

# COVID Model Projections

August 6, 2021

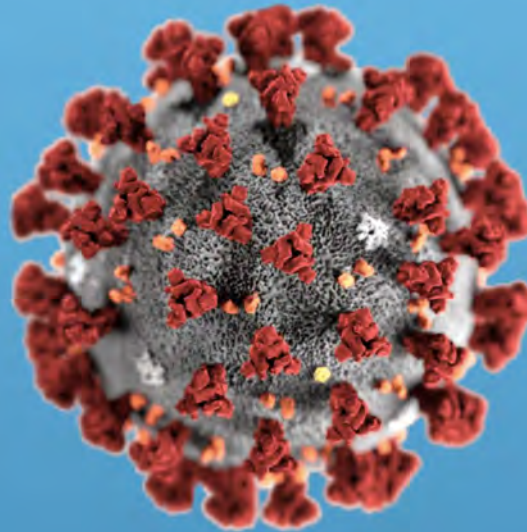
[BC COVID-19 Modelling Group](#)

**Given the rapidly changing COVID-19 situation in BC,  
this is an intermediate report  
(only updated data slides are included - see July 28 report for details).**

# About BC COVID-19 Modelling Group

The BC COVID-19 Modelling Group works on rapid response modelling of the COVID-19 pandemic, with a special focus on British Columbia and Canada.

The interdisciplinary Group was convened by [Caroline Colijn](#) (SFU) and [Dan Coombs](#) (UBC) with support from the [Pacific Institute for the Mathematical Sciences](#).



<https://bccovid-19group.ca>

## Contributors to report

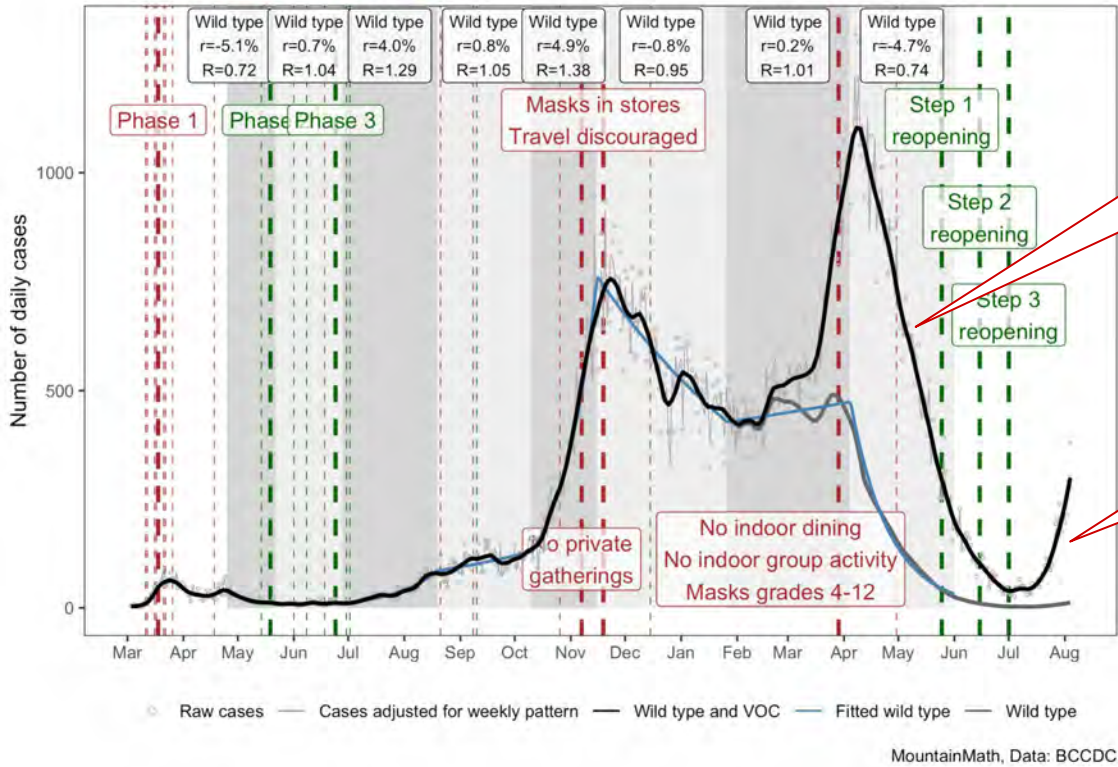
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*Independent and freely offered advice,  
using a diversity of modelling approaches.*

# State of the COVID-19 Pandemic in BC

Covid-19 daily new cases in British Columbia (up to Wed Aug 04)

Timeline of closure and reopening events



April 2021: BC bent down the COVID-19 curve following March 30 "circuit breaker"

Cases are showing strong and sustained growth after Step 3 reopening.

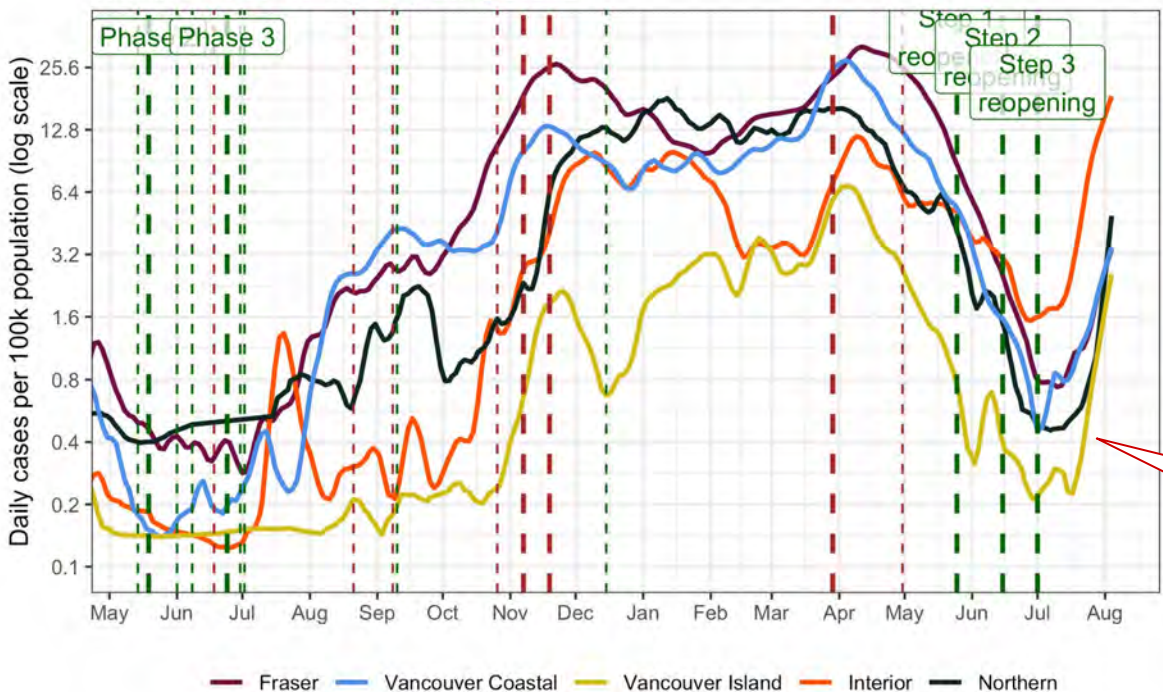
**COVID-19 is now spreading rapidly in BC, echoing growth of Delta in other regions.**

