

Update on COVID-19 in Canada: Epidemiology and Modelling

March 26th, 2021

Canada.ca/coronavirus

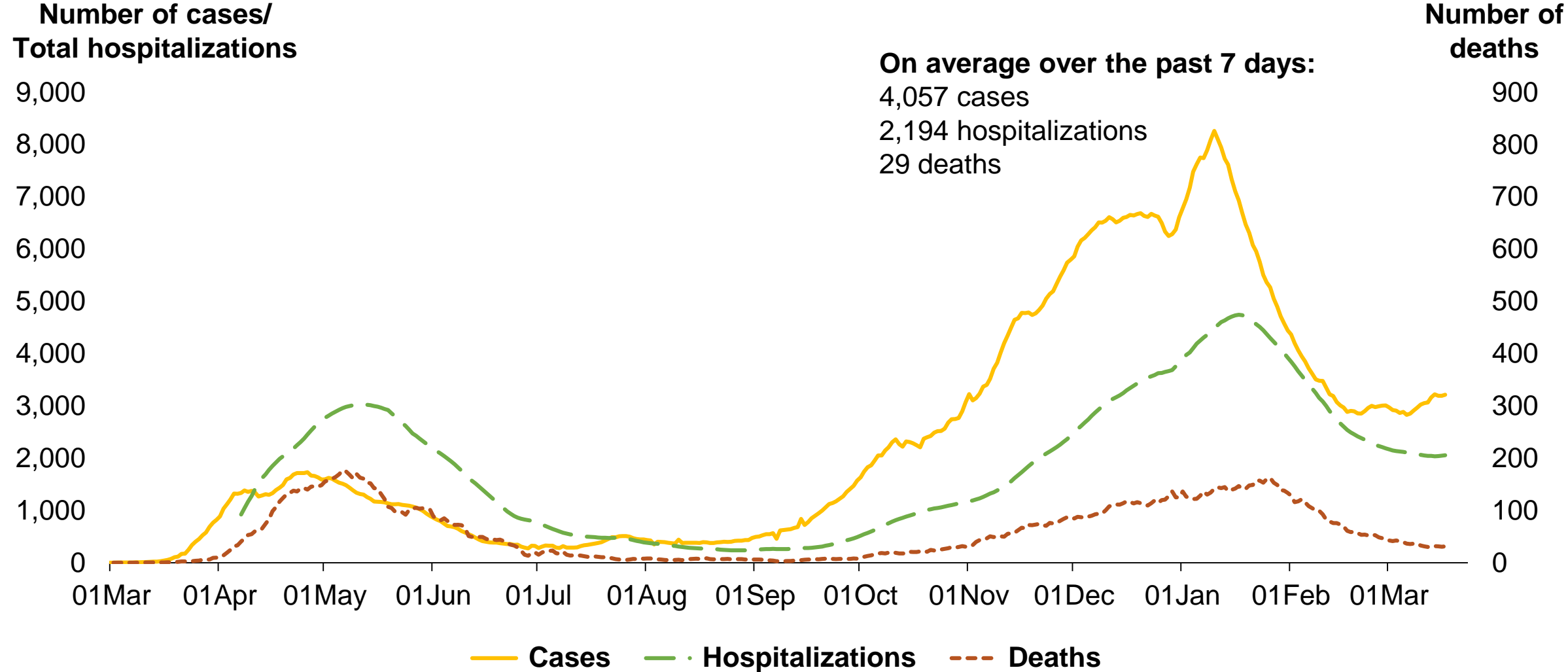


Public Health
Agency of Canada

Agence de la santé
publique du Canada

Canada

National daily case counts and severity indicators are back on the rise

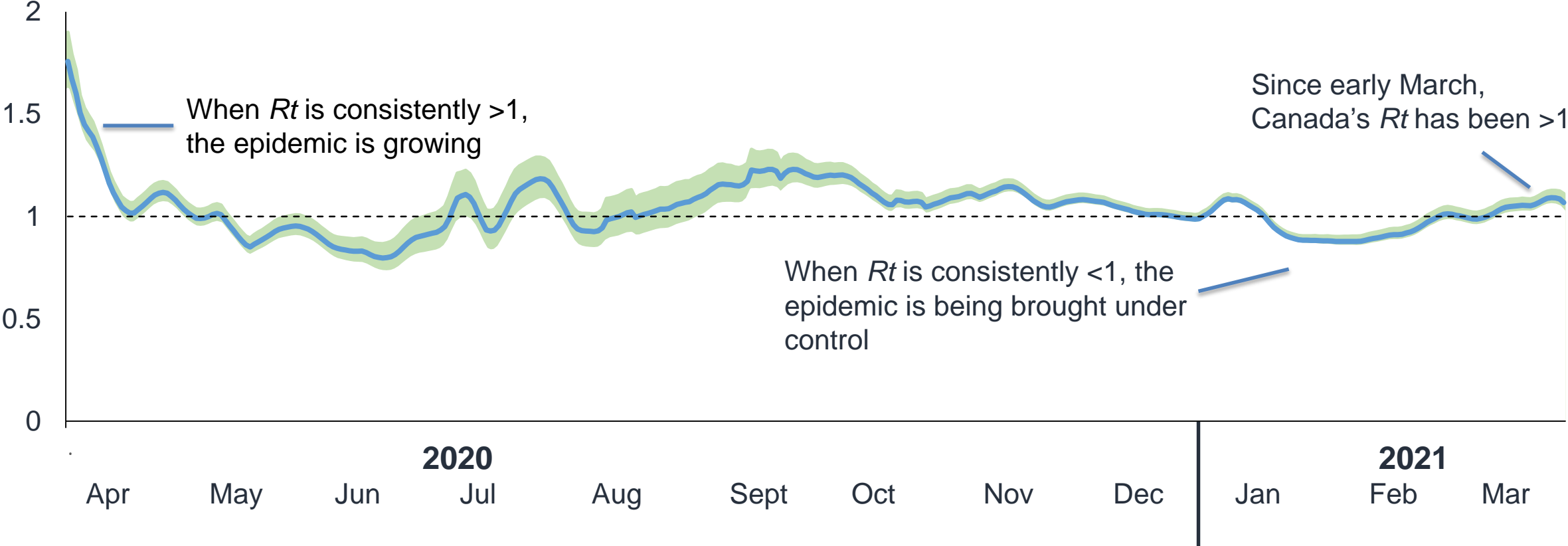


Data as of March 23, 2021

Note: 7-day moving averages. Total hospitalizations include all people in hospital on that day, and the average length of stay in hospital is approximately two weeks.



