01 EXECUTIVE SUMMARY AND CONTEXT

EXECUTIVE SUMMARY

This is the February 25, 2021 overview of findings of modelling studies conducted and collated by the PHAC Modelling Group.

Current situational awareness

The reproduction number (Rt) for Canada on February 13, 2021, estimated using date of illness onset is <1 (0.9) and is <1 in all provinces, except for Newfoundland and Labrador (*Rt*=1.5).

The short-range statistical forecast in Canada up to March 4, 2021 is:

- 879,730 cumulative cases (range: 875,590 to 883,896)
- 22,105 cumulative deaths (range 21,877 to 22,260)

Overall, mean case incidence is projected to decrease by 3.9% throughout the projection period in Canada. The incidence of new deaths is also projected to decrease.

The nowcast of the force of infection suggests that the epidemic is decreasing or stable in all provinces, except in Newfoundland-Labrador.

The long-range dynamic modelling forecast in Canada over the next two months included three scenarios: With current contact rates, the model projects continued control of the epidemic. If recent lifting of closures results in a 20% increase in contact rates resurgence of the epidemic is forecast. With public health measures that result in the equivalent of a 25% reduction in contact rates, the model predicts the epidemic can be brought further under control.

The long-range dynamic modelling forecast including the introduction of variants of concern in Canada suggests that nationally, and in all major provinces, current controls may not be sufficient to fully control more transmissible variants of concern.

Importation risk modelling for the week of February 14 to 20, 2021, an estimated 2,897 people with COVID-19 came to Canada, primarily from the United States (US), Lebanon and India. For the top 10 countries estimated to contribute infected travellers to Canada for that week, the percent contribution from variants of concern (VOC) are the United Kingdom (UK) variant at 15%, the Californian variant at 5%, the South African (SA) variant at 1%, the Brazilian P1 variant at 1%, and the Brazilian P2 variant at <1%.

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

- Canada's sustained (~6 week long) and relatively high stringency index (75) has been successful in reducing the incidence of reported cases, since the peak of the second wave on January 10, 2021. The current weekly rolling average of daily cases (2,973) is still ~7 times higher than the 2020 summer lows of <400 cases.
- Of the countries included in this report, Canada is often lower in terms of vaccination and testing indicators; however, the Canadian data are often 7-10 days behind data for other countries.
- There is variation in both magnitude and trends in the stringency index across Canadian provinces and territories. Although cases are decreasing or holding steady in many regions, the stringency index may be too low in some regions to prevent resurgence of the epidemic.

Dynamic modelling

An _Ensemble forecast for COVID-19 reported cases_ was obtained to capture possible differences among forecasts produced using different models. Ensemble forecasts provide balanced projections that avoid having to "pick and choose" models arbitrarily. Results showed that, overall, there is a relatively good agreement among the mean forecasts of the models when the historical data on which they are fitted shows a clear trend.

A _Further analysis of the COVID-19 epidemic with evasion of a variant of concern (VOC), vaccination rollout, and lifting of closures and physical distancing_ used the PHAC agent-based model to explore the rollout in 2021 of vaccines with different performance, while assuming a variant of concern (VOC). The results suggest that restrictive public health measures can be released with >66% of the population vaccinated if the vaccine has high (95%) efficacy against infection. However, if vaccines have lower efficacy against infection (50%), ongoing asymptomatic transmission means that lifting restrictive measures when 75% of the population is vaccinated, hospitalisations will exceed healthcare capacity. This may be somewhat mitigated if vaccine acceptance is increased above 75% in the most vulnerable age groups, and/or alternative public health measures such as testing and tracing are enhanced and sustained. Vaccines are expected to control the emergence and dominance of VOC, but premature lifting of public health measures before a large proportion of the population is vaccinated will cause the VOC to dominate making subsequent epidemics harder to control.

A study on _Timing of SARS-COV-2 detection in waste water and clinical cases_ presented key insight into conditions under which wastewater signals may precede clinically reported cases. In some circumstances, the signal from wastewater is earlier than detection of clinical cases by case surveillance. However, this is affected by various factors including the sensitivity of the assay to detect Ribonucleic acid (RNA) in wastewater, the flow rate of the sewage system and the decay rate of SARS-CoV-2 RNA in wastewater.