



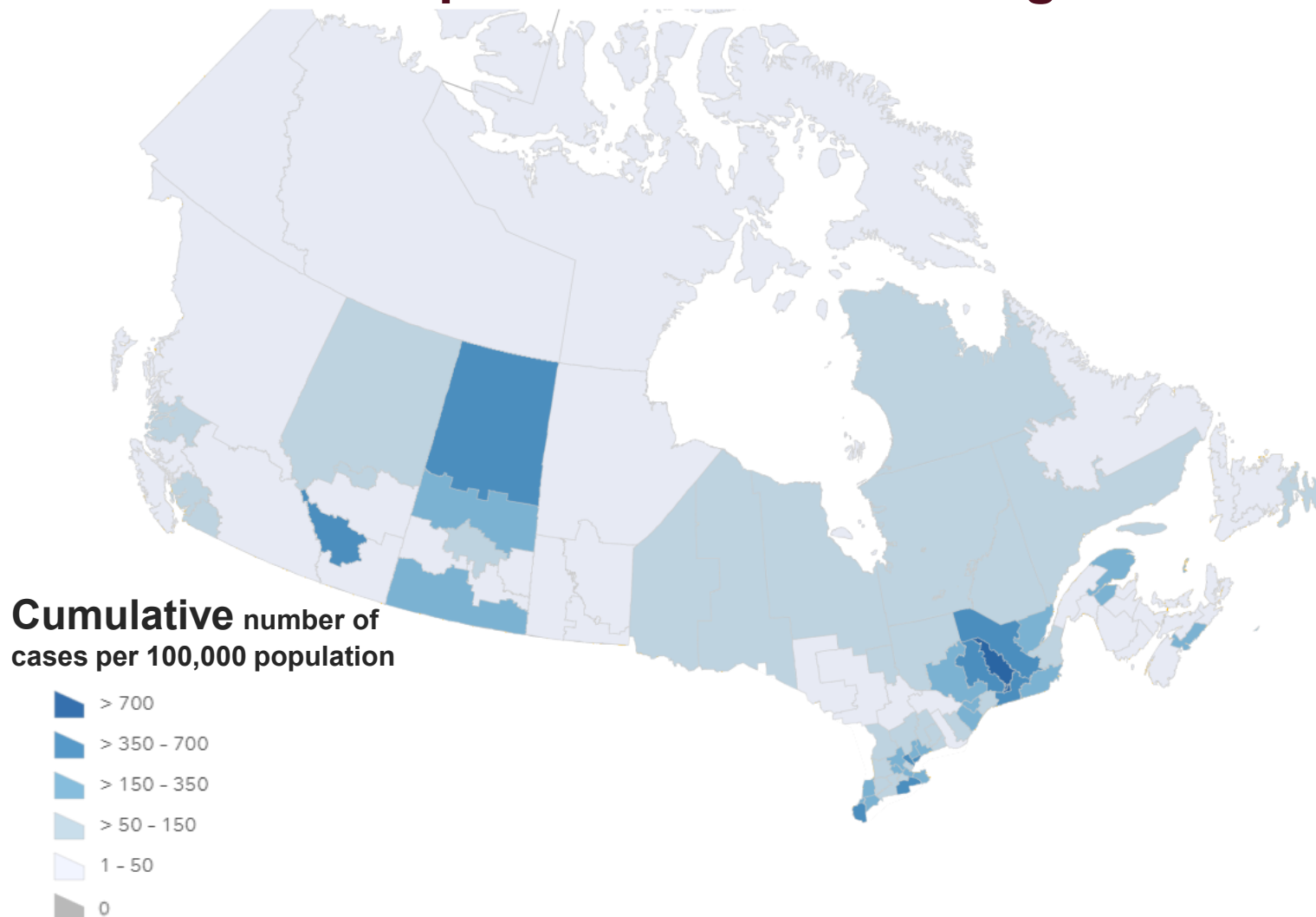
Update on COVID-19 in Canada: Epidemiology and Modelling

July 8, 2020



EPIDEMIOLOGY

COVID-19 has impacted some health regions more than others



Median age (range)	49 years (<1 to 112)
Females	58,495 (56%)
Males	45,930 (44%)
Other gender	17 (<1%)

