

Update on COVID-19 in Canada: Epidemiology and Modelling

November 5, 2021

Canada.ca/coronavirus



Public Health
Agency of Canada

Agence de la santé
publique du Canada

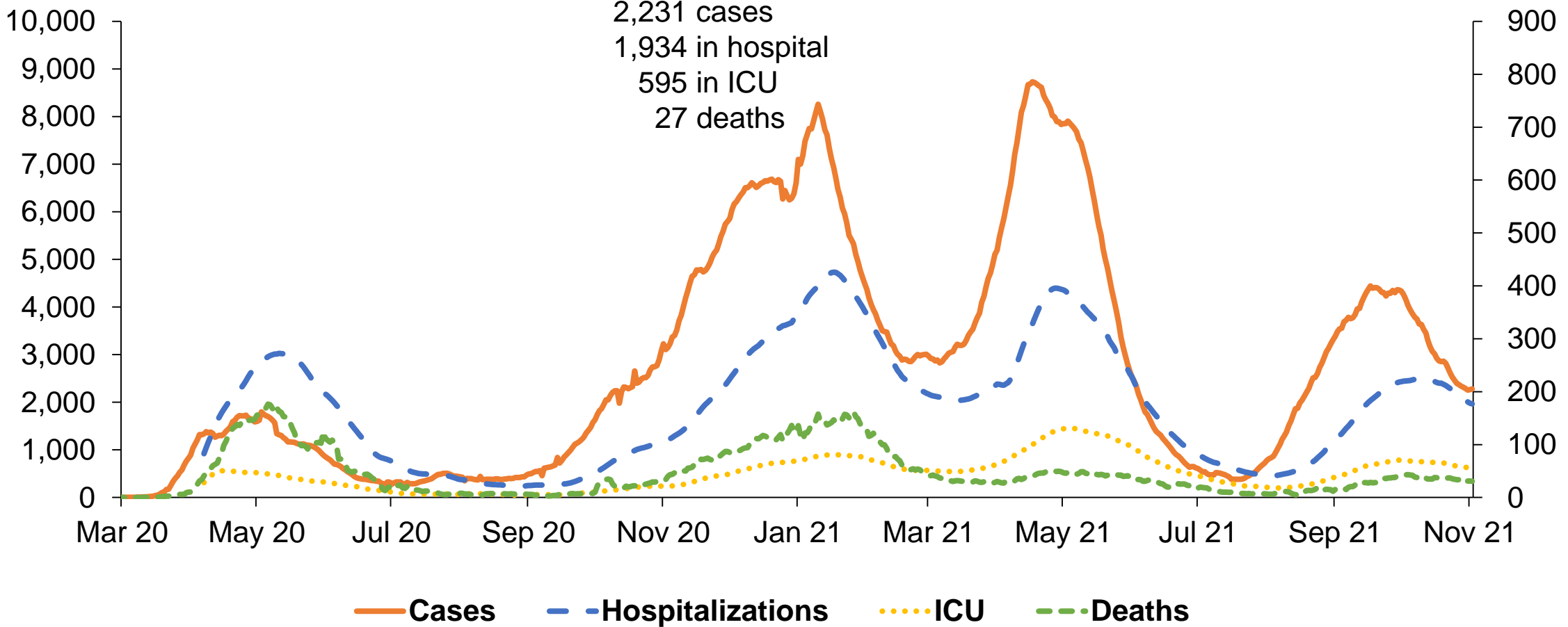
Canada

Nationally, COVID-19 disease activity continues to decline, while severity trends have begun to decrease but remain elevated in some areas of the country

Number (cases/
in hospital / in ICU)

Daily counts
(average over past 7 days):

Number (deaths)



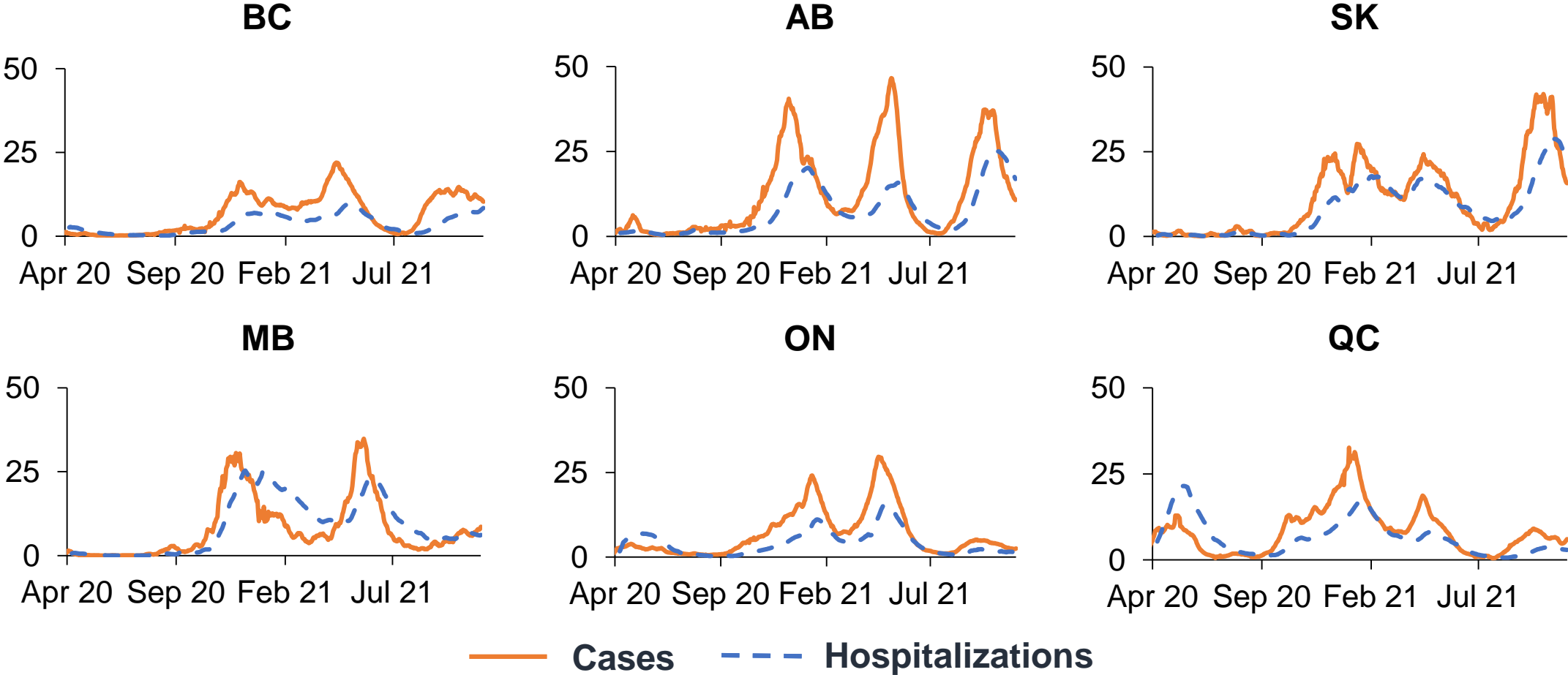
Data as of November 2, 2021

Note: Trend lines reflect 7-day moving averages. Total hospitalizations and ICU admissions include all people in hospital and in ICU on that day. Hospitalizations and ICU counts do not include data from NWT.