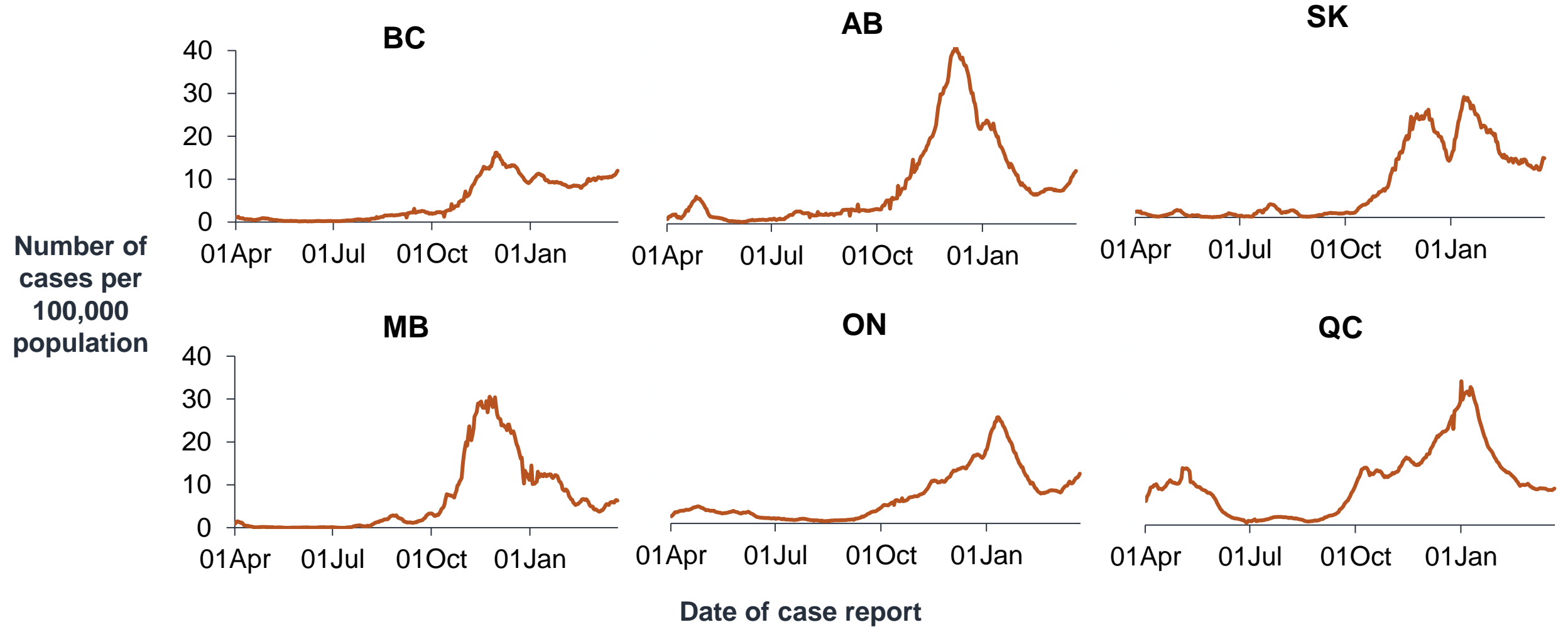
Each new case in Canada is spreading infection to more than one person, bringing the epidemic back into a growth pattern



Data as of March 23, 2021
Note: Calculations are based on the earliest date available for cases



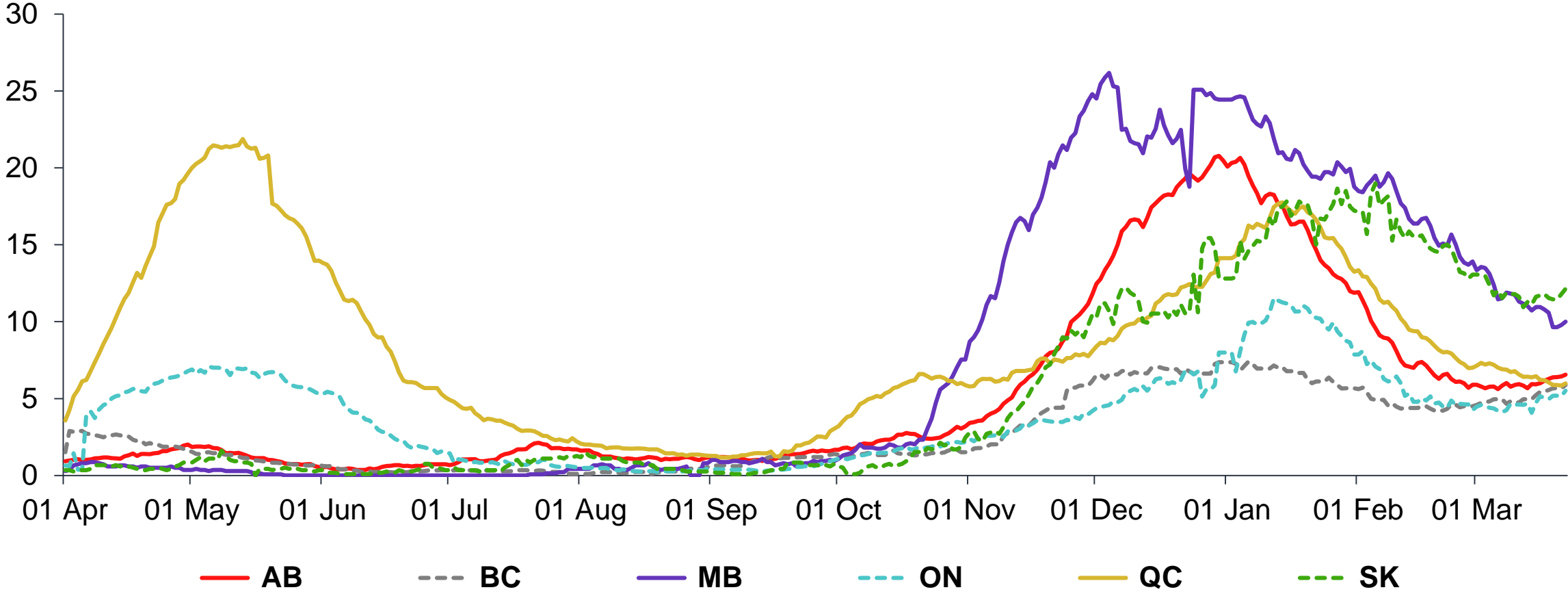
COVID-19 incidence is increasing in provinces west of the Atlantic region



