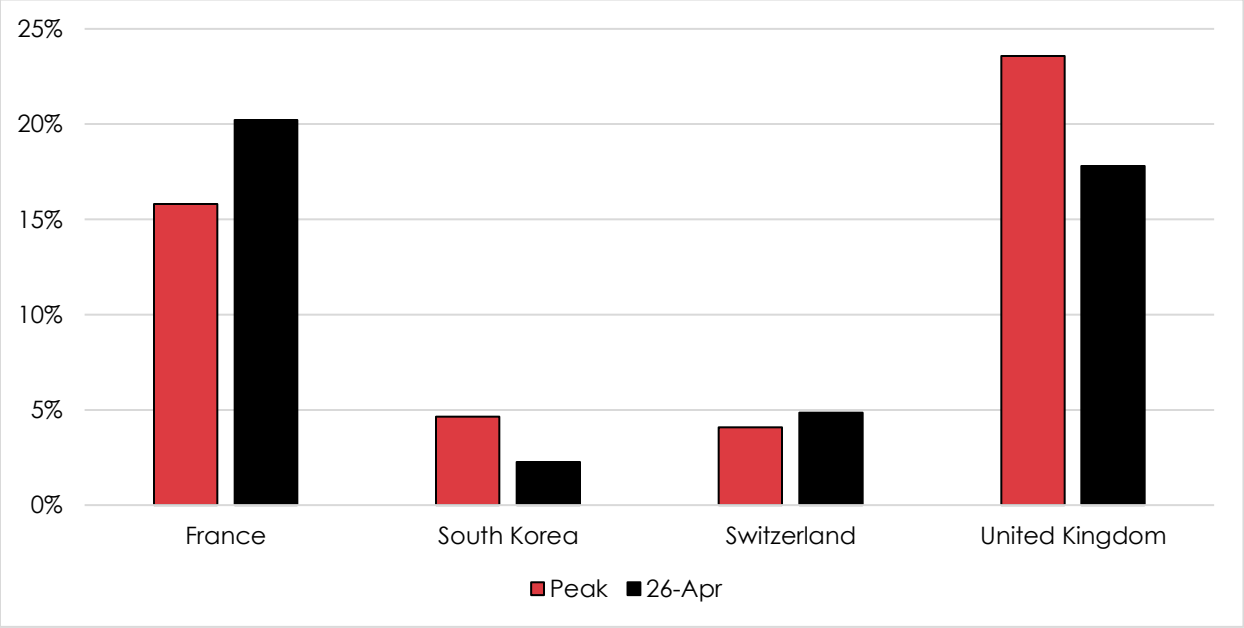
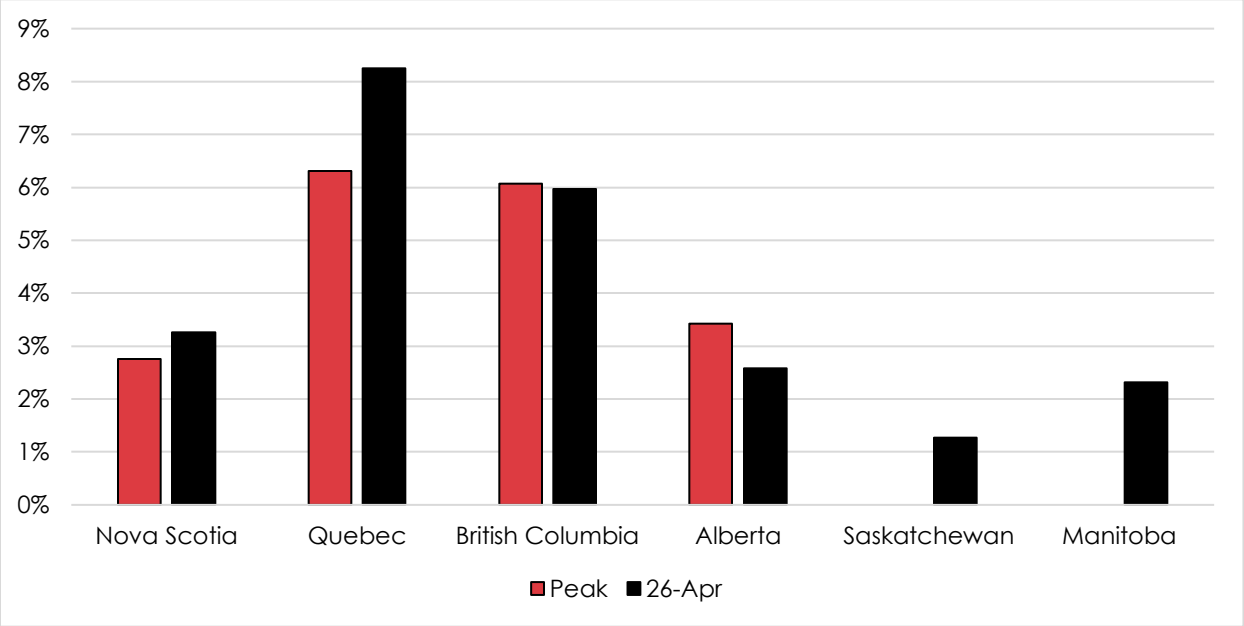


