# Trends and Insights Report

Updated 22 July 2022

*This report is classified as "in confidence" and should only be distributed beyond the intended recipients on a need-to-know basis.*

## Purpose of report

This report comments on national and regional quantitative trends in the New Zealand COVID-19 pandemic, including infections, diagnosis, hospitalisations and mortality. It also comments on international COVID-19 trends and the latest scientific insights related to outbreak management. The report relies on data that may be subject to change or are incomplete.

## Special topic – Focus on Mortality: Trends and Inequities in Aotearoa

- There have now been 1,326 deaths attributed to COVID-19 to 17 July 2022, and 1,868 if all deaths within 28 days of case report are included.
- Death rates have been steadily increasing in the past month, consistent with increasing case numbers in the elderly.
- There was inequitable risk was for Māori and Pacific, after accounting for other factors that could influence risk, such as vaccination, there remained a 1.7 times increased risk of death for Māori and 2.8 times risk for Pacific compared with European and Other.
- High deprivation and co-morbidities were also strongly associated with mortality risk.
- However, vaccination has a strong protective effect that can mitigate a substantial proportion of this excess risk. Among cases, those who had not been fully vaccinated had 6.0 times the risk of death compared with vaccinated cases; when examined in those aged under 60, the risk was 13.6 times.

## Key insights

*Infection Trends*

- Nationally, the weekly case rate was 13.7 per 1,000 population for the week ending 17 July. This is a 4.4% increase from the previous week, which was 13.1 per 1,000.
- For the week ending 17 July, estimates suggest that 2.8% (919/32,963) of healthcare workers (HCW) tested positive. HCW have a similar risk of infection to the general community, as they are more likely to be infected in the community than in their workplace due to strict infection prevention and control measures.
- Comparisons of case rates in HCW to general community indicate a minimum of 46% of community infections are not being reported
- Levels of viral RNA in wastewater have plateaued after increasing steadily in the past weeks. Both case rates and wastewater viral RNA trends suggest that increase in new infections has slowed compared to the previous week.
- In the past week, 12 out of 18 Districts experienced an increase in case rates.

*Demographic Trends in Case Rates*

- The lowest case rate continues to be in Pacific Peoples (7.0 per 1,000); case rates in this group have increased by 17% in the past week. Māori case rates have also increased and are now at 8.5 per 1,000.
- For the 65+ age group, case rates in the Northern region decreased by 3.4%, Te Manawa Taki increased by 13.9%, Central increased by 4.5% and Te Waipounamu increased by 7.8% in the past week.
- Case rates for those at higher risk of complications or severe illness from COVID-19, for those aged 45-64 and those aged 65+, were highest in European or Other (45-64 at 18.3 per 1,000 and 65+ at 16.3 per 1,000).

*Whole Genomic Sequencing*

- Omicron BA.5 was the dominant subvariant which made up about 61% of sequenced community cases in the past week.
- This week, watchlist variants (BA.4 and BA.5) were again detected in community samples and Wastewater data detected BA.4/5 at all sites. The upward rise of the BA.5 variant of Omicron is a key observation – it is estimated to make up 90% of cases by August.
- It is likely that BA.5 is largely responsible for the current national increase in case rates.
- As of 20 July, ESR received samples from and had processed 140 of the 665 PCR positive hospital cases with a report date in the two weeks to 15 July 2022. Of these, 37% had a BA.2 genome, 11% were BA.4, and 52% were BA.5.

*Border Surveillance*

- In the week ending 10 July, there were 63,944 border arrivals, of whom 88% (56,276) uploaded a RAT result upon arrival. This is similar to 90% in the week prior.
- In the week ending 10 July, 3.9% of recent arrivals tested positive via RAT, a decrease from 4.1% in recent weeks.
- Cases in border arrivals rose sharply after 20 June and are approaching a new steady state. By 19 July, they were between 300 and 400 reports per day. While the increase is sudden, it is in line with expectations following the removal of pre-departure testing from 20 June and is still few compared to cases acquired in the community.
- The percentage of PCR positive border arrivals with WGS complete was 16.7%. This figure is quite low, however, it should rise as more of the recent cases are processed. In the previous three months, this figure was between 40% and 70%.
- The number of samples available for genomic sequencing has decreased in the last week and does not meet the target of 300 per week needed for good detection of new variants.

*Hospitalisation and Mortality*

- For the week ending 17 July, the national daily average hospital occupancy for inpatients with COVID-19 was 14.2 per 100,000 population, an increase of 28% from the week prior. Hospital occupancy average rates increased across all regions in the past week. The Northern region (15.2 per 100,000) increased by 31%, Te Manawa Taki (11.7 per 100,000) increased by 11%, Central region (15.2 per 100,000) increased by 38% in the past week and Te Waipounamu (13.8 per 100,000) increased by 31%.
- As of 20 July 2022, there were 1,868 deaths with COVID-19 infection who died within 28 days of being reported as a case and/or with COVID-19 being the primary cause of death.

- Of the deaths that have been reviewed, 50% had COVID-19 as the main underlying cause, and COVID-19 contributed to 27% of deaths. The remaining 23% were found to be due to unrelated causes, such as accidents.

*International and Scientific Insights*

- Globally, in the week ending 17 July 2022, the number of weekly cases plateaued, with just 6.3 million new cases reported after an increasing trend for the past five weeks.
- The number of new weekly deaths is increasing with 11,000 deaths reported.
- Globally, from 13 June to 13 July 2022, 200,845 SARS-CoV-2 sequences were collected and submitted to GISAID. The Omicron VOC remains the dominant variant circulating accounting for 95.4% (191,648) of sequences.
- A comparison of sequences submitted to GISAID in the week ending 3 July and the week ending 10 July shows a decline in BA.2 sequences from 3.8% to 2.6% and a decline in BA.2.12.1 sequences from 10.6% to 4.5%. Within the same period, the proportion of reported sequences of BA.4 declined from 13.2% and 10.6% and BA.5 increased from 51.8% to 55.4%.
- BA.2.75 is an Omicron subvariant under monitoring by the WHO, with earliest sequences reported from May 2022. As of 18 July, 250 sequences of BA.2.75 from 15 countries have been reported to GISAID.
- The scientific insights section includes studies on outbreak management, economic evaluations, transmission dynamics and modelling studies.

*Health System Capacity*

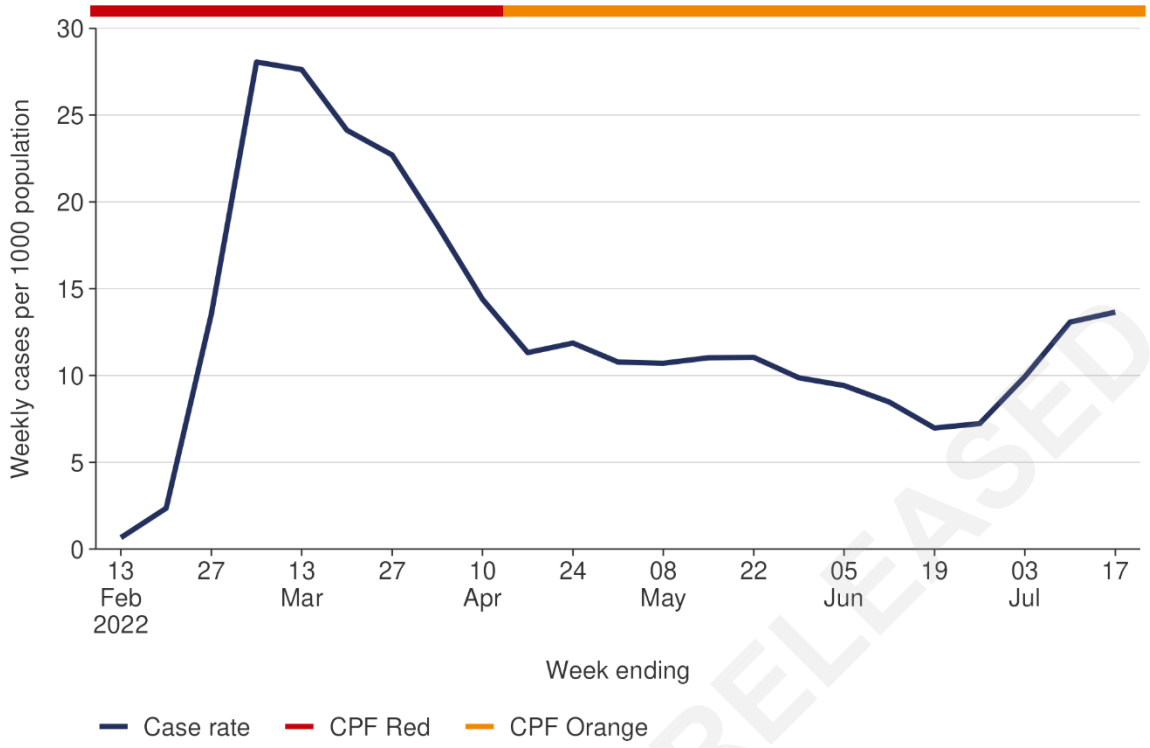
- The data source for this section has ended. We are sourcing a new information to provide context and data for this area.

# Domestic epidemic outlook

## Infection outlook

- NZ was in COVID Protection Framework Red from the start of the year until 14 April 2022 when it switched to Orange, where it continues to be ( Figure 1). The rate of decline slowed after the week ending 17 April, after which a plateau with a slight decline to the week ending 19 June was observed.
- However, community cases have increased for the past four weeks but tapered slightly in the last week with an increase of 4.6% from the previous week.
- Comparisons of community cases against routine worker testing indicate a substantial under-ascertainment, with approximately half of community cases likely to not be reported.
- Wastewater quantification levels have also tapered slightly and are close to the levels during the March Peak across the motu, supporting the trend in case rates.
- Case rates across all age groups also plateaued over the past week with rates among cases aged 65+ increasing by 5%.
- These trends continue to be driven by Omicron sub-variant BA.5. Models predict BA.5 will reach 90% of all community cases in early August.
- Due to the overlapping impacts of immune evasion characteristics of BA.5, changes in adherence to public health measures, and infections moving into previously protected communities at high risk of infections, continued substantial increases in infections will result in the coming weeks.
- It is possible that the current slowdown of case rates is due to the school holidays and a reduction of mixing that is affecting testing behaviour and transmission.
- Hospitalisations increased by 28% and it is highly likely that infections and hospitalisations will continue to increase in the coming weeks. Modelling predicts a peak of 21,000 cases and 1,200 hospitalisations daily at peak.

*Figure 1: National weekly case rates and CPF level for 12 February – 17 July 2022*




Source: Éclair/Episurv, 2359hrs 17 July 2022



## Tertiary Care outlook

- Inpatient test positivity for COVID-19 has been steadily increasing for the past month but has decreased slightly and is now 41 per 1,000 inpatients.
- New CMA modelling scenarios predict a sharp rise in hospitalisations from BA.5 becoming the dominant variant in the community, estimated at 1200 hospitalisations a day.
- Increasing trends in hospitalisations in the coming weeks are likely to exacerbate poor outcomes for at-risk populations such as those who are older, unvaccinated and/or have co-morbidities.

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# Special topic – Focus on Mortality: Trends and Inequities in Aotearoa

## Time Trends in Mortality

Mortality risk is strongly linked with increasing age; there have been substantial increases in case rates in those aged over 60 years during the past month (see Figure 2), and consequently a steady rise in the weekly numbers of deaths in the past month (seeFigure 3).

From March 2020 to 20 July 2022, there were 1,868 deaths with COVID-19 infection who died within 28 days of being reported as a case and/or with the cause being attributable to COVID-19 (that is an underlying or contributory cause). Of these deaths that have been formally coded by cause of death, 861 (50%) were determined to have COVID-19 as the main underlying cause. COVID-19 contributed to a further 465 deaths (27%). Another 390 people died of a separate, unrelated cause (23%).

*Figure 2 Case rates (per 1000) in those aged over 50 years, 13 February to 17 July 2022*

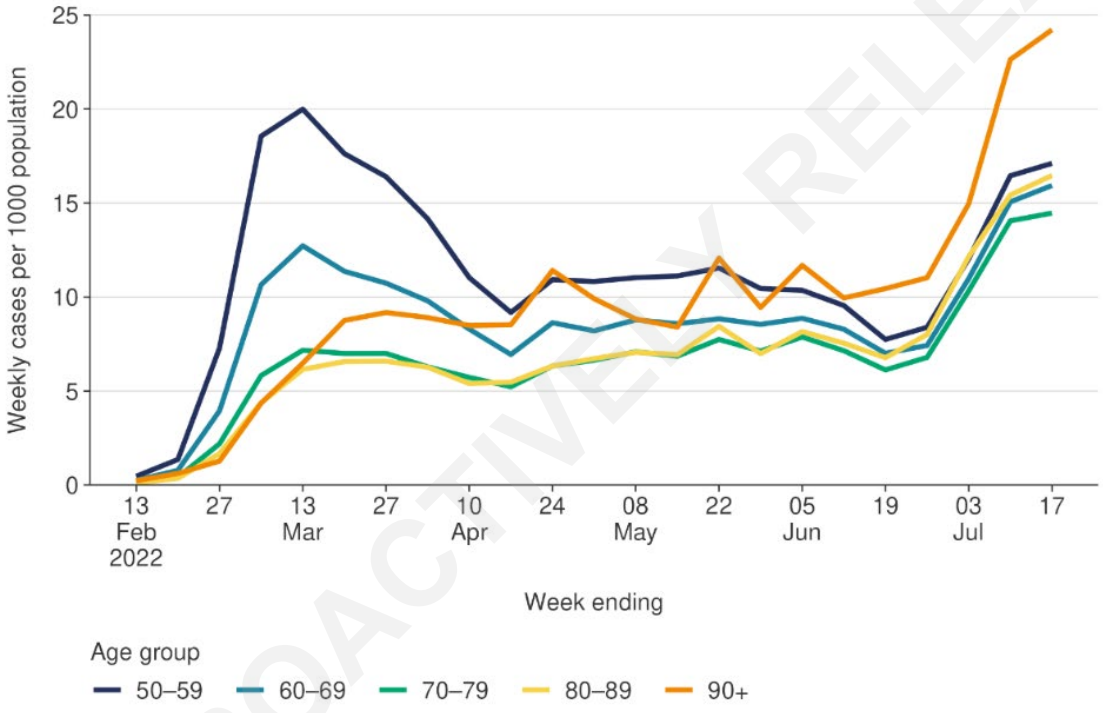
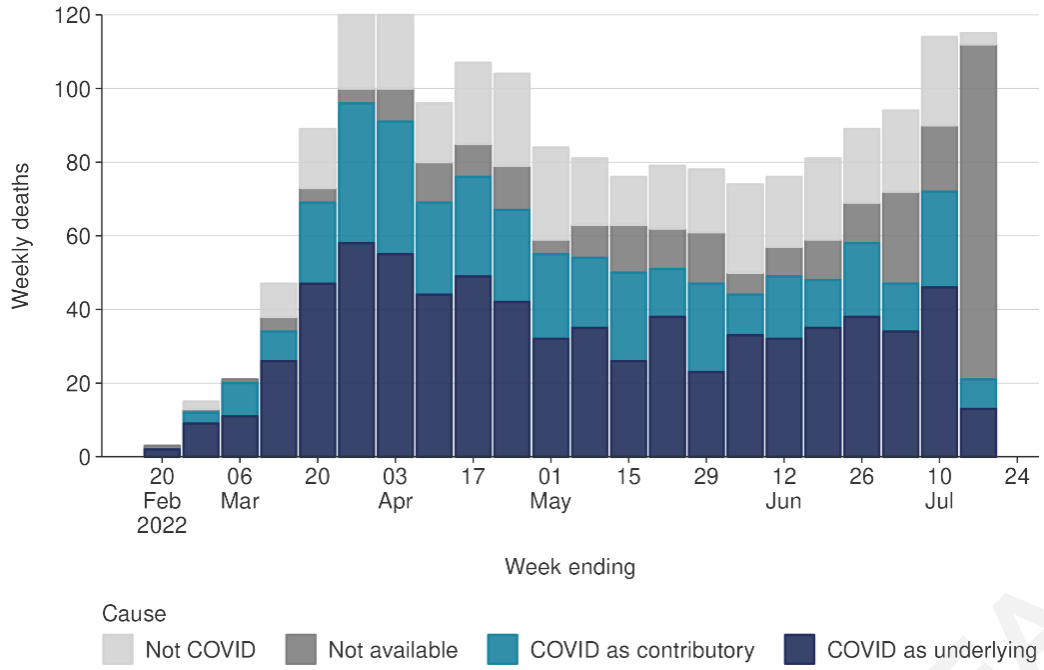


*Figure 3 Weekly death counts by cause of death, 01 January to 17 July 2022*




*Source: Ministry of Health. All deaths where someone has died within 28 days of being reported as having a positive test result for COVID-19 are reported. This approach aligns with countries such as the United Kingdom; it ensures that all cases of COVID-19 who die are formally recorded to help provide an accurate assessment of the impact of COVID-19.*

*All of the deaths within 28 days of a positive test report are fast-tracked for clinical/mortality coding to determine whether the infection was the underlying cause of the death, contributed to the death, or was unrelated to the death. An example of an unrelated death is a car accident; an example of a COVID-19 contributing is a person who dies who also has a pre-existing health condition.*

## Inequities in COVID-19 Mortality

Unadjusted and age-adjusted risk: Disparities in mortality risk by ethnicity and deprivation are clearly observed after adjusting for differences in age demographics.

The ethnic and deprivation groups that tend to be associated with higher mortality risk also tend to be systematically younger in age on average. Therefore, the mortality risk for these communities must be adjusted for age in order to make an accurate mortality comparison.

Table 1 in the Appendix shows that total COVID-19 attributed mortality rates are lower in Māori (16.5 per 100,000 of population) than in European and Other (26.7 per 100,000), while the Pacific rate is similar (27.0 per 100,000); however, *all* of the age-specific rates are higher for Māori and Pacific compared with European and Other. Table 2 in the appendix show a similar phenomenon occurs for deprivation.

