England & Wales mortality monitor –week 1 of 2023

Note: Bank holidays mean that results for recent weeks may not be directly comparable to other weeks or years.

Summary

There have been around 155,300 excess deaths from all causes in the UK from the start of the pandemic to 6 January 2023. We calculate excess deaths by comparing deaths to those expected if mortality rates were similar to those experienced in 2019. This estimate uses data from National Records Scotland (NRS) and the Northern Ireland Statistics and Research Agency (NISRA) as well as the Office for National Statistics (ONS).

In week 1 of 2023, there were 30% more deaths registered in England & Wales than would have been expected if Standardised Mortality Rates had been the same as in the corresponding week of 2019. The corresponding figure for week 52 of 2022 was 22% more deaths. These figures will have been affected by bank holidays over the Christmas and New Year period.

Background

In light of the coronavirus pandemic we have been publishing frequent updates to the CMI Mortality Monitor. This update shows the position as at 6 January 2023 (week 1 of 2023), based on provisional deaths data published by the Office for National Statistics (ONS) on 17 January 2023.

In future weeks, we plan to publish:

- A summary weekly monitor. The next is planned for week 2 of 2023 on Tuesday 24 January 2023.
- More detailed information quarterly. The next is planned for week 13 of 2023 in April 2023.

All updates are publicly available from the CMI pages of the Institute and Faculty of Actuaries website, together with software that we have made available to Authorised Users to carry out ad hoc analyses.

Notes

Full details of the methods used for results based on the ONS data are included in Working Paper 111. Our analysis is based on Standardised Mortality Rates (SMRs). These adjust the provisional weekly deaths data published by the ONS to control for changes in the size, age and gender distribution of the population over time. We note that mortality rates and mortality improvements vary by age, and the results shown are sensitive to the age distribution of the chosen standard population (the 2013 European Standard Population).

Our calculations rely on data for registered deaths, and we are conscious that during the pandemic deaths may have been registered earlier or later than in previous years. Consequently, comparisons of mortality between years during the pandemic and earlier years may not be on a like-for-like basis. Also, results for individual weeks may not be consistent between years due to the timing of public holidays.

Our calculations do not take account of the 2021 census in England & Wales. Our blog discusses the implications of the initial census results. We intend to analyse the impact of the census on the mortality monitor once the ONS has published revised mid-year population for mid-2012 to mid-2020, expected in 2023.

Use of this document

The CMI disclaims any liability from use of or reliance on these calculations, including in relation to financial transactions such as longevity swaps; and the CMI does not guarantee that it will continue to publish updates. Please also see the reliances and limitations, disclaimer, and copyright notice on the final page of this document.

TAS compliance

This paper is intended to analyse recent mortality in England & Wales. It complies with the principles in the Financial Reporting Council's Technical Actuarial Standard "TAS 100: Principles for Technical Actuarial Work". Any person using this paper should exercise judgement over its suitability and relevance for their purpose.

Results – Standardised mortality rates

Chart 1 shows how SMRs in 2019, 2020, 2021, 2022 and 2023 compare to the range of SMRs in the same week in the 2011-2019 period. (Note that most years do not have a week 53 – there was no week 53 in 2019, 2021 or 2022, and the 2011-2019 range for week 53 only relates to 2015.)

Ignoring the volatility caused by bank holidays, standardised mortality in recent weeks has tended to be near or above the top of the 2011-2019 range.