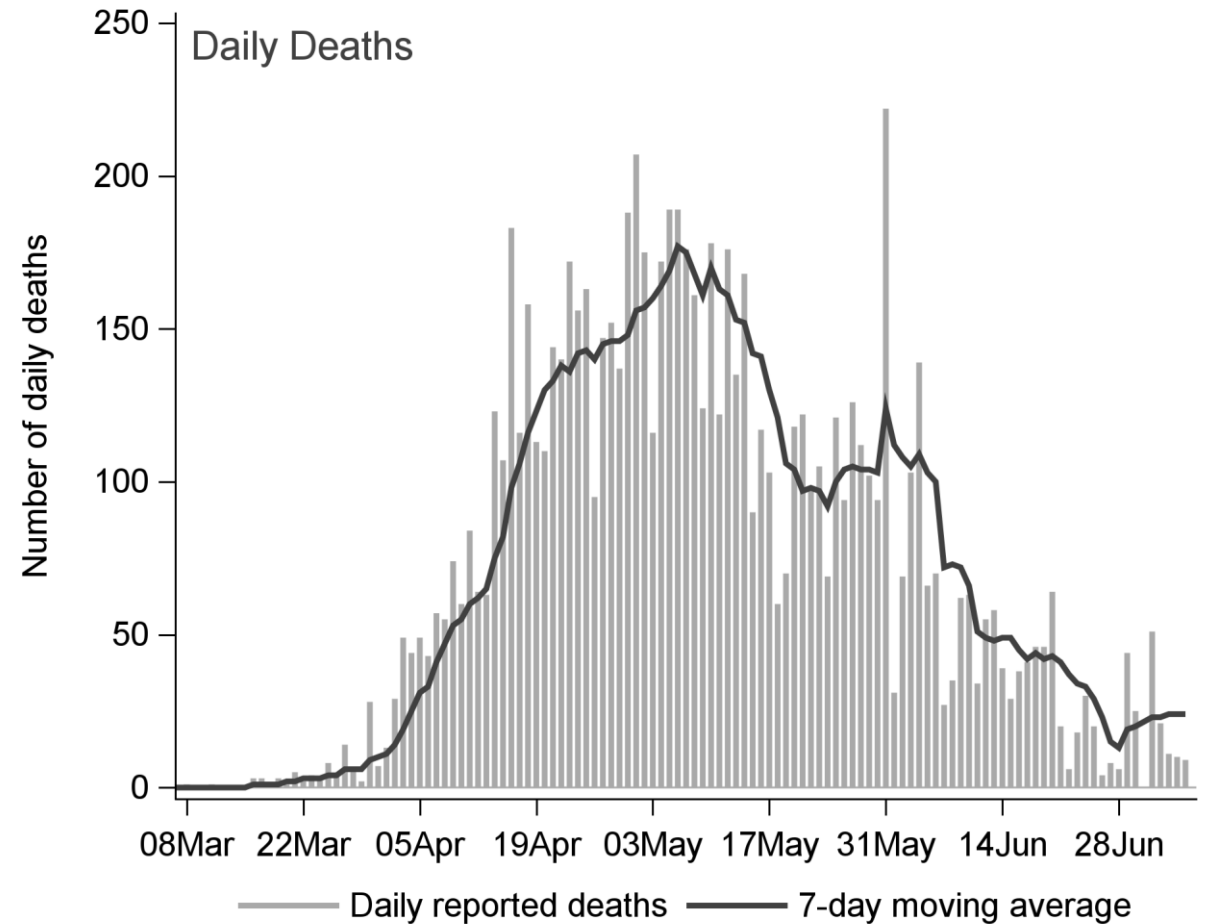
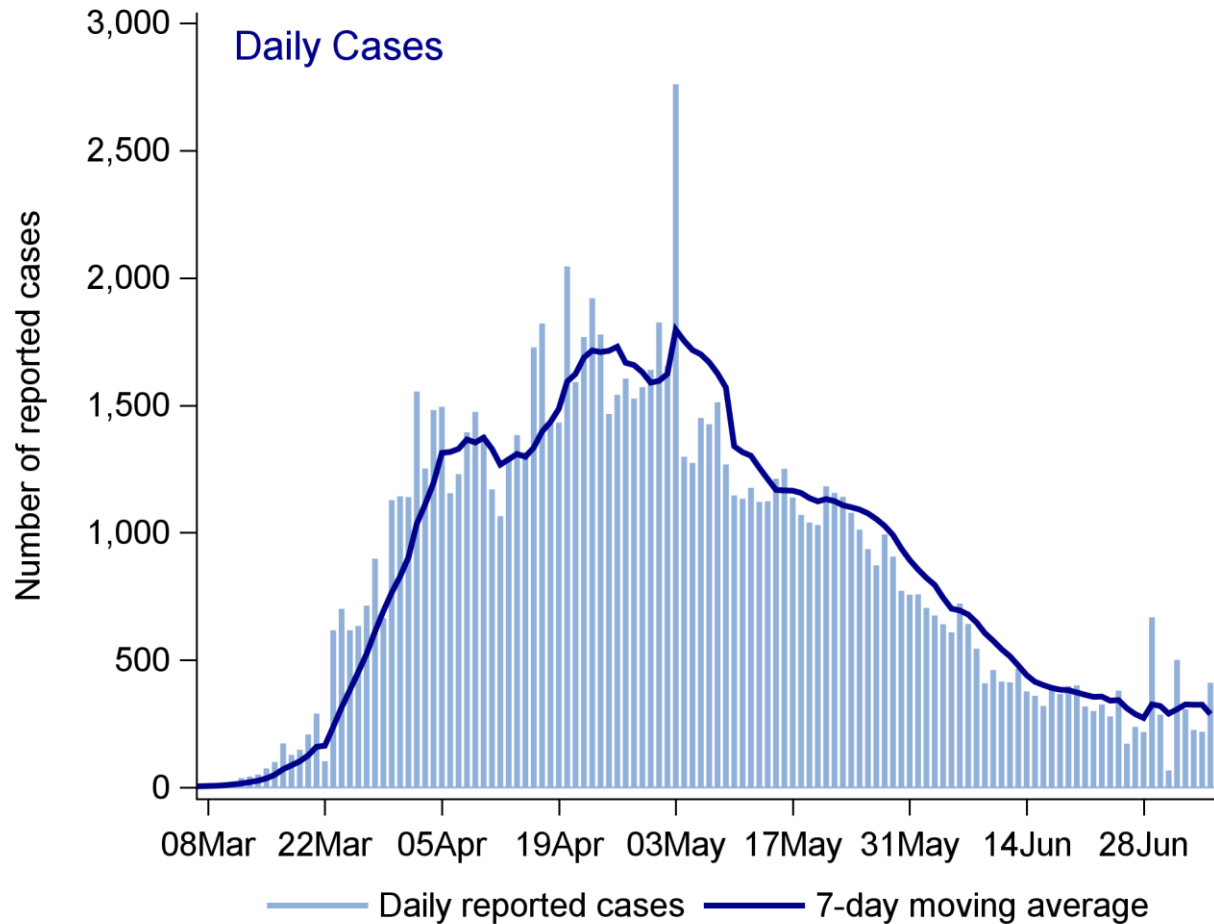
Age and gender available for 103,996 and 104,442 cases, respectively, as of July 6.

Deaths	8,693 (8%) [¥]
Hospitalizations	10,392 (15%)*
ICU Admissions	2,128 (3%)*

[¥] Of 105,935 total cases as of July 6.
 * Of 69,289 case reports for which the hospitalization fields were completed.

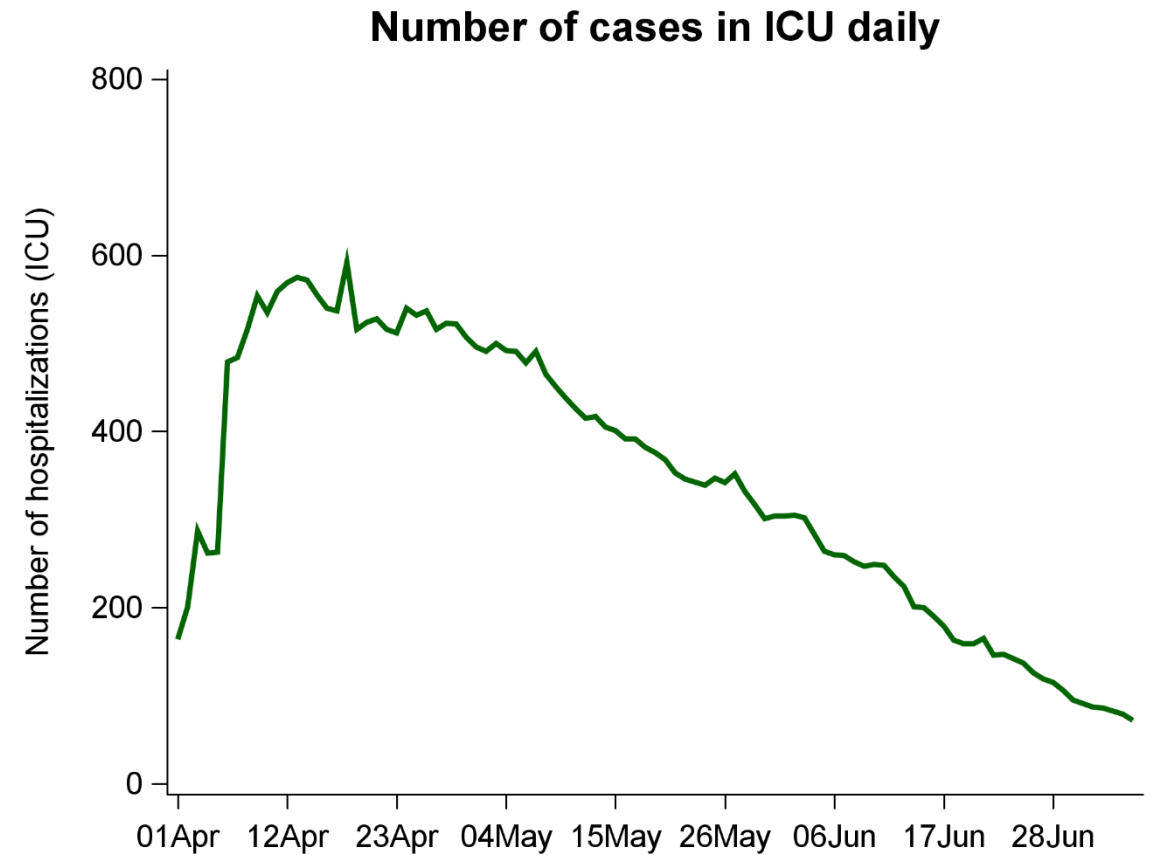
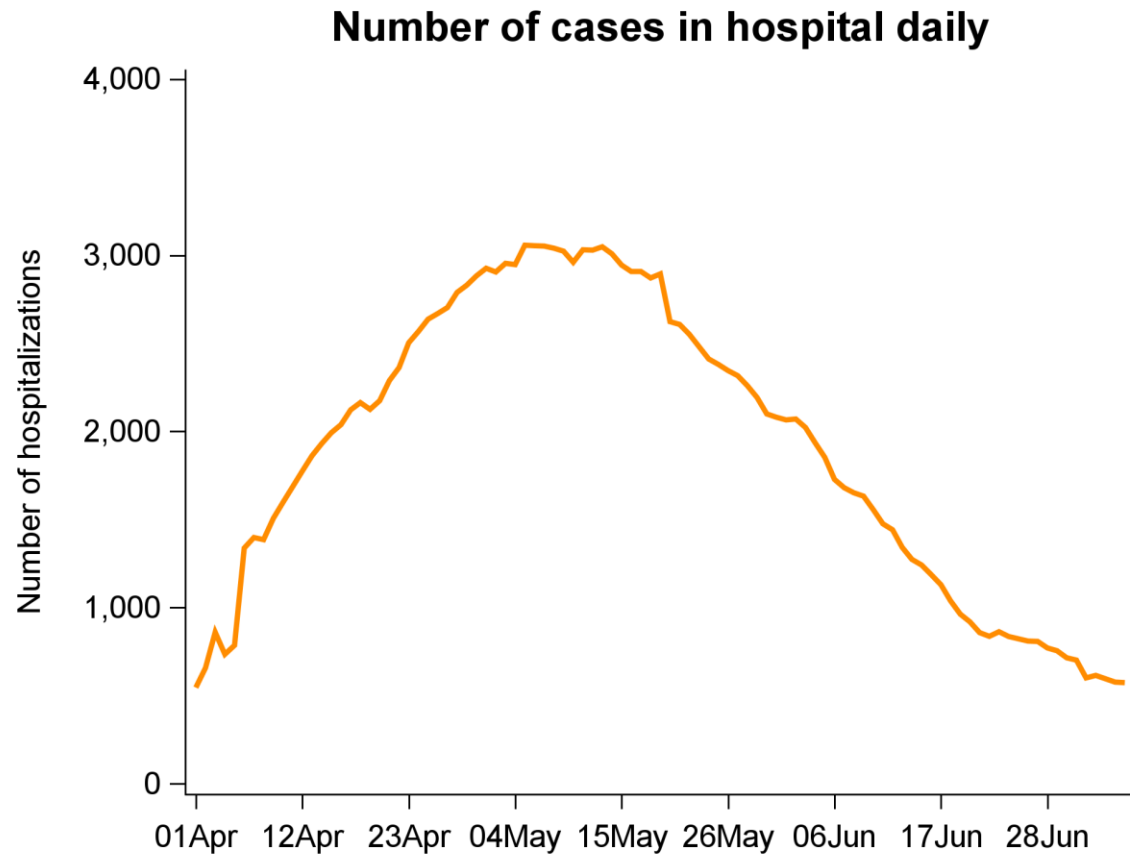
Data as of July 6, 2020 at 11:00 am
 Credit: A collaboration between Public Health Agency of Canada, Statistics Canada & Natural Resources Canada. Powered by: ESRI Canada and Amazon Web Services (AWS). Data source: Berry I, Soucy J-PR, Tuite A, Fisman D. Open access epidemiologic data and an interactive dashboard to monitor the COVID-19 outbreak in Canada.