Figure 12: Mortality Rate (CFR), by province



In the above figures, we see that countries such as Austria, Czech Republic, Finland, Germany, and Norway exhibit fewer cases near the period of easing restrictions (around one week ago). On the other hand, case fatalities result from older cases could spike near the eased restriction period, resulting in higher CFR post easing restrictions.

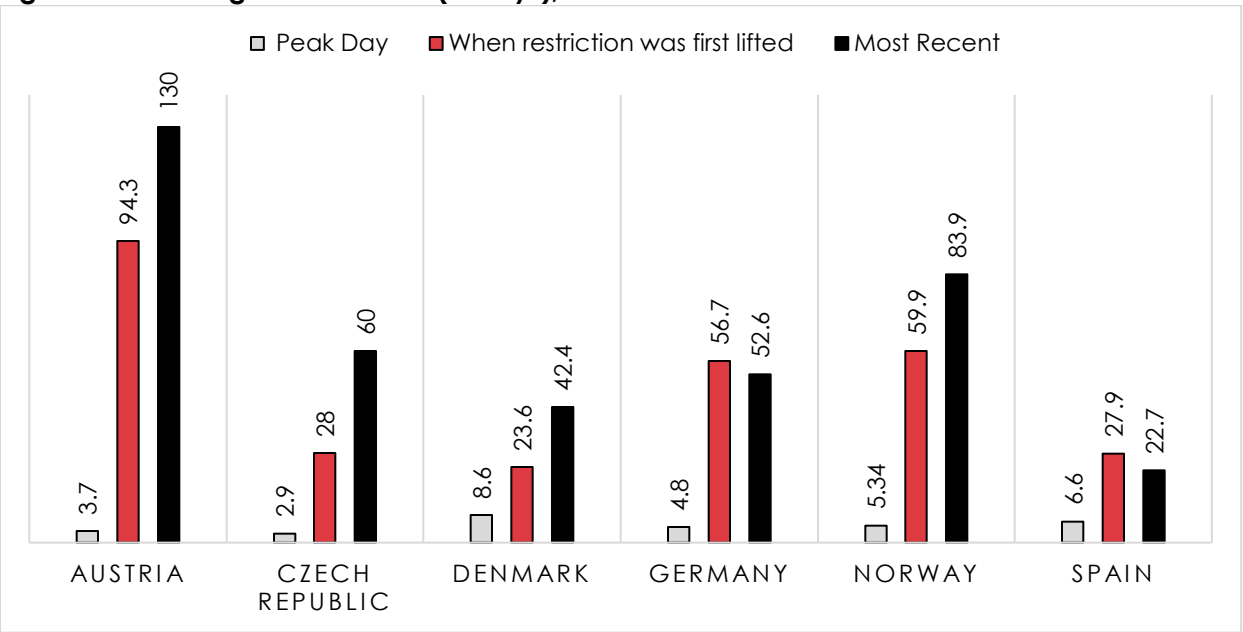
China revised (increased) its death toll by 50% on April 17 after reviewing deaths at home and at a few medical institutions that were not linked to the epidemic initially. Thus, China's recent mortality rate (CFR) increases (attributed to revised deaths) after easing restrictions.

As of April 26, there are no deaths in New Brunswick, and apart from NB, other provinces in Figure 12 have not implemented an easing of restrictions.

