Te Pou Hauora Tūmatanui
Public Health Agency

MANATŪ HAUORA
MINISTRY OF HEALTH

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7 August 2024

Chris McCashin

By email: fyi-request-27316-f1da3c1a@requests.fyi.org.nz
Ref: H2024046795

Tēnā koe Chris

Response to your request for official information

Thank you for your request under the Official Information Act 1982 (the Act) which was partially transferred from Health New Zealand – Te Whatu Ora to the Ministry of Health – Manatū Hauora (the Ministry) on 18 July 2024 for:

> *Any memos, formal / informal, communications discussing excess deaths and potentially taking the Pfizer vaccine out of circulation (note AstraZeneca is no longer available) which functions the same as the Pfizer vaccine.*

I have interpreted this part of your request to be for information about excess death and the Comirnaty (Pfizer) COVID-19 vaccine. Documents within scope of your request are itemised in Appendix 1 and copies of the documents are enclosed. Please note, phone numbers have been withheld under section 9(2)(a) of the Act, to protect the privacy of natural persons. I have considered the countervailing public interest in releasing information and consider that it does not outweigh the need to withhold at this time.

> *Any analysis completed by the Ministry of Health on the data released by Steve Kirsch or your own internal databases. Please let me know what teams, epidemiologists consultants did the analysis. If no analysis was done, please explain why*

The Ministry does not hold any analysis of the data released by Steve Kirsch. With regard to your request for any analyses on other health data, a more specific request identifying the kind of analyses that is requested would be required. As such, this part of your request is refused under section 18(g)(i) of the Act, as the information is not held by the Ministry or another agency subject to the Act. Please note, while it is permissible to seek information by asking questions under the Act, a distinction must be drawn between questions which seek information that is 'held', and questions which seek to elicit an opinion or explanation. The primary purpose of the Act is to allow requesters to seek information 'held' by agencies. It is not a mechanism for requesters to seek an explanation or opinion from an agency.

If you wish to discuss any aspect of your request with us, including this decision, please feel free to contact the OIA Services Team on: oiagr@health.govt.nz.

Under section 28(3) of the Act, you have the right to ask the Ombudsman to review any decisions made under this request. The Ombudsman may be contacted by email at: info@ombudsman.parliament.nz or by calling 0800 802 602.

Please note that this response, with your personal details removed, may be published on the Manatū Hauora website at: www.health.govt.nz/about-ministry/information-releases/responses-official-information-act-requests.

Nāku noa, nā

Kristie Carter
Group Manager, Intelligence, Surveillance and Knowledge
Public Health Agency | Te Pou Hauora Tūmatanui

Appendix 1: List of documents for release

#	Date	Document details	Decision on release
1	16 August 2022	Briefing: Inequities in COVID-19 Mortality (H20221246)	Some information withheld under section 9(2)(a) of the Act, to protect the privacy of natural persons.
2	8 September 2022	Briefing: Excess Mortality Update – September 2022 (H20221430)	

Document 1

MINISTRY OF HEALTH
MANATŪ HAUORA

Briefing

Inequities in COVID-19 Mortality

Date due to MO:	16 August 2022	**Action required by:**	N/A
Security level:	IN CONFIDENCE	**Health Report number:**	20221246
To:	Hon Dr Ayesha Verrall, Minister for COVID-19 Response		

Contact for telephone discussion

Name	Position	Telephone
Dr Andrew Old	Deputy Director General, Public Health Agency, Ministry of Health	S9(2)(a)
Dr Fiona Callaghan	Lead Science Advisor, Intelligence Surveillance & Knowledge, Public Health Agency, Ministry of Health	S9(2)(a)
Dr Antoinette Righarts	Principal Advisor, Intelligence Surveillance & Knowledge, Public Health Agency, Ministry of Health	S9(2)(a)

Minister's office to complete:

☐ Approved ☐ Decline ☐ Noted

☐ Needs change ☐ Seen ☐ Overtaken by events

☐ See Minister's Notes ☐ Withdrawn

Comment:

Document 1

Inequities in COVID-19 Mortality

Security level:	IN CONFIDENCE	**Date:**	16 August 2022
To:	Hon Dr Ayesha Verrall, Minister for COVID-19 Response		

Purpose of report

1 This report outlines the most recent analysis of inequities in COVID-19 mortality in Aotearoa.

2 This report is provided following request from the Strategic Public Health Advisory Group (SPHAG) for additional COVID-19 mortality analysis. It is recommended that this Health Report is forwarded to former SPHAG chair Sir David Skegg and the SPHAG, chaired by Dr Nikki Turner.

3 This report discloses all relevant information.

Summary

4 With the accumulating levels of mortality, it is becoming increasingly important to consider inequities in the impact of COVID-19. Prior to 2022 there had been 55 deaths attributed to COVID-19 (underlying cause or contributory), however, between 01 January and 01 August there have been a further 1,447 deaths.

5 The population-based mortality risk was 28.2 per 100,000 of population and the case fatality rate (CFR) was 92.8 per 100,000 cases up to 01 August.

a. The population-based mortality rates and 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 being identified as a case only.

b. It is important to note that the CFR (and risks) are distinct from the infection fatality rate (IFR). The IFR is the risk of death following infection. However, many, even the majority, of infections are not tested for or reported, including asymptomatic infections where the person themselves may be unaware of being infected. Hence, the interpretation of the CFR depends on biases in case ascertainment as well as the intrinsic clinical risks following infection, and it can be difficult to tease these factors apart.

6 The Intelligence Surveillance and Knowledge (ISK) Group of the Public Health Agency (PHA) has undertaken exploratory analysis of COVID-19 attributed mortality in Aotearoa to identify and quantify inequities in the burden of mortality.

7 This analysis supports that, as well as age being a strong risk for mortality, there is excess risk for Māori and Pacific, those in high deprivation groups, and for those with co-morbidities.

8 Inequitable mortality risks were even more substantial for Māori and Pacific Peoples under the age of 60 years. The case fatality risk for Māori and Pacific Peoples was also more likely to be mediated by deprivation (30-40% of the risk was explained by deprivation) among those under 60 years. Co-morbidity, while much less common in those under 60, carried a

much stronger risk for younger people compared to the over 60-year-old group, and explained a substantial proportion of the excess risk.

9 With weekly case rates having increased substantially in those aged 60 or more between late June to mid-July, and with case rates remaining high in those aged over 90, mortality from COVID-19 is unlikely to decline quickly in the near future.

10 However, vaccination had a strong protective effect that can mitigate a substantial proportion of this excess risk, including in younger groups. The proportion of deaths that may be attributed to lack of a booster vaccination in those aged between 40 to 59 years, was 46% (population attributable fraction)[1]. In addition, among cases in those aged under 60 years, individuals not fully vaccinated (not received primary course) had a higher risk[2] of death.

[1] The population attributable fraction (PAF) is the proportion of the incidence of a disease in the population (exposed and nonexposed) that is due to exposure. The 'exposure' in this example is not having a booster vaccination.
[2] The risk ratio (RR), often also referred to as a relative risk, a measure of strength of association, is the ratio of the probability of an outcome in an exposed group to the probability of an outcome in an unexposed group.

Recommendations

We recommend you:

a)	**Forward** this Health Report to Sir David Skegg, and the Strategic Public Health Advisory Group, for their information.	**Yes/No**
b)	**Note** that representatives from the Ministry of Health have met with Sir David Skegg and members of the Strategic Public Health Advisory Group to discuss COVID-19 mortality data and analysis.	**Noted**
c)	**Note** additional mortality analysis, namely population-based mortality rates case fatality rates stratified by inequities, as outlined in this Health Report.	**Noted**
d)	**Note** the trends and risk analysis for mortality will be presented as a peer-reviewed (both internal and external) report for public release.	**Noted**

Dr Diana Sarfati
Te Tumu Whakarae mō te Hauora
Director-General of Health
Date:

Dr Andrew Old
Deputy Director-General
Public Health Agency
Date: 12 August 2022

Hon Dr Ayesha Verrall
Minister for COVID-19 Response
Date:

Document 1

Inequities in COVID-19 Mortality

Context

1 On 3 June 2022, Sir David Skegg, in his former capacity as Chair of the Strategic Public Health Advisory Group (SPHAG) wrote to Dr Ian Town at the Ministry of Health (the Ministry), regarding his concern about the continuing number of deaths daily from COVID-19.