Data as of March 23, 2021

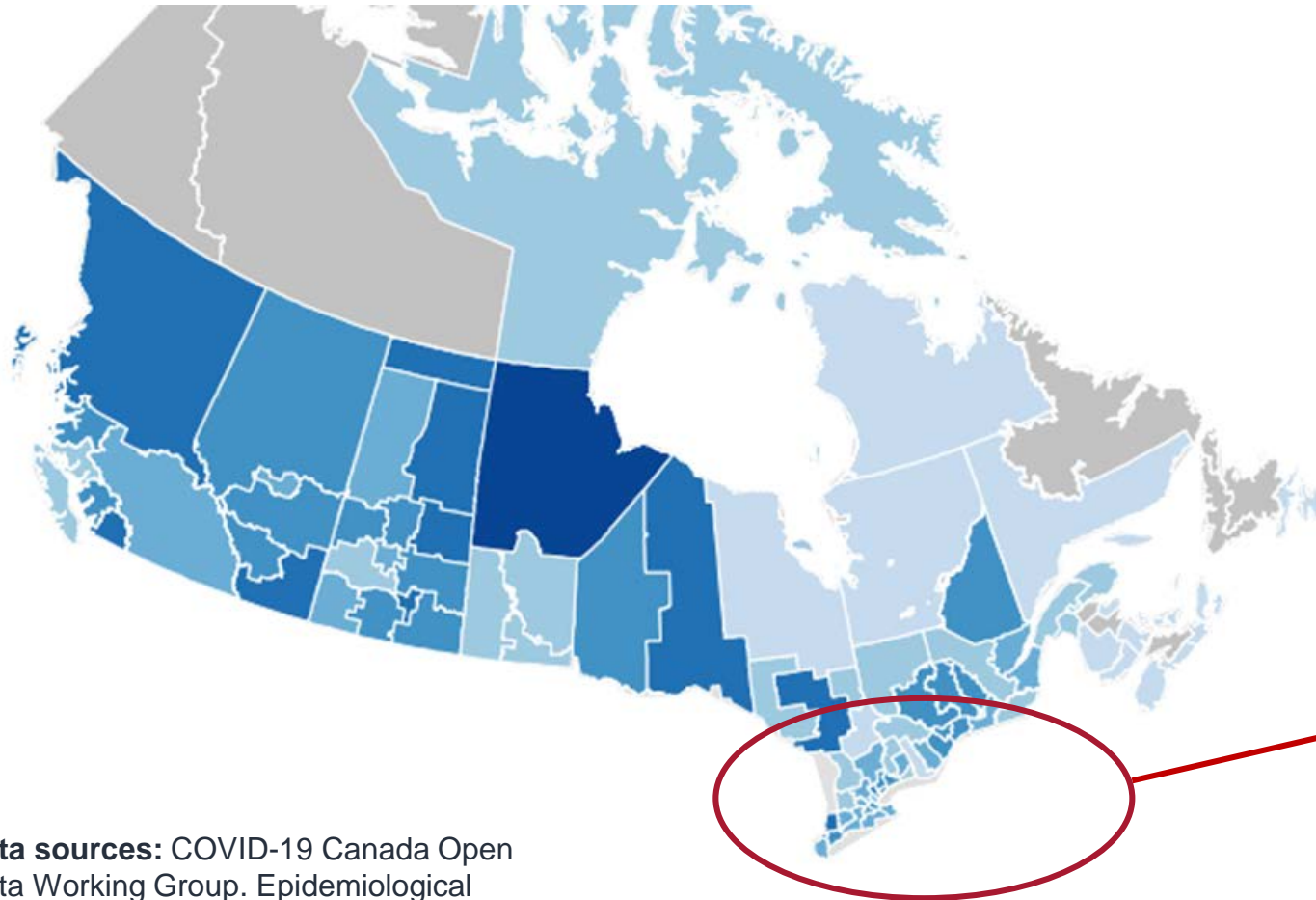
COVID-19 hospitalization rates levelling off or increasing in provinces with elevated disease activity

Number of cases in hospital per 100,000 population

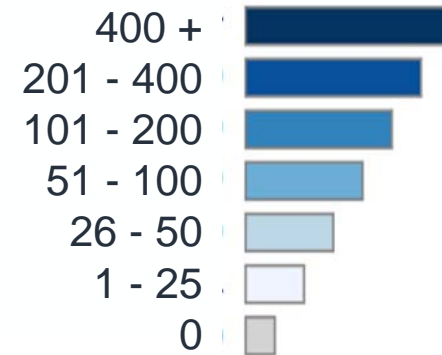


Data as of March 22, 2021
Note: 7-day moving average

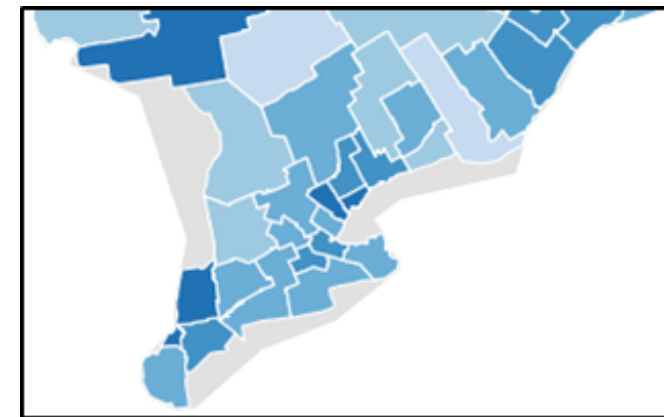
Highest incidence of COVID-19 occurring in Northern health regions of British Columbia, Saskatchewan, Manitoba, and parts of Ontario



Cases per 100,000 population (Mar 7 – Mar 22, 2021)



37 of 99 health regions with > 100 cases per 100,000 population over a 14-day period



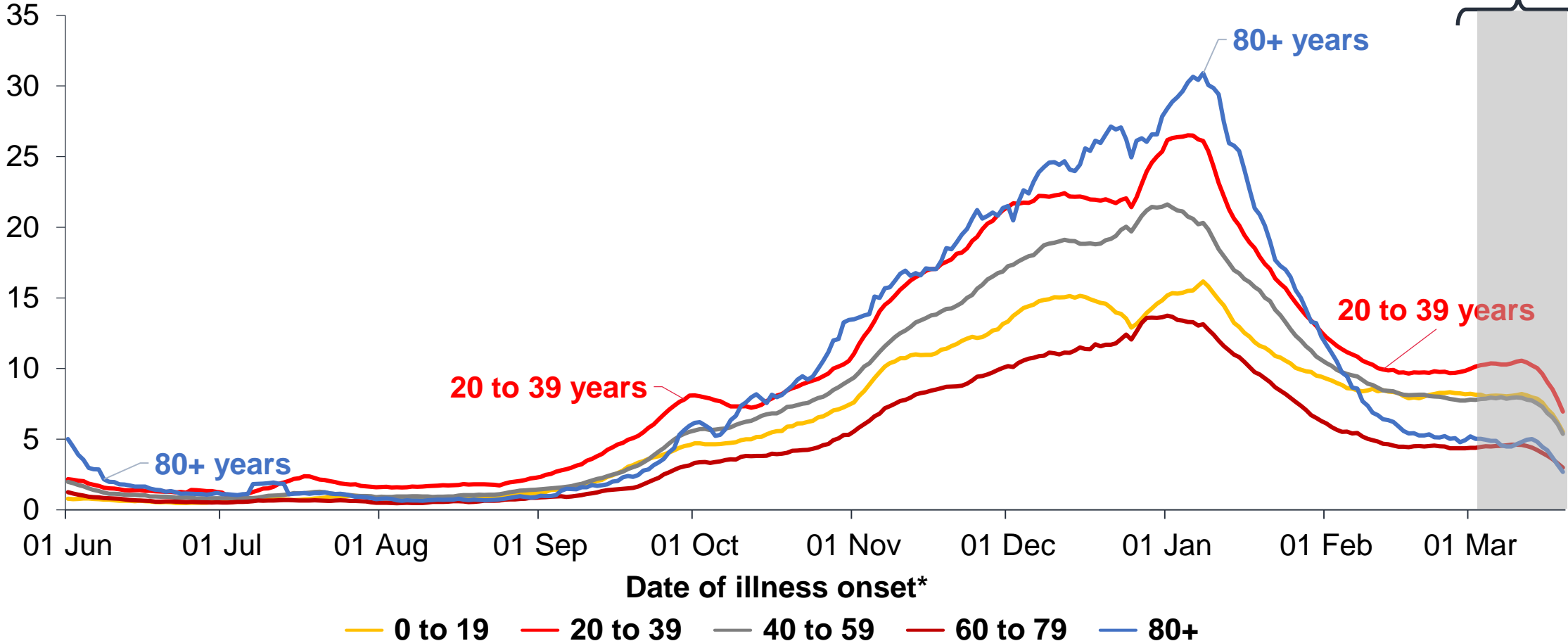
Data sources: COVID-19 Canada Open Data Working Group. Epidemiological data from the COVID-19 Outbreak in Canada

Data as of March 22, 2021

Note: Map only shows COVID-19 cases where health region had been attributed in source data

Incidence rates have declined among older age groups and are now highest among young adults aged 20 to 39 years