Chart 1: Weekly standardised mortality rates for 2011 to 2023

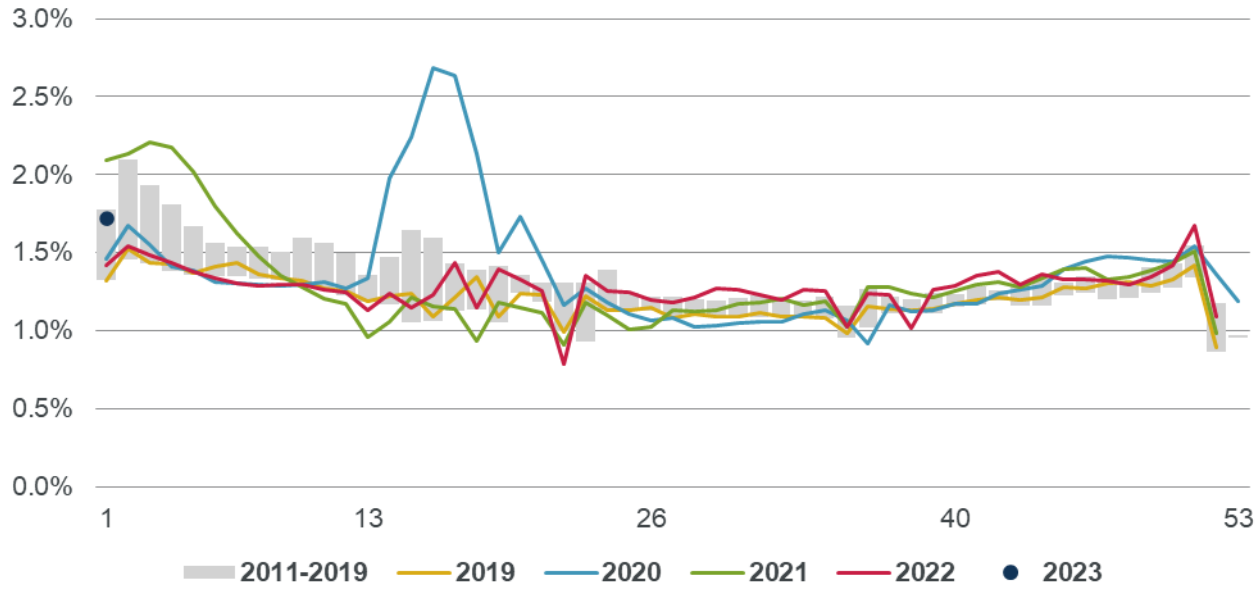
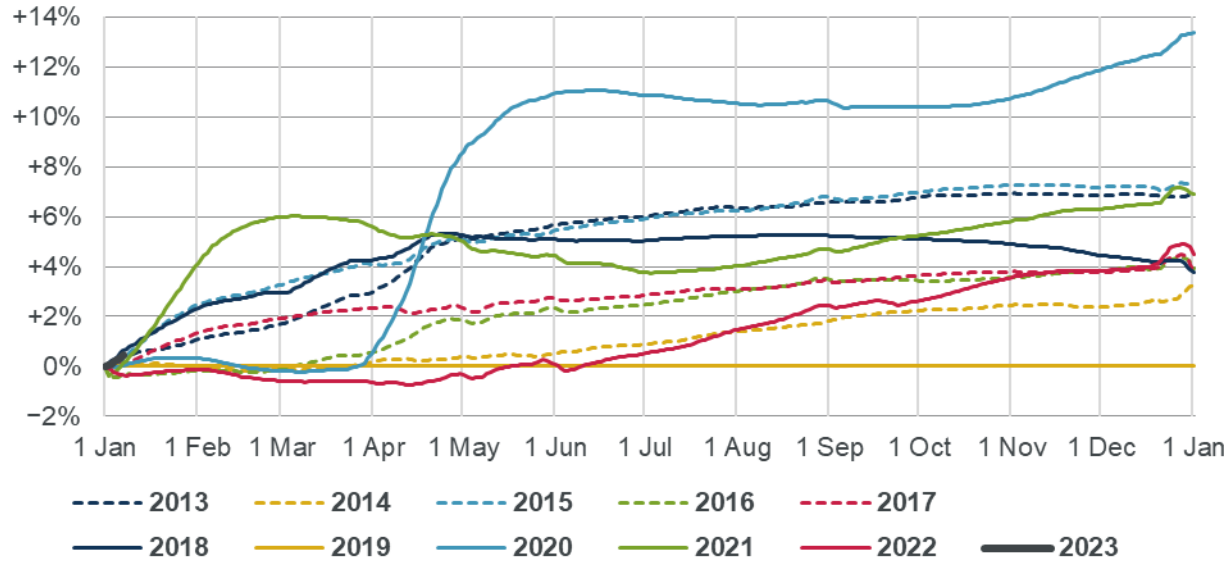