Overall, comparing the age-standardised rate with European/Other (6.0 per 100,000; 95% Confidence Interval [CI[1]] 5.5-6.5 per 100,000), Māori (16.6 per 100,000; 95% 13.8-19.9 per 100,000) and Pacific (24.1 per 100,000, 95% CI 19.5-29.4 per 100,000) rates were 2.8 and 4.0 times greater, respectively (see Figure 4). Mortality was 3.1 times higher among those in high (10.6 per 100,00, 95% CI 9.4-12.0 per 100,000) compared with low (3.5 per 100,000, 95% CI 2.9-4.2 per 100,000) deprivation (see Figure 5).

[1] *Mortality data, even based on complete counts, may be affected by random variation—that is, the number of deaths that actually occurred may be considered as one of a large series of possible results that could have arisen under the same circumstances.* (https://stacks.cdc.gov/view/cdc/79486 - page 72). Confidence intervals account for the random variation inherent in deaths and illnesses (See Brillinger 1986 - The Natural Variability of Vital Rates and Associated Statistics). A 95% confidence interval means we are 95% confident that the rate would fall within the interval if we were to measure the number of deaths again under the same circumstances.

*Figure 4 Age-standardised cumulative incidence (and 95% confidence intervals) of mortality attributed to COVID-19 by ethnicity, March 2020 to 17 July 2022*

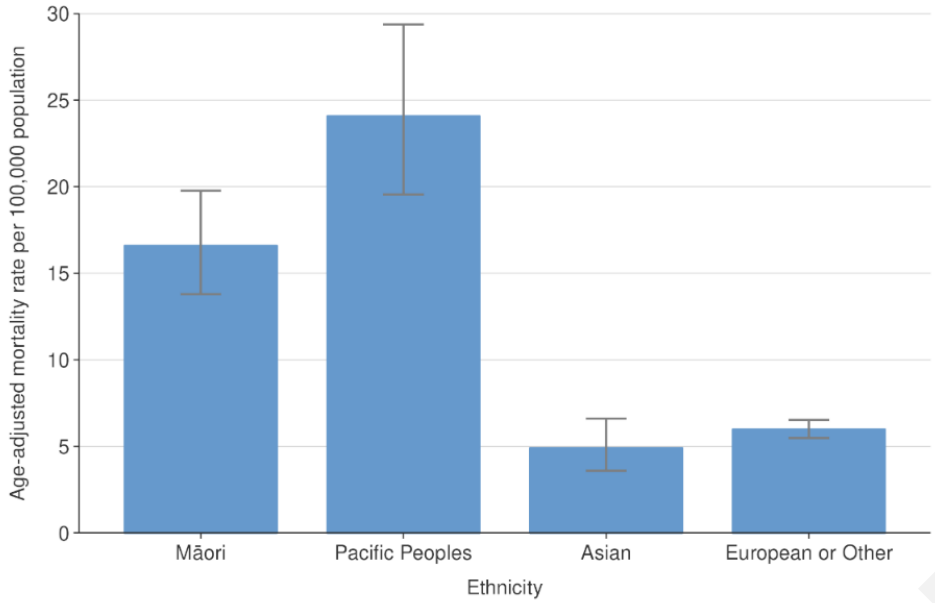
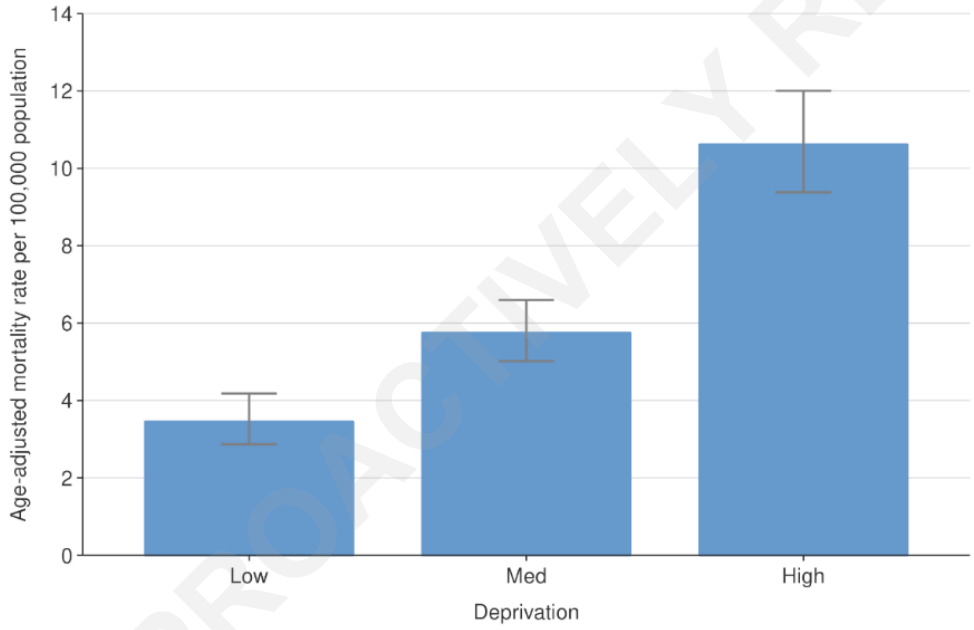



*Figure 5 Age-standardised cumulative incidence (and 95% confidence intervals) of mortality attributed to COVID-19 by deprivation, March 2020 to 17 July 2022*



## The determinants of mortality risk

The more complex relationship between deaths and demographic factors, vaccination and comorbidity were analysed in order to gain insight into the potential determinants of inequity. The following estimates of risk adjust for the influence of multiple factors of interest and better reflect how much each of these contribute independently to excess risk.[2] The population-based mortality risk estimates incorporate both the risk from initial infection in the first instance, and the risks following infection. Case fatality risk estimates address the risk following infection (and being identified as a case) only.

The COVID-19 attributed population-based and case-based adjusted mortality risks are presented in Table 1, as well as the case mortality rates for those aged <60 years. These risks have been adjusted for age and gender (not shown) and all other factors in the table. The full tables of rates, relative risks and adjusted relative risks are shown in the appendix.

*Table 1: Adjusted mortality risks among the population, among cases and among cases aged less than 60 years, March 2020 to 17 July 2022*

| | | Population risk (ARR) | | | Case-based risk (ARR) | | | Case-based in <60s | |
|---|---|---|---|---|---|---|---|---|---|
| | | Risk Ratio | 95% CI | | Risk Ratio | 95% CI | | Risk Ratio | 95% CI |
| Prioritised ethnicity | Māori | 1.71 | (1.61- | 1.81) | 1.49 | (1.23- | 1.81) | 2.02 | (1.14-3.56) |
| | Pacific | 2.79 | (2.62- | 2.97) | 1.38 | (1.11- | 1.70) | 1.81 | (0.94-3.47) |
| | Asian | 1.05 | (0.98- | 1.14) | 0.79 | (0.59- | 1.06) | 1.45 | (0.59-3.57) |
| | Other | Baseline | | | | | | | |
| Deprivation | Low | Baseline | | | | | | | |
| | Medium | 1.24 | (1.17- | 1.32) | 1.36 | (1.16- | 1.60) | 2.64 | (1.07-6.51) |
| | High | 1.56 | (1.47- | 1.66) | 1.49 | (1.26- | 1.77) | 3.34 | (1.36-8.19) |
| Vaccination status | <2 doses | 2.95 | (2.82- | 3.09) | 5.95 | (5.09- | 6.96) | 13.61 | (7.50-24.69) |
| | 2 doses | 1.81 | (1.71- | 1.91) | 2.78 | (2.39- | 3.23) | 2.90 | (1.60-5.24) |
| | >2 doses | Baseline | | | | | | | |
| One or more co-morbidities | No | Baseline | | | | | | | |
| | Yes | 4.35 | (4.15- | 4.55) | 3.29 | (2.80- | 3.87) | 10.76 | (6.31-18.35) |

## Mortality risk among the population

The age-adjusted relative risks for Māori and Pacific were substantial, as already shown in the age-standardised rates (see Figure 4). These risks were partially explained by the other factors of interest, but there remained significant unexplained excess risk due to ethnicity alone: the fully adjusted relative risks were 1.7 (95% CI 1.6-1.8) for Māori and 2.8 (95% CI 2.6-1.8) for Pacific compared with European and Other; only approximately 20% of the excess in mortality could be explained by the association between deprivation and ethnicity.

All other factors examined were also independently associated: The relative risks were 4.3 (95% CI 4.2-4.6) for comorbidity, 1.6 (95% CI 1.5-1.7) for high compared with low deprivation, and 3.0 (95% CI 2.8-3.1) for those not fully vaccinated compared with those who have had a booster.

## Case-based mortality risk

Among cases, there was also excess risk for Māori and Pacific that was not accounted for by the other factors, including deprivation, co-morbidity and vaccination uptake, though not as substantial, suggesting some population-based excess risk may be due to differences in infection incidence.

[2] A summary of the statistical method is provided in the Appendix.

Overall, across all ethnicities, the strongest modifiable risk was vaccination: those not fully vaccinated had 6.0 (95% CI 5.1-7.0) times the risk of case fatality compared with those who had received a booster.

When the data were examined among those under 60 years only, the inequitable risks for Māori and Pacific and those in high deprivation were even more pronounced. After adjusting for all factors of interest, the relative risk for Māori and Pacific compared with European was 2.0 (95% CI 1.1-3.6) and 1.8 (95% CI 0.9-3.5), respectively. The relative risk was 3.3 (95% CI 1.4-8.2) for high deprivation and 2.6 (95% 1.1-6.5) for medium compared with low. Notably in people under the age of 60, having a co-morbidity carried a relative risk of 10.8 (95% CI 6.3-18.5) and not being fully vaccinated 13.6 (95% CI 7.5-24.7) compared with baselines of no comorbidity and having had a booster, respectively.

## Summary

This analysis supports that, as well as age being a strong risk for death, there is excess risk for Māori and Pacific, those in high deprivation and for those with co-morbidities. This is especially true for risk of death in those aged under 60 years. However, vaccination has a strong protective effect that can mitigate some, but not all, of this excess risk.

# Infection Trends

## Summary of evidence for infection and case ascertainment trends

Currently, the healthcare workforce case rates in the past week (27.9 per 1,000) were higher than the general population (13.7 per 1,000); This suggest that the underlying level of infection are substantially higher than diagnosed rates. Case rates in healthcare workers have decreased slightly from the previous three weeks of increase and are consistent with general population case rates which have increased at a much slower rate compared to the previous three weeks. These trends are consistent at a national level across all ethnicities and age groups.

Inpatient test positivity at tertiary hospitals across the motu has increased steadily for the past four weeks but has declined slightly in the previous week to approximately 4.1% (41 per 1000) of inpatients testing positive for COVID-19. This trend is also similar to that observed in the general population.

Levels of viral RNA in wastewater have decreased slightly in all regions in the past week after a steady increase for two weeks. 67% of sites are still higher than levels observed a month ago.

EpiNOW forecasting indicates that the median estimate of effective R (Reff) nationally is 0.9. This means case are likely to remain at similar levels or decrease in the coming week.

COVID-19 Modelling Aotearoa (CMA) scenarios indicate under current public health measures settings, cases will peak at approximately 21,000 cases and 1,200 hospitalisations daily in early August. However, community trends for cases are tracking lower than the modelled scenario. This may suggest the model scenario was more pessimistic on the number of cases. Models will be updated in next week's report.

## Approximation of underlying infection incidence

Please note that we have removed data related to Border Worker case rates and testing as the underlying surveillance data is under review due to the end of the legal requirement for routine testing.

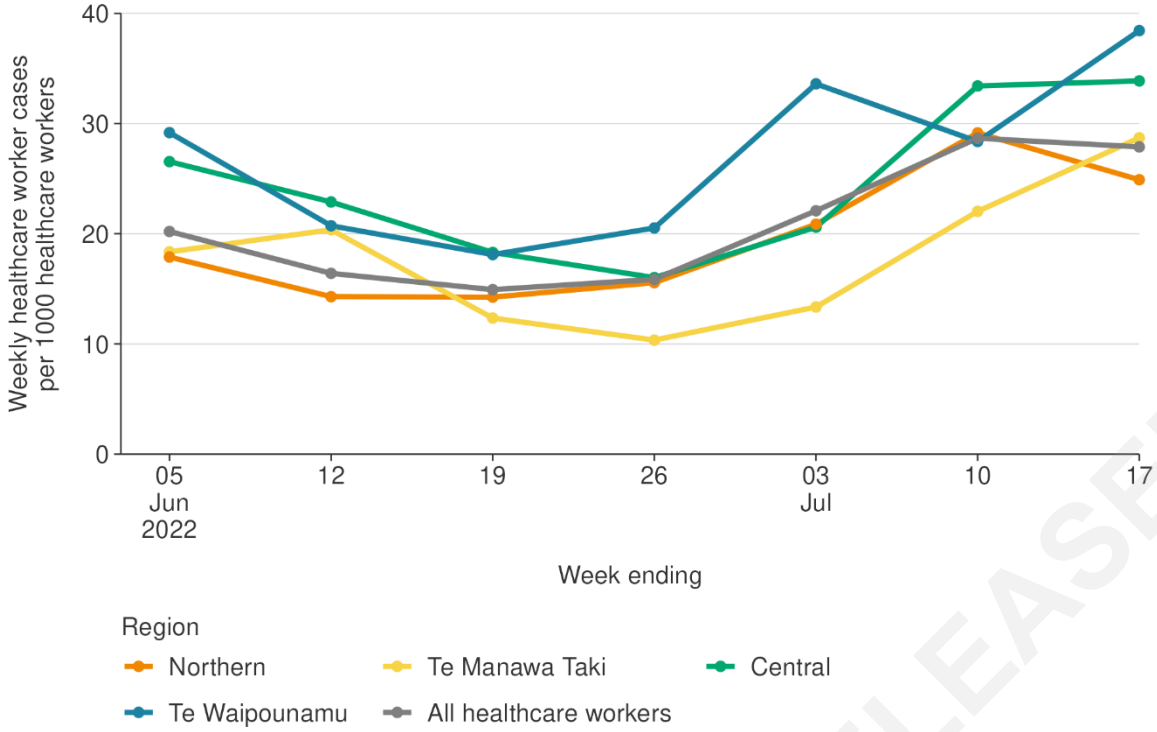
Underlying infection incidence has been estimated using case rates for routinely tested healthcare workers where there was evidence of regular testing.[3] While these workers are not a representative sample of New Zealanders, healthcare workers are likely to have a similar risk to the general population as their risk of infection from the community is likely to be much higher than the risk faced in their workplace, due to strict infection prevention and control policies.

For the week ending 17 July, estimates suggest that 2.8% (919/ 32,963) of healthcare workers (Figure 6) tested positive (for the first time).



[3] The population has been identified based on ever having a surveillance code related to the respective workforce and having at least 2 tests (at least one of which was negative) in 2022. A sensitivity check was run using at least 3 tests and while these numbers reduced, the incidence estimates remained very similar.

*Figure 6: Regional weekly case rates of health care workers for weeks 05 June – 17 July 2022*

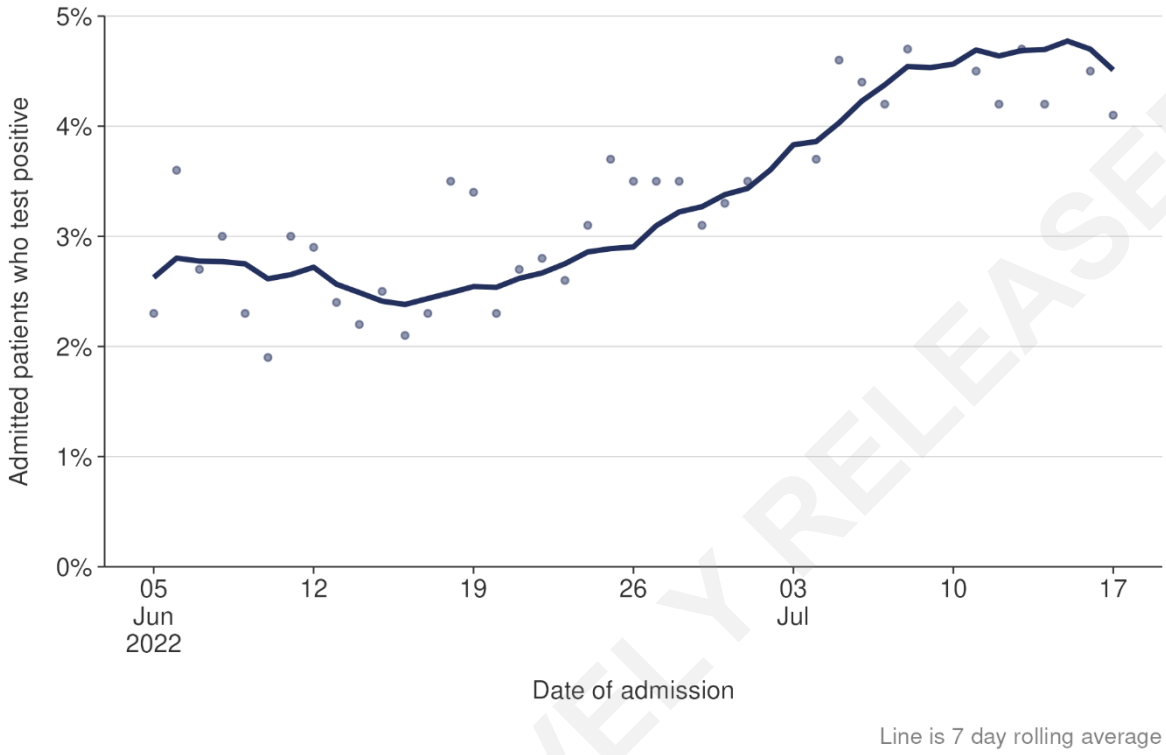



Source: Éclair/Episurv, 2359hrs 17 July 2022

## Test positivity trends among tertiary hospital admissions

Inpatient test positivity trends for tertiary hospital admissions[4] is shown in Figure 7. Tertiary hospital admission positivity has been steadily increasing since mid-June with a 7-day rolling average of 4.5% (539/11,950) for the week ending 17 July. However, there was a slight downward trend of tertiary hospital admission positivity reported on 16 and 17 July at 4.5% (62/1,370) and 4.1% (48/1,157) respectively. Preliminary analysis indicates a large majority of cases who are admitted to hospital, test positive and are confirmed as a case on the day of their hospitalisation.