Number of reported cases per 100,000 population



Incomplete data, due to reporting lag

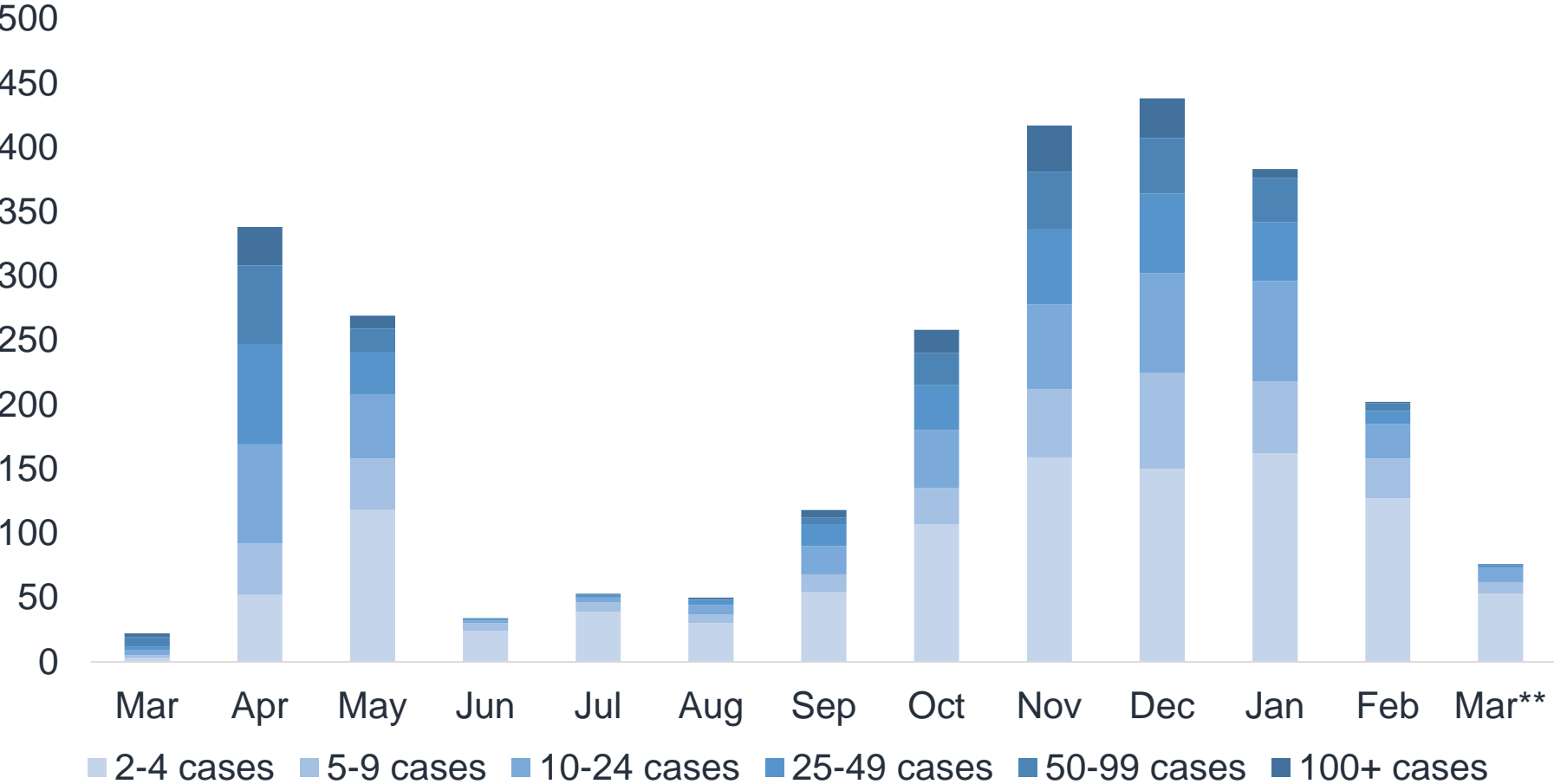
Data as of March 22, 2021

Note: 7-day moving average *The earliest of the following dates: Onset date, specimen collection date, laboratory testing date, date reported to province or territory, or date reported to PHAC



Number and size of outbreaks in long term care* homes continue to decline

Number of Outbreaks



Studies in QC, BC and ON showed high vaccine effectiveness and significant reductions in symptomatic illness^{1,2} and severe outcomes³ among long-term care home residents and health care workers after single dose of mRNA vaccine.

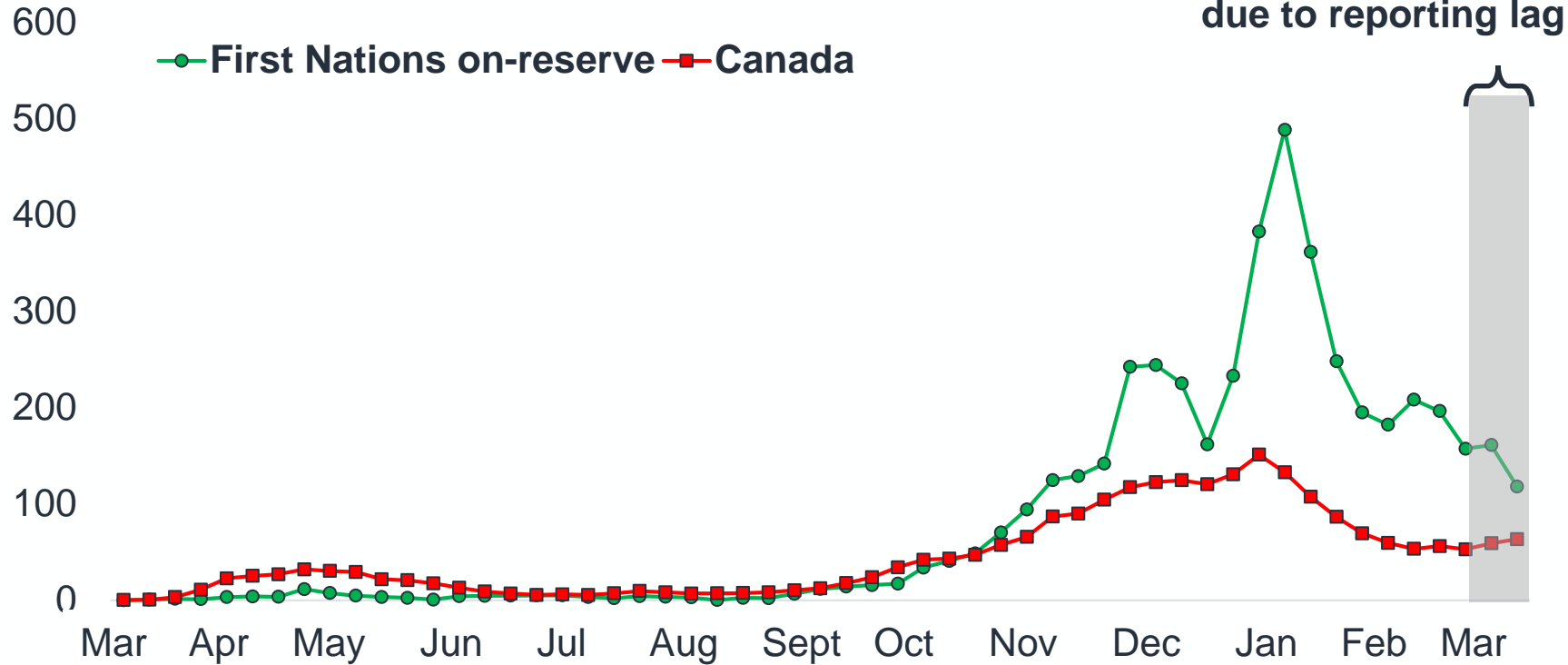
Data as of March 23, 2021; by date outbreak first reported
Note: *Including retirement residences. Data based on publicly reported information. **Data is incomplete for March, 2021

