**Community Affairs**

ANSWERS TO QUESTIONS ON NOTICE

**Australian Bureau of Statistics**

**Division**: Australian Bureau of Statistics
**Question No**: 4
**Topic**: Expected and Annual death comparisons
**Reference**: Hansard, Page 6
**Senator**: Malcolm Roberts

**Question**:

Could I turn to this graph? I can't remember which number it is, but I can table it if you'd like me to. It's in your submission.
CHAIR: Are you able to refer everyone to the page number in the submission?
Senator ROBERTS: I can't remember the page number in the submission, but it's graph 1 of your submission. Do you have it?
Ms Moran: Yes.
Senator ROBERTS: It uses a different way of showing the comparison between expected and actual deaths. In particular, you've changed the baseline and removed the range of deaths, replacing that with a simple 95 per cent confidence interval, which is the blue area in the graph. In effect, this graph is saying that excess deaths minus COVID deaths are almost entirely within the 95 per cent confidence interval. So there's nothing to see here; move on. The validity of your analysis, though, comes down to one thing: the validity of the baseline calculation. Have you brought along a clear and transparent explanation of that calculation for the committee, please, in writing? I'd like to see it stepped through. If you don't have that here, can we get it on notice?
Ms Moran: We can take that on notice.
Senator ROBERTS: Thank you for that, Ms Moran. Could you provide a detailed, step-by-step explanation of the change of baseline and the calculation, along with reasons and justification, please?
Ms Moran: Yes, we can do that.

**Answer**:

In July 2023, the ABS extended the number of years in the baseline used to forecast the expected number of deaths in its excess mortality outputs. The baseline now covers 2013 to 2019 (previously it was 2015 to 2019). The ABS did this so the mortality trend would be more stable. This is particularly important for smaller jurisdictions with low numbers of weekly deaths.

The ABS considered three key attributes when selecting the baseline range for excess deaths:

i. there needed to be enough input data available to predict the expected number of deaths in each jurisdiction;
ii. a stable and clear mortality trend needed to be identified; and
iii. the baseline period needed to be applied consistently across jurisdictions.

In addition to requiring a stable and clear mortality trend, the ABS determined that the expected number of deaths produced by the model should meet the following assumptions:

- The number of deaths should increase over time in line with a growing and ageing population.
- The age-standardised mortality rate should decrease over time in line with improvements in health care and increased life expectancy.

Finally, the ABS intentionally excluded pandemic years from the baseline. That's because, to date, the question the ABS has been answering in producing excess deaths estimates is: '*How does the number of deaths which has occurred during the COVID-19 pandemic (2020-2023) compare to the number of deaths expected had the pandemic not occurred?'.*

To decide on the baseline range, the ABS conducted a sensitivity analysis to systematically assess the impact of different reference period inputs on the outcomes of the model. This analysis tested three reference periods: 2010-2019, 2013-2019 and 2015-2019. The ABS chose 2013-2019 as the predictor reference period because it produced a more stable mortality trend for estimating expected numbers of deaths consistently across each jurisdiction compared to the reference period 2015-2019 (in use prior to July 2023). The sensitivity analysis found:

- There was a large decline in mortality between 2017 and 2018. This is likely due to the severe influenza season in 2017 causing some mortality displacement in 2018. (Mortality displacement is an epidemiological concept which describes the phenomenon of a period of very high mortality being followed by a period of low mortality.) Even controlling for 2017, when 2015-2019 was tested, the model was overcompensating for the rate of decline during 2015-19, resulting in a very low number of expected deaths in 2022 and 2023.
- Not all jurisdictions experienced a severe influenza season in 2017. Western Australia (WA), for example, had higher mortality rates in 2015 and 2016. Variability across jurisdictions meant that 2015-2019 had different outcomes across jurisdictions.
- WA had steeper declines in mortality rates between 2015-2016 and 2017 compared to other jurisdictions. Starting the baseline at the highest mortality points was overstating the rate of decline in WA and resulting in a very low number of expected deaths in 2022 and 2023.
- For smaller jurisdictions with low numbers of weekly deaths, adding additional years onto the baseline provided a more stable trend.
- There was some excess mortality in 2014, 2015 and 2017. The ABS made adjustments to outliers to control for this. 2013 was a year of stable mortality where no adjustments had to be made across any jurisdictions.

The mortality trend produced by the model using the 2013-2019 reference period produced similar results to the 2010-2019 reference period. The ABS selected the 2013-2019 reference period because it had two advantages over 2010-2019:

i. There is less population change to account for from 2013. This was especially important for smaller jurisdictions where age adjustment was not as precise due to the small numbers involved.

ii. ABS will use the same model for analysis of diseases. There were coding changes in 2013 so starting the reference period at 2013 ensures continuity of time series for this analysis.

The steps to calculate the estimated expected number of deaths are as follows:

1. Decide on age-groups. For Australia, modelled age groups were 0-34, 35-54, 55-64, 65-74, 75-84, 85-89, 90-94 and 95+.
2. Calculate age-specific rates for each group by week between 2013-2019. The denominator used is quarterly Estimated Resident Population published by the ABS. The ABS updates the population denominator for every three-month block.
3. Import the data into a statistical software system and apply a regression, forecasting expected deaths for the years 2020-2023.
4. Calculate 95% confidence intervals for each age-specific death rate.
5. Export the forecast age-specific death rates by age group.
6. Check coefficients and that assumptions are met. (These assumptions are explained above in the section of the answer relating to the reasons for the ABS' choice of baseline.)
7. If assumptions are not met, identify points in the baseline where weekly data may be affecting the projected counts. Adjust for any extreme outliers. (The ABS identified outliers in the data during 2017 where very high mortality was recorded in some weeks due to a severe influenza outbreak. If deaths are very high in the baseline, then the projected count of expected deaths may be too high and could inadvertently understate excess deaths if not adjusted.)
8. Re-import adjusted statistical data into a statistical software system and re-run the regression.
9. Convert the age-specific rates and confidence intervals into raw counts of deaths.
10. Add up deaths across all age groups to obtain an expected number of deaths.
11. Subtract actual deaths from expected deaths to gain a count of excess deaths.

More information is available from the Methodology section of the excess deaths reports (see: www.abs.gov.au/articles/measuring-australias-excess-mortality-during-covid-19-pandemic-until-first-quarter-2023#methodology).