*Figure 7: Percent of tests positive among tertiary hospital admissions*




Source: Tertiary hospitalisation data, NCTS & EpiSurv as at 2359hrs 17 July 2022



[4] These are hospital admissions who had COVID at the time of admission or while in hospital. This data is from Districts with tertiary hospitals; these Districts are Auckland, Canterbury, Southern, Counties Manukau, Waikato, Capital & Coast, Waitemata, and Northland.

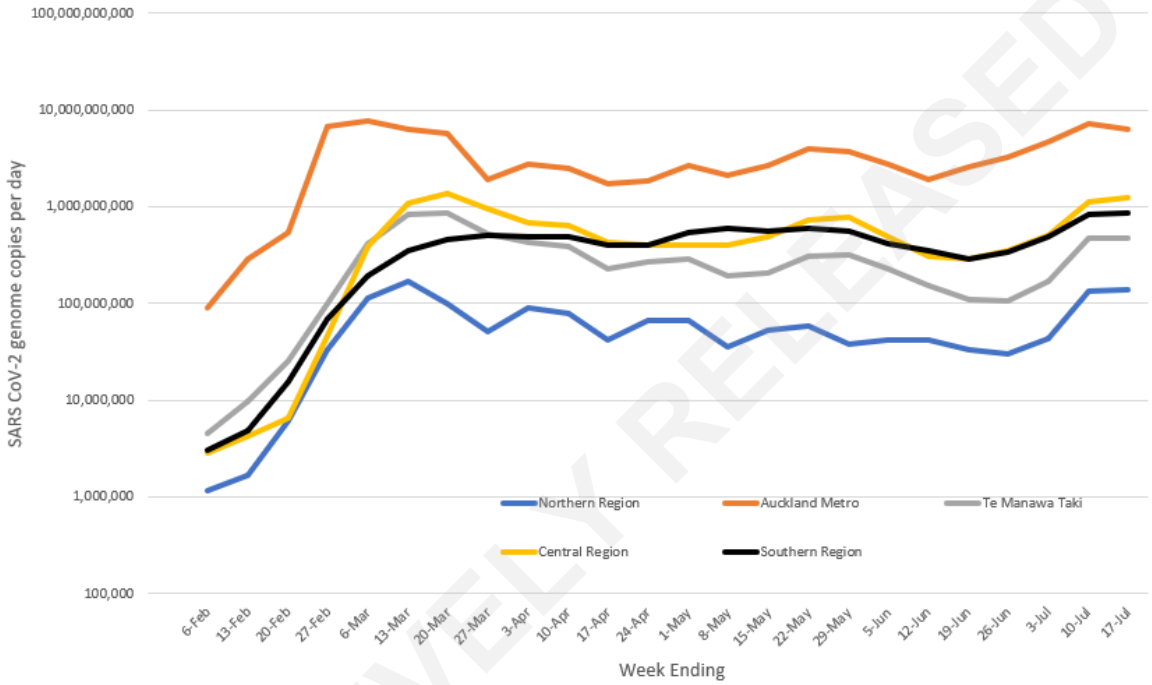
## Wastewater quantification

Figure 8 provides an overview of wastewater results by region. Please note that it is not appropriate to compare SARS-CoV-2 absolute levels by region; this figure can only be used to assess the trends *within* each region.

The SARS-CoV-2 RNA levels in wastewater in all regions have plateaued after increasing steadily in the past weeks. However, in all regions, the wastewater levels are similar to the levels seen in March.

The trends in each catchment area are not necessarily consistent within each region; within-region trends are available in ESR's weekly wastewater report.

*Figure 8: Regional wastewater trends in SARS-CoV-2 genome quantification (2-week rolling average) for weeks 06 February – 17 July 2022*




Source: ESR SARS-CoV-2 in Wastewater update for week ending 17 July 2022

## Trends in diagnosed cases

Overall, the weekly case rate was 13.7 per 1,000 population for the week ending 17 July. This is a 4.4% increase from the previous week, which was 13.1 per 1,000.

Figure 9 shows that case rates have increased across all regions except Northern Region in the past week. The Northern region rate (11.8 per 1,000) decreased by 2% in the past week, Te Manawa Taki (11.0 per 1,000) increased by 9%, Central region (16.4 per 1,000) increased by 6% and Te Waipounamu (16.9 per 1,000) increased by 8%.

In the past week, 12 out of 18 Districts experienced an increase in case rates. There was a 7% increase in Counties Manukau, a 1% increase in Northland, a 29% increase in Lakes, a 11% increase in Bay of Plenty, a 9% increase in Waikato, a 13% increase in Hawke's Bay, a 20% increase in Wairarapa, a 19% increase in Whanganui, a 21% increase in MidCentral, a 21% increase in Southern, a 3% increase in Canterbury and West Coast, a 11% increase in South Canterbury, a 5% increase in Nelson Marlborough.

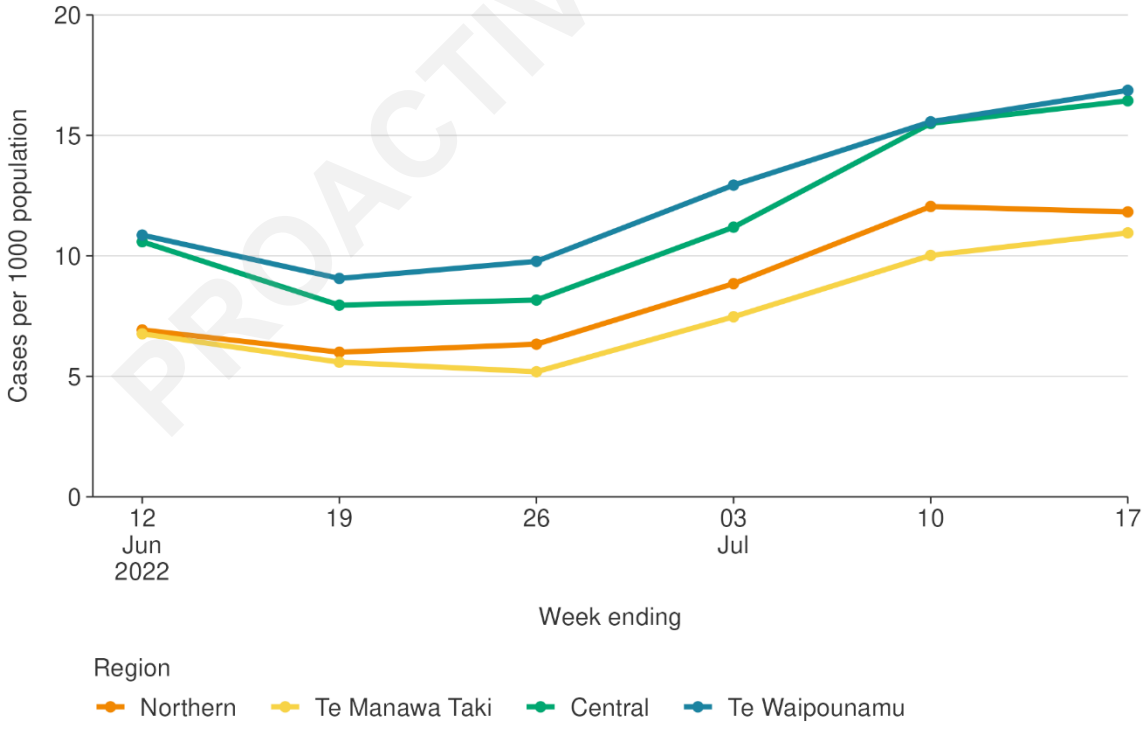
In the Northern region, the weekly case rate was highest for Waitematā (13.5 per 1,000) followed by Auckland District (12.8 per 1,000). However, there were decreases by 5% in those two districts compared to the week prior.

In Te Manawa Taki, weekly case rates were highest in Lakes (12.4 per 1,000), followed by Taranaki District (11.7 per 1,000). There was a decrease of 11% in Tairāwhiti and the weekly case rate was similar in Taranaki compared to the week prior.

The highest weekly case rates in the Central region were in Hawke's Bay (18.5 per 1,000) followed by Wairarapa (18.2 per 1,000). There was a decrease by 4% in Capital, Coast and Hutt Valley compared to the week prior.

In Te Waipounamu, the highest case rates were in Southern District (17.8 per 1,000) followed by Canterbury and West Coast (17.5 per 1,000).

*Figure 9: Regional weekly case rates for weeks 12 June – 17 July 2022*




Source: NCTS/EpiSurv as at 2359hrs 17 July 2022

## Reinfection

Analysis and interpretation of reinfection data is being developed and will be provided in the next report. However, preliminary analysis indicated that 3.2% (2,164/66,905) of cases between 4-10 July were reinfections. To date, 16.4% of those who were reported as a case prior to the August 2021 Delta outbreak, when case ascertainment was more complete, have reported a subsequent infection.

It is important to note that these data come with several significant limitations: (1) Reinfections can only be identified if the previous infection was also reported. (2) Guidance on when to test after first infection was changed on June 30, the previous guidance was not to test until 90 days after first infection. This in now 28 days, and consequently early reinfections were under-reported prior to June 30. (3) Those who have already had a first infection may be less likely to test during their second infection. (4) Reinfections are possibly more likely to be mild or asymptomatic.

## Trends in Influenza-like Illness symptoms

The data for this section is not available this week.

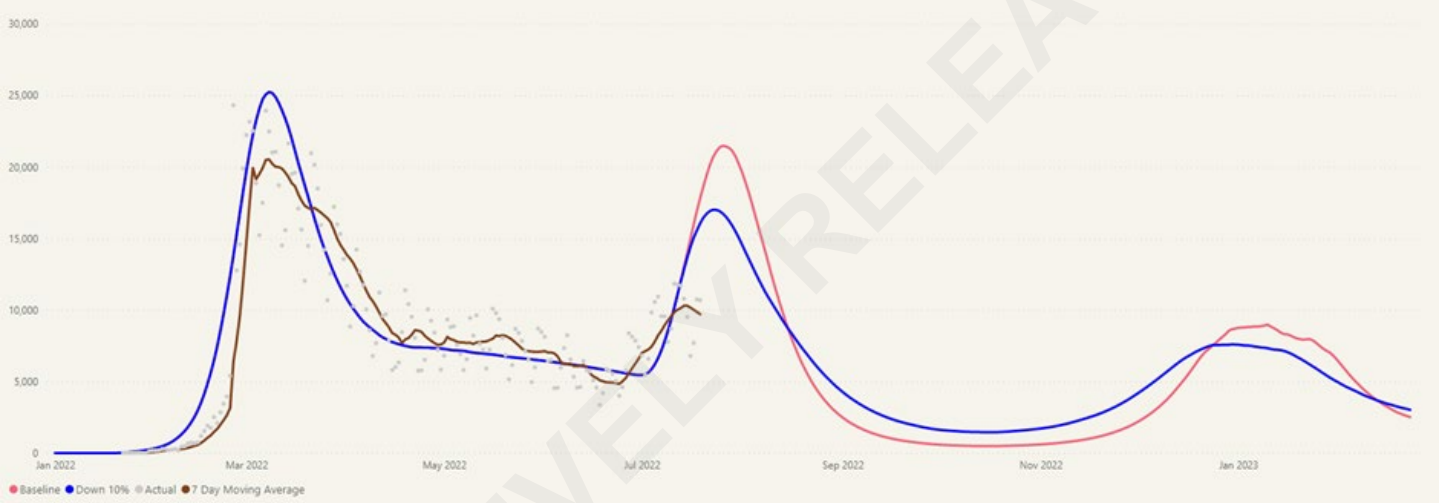
## Modelled and actual cases

The COVID-19 Modelling Aotearoa group compare predictive model scenarios for number of reported cases with actual number of cases. Figure 10 compares cases with the new BA.5 scenarios. The baseline scenario assumes no change in policy or behaviour in the New Zealand population throughout the current BA.5 wave; hence that Covid-19 transmission remains the same. The "Down 10%" scenario assumes a reduction in Covid-19 transmission by 10%.

These scenarios are based on the current Omicron BA.5 variant. The peak is projected to occur between late July and early August with daily cases rising to approximately 21,000 a day, or 17,000 under the "Down 10%" scenario.

Currently, we see that cases may be peaking below both scenarios at approximately 11,000 cases a day, in mid-July. The 7-day moving average of cases has declined slightly in the few days to 19 July. Next week we will have more insight regarding whether cases have indeed peaked and are starting to plateau/decline, or whether this is just a small aberration in an overall increasing trend. Model scenarios will be updated by next week, as they are possibly over-predicting the number of cases.

*Figure 10: COVID-19 Modelling Aotearoa scenarios compared with reported cases nationally (BA.5 scenarios)*



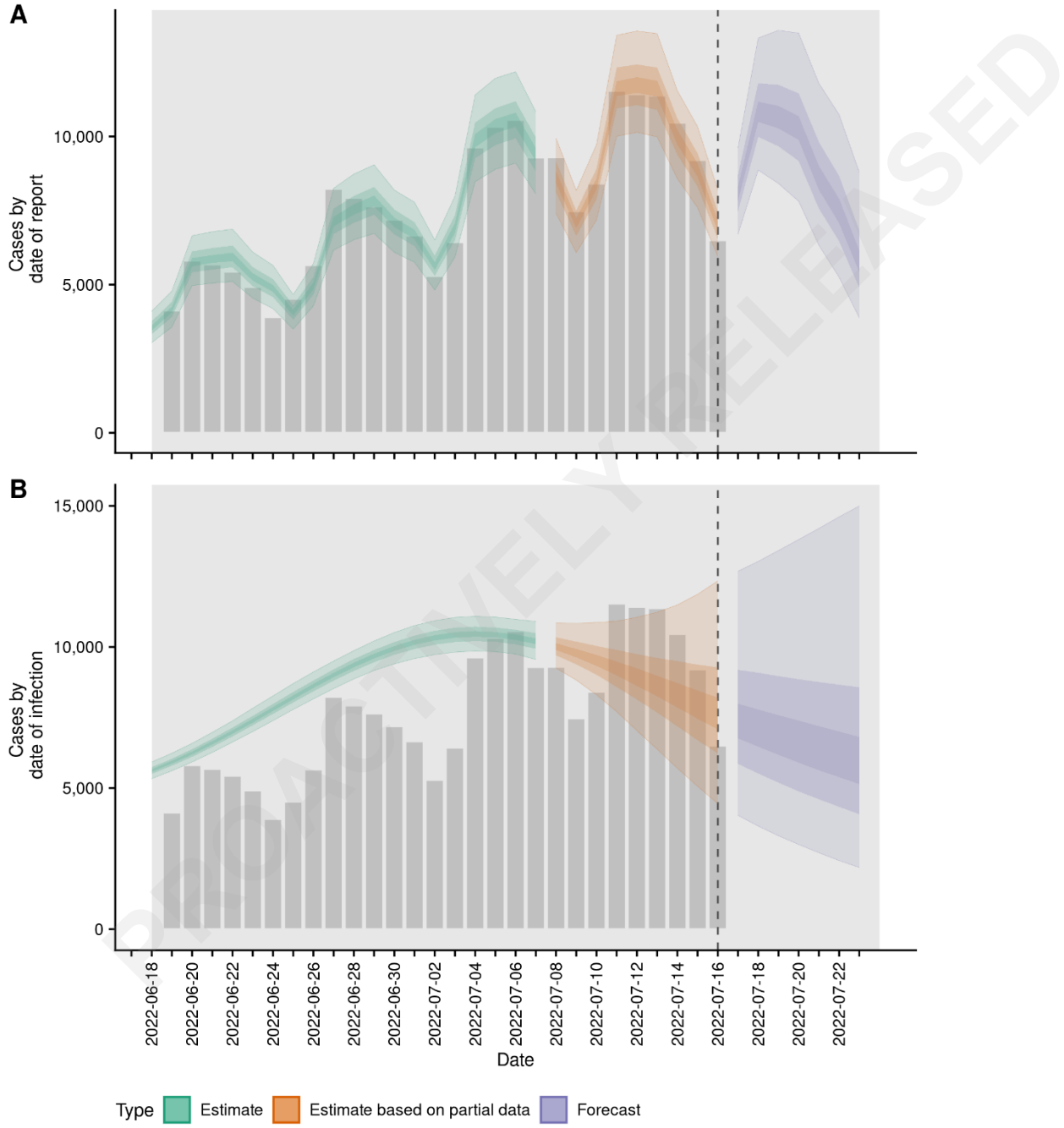

Sources: COVID-19 Modelling Aotearoa Branching Process Model April 2022, and Ministry of Health reported case data 19 July 2022

## Effective reproduction rate, and forecasts of cases and infections

These estimates used the EpiNow package on 18 July using data to 16 July[5]. The median estimate of effective R (Reff) nationally is 0.9 (90% Credible Interval [CI]: 0.6-1.1) for cases to 16 July, after adjusting for data lags; this is below the previous two weeks. The confidence interval indicates a low to moderate level of uncertainty for this estimate.

The model's median estimate is that national reported cases could be 5,772 cases per day by 23 July (50% credible interval: 4,898 – 6,826). However, the credible intervals for the projected cases would be even wider if the possibility of continuing trend changes in effective R were included.