¹INSPQ. <https://www.inspq.qc.ca/sites/default/files/publications/3111-vaccine-effectiveness-strategy-vaccination-shortage-covid19.pdf>
²BCCDC. <http://www.bccdc.ca/about/news-stories/news-releases/2021/early-findings-show-the-first-vaccine-dose-reduced-the-risk-of-covid-19-by-80-per-cent-or-more>
³Brown KA et al. <https://doi.org/10.47326/ocsat.2021.02.13.1.0>



Indigenous communities' experience of COVID-19 has moved from strength through challenge to resilience

Newly reported cases per 100,000 population



Territories and most Indigenous communities

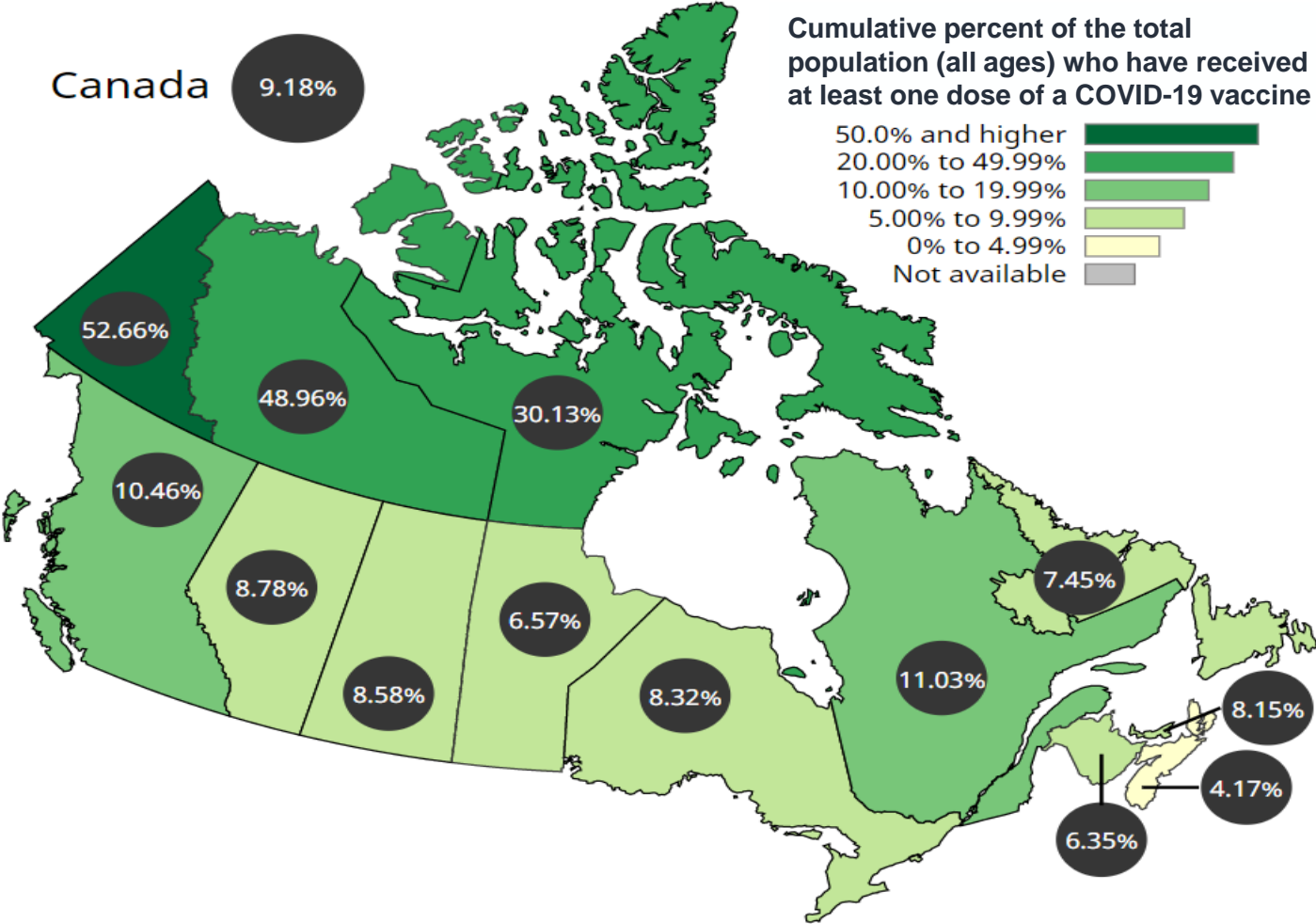
- were successful in efforts to limit introduction and spread early in the pandemic
- innovated rapidly to control introduction and further spread through fall and winter
- showed leadership in rolling out vaccines early to protect high-risk populations

COVID-19 incidence in First Nations on-reserve and general Canadian population

Data as of March 19, 2021
Note: By episode date



Vaccination coverage is increasing across Canada, with benefits being seen in prioritized high-risk populations



