

1 EXECUTIVE SUMMARY AND CONTEXT

This is the January 27, 2022 overview of modelling studies conducted and collated by the PHAC Modelling Group. Summaries below are hyperlinked to the related section of the report for full details.

CURRENT SITUATIONAL AWARENESS

Domestic

The effective reproduction number (R_t) for Canada as of January 15, 2022, estimated using date of illness onset, was 0.81. Nationally, R_t has been above 1 since mid-December. On January 15, 2022, R_t was at or above 1 in Alberta and Saskatchewan and below one in British Columbia, Manitoba Ontario and Quebec. Decline in R_t in late December and early January is likely to be in part due to changes in testing practices.

The short-range statistical forecast for Canada up to February 3, 2022 is:

- 34,193 cumulative deaths (range 33,927 to 34,447).

Short-range forecasts for cases were not produced given the recent changes to testing protocols across Canada. However, the rate of new deaths increased at a faster rate than the forecast produced for the previous modelling report. The incidence of new deaths is projected to remain stable at an average of 68 deaths per day.

The long-range dynamic modelling forecast (Simon Fraser University model) for Canada suggests the Omicron-driven resurgence nationally may have peaked. Projections suggest that this wave has peaked in Quebec, and is at or close to peak in other provinces. Due to surveillance limitations, the uncertainty of the recent measures are large.

The long-range dynamic modelling forecast (PHAC-McMaster University model) suggests that infections peaked and began to decline in mid to late January. Current reduction in growth in hospitalization and delayed peak timing compared to previous forecasts suggest that public health measures in place in late December have been effective. While incidence is expected to decline after the peak, hospital occupancy is forecast to decline more slowly than cases.

The Wastewater-based forecasts and effective reproduction number estimates suggest the peak of SARS-CoV-2 infections caused by the Omicron variant may have been reached in late December 2021/early January 2022 in the five cities across Canada (Vancouver, Edmonton, Toronto, Montreal and Halifax) where the presence of SARS-CoV-2 in wastewater has been monitored since October 2020.

International

Importation risk modelling for the week of January 16 to 22, 2022 suggests that an estimated 11,203 people with COVID-19 came to Canada including 4,403 air travellers, primarily from the United States of America (USA), Mexico, and France, and 6,800 land travellers from the USA. From January 16 to 22, 2022, the estimated percentages of imported cases from air travel that may be variants of concern or variants

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of interest are 94.13% B.1.1.529 (Omicron), 5.01% B.1.617.2 (Delta), and 0.03% for AY.4.2 (Delta). Many jurisdictions are limiting the use of COVID-19 tests, impacting global case count and testing data estimates. The resulting paucity of data could result in an underestimation of the model results.

Assessment of the impact of interventions on the COVID-19 epidemic in Canada and other countries using the Oxford University stringency index:

- In Canada the stringency index has increased since late-December 2021 and is currently at 75. Saskatchewan has the lowest stringency index value and Yukon has the highest stringency index value.
- Most provinces and territories have implemented public health restrictions in response to Omicron-driven COVID-19 resurgence. The most commonly implemented measures were restrictions on public events and gatherings, and school closures.
- Experiences in several countries suggest the need for either re-implementation or continuation of a high level of public health measures coupled with accelerated booster rollout to limit the impact of the high volume of Omicron variant cases on health care systems.

DYNAMIC MODELLING

A summary of the *PHAC agent-based model (ABM)* analyses conducted in the first two years of the epidemic in Canada is presented. The ABM has been used to conduct many studies to support decision making during the COVID-19 epidemic in Canada and the findings of these studies remain relevant to the management of future SARS-CoV-2 variants with non-pharmaceutical interventions and vaccines. This report aims to be a readily-available resource for relevant previous studies to be identified.

The PHAC compartment model explored the impact of waning immunity and different lifting strategies on the progression of the epidemic following the rise in Omicron cases. Simulations suggest that gradual lifting of restrictions would be prudent to avoid significant resurgence of hospitalisations. Also, results suggest that the faster immunity wanes, the greater the size of peaks of hospitalisations once public health measures are lifted.

SPECIAL REPORT

The study *Assessment of potential COVID-19 trajectories in Ontario* and quantification of the evolution of the infectious population over time explored hypothetical scenarios of the extent to which recent public health measures have mitigated COVID-19 transmission, in order to project possible future trajectories of the epidemic in Ontario. This analysis suggests that strong effective measures, resulting in a reduced levels of social contact mixing, may reduce the peak of cases, but also prolong the epidemic.