Regional COVID-19 trends show still elevated rates of COVID-19 cases in hospital in some Western provinces, lagging behind declines in disease incidence

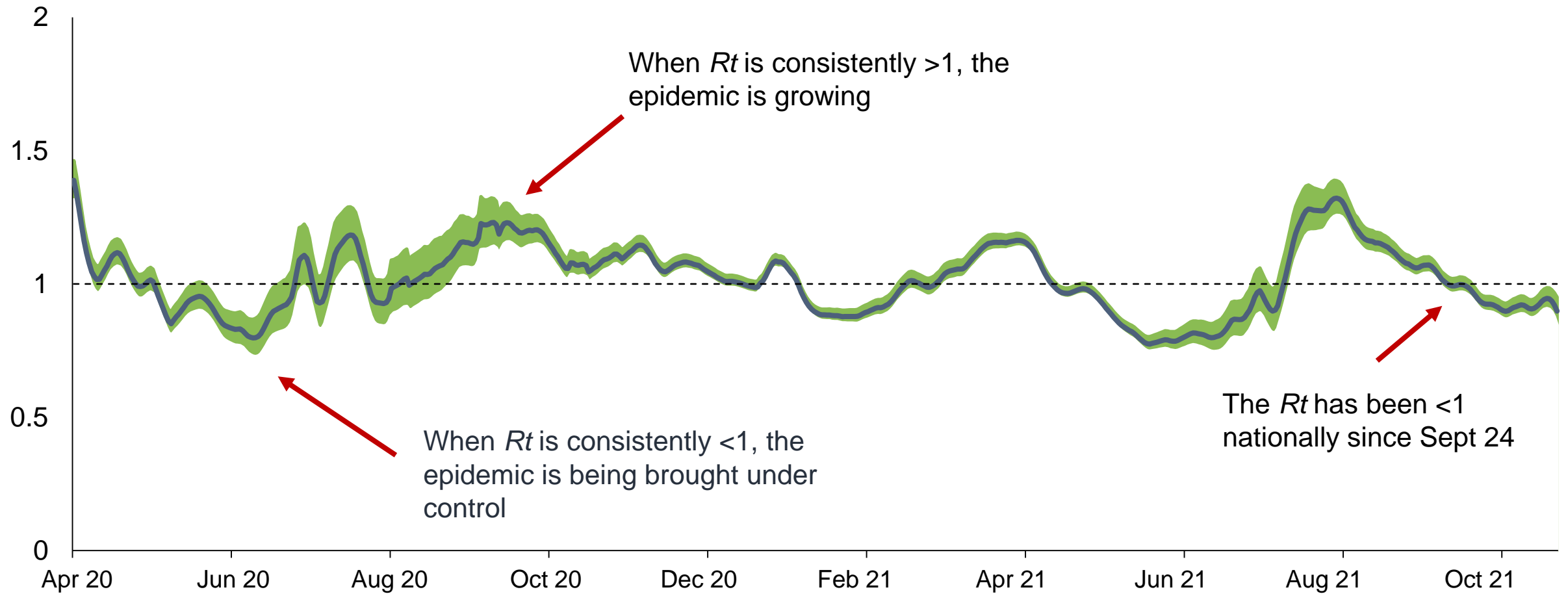
Number cases / in hospital per 100,000 population



Data as of November 2, 2021

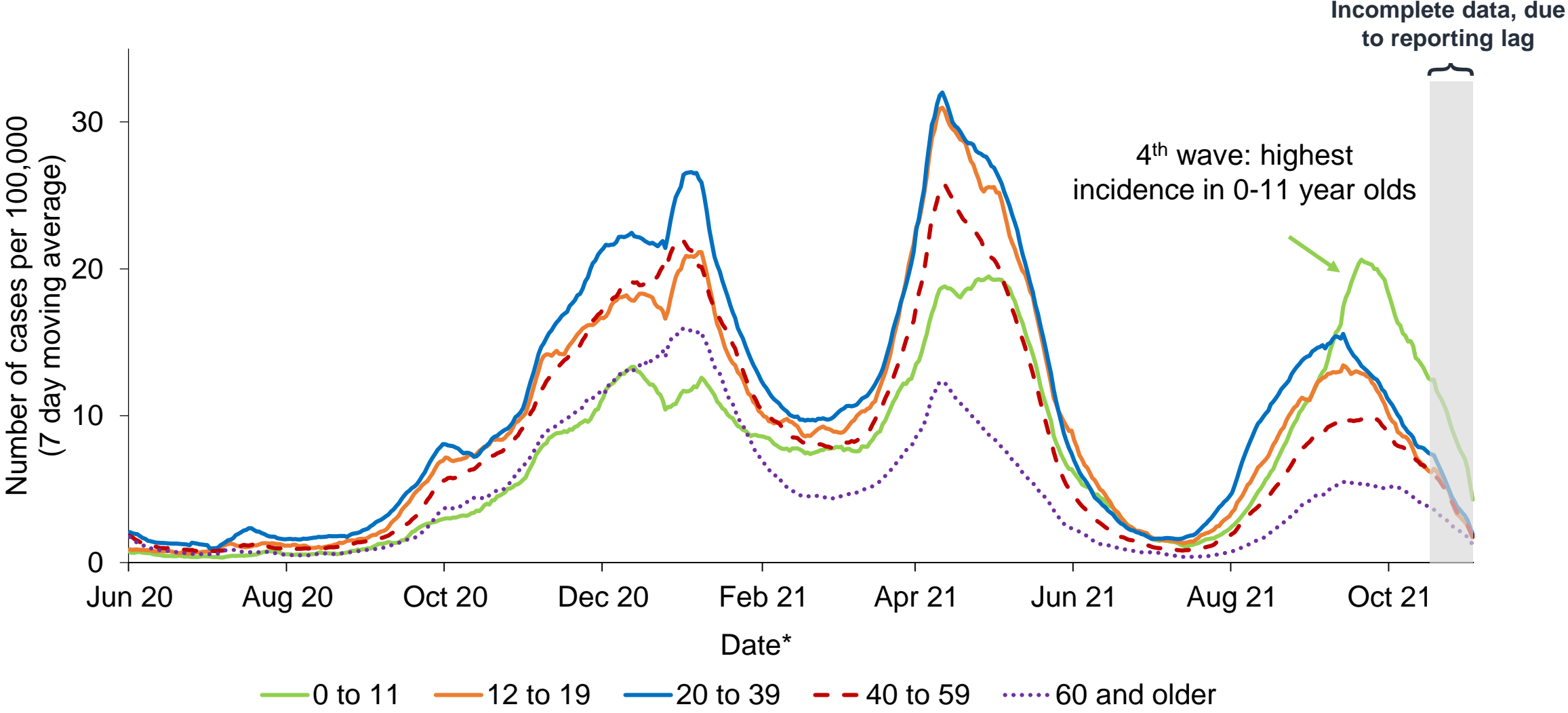
Note: Daily cases trend lines reflect 7-day moving averages. Total number in hospitals include all people in hospital on that day.