Source (J. von Bergmann) Case data from BC COVID-19 Database (<http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data>). Vertical lines give dates of public health measures (major as thick lines, minor as thin lines). Grey dots are raw case counts, grey lines is cases abused for weekly pattern, black STL trend line and blue fitted periods of constant exponential growth.

# State of the COVID-19 Pandemic in BC

Covid-19 daily new cases in British Columbia (up to Wed Aug 04)

Timeline of **closure** and **reopening** events



### First-dose vaccination % of total population:

- Interior Health: 66.4%
- Northern Health: 58.3%
- Fraser Health: 70.3%
- Vancouver Coastal: 80.8%
- Vancouver Island: 71.9%
- BC: 72.9%**

**All Health Authorities are showing strong and sustained growth.**

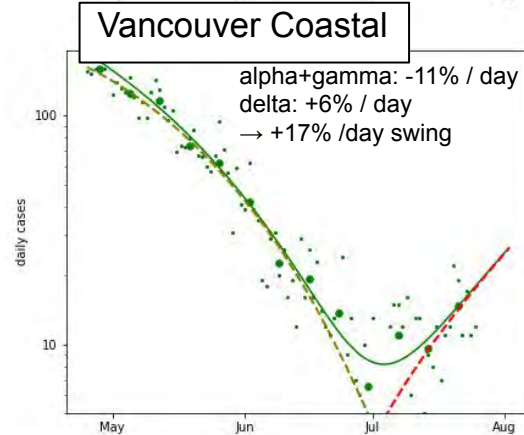
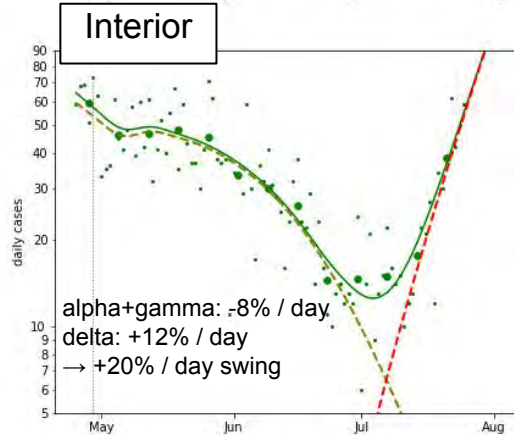
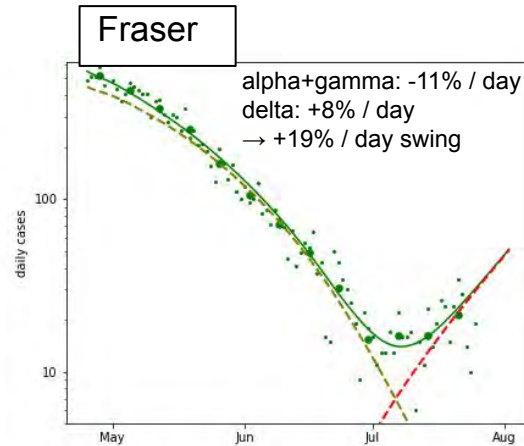
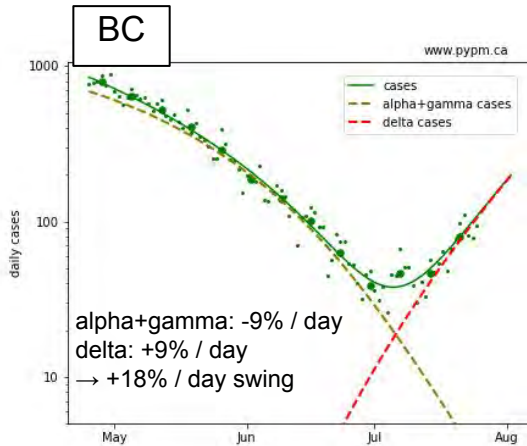
Recent rise in case numbers is in Interior Health Authority is now echoing in all other HAs.

MountainMath, Data: BCCDC, BC Stats

**Source (J. von Bergmann)** Case data from BC COVID-19 Database (<http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data>). Vertical lines give dates of public health measures (major as thick lines, minor as thin lines). Grey dots are raw case counts, grey lines is cases abused for weekly pattern, black STL trend line and blue fitted periods of constant exponential growth. Vaccination % by Health Authority from the BCCDC [Dashboard](#), with [BC population](#) 2021 projections.