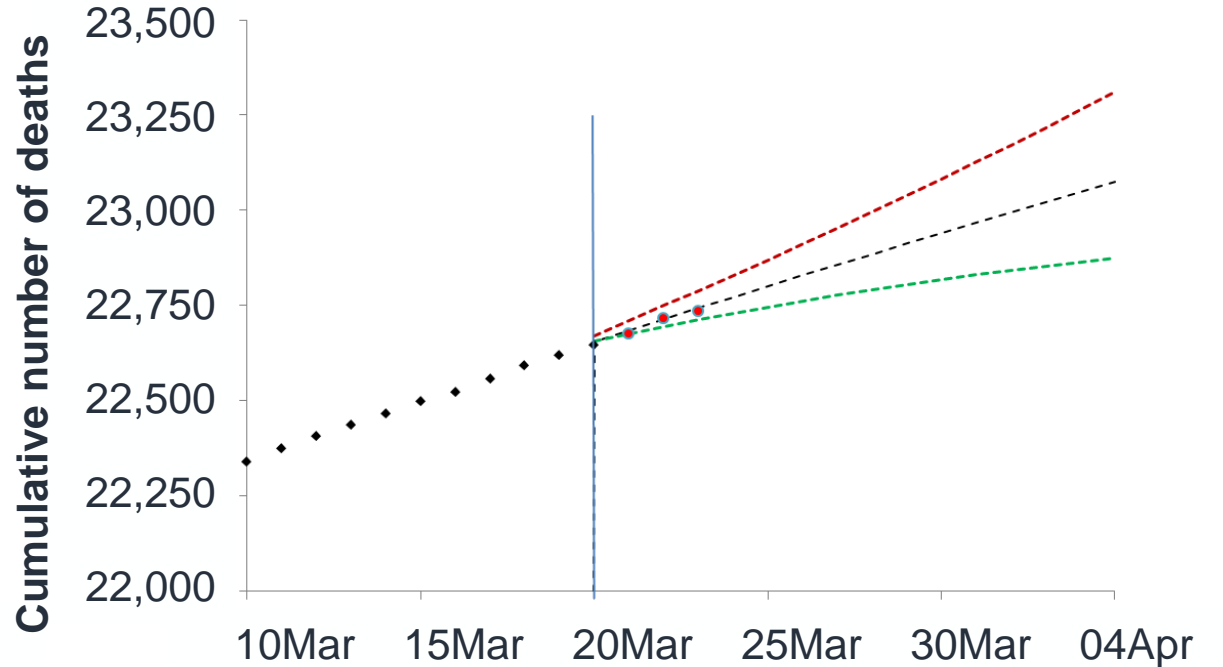
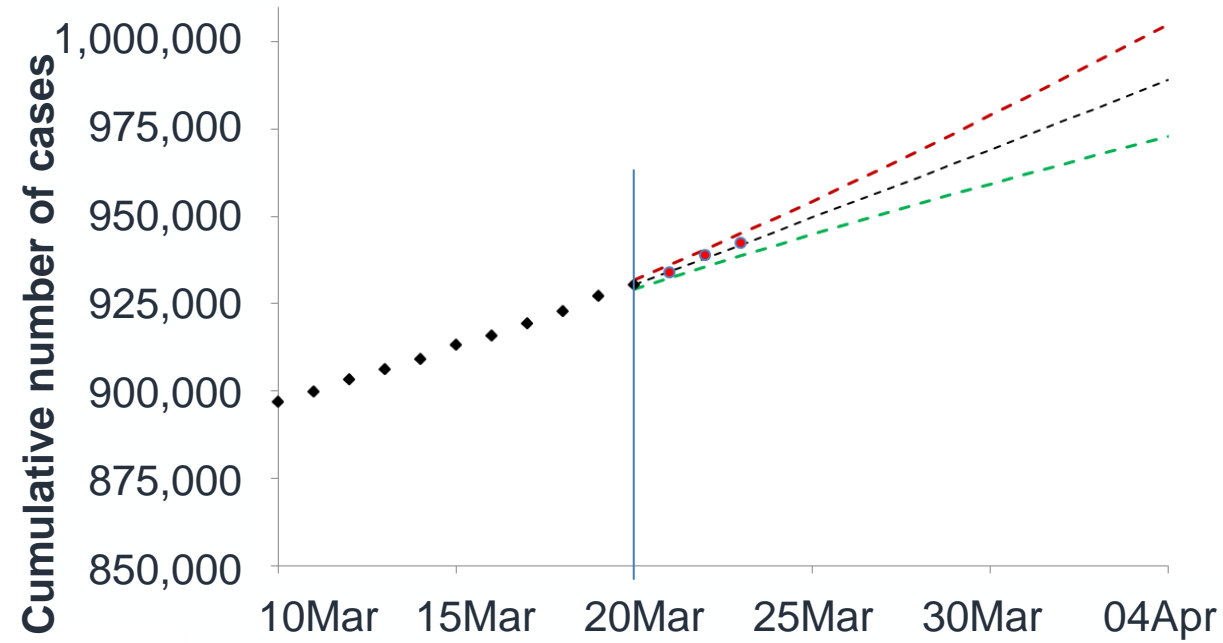
- More than 4.5 million vaccine doses have been administered
- More than 11% of Canadian adults have received at least one dose of vaccine
- Nearly 60% of seniors aged 80+ have received at least one dose of vaccine
- In the three territories, more than 60% of adults have received at least one dose

Data as of March 20, 2021

Short-term forecast predicts total cases will increase faster than total deaths due to the recent acceleration in daily cases

Cumulative cases predicted to April 4, 2021:
973,080 to 1,005,020

Cumulative deaths predicted to April 4, 2021:
22,875 to 23,315



- ◆ Cumulatively reported cases in Canada by March 20, 2021
- Cases added since March 20 when the prediction was made
- Prediction to Apr. 4, 2021
- - - Lower 95% prediction limit
- - - Upper 95% prediction limit

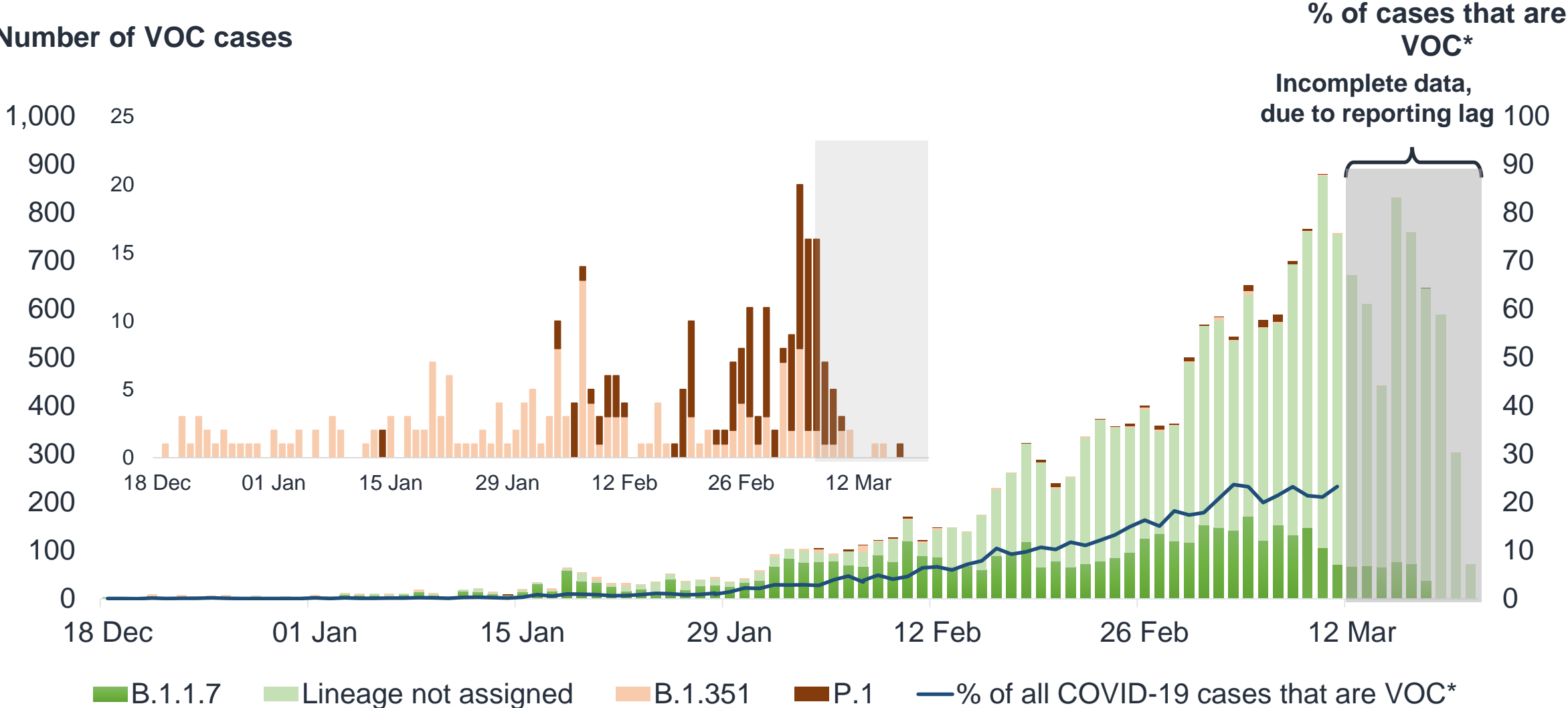
Data as of March 23, 2021.

Note: Extrapolation based on recent trends using a forecasting model (with ranges of uncertainty).