Canada's R_t has remained below 1 for six weeks, indicating the epidemic has remained out of a growth pattern at the national level



Data as of November 1, 2021
Note: 7-day moving average.

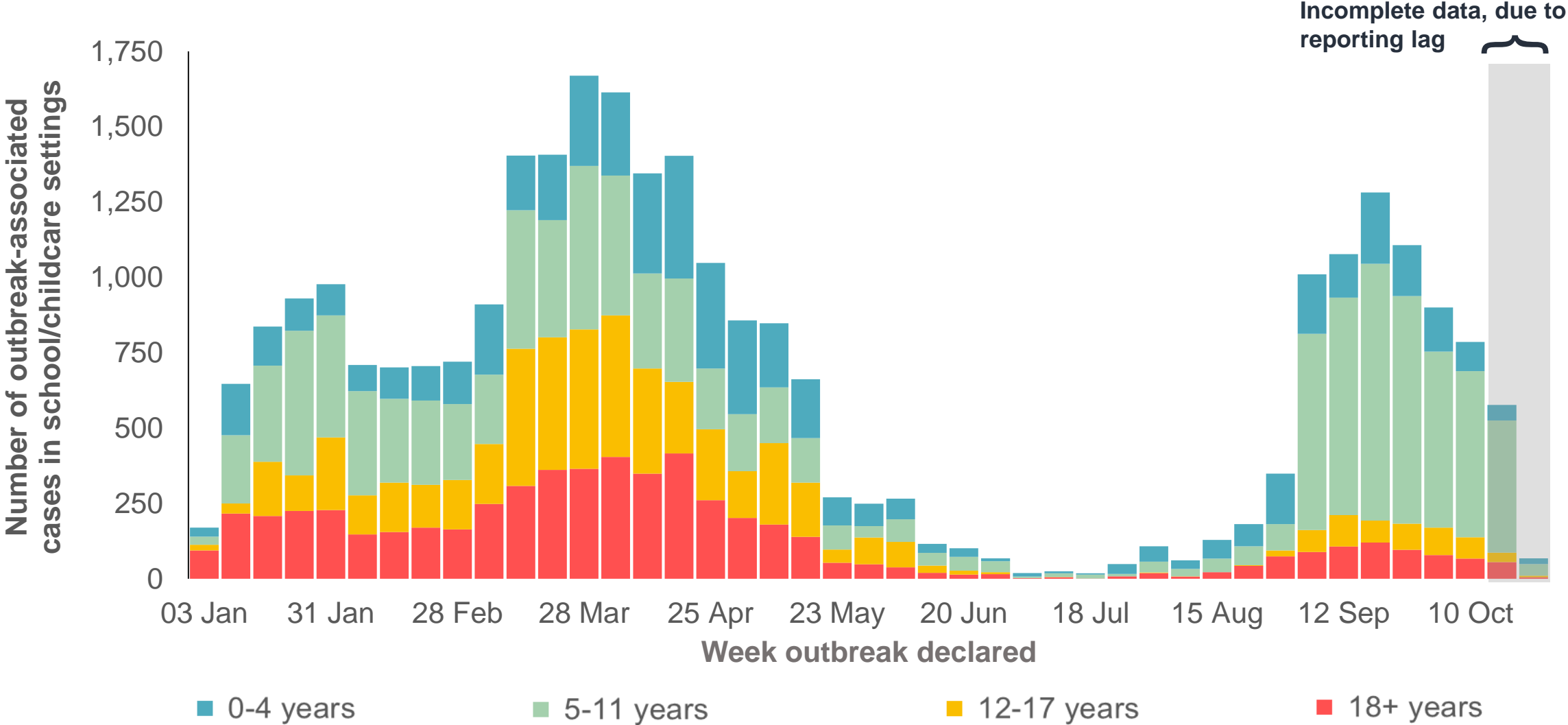
Nationally, incidence of reported cases is now highest among children under 12 years of age, as the large majority of eligible age groups is now fully vaccinated



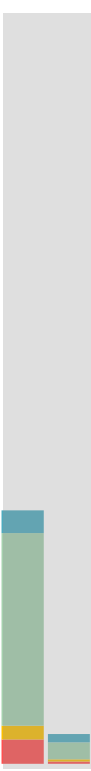
Data as of November 2, 2021.
Source: Detailed case data submitted to PHAC by the provinces and territories.
*The earliest of symptom onset date, lab specimen collection date, lab result date, date reported to province or territory, and date reported to PHAC.



Outbreaks in schools and childcare settings remain small in size and predominantly involve children under 12 years of age