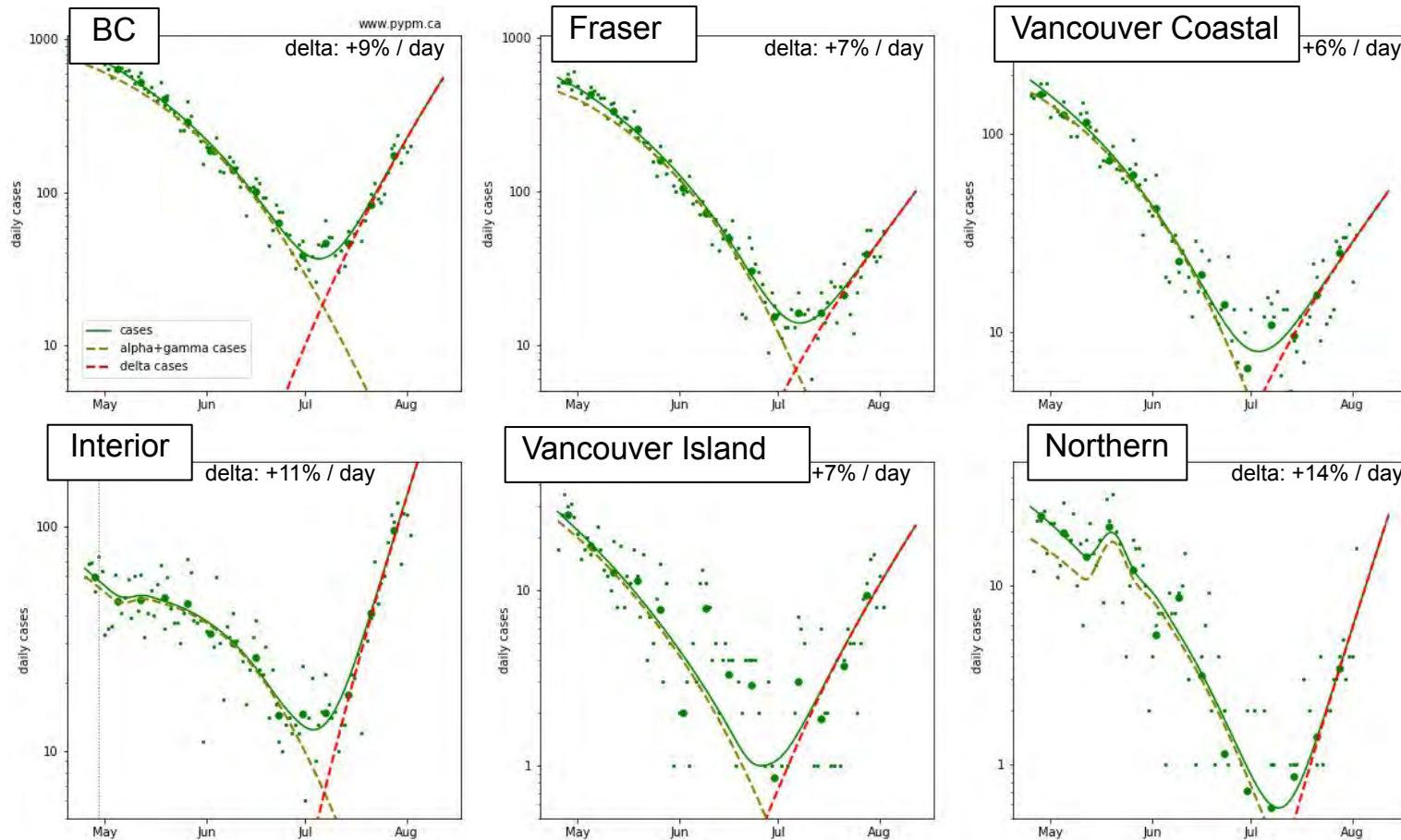
# Previous model fits to BC data (July 28 report)



BC data fits are consistent with the pattern seen in Europe and US states, where the combination of relaxation and the emergence of delta has produced large swings in daily growth rates.

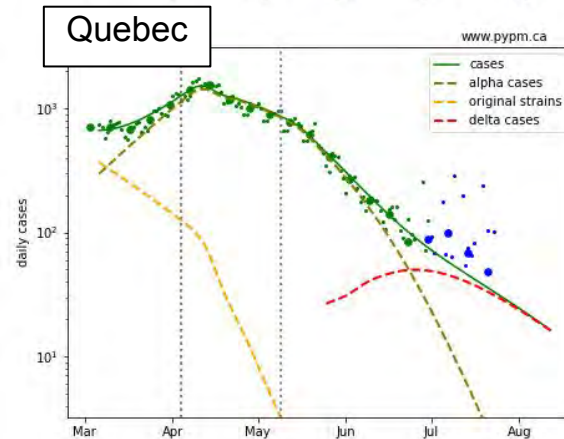
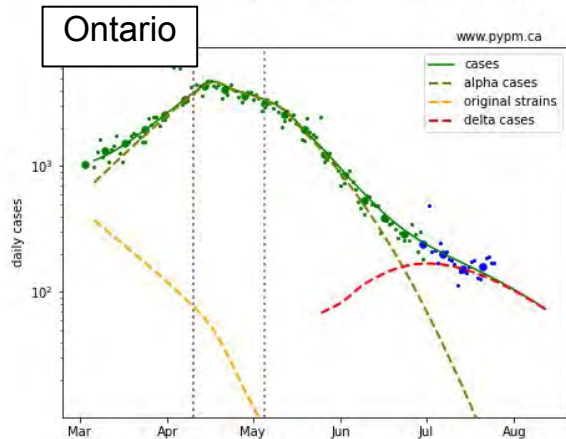
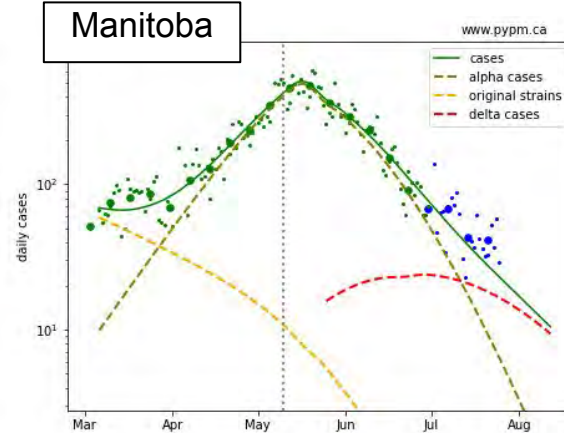
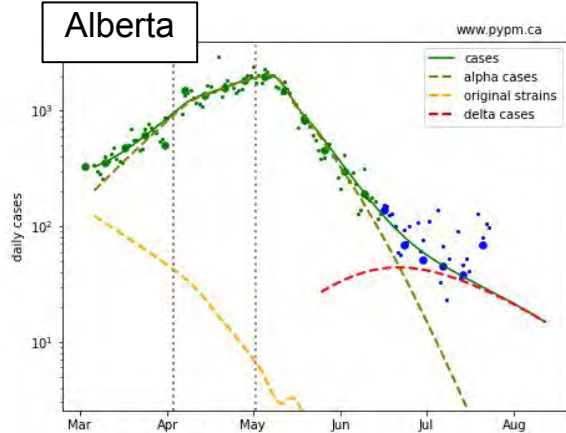
The proportion of cases due to delta may differ from these fits since the fits assume constant behaviour.