Indicators of COVID-19 transmission show steady decline nationally



- Daily number of reported cases and deaths have been **declining steadily**
- **Recent small spikes** are largely attributable to **localised outbreaks**

Indicators of severity of COVID-19 infection also show steady decline nationally

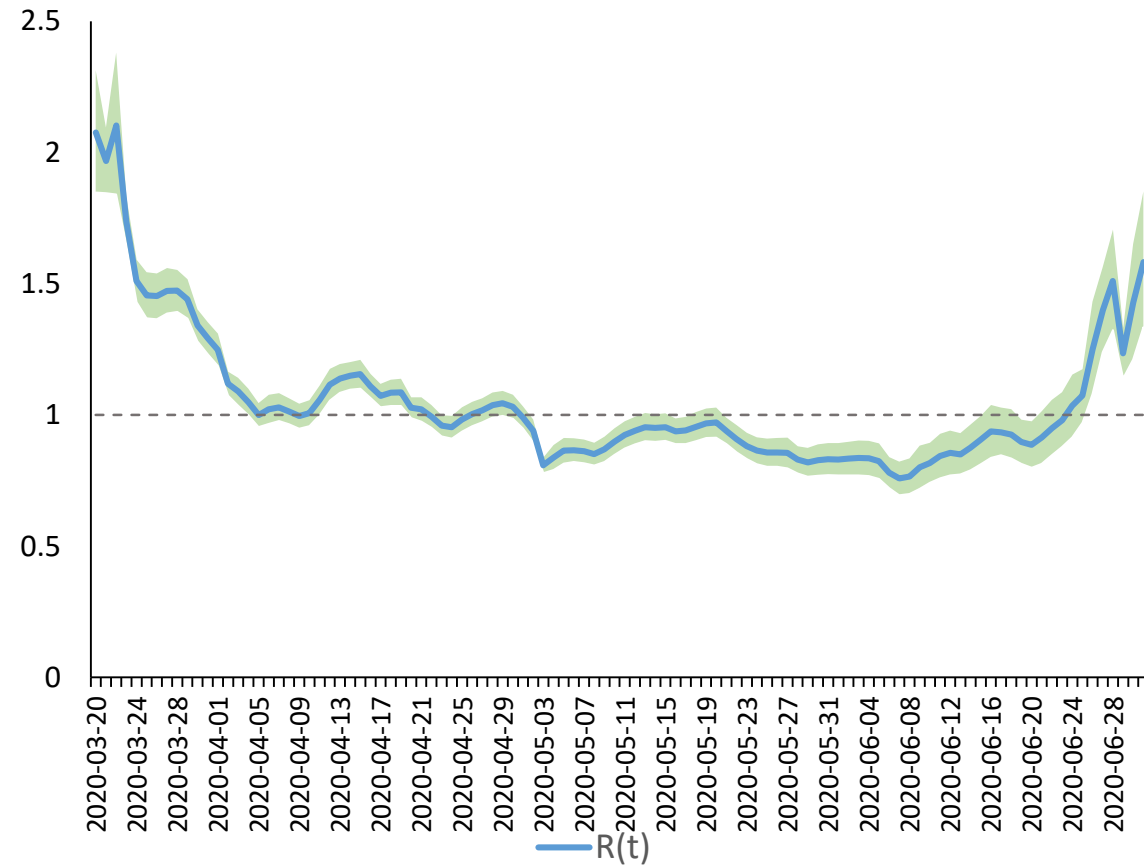


- Daily numbers of hospitalised and critical care cases **steadily declining**
- Recoveries increasing and admission rates declining

Data as of July 6, 2020, x-axis represent date of report

Recent fluctuations in Canada's R_t are driven by localised outbreaks

Canada's R_t over time



Data as of July 3, 2020
Calculations are based on date of case report

R_t , or the time varying effective reproduction number, represents the average number of people infected by each case