Doubling Rate of Infection

The figures below presents the doubling rate of COVID-19 – that is, the number of days it would take for the number of infections to double – for countries that have lifted various COVID-19 restrictions. The doubling rate measures whether the growth rate of cases has slowed. An increase in the growth rate over time indicates that it is increasingly taking more days for the number of cases to double – in this case, an extremely good thing.

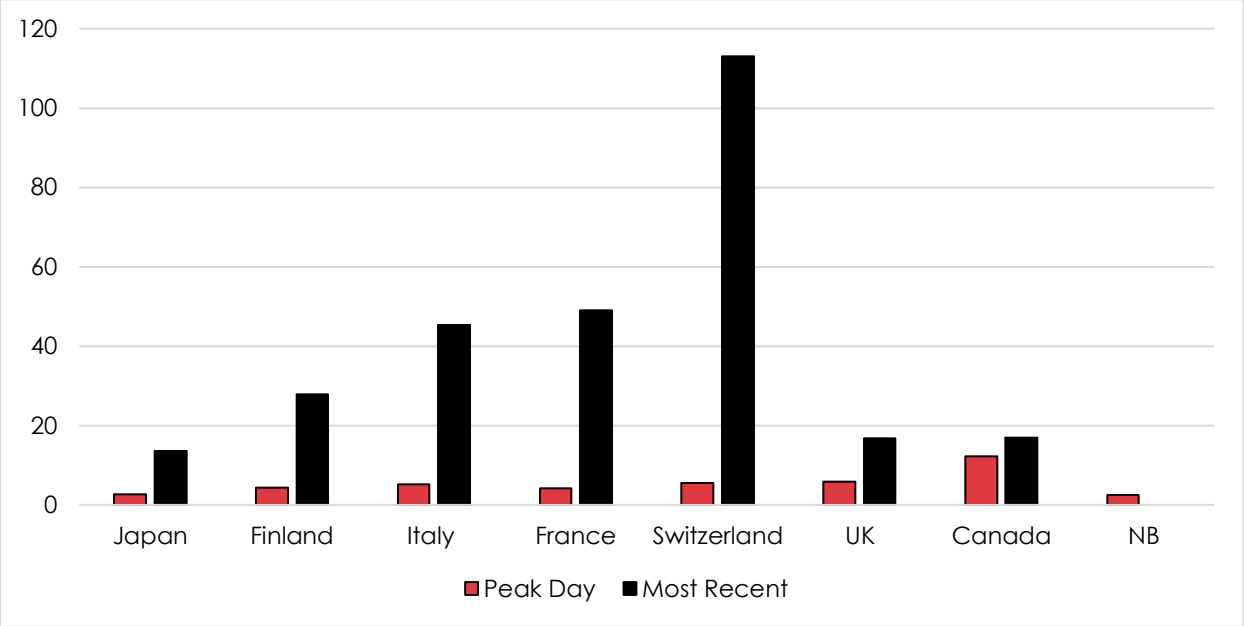
Figure 13: Doubling Rate of Cases (in Days), Countries that Lifted Restrictions