*Figure 11: Projected national cases by (A) date of report and (B) date of infection*




Source: EpiNow 16 July 2022, based on NCTS and EpiSurv cases

[5] The EpiNow package 'now-casts' and forecasts cases to measure current, past and future transmission nationally by calculating and then extrapolating the effective reproduction number, Reff. The model does not consider several factors that may impact transmission, such as rapid changes in public health measures, population behaviour, mobility, or school holidays. This model requires sustained daily cases before it can make predictions. It only counts cases that become confirmed at some stage.

# Demographic trends in case rates

## Ethnicity trends over time and by region

Figure 12 shows national case rates by ethnicity. Figure 14 shows regional case rates by ethnicity.

In the past week, case rates increased for all ethnicities. Rates in Asian and European or Other ethnicities remain higher than those for Māori and Pacific Peoples. European or Other continue to have the highest weekly case rate at 15.6 per 1,000 (up from last week's 15.2 per 1,000), followed by Asian at 13.8 per 1,000 (up from 12.9 per 1,000 last week). The lowest case rate continues to be in Pacific Peoples (7.0 per 1,000), which is a 17% increase from last week (6.0 per 1,000). The Māori case rate has also increased by 11%, from 7.7 per 1,000 in the previous week to 8.5 per 1,000.

Case rates in the Northern region for European or Other were 13.7 per 1,000 and rates for Asian were 13.0 per 1,000. Māori had the second lowest case rate at 7.7 per 1,000. Pacific Peoples (6.6 per 1,000) had the lowest case rates in this region.

Case rates for Te Manawa Taki were highest for European or Other (12.6 per 1,000), followed by Asian (11.1 per 1,000). Pacific Peoples had the second lowest case rate at 7.3 per 1,000 followed closely by Māori who had the lowest case rates at 7.0 per 1,000.

In the Central region, case rates were highest for European or Other (18.4 per 1,000), compared to Asian (17.5 per 1,000). Māori had the second lowest case rate at 10.8 per 1,000 and Pacific Peoples had the lowest case rate at 7.9 per 1,000.

Case rates for Te Waipounamu were highest for European or Other (17.8 per 1,000) and Asian (16.7 per 1,000). Māori had the second lowest case rate at 10.8 per 1,000 and Pacific Peoples had the lowest case rates at 8.2 per 1,000.

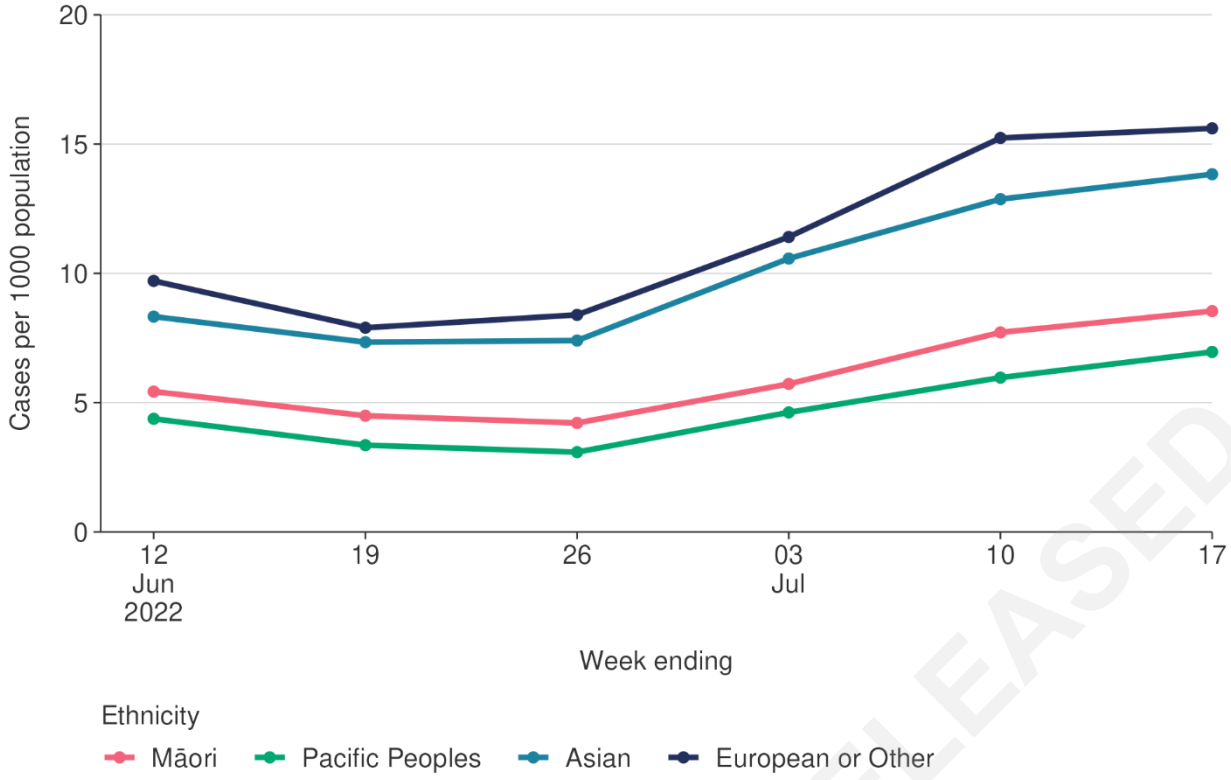
Figure 13 shows national case rates by ethnicity and a further breakdown by age group. The highest case rates out of any cohort were within those aged 25-44 and 45-64 of European or Other ethnicity (17.1 and 18.3 per 1,000 respectively) whilst the lowest case rates were in those aged 0-4 and 5-14 of Pacific Peoples ethnicity (3.3 and 3.1 per 1,000 respectively). For both Māori and Pacific Peoples, case rates were highest in the 25-44, 45-64 and 65+ age groups. For Asian people, case rates were highest in the 15-24, 25-44 and 45-64 age groups. For European or Other, case rates were highest in the 25-44, 45-64 and 65+ age groups.

Cases rates for all ethnicities aged 65+ increased, although to a lesser extent except Pacific Peoples, in the past two weeks. In the week ending 17 July, case rates for Asian aged 65+ were 9.9 per 1,000 (8% increase from week prior). Case rates for European or Other aged 65+ were 16.3 per 1,000 (4% increase from week prior). Case rates in Māori aged 65+ were 12.4 per 1,000 (3% increase from week prior). Case rates in Pacific People aged 65+ were 9.7 per 1,000 (40% increase from week prior).

Case rates for those at higher risk of complications or severe illness from COVID-19, for those aged 45-64 and those aged 65+, were highest in European or Other (45-64 at 18.3 per 1,000 and 65+ at 16.3 per 1,000).

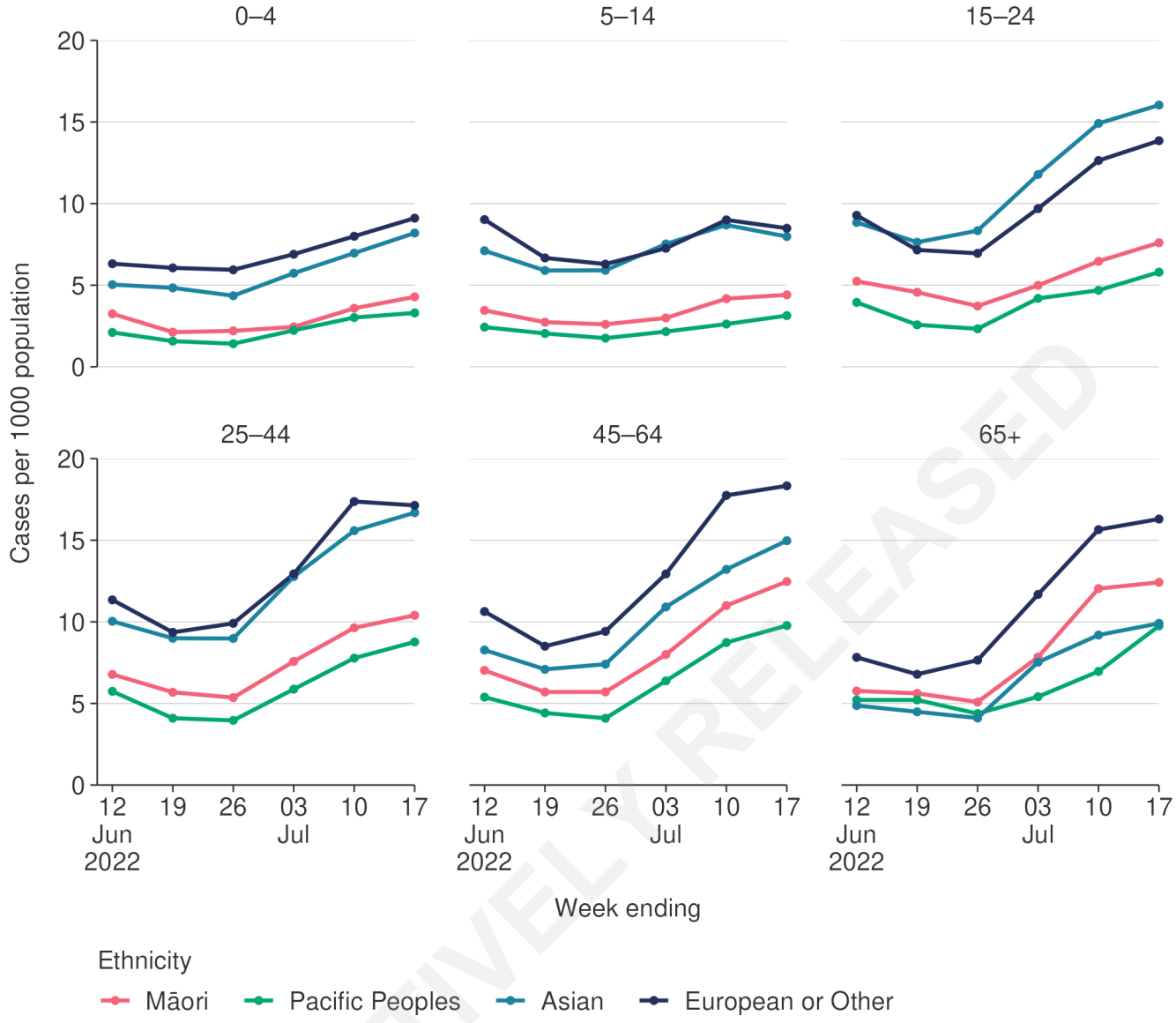
As Māori and Pacific Peoples have lower life expectancies than other ethnicities in Aotearoa New Zealand, they are likely to have a higher risk for COVID-19 complications at a younger age than other ethnicities.

*Figure 12: National weekly case rates by ethnicity for weeks 12 June – 17 July 2022*



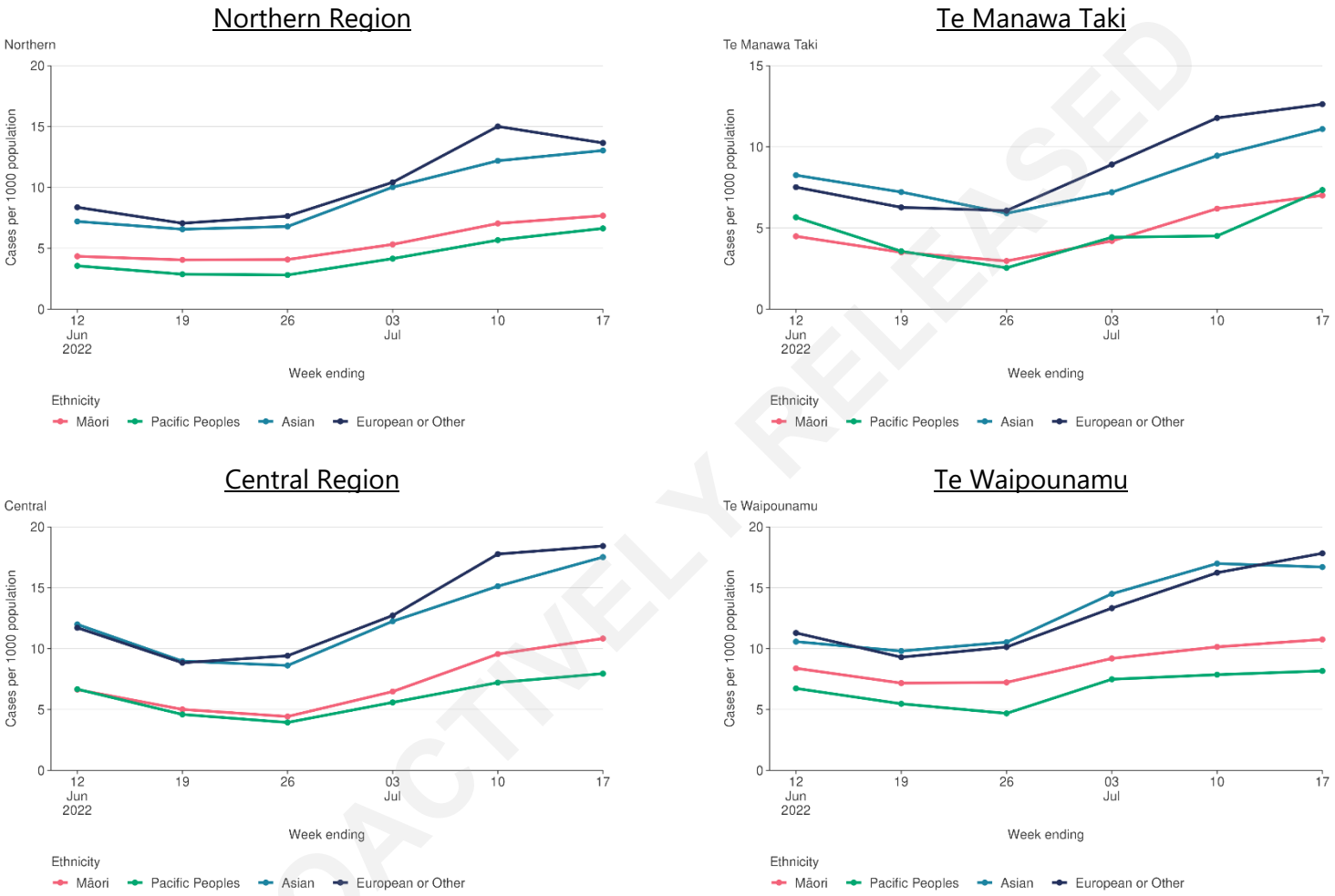

Source: NCTS/EpiSurv as at 2359hrs 17 July 2022

*Figure 13: National ethnicity-specific weekly case rates by age group for weeks 12 June – 17 July 2022*




Source: NCTS/EpiSurv as at 2359hrs 17 July 2022

*Figure 14: Regional weekly case rates by ethnicity for weeks 12 June – 17 July 2022*






Source: NCTS/EpiSurv as at 2359hrs 17 July 2022

## Age trends over time and by region

Figure 15 shows community cases by age nationally. Case rates have increase across all age groups except 5-14 in the past week. Nationally, case rates in the 65+ age group increased 5% from last week, to 15.3 per 1,000.

Nationally, case rates were relatively similar for 0-4 and 5-14 age groups (7.1 and 6.9 per 1,000 respectively); Case rate in the 15-24 age groups was at 12.0 per 1,000; The 25-44 age group had the second highest case rate at 15.5 per 1,000; The 45-64 age groups had the highest case rates at 16.7 per 1,000 in the past week; Those aged 5-14 had the lowest weekly case rate at 6.9 per 1,000.

For the 0-4 age group, case rates in the Northern region increased by 15.1%, Te Manawa Taki increased by 27.3%, Central increased by 28.5% and Te Waipounamu increased by 0.7%.

For the 5-14 age group, case rates in the Northern region decreased by 0.6%, Te Manawa Taki increased by 6.9%, Central decreased by 3.5% and Te Waipounamu decreased by 10.9%.

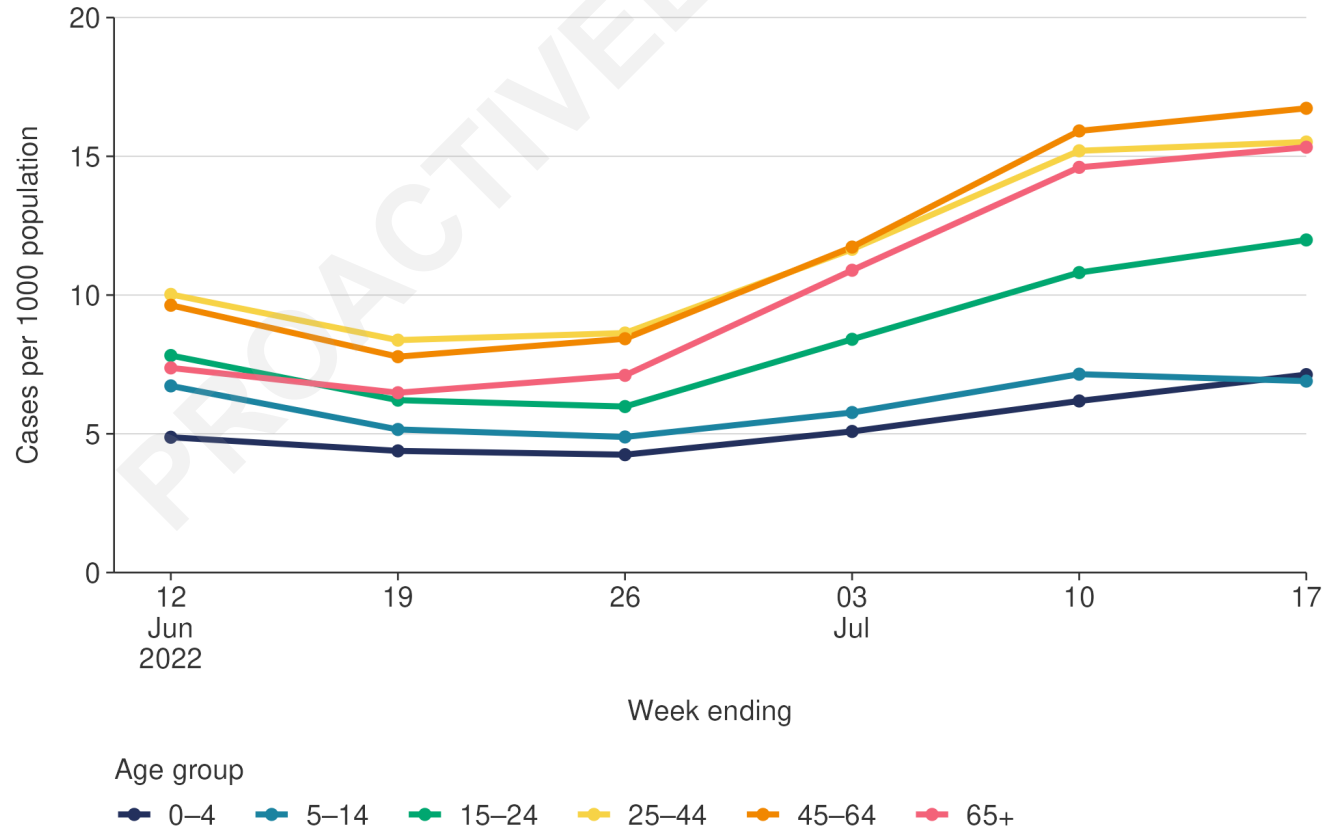
For the 15-24 age group, case rates in the Northern region increased by 10.5%, Te Manawa Taki increased by 7.6%, Central increased by 12.9% and Te Waipounamu increased by 11.2%.