Number and proportion of variant of concern cases are increasing rapidly in several areas of Canada

Number of VOC cases

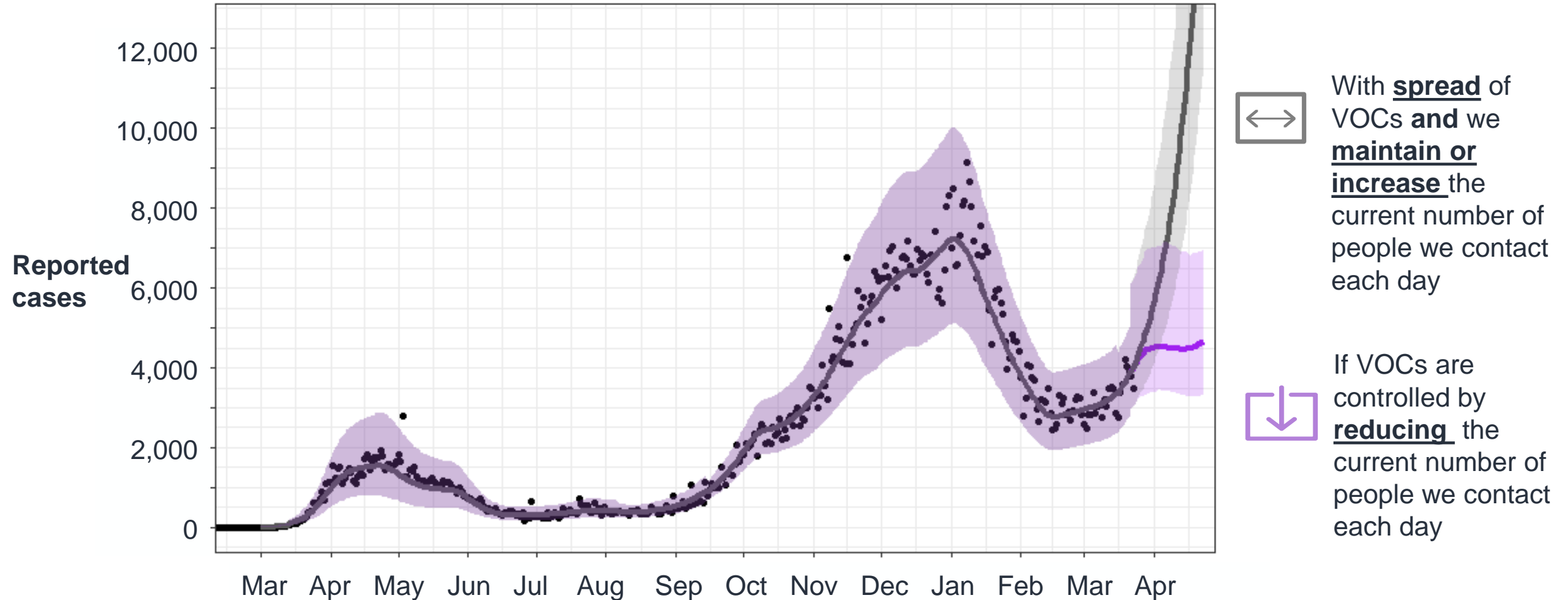


Data as of March 24, 2021

Note: By laboratory specimen collection date. *Includes cases with confirmed VOC lineage and cases with a mutation associated with VOC. Cases with no assigned lineage reported only by MB, ON, NB, and PEI, resulting in underestimation. QC and SK are excluded from this analysis.



Longer-range forecast shows stronger public health measures will be required to counter more transmissible variants of concern



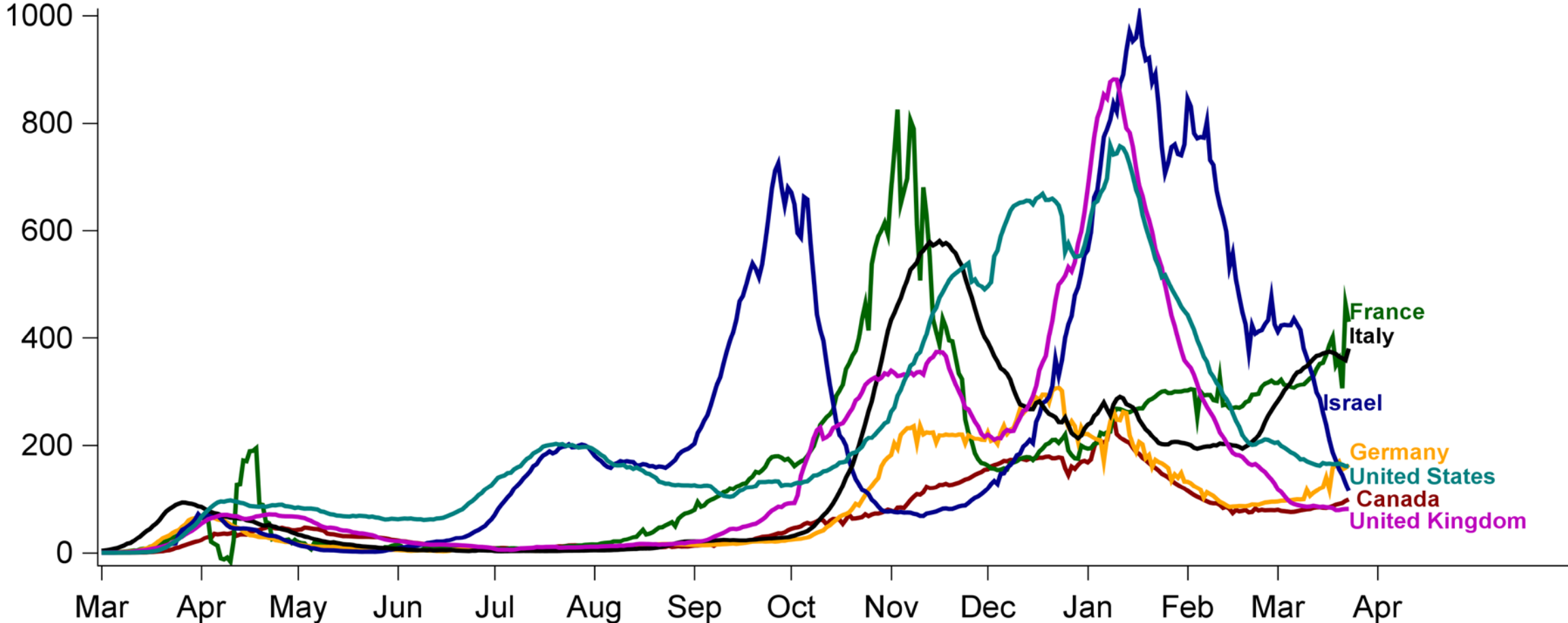
Data as of March 24, 2021

Note: Ensemble of output from PHAC-McMaster and Simon Fraser University models

The PHAC McMaster forecast is based on current estimates transmission rates fitted to reported cases. It assumes VOCs are introduced in mid-Dec (~1 week prior to first detected case in Canada) at very low prevalence; VOCs (all VOCs known to date) are 50% more transmissible than wild-type; growth rate AND replacement rate are negatively correlated with the strength of public health measures. Proportion of VOC is obtained by a combination of calibrating to surveillance data as well as information on proportions of cases that are VOC. Recent changes in testing rates are not taken into account in this forecast. SFU methods are at <https://www.sfu.ca/magpie/blog/variant-simple-proactive.html>