$R_t > 1$ is an indication the epidemic is growing

$R_t < 1$ is an indication the epidemic is being brought under control

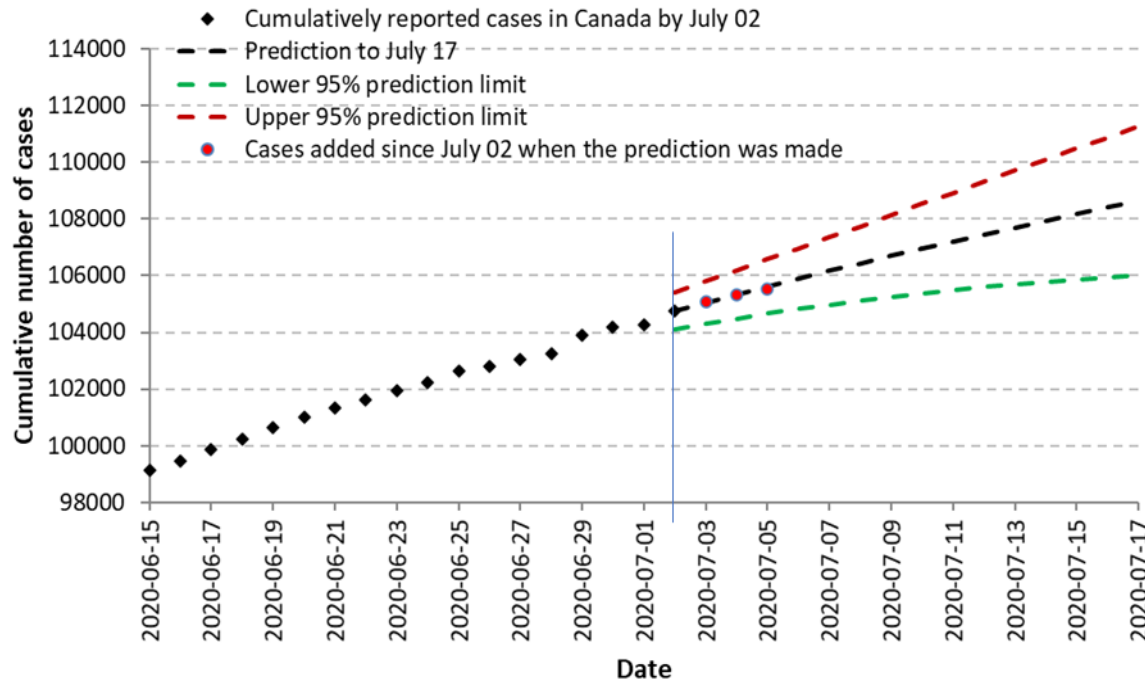
Canada's R_t has been < 1 for most of the last ten weeks

Canada's effective reproduction number (R_t) has recently risen > 1

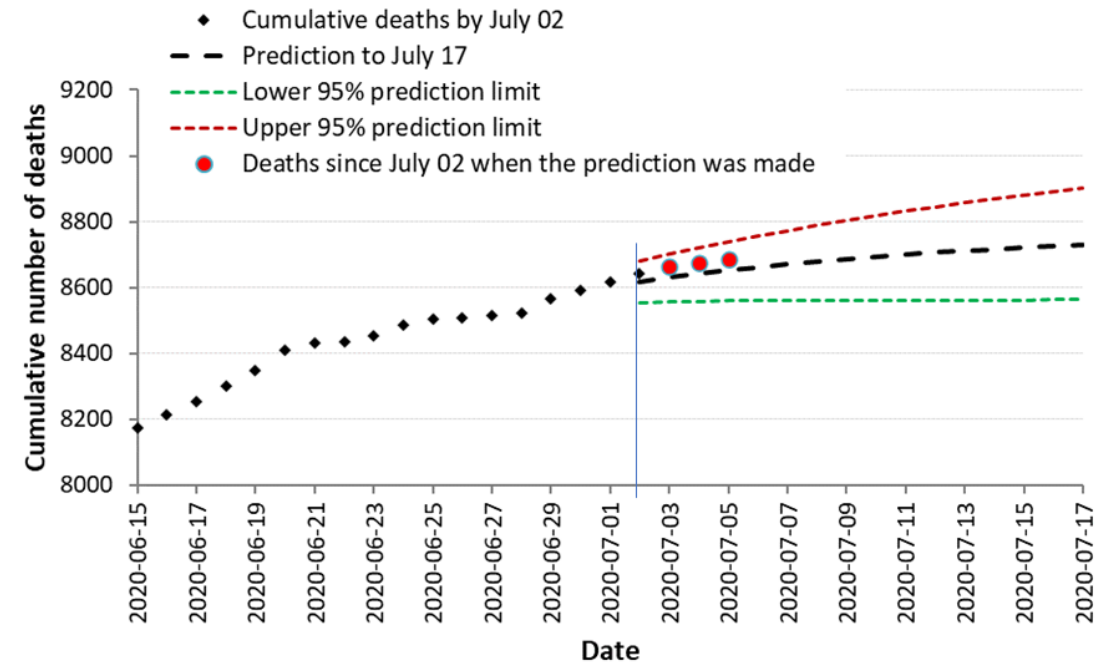
Community transmission remains low in most of the country and recent fluctuations in Canada's R_t reflect a small number of localised outbreaks.

Data driven models forecast short-term epidemic trajectory

Cumulative cases by July 17: from 106,015 to 111,260 based on data up to July 02



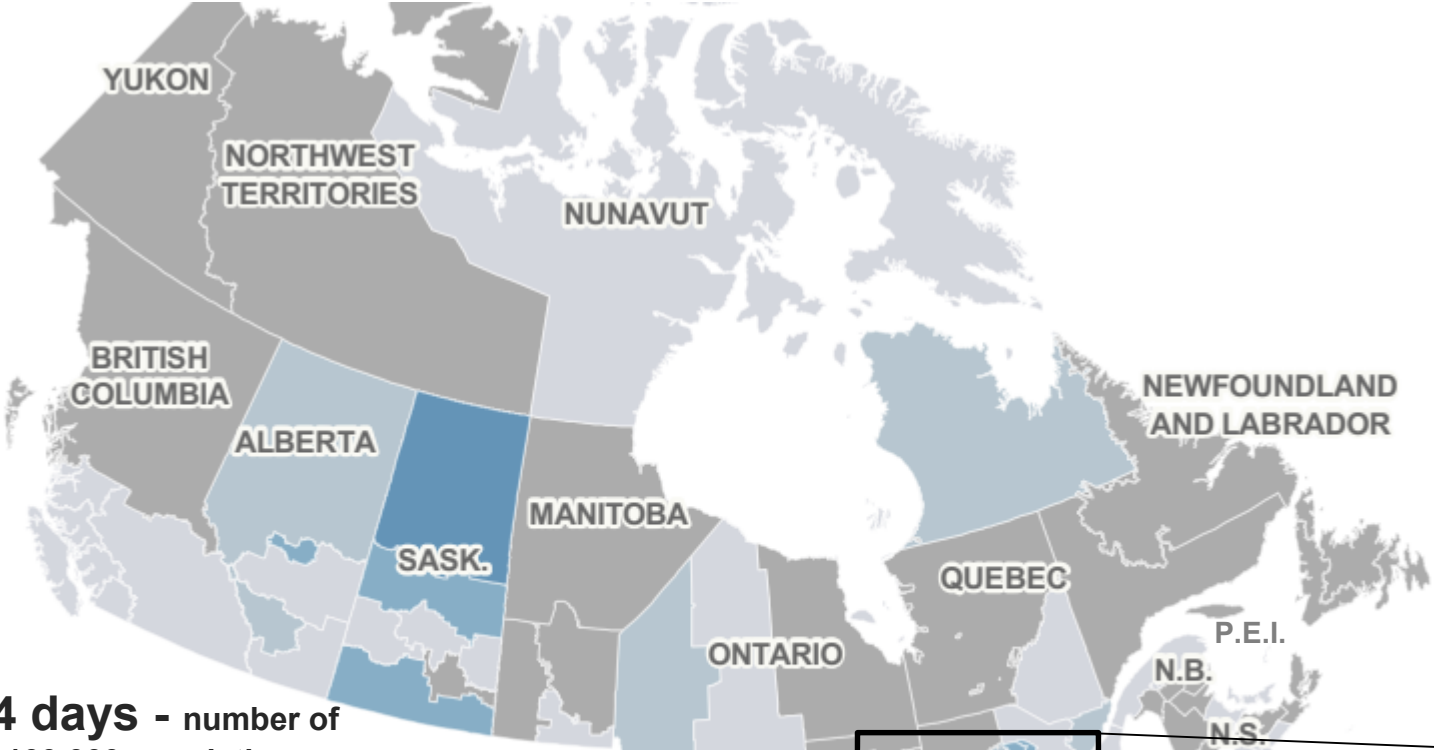
Cumulative deaths by July 17: from 8,560 to 8,900 based on data up to July 02



