

Mortality in the age of Omicron

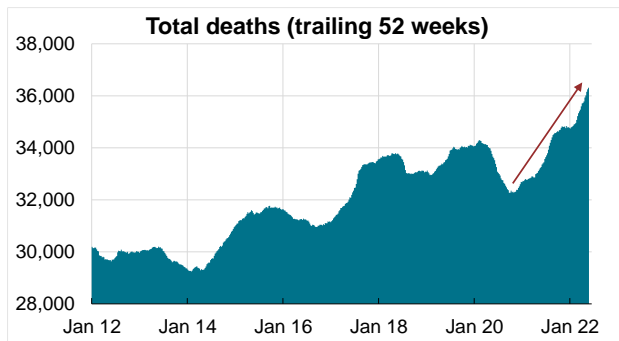
A model to examine excess mortality in New Zealand



June 2022

Recent mortality experience

After a remarkable fall in mortality during 2020, we have sadly seen an increase in the number of New Zealanders dying in recent months. The following chart shows the number of deaths in New Zealand over the trailing 52 weeks (which eliminates seasonality – many more people tend to die in the winter months).



The latest Statistics New Zealand data (for the period ended 12 June 2022) shows that about 36,000 Kiwis died over the preceding year – the highest on record.

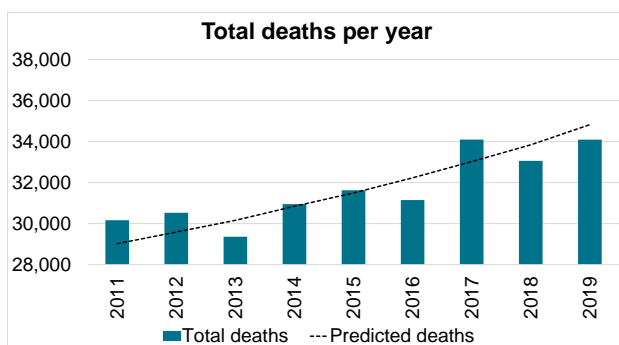
Of course, part of the reason this is a record number is because New Zealand's population has been growing, and the mix of ages within our population has been changing (on average, getting older).

In this paper, we present results from a model which is constructed to examine "excess mortality" – how many more (or fewer) people died than would otherwise be expected.

Model structure

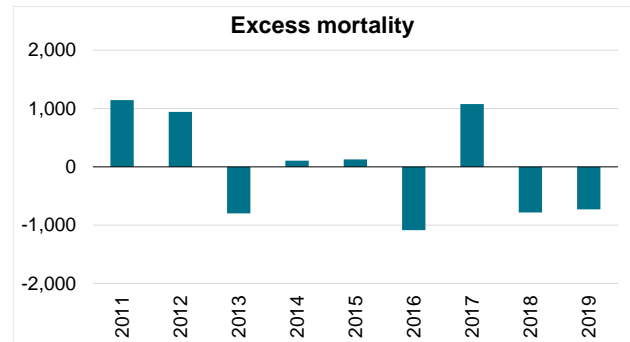
Our model simply considers mortality as a function of the make-up of the population by age group. We use the period from 2011 to 2019 to calibrate the model because detailed population and mortality data is readily available for this period, and this period predates the emergence of Covid-19.

The model's predicted number of deaths is shown by the black line below, with the actual deaths in each year as columns.



The number of predicted deaths rises in line with New Zealand's population growth, as expected.

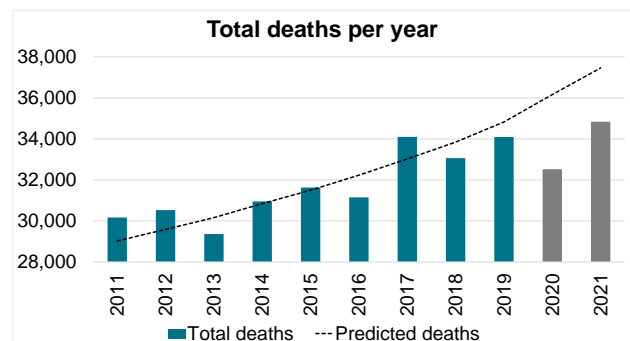
The difference between the dashed line and the height of each column is each year's excess mortality. We show this in the following chart.



