Choosing a five year average for the measurement of excess deaths

THIS PAPER WAS UPDATED ON 9TH FEBRUARY 2022 TO CLARIFY THE POSITION OF NISRA.

Summary

Excess deaths is a term used to describe the difference between the number of deaths in the current year and the 'expected' number. This 'expected number' is calculated by taking the average number of deaths over the last 5 years.

The standard approach is to compare with the average of the 5 years prior to the current year. However, due to the impact of COVID and the highly unusual levels of mortality in 2020, agreement was reached in early 2021 by National Records of Scotland (NRS), the Office for National Statistics (ONS) and the Northern Ireland Statistics and Research Agency (NISRA) that the excess deaths calculation for 2021 would make use of the average from the years 2015 – 2019 rather than moving to 2016 – 2020.

For 2022, the excess deaths calculation would usually incorporate the mortality data for the most recent 5 year period (2017 – 2021). However, given the unusual nature of the 2020 data and the decision previously taken for 2021, it has been agreed with ONS[1] that the excess deaths calculation will compare 2022 mortality data with the average of 2016, 2017, 2018, 2019 and 2021, and therefore continue to exclude 2020.

Background

- A five year average is used to compare mortality data from the current year with data in the recent past to see whether the level of deaths is above or below the average. This is commonly referred to as 'excess deaths'.
- This is a simple measure of excess deaths, and is easily understood by users of these statistics.
- Usually the last five years (prior to the current year being measured against) are used to collate this average measure.
- In 2021, NRS along with ONS and NISRA agreed that including 2020 in a five year average would not make sense due to very large spikes in mortality for certain weeks of 2020. The five year average for those weeks would be inflated and therefore unsuitable for calculating excess deaths (a key measure of mortality during the pandemic).
- Data for 2021 was therefore compared against the most recent five year period excluding 2020, which was 2015-2019. This is the same five year average used in 2020.
- Scotland's population is ageing. For a number of years prior to the pandemic there was an existing increasing trend in deaths. It could have been expected that the annual number of deaths continued to rise given the increasing proportion of the population in the older age groups, even without the COVID

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[1] It should be noted that NISRA present a range of 5-year averages for calculation of excess deaths, including this one, but their headline measure is 2017-2021.

pandemic. To be a useful measure, the five year average must reflect this and use the most recent data where sensible to do so. Therefore, maintaining the current 2015-2019 average to calculate excess deaths in 2022 would be a less meaningful comparison.

Why not continue using the last five years as normal?

Figure 1 shows the averages on a weekly basis for:

- 16-20 (would have been used in 2021)
- 17-21 (would have been used in 2022)
- 15-19
- 16,17,18,19,21

Figure 2 shows the weekly totals from 2010 to 2021, by each individual year. It is clear that there was a period in the first wave of the COVID-19 pandemic in spring 2020 (weeks 14 to 21) which has a considerable effect if included in the calculation of any of the five year average options - which would result in excess deaths looking artificially low in the spring.