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

- The blue dotted line is the projected number of cases or deaths.
- The red dotted line is the upper limit and green line is the lower limit range that the projected number of cases and deaths for a given day.
- When the cases and deaths reported are between the red dotted line and green dotted line, they are within the forecasted range of expected cases and deaths

Recent trends reflect community transmission hot spots and localised outbreaks



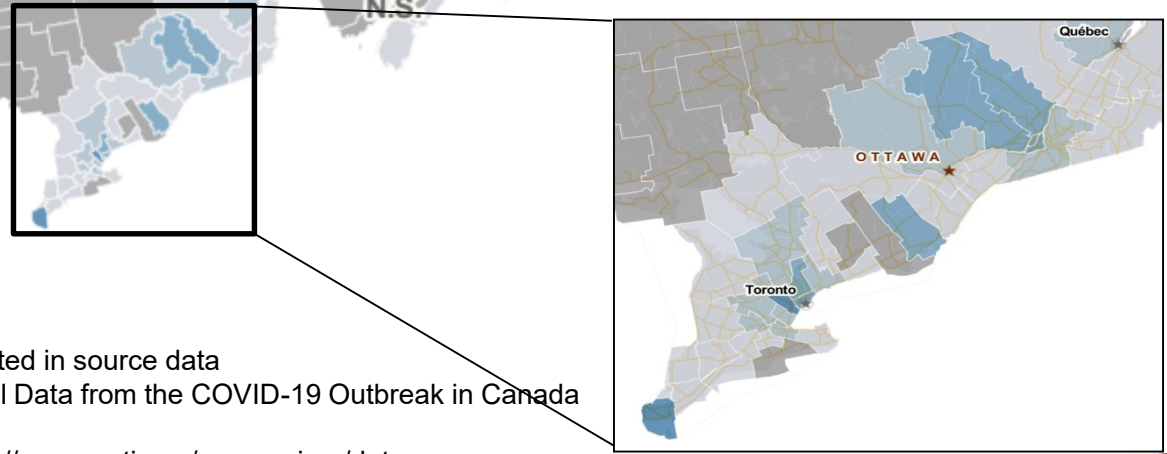
Past 14 days - number of cases per 100,000 population

- No reported cases
- > 0 - 7
- > 7 - 17
- > 17 - 40
- > 40 - 101

Data as of July 6, 2020

Note: Map only shows COVID-19 cases where health region had been attributed in source data
 Data sources: COVID-19 Canada Open Data Working Group. Epidemiological Data from the COVID-19 Outbreak in Canada
<https://github.com/ishaberry/Covid19Canada>
 Novel coronavirus (COVID-19) cases in Nova Scotia: data visualization. <https://novascotia.ca/coronavirus/data>

Health regions with highest number of cases per population in past 14 days	Cases per 100,000 population in past 14 days
Saskatchewan: Far North Ontario: Peel Region (Mississauga, Brampton, Caledon) and Windsor-Essex County	>40 - 101
Quebec: Montreal, Laval, Laurentides, Lanudiere Ontario: Toronto, York, Kingston, Frontenac, Lennox and Addington Alberta: Edmonton Saskatchewan: North, South (excluding Regina)	>17 - 40



Outbreaks point to vulnerabilities in closed and crowded settings

Outbreak Setting	Reported Number* of		
	Outbreaks	Cases	Deaths
Long-term care and seniors' homes	1,028	20,819	6,415
Hospitals	129	1,798	189
Correctional facilities	26	818	5
Meat and poultry plants	14	3,031	6
Agricultural work settings including those with congregate living for workers	24	1,242	4
Workplaces including those with congregate living for workers	73	846	3
Shelters	35	607	3

- Long-term care and retirement residences continue to account for the largest proportion of active outbreaks
- Congregate living and work settings account for a large proportion of outbreaks (eg. Agricultural work settings)
- Outbreaks have been linked to social gatherings, particularly in closed settings with close contacts (e.g., funerals, indoor family gatherings)

Data as of July 7, 2020

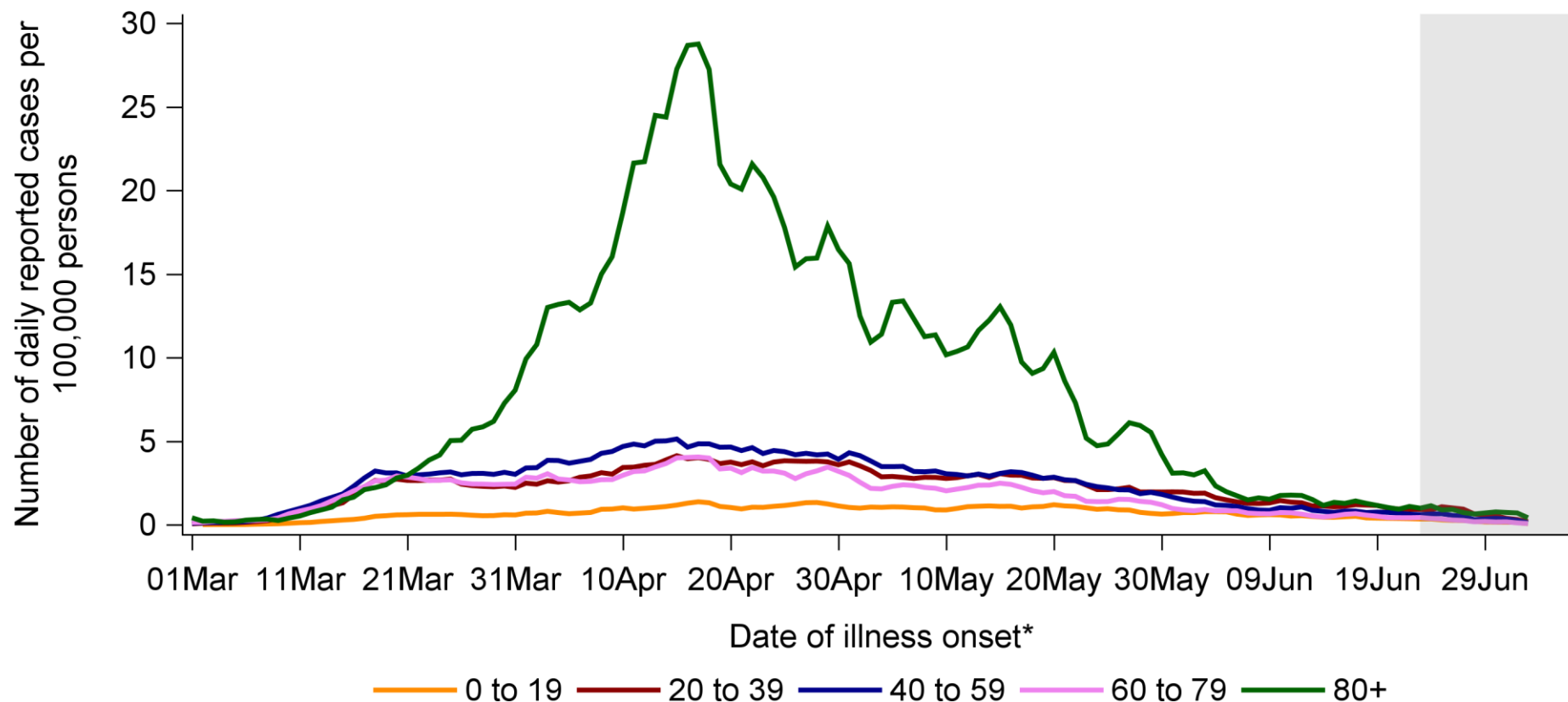
Estimates are based on public information sources and likely underestimate the true number of outbreaks and cases in these settings.

*Variables were remapped for accuracy, therefore there are differences in some of the numbers from the previous version.