For the 25-44 age group, case rates in the Northern region decreased by 5.1%, Te Manawa Taki increased by 10.0%, Central increased by 2.6% and Te Waipounamu increased by 8.3%.

For the 45-64 age group, case rates in the Northern region decreased by 3.9%, Te Manawa Taki increased by 5.3%, Central increased by 8.5% and Te Waipounamu increased by 14.1%.

For the 65+ age group, case rates in the Northern region decreased by 3.4%, Te Manawa Taki increased by 13.9%, Central increased by 4.5% and Te Waipounamu increased by 7.8%.

*Figure 15: National weekly case rates by age for weeks 12 June – 17 July 2022*




Source: NCTS/EpiSurv as at 2359hrs 17 July 2022

## Deprivation trends over time, by ethnicity and by region

Figure 16 shows case rates based on the NZDep2018.[6] Deprivation is a structural determinant of COVID-19 both in terms of risk of infection and poor outcomes. Areas of high deprivation are ones where there is poor access to the internet, low incomes, higher number of welfare recipients, increased unemployment, single parent families and higher prevalence of people living in rented accommodation and/or in homes that are overcrowded and damp. These factors impact the ability to sustain self-isolation for cases and their household members.

Overall, in the past week, case rates continued to be highest in the areas of least deprived (16.4 per 1,000 population), followed by areas of mid-range deprivation (14.5 per 1,000) and areas of most deprived (10.4 per 1,000).

Behavioural insights evidence indicates that not knowing where to report RAT results, financial issues from having to isolate, inability to take time off work and not having a place to isolate safely impact the registering of a positive test. These issues could be exacerbated in areas of higher deprivation. Thus, it could be that some of the difference is explained by bias in case ascertainment associated with deprivation; however, data are not available to investigate case ascertainment. It is also feasible that lower case rates in areas of high deprivation could be partially explained by higher infection rates earlier in the year.

Comparison of national case rates of deprivation by ethnicity in the past week for areas most deprived shows that case rates were highest in the European or Other ethnicity followed by Asian ethnicity (13.6 and 13.0 per 1,000 respectively). Case rates in Pacific Peoples were the lowest in every deprivation level, while case rates in European or Other people were the highest in every deprivation level. European or Other had the highest case rates in areas least deprived at 17.2 per 1,000 followed by Asian (14.3 per 1,000).

For the most deprived areas, Māori made up 18.6% of cases, which is less than the proportion of Māori population in deprived areas. The proportion of cases in the most deprived areas for Pacific Peoples was 9.0%, for Asian 16.3% and for European and Other, 56.1%. Following this, 81.0% of cases in areas of least deprivation were European and Other compared with 12.3% Asian, 5.1% Māori and 1.5% Pacific Peoples.

In the Northern region, case rates were highest in the least deprived areas (14.0 per 1,000 population) followed by areas of mid-range deprivation (13.2 per 1,000) and areas most deprived (8.3 per 1,000).

In Te Manawa Taki, case rates were highest in the least deprived areas (13.2 per 1,000) followed by areas of mid-range deprivation (11.7 per 1,000) and areas most deprived (9.2 per 1,000).

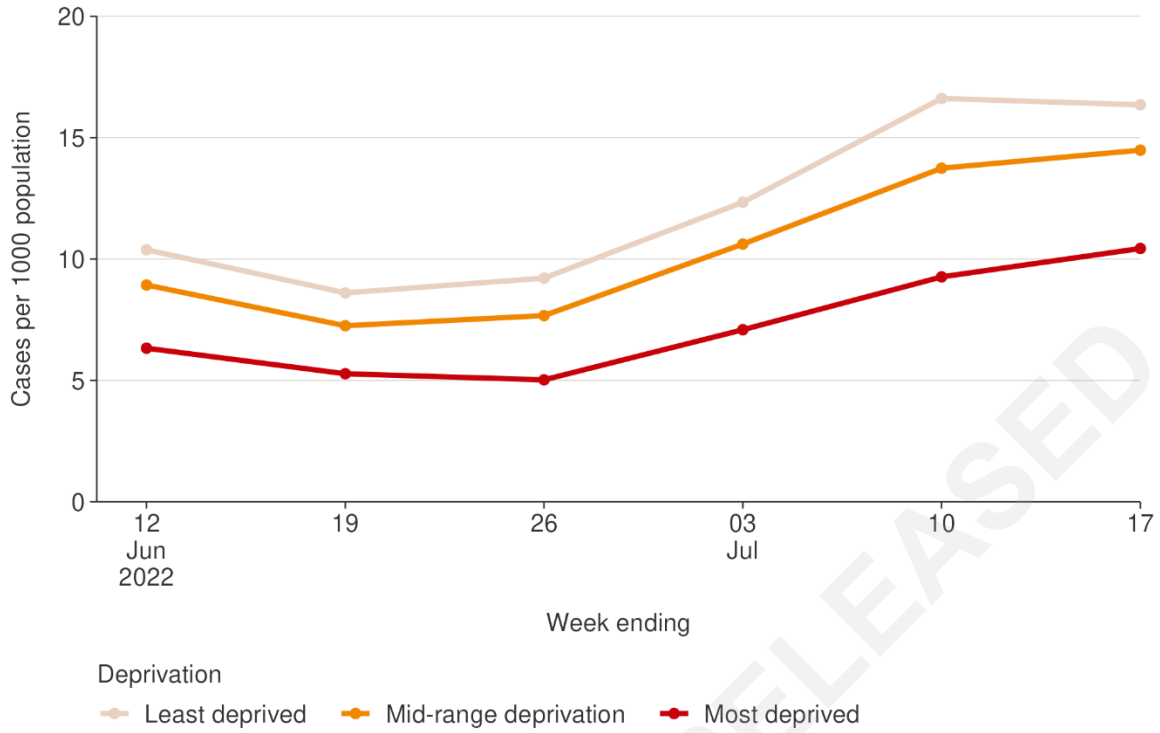
In the Central region, case rates were highest in the least deprived areas (18.9 per 1,000) followed by areas of mid-range deprivation (17.4 per 1,000) and areas most deprived (13.3 per 1,000).

In Te Waipounamu, case rates were highest in the least deprived areas (19.3 per 1,000) followed by areas of mid-range deprivation (16.6 per 1,000) and areas most deprived (14.0 per 1,000).



[6] Contents (otago.ac.nz)

*Figure 16: National weekly COVID-19 case rates by deprivation status for weeks 12 June – 17 July 2022*




Source: NCTS/EpiSurv as at 2359hrs 17 July 2022

## Vaccination trends over time

This section has been removed this week.

# PCR and RAT testing trends

Since New Zealand entered Phase 3 of the Omicron response, the majority of testing has been by rapid antigen tests (RATs) rather than PCR tests. RATs are self-administered and therefore require the individual to self-report their results, which may result in under-reporting. In addition, RATs are more likely than PCR tests to return a false-positive or false-negative result, especially if used during early periods of infection. On the other hand, increased availability of RATs may mean that more people have tested than would have otherwise, had PCR tests continued to be the main surveillance method. Test positivity for RATs would require data on the total number of RATs used, especially negative results. As PCR testing is only used to monitor priority populations and confirm positive RATs in specific situations, these rates and positivity data are not fully representative of the current testing state of New Zealand.

## Whole Genomic Sequencing of Community cases

This week, watchlist variants BA.4 and BA.5 were again detected in community samples (first detected in late May/early June). Wastewater data also detected BA.4/5 at all sites in the past week. Wastewater data coupled with community case Whole Genome Sequencing (WGS) results strongly suggests that BA.4/5 are circulating within the wider NZ population. The upward rise of the BA.5 variant of Omicron is a key observation – it is the dominant variant. There is high certainty that BA.5 is largely responsible for the rise in case numbers across the country (and internationally). Models predict it will reach 90% of all community cases in early August 2022.

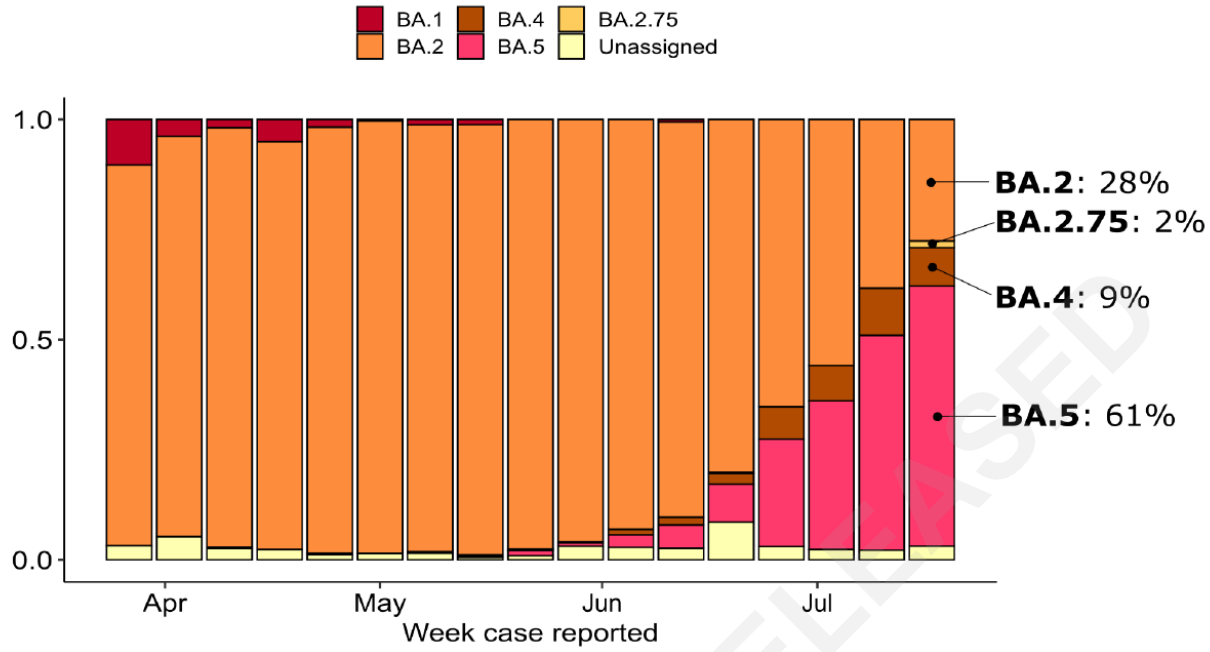
Omicron is the dominant variant in New Zealand having outcompeted Delta, which made up ~70% of all sequenced cases at the start of January 2022 but fell to less than 10% of sequenced cases by the end of January 2022.

Figure 17 shows that BA.5 made up about 61% of sequenced community cases in the past week. Figure 17 also shows the increasing frequency of BA.5 in community samples over the past few weeks. As expected, in NZ we see a (relative) growth advantage of BA.5 over other variants. BA.4 is holding steady at approximately 9% of community cases.

A recent subvariant BA.2.75 looks to be gaining a global foothold. So far, there have been a very small number of reported cases (<20); most are from the border but two of these cases are from the community and have no clear epidemiological link to the border. It is probable that small numbers of BA.2.75 are transmitting within the NZ community - it remains highly uncertain what impact, if any, this will have on case numbers, reinfection and spread relative to BA.5.

Please see the caveats in the Glossary at the end of this document.

*Figure 17: Frequency of Variants of Concern in community cases in New Zealand*




Source: ESR COVID-19 Genomics Insights Report #15, EpiSurv/Microreact 0900hrs 18 July 2022

# Border Surveillance

## Cases detected at the Air Border

Imported cases initially increased as travel volumes increased following the first stage of border reopening's in March. Detected cases then remained roughly constant through May and June and began rising again in late June.

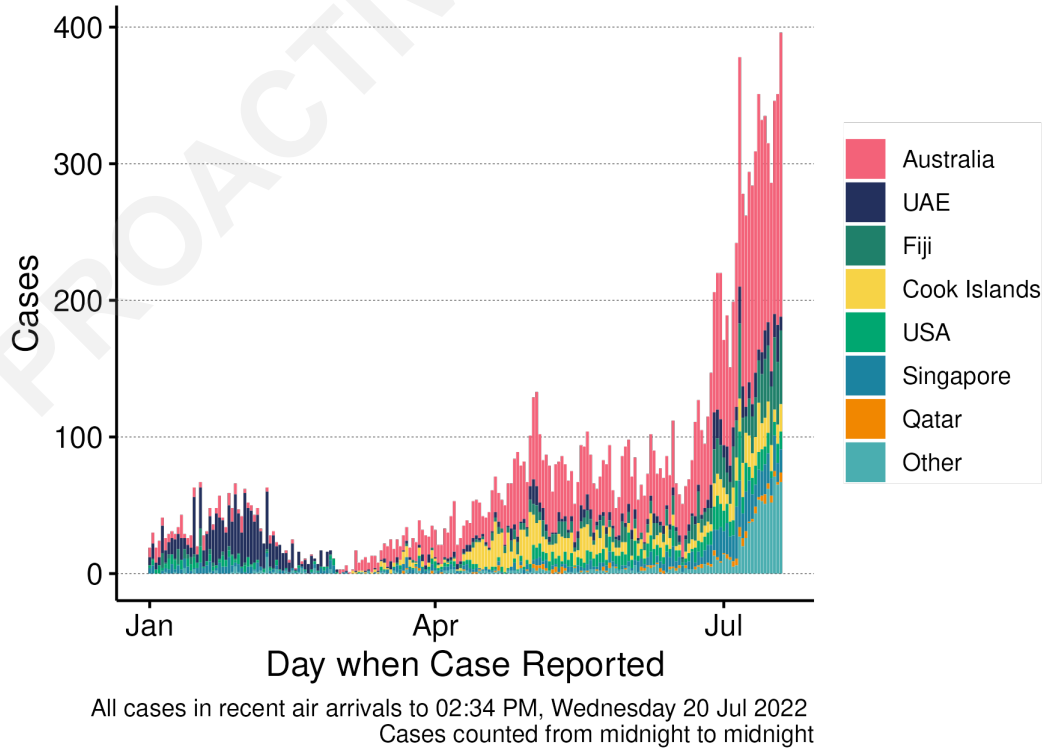
With the removal of pre-departure testing from 20 June, it appears that detected cases have increased from most countries. The increase is consistent with expectations that pre-departure testing halves the number of infected people boarding aircraft, and with increasing Omicron BA.5 prevalence in many source countries. From 03 July, roughly 4% of recent arrivals were reporting a positive test.

Figure 18 shows the number of RAT-positive cases in arrivals since January 2022. Before Reconnecting New Zealand dropped most of the quarantine requirements, most active cases were on the long-haul flights via the United Arab Emirates (UAE). From then until 19 June, while pre-departure tests were required, most cases arrived on flights from Australia followed by the Cook Islands and Fiji, and then the USA. Since 20 June, there has been an increase in cases detected on the flights from Australia, Singapore, the Cook Islands and Fiji.

Flights from Australia include both short-haul trans-Tasman flights and long-haul flights that transit through an Australian airport. It is no longer possible to accurately track the first country in a multi-stage voyage, as arrival cards are no longer scanned and data in the New Zealand Traveller Declaration system records only countries visited in the weeks before the Declaration is filled in.