Chart 2 shows cumulative standardised mortality rates relative to 2019, as a proportion of mortality for 2019 as a whole[1]. Cumulative mortality to the end of 2022 was 4.5% higher than in 2019.

Chart 2: Cumulative standardised mortality rate compared to 2019



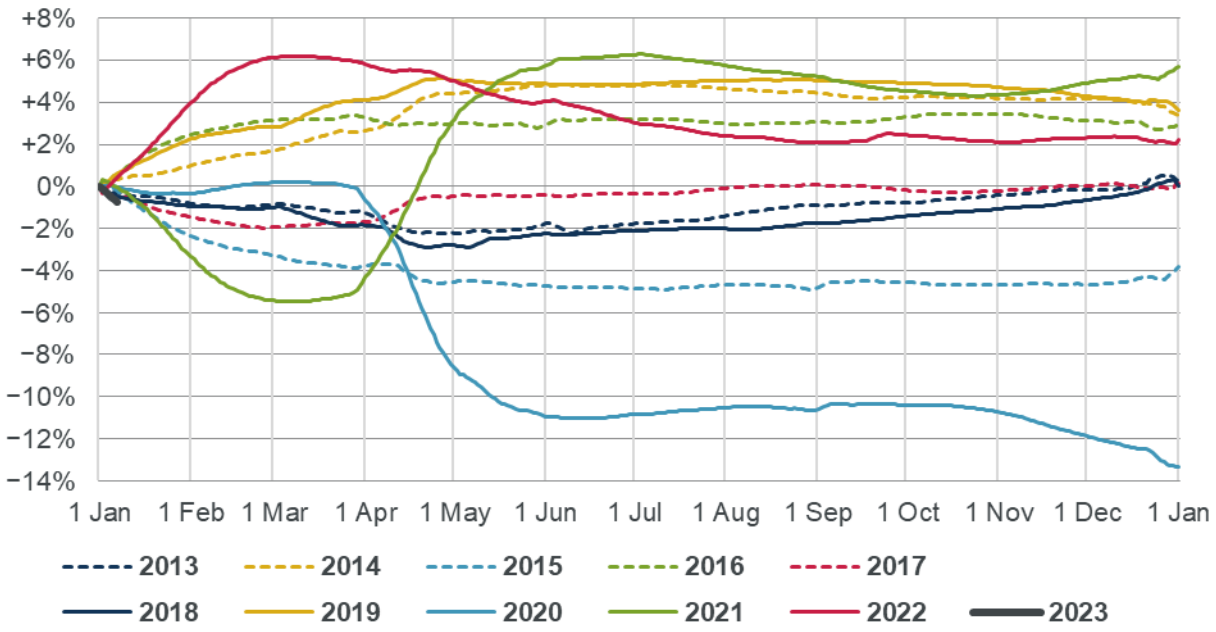
[1] Showing relative mortality rather than absolute mortality makes it easier to make comparisons between years. We use 2019 as the comparator as this is consistent with the excess deaths calculations in this report.

Chart 3 shows the cumulative annual standardised mortality improvement for 2023 and the previous ten years. The cumulative mortality improvement to the end of 2022 was +2.2%.