Steepest declines in transmission observed among oldest age groups

Number of cases by date of illness onset and age group

Including 80+ age group

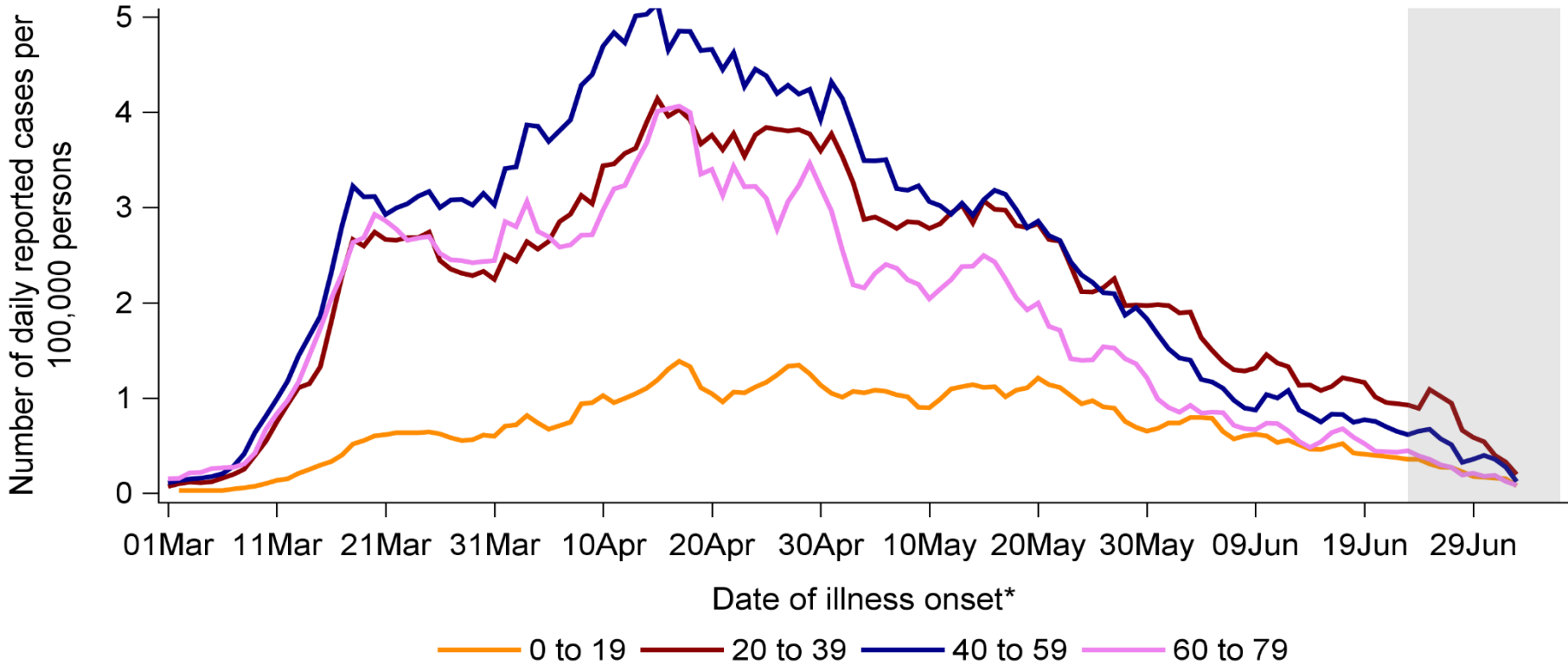


Data as of July 6, 2020

*First available of illness onset, specimen collection, laboratory test date; cases may not yet be reported in shaded area due to reporting lag

Slower decline in 20 to 39 year-olds since late May

Number of cases by date of illness onset and age group
Excluding 80+ age group

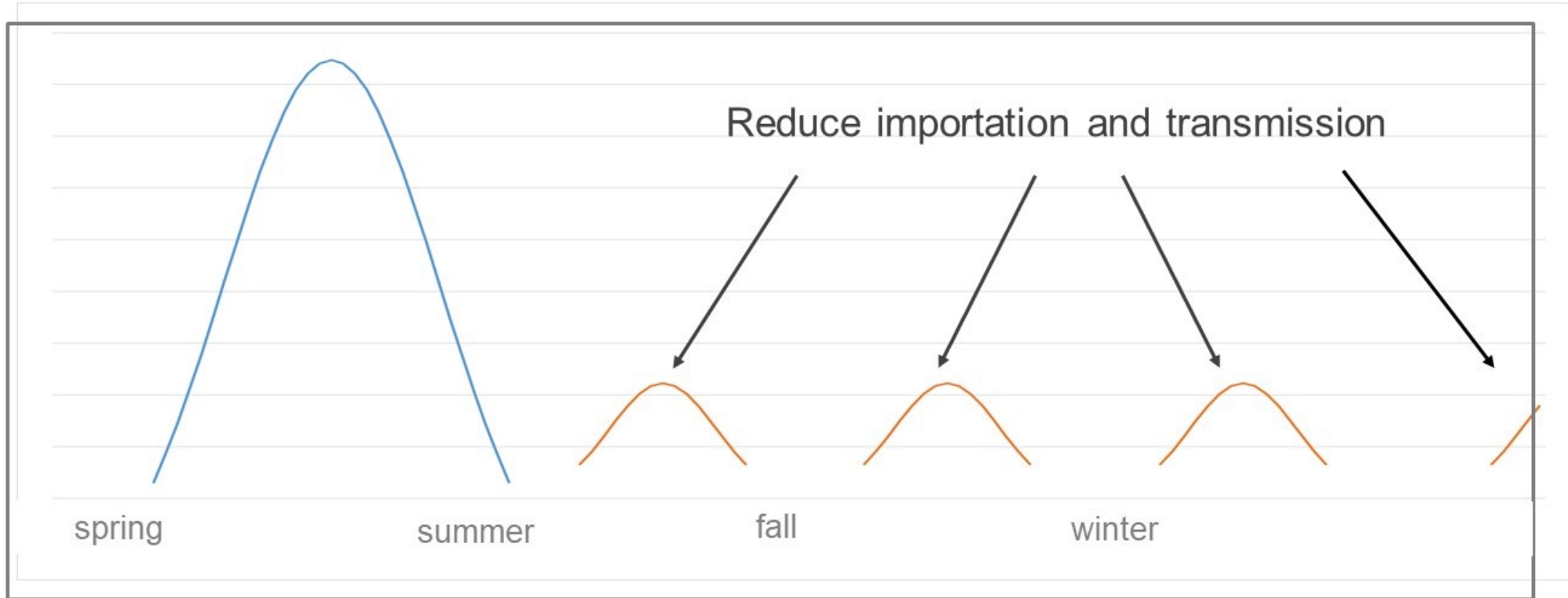


Data as of July 6, 2020

*First available of illness onset, specimen collection, laboratory test date; cases may not yet be reported in shaded area due to reporting lag