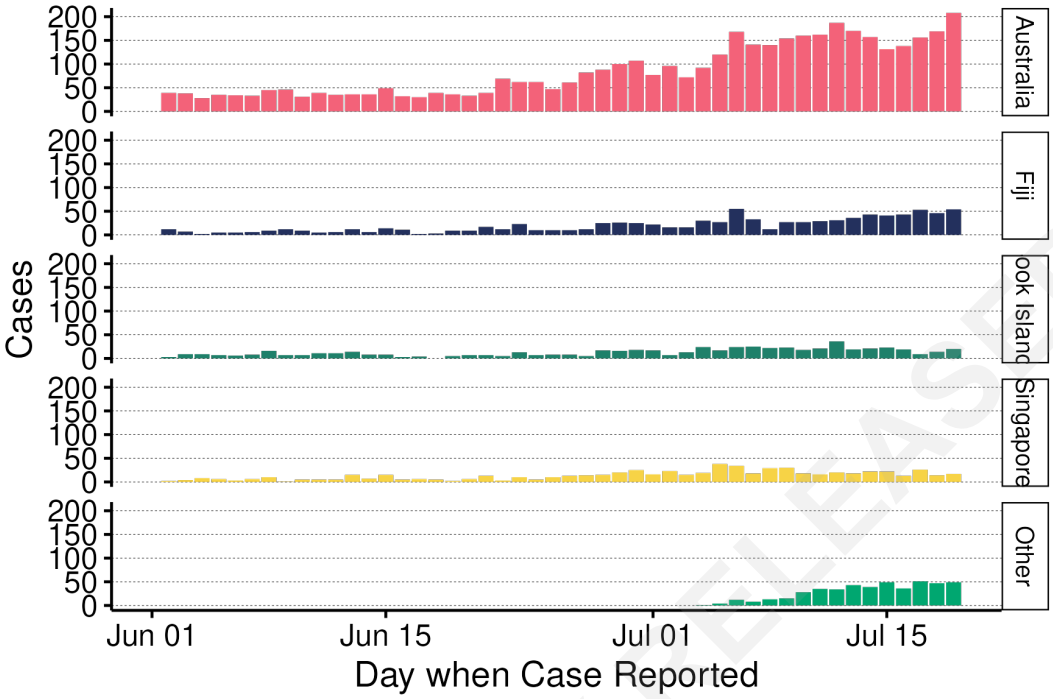
While the increase since 20 June was rapid, it is in line with expectations from the removal of pre-departure testing. Even with this increase, the total number of cases detected at the border is much less than the number reported each day in the community.

*Figure 18: Cases reported in post-arrival testing by country of flight departure, 01 January – 19 July 2022*




Source: NCTS/EpiSurv as at 2359hrs 19 July 2022

*Figure 19: Cases reported in post-arrival testing, by the five flight-departure countries with most cases reported in the seven days to 19 July 2022*



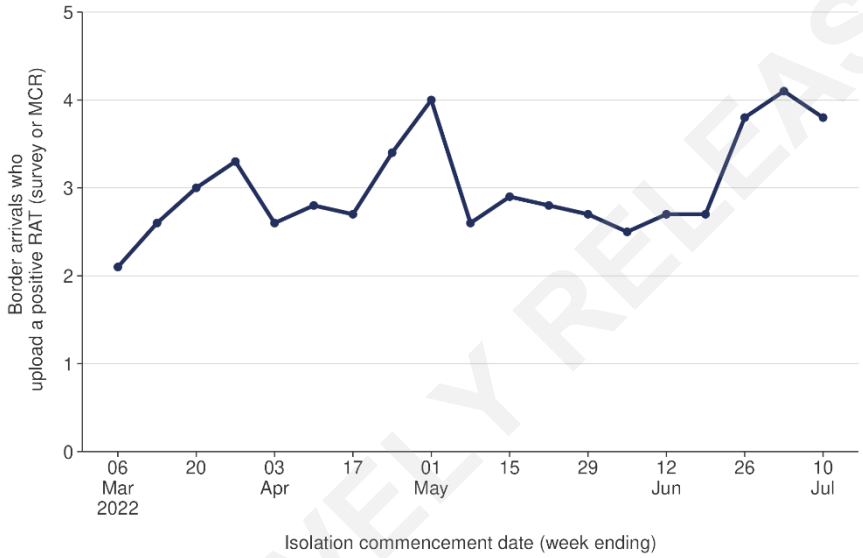

Source: NCTS/EpiSurv as at 2359hrs 19 July 2022

## Testing of Border Arrivals

Figure 20 shows that the percentage of positive RATs in border arrivals who reported a test was mostly between 2 - 4% for the period 6 March – 03 July 2022. From early May to the week ending 19 June, the percentage of border arrivals returning positive RATs through either the survey or My COVID Record had been holding steady between 2% and 3%. In the past 2 weeks, this has jumped to 4%. The percentage of border arrivals returning positive RATs was 3.9% (2,463 of 63,944 arrivals) for the week ending of 10 July. We predicted that rates were likely to rise this week as more day 5 tests from recent arrivals are reported.

Rates per traveller are rising as expected in the fortnight after 20 June, when pre-departure tests were no longer required.

*Figure 20: Percentage of positive tests in border arrivals who report RATs, 6 March – 10 July 2022*



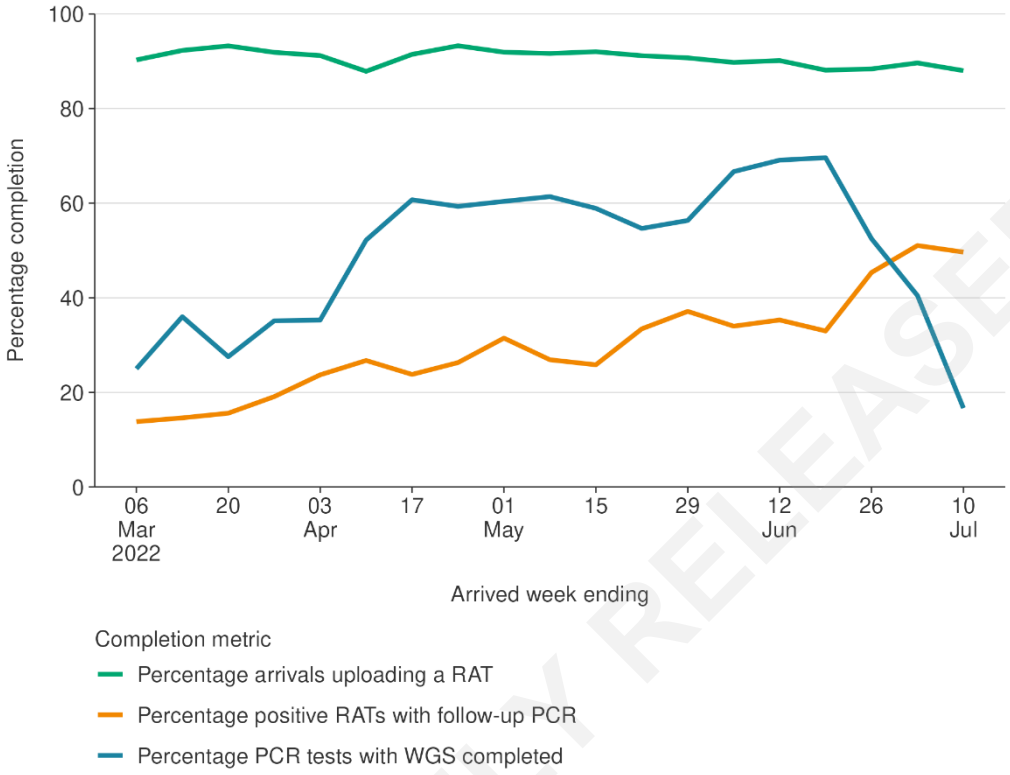

Sources: NCTS/EpiSurv/Éclair as at 2359hrs 10 July 2022

## Whole Genomic Sequencing of Imported cases

Figure 21 shows the completion metrics for border returnee testing and WGS from 06 March to 10 July 2022. The percentage of arrivals uploading a RAT has been constant with an average of 90%. In the week ending 10 July, there were 63,944 border arrivals, of whom 88% (56,276) uploaded a RAT result upon arrival. This is similar to 90% in the week prior.

Genomic sequencing data is lagged by 1 or 2 weeks because of the time needed for recent arrivals to report a positive RAT, seek a follow-up PCR and for it to be processed by ESR.

***Figure 21: Completion metrics for border returnee testing and WGS for arrivals, 06 March – 10 July 2022***




Sources: NCTS/EpiSurv/Éclair as at 2359hrs 03 July 2022, ESR WGS 10 July 2022[7]

Figure 22 shows the border returnee testing and WGS metrics for arrivals. In the week ending 10 July, 49.7% of border arrivals who returned a positive RAT had a follow-up PCR test. This is similar compared to 51.0% the week prior and is the highest we have seen in months.

In the week ending 10 July, the percentage of PCR positive border arrivals with WGS complete was 16.7%. This figure is quite low, however, it should rise as more of the recent cases are processed. In the previous three months, this figure was between 40%-70%. Figure 22 shows that not enough PCR swabs are being sent to ESR to meet the genomic surveillance target of 300 sequences a week.

Over half of the genomes sequenced at the border in the past fortnight are the watchlist variants; BA.4/5. These cases include reports of BA.2.75 in travellers to New Zealand. As at 6:00pm 15 July, ESR had received samples from 443 of the 3,919 PCR-positive border cases with a report date in the two weeks to 15 July. Of the successfully sequenced samples, 65% were BA.5, 25% were BA.2, 25% were BA.4 and <1% BA.2.75.

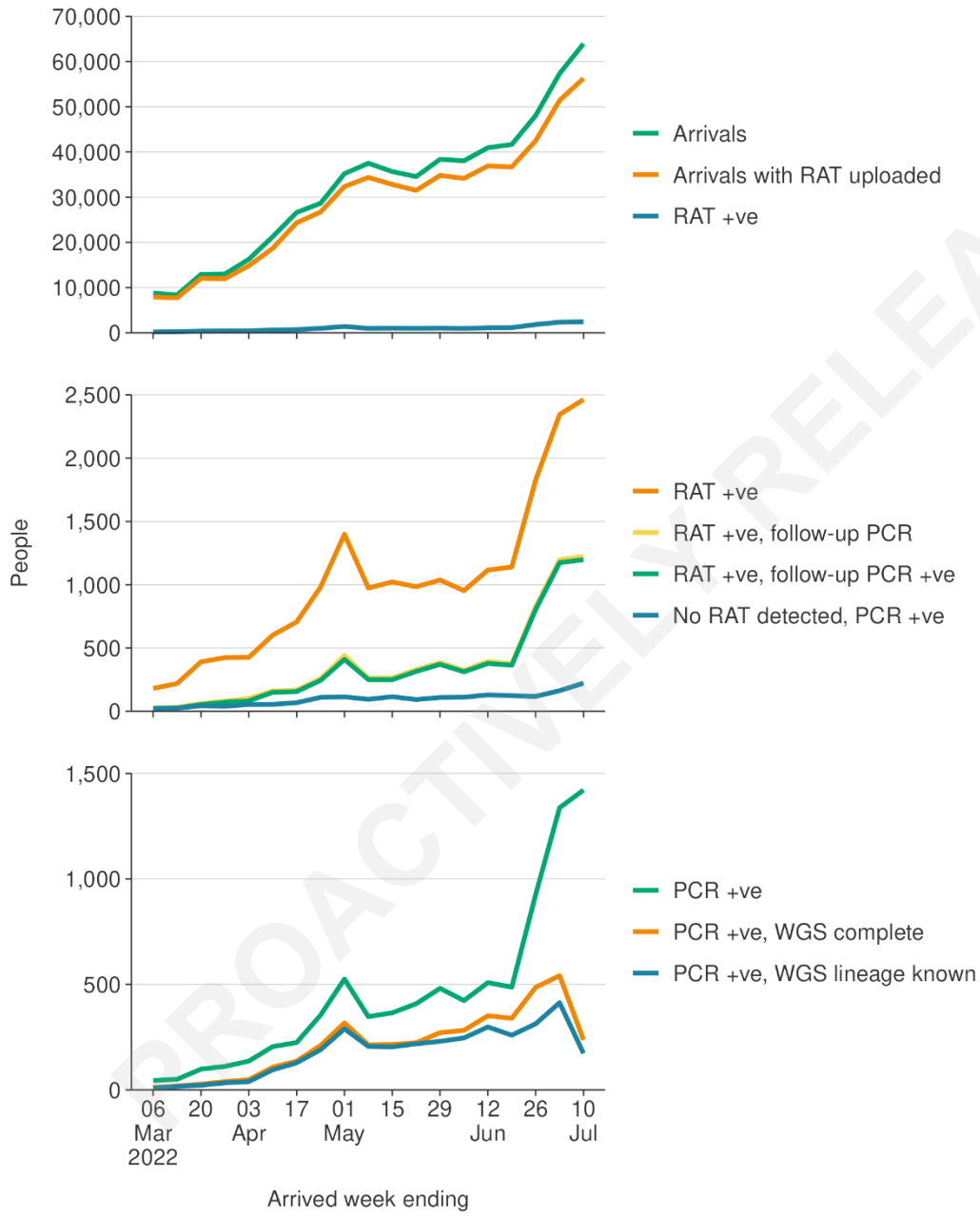
A case can only be referred to ESR for WGS if the traveller is referred to PCR testing and the lab then sends the PCR sample on.

Testing and reporting at the border are a "high-trust" model, and it is not expected that there will be 100% compliance with testing amongst travellers.

[7] Please note that WGS may not be completed/uploaded yet for more recent cases

Labs are notified of all positive RAT results that are known to be from recent arrivals. However, up to 10% of arrivals have not completed a New Zealand Traveller Declaration that enables data linkage, and others may not be reporting RAT results.

***Figure 22: Border returnee testing and WGS metrics for arrivals, 06 March – 10 July 2022***






Sources: NCTS/EpiSurv/Éclair as at 2359hrs 19 June 2022, ESR WGS 10 July 2022[8]

[8] Please note that WGS may not be completed/uploaded yet for more recent cases

# Hospitalisation and Mortality

## Hospitalisation Rates

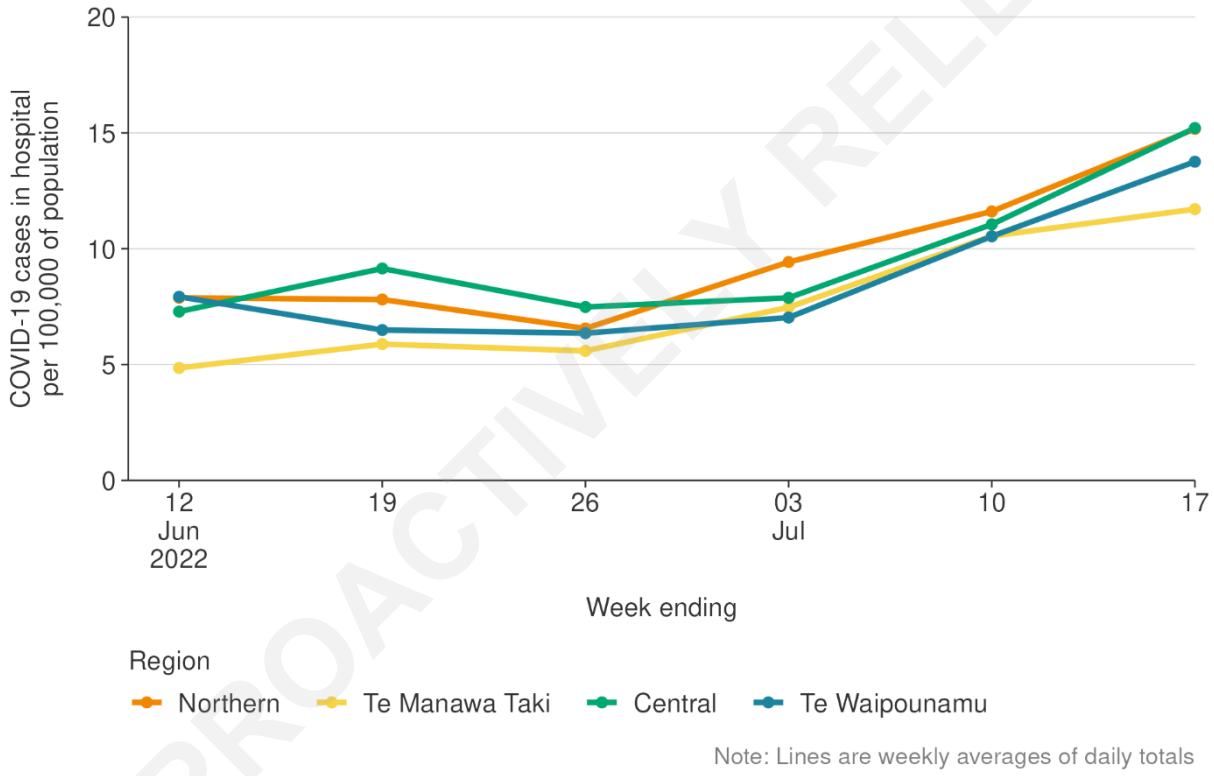
Due to varying definitions of an active case, there may be regional differences in the coding of COVID-19 infection status for hospitalisations.

## Hospital Occupancy

For the week ending 17 July, the national daily average hospital occupancy for inpatients with COVID-19 was 14.2 per 100,000 population, an increase of 28% from the week prior (Figure 23).

Hospital occupancy average rates increased across all regions in the past week. The Northern region (15.2 per 100,000) increased by 31%, Te Manawa Taki (11.7 per 100,000) increased by 11%, Central region (15.2 per 100,000) increased by 38% in the past week and Te Waipounamu (13.8 per 100,000) increased by 31%.

*Figure 23: Regional weekly hospital occupancy average per 100,000 population, 05 June – 17 July 2022*




Source: Daily hospital questionnaire as of 17 July 2022

## Whole Genomic Sequencing of hospitalised cases

As of 20 July, ESR received samples from and had processed 140 of the 665 PCR positive hospital cases with a report date in the two weeks to 15 July 2022. Of these, 37% had a BA.2 genome, 11% were BA.4, and 52% were BA.5.

ESR receives a daily list of active COVID-19 cases who tested positive in the past 14 days and were hospitalised in the past 7 days. ESR is working with the Ministry of Health to receive information indicating which cases have been admitted to ICU or HDU.