International experience shows that stronger measures are needed to control epidemic growth driven by more contagious variants of concern

Rate per 1,000,000 population



Data as of March 23, 2021
Note: 7-day moving average

Data inform jurisdictions' decisions to adjust restrictive public health measures

□ **Vaccine coverage and effectiveness** (including for circulating VOCs) supports epidemic control and enables improvement of other indicators

□ **COVID-19 transmission**, including VOCs, is **controlled** to manageable levels

□ Sufficient **public health capacity** is in place to test, trace, isolate and quarantine a high proportion of cases and contacts

□ Sufficient **healthcare capacity** exists, including substantial clinical care capacity to respond to surges

□ **Risk reduction measures** are in place for populations who are at high risk and in high risk settings

Note: Criteria and indicators build on those established by the Special Advisory Committee in July 2020 and published online here: <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/canadas-reponse/recommendations-lifting-restrictive-public-health-measures.html>

Many factors will influence the epidemiological situation and timing for adjusting public health measures... but summer holds promise



Key factors include:

- Spread of variants of concern that impact transmission, severity of illness and vaccine effectiveness
- Degree to which public health measures and our adherence to them are successful in controlling transmission while vaccines roll out
- Effect of vaccines in preventing transmission in addition to preventing severe disease and death
- How many people are vaccinated

Success in vaccines versus variants depends on all of us!

- **Updated forecasts, with variants of concern spreading, show we must continue with strong measures** until enough people are vaccinated to safely ease restrictions.
- **Acceleration of vaccination programs will bring more benefits**, protecting more Canadians and helping us resume our valued social and economic activities.
- We are closer now than ever, but **it is still too soon to relax** measures and **too soon to gather in areas where COVID-19 is circulating**.
- **As Passover, Easter, and Ramadan approach**, make plans to celebrate safely, including having virtual celebrations to protect and support each other as we make this last big push to keep the path clear for vaccines!

Every moment we realise we could be doing more, better...



Is an opportunity we can take to do our best to protect each other...

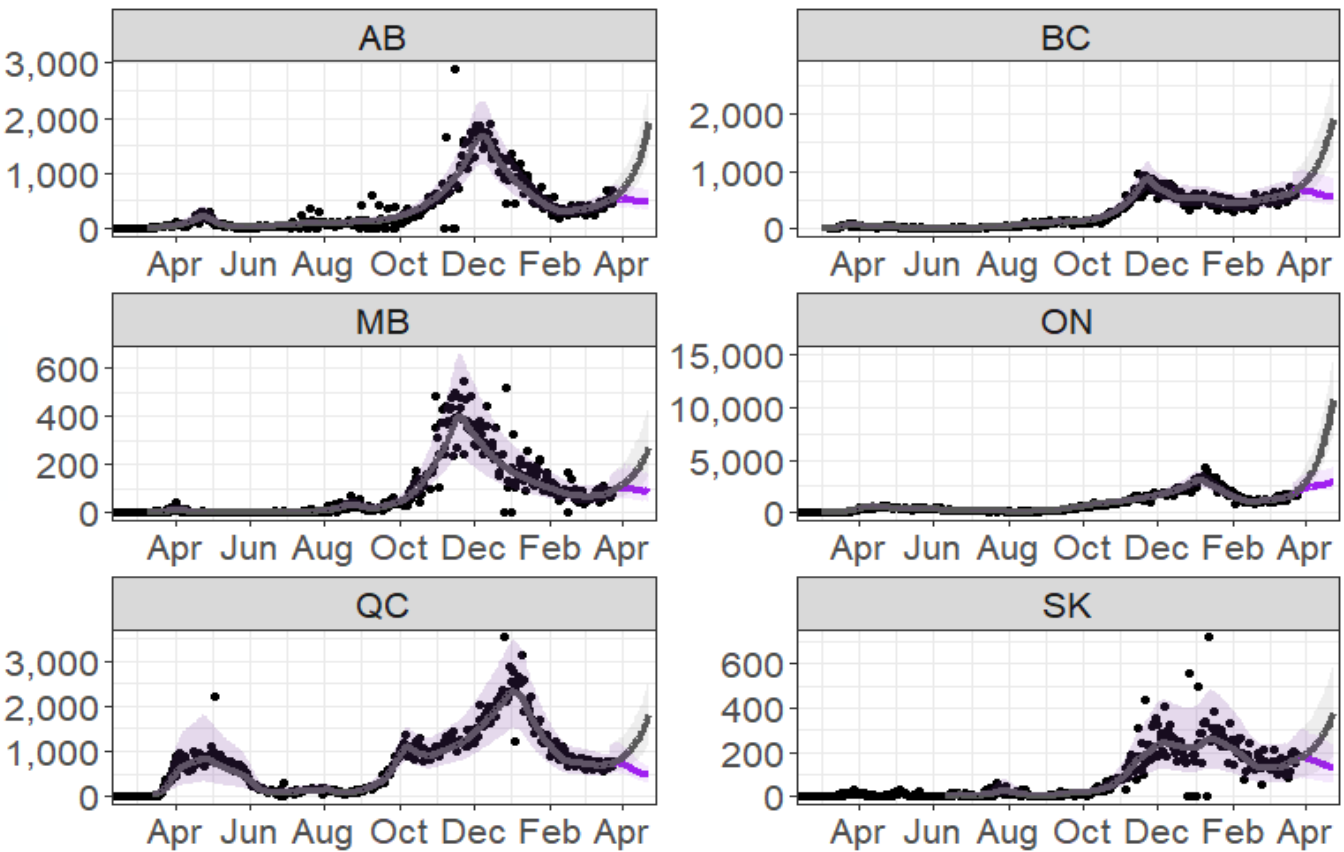


fewest interactions, with the **fewest people** for the **shortest time** at the **greatest distance** possible while wearing **the best-fitting mask**

ANNEX

Longer-range forecasts show strong resurgence nationally if variants of concern replace wild type virus and public health measures remain at current levels

Reported cases



With spread of VOCs and we maintain or increase the current number of people we contact each day



If VOCs do not spread or are controlled by reducing the current number of people we contact each day

Data as of March 24, 2021

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Long-range forecasting model assumptions

- The forecast combines estimates from two compartmental models reflecting the biology of COVID-19 and public health response. One of the models was developed by PHAC in collaboration with McMaster University, and the other was developed at Simon Fraser University.
- The ensemble forecast assumes VOCs are 40-50% more transmissible compared to previous strains. This value is used to estimate the rate at which VOCs replace existing strains.
- VOCs are considered to have been introduced at very low prevalence a week prior to the first reported case in each province. The proportion of cases due to VOCs over time in each jurisdiction is then adjusted to match provincial VOC screening/surveillance data.
- Changes to public health measures impact the speed with which VOCs replace previous strains; stronger public health measures result in slower growth and replacement rates. The impact of public health measures on controlling pre-existing strains and variants is obtained by fitting the model to surveillance data while accounting for the estimated prevalence of variant cases.
- The ensemble forecast includes a graph showing expected increases in cases with VOC spread (grey line), and a graph which assumes that transmission (including VOCs) is controlled (purple line) by public health measures that are equivalent to a 20-30% reduction in rates of contact between people in Canada
- Forecasts are limited to mid-April. This is because assumptions related vaccination roll-out are not incorporated in the model for the below reasons:
 - Only a small proportion of the Canadian public have been vaccinated
 - At present there is uncertainty about the degree to which vaccines protect against infection and transmission
 - The current target groups for vaccination (particularly older adults) contribute little to transmission.