MODELLING UPDATE

Canada is aiming for strong epidemic control over the course of the pandemic



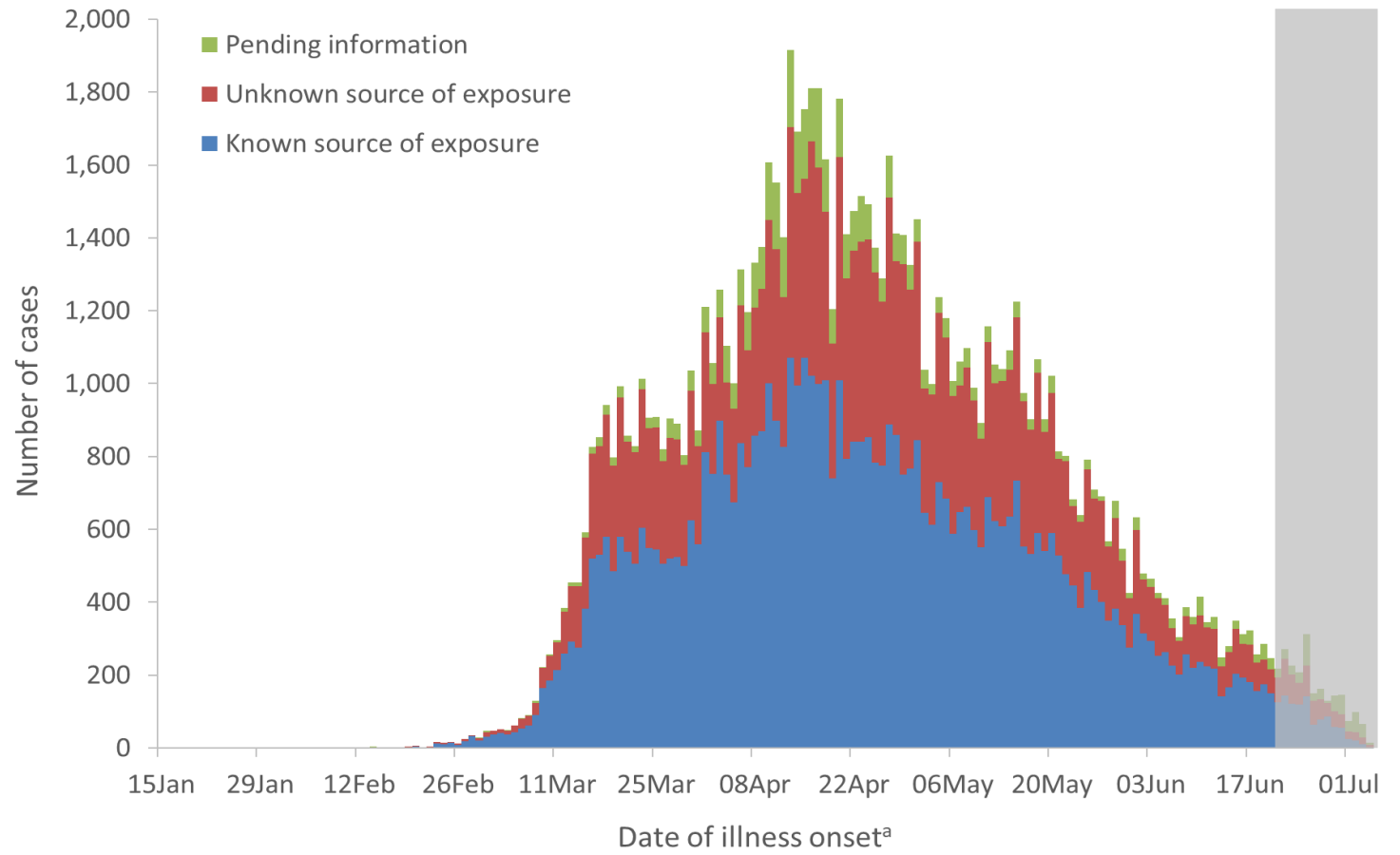
Keys to effective epidemic control

- Public health measures remain essential to control spread of COVID-19 and limit the size and impact of resurgences
- Public health authorities are continuing to build capacity to:
 - > **Detect and isolate** as many **cases** as possible early in their infectious period
 - > **Identify (trace) and quarantine** as many **contacts** as possible and as soon as possible after exposure
 - > Rapidly detect and respond to all outbreaks through enhanced surveillance and early alerting mechanisms
- Individuals play a key role by practising good personal hygiene such as staying home when sick, physical distancing, mask wearing, and hand washing

Effective contact tracing means we know how people were exposed to the virus

- Lower daily case counts facilitate contact tracing to link cases and break chains of transmission
- The more cases that are unlinked (i.e. we don't know how they were exposed) the harder it is to stop community spread

Number of cases by date of illness onset^a and exposure status as of July 6, 2020 (n=99,175^b)



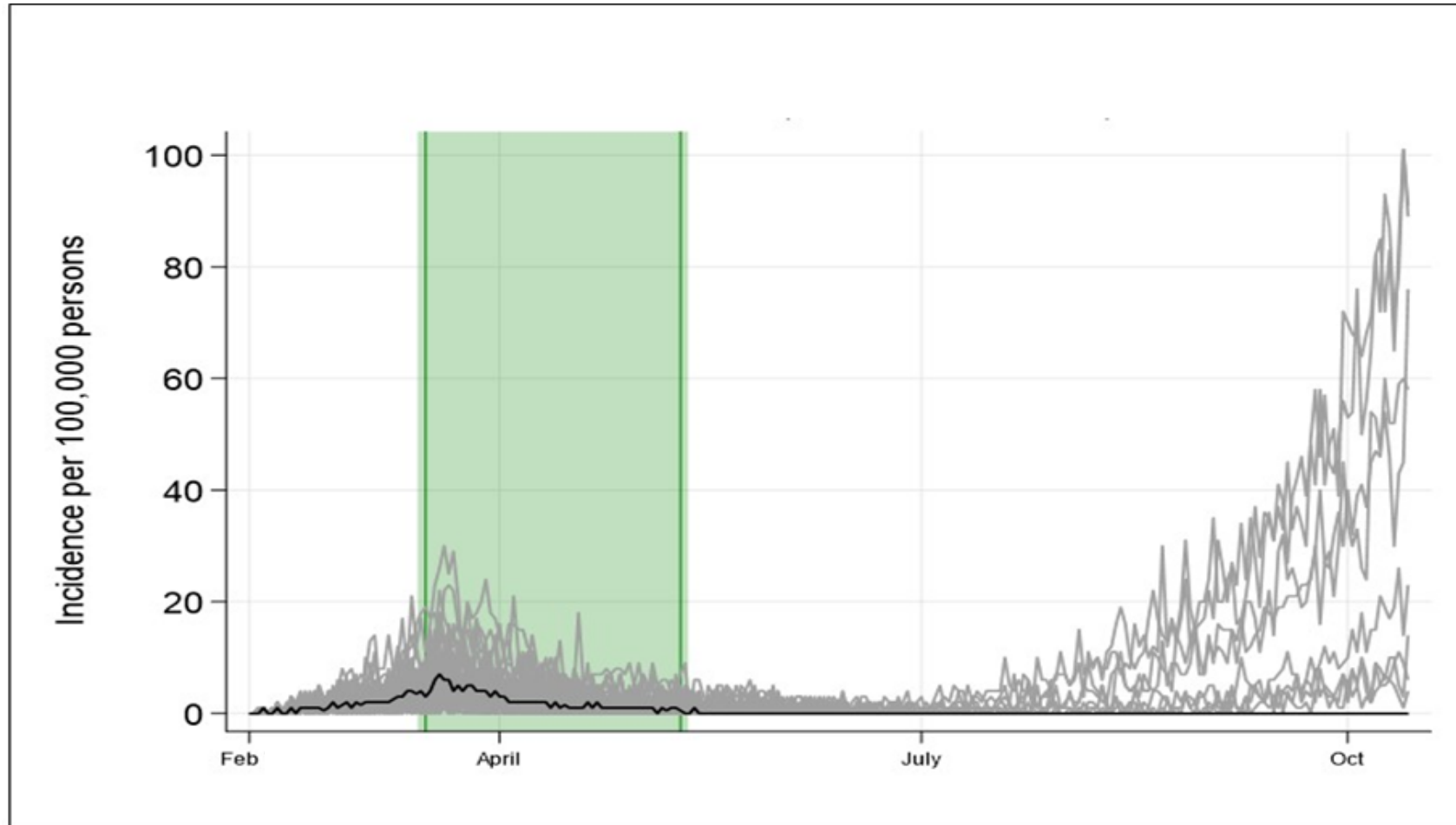
^a Specimen collection date or laboratory testing date was used if illness onset not available.