# Model fit update with recent BC data



Source (D. Karlen). See [www.pypm.ca](http://www.pypm.ca). These models have no age structure. Fits include past vaccination schedule.

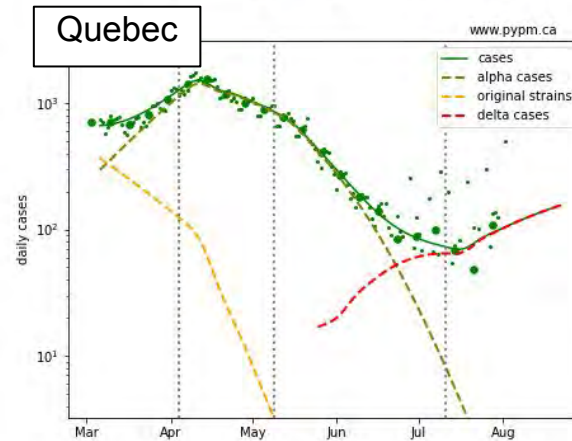
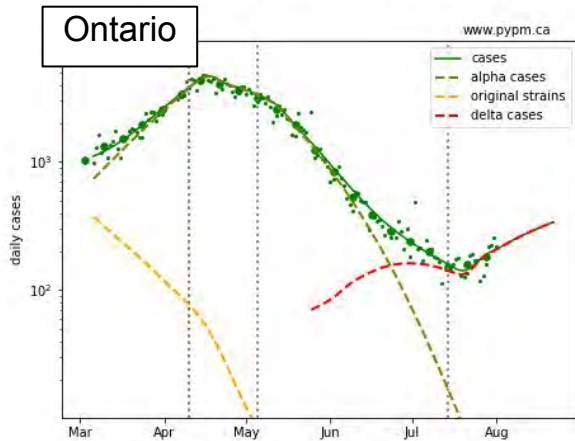
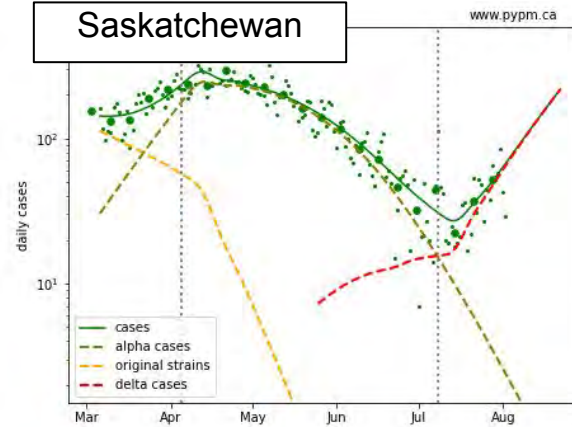
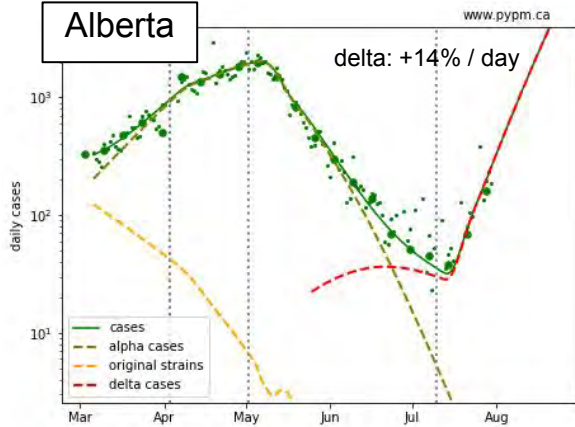
# Earlier model fits for other provinces, showing recent data



Recent data are compared to earlier model projections for 4 provinces.

The decline in case rates agrees with the projections from a month earlier, with the exception of Alberta, where a significant uptick in case rate is seen in the past week.

# Update for other provinces





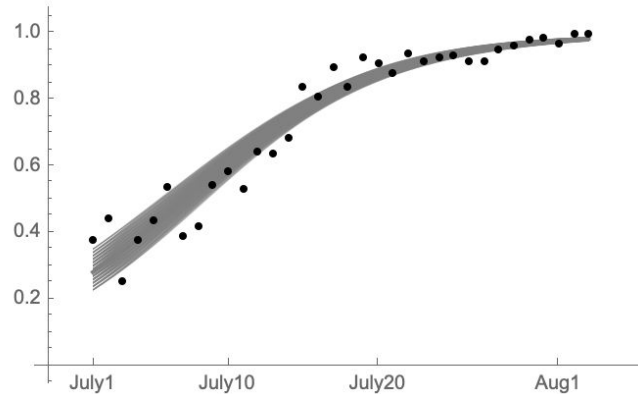
# Delta trends in Alberta

Delta is now the most common Variant of Concern in Alberta (left), making up 99% of the variants and 76% of all cases (projections for August 6th). The seven-day average case number has now risen to nearly 200, up from under 50 the month before (right). Delta cases have recently risen rapidly (blue; doubling time ~7-8 days), underlying the rise in overall case numbers.