2 Dr Ian Town, Dr Robyn Carey, Dr Fiona Callaghan, Dr Antoinette Righarts and Dr Chris Knox met with the SPHAG on 15 June and 29 June to discuss and address their concerns specifically regarding mortality rates in Aotearoa, in those under 70 and in priority populations including Māori and Pacific Peoples. The Ministry prepared several analyses to address the questions raised by the SPHAG.

3 Additional analysis was later commissioned to understand the patterns in mortality risk, and to the understand the extent to which these findings are related to methodological issues; including the extent to which they may reflect systematic issues that should be addressed.

4 This briefing responds to this request and we recommend it is shared with Sir David Skegg, and members of the SPHAG.

Overview of Health Inequities in Aotearoa

5 With the accumulating levels of mortality and other poor outcomes, it is becoming more urgent to consider inequities in the impact of COVID-19. Prior to 2022 there had been 55 deaths attributed[3] to COVID-19, however, between 01 January and 01 August there have been a further 1,447 deaths.

6 Globally the COVID-19 pandemic has exacerbated social, economic and health inequities. Groups that have experienced increased rates of COVID-19 morbidity and mortality include poorer people, ethnic minorities, and indigenous people, and those who have underlying co-morbidities[4]. This pattern of impact is also evident in Aotearoa New Zealand.

7 The evidence of social and economic gradients in health status and mortality are established findings in public health research both historically and in the present.[5] For example, historical analysis of the 1918 influenza pandemic indicates higher mortality rates that were seven-fold higher in Māori compared to NZ Europeans[6]. At present, geographical areas that were identified at high risk of an unequal impact of a COVID-19 outbreak were those with

[3] A death is attributed to COVID-19 if it was determined to be the underlying or contributing cause, regardless of time elapsed since infection report date.
[4] WHO (2021) COVID-19 and the social determinants of health and health equity: evidence brief.
[5] Marmot M (2005), Social determinants of health inequalities. The Lancet. https://www.sciencedirect.com/science/article/pii/S0140673605711466
[6] Summers J A, et al (2018) New Zealand's experience of the 1918-19 influenza pandemic: a systematic review after 100 years. New Zealand Medical Journal https://journal.nzma.org.nz/journal-articles/new-zealand-s-experience-of-the-1918-19-influenza-pandemic-a-systematic-review-after-100-years

higher socioeconomic deprivation, lower access to care and higher reported co-morbidities. Identified areas had higher populations of Māori and Pacific Peoples.[7]

8 In 2017–19, life expectancy was more than 5 years lower for Māori compared with European or other. For Pacific People it was 3 years lower compared to Europeans. For those who live in the most deprived areas it was almost 10 years lower compared with those who live in the least deprived areas[8].

9 Avoidable causes of death are large contributors to the life expectancy differentials in Māori and Pacific populations It is estimated that nearly half of all deaths in Pacific (47.3%) and over half in Māori (53.0%) can be potentially attributed to avoidable causes of death, compared with less than one quarter (23.2%) in the non-Māori non-Pacific population[9].

10 Access to health care is also different when comparing by ethnicity with 20% of Māori and 16% of Pacific People having unmet need for General Practice (GP) services due to cost barriers compared to only 11% for Asian and 13% of NZ Europeans[10].

11 There is a need to continue to address the underlying determinants of poor health outcomes (primary prevention) and ensure equitable access to health services to reduce disproportionate burden of burden of severe outcomes for those of Māori and Pacific ethnicity and for those living in higher deprivation.

12 Inequities and the wider determinants of health are core focuses on the newly established Public Health Agency. Further work will be undertaken in this space in due course.

Aims of Analyses

The purpose of analysing COVID-19 attributed mortality in Aotearoa New Zealand was to identify and quantify inequities in the burden of mortality

13 The specific aims were to:

a. Examine the time trends in cases and mortality to understand past risk and potential risk going forward,

b. Use age-stratified data to quantify any differences by ethnicity and/or deprivation,

c. Explore the intersection between ethnicity, deprivation, and other determinants of inequity using available surveillance data.

[7] Wiki J et al (2021) Understanding vulnerability to COVID-19 in New Zealand: a nationwide cross-sectional study. Journal of the Royal Society of New Zealand. https://www.tandfonline.com/doi/full/10.1080/03036758.2021.1900294
[8] StatsNZ (2021) National and subnational period life tables: 2017–2019. https://www.stats.govt.nz/information-releases/national-and-subnational-period-life-tables-2017-2019/
[9] Walsh M, Grey C (2019) The contribution of avoidable mortality to the life expectancy gap in Māori and Pacific populations in New Zealand-a decomposition analysis. New Zealand Medical Journal. https://journal.nzma.org.nz/journal-articles/the-contribution-of-avoidable-mortality-to-the-life-expectancy-gap-in-maori-and-pacific-populations-in-new-zealand-a-decomposition-analysis
[10] Ministry of Health (2022) Health and Independence Report 2020 https://www.health.govt.nz/publication/health-and-independence-report-2020

Time Trends in Mortality

Mortality risk is strongly linked with increasing age; there has been a steady rise in the weekly numbers of deaths in the past month, consistent with substantial increases in case rates in those aged >60 years between late June to mid-July.

14 With weekly case rates having increased in those aged 60 or more (see **Figure 1**), substantially from late June to mid-July, and with case rates remaining high in those aged over 90, mortality from COVID-19 is unlikely to decline quickly in the near future.

15 Deaths where COVID-19 has been determined to be the underlying cause or a contributing cause of the death are termed COVID-19 "attributed" deaths. **Figure 2** shows total weekly COVID-19 mortality in 2022. This includes all deaths within 28 days of a positive test for COVID-19 or deaths *after* 28 days that are attributed (or provisionally attributed) to COVID-19 during 2022. These deaths are then classified as follows:

a. COVID-19 was the underlying cause,

b. COVID-19 contributed to the death,

c. COVID-19's role in the cause of death has not yet been determined, and/or

d. COVID-19 was unrelated to the cause of death, or

e. COVID-19's role in the cause of death has not yet been determined.

16 To note, as shown in **Figure 2**, there is a lag from death being reported to the cause determined to be attributed to COVID-19 or to another cause; therefore, the analysis tends not to include the most recent deaths.

17 The mortality first peaked in late March, following the peak of reported case rates in early March; unlike the case rates, there had not been a substantial decline in mortality after the March peak. However, this was not unexpected given the subsequent shift in the age trends to older groups.

18 In the past month weekly mortality has increased substantially, in line with increases in cases in the older age groups and is now substantially higher than the peak seen in March.

