1 EXECUTIVE SUMMARY AND CONTEXT

This is the November 4, 2021 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 (Rt) for Canada as of October 23, 2021, estimated using date of illness onset, was 0.89. Nationally, *Rt* was above 1 in July and the beginning of August, but has been declining since mid-August. On October 23, *Rt* was <1 in all of the six provinces analysed, except Manitoba.

The short-range statistical forecast for Canada up to November 11, 2021 is:

- 1,740,102 cumulative cases (range: 1,735,252 to 1,744,832); and
- 29,351 cumulative deaths (range 29,254 to 29,457) by that date.

On average, case incidence is projected to remain constant over the next week in Canada. Mean case incidence is projected to remain fairly constant throughout the projection period in all modelled provinces, except for British Columbia and Saskatchewan, where case incidence is projected to decrease. The incidence of new deaths is projected to remain stable in Canada.

The NOWcast of the force of infection suggests the epidemic is decreasing or remaining at the same low level in all provinces except British Columbia, Manitoba and New Brunswick. Force of infection is forecast to plateau at a moderate level in British Columbia and Manitoba, and to increase in New Brunswick.

The long-range dynamic modelling forecast (Simon Fraser University model) for Canada suggests the trajectory is towards a decline over the coming two months, with ~1,500 daily cases by the end of November if contact rates remain at the current level. Increasing contacts by a further 15% would result in resurgence, while a reduction of contacts by 15% would further maintain the epidemic under control. In Manitoba, the trajectory is towards a slight increase then plateauing over the coming 2 months if contact rates remain at the current levels, and the epidemic is forecast to plateau or decline in all other provinces.

The long-range dynamic modelling forecast (PHAC-McMaster University model) suggests that nationally and in each province (except for Manitoba), the trajectory is towards a plateau or a decline of the epidemic, with ~1,450 daily cases by early December assuming current contact rates. A slow increase in cases is forecast for Manitoba. If relaxation of public health measures or behavioral changes increase contacts by 15%, resurgence is forecast for British Columbia, Manitoba, Ontario and Quebec.

International

Importation risk modelling for the week of October 24 to 30, 2021 suggests that an estimated 4,330 people with COVID-19 came to Canada including 901 air travellers, primarily from the United States of America

(USA) and the United Kingdom and 3,429 land travellers from the USA. From October 24 to 30, 2021, the estimated percentages of imported cases from air travel that may be variants of concern or variants of interest are 99.3% B.1.617.2 (delta), and 0.01 % for B.1.1.7 (alpha), B.162.1 (mu) and P.1 (gamma).

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

- As case numbers continue to decrease in Canada, the stringency index decreased for the first time in over a month to 64 on October 23, 2021 but was then increased to 67 on November 1, 2021.
- In several countries, re-implementation of strict, well-timed measures have successfully decreased cases in past and current waves as vaccines have rolled out.
- Experiences in some countries suggest that rapid re-implementation of public health measures may still be needed as the virus evolves and affects pockets of vulnerable populations.

DYNAMIC MODELLING

The PHAC agent-based model (ABM) explored the potential impact of waning immunity into 2023 under two scenarios and at different rates for those older than 65 and those under 65. Results suggest that under both waning scenarios, when coupled with the complete lifting of public health measures (a return to pre-COVID contact rates, the removal of masking and the elimination of a vaccine passport), a resurgence in cases and hospitalization would be expected. The more rapid waning scenario resulted in greater risk for health care capacity being in the fall of 2022.

The PHAC compartment model explored the potential impact of waning immunity in the context of full lifting of public health measures in early 2022. Results suggest that with the complete lifting of public health measures, a case resurgence would be expected, however the timing of that resurgence is dependent on the rate at which waning occurs and the seasonal impact on transmission. This rate is still uncertain in Canada and attempts to fit surveillance data to United Kingdom (UK) waning rates suggest that immunity in Canada has not waned to the extent observed in the UK. Overall, exploring additional levels of population immunity by boosters and wider coverage, coupled with a gradual lifting of public health measures would be required going forward.