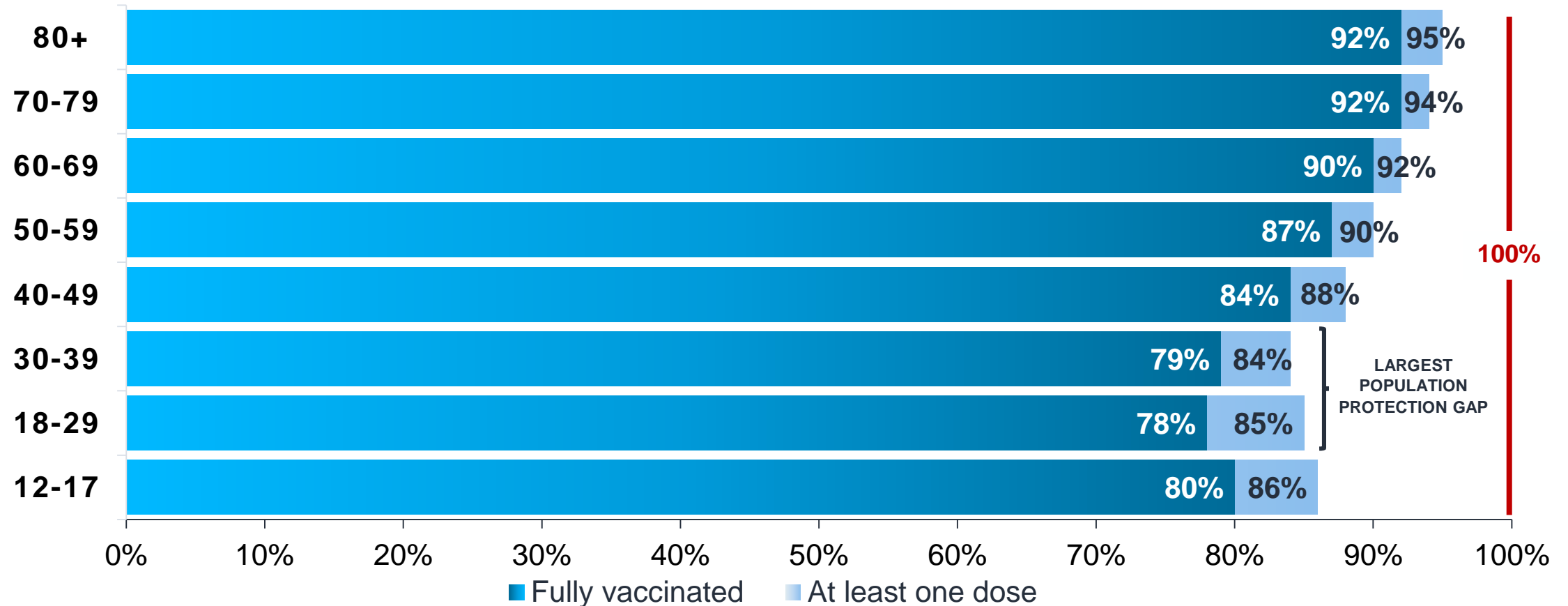
Incomplete data, due to reporting lag



Data as of October 30, 2021 based on COVID-19 outbreaks and cases in school and childcare settings reported from Ontario and Quebec.

Vaccine coverage continues to increase, though there is room for improvement among the younger age groups

Percentage of eligible people (≥ 12 years) with at least one dose and fully vaccinated by age group, as of October 30th, 2021

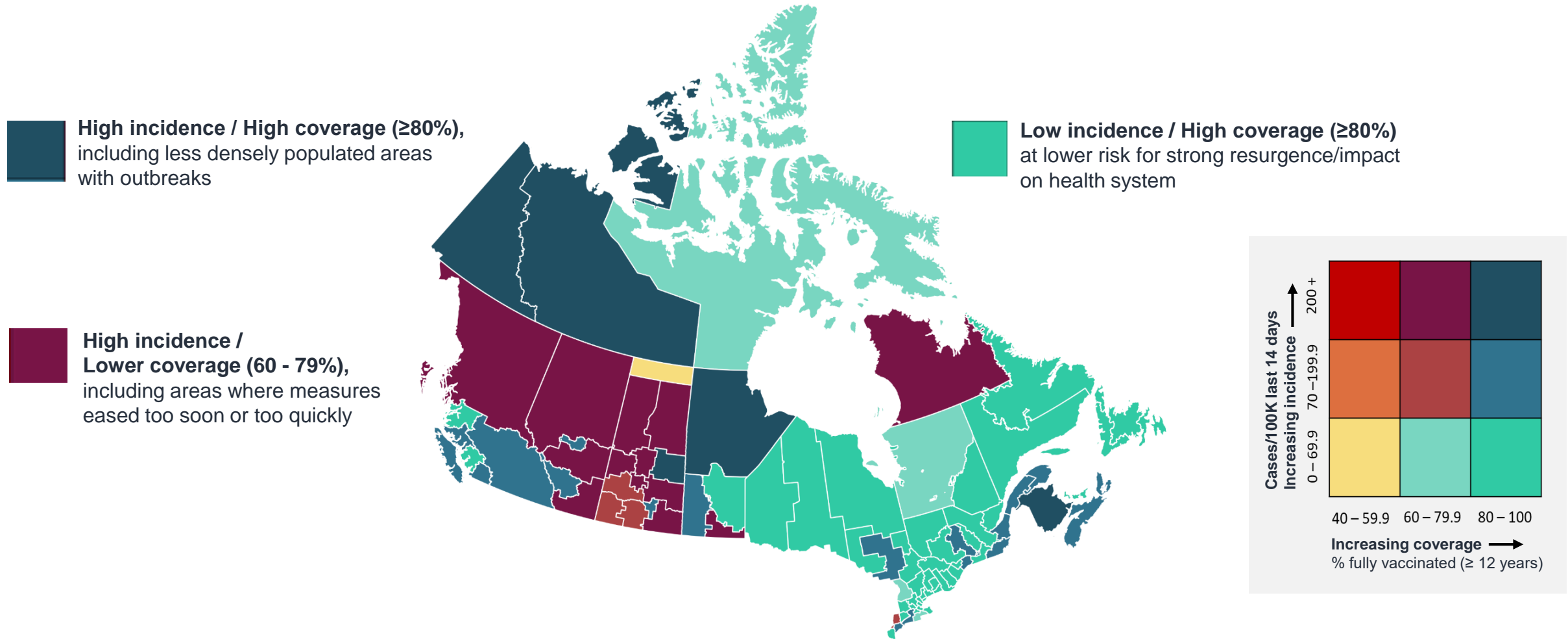


Data as of October 30, 2021

Note: Data obtained from the Canadian COVID-19 Vaccination Coverage Surveillance System



Health regions with lower vaccination coverage are at greater risk of high infection rates and strain on the health system



Data as of November 2nd, 2021

Note: Map only shows COVID-19 cases where health region had been attributed in source data. In some jurisdictions, coverage may be overestimated due to the inclusion of non-residents among the vaccinated. This effect is more prominent in less populated regions. Data sources: COVID-19 Vaccine Tracker

(<https://covid19tracker.ca/vaccinationtracker.html>), COVID-19 Canada Open Data Working Group (<https://github.com/ccodwg/Covid19Canada>) and Données Québec.

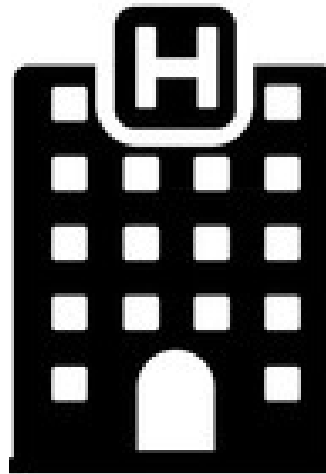
Surveillance data demonstrate substantial protection of COVID-19 vaccines against severe illness, particularly among younger age groups

Unvaccinated people are significantly more likely to be hospitalized with COVID-19 compared to fully vaccinated people