Please note:

- The cumulative improvement for year N is the reduction in cumulative mortality from year N–1 to year N, as a proportion of full-year mortality for year N–1.
- The cumulative mortality improvement for a year reflects mortality in that year and the prior year.
- Chart 3 shows cumulative improvements, so a higher value represents a higher improvement and lower mortality; whereas in Chart 2 a higher value represents higher mortality.
-

Chart 3: Cumulative annual standardised mortality improvement for 2013 to 2023



Results – Excess and COVID-19 deaths

The ONS data shows 739 deaths registered during week 1 of 2023 “where COVID-19 was mentioned on the death certificate”. The overall impact of the coronavirus pandemic on total deaths has differed during the pandemic for various reasons:

- There may have been some deaths that were wholly or partially due to COVID-19 but where COVID-19 was not mentioned on the death certificate.
- Some deaths where COVID-19 was mentioned on the death certificate may not be “excess” deaths, as the deceased might have died from another cause in the same period, in the absence of coronavirus.
- There may have been “forward mortality displacement”: some deaths that occurred earlier in the pandemic would otherwise have occurred in this period.
- There may have been indirect impacts on deaths due to restrictions on movement and changes in behaviour during the pandemic. For example, access to healthcare, reductions in other infectious diseases, and changes in traffic, pollution and mental health.
- The pandemic has led to increased pressures on the NHS and the provision of social care.
- In the absence of the pandemic, we would have expected mortality to tend to fall over time, but with some volatility from year to year.

To consider the possible impact of the pandemic on total deaths, we have estimated the number of "expected" deaths that we would have seen in each week of the pandemic (in 2020, 2021, 2022 and 2023) if the SMRs for each gender and age-group had been the same in that week as in the corresponding week of 2019, the last full "normal" year before the pandemic.

We can then subtract the expected deaths from actual deaths to estimate the "excess" deaths that, in the absence of other likely causes, may be attributable to the pandemic.

Excess death calculations depend on the historical period used to estimate expected deaths. We initially used 2019 as our measure of "expected" mortality because of the similarity of SMRs in the first 12 weeks of 2019 and 2020, before the pandemic had a material impact on mortality.

While we would have expected to see mortality improvements since 2019 in the absence of a pandemic, we still consider 2019 to be a reasonable measure of expected mortality, for the reasons set out in the appendix.

As there was no ISO week 53 in 2019, we have instead used week 1 of 2020 to calculate expected deaths for 53 week of 2020.

We have not made any adjustment for differences in the timing of public holidays. While such differences affect individual weeks, the positive and negative impacts for different weeks should cancel out over time in cumulative results.

Table 1 shows results for week 1 of 2023 compared to week 52 of 2022:

- Actual deaths in week 1 of 2023 were 30% higher than expected: 27% higher than expected for males and 32% higher than expected for females.
- In week 52 of 2022 deaths were 22% higher than expected: 21% higher than expected for males and 23% higher than expected for females.
- These figures will have been affected by bank holidays over the Christmas and New Year period.

Table 1: Comparison of COVID-19 deaths and "excess" deaths

Description	Week 1 of 2023			Week 52 of 2022
	Male	Female	Total	Total
"Expected" registered deaths	5,561	5,985	**11,546**	7,812
Actual registered deaths, from all causes	7,085	7,898	**14,983**	9,517
"Excess" registered deaths (actual minus expected)	1,524	1,913	**3,437**	1,705
Registered deaths where COVID-19 was mentioned on the death certificate	379	360	**739**	393
Excess as a proportion of expected	27%	32%	**30%**	22%

Chart 4 compares three measures of COVID-19 mortality during the pandemic: our calculation of "excess" registered deaths from all causes, ONS data for registered deaths where COVID-19 was mentioned on the death certificate, and data for deaths of people within 28 days of a positive test result for COVID-19, from the UK Health Security Agency (UKHSA) COVID-19 dashboard.

The relationship between the three measures has varied considerably during the pandemic. Early in the pandemic, the number of excess deaths was much higher than for the other two measures, but this has not been the case since then. During the second half of 2021, all three measured tended to show broadly similar results. Excess deaths were markedly lower than ONS and UKHSA figures at the start of 2022, and negative in some weeks. However, in the past six months the number of excess deaths has tended to be higher than the other two measures.