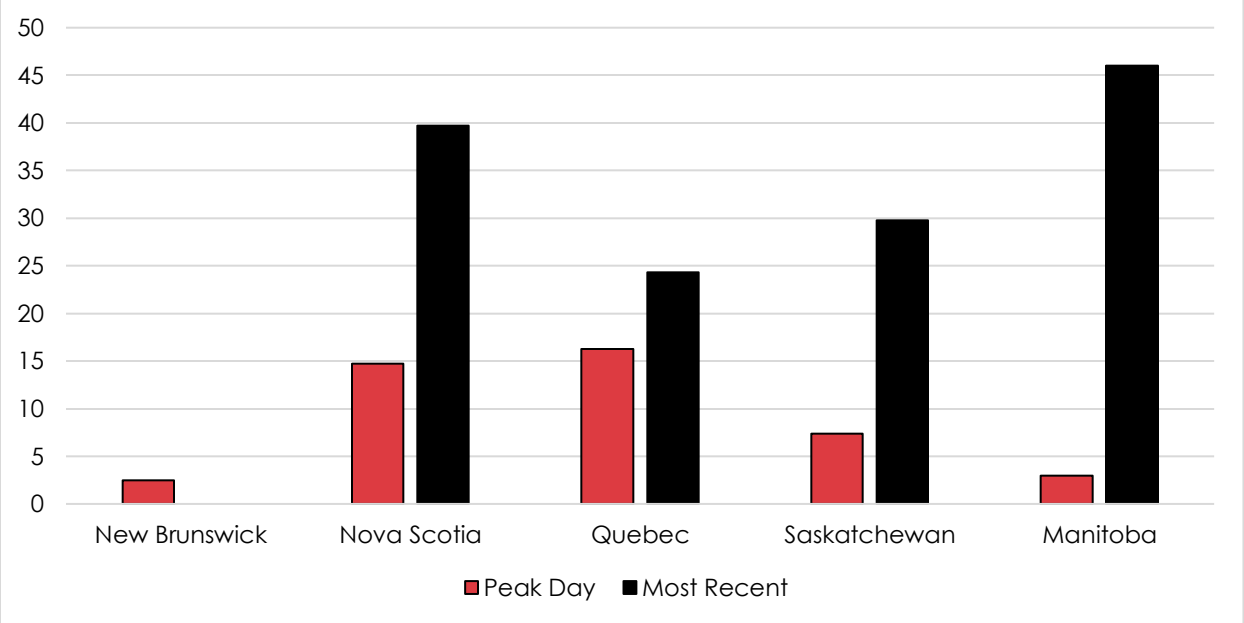
We see that for Austria, it would have taken 3.7 days during the country's peak for the number of cases to double. However, the most recent doubling rate is 130 days. For the majority of countries examined above, there is a substantial increase in the doubling rate between peak day and the day that restrictions were first lifted. However, the doubling duration estimates in Germany and Spain have worsened (decreased) since removing restrictions.

Below, we find an increase in the doubling rate for all jurisdictions. While there is some growth in the doubling rate for Canada, this increase is slight compared to other jurisdictions, one more reflecting the recent increase in the country's cases. The most recent doubling rate for New Brunswick (0) is not applicable – though, this is a good thing, as it reflects the fact that the province has seen no daily new cases during the examined period.

Figure 14: Doubling Rate of Cases (in Days), selected countries



Doubling Rate of Cases (in Days)



Tests

In the figures below, we examine the number of tests conducted per 1,000 population at three different points in time (March 31, April 14, and April 26) for the countries and provinces discussed previously in Part 1. It should be noted that daily data for number of tests is unfortunately not available for all countries.

The rates below show the difference in the number of tests conducted between each date. For example, the number of tests per 1,000 population for April 14 is calculated by subtracting the

number of total tests as of March 31 from total tests as of April 14 (i.e. Total Tests between April 1-April 14 = Total Tests until April 14 – Total Tests until March 31.

Similarly, Total Tests between April 15-April 26 = Total Tests until April 26 – Total Tests until April 14.