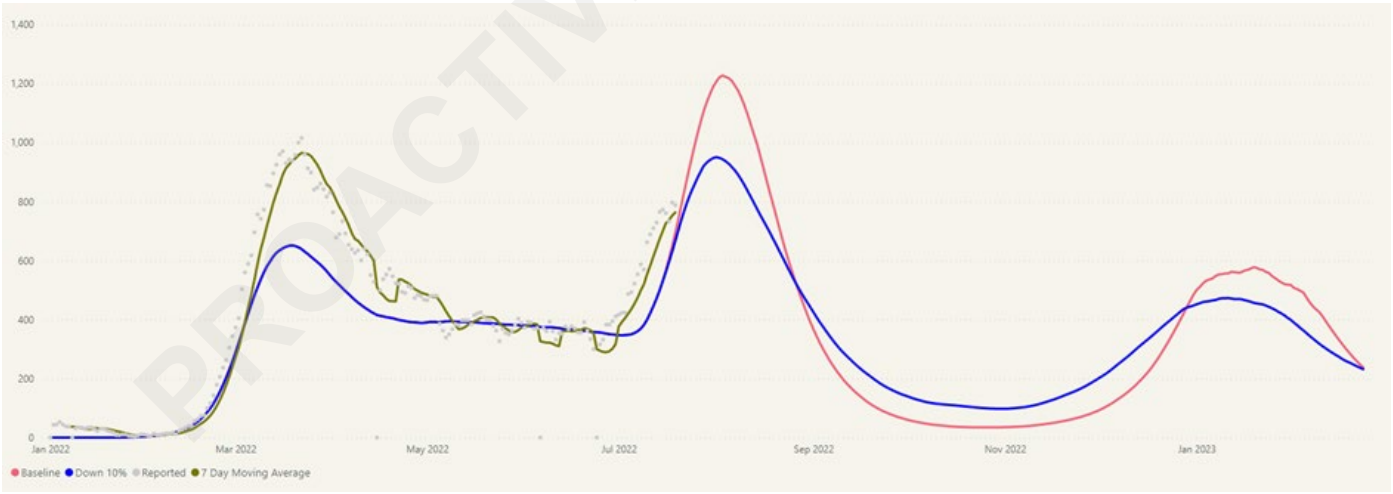
## Modelled and actual hospital occupancy rate

The COVID-19 Modelling Aotearoa group's modelling scenarios track beds occupied by people with COVID-19 infections. Figure 24 compares hospital occupancy with the new BA.5 scenarios. The baseline scenario assumes no change in policy or behaviour in the New Zealand population throughout the current BA.5 wave; hence that COVID-19 transmission remains the same. The "Down 10%" scenario assumes a reduction in COVID-19 transmission by 10% in the modelled scenario.

These scenarios are based on the current Omicron BA.5 variant. The peak is projected to occur between late July and early August with daily hospitalisations rising to approximately 1,200 a day, or 950 under the "Down 10%" scenario.

The number of hospital beds occupied by people with confirmed COVID-19 infections was approximately 16 per 100,000 population in the last week; this has steadily been trending upward since early July. This count includes infected people hospitalised for any reason, and at a national level is tracking close to both scenarios. It is likely that next week with more actual data we will see whether the trajectory of hospital occupancy will peak closer to the baseline or the "transmission down 10%" scenario.

*Figure 24: COVID-19 Modelling Aotearoa hospital occupancy scenarios compared to actual hospital occupancy*




Sources: COVID-19 Modelling Aotearoa (CMA) Branching Process Model April 2022, and District reports to TAS of daily hospital occupancy (all COVID-19 positive people admitted as inpatients) as of 19 July 2022.

## Mortality

Please see the special edition of Mortality on page 10.

## All cause death rates

Details and methods are published by Statistics NZ at https://www.stats.govt.nz/experimental/covid-19-data-portal under "Total death rates" in the "Health" section of its COVID-19 data portal.

# International and Scientific Insights

*Please note, global trends in cases and deaths should be interpreted with caution as several countries have been progressively changing COVID-19 testing strategies, resulting in lower overall numbers of tests performed and consequently lower numbers of cases detected.*

## Overseas waves and the likely impacts of new variants, policy changes, notifiable disease and waning immunity

Globally

- Globally, in the week ending 17 July 2022, the number of weekly cases plateaued, with just 6.3 million new cases reported after an increasing trend for the past five weeks.
- The number of new weekly deaths is increasing with 11,000 deaths reported.
- At the regional level, the number of new weekly cases increased in the Western Pacific Region (+37%), the Region of the Americas (+9%) and the South-East Asia Region (+5%), while it decreased in the African Region (-27%) and the European Region (-16%).
- The number of weekly deaths increased in the South-East Asia Region (+20%), the Eastern Mediterranean Region (+15%), the Region of the Americas (+7%), while it decreased in the African Region (-39%) and the European Region (-14%).
- Globally, from 13 June to 13 July 2022, 200,845 SARS-CoV-2 sequences were collected and submitted to GISAID. The Omicron VOC remains the dominant variant circulating accounting for 95.4% (191,648) of sequences.
- A comparison of sequences submitted to GISAID in the week ending 3 July and the week ending 10 July shows a decline in BA.2 sequences from 3.8% to 2.6% and a decline in BA.2.12.1 sequences from 10.6% to 4.5%. Within the same period, the proportion of reported sequences of BA.4 declined from 13.2% and 10.6% and BA.5 increased from 51.8% to 55.4%.
- BA.2.75 is an Omicron subvariant under monitoring by the WHO, with earliest sequences reported from May 2022. As of 18 July, 250 sequences of BA.2.75 from 15 countries have been reported to GISAID.

Australia

- The numbers of COVID-19 hospitalisations and daily deaths are nearing the levels seen in the January 2022 peak. As at 18 July 2022, the number of COVID-19 patients admitted to hospital was 207.9 per million, while the total deaths per million was 419.9 per million
- For much of the pandemic Australia has had fewer hospitalisations and deaths than other comparable countries, and until the Delta wave in late 2021 was one of the few countries with fewer deaths (or "excess deaths") than would be expected based on previous trends.
- Since the beginning of the pandemic Australia has now seen over 15,000 excess deaths. The vast majority of COVID-19 deaths have occured this year.

United Kingdom

- The Office for National Statistics (ONS) survey reports that since the Omicron variants became dominant, there has been a large increase in the rates for all first reinfections and first reinfections with a high viral load. Of reinfections from 2 July 2020 to 8 July 2022 around 75% of reinfections were

in the Omicron-dominant period following first reinfection in the Alpha (37.9%) and Delta (37.1%) dominant periods.

- COVID-19 infections continue to increase in England (5.27%), Wales (6.04%), Northern Ireland (5.86%) and Scotland (6.34%) in the week ending 6 July (for England, Wales and Northern Ireland) and 7 July 2022 for Scotland.
- Overall, the hospital admission rate of COVID-19 confirmed patients in England has increased to 17.9 per 100,000 people for the week ending 10 July, an increase from 15.74 per 100,000 people observed the previous week.
- In the week ending 8 July 2022 there were 506 deaths involving COVID-19 in Great Britain. This accounted for 4.5% of all deaths, an increase from 3.4% in the previous week.

France

- An average of 83,445 cases per day were reported in France in the last week (as of 20 July). Cases have decreased by 32% from the average seen two weeks ago. Deaths have also increased by 90%.
- The highest average number of cases was observed in January 2022, while April 2020 was the month with the highest number of deaths in France.

## Primary evidence on effectiveness of public health and outbreak control measures.

This section outlines some of the available literature about the effectiveness of public health and outbreak control measures. It is not intended to be a systematic review of all available evidence, but to provide an overview of available evidence.

- A review of Taiwan's mitigation and containment strategy found that non-pharmaceutical interventions, including public masking and social distancing, coupled with early and aggressive identification, isolation, and contact tracing to inhibit local transmission were optimal policies for public health management of COVID-19 and future emerging infectious diseases.
- A research article on COVID-19 testing and mortality outcomes between countries found that countries that developed stronger COVID-19 testing capacity at early timepoints, as measured by tests administered per case identified, experienced a slower increase of deaths per capita.
- A study on behavioural decisions and risk perception through monitoring the flows of information from both physical contact and social communication found that maintaining focus on awareness of risk among each individual's physical contacts promotes the greatest reduction in disease spread, but only when an individual is aware of the symptoms of a non-trivial proportion of their physical contacts.
- A commentary in the Lancet on face masks suggests that mass masking would be of particular importance for the protection of essential workers who cannot stay at home. As people return to work, mass masking might help to reduce a likely increase in transmission.
- A research article on the efficacy of non-pharmaceutical interventions for COVID-19 in Europe found that the population prevention and control measures implemented by the government had an impact on the change in the reproduction rate. Furthermore, that most effective factors in individual level prevention was a reduction of mobility/mixing.
- A modelling study looking at the impact of non-pharmaceutical interventions on controlling COVID-19 outbreak without lockdowns in Hong Kong found that delays in implementing control measures had significant impact on disease transmission.

- A survey of COVID-19 in public transportation looking at the risk of transmission and the impact of mitigation measures found that social distancing, density limits, masking and improving ventilation were effective at reducing the risk of transmission. Reff decreased by 20.3% after the introduction of targeted testing and by 17.5% after extension of face-mask rules, reducing Reff to 0.9 and suppressing the outbreak.
- A evidence brief on the properties of the Omicron variants and how it affects public health measures effectiveness found that the effects of early isolation, adult-focused reduction of interpersonal contact, and vaccination have different sites of action in infection spread dynamics and their combination can work synergistically. Implementing all the interventions has a synergistic effect on controlling the COVID-19 epidemic, even if the impact of each intervention is moderate. Additional public health measures for children could further help the mitigation
- A preprint study has noted that reinfections of COVID-19 are associated with an increase of risk of all-cause mortality, hospitalisation, and adverse health outcomes. A study of 39,000 people with reinfections were compared against 257,000 people who had one infection and 5,396,855 of those who had no infection. Those who experienced a reinfection had increased post-viral sequelae of pulmonary and extrapulmonary organ systems including cardiovascular disorders, coagulation and hematologic disorders, fatigue, gastrointestinal disorders, kidney disorders, diabetes, musculoskeletal disorders, and neurological disorders. This suggests that for people who already had a first infection, prevention of a second infection may protect from additional health risks, and therefore prevention of infection and reinfection with SARS-CoV-2 should continue to be the goal of public health policy.
- A Canadian wastewater research paper has noted that the lack of a quantitative framework to assess and interpret the wastewater data generated has been a major hurdle in translating wastewater data into public health action.
- A population study using a surveillance dataset that records all results of SARS-CoV-2 tests in France found a positive social gradient between deprivation and the risk of testing positive for SARS-CoV-2.
- A mathematical modelling study assessing the impact of public compliance on non-pharmaceutical interventions with a cost-effectiveness analysis.
- An evaluation of COVID-19 policies in 50 different countries and territories considers both pharmaceutical and non-pharmaceutical interventions and assesses a jurisdiction's success at containing COVID-19 both prior to and after vaccination.
- An observational study on the impact of contact tracing and testing on controlling COVID-19 without lockdown in Hong Kong.
- A cross-sectional study comparing OECD countries in evaluating economic outcomes found that non-pharmaceutical interventions effectively contained the outbreaks and had positive impacts in lowering unemployment rates.
- A modelling study points to the role of super-spreader events in the contribution of novel variant predominance from a public health perspective, the results give weight to the need to focus NPIs on preventing large super-spreader events (10 or 20 secondary infections from single infected individual).
- A preprint study on social gatherings and transmission found that small gatherings, due to their frequency, can be important contributors to transmission dynamics.
- Systematic review of economic evaluations of COVID-19 interventions

# Health System Capacity

## Omicron Dashboard

The Omicron dashboard reporting has ended. This section will be updated once we have a new data feed for this information.

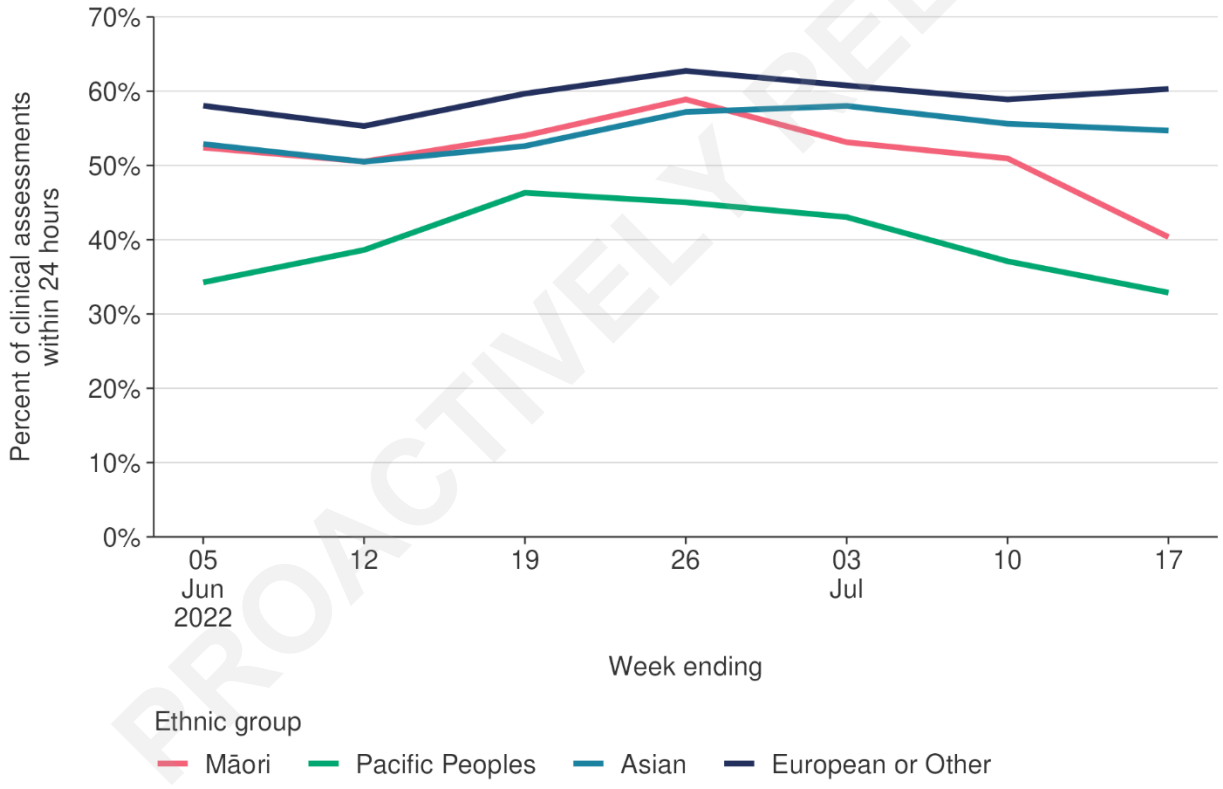
## Care in the Community

The Ministry of Health and the Ministry of Social Development collaborated to develop COVID-19 Care the Community (CinC). This program is to provide support for people in self-isolation and is regionally coordinated through Care Coordination Hubs. Each hub brings together local providers of public health and welfare support, including district health boards, public health teams, general practice teams, Ministry of Social Development, welfare providers, iwi, Māori and Pacific providers.

Figure 25 shows the percentage of clinical assessment completed within 24 hours by Ethnicity. In the week ending 17 July 40% of Māori, 33% of Pacific Peoples, 55% of Asians and 60% of European or others had clinical assessment completed within 24hrs. This trend has been similar for all ethnic groups for the past three weeks.

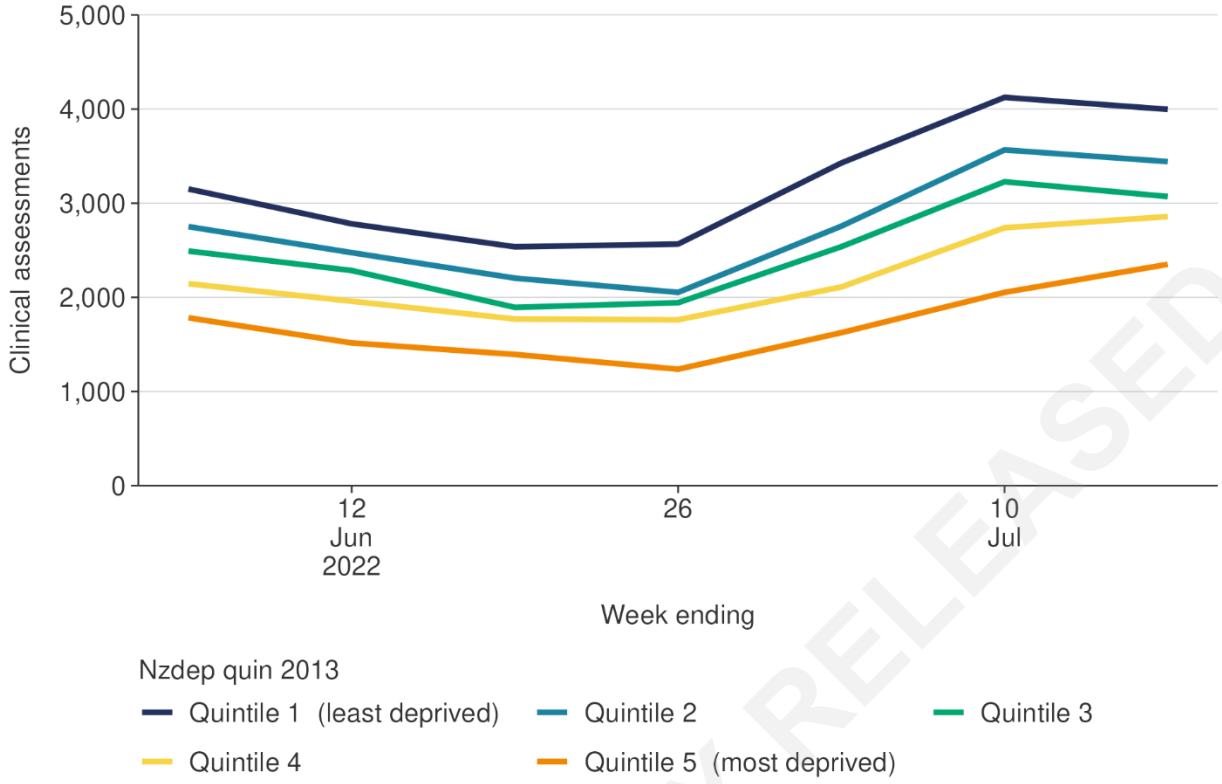
Figure 26 shows the number of clinical assessments by deprivation. Last week, people residing in the least deprived areas have a higher number of completed clinical assessments compared to those living in the most deprived areas, a difference of 1,646.