We note the UKHSA data for England has no deaths for the week ending 29 December 2022 and these appear to be included in the figure for the week ending 5 January 2023.

Chart 4: Comparison of weekly measures of COVID-19 deaths (see text for details)

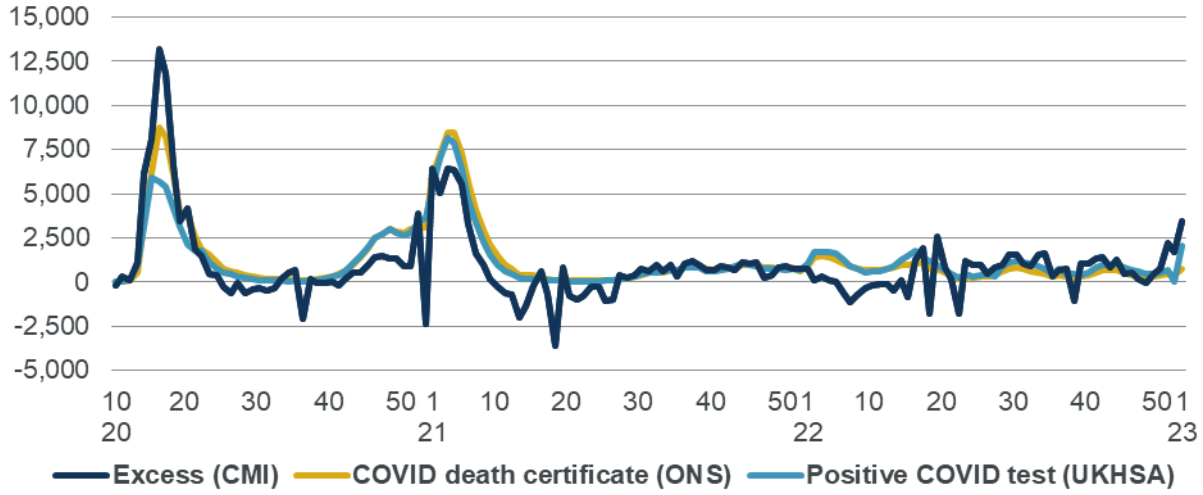
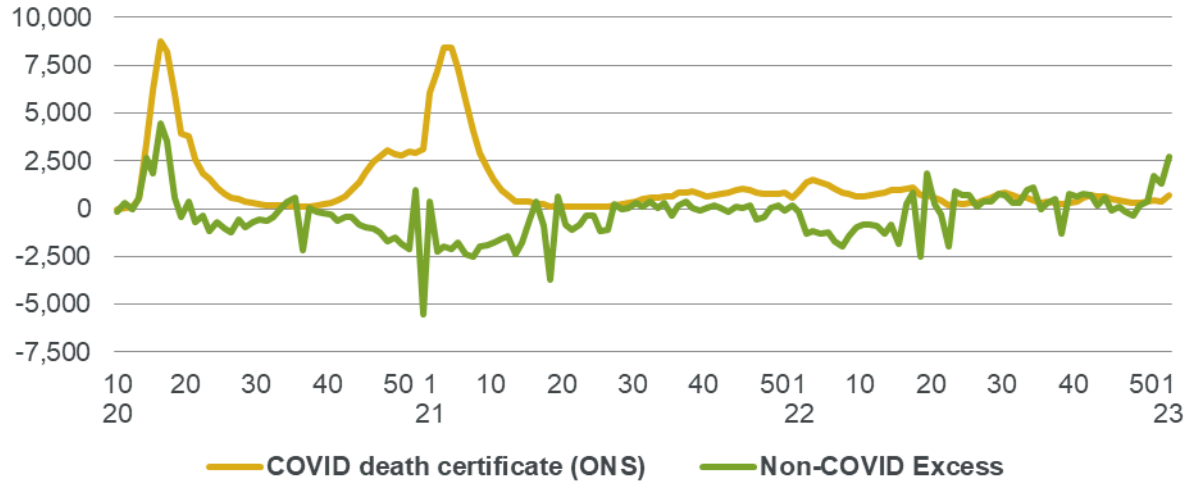