Among youth and adults aged 12 to 59 years, unvaccinated people were

51 times

more likely to be hospitalized with COVID-19 than fully vaccinated people



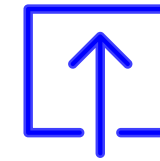
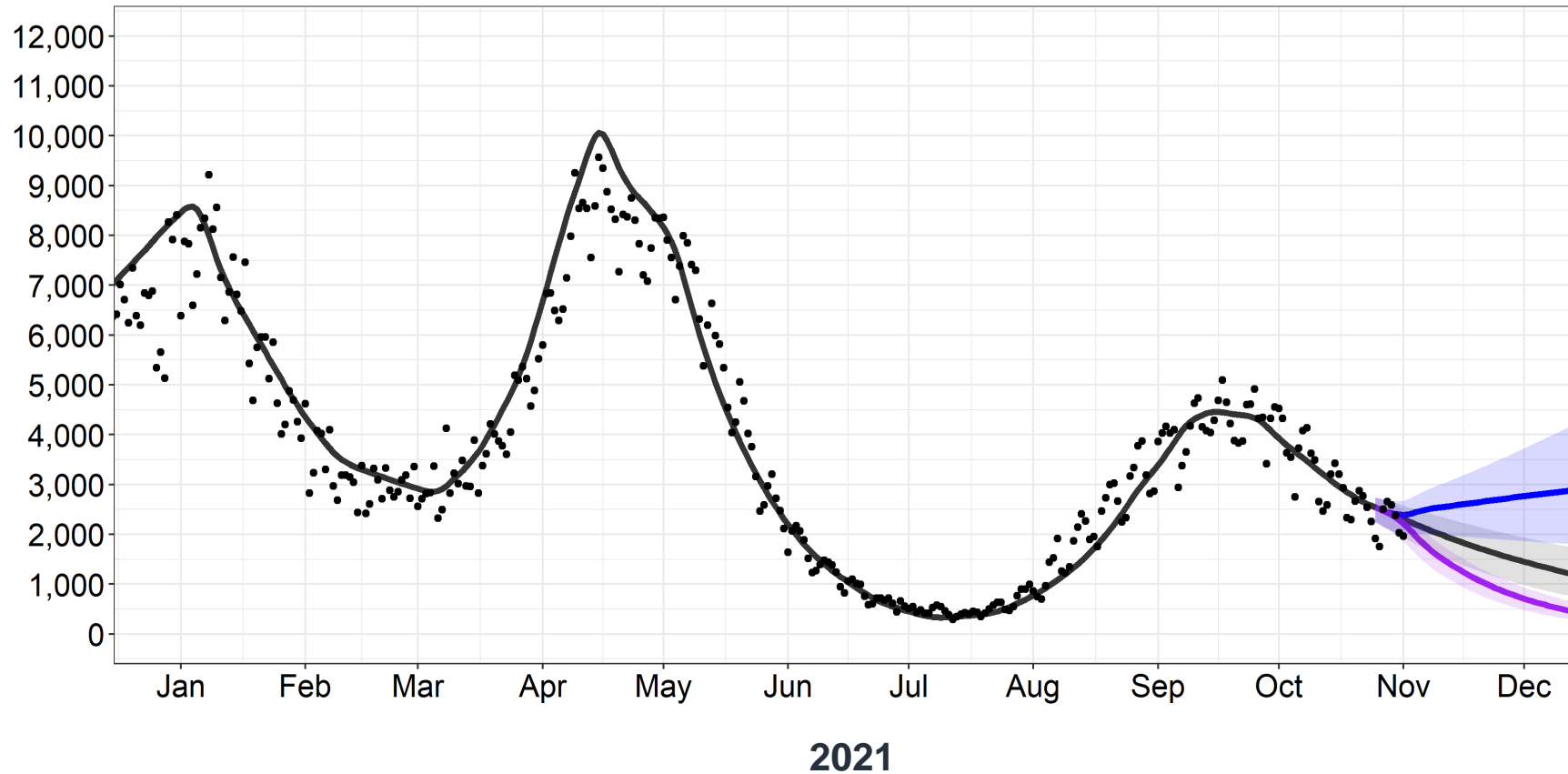
Among older adults aged 60 years or older, unvaccinated people were

19 times

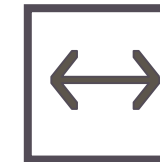
more likely to be hospitalized with COVID-19 than fully vaccinated people

Longer-range forecast suggests that cases could continue to decline if current levels of transmission are maintained

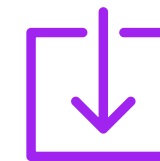
Reported cases



If transmission **increases** by 15%



If we **maintain** the current levels of transmission



If public health measures **reduce** transmission by 15%

Data as of November 1, 2021

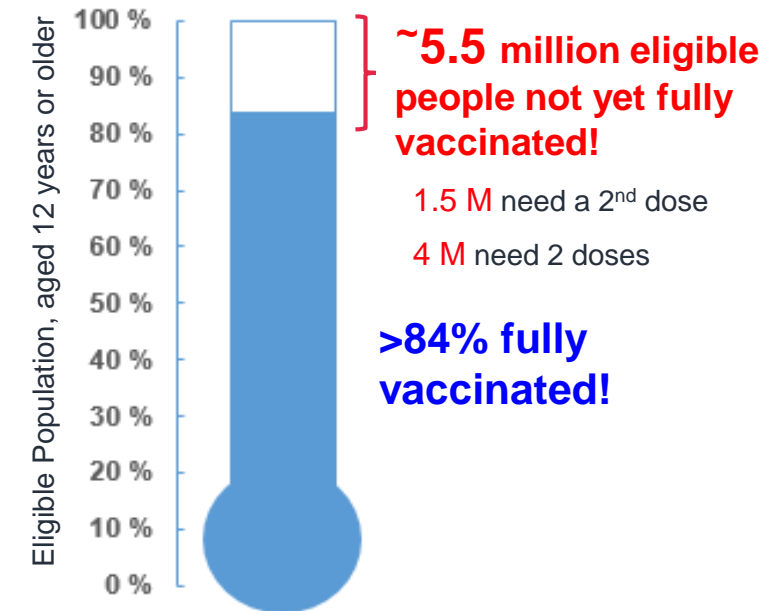
Note: Output from PHAC-McMaster model. Model considers impact of vaccination and increased transmissibility of VOCs (including Delta), refer to annex for detailed assumptions on modelling.

Layers of protection remain important for managing COVID-19 and other respiratory infections over the coming months

- The longer-term forecast reaffirms the importance of public health and personal protective measures, even at current levels of vaccination coverage.
- Along with COVID-19, the winter months may bring some additional challenges as other respiratory infections make a comeback.
- **COVID-19 vaccines continue to provide excellent protection against severe illness**, but with less protection against infection and the presence of a highly transmissible Delta variant, we need to keep up with additional precautions.
- **This fall and winter, the same as we layer up for warmth, Canadians are urged to layer protections against respiratory infections.**
 - Get your COVID-19 vaccines, annual flu shot, and other routine vaccines as an essential base layer of protection.
 - Wear face masks, improve indoor ventilation, and avoid crowding for added protection.
 - Follow local public health advice as COVID-19 activity is not the same everywhere.