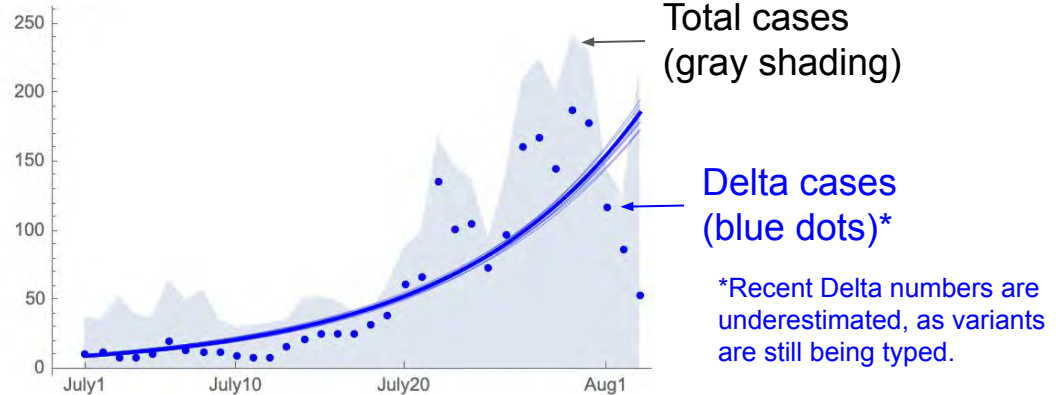
Daily selective advantage of Delta  
 $s = 0.15$  {95% CI: 0.14–0.17}

Daily growth rate of Delta  
 $r = +0.090$  {95% CI: 0.085–0.094}

Proportion Delta of VoC

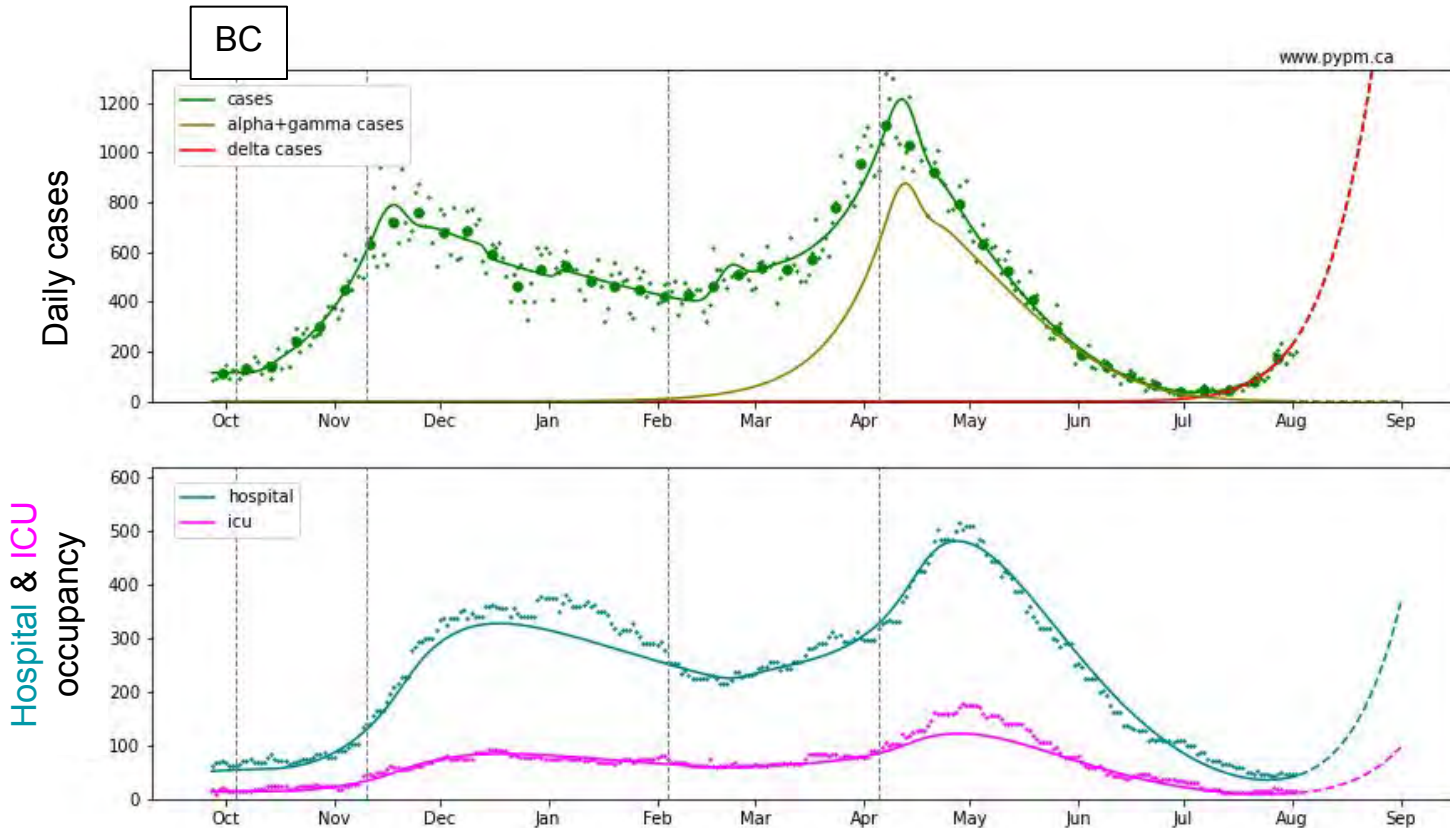


Number Delta



**Source (S. Otto).** Data from source file <https://www.alberta.ca/stats/covid-19-alberta-statistics.htm#variants-of-concern> (accessed August 5, using data through August 3). Uses a maximum likelihood approach, with binomial sampling among VOC to estimate  $s$  for Delta relative to other VOC (mainly Alpha) and with Poisson sampling to estimate  $r$  for Delta. Curves are fits within the 95% CI for  $s$  and initial proportion (left) or for  $r$  and initial number (right).  $r$  and  $s$  change over time and their averages shown.