Figure 1 *Case rates (per 1000) in those aged over 60 years, 13 February to 31 July 2022*

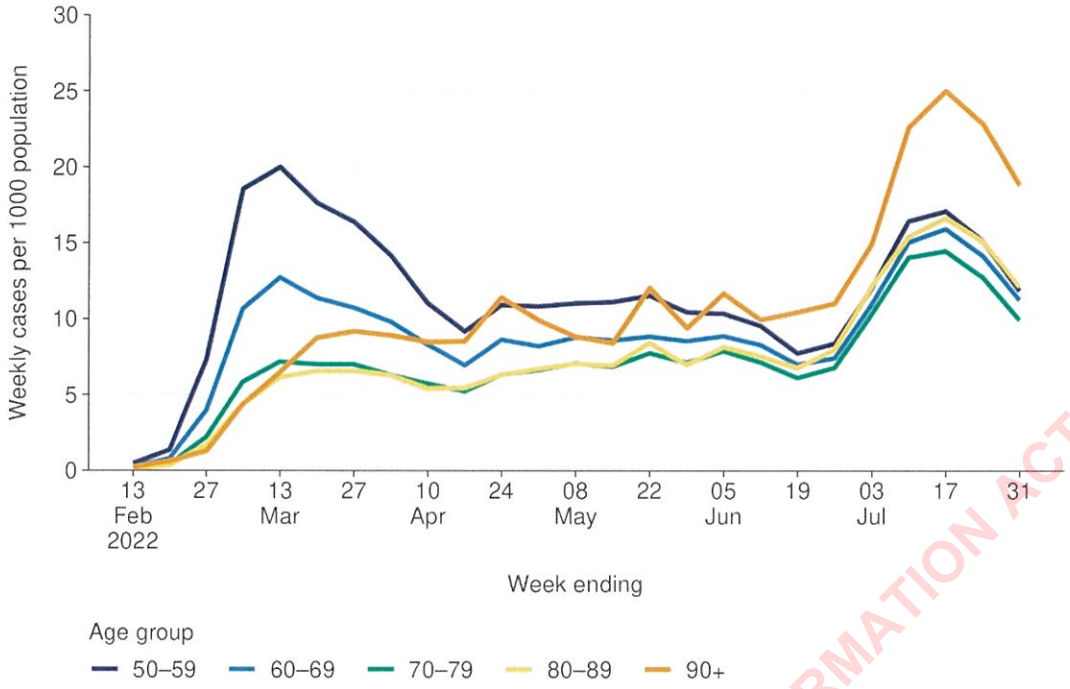
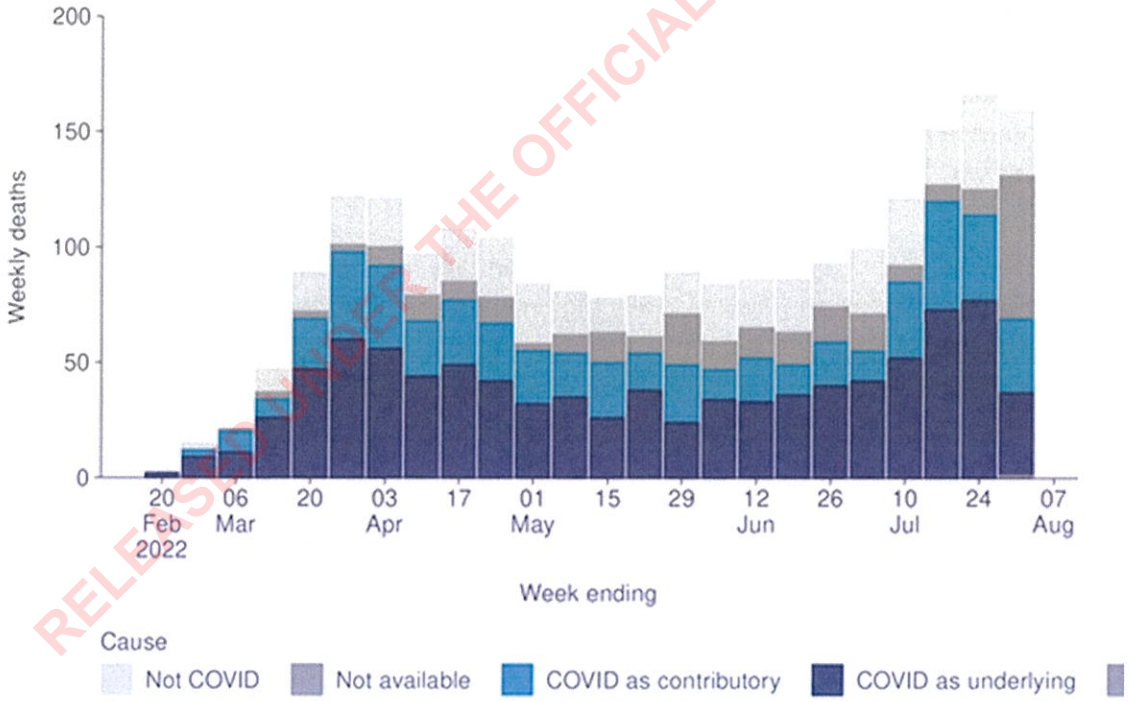


Figure 2 *Weekly death counts by cause of death, 01 January to 31 July 2022*



Unadjusted and age-adjusted risk: Disparities in population-based mortality risk 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.

19 Tables stratified by age illustrate the masking effect of age in the unadjusted population-based cumulative incidence rates[11]; **Table 1** shows that the unadjusted COVID-19 attributed mortality rates are lower in Māori (19.1 per 100,000 of population) than in European and Other (26.7 per 100,000), while the Pacific rate is similar (28.3 per 100,000); however, *all* of the age-specific rates are higher for Māori and Pacific Peoples compared with European and Other. The differences within the age strata vary from a 1.5 up to a 6-fold difference; these inequities are not visible when considering overall rates by ethnicity. However, small numbers of deaths in some subgroups increases the uncertainty of some of the risk estimates. Nonetheless, a consistent trend is observed between ethnicities across age strata.

20 **Table 2** shows the population-based mortality rate age-stratified by deprivation. While overall rate indicates consistent excess risk with increasing deprivation, the **age strata show this excess risk is more substantial at younger ages.**

[11] To note, while the formal definition of an incidence rate uses a denominator of person-time at risk, from this point forward the cumulative incidence of mortality from March 2020 to 01 August 2022 is referred to as a rate. In general, the cumulative incidence will approximate to the rate over the same period when outcome is rare, for example mortality, and where the denominator is large and relatively unaffected by changes in the numbers at risk, such as the New Zealand population. Where a case denominator is used, this is also the cumulative incidence of cases over the same period.

Table 1 *COVID-19 attributable death counts (with rates and 95% confidence intervals [CI] per 100,000 of population) by age group and ethnicity, March 2020 to 31 July 2022*

	Māori		Pacific		Asian		European/Other		Total	
Age (years)	N	Rate; 95% CI	N	Rate; 95% CI	N	Rate; 95% CI	N	Rate; 95% CI	N	Rate; 95% CI
0–60	29	4.2; 2.8–6.1	14	4.2; 2.3–7.1	7	1.1; 0.4–2.2	35	1.5; 1.0–2.0	85	2.1; 1.7–2.6
60–69	33	56.7; 39.1–79.7	22	83.9; 52.6–127.1	7	11.7; 4.7–24.1	58	13.2; 10.0–17.0	120	20.5; 17.0–24.6
70–79	39	146.8; 104.4–200.7	25	178.6; 115.6–263.7	14	45.1; 24.6–75.6	222	67.2; 58.7–76.7	300	74.6; 66.4–83.6
80–89	33	387.9; 267.0–544.7	33	676.9; 466.0–950.7	20	170.2; 104.0–262.9	450	271.9; 247.3–298.2	536	281.2; 257.9–306.0
90+	15	1293.1; 723.7–2132.8	15	1989.4; 1113.4–3281.2	12	642.7; 332.1–1122.7	419	886.2; 803.4–975.3	461	902.9; 822.3–989.2
Total	**149**	**19.1; 16.2–22.4**	**109**	**28.8; 23.6–34.7**	**60**	**7.8; 6.0–10.1**	**1184**	**35.0; 33.0–37.1**	**1502**	**28.3; 26.9–29.8**

Table 2 *COVID-19 attributable death counts (with rates and 95% confidence intervals [CI] per 100,000 of population) by age group and deprivation, March 2020 to 31 July 2022*