58.9 MILLION+ vaccines given in Canada
28 MILLION+ Canadians fully vaccinated!

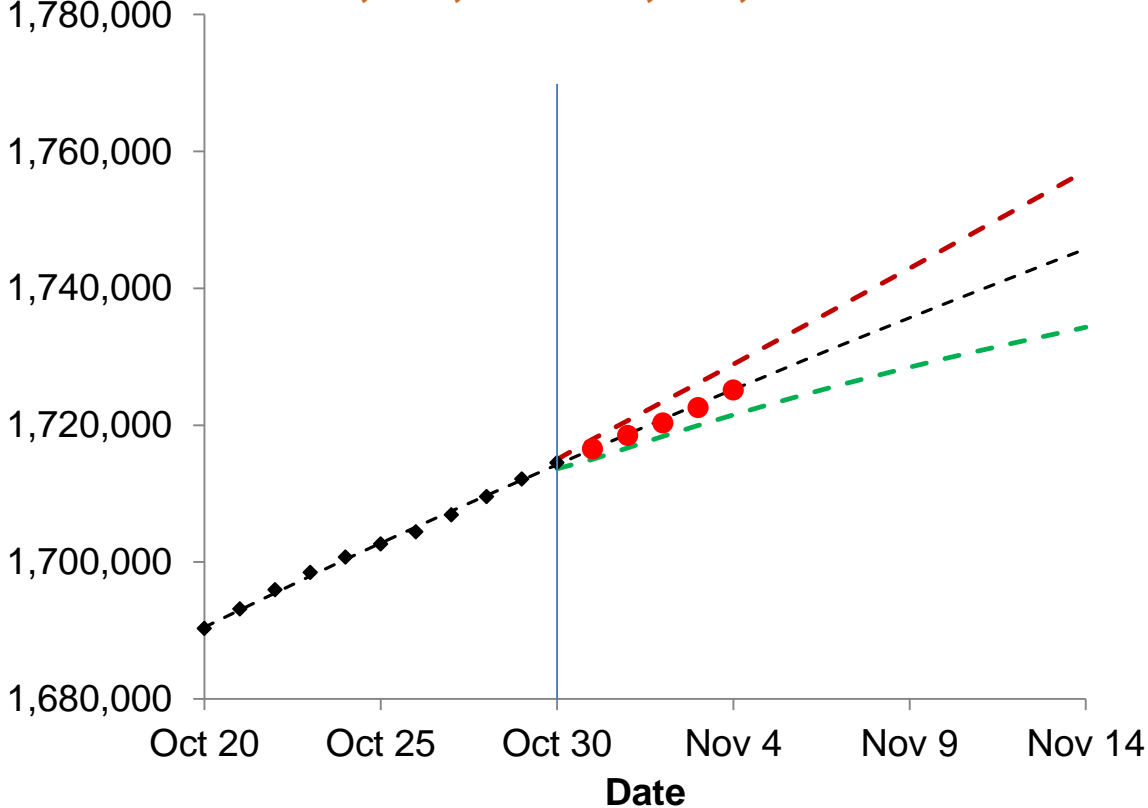
🧡 THANK YOU!! 🧡



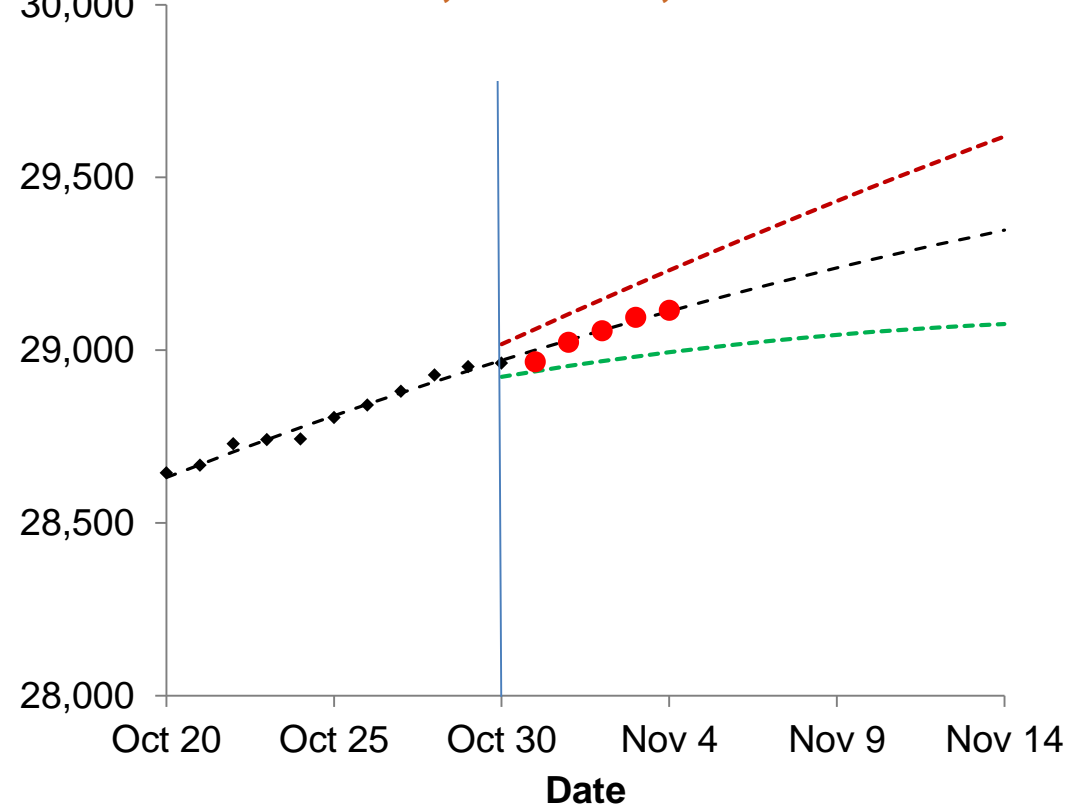
ANNEX

Short-term forecast predicts steady increases in cumulative cases and cumulative deaths

Cumulative cases predicted to November 14, 2021:
1,734,290 to 1,757,170



Cumulative deaths predicted to November 14, 2021:
29,075 to 29,620

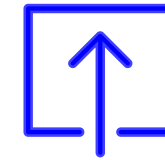
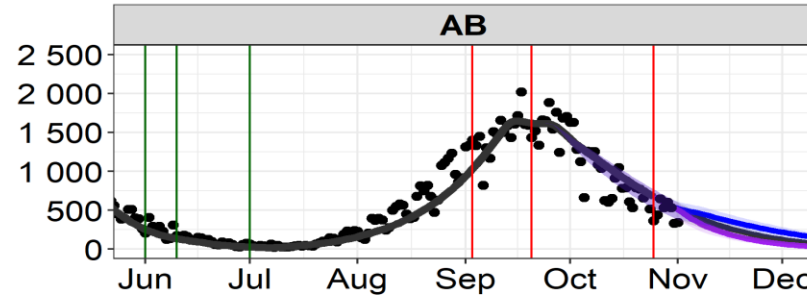
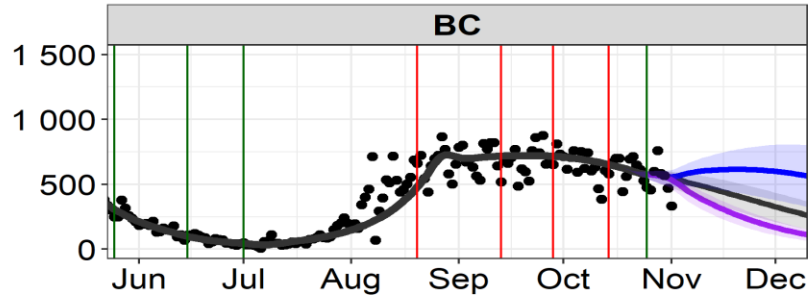


