

01 EXECUTIVE SUMMARY AND CONTEXT

EXECUTIVE SUMMARY

This is the May 20, 2021 overview of findings of modelling studies conducted and collated by the PHAC Modelling Group.

Current situational awareness

The effective reproduction number (R_t) for Canada on May 8, 2021, estimated using date of illness onset, was 0.93. There has been an increasing trend in R_t in most provinces from early February to early April. Nationally, R_t began to decrease in early April and on May 8, R_t was <1 in most major provinces, except for Manitoba and Nova Scotia.

The short-range statistical forecast for Canada up to May 27, 2021 is for:

- 1,330,508 cumulative cases (range: 1,374,008 to 1,386,913); and
- 25,429 cumulative deaths (range 25,323 to 25,536), by that date.

Overall, case incidence is projected to decrease by 25% over the next week in Canada. Mean case incidence is projected to decrease throughout the projection period in all modelled provinces. The incidence of new deaths is projected to remain constant in Canada.

The nowcast of the force of infection suggests that the epidemic is decreasing in British Columbia, Ontario, Quebec and New Brunswick and stable in Alberta and Saskatchewan. However, the force of infection is forecast to continue to increase in Manitoba and Nova Scotia.

The long-range dynamic modelling forecast (Simon Fraser University model) for Canada, suggests the trajectory is towards a decline in the epidemic over the coming two months, with $\sim 2,000$ daily cases by mid-June. The epidemic is forecast to decline in all provinces except Manitoba where the epidemic is forecast to continue to resurge.

The long-range dynamic modelling forecast (PHAC-McMaster University model) suggests that nationally, the trajectory of the epidemic in Canada is declining with $\sim 2,200$ cases per day forecast by mid-June. In most provinces, the epidemic is forecast to decline, except for Manitoba where the epidemic is forecast to plateau with large uncertainty as to when it will decline.

The long range ensemble forecast of reported cases in Canada using dynamic modelling including variants of concern suggests that the measures in place have slowed the third wave on the national scale, and are highly effective for most provinces. Without additional measures in place or lifting current measures, reported cases in Canada are forecast to decline to approximately 2,000 cases a day by mid-June.

Importation risk modelling for the week of May 9 to May 15, 2021, showed that an estimated 2,418 people with COVID-19 came to Canada (259 air travellers and 2,159 land travellers), primarily from the United States of America, Colombia and Iran. From May 9 to May 15, 2021, the estimated percentages of cases that may be variants of concern or interest are 14% B.1.1.7 (UK variant), 3% B.1.427 and B.1.429 (Californian variants), 1.9% P.1

(Brazilian variant), 1.8% B.1.351 (South African variant), and each of the following at less than 1%: B.1.526 (Nigerian variant), P2 (Brazilian variant) and B.1.617 (Indian variant).

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

- Canada's stringency index increased to 75 as of April 1, 2021 and has remained at this level. The weekly rolling average of daily cases reached a high of 8,730 on April 17, 2021 and has dropped by 37% since that time.
- In some regions where cases have either plateaued or have started to decrease, stringency has been reduced, but it may be too soon to determine if measures in place are adequate to bring the epidemic under control.

Dynamic modelling

The impact of immediate versus two-step lifting of public health measures during vaccination rollout in Canada and the effect of vaccination of adolescents (12 to 17 year olds) explored the impact of an immediate lifting of public health measures (PHMs) in comparison to a two-step lifting of PHMs with various levels of vaccine acceptance in the 12 to 17 years age group. Results suggest that vaccinating adolescents substantially reduced infections acquired in schools/summer activities for school-aged children, which in turn reduced infections acquired in the household and in the community, and reduced severe cases in older unvaccinated individuals thus preventing the healthcare system from being overwhelmed. In addition, a two-step lifting approach resulted in better health outcomes, additional protection for healthcare, and would provide a buffer for uncertainty against waning immunity and emerging variants of concern with immune escape.

Exploring the use of age-targeted strategies to detect asymptomatic infected individuals by screening with rapid diagnostic tests investigated the impact of age-targeted, asymptomatic population screening with rapid diagnostic tests in the presence of emerging variants of concern as vaccines roll out across Canada. In all scenarios, screening asymptomatic cases with rapid tests reduced hospitalizations and the risk of exceeding healthcare capacity when restrictions were lifted. However, the daily number of tests needed to implement the theoretical scenarios simulated would be high and would yield to a high number of false positives (a minimum of 300,000 to 700,000 tests yielding 15,000 to 30,000 false positive results each day in the scenarios explored).

Special report

Estimating population vaccine effectiveness by the screening method presents a discussion on methods to estimate vaccine effectiveness. Vaccine effectiveness can be estimated while vaccines are rolled out during an epidemic if both the vaccine coverage and the percentage of infected people who have received a vaccine are known. There is also a discussion of the fact that when vaccine coverage is high, the proportion of infected people that have had a vaccine may appear to be surprisingly high, which requires consideration in communications on vaccine effectiveness.