# What are the projected hospital numbers?

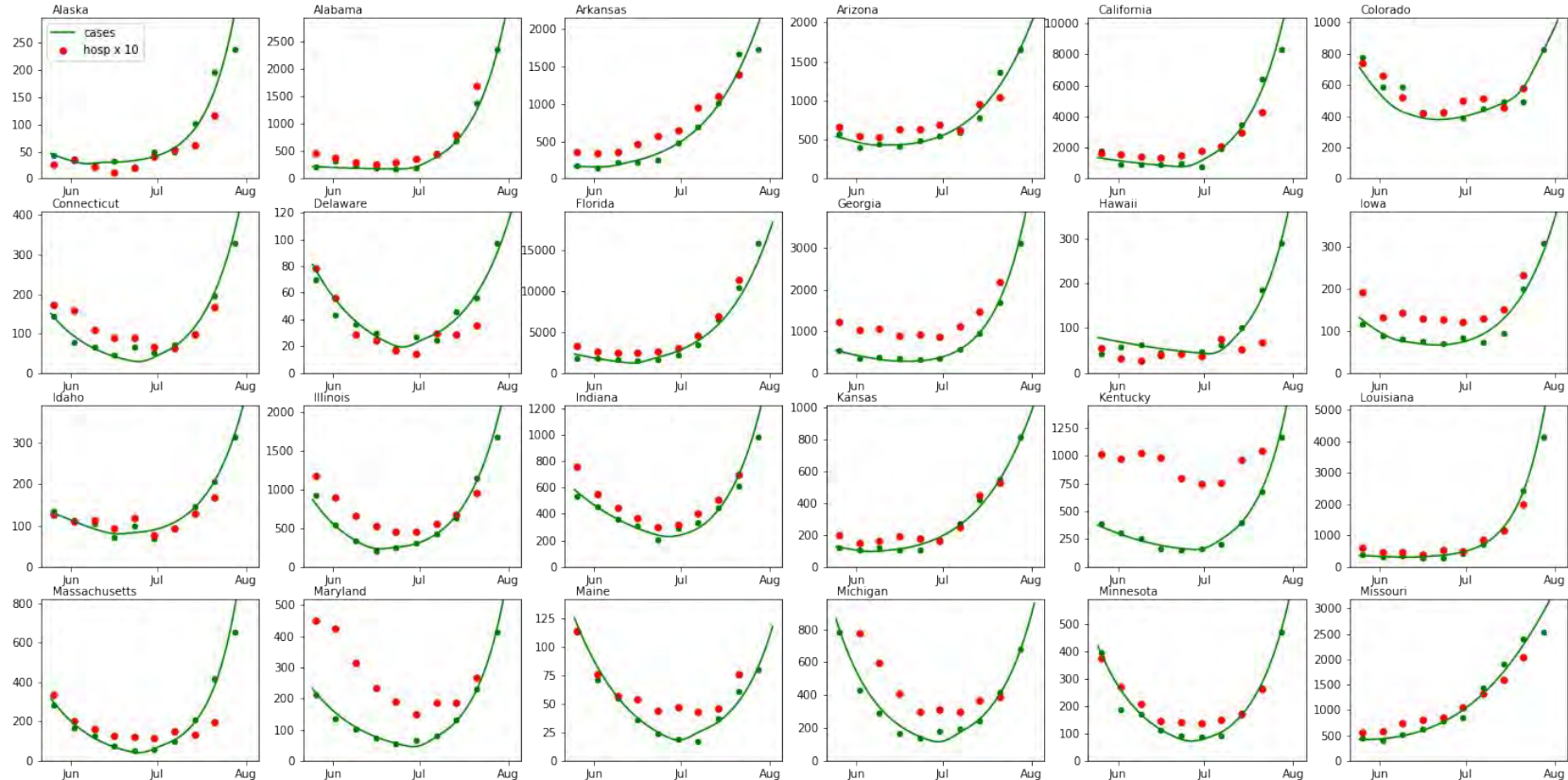


If cases continue to rise, hospitalization and ICU are expected to follow suit with a short delay.

# Hospitalization rates rise with cases (USA)

US is in a Delta wave, and hospital admissions (red) are rising with increasing case rates (green), despite high vaccination levels.

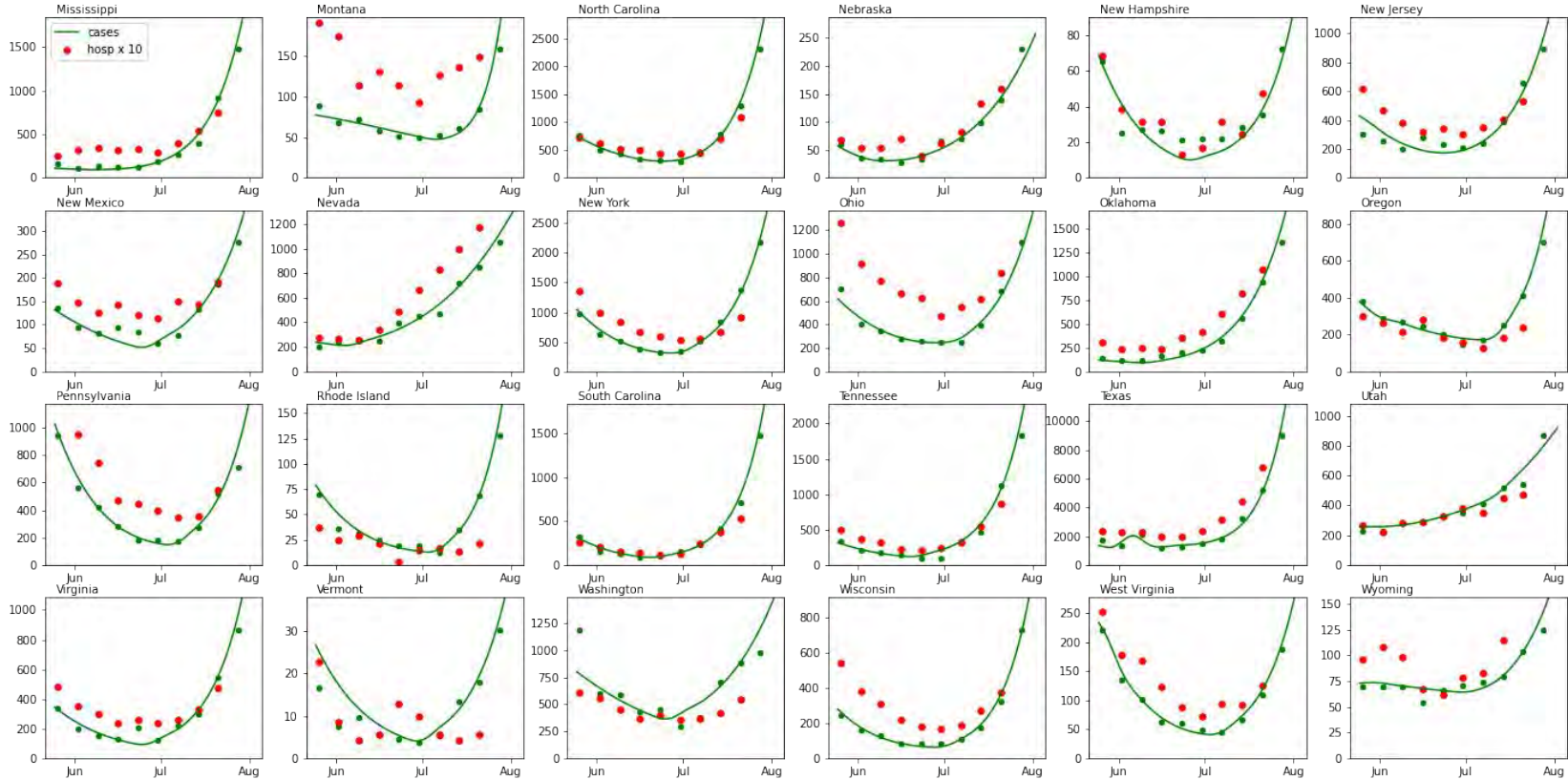
Daily cases and hospital admissions (x 10)