^b Cases for which information on exposure and date of illness onset (or any of the dates above) are missing are excluded from the curve.

Note: Cases that occurred during the shaded time period may not yet be reported.

Public health measures remain essential to control the epidemic

- Dynamic models show lifting population-based measures (e.g., business and school closures, stay-at-home requirements) without strengthening other controls (e.g., personal public health practices, detect and isolate cases, trace and quarantine contacts) will likely cause the epidemic to rebound



Protect yourself, your loved ones and help control COVID-19 in Canada

- **Be aware of local COVID-19 activity to make informed decisions and reduce your risk**
- **Take precautions to lower your risk of exposure**
 - **Maintain good hygiene practices:** handwashing, cough/sneeze etiquette, avoiding contaminated surfaces and objects
 - **Keep 2-metres physical distance from others** when outside your home/bubble or wear a non-medical mask or face covering when you can't
 - **Minimise your number of close contacts**
- **Avoid high-risk settings and situations**
 - Avoid or strictly limit your exposure to **closed spaces, crowded places, close contact** with others
- **If you have symptoms, no matter how mild, stay home**
 - Stay at home and isolate yourself from others to prevent spread to others
 - Consult your local health authority to be assessed, determine if you require testing and guided safely to care

Consider:

- ***If you test positive, how long would your list of close contacts be?***
- ***No one is immune to severe illness due to COVID-19***
- ***You or your contacts may be at high risk***
- ***Keeping COVID-19 controlled and away from vulnerable populations is a shared responsibility of all Canadians***

APPENDIX

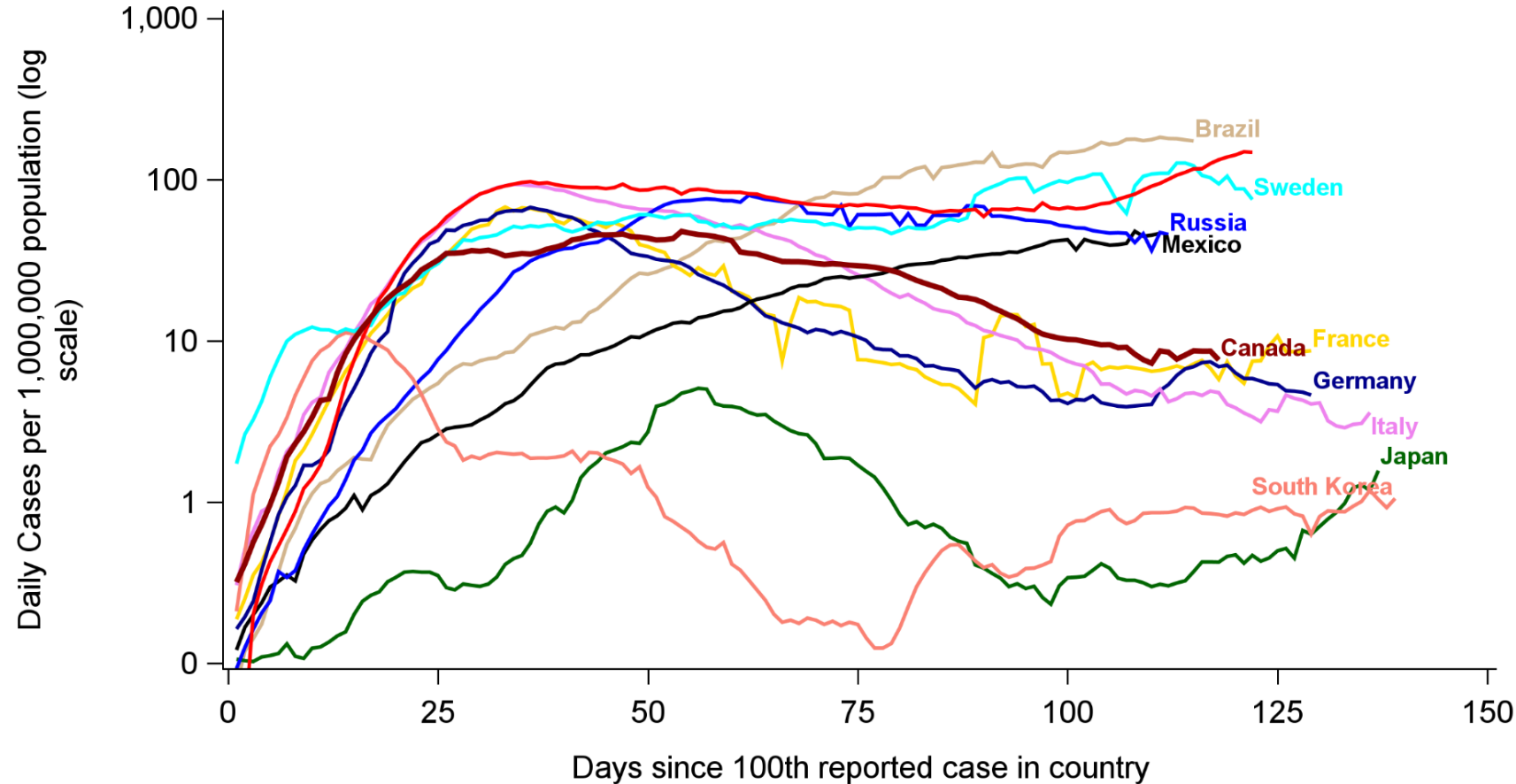
We are learning from the experience of the global community

Daily cases by country (7-day moving average, population adjusted)

Canada flattened the curve sooner than a number of countries such as Italy and US.

Other countries such as South Korea and Japan demonstrated strong epidemic control to keep their curves smaller overall.

All countries realise this is an ongoing effort, requiring sustained public health measures to avoid resurgent transmission.



Data as of July 6, 2020

Note: The methodology for reporting positive cases changed on July 2nd for UK to remove duplicates (ensuring that a person is only counted once). The result of this was a large decrease (30,302) of COVID-19 cases, it is removed from figure until the UK is able to update their data retrospectively to the start of the outbreak to account for possible cases who were double counted.

Dynamic models of scenarios

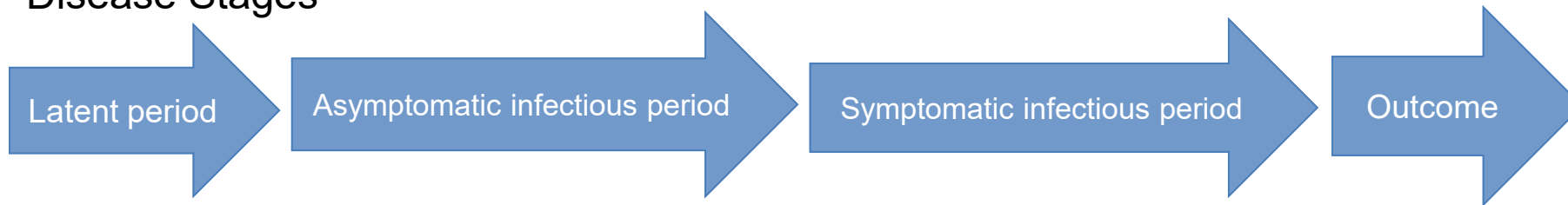
Model moves people through different states of infection. All start out as susceptible.



Individuals are then exposed. They either become infected, or remain susceptible.



Disease Stages



The duration of each stage has an impact on the speed of spread of the disease. The models are run with different values for these periods.

Mitigating factors

Model includes factors that reduce transmission, with different scenarios for different levels of public health measures possible. Hospitalization in the models is also assumed to include no further transmission.



Exacerbating factors

Model includes factors that increase transmission, i.e., the movement of infectious (symptomatic / asymptomatic) people, where contacts take place (e.g., school, work, etc.).