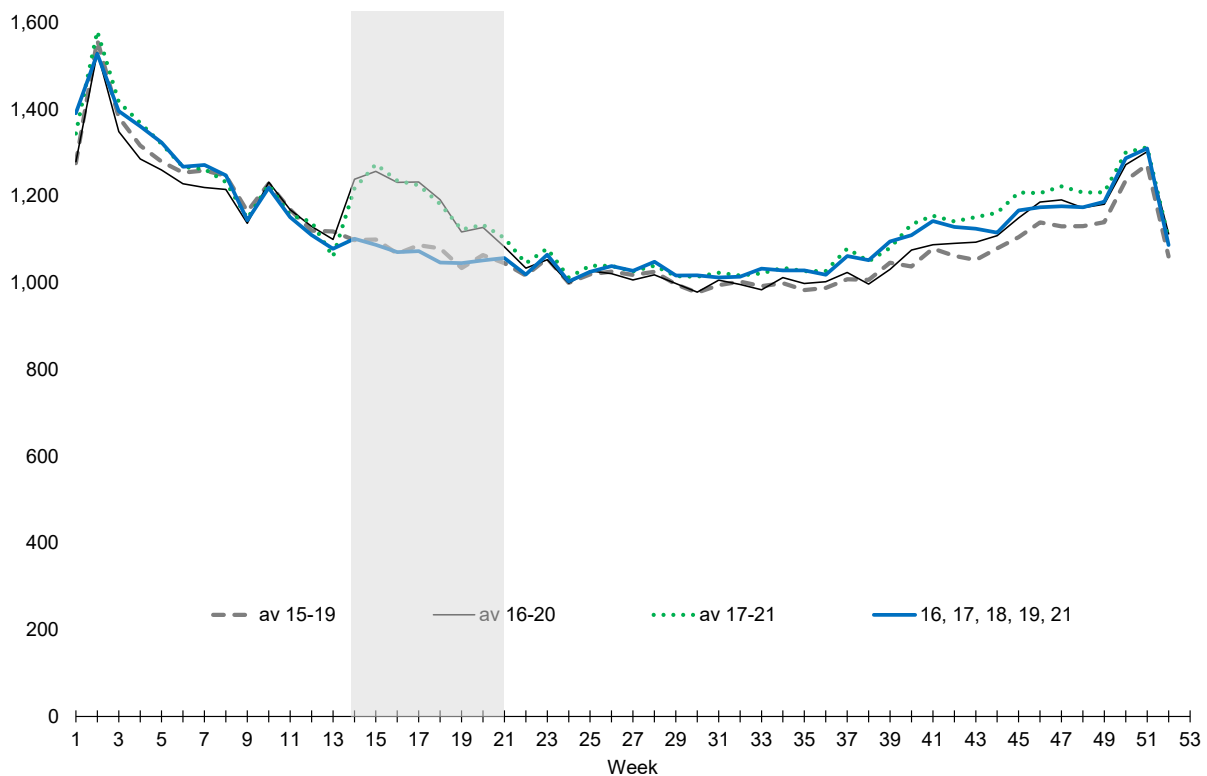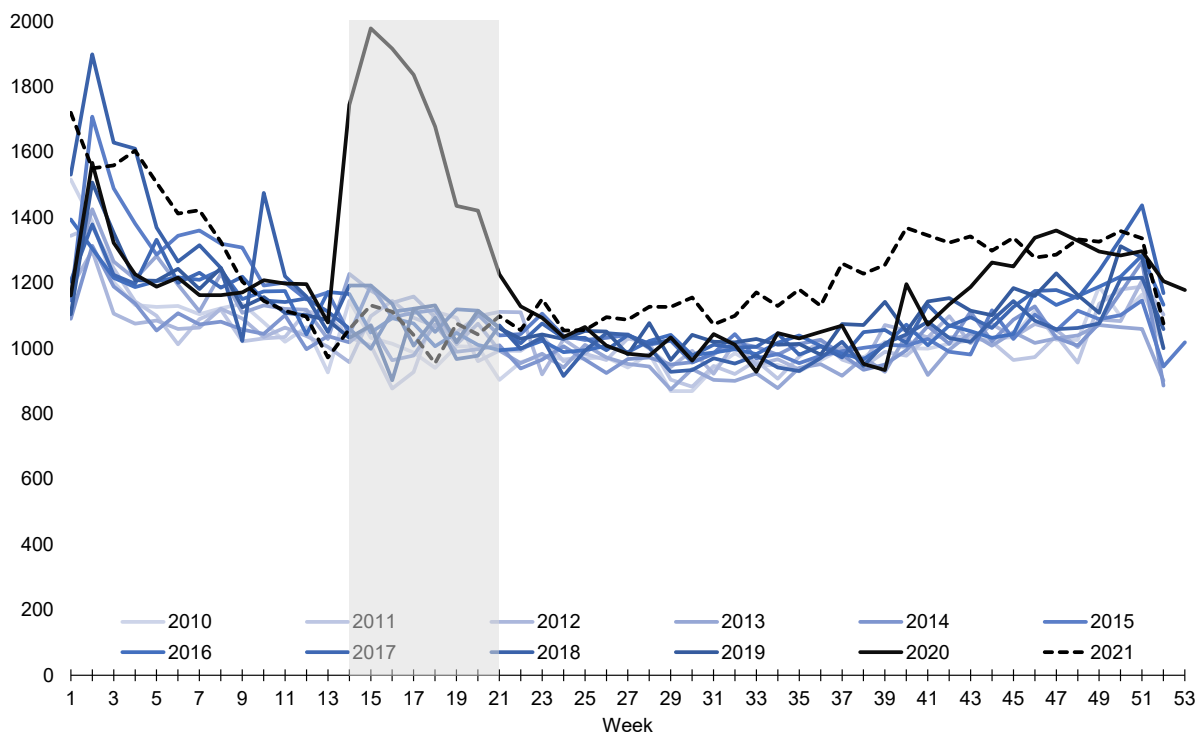**Figure 1: Deaths per week for selected five year averages**