# Hospitalization rates rise with cases (more states)

US is in a Delta wave, and hospital admissions (red) are rising with increasing case rates (green), despite high vaccination levels.

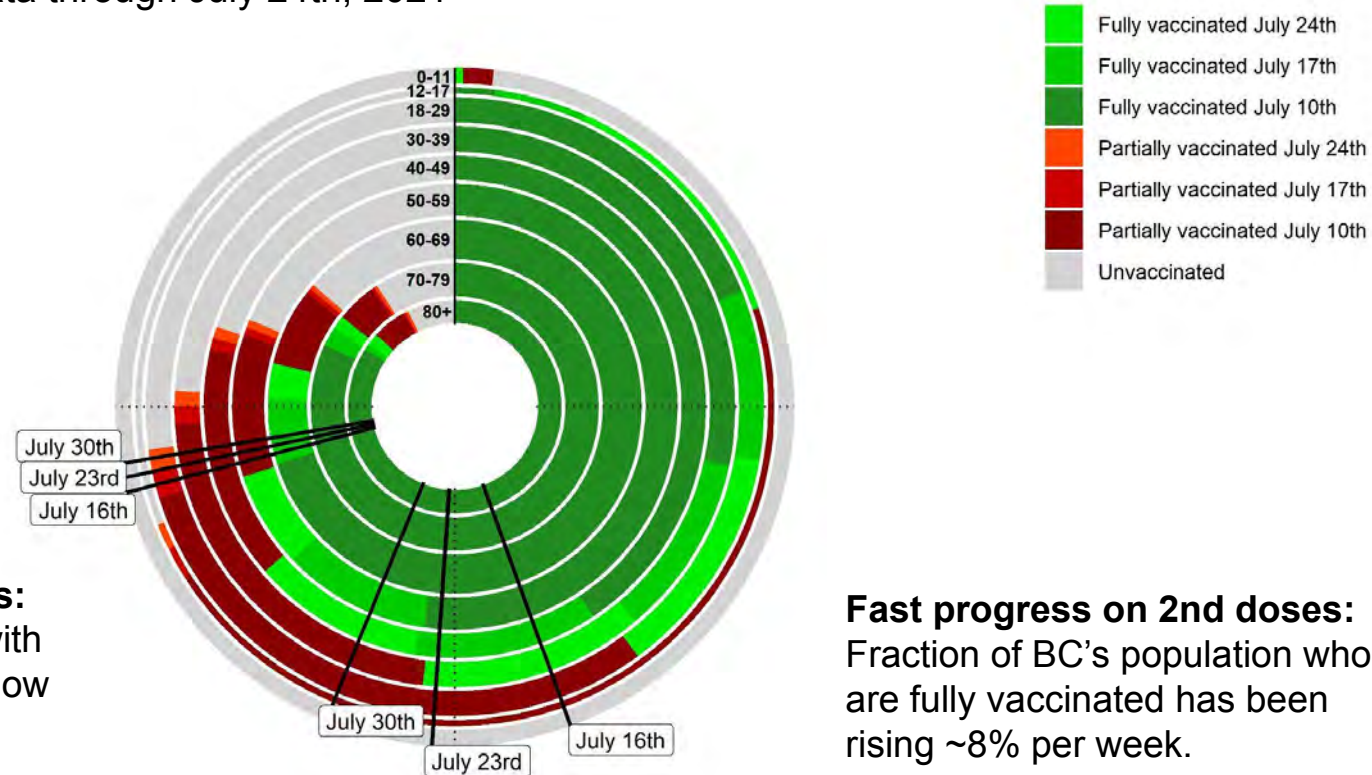
Daily cases and hospital admissions (x 10)