	Quintile 1: 20% least deprived		Quintile 2		Quintile 3		Quintile 4		Quintile 5: 20% most deprived		Total	
Age (years)	N	Rate; 95% CI	N	Rate; 95% CI	N	Rate; 95% CI	N	Rate; 95% CI	N	Rate; 95% CI	N	Rate; 95% CI
0–60	4	0.5; 0.1–1.3	7	0.9; 0.4–1.9	18	2.3; 1.4–3.7	14	1.8; 1.0–2.9	39	4.5; 3.2–6.2	82	2.1; 1.6–2.6
60–69	12	9.2; 4.7–16.1	19	15.9; 9.6–24.8	18	16.0; 9.5–25.3	18	16.7; 9.9–26.4	50	49.9; 37.0–65.8	117	20.5; 17.0–24.6
70–79	24	27.5; 17.6–41.0	51	61.0; 45.4–80.1	46	57.6; 42.2–76.8	80	103.9; 82.4–129.3	88	133.9; 107.4–165.0	289	73.5; 65.2–82.4
80–89	49	156.1; 115.5–206.4	108	276.6; 226.9–333.9	119	291.4; 241.4–348.7	132	319.8; 267.5–379.2	110	356.0; 292.6–429.0	518	282.4; 258.6–307.8
90+	39	665.4; 473.2–909.6	82	821.3; 653.2–1019.5	110	957.4; 786.9–1154.0	131	1078.9; 902.1–1280.3	78	1009.1; 797.6–1259.3	440	932.1; 847.0–1023.4
Total	**128**	**12.3; 10.3–14.7**	**267**	**26.3; 23.2–29.6**	**311**	**30.4; 27.2–34.0**	**375**	**36.2; 32.6–40.1**	**365**	**34.1; 30.7–37.8**	**1446**	**27.9; 26.5–29.4**

Overall, comparing to European/Other, Māori and Pacific age-standardised population-based mortality rates were 2.3 and 3.1 times greater, respectively. Mortality was 3.8 times higher among those most deprived compared with those least deprived.

21 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 and is essential for making an 'apples-to-apples' comparison of mortality risk between populations.

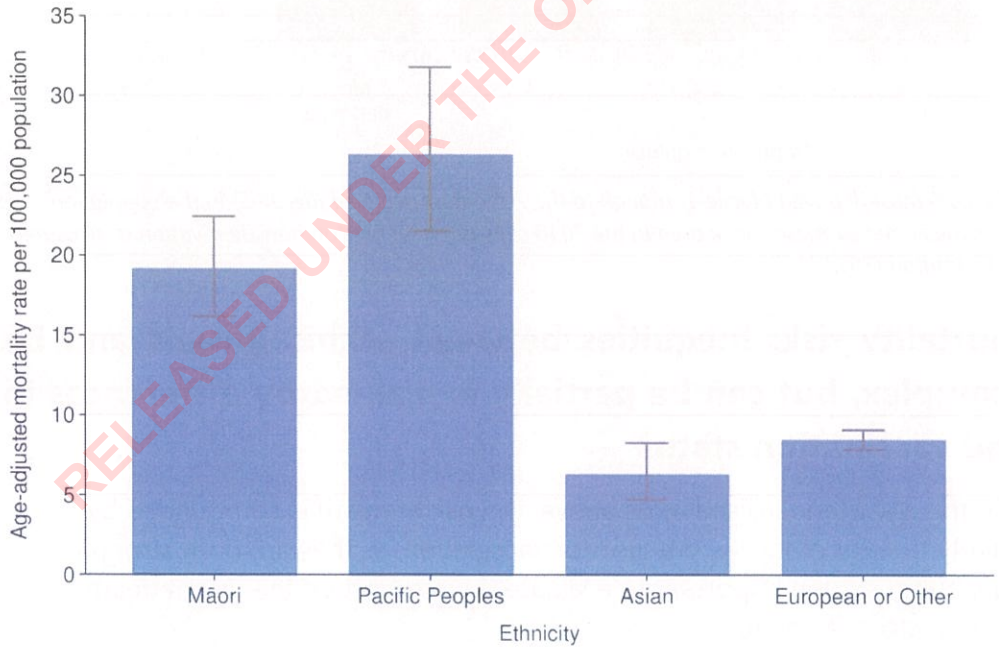
22 The age-stratified population-based mortality rates for all ethnicities presented in **Figure 1** were applied to the Māori population structure to calculate age-standardised rates; the results are shown in **Figure 3**.

a. The age-standardised rates clearly demonstrate a substantial disparity in population COVID-19 attributed mortality rates.

b. If European/Other had the same (younger) age structure as the Māori population, we would expect their rate to be 8.4 per 100,000 of population (95% Confidence Interval [CI] 7.8–9.1 per 100,000), which is much lower than the observed risk in Māori of 19.1 per 100,000 (95% CI 16.2–22.4 per 100,000).

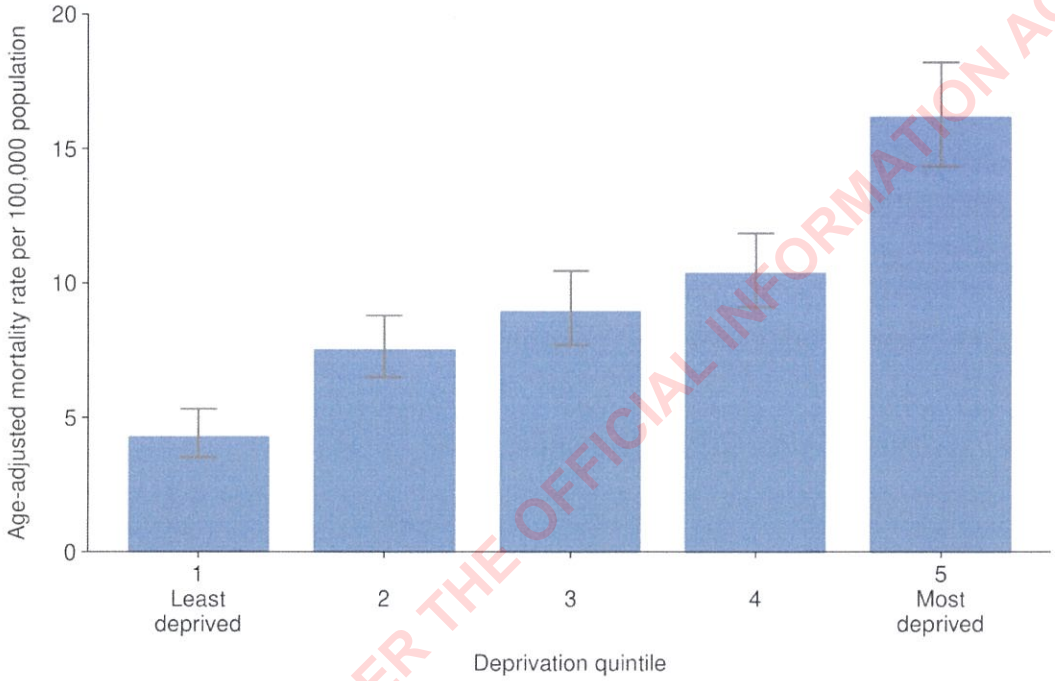
c. The population-based rate in Māori was 2.3 times greater and in Pacific (26.3 per 100,000, 95% CI 21.5–31.8 per 100,000) was 3.1 times greater than that in European/Other. These differences were statistically significant.

Figure 3 *Age-standardised cumulative incidence rate (and 95% confidence intervals) of mortality attributed to COVID-19 by ethnicity, March 2020 to 01 August 2022*



23 Deprivation was similarly age-standardised to the Māori population structure and results are shown in **Figure 4**. The effect of age standardisation did not have any substantial impact on the comparison between deprivation groups as it did with ethnicity. Mortality for those in medium deprivation (quintile 3, with a rate of 8.9 per 100,000 of population, 95% CI 7.7–10.4 per 100,000) was 2.1 times more likely than for those in quintile 1, the 20% least deprived (4.3 per 100,000, 95% CI 3.5–5.3 per 100,000). In quintile 5, the 20% most deprived, the age-standardised rate (16.2 per 100,00, 95% CI 14.3–18.2 per 100,000) was 3.8 times greater than those least deprived. The differences between the lowest and highest levels of deprivation were statistically significant.