*Figure 25: Percent of initial clinical assessment completed within 24 hours of positive case by ethnicity, 05 June – 17 July 2022*




Sources: CCCM/QLIK, Socrates 17 July 2022

*Figure 26: Number of clinical assessments by deprivation 05 June – 17 July 2022*



# Appendix: Mortality Trends and Inequities methods and results tables

## Methods

Rates and risks of mortality where COVID-19 was the underlying or contributing cause[9] have been estimated for among the population (Table 3) and among cases (Table 4); data are based on cases and mortality reported from March 2020 up to end 17 July 2022. These analyses are preliminary and have not been peer-reviewed.

Population denominators were sourced from the HSU. Deprivation was based on NZdep2018 and vaccination status was based on number of doses 7 days prior to the case report date, or for the population that have not reported an infection, vaccination status on 01 May 2022.

Incidence rates were calculated per 100,000. Ethnicity and deprivation mortality were calculated overall, and by age start (see Tables 1 & 2). Age-standardised rates[10] with 95% confidence intervals for ethnicity and for deprivation were calculated using the age-stratified rates presented in Table 1 and Table 2 applied to the HSU Māori population structure.

Relative risks with 95% confidence intervals were estimated for variable using Poisson regression with robust standard errors. Adjusted models were also produced, adjusted for age, and adjusted with all variables in the tables included in the final model. For adjustments, age was used as a continuous variable. The bias associated with the population vaccination status was examined by using alternative dates for the population vaccination status: 01 February 2022 and 01 July 2022. Restricted analyses for <60-year-olds and for those who had COVID-29 as their underlying or contributing cause were also undertaken (Table 5).

## Strengths and Limitations of this analysis

These analyses have clearly demonstrated the inequitable risks for Māori and Pacific and those in high deprivation after accounting for the effect of age differences.

Furthermore, multivariable regression has identified that while ethnicity and deprivation are inter-related, they both have independent effects on risk. Some of this excess risk can be explained by co-morbidity, but the strongest modifier of risk was confirmed to be vaccination.

However, the analysis is not based on a bespoke research study, so is limited to the data collected for surveillance and operational purposes. There will be explanatory factors of importance that have not been accounted for

For example, it is feasible that some of the excess case fatality risk could also be explained by lower case ascertainment in the groups with excess risk, there is no data available to evaluate this.

Health care access/engagement, very likely to be important for case fatality risk, cannot be assessed with the available data.

As show in Figure 3, there is a lag from death being reported to the cause determined to attribute to COVID-19 or to another cause; therefore, the analysis does not include many recent deaths.

[10] Age-standardisation involves using the age group-specific rates applied to a reference population structure to calculate the rate expected if these populations all had the same age structure. This then reduces the confounding effect of age when comparing rates .

## Age-stratified Tables

*Table 1 COVID-19 attributable death counts (with rates per 100,000 of population) by age group and ethnicity, March 2020 to 17 July 2022*

| | Māori | | Pacific | | Asian | | European/Other | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | (rate; 95% CI) | N | (rate; 95% CI) | N | (rate; 95% CI) | N | (rate; 95% CI) | N | (rate; 95% CI) |
| 0-60 | 27 | (3.9; 2.6–5.7) | 14 | (4.2; 2.3 – 7.0) | 7 | (1.1; 0.4-2.2) | 28 | (1.2; 0.8-1.7) | 76 | (1.9; 1.5 – 2.3) |
| 60-69 | 31 | (53.3; 36.2–75.6) | 21 | (79.9; 49.5 – 122.1) | 7 | (11.7; 4.7 – 24.1) | 48 | (10.9; 8.0 – 14.5) | 107 | (18.3; 15.0 – 22.1) |
| 70-79 | 35 | (132.1; 92.0 – 183.7) | 23 | (164.4; 104.2 – 246.7) | 12 | (38.7; 20.0 – 67.7) | 183 | (55.4; 47.7 – 64.1) | 253 | (63.0; 55.5 – 71.3) |
| 80-89 | 25 | (294.3; 190.5 – 434.5) | 32 | (656.3; 448.9 – 926.5) | 16 | (136.7; 78.2 – 222.1) | 345 | (208.8; 187.4 – 232.0) | 418 | (219.7; 199.1 – 241.8) |
| 90+ | 11 | (952.4; 475.4 – 1704.1) | 13 | (1726.4; 919.2 – 2952.2) | 9 | (485.7; 222.1 – 922.0) | 300 | (637.7; 567.6 – 714.1) | 333 | (655.4; 586.9 – 729.8) |
| Total | 129 | (16.5; 13.7 – 19.6) | 103 | (27.0; 22.1 – 32.8) | 51 | (6.7; 5.0 – 8.8) | 904 | (26.7; 24.9 – 28.5) | 1,187 | (22.3; 21.1 – 23.6) |

*Table 2 COVID-19 attributable death counts (with rates per 100,000 of population) by age group and deprivation, March 2020 to 17 July 2022*

| N (rates per 100K) | Low | | Medium | | High | | Total | |
|---|---|---|---|---|---|---|---|---|
| 0-60 | 6 | (0.5; 0.2 - 1.1) | 25 | (1.6; 1.0 – 2.4) | 42 | (3.3; 2.4 – 4.5) | 73 | (1.8; 1.4 – 2.3) |
| 60-69 | 21 | (10.9; 6.8 – 16.7) | 28 | (12.5; 8.3 – 18.0) | 53 | (34.5; 25.8 – 45.1) | 102 | (17.9; 14.6 – 21.7) |
| 70-79 | 36 | (27.6; 19.4 – 38.2) | 88 | (55.5; 44.5 – 68.3) | 118 | (113.5; 94.0 – 135.9) | 242 | (61.6; 54.1 – 69.9) |
| 80-89 | 88 | (172.1; 138.1 – 212.1) | 185 | (230.1; 198.2 – 265.8) | 127 | (246.7; 205.6 – 293.5) | 400 | (218.6; 197.7, 241.1) |
| 90+ | 58 | (536.0; 407.0 – 692.9) | 144 | (640.3; 540.0 – 753.9) | 115 | (842.7; 695.8 – 1011.6) | 317 | (675.1; 602.8 – 753.7) |
| Total | 209 | (13.5; 11.7 – 15.5) | 470 | (22.9; 20.9 – 25.1) | 455 | (28.5; 25.9 – 31.2) | 1,134 | (21.8; 20.6 – 23.1) |

## Regression Results Tables

*Table 3: Cumulative incidence and risk of death attributed to COVID-19 among the population, March 2020 to 17 July 2022*

| | | | | Unadjusted Risk | | Age-adjusted Risk | | Fully Adjusted Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | Death count | Incidence, (per 100k) | Risk Ratio | 95% CI | Risk Ratio | 95% CI | Risk Ratio | 95% CI |
| **Total** | | **1,187** | **(22.3)** | | | | | | |
| Sex | Male | 638 | (24.1) | Baseline | | | | | |
| | Female | 549 | (20.6) | 0.85 | (0.76- 0.95) | 0.67 | (0.60- 0.75) | 0.94 | (0.90- 0.98) |
| Age group (years) | <60 | 76 | (1.9) | 0.10 | (0.08- 0.14) | | | 0.10 | (0.07- 0.14) |
| | 60-69 | 107 | (18.3) | Baseline | | | | | |
| | 70-79 | 253 | (63.0) | 3.44 | (2.74- 4.31) | | | 3.10 | (2.46- 3.92) |
| | 80-89 | 418 | (219.6) | 12.00 | (9.70- 14.83) | | | 9.27 | (7.40- 11.61) |
| | 90+ | 333 | (655.4) | 35.80 | (28.80- 44.50) | | | 24.62 | (19.34- 31.34) |
| Priortised ethnicity | Maori | 129 | (16.5) | 0.62 | (0.51- 0.74) | 2.43 | (2.02- 2.92) | 1.71 | (1.61- 1.81) |
| | Pacific | 103 | (27.0) | 1.01 | (0.83- 1.24) | 3.56 | (2.90- 4.37) | 2.79 | (2.62- 2.97) |
| | Asian | 51 | (6.7) | 0.25 | (0.19- 0.33) | 0.76 | (0.57- 1.01) | 1.05 | (0.98- 1.14) |
| | Other | 904 | (26.7) | Baseline | | | | | |
| Deprivation | Low | 209 | (13.5) | Baseline | | | | | |
| | Medium | 470 | (22.9) | 1.70 | (1.44- 2.00) | 1.46 | (1.24- 1.73) | 1.24 | (1.17- 1.32) |
| | High | 455 | (28.5) | 2.11 | (1.79- 2.48) | 2.21 | (1.87- 2.61) | 1.56 | (1.47- 1.66) |
| Vaccination status | <Two doses | 229 | (19.5) | 0.71 | (0.61- 0.83) | 1.50 | (1.27- 1.77) | 2.95 | (2.82- 3.09) |
| | Two doses | 239 | (15.7) | 0.57 | (0.49- 0.66) | 2.36 | (2.04- 2.73) | 1.81 | (1.71- 1.91) |
| | >Two doses | 719 | (27.4) | Baseline | | | | | |
| One or more co-morbidites | No | 276 | (6.1) | Baseline | | | | | |
| | Yes | 911 | (116.7) | 19.20 | (16.79- 21.97) | 3.98 | (3.42- 4.64) | 4.35 | (4.15- 4.55) |

*Table 4 Cumulative incidence and risk of death attributed to COVID -19 among cases, March 2020 to 17 July 2022*

| | | | | Unadjusted Risk | | Age-adjusted Risk | | Fully Adjusted Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Death count** | **CFR (per 100,000)** | **Risk Ratio** | **95% CI** | **Risk Ratio** | **95% CI** | **Risk Ratio** | **95% CI** |
| **Total** | | **1,187** | **(78.7)** | | | | | | |
| Sex | Male | 638 | (91.0) | Baseline | | | | | |
| | Female | 549 | (68.1) | 0.75 | (0.67- 0.84) | 0.64 | (0.57- 0.72) | 0.62 | (0.55- 0.69) |
| Age group (years) | <60 | 76 | (5.8) | 0.06 | (0.04- 0.08) | | | 0.05 | (0.03- 0.06) |
| | 60-69 | 107 | (97.9) | Baseline | | | | | |
| | 70-79 | 253 | (454.7) | 4.64 | (3.70- 5.82) | | | 4.27 | (3.37- 5.41) |
| | 80-89 | 418 | (1827.2) | 18.66 | (15.10- 23.06) | | | 13.99 | (11.12- 17.61) |
| | 90+ | 333 | (5758.3) | 58.81 | (47.37- 73.00) | | | 39.01 | (30.69- 49.58) |
| Priortised ethnicity | Maori | 129 | (53.9) | 0.55 | (0.45- 0.66) | 2.20 | (1.83- 2.64) | 1.49 | (1.23- 1.81) |
| | Pacific | 103 | (73.7) | 0.75 | (0.61- 0.92) | 2.43 | (1.99- 2.97) | 1.38 | (1.11- 1.70) |
| | Asian | 51 | (24.2) | 0.25 | (0.19- 0.33) | 0.97 | (0.73- 1.29) | 0.79 | (0.59- 1.06) |
| | Other | 904 | (98.5) | Baseline | | | | | |
| Deprivation | Low | 209 | (46.7) | Baseline | | | | | |
| | Medium | 470 | (81.6) | 1.75 | (1.49- 2.06) | 1.50 | (1.27- 1.76) | 1.36 | (1.16- 1.60) |
| | High | 455 | (98.8) | 2.12 | (1.80- 2.49) | 2.04 | (1.73- 2.41) | 1.49 | (1.26- 1.77) |
| Vaccination status at case report | <Two doses | 229 | (90.6) | 0.93 | (0.80- 1.08) | 5.07 | (3.74- 6.87) | 5.95 | (5.09- 6.96) |
| | Two doses | 239 | (46.2) | 0.47 | (0.41- 0.55) | 2.86 | (2.44- 3.35) | 2.78 | (2.39- 3.23) |
| | >Two doses | 719 | (97.4) | Baseline | | | | | |
| Co-morbidity (m3) | No | 276 | (20.8) | Baseline | | Baseline | | | |
| | Yes | 911 | (506.0) | 24.36 | (21.29- 27.87) | 3.70 | (3.15- 4.35) | 3.29 | (2.80- 3.87) |

*Table 5: Adjusted risk of death among cases where: COVID-19 was the underlying cause; COVID-19 was a contributing case; attributable deaths were in those aged less than 60 years, March 2020 to 17 July 2022*

| | | Deprivation excluded | | Underlying only | | Contributory only | | Age <60 years | |
|---|---|---|---|---|---|---|---|---|---|
| | | Risk Ratio | 95% CI | Risk Ratio | 95% CI | Risk Ratio | 95% CI | Risk Ratio | 95% CI |
| **Total** | | | | | | | | | |
| Sex | Male | Baseline | | | | | | | |
| | Female | 0.63 | (0.56- 0.70) | 0.60 | (0.52- 0.70) | 0.64 | (0.52- 0.78) | 0.50 | (0.31- 0.80) |
| Age (yearly) | | 1.13 | (1.13- 1.14) | 1.14 | (1.13- 1.15) | 1.12 | (1.11- 1.13) | 1.13 | (1.10- 1.16) |
| Priortised ethnicity | Maori | 1.61 | (1.34- 1.93) | 1.69 | (1.34- 2.13) | 1.17 | (0.83- 1.66) | 2.02 | (1.14- 3.56) |
| | Pacific | 1.53 | (1.25- 1.88) | 1.44 | (1.11- 1.86) | 1.27 | (0.87- 1.85) | 1.81 | (0.94- 3.47) |
| | Asian | 0.83 | (0.62- 1.10) | 0.78 | (0.54- 1.12) | 0.82 | (0.51- 1.32) | 1.45 | (0.59- 3.57) |
| | Other | | | | | | | | |
| Deprivation | Low | | | Baseline | | | | | |
| | Medium | | | 1.47 | (1.20- 1.81) | 1.19 | (0.91- 1.55) | 2.64 | (1.07- 6.51) |
| | High | | | 1.59 | (1.28- 1.97) | 1.34 | (1.01- 1.78) | 3.34 | (1.36- 8.19) |
| Vaccination status at case report | <Two doses | 6.33 | (5.45- 7.37) | 7.22 | (6.02- 8.67) | 3.62 | (2.63- 4.99) | 13.61 | (7.50- 24.69) |
| | Two doses | 2.82 | (2.43- 3.26) | 2.69 | (2.22- 3.25) | 2.92 | (2.29- 3.73) | 2.90 | (1.60- 5.24) |
| | >Two doses | Baseline | | | | | | | |
| Co-morbidity (m3) | No | Baseline | | | | | | | |
| | Yes | 3.34 | (2.85- 3.90) | 3.24 | (2.66- 3.96) | 3.42 | (2.61- 4.50) | 10.76 | (6.31- 18.35) |

# Glossary

Data Sources

Community Cases

Data on community cases is sourced from a combination of the National Contact Tracing Service (NCTS) and EpiSurv (New Zealand's public health surveillance platform).

Whole genome sequencing (WGS)

All information on WGS is sourced from the ESR COVID-19 Genomics Insights (CGI) Report, a weekly overview of SARS-CoV-2 genomic surveillance across the country.

Prevalence Estimates

National estimates of underlying infection incidence are based on the weekly test positivity in routinely asymptomatically tested populations, assuming therefore that their positivity rates are indicative of their underlying infection rates. The populations identified for these estimates using surveillance codes provided for testing data are border, emergency and healthcare work forces, as well as hospital inpatients. Inpatient estimates are also produced based on a direct data feed from Tertiary hospitals rather than identifying inpatients in the national testing database; they are therefore more accurate than the national figures.

Wastewater quantification

Wastewater quantitation is a measure of the levels of virus circulating in the community. Because infectious individuals tend to shed vastly more viral particles than non-infectious individuals (particularly later on in the infection), the wastewater quantitation results are driven largely by infectious individuals, in the first 5-6 days of their infection. Although people can shed detectable virus for some weeks that can be detected by PCR testing, these individuals are unlikely to have a large impact on the quantitation curves.

Wastewater is analysed by ESR's Kenepuru and Christchurch Laboratories.

*Data limitations*

Prevalence estimates based on routinely tested populations

- The groups of routine testers that have been identified (healthcare, border and emergency workers, and hospital inpatients) are not a representative sample of New Zealanders, overall, they are higher risk of COVID-19 infection than the general population.
- The identification of these groups at a national level is based on surveillance codes, which may not be completed accurately, particularly since the introduction of RAT testing.
- The national estimate is for people who have uploaded at least one test result in the week, so will be an over-estimate if negative test results are not being recorded for these groups.
- National level estimates will be masking differing trends by region.
- Tertiary hospital inpatient data, while likely to be more accurate than the national level data, still reflects a higher-risk group, and neither the estimates nor the trends are generalisable to the rest of the population.
- The identification of these groups is based on surveillance codes, which may not be completed accurately, particularly since the introduction of RAT testing.
- The population has been identified based on ever having a surveillance code related to the respective workforce and having at least 2 tests (at least one of which was negative) in 2022. A sensitivity check was run using at least 3 tests and while these numbers reduced, the incidence estimates remained very similar.

Wastewater quantification

- Approximately 1 million people in New Zealand are not connected to reticulated wastewater systems.
- Samples may be either grab or 24-hour composite samples. Greater variability is expected with grab samples.
- While a standard method is being used, virus recovery can vary from sample to sample.
- SARS-CoV-2 RNA concentrations should not be compared between wastewater catchments.
- Day-to-day variability in SARS-CoV-2 RNA concentrations especially in smaller catchment is to be expected.