We can see, for example, that 2017 was a bad year with 1,076 more deaths than expected (probably due to a particularly bad flu season).

Overall, the model does a good job with actual mortality within about $\pm 1,000$ of the prediction.

Next, we turn to adding in the "out of sample" years: 2020 and 2021. These years were not used to calibrate the model.



2020 and 2021 saw a similar number of deaths to 2017-2019, but this was well below what the model predicted.

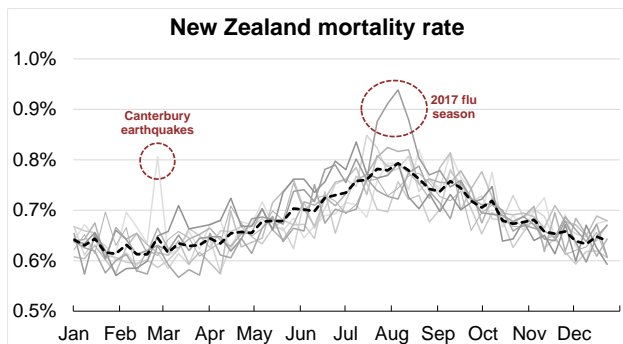
The reason the model predicted more deaths was because of population growth, particularly in the 80 years and older age group which grew 10% over the two years (outpacing broader population growth of 1.6%).

In other words, we have had significant *negative* excess mortality; some 6,200 fewer deaths occurred over 2020 and 2021 than would have otherwise been expected.

Intra-year variation

Another way to present this data is to show how the mortality rate varies through the calendar year.

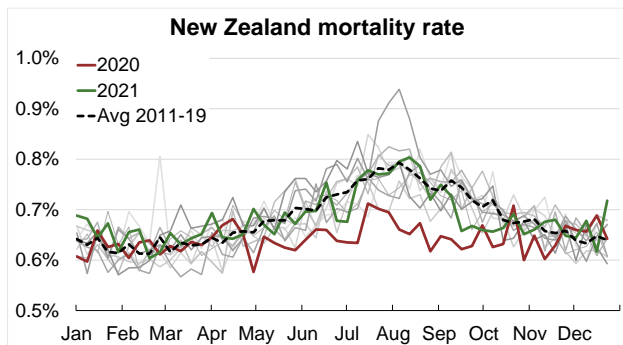
This is shown in the following chart with the grey lines indicating different years in the 2011 to 2019 period (darker lines are more recent), and the average given by the black dashed line. We calculate the mortality rate as the deaths per week, annualised and divided by population.



New Zealand’s mortality rate, which averages 0.68% over the full year, fluctuates from 0.61% in the summer months, to 0.79% in winter.

This chart highlights just how bad the 2017 flu season was (the mortality rate peaked at 0.94%). The deaths from the 2011 Canterbury earthquakes are also clearly visible.

We can then overlay our recent experience.



2020 did not have any noticeable peak in deaths in the winter months and this accounts for the lower overall number of deaths over the year. By contrast, 2021 tracked remarkably close to the average.

It is interesting to pause and consider the 2021 line. Why does 2021 look like an “average year” when our model suggests that 2,600 fewer people than expected died?