Figure 4 *Age-standardised cumulative incidence rate (and 95% confidence intervals) of mortality attributed to COVID-19 by deprivation quintile*, March 2020 to 01 August 2022*



* *The quintiles represent the 20% most deprived (decile 1) though to the 20% most deprived (decile 5) in the population based in residential area as measured by mesh-block area in the 2018 census. For details on how deprivation is measured and used see Salmond & Crampton (2012)*[12]

Fully adjusted mortality risk: Inequities between ethnic groups and by deprivation are complex, but can be partially explained by differences in co-morbidities and vaccination status

24 As demonstrated in the age-standardised rates above, the risk of death is confounded by age. This is particularly true for ethnicity, but also for vaccination, as they are both strongly associated with age, but it is often important to evaluate their impact on the risk of death independent of other factors, if possible.

[12] Salmond, C. E., & Crampton, P. (2012). Development of New Zealand's Deprivation Index (NZDep) and Its Uptake as a National Policy Tool. Canadian Journal of Public Health / Revue Canadienne de Sante'e Publique, 103, S7–S11. http://www.jstor.org/stable/41995682

25 However, stratification becomes infeasible when there are multiple confounding or other factors of interest. Therefore, further analyses of the complex relationship between deaths and demographic factors, vaccination and comorbidity were undertaken. The following regression estimates adjust for confounding across multiple factors of interest and better reflect how much each of these contribute independently to excess risk. **It is important to note that these analyses require peer-review and are, therefore, preliminary.**

a. A summary of the statistical method is provided in **Appendix 1**: Regression Methods. Primary analyses are the 'age-adjusted' and 'fully adjusted' risk ratios; fully adjusted risk estimates are adjusted for sex, age, ethnicity, vaccination, and comorbidity. Fully adjusted risk ratios did not include deprivation so that a more 'complete' estimate of the impact of ethnicity could be estimated from the available data. Deprivation was examined as a sensitivity analysis in both the age-adjusted ethnicity and fully adjusted models, which provided an estimate of the proportion of excess risk that is mediated by deprivation. Results restricted to those aged under 60, and the difference in risk for underlying and contributing cause are also provided.

b. The *population-based* mortality rates based on deaths attributed to COVID-19, risk ratios and adjusted risk ratios are shown in **Table 3** in **Appendix 2**: Regression Results Tables.

c. **Table 4** in the **Appendix** provide the results for *case fatality rates* (CFRs) and risks.

Population-based mortality risk

26 The population mortality risk estimates are given in **Table 3**. The age-adjusted risk ratios for Māori and Pacific compared with European/Other were substantial, as already shown in the age-standardised rates (see **Figure 3**).

a. Very little of this excess risk was explained by the other factors of interest. When the contribution of each factor was examined individually, we found that sex, vaccination status, or any co-morbidity had almost no impact on the age-adjusted risks (data not shown). The fully adjusted risk ratios of 2.0 (95% CI 1.7–2.3) for Māori and 2.6 (95% CI 2.1–3.1) for Pacific compared with European and Other, were not substantially different from the age-adjusted risk.

b. When deprivation was examined in the age-adjusted model, the risk ratio was 1.9, (95% CI 1.6–2.3), for Māori and 2.5 (95% CI 2.2–3.0) for Pacific compared to European/Other. A slightly larger impact was observed when deprivation was introduced into the fully adjusted model, with the risk estimates for Māori decreasing slightly to 1.7 (95% CI 1.4–2.1) and for Pacific to 2.2 (95% CI 1.8–2.7). This suggests some, but not a substantial proportion, of the ethnicity-associated risk, was mediated by deprivation.

27 All other factors examined were also independently associated: the risk ratios were 0.7 (95% CI 0.6–0.8) for females compared with males, 3.3 (95% CI 2.9–3.8) for comorbidity, and 1.8 (95% CI 1.5–2.0) for those who had completed their primary course compared with those who have had a booster. At a population level there was no significant difference between those who had not completed their primary course and those who had received a booster. However, it is possible that the lack of a detectable effect is due to data limitations, this is being further explored.

a. The age-adjusted estimates for deprivation showed a 2.9 (95% CI 2.4–3.6) times increase in the risk from the 20% least to the 20% most deprived. A similar pattern to

ethnicity was seen when the age-adjusted risk was tested against the other factors of interest, with little impact on the risk ratio observed (data not shown).

28 The mortality risk is much lower in those aged under 60 years, and with only 6% of deaths (85/1502) being in those aged under 60; therefore, the results are largely driven by those over 60, and therefore examining risk across all ages may not reflect risk in those aged under 60 years. While mortality is rare in those under 60 years, there has been concern that potentially a disproportionate burden of mortality in those aged under 60 years may fall upon Māori and Pacific Peoples. Therefore, analyses restricted to under 60 years were also undertaken (see **Table 3** for the fully adjusted risks in those under 60 years).

a. The age-adjusted estimates showed that the risk in those under 60 years was 4.5 (95% CI 2.8–7.4) times greater for Māori and 4.3 (95% CI 2.3–8.1) for Pacific Peoples compared with European/Other (there was no difference in risk for Asian) (data not shown). While sex did not impact on these estimates, differences in vaccination and co-morbidity explained a substantial proportion of the excess risk. The fully adjusted risks for mortality were 2.6 (95% CI 1.6–4.2) and 2.7 (95% CI 1.5–5.0) for Māori and Pacific Peoples, respectively. A higher proportion of excess risk was mediated by deprivation in under 60s, the age-adjusted risk ratios reduced by 40% for Māori and 30% for Pacific Peoples when deprivation was included. (see **Table 3**).

b. The adjusted risk ratio for those who had not completed their primary course was 5.6 (95% CI 3.3–9.5), and for those who had completed their primary course 3.3 (95% CI 1.8–5.2), compared with those having had a booster. The proportion of all COVID-19 related deaths that could be attributed (the population attributable fraction[13] [PAF]) to not having had a booster vaccination in those aged between 40 to 59 years, was 46% (data not shown).

c. It should be noted these analyses are based on a small number of deaths, reflected in the wider confidence intervals around the estimates.

29 Results restricted to deaths where COVID-19 was the underlying cause and where it was a contributing cause are also provided in **Table 3**.

Case-based mortality risk

30 The results for mortality risk among cases (case fatality risks) are given in **Table 4**. The age-adjusted case fatality risk was 2.1 (95% CI 1.8–2.5) and 2.3 (95% CI 1.9–3.0) times higher for Māori and Pacific Peoples, respectively, than European and Other. This was similar to the population-based risk ratio.

a. When the contribution of each factor of interest to this age-adjusted risk ratio was examined individually, sex had no impact on the age-adjusted risk and co-morbidity only explained around 10% of the excess risk observed in Māori and Pacific Peoples (data not shown).

b. However, when vaccination was taken into account in the age adjusted ethnicity estimates the risk ratio reduced to 1.7 (95% CI 1.5–2.1) for Māori and 1.6 (95% CI 1.3–

[13] **The population attributable fraction (PAF) is a measure of impact that describes the contribution of a risk factor to the burden of disease or death**

2.0) for Pacific Peoples; **the strongest determinant of excess risk for Māori and Pacific Peoples was the level of vaccination**.

c. A further sensitivity analysis looked at the effect of deprivation, this found that just under **20% of the excess in mortality was mediated by deprivation**.

31 Excess risk remained for Māori and Pacific Peoples that was not accounted for by the other factors, including, co-morbidity and vaccination uptake. Even after adjusting for age and these other factors, the independent risks in Māori and Pacific groups were around 50% higher compared with European and Other; risk ratios were 1.6 (95% CI 1.4–1.9) and 1.5 (95% CI 1.2–1.8), respectively.

32 Overall, while age remains the greatest risk for case fatality attributed to COVID-19, the strongest modifiable risk was vaccination: those not fully vaccinated had 5.7 (95% CI 4.9–6.5) times the risk of mortality compared with those who had received a booster.