# Closing the circle: Vaccination status by age

July 30th update includes data through July 24th, 2021



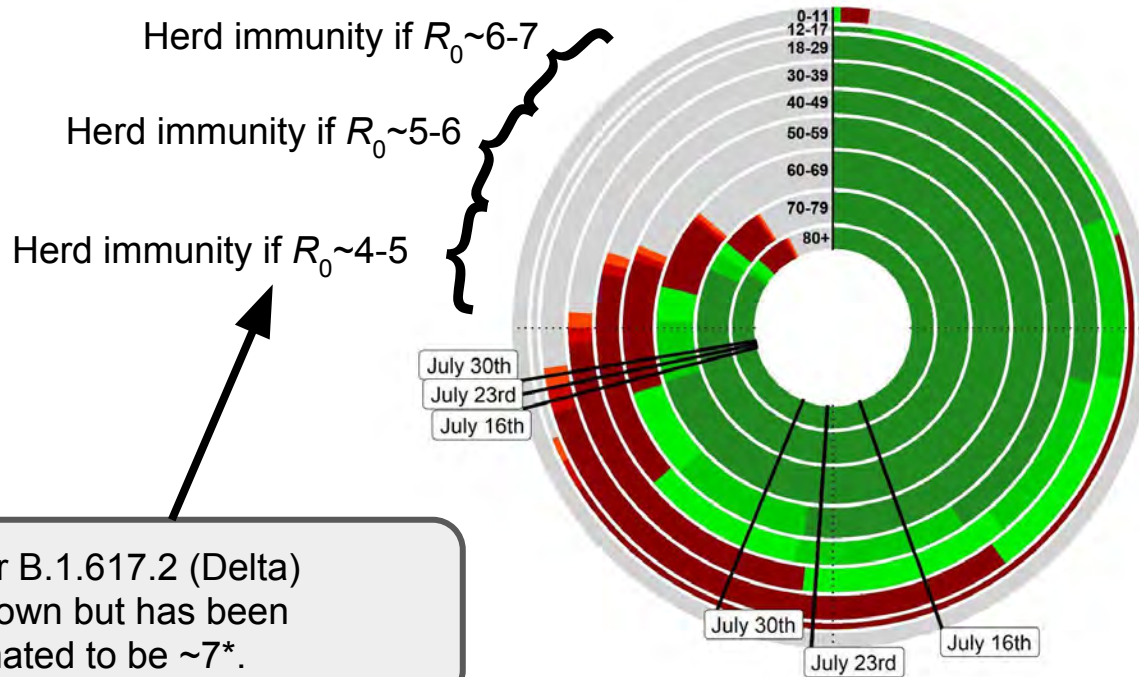
**Slow progress on 1st doses:**  
Fraction of BC's population with at least one vaccine shows slow growth, rising ~1% per week.

**Fast progress on 2nd doses:**  
Fraction of BC's population who are fully vaccinated has been rising ~8% per week.

# Closing the circle: Vaccination status by age

July 30th update includes data through July 24th, 2021

If vaccines were 100% effective:



**Herd immunity:** the level of immunity in a population at which a disease starts to decline\*

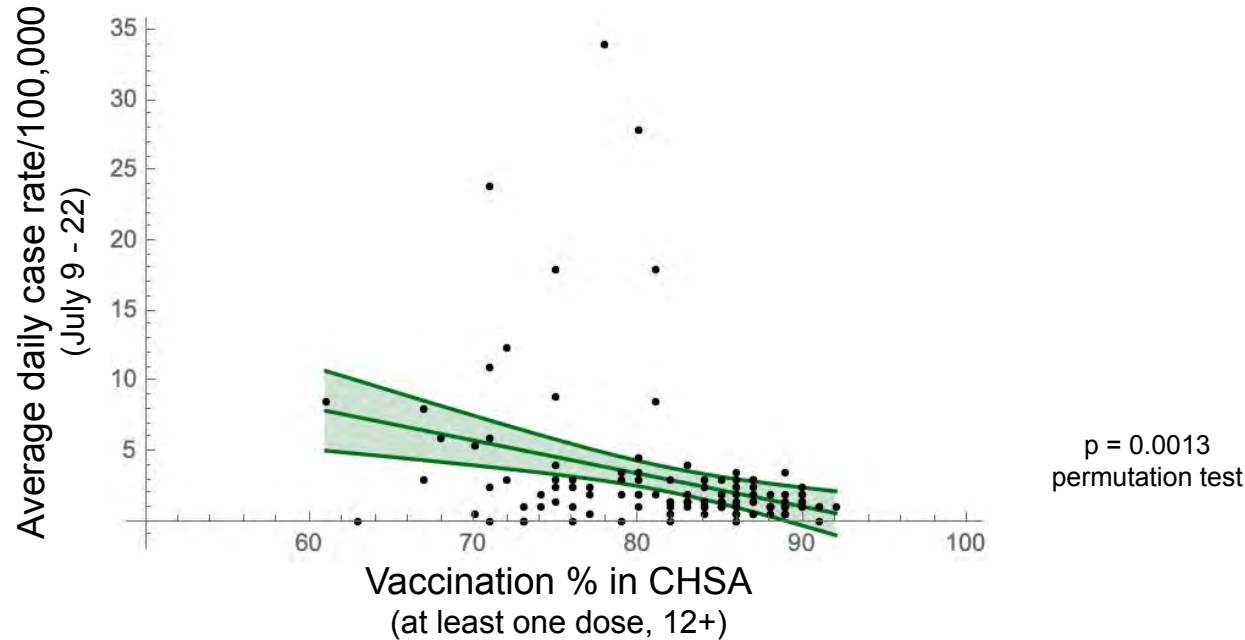
→  $(1-f) R < 1$  where  $f$  is level of immunity

**Reproductive number ( $R$ ):** number of new cases per case, called  $R_0$  in the absence of any control measures.

$R_0$  for B.1.617.2 (Delta) unknown but has been estimated to be  $\sim 7^*$ .

# Vaccination helps

Community Health Service Areas (CHSA) with higher vaccination rates have significantly lower daily case counts in BC. Communities that are 70% vaccinated have **five** times higher rates of COVID-19 cases than those with 90% vaccination.



# Final messages

Recent growth in cases is predominantly in communities with lower vaccination rates, with many communities in the Interior Health Authority at higher risk.

Delta (B.1.617.2) has been rising relative to other variants, consistent with a ~10% growth advantage *per day* compared to Alpha.

Delta case growth has been extremely rapid in many other jurisdictions. **There are now clear signs of similar growth in BC.**

Communities with lower vaccination rates are seeing five times as many cases as those with higher levels of vaccination.

To reduce the growth of cases, we encourage continued use of masks in indoor public settings, reduced exposure to poorly ventilated and crowded indoor environments, and vaccination by all those who are able.