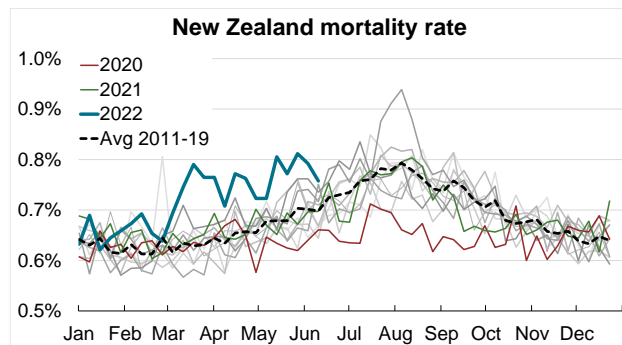
The answer is down to changing demographics. The proportion of the population aged 60 and over, which was about 20% through the calibration period, rose to over 22% by 2022.

	Average 2011-19	2020	2021	2022
Under 60	80.1%	78.8%	78.3%	77.9%
60 and over	19.9%	21.2%	21.7%	22.1%

An older population suggests we should expect more deaths. However, at an overall level, 2021 saw about an average number of deaths, meaning that mortality experience was lighter than expected.

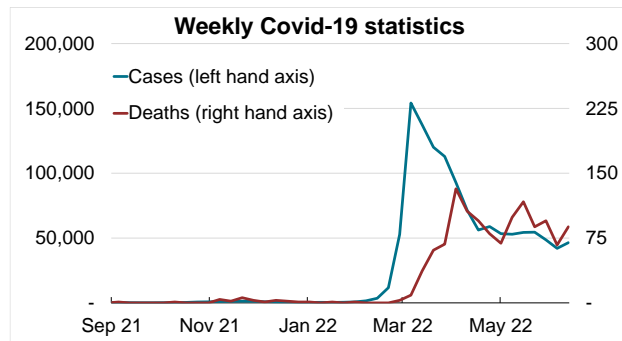
Covid-19 in the community

We now turn to considering the first 24 weeks of 2022. We add 2022 to the previous chart.



As suggested by our very first chart which showed a record number of deaths, mortality is running above average. We have seen a mortality rate of around 0.75% since mid-March which is more akin to the mortality rate during a typical winter season.

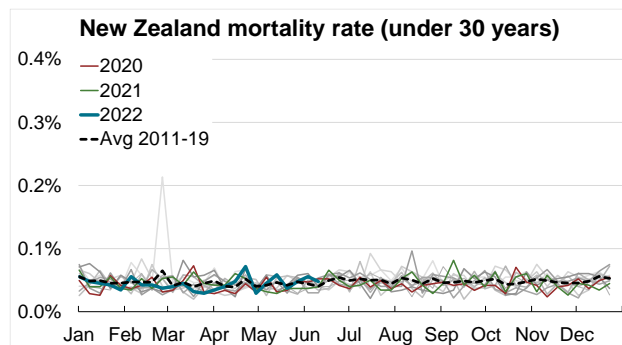
Clearly, what has changed in 2022 is that we have Covid-19 circulating in the community. As the following chart shows, weekly Covid-19 related deaths have averaged between 75 and 120 recently.