33 For case fatality risk where COVID-19 was the underlying cause of death (excluding contributory), vaccination had a stronger effect: mortality was 6.6 (95% CI 5.6–7.8) times higher in the unvaccinated compared with those who had a booster.

34 When the data were examined restricted to those under 60 years only, the inequitable risks for Māori and Pacific Peoples and those in high deprivation were even more pronounced.

a. The age-adjusted risk for under 60s for Māori and Pacific Peoples compared with European/Other was 4.5 (95% CI 2.7–7.4) and 3.5 (95% CI 1.9–6.6),

b. The age-adjusted risk was reduced substantially when co-morbidity was introduced into age-adjusted models, with around 30% of excess risk explained. When vaccination was considered 30% of excess risk was explained for Māori and 20% for Pacific Peoples.

c. Deprivation was also separately examined; deprivation was strongly associated with mortality, there was a 6.5 (95% CI 2.2–19.3) times increase in risk between the 20% least and 20% most deprived. Deprivation also explained around 40% of the excess risk for Māori and Pacific Peoples suggesting that among those aged under 60, a greater proportion of case fatality is mediated though deprivation than for those aged 60 or more years.

d. After adjusting for all factors of interest, excluding deprivation, substantial excess risk remained with there being 2.3 (95% CI 1.4–3.8) times for Māori, and 1.9 (95% CI 1.0–3.6) times for Pacific Peoples, greater risk than that of European/Other.

35 Notably in people under the age of 60, having a co-morbidity carried an 11.2 (95% CI 7.0–18.0) times increased risk and not being fully vaccinated 14.9 (95% CI 8.6–25.6) compared with baselines of no comorbidity and having had a booster, respectively.

Discussion

36 In summary, this analysis supports that, as well as age being a strong risk factor for mortality, there is an overall excess mortality risk and case fatality risk for Māori and Pacific Peoples that is not explained by other factors. The analysis also found increased risks associated with deprivation and severe comorbidities. Prior comorbidity was a particularly strong risk factor in those under 60 years of age. However, vaccination has a strong protective effect that can mitigate some, but not all, of this excess risk.

Strengths and Limitations of this analysis

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

38 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.

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

a. 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, we are exploring whether it is feasible to use total testing rates to evaluate this.

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

c. It is likely, especially for deprivation (which is an area-based and not an individual measure) and co-morbidity (which is a hospitalisation data-based index, so relies on access and interaction with healthcare), that residual confounding in the measurement of the variables in use is an issue.

40 To note, as shown in **Figure 2**, there is a lag from death being reported to the cause determined to be attributed to COVID-19 or to another cause; therefore, the analysis tends not to include the most recent deaths.

Comparison with audit of COVID-19 deaths in under 70-year-olds

41 The findings of this analysis are also similar to a clinical review commissioned by the Northern Region Coordination Centre (NHRCC) on deaths of those under 70 years old from 1 January to 8 June 2022.

42 The NHRCC review found that in deaths under 70 years old, comorbidities were a substantial factor in most deaths. Nearly every person who died had serious pre-existing conditions, with cancer, dialysis, severe psychiatric disorders, and immunosuppression being noted.

a. Of the review of 86 deaths, 59 had a hospital discharge summary recording the death. Of those, half (29) of these attributed the death to COVID-19 and 30 were definitively attributed to other causes of death.

b. There were 27 cases that did not have a cause of death on discharge summary. These are a mix of at-home arrests/collapses that were not brought to hospital.

c. Only 4 cases had no known comorbidities.

d. The review identified 29 cases that had a hospital admission during the course of their COVID-19 episode, that preceded the hospital admission during which they died (i.e., were discharged, then readmitted) of which 12 had COVID-19 attributed to their death.

e. Out of the 86 reviewed deaths, 43% of them were Pacific Peoples, 22% Māori, 20% European or Other and 13% Asian.

Comparing Aotearoa's COVID-19 Mortality Inequities with Other Countries

43 Data from the Australia Bureau of Statistics showed that people with a country of birth overseas had an age-standardised death rate three times higher than those of who were born in Australia[14] .

a. Furthermore, those living in poverty were three times more likely to die from COVID-19 compared with those who were wealthy.

b. Over half of deaths registered by 31 January 2022 were in people who had underlying co-morbidities.

44 An Australian research survey to quantify general health risk specifically for Aboriginal and Torres Strait Islander adults, found that the risk of severe illness from COVID-19 was high as 59% of those surveyed had one or more health related risk factors/and or were aged over 65[15].

45 A study using the UK Biobank cohort found evidence of ethnic inequalities in hospitalisations and mortality finding that for those from the Black community the risk (odds ratio) of mortality was five times higher and two times higher for those from South Asian communities compared to the White community.

a. Furthermore, despite statistical control for social factors, lifestyle indices, biological factors, and comorbidities, there remained a markedly raised risk of COVID-19 mortality in people of African-Caribbean and South Asian backgrounds[16].

46 A study of excess years of life lost (YLL) using mortality data from the UK during 2020 found that longstanding existing inequalities exacerbated the patterns of mortality in the UK. It found that there was a strong deprivation gradient in all-cause excess YLL, with rates per 100,000 population ranging from 916 (95% CI: 820–1,012) for the least deprived quintile to 1,645 (95% CI: 1,472–1,819) for the most deprived.

47 A systematic review and meta-analysis from the USA found of 4.3 million patients from 68 studies, African American, Hispanic, and Asian American individuals had a higher risk of COVID-19 positivity and ICU admission than White individuals. Socioeconomic disparity and lower access to health care were associated with COVID-19 incidence and mortality in racial and ethnic minority groups[17].

48 A study using mortality data from the US during 2020 also had similar findings with most ethnic minority populations having higher age-adjusted mortality rates than non-Hispanic White populations, including when comparing within levels of educational attainment (a proxy for deprivation)[18].

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[14] Australian Bureau of Statistics (2022). COVID-19 Mortality in Australia, Deaths registered to 31 January 2022. https://www.abs.gov.au/articles/covid-19-mortality-australia-deaths-registered-31-january-2022

[15] Thurber K A (2021) Risk of severe illness from COVID-19 among Aboriginal and Torres Strait Islander adults: the construct of 'vulnerable populations' obscures the root causes of health inequities. Australian and New Zealand Journal of Public Health https://onlinelibrary.wiley.com/doi/full/10.1111/1753-6405.13172

[16] Batty G D et al (2021) Explaining Ethnic Differentials in COVID-19 Mortality: A Cohort Study. American Journal of Epidemiology https://academic.oup.com/aje/article/191/2/275/6377919

[17] Magesh S et al (2021) Disparities in COVID-19 Outcomes by Race, Ethnicity, and Socioeconomic Status A Systematic Review and Meta-analysis. JAMA Network Open https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2785980

[18] Feldman J et al (2021) Variation in COVID-19 Mortality in the US by Race and Ethnicity and Educational Attainment. JAMA Network Open. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2786466

Equity

49 As part of the Ministry's obligations to Te Tiriti o Waitangi and equity, COVID-19 mortality data from priority populations is central to health equity monitoring and informing policies or operational decisions that work towards equitable health outcomes.

50 It is recognised that in Aotearoa, people experience different opportunities, exposures and stresses, which result in differences in underlying health status, and, in addition, experience differences in the access and quality of health care.

51 The collection of COVID-19 mortality and demographic data allows for the identification of the risk factors that contribute to excess death in Māori, Pacific Peoples and other priority populations.

52 The analysis is clear that there remains excess risk for Māori and Pacific Peoples that is not accounted for by other factors examined, including deprivation, co-morbidity and vaccination uptake.

Next steps

53 The Ministry will continue to undertake ongoing mortality data analysis, this will be published weekly in the PHA's 'Trends and Insights Report'. This analysis will be extended to examine other severe outcomes of COVID-19, including hospitalisations and admission to Intensive Care Units (ICU).