Chart 5 shows the split of excess deaths into deaths where COVID-19 was mentioned on the death certificate and "Non-COVID excess" (i.e. excess deaths minus deaths with COVID-19 mentioned on the death certificate). For most of the period, the Non-COVID excess has tended to be negative; i.e. deaths from causes other than COVID-19 were lower than in the corresponding part of 2019. However, the Non-COVID excess has been positive during much of the second half of 2022.

Chart 5: Split of Excess deaths into COVID and Non-COVID Excess



Charts 4B and 5B are "zoomed in" versions of Charts 4 and 5, showing greater detail of the past 26 weeks, with a narrower y-axis range.

Chart 4B: Recent detail of Chart 4

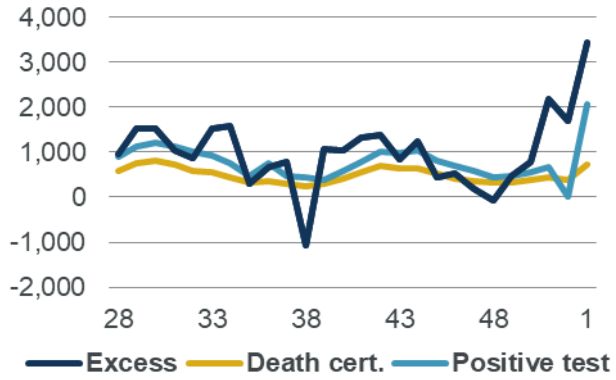


Chart 5B: Recent detail of Chart 5

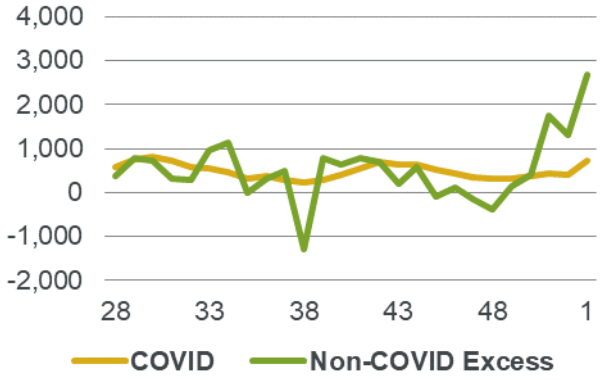
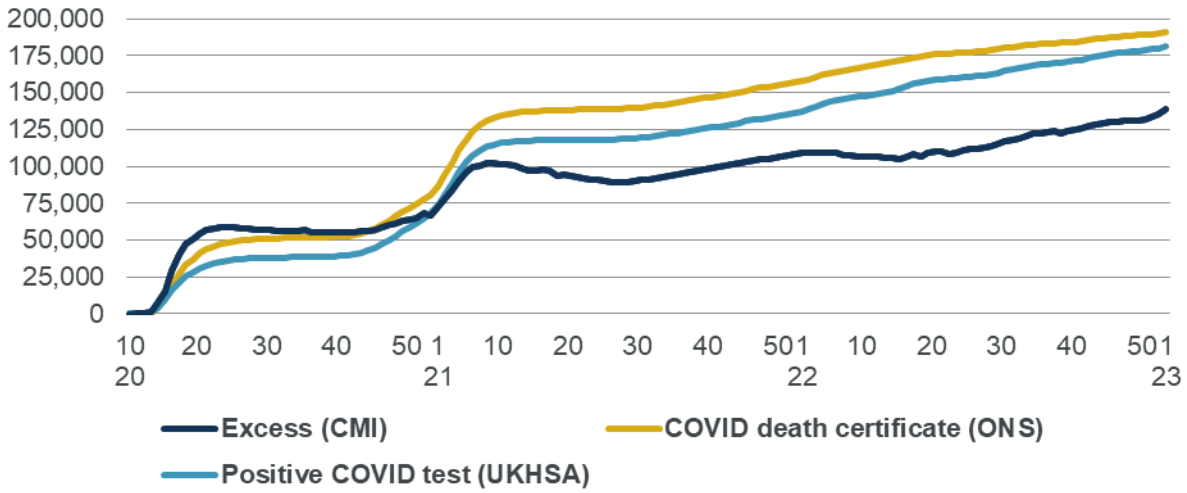