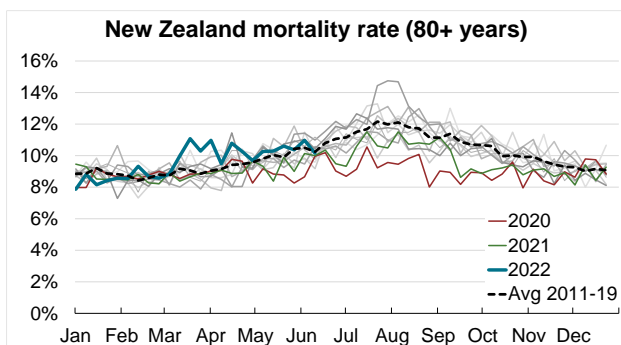
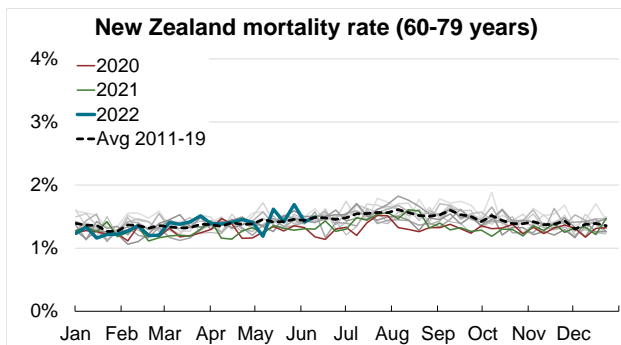
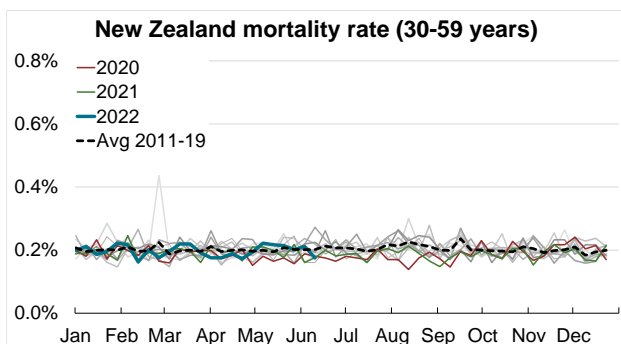


In total, we have seen 1,267 deaths recorded as linked to Covid-19, with the vast majority (1,216) occurring in 2022.

Demographic breakdown

We can dig into the data by breaking it down by age group. Note that the vertical axis differs greatly across the following charts.





The only chart to show a deviation in 2022 is the last; for those aged 80 and over. But even then, the deviation from the average line is not as severe as in the overall chart. In fact, for those aged 80 and over, the mortality rate is now around average for this time of year.

This emphasises the point that within-cohort excess mortality has not been as much as the overall increased number of deaths might suggest. Rather, it shows that the changing mix of demographics has been the main driver of the recent higher mortality.

Data sources

Statistics New Zealand: [mortality data](#) and [population estimates](#).

Ministry of Health: [Covid-19 case demographics](#).

Formalising this, we present the excess mortality by age cohort in the next table.

Excess mortality	2020	2021	2022*
Total	-3,641	-2,623	610
Under 30	-109	-45	-34
30 to 59	-342	-281	-64
60 to 79	-1,234	-1,010	-49
80 and over	-1,957	-1,287	756

* Predicted based on first 24 weeks of the year.

We can clearly see the negative excess mortality in 2020 and 2021 – fewer people dying than expected. Most of this benefit came about in the older age groups.

By contrast, excess mortality is expected to be 610 in 2022 given current trends. This accounts for the current demographic profile (more people aged over 80) and so represents a true excess mortality effect. Indeed, the only age group to show positive excess mortality is the oldest. Other groups are tracking about in line with expectations.

In other words, while the total number of deaths may be running at an annual rate which is 4,000 higher than in late 2020, most of this increase is due to the changing demographic profile and age-adjusted excess mortality is expected to be around 610 in 2022.

(This model assumes the typical mortality development pattern will continue for the rest of 2022. It could be that the usual winter peak in deaths has been “pulled forward”, in which case 2022 may end up with lighter mortality overall.)

Conclusion

New Zealand’s response to Covid-19 appears to have resulted in significantly lighter mortality once we adjust for age. While it is true that in recent months the number of deaths has increased, by age group mortality is broadly in line with expectations.

Our modelling suggests that 2022 is on course for approximately 610 more deaths than would be expected. This compares with some 6,200 fewer deaths experienced over 2020 and 2021 compared with what would have otherwise been expected.

ABOUT MELVILLE JESSUP WEAVER

Melville Jessup Weaver is a New Zealand firm of consulting actuaries providing advice on investment consulting, insurance and superannuation. The company, established in 1992, has offices in Auckland and Wellington and is an alliance partner of WTW, a leading global professional services firm.

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