Figure 15: Tests per 1, 000 (Total Population), selected countries

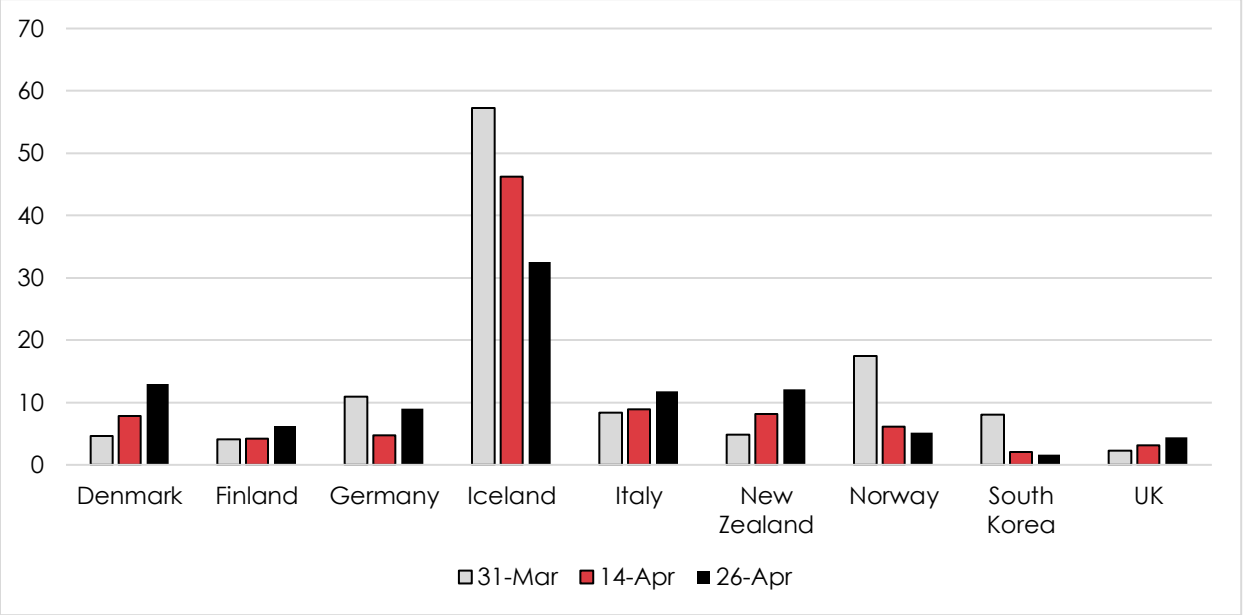
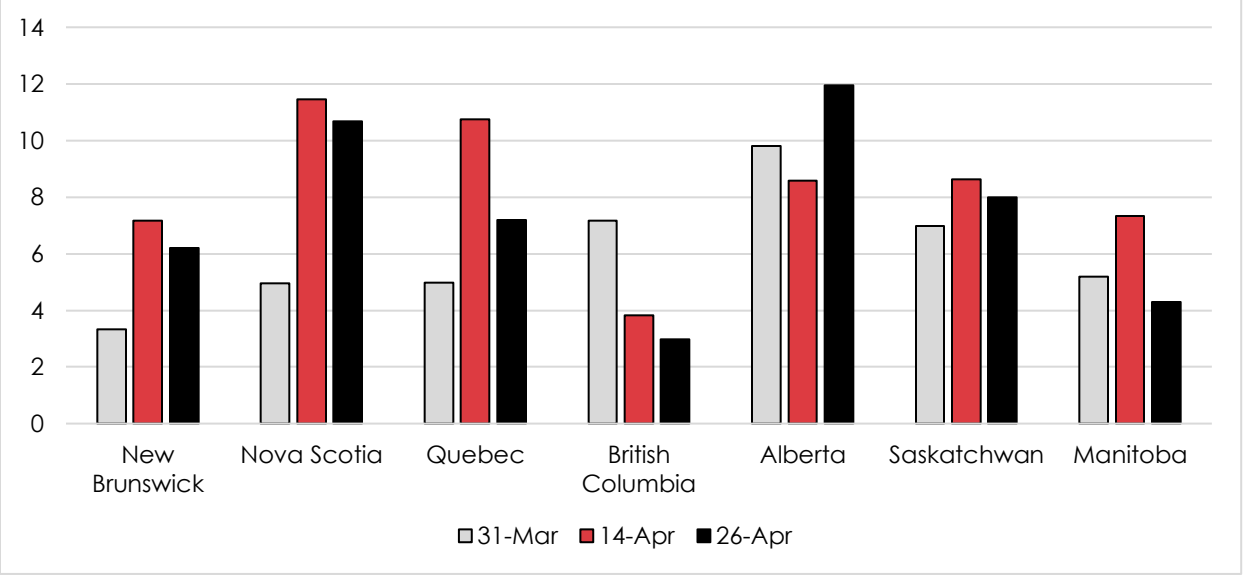


Figure 16: Tests per 1, 000 (Total Population), by province



lxxvii

Some countries, such Denmark, Finland, and Germany (Figure X), appear to be conducting thorough testing after easing restrictions (see the higher number in the later phase), indicating the likely capture of asymptomatic cases to prevent a surge in confirmed cases.

On the other hand, countries such as Iceland and South Korea conducted extensive testing at the beginning of the pandemic, capturing asymptomatic and pre-symptomatic cases. It is

possible the decline in number of tests could reflect a fall in demand for testing (i.e., less individuals are calling to be tested), instead of capacity to test – as was stated to be the case in NB.

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[ii] https://www.ifo.de/en/node/54396
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[v] Calculations by Dr. Philip Leonard, NB-IRDt, based on Statistics Canada, February 2020 Labour Force Survey, https://www150.statcan.gc.ca/n1/daily-quotidien/200306/t003a-eng.htm
[vi] CBC.ca, April 7, 2020. "N.B. COVID-19 roundup: Testing expands to include people with symptoms who have not travelled." https://www.cbc.ca/news/canada/new-brunswick/coronavirus-covid-19-pandemic-1.5524408
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