- ◆ Cumulatively reported cases in Canada by Oct 30
- Cases added since Oct 30 when the prediction was made
- Prediction to November 14
- - - Lower 95% prediction limit
- - - Upper 95% prediction limit

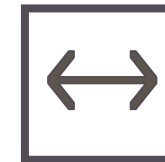
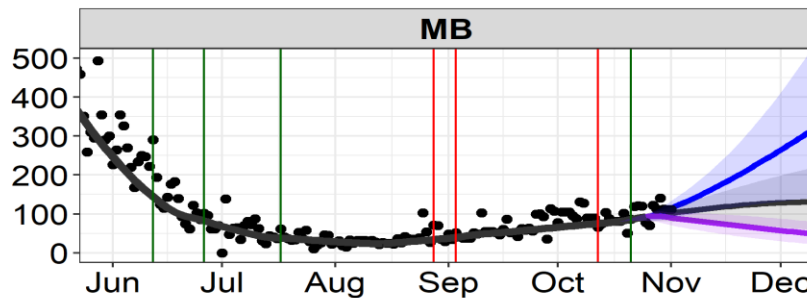
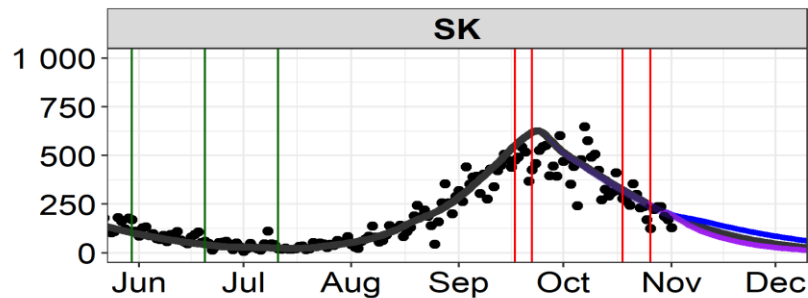
Data as of October 30, 2021
 Note: Extrapolation based on recent trends using a forecasting model (with ranges of uncertainty).

Longer-range forecasts suggest cases will decline in most provinces

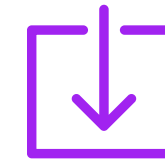
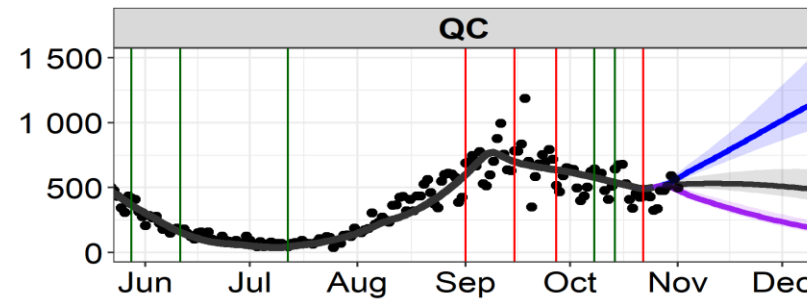
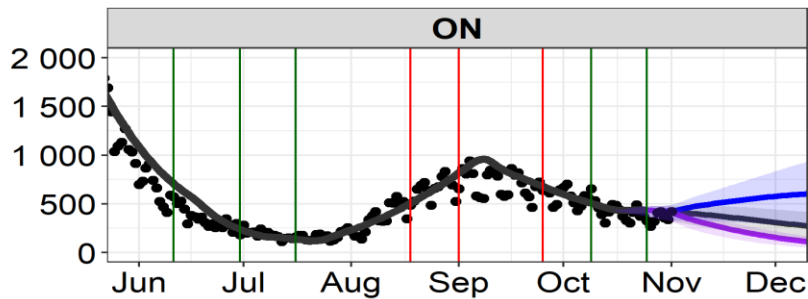
Reported cases



If transmission **increases** by 15%



If we **maintain** the current levels of transmission



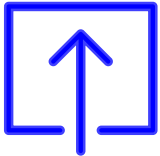
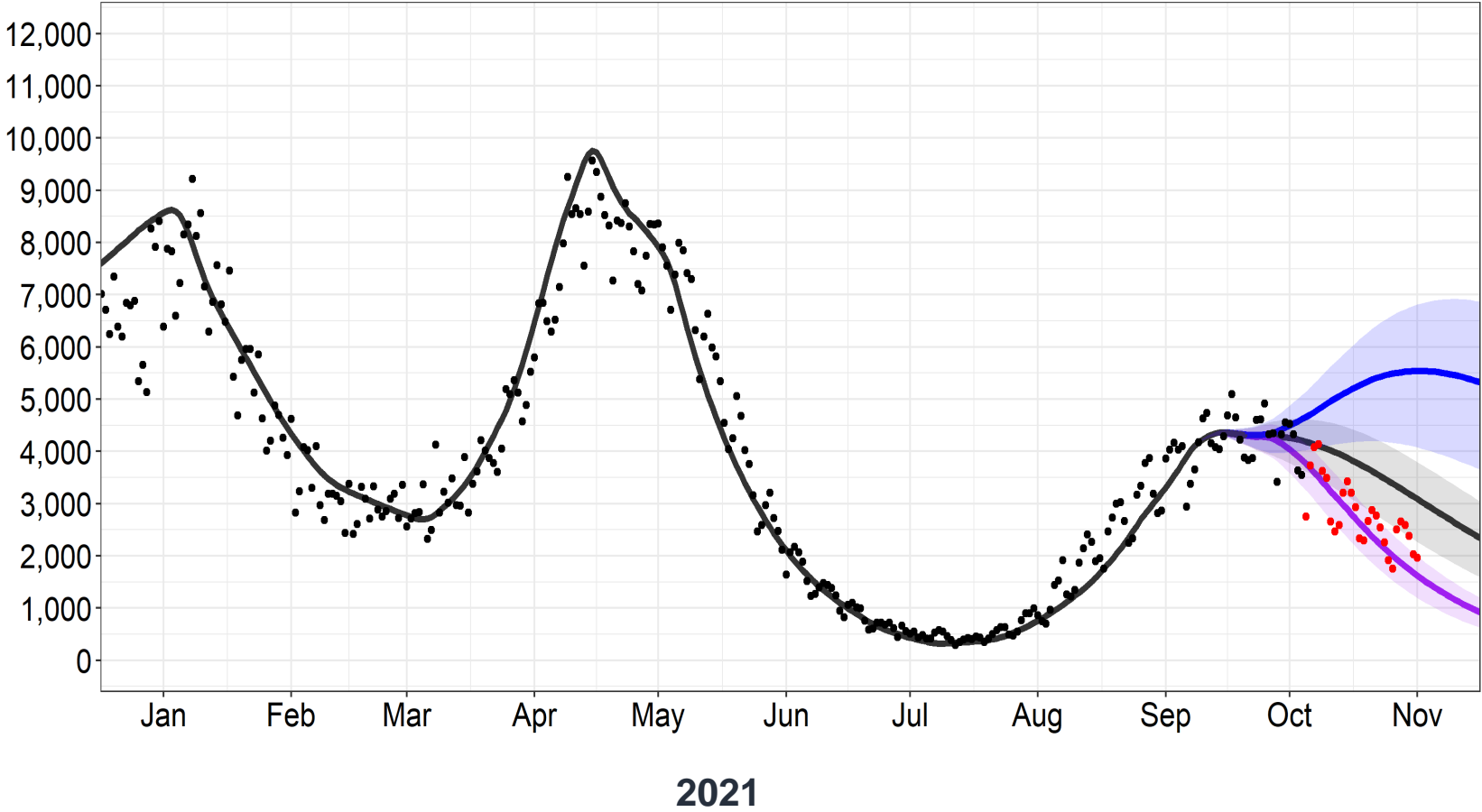
If public health measures **reduce** transmission by 15%