54 Internally peer-reviewed in-depth reports on risk and inequities with respect to severe outcomes (that is hospitalisation, ICU stay and mortality) following infection are recommended, with the report made available on the Ministry website.

55 Additional action has been jointly commissioned to the Public Health Agency (within the Ministry), Health New Zealand and the Health Quality and Safety Commission (HQSC) for further review and ongoing governance. A meeting on this was convened by HQSC to discuss this on Thursday 4 August. Professor Nikki Turner attended, chair of the SPHAG.

56 Some of the inequitable risk needs long term interventions to address.[19] This includes those associated with socio-economic deprivation that lead to further consequences, such as co-morbidities at younger ages. However, vaccination can mitigate the risk of mortality and reduce inequality; therefore, from this perspective a strong focus needs to remain on vaccination uptake and roll out of second boosters. Evaluation of indicators of healthcare access and uptake of therapeutics is also needed, as these factors could be contributing to inequity and will need addressed.

ENDS.

[19] Bamber C (2022) Pandemic inequalities: emerging infectious diseases and health equity. International Journal for Equity in Health. https://link.springer.com/article/10.1186/s12939-021-01611-2#Sec8

Appendix 1: Regression Methods

57 Rates and risks of mortality where COVID-19 was the underlying or contributing cause[20] 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.**

58 Population denominators were sourced from the HSU joined to the COVID-19 vaccination register. Sex, age and prioritised ethnicity were retrieved from the National Health Index (NHI) database. Deprivation was based on NZdep2018, coded into quintiles from the 20% least to the 20% most deprived. Co-morbidity was a hospitalisation-history based index ('M3 score'), coded as a binary variable. 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.

59 Population-based cumulative incidence rates and case fatality rates were calculated per 100,000. Risk ratios with 95% confidence intervals were estimated for all variables using Poisson regression with robust standard errors. Adjusted models were also produced: firstly, a model for each variable was produced adjusted for age as a continuous variable, then the age-adjusted ethnicity model had each of the other variables tested one at a time to examine how much of the ethnicity risk ratios could be explained by each one. This was process was also undertaken for the age-adjusted deprivation model. All variables in the tables except deprivation were included in the final fully adjusted model; deprivation was examined in this model to but not included due to being on the causal pathway between ethnicity and mortality. 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 under 60-year-olds and for those who had COVID-29 as their underlying or contributing cause were also undertaken.

60 Model fit was assessed using Akaike's information criterion, co-variance in adjusted models was assessed.

61 The probable biases in case ascertainment will impact on case-based risk estimates. Deprivation is an area, and not an individual-based, measure. There will be confounding factors not accounted for and residual cofounding. As co-morbidity identification relies on past interaction with healthcare services, this variable was likely to be particularly impacted by residual confounding.

[20] https://www.abs.gov.au/ausstats/abs@.nsf/mf/1205.0.55.001?OpenDocument

Document 2

MANATŪ HAUORA
MINISTRY OF HEALTH

Briefing

Excess Mortality Update – September 2022

Date due to MO:	8 September 2022	**Action required by:**	N/A
Security level:	IN CONFIDENCE	**Health Report number:**	20221430
To:	Hon Dr Ayesha Verrall, Minister for COVID-19 Response		
Consulted:	Health New Zealand: ☐ Māori Health Authority: ☐		

Contact for telephone discussion

Name	Position	Telephone
Dr Fiona Callaghan	Lead Science Advisor, Intelligence Surveillance & Knowledge, Public Health Agency	S9(2)(a)
Dave Henderson	Group Manager and Lead, Intelligence Surveillance & Knowledge, Public Health Agency	S9(2)(a)

Minister's office to complete:

☐ Approved	☐ Decline	☐ Noted
☐ Needs change	☐ Seen	☐ Overtaken by events
☐ See Minister's Notes	☐ Withdrawn	

Comment:

Document 2

Excess Mortality Update – September 2022

Security level:	IN CONFIDENCE	**Date:**	8 September 2022
To:	Hon Dr Ayesha Verrall, Minister for COVID-19 Response		

Purpose of report

1. This report responds to your request for an update on excess mortality for 2022, analysis on how Aotearoa is tracking in comparison to previous years and an international comparison for year to date.

2. This report discloses all relevant information.

Background

3. The most recent update on excess mortality was provided to you on 7 June 2022, in a memorandum titled, *Mortality Data and Excess Mortality for the COVID-19 Pandemic in Aotearoa New Zealand* [HR20221003]. This paper highlighted that, "*...while there has been an increase in the number of deaths from COVID-19 since the start of the Omicron outbreak, particularly among people over 90, New Zealand has still experienced significantly lower cumulative COVID-19 mortality overall than most countries.*"

4. Further advice was provided to you on 1 July 2022, in a briefing titled, *COVID-19 Mortality Reporting and Analysis in Aotearoa'* [HR20221169]. This summarised the discussions had with the COVID-19 Strategic Public Health Advisory Group and actions taken with regards to mortality and excess mortality data.

5. As you will be aware, StatsNZ are the lead government agency for excess mortality data, and Manatū Hauora work closely with them on matters relating to the impact of the pandemic. They provide public information on their website regarding deaths; a running total of all-cause mortality on their COVID-19 portal[1], as well as more broadly on mortality patterns in Aotearoa and the aging population.

Excess mortality for year to date

6. An analysis conducted by StatsNZ below provide a summary of the situation that is current as of 21 August 2022[2]. As can be seen in the table and graph below, deaths above expectations are mostly observable in the oldest age groups.

[1] https://www.stats.govt.nz/experimental/covid-19-data-portal/ Select: Health>total death rates

[2] An average of 5% of Deaths are registered 2 weeks or more after Date of Death therefore weekly totals are expected to increase over time as Death Registrations are submitted and processed. Weekly deaths data are based on Date of Death and differ from other deaths statistics based on date of registration. These data are provisional and subject to revision during the full process of producing death statistics.

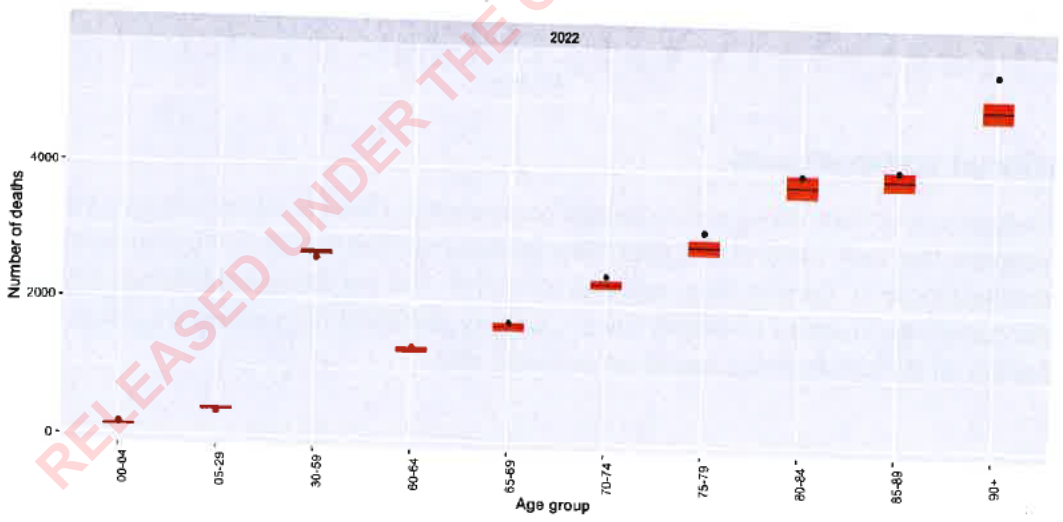
7. In total there have been 1,204 excess deaths this year. A majority of them have occurred in the 90 years and older age group, followed by 75–79-year-olds and 80- to 84-year-olds.