Figure 2: Weekly deaths 2010-2021
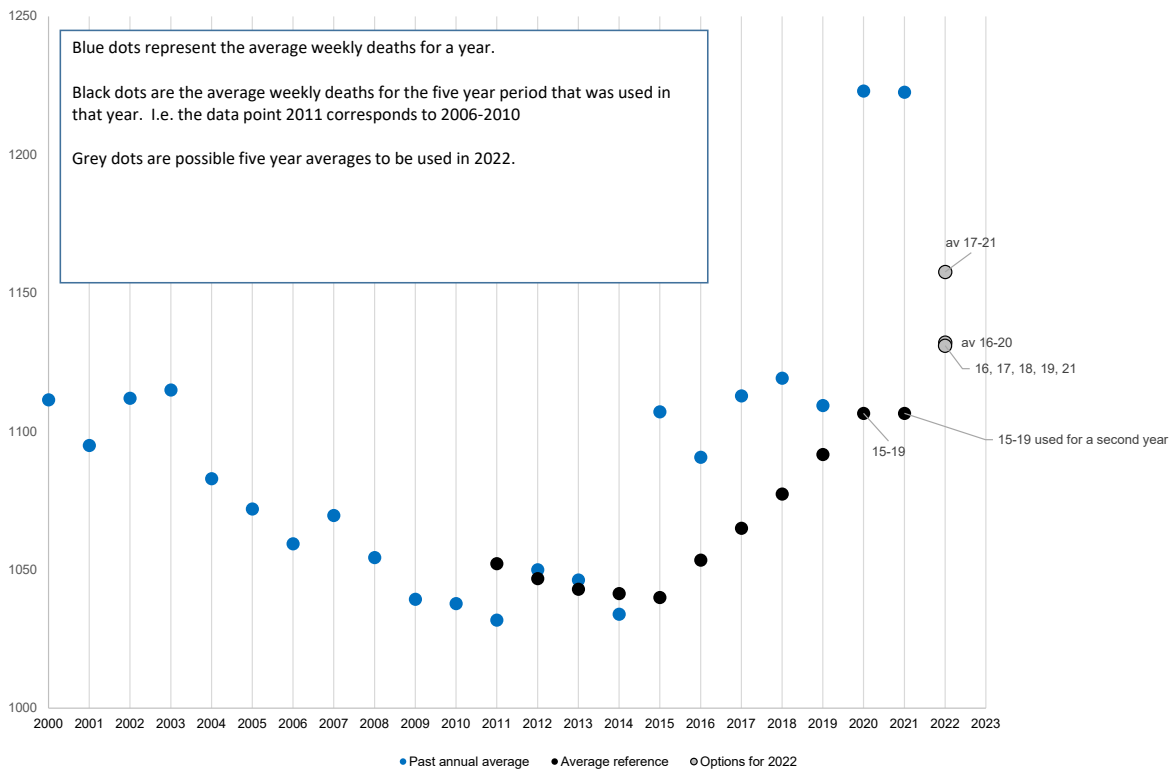
Why not continue to use 2015-2019?

The 2015-2019 five-year average is helpful as it can be used to compare current numbers of deaths with pre-pandemic levels of mortality. However, the population has aged in recent years, and Scotland has a growing number of people reaching older ages. The expectation being that more people will die, as deaths more commonly occur at older ages. It is therefore important that the five year average of the number of deaths continues to move on and age with the population.

Figure 3 shows:

- Black dots - the average number of weekly deaths in the five year average increased steadily until 2015-19
- Blue dots - the average number of weekly deaths in each year
- Grey dots - the alternative options for the five-year average calculation.

While the 17-21 and 16-20 averages may appear on trend with previous averages, it is important to note that they both contain the spring 2020 spike which makes them unsuitable for weekly comparisons (see Figure 1).

Figure 3: Average weekly deaths 2000-2021

Blue dots represent the average weekly deaths for a year.

Black dots are the average weekly deaths for the five year period that was used in that year. I.e. the data point 2011 corresponds to 2006-2010

Grey dots are possible five year averages to be used in 2022.

av 17-21

av 16-20

16, 17, 18, 19, 21

15-19 used for a second year

15-19

● Past annual average   ● Average reference   ◎ Options for 2022

Why use 2021 in the five year average but not 2020?

While the number of deaths in 2021 (particularly in the second half) have been considerably higher than years prior to 2020, it has more closely followed the general weekly pattern we see year on year (Figure 2) without the large spikes in the weekly data which occurred in 2020.

Using the most recent five years excluding 2020 also provides a clear way forward for future years. Deaths in 2023 will be compared against the five year average for 2017, 2018, 2019, 2021 and 2022. This can roll forward each year until 2026 when the average can return to the standard five-year average of 2021-2015.

Alternative Comparisons

If users would like to make alternative comparisons, the weekly mortality data for all years from 2000 onwards is available to download from the NRS website. This allows the calculation of any alternative five-year average (or NRS can provide these on request). However, the official definition of excess deaths for Scotland and for comparison within the UK is to use the methodology which excludes 2020 from the 'expected' number of deaths calculation.