Data as of November 1, 2021

Note: Output from PHAC-McMaster model. Model considers impact of vaccination and increased transmissibility of VOCs (including Delta), refer to annex for detailed assumptions on modelling. In provincial plots, dark green vertical lines represent reopening/lifting measures. Solid red vertical lines represent reimplementing/reinforcement of public health measures.

Since October 8th forecast, cases have decreased along the reduction in transmission trajectory (purple)

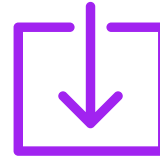
Reported cases



If transmission **increases** by 15%



If we **maintain** the current levels of transmission



If public health measures **reduce** transmission by 15%

Red points – Surveillance data after the forecast from Oct 4th to Nov 1st

Model data as of Oct 4th, 2021. Surveillance data as of November 1st, 2021.

Note: Output from PHAC-McMaster model. Model considers impact of vaccination and increased transmissibility of VOCs (including Delta), refer to annex for detailed assumptions on modelling.



Types of models used to inform decision making

Statistical forecast models:

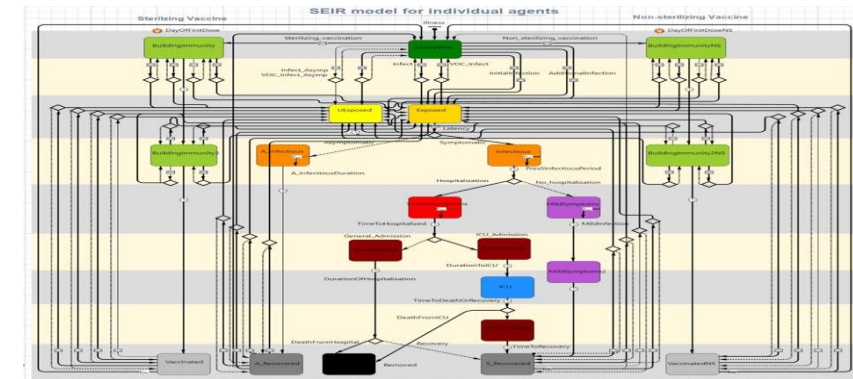
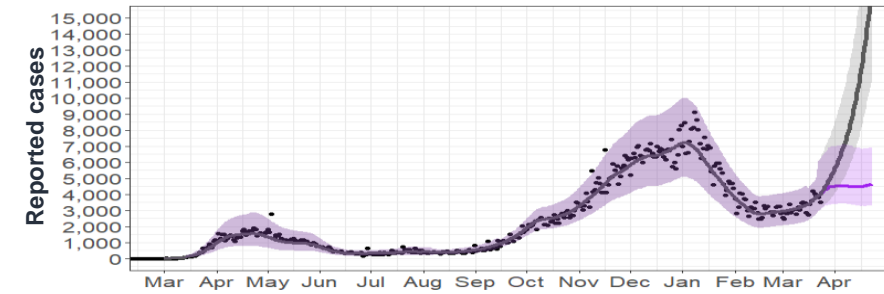
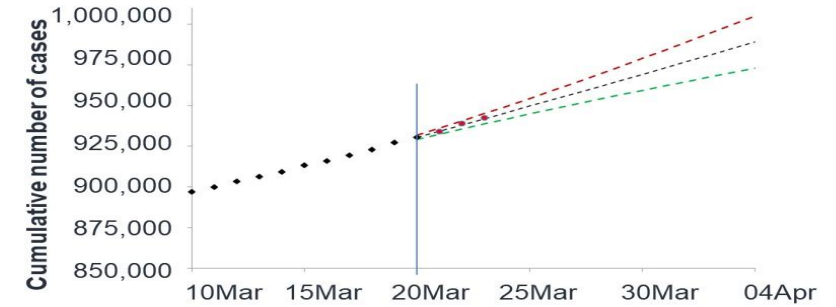
- Short-range forecast of expected cases given recent incidence

Long-range forecast models:

- Dynamic compartment model adapted to project near-future given recent incidence and scenarios for control/release/variants of concern

Models to explore scenarios of opening up:

- More complex models
 - Deterministic, age structured compartment model
 - Agent-based model
- Initially developed to model control measures needed
- Recently adapted to model effects of vaccination and transmission of VOC



Longer-range forecasting model assumptions

- The forecast uses a compartmental model reflecting the biology of COVID-19 and public health response developed by PHAC in collaboration with McMaster University. It projects the near future given recent incidence of COVID-19 and scenarios for public health measures, variants of concern and vaccination.
- The model assumes that the B.1.617.2 (Delta) VOC is 50% more transmissible compared to B.1.1.7 (Alpha). This value is used to estimate the rate at which VOCs replace existing strains.
- Delta is considered to have been introduced in mid-March at very low prevalence. The proportion of cases due to VOCs are indirectly fitted when calibrating to data, but are assumed to dominate at present.
- Dark green vertical lines represent previous stages of re-opening/lifting measures. Red solid vertical lines represent reimplementation/reinforcement of public health measures.
- The national forecast includes three scenarios for changes in the effective transmission rate as of the latest public health measure in place for each province. This includes a line showing the expected change in cases if effective transmission rates do not increase (grey line); a line that assumes effective transmission increases by 15% (blue line); and a line that assumes effective transmission decreases by 15% (purple line). There are uncertainties with the amount of transmission in the forecasting scenarios.
- The PHAC-McMaster model forecast includes current vaccine roll-out, including an assumption that vaccinations are 60% effective against infection after one dose and 90% after second dose for all variants except for Delta (30% after one dose and 80% after second dose). The vaccine projections assume 5% for first dose and 8% for second dose hesitancy of the eligible population.