8. In the **figure 1**, the red bands give an approximate range of the expected number of deaths for that age group based on pre-pandemic years, with +/- 1 standard deviation. Therefore, they give an approximate direction of positive or negative excess mortality, but not strong evidence of excess mortality, either positive or negative. There are some additional age groups for whom their excess mortality for 2022 is above the expected pre-pandemic range (e.g., 70–74-year-olds) and some where the excess mortality is somewhat lower (e.g., 30–59-year-olds), but the only strong trend for excess mortality in 2022 is in the 75-79 and 90+ age groups.

Table 1 – Observed deaths compared to expected deaths during the pandemic 2022-08-21

Age group	Observed deaths	Expected deaths	1 S.D Expected deaths	Excess deaths	Mean population
00-04	191	164	18	27	304,190
05-29	370	415	26	-45	1,663,572
30-59	2,627	2,711	38	-84	2,020,766
60-64	1,370	1,330	45	40	302,398
65-69	1,748	1,680	62	68	256,481
70-74	2,439	2,319	65	120	219,886
75-79	3,128	2,884	114	244	157,981
80-84	3,970	3,810	178	160	108,428
85-89	4,057	3,927	137	130	57,559
90+	5,540	4,996	161	544	34,964
Total	25,440	24,236	844	1,204	5,126,225

Figure 1 – Observed deaths compared to expected deaths during the pandemic 2022-08-21



9. It should be noted that as people live longer, the population is aging and this plays a role in shifting the mortality patterns to the older age groups moving forward, compared to pre-pandemic patterns. This means that, in general, there is a general trend to having a higher mortality risk in the older age groups (in addition to the pandemic effect) which likely contributes in part to some of the excess mortality in the very elderly. Historically,

mortality rates have been dropping in older age groups, so a levelling off or an increase represents a structural change in prior observation.

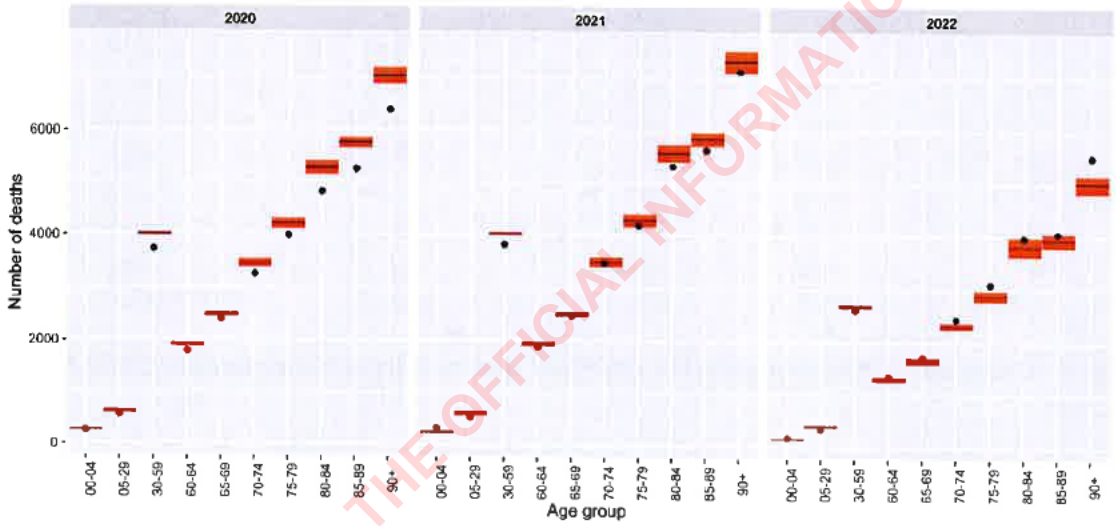
Comparison to excess mortality before and during the pandemic?

10. Excess deaths tended to be suppressed in most age groups in the first two years of the pandemic compared to 20t22 as seen below in **Figure 2**.

11. Death rates across 2012 – 2021 show that in almost all older age groups there is a trend of a slight decrease in death rates over time (**appendix**). The 90+ group shows a that as the population ages, the mortality risk for most age groups decreases; however, the risk in the most elderly (90+) does not have shown this effect.

12. It is observed (though it is only one data point) that in 2021, death rates are already starting to revert to average expectations after the clear decrease in 2020. However, they are still typically on or below -1 standard deviation of the extrapolated rates.

Figure 2 – Expected (extrapolated) deaths vs. Observed deaths through pandemic

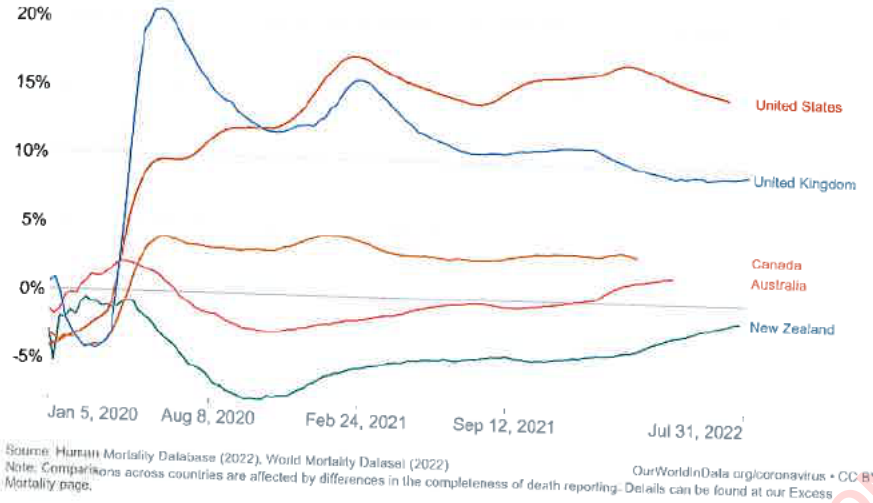


International comparisons

13. Comparison of cumulative excess deaths compared to those of other jurisdictions indicates that with most recent data, New Zealand has the lowest cumulative excess deaths (Figure 3). Current data indicates a small (~ 1%) percentage difference between the cumulative number of deaths since 1 January 2020 and the cumulative projected deaths for the same period based on previous years.

Document 2

Figure 3 – Cumulative deaths from all causes compared to projection based on previous years



Equity

14. With the increase in COVID-19 attributed deaths, it is increasingly important to consider the direct health inequities in the impact of COVID-19.

15. As you will be aware, the Intelligence, Surveillance and Knowledge (ISK) Group of the Public Health Agency (PHA) has undertaken exploratory analysis of COVID-19 attributed mortality to identify and quantify inequities in the burden of COVID-19 mortality Aotearoa [refer to *Inequities in COVID-19 Mortality HR20221246*].

16. The results of the analysis will be publicly released and shared with wider health agencies to inform decisions and actions to improve health outcomes. We plan to release the report in late September and will work with your Office to ensure you have the opportunity to review prior to release.

Next Steps

17. Manatū Hauora will continue to work closely with StatsNZ to understand data on excess mortality as it is released. We will update you regularly.

Recommendations

We recommend you:

a) **Note** the most recent information outlined in this report regarding excess mortality due to COVID-19 in Aotearoa for 2022 and how this compares internationally. **Noted**

Dr Andrew Old
Deputy Director-General of Health
Public Health Agency
Date: 8 September 2022

Hon Dr Ayesha Verrall
Minister for COVID-19 Response
Date: 8/9/22

Document 2

Appendix: Changes in death rates in age groups across time

The plots below show the death rates across 2012 – 2021. The bands show the linear fit and extrapolation, with uncertainty (+/-1 s.d.). As we can see almost all older age groups show a slight decrease in death rates. The 90+ group shows a levelling effect.

We observe (though it is only one data point) that in 2021, death rates are already starting to revert to average expectations after the clear decrease in 2020. However, they are still typically on or below -1 standard deviation of the extrapolated rates.