Chart 6 is similar to Chart 4, but shows cumulative numbers of deaths since week 10 of 2020. In the earlier part of the period shown, the cumulative number of excess deaths from all causes was higher than both the cumulative number of deaths where COVID-19 was mentioned on the death certificate, and the cumulative number of deaths within 28 days of a positive test. However, cumulative excess deaths are now lower than both of those measures – a consequence of weekly excess deaths often being lower than the other measures, and sometimes negative.

Chart 6: Comparison of cumulative deaths measures (see text for details)



Charts 7 and 8 show excess deaths as a proportion of expected deaths by age band for each week during the pandemic. Charts 7B and 8B show the same information, for the most recent 26 weeks, in more detail. For much of the period excess deaths as a proportion of expected have tended to be lower for the older age groups, but there is no clear pattern by age in recent weeks. We do not show results for ages below 45 as the relatively low numbers of deaths at those ages means that estimates of expected deaths would be unreliable.

Chart 7: Excess as a proportion of expected in each week – males (see text for details)

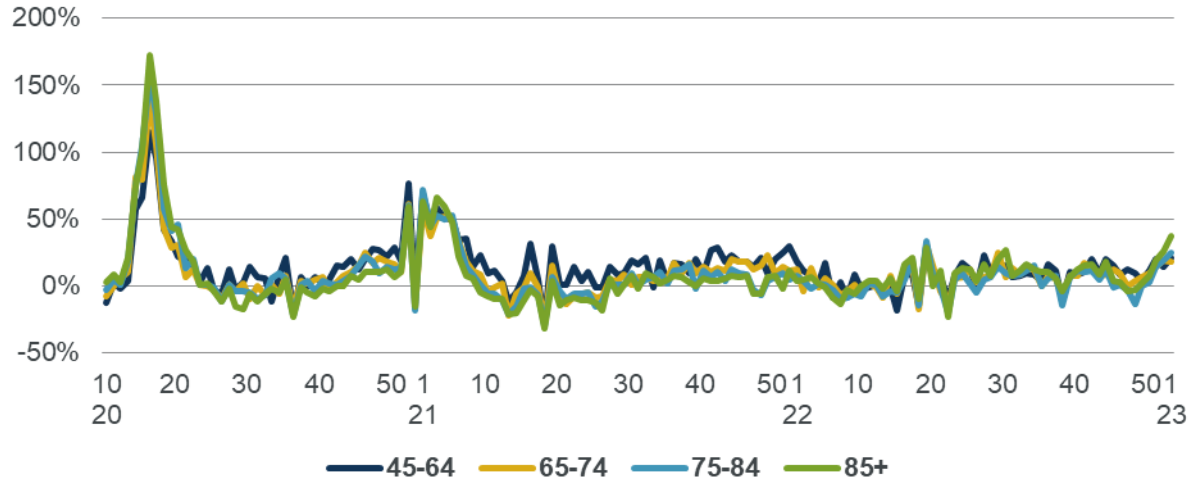


Chart 8: Excess as a proportion of expected in each week – females (see text for details)

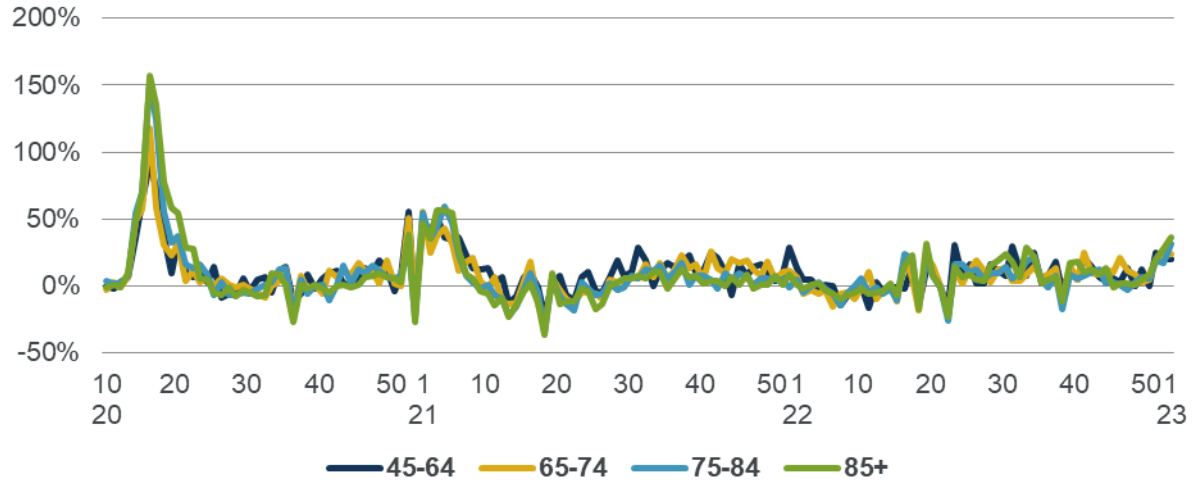


Chart 7B: Recent detail of Chart 7 – males

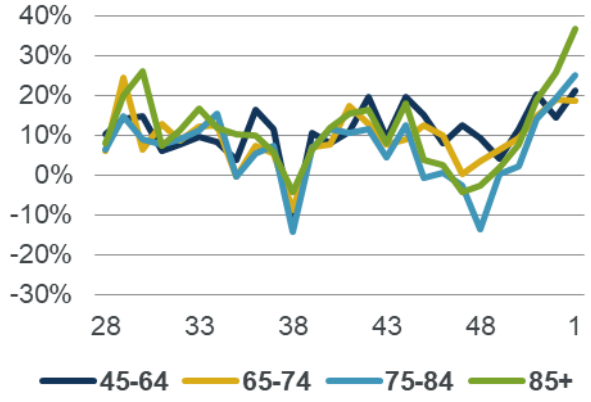
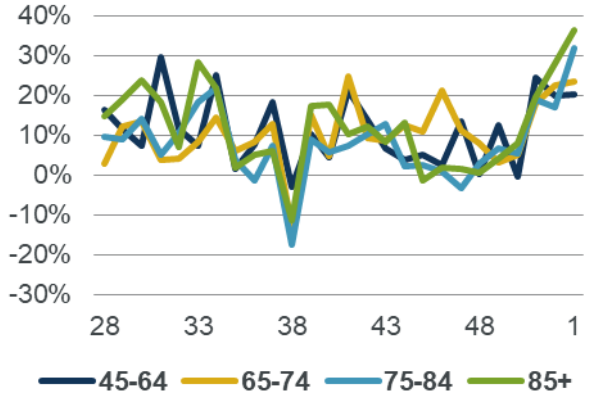


Chart 8B: Recent detail of Chart 8 – females



Results – Excess deaths for the United Kingdom

The previous sections of this report are based on registered deaths data for England & Wales to 6 January 2023, published by the ONS. In this section we extend our analysis to the United Kingdom as a whole.

We estimate that the numbers of excess deaths from the start of the pandemic to 6 January 2023 are:

- 139,100 for England & Wales[2]; and
- 155,300 for the United Kingdom.

Chart 9 shows the split of excess deaths by quarter. Q1 of 2020 is not a full quarter and Q4 of 2020 has an extra week. Table 3 shows the split by calendar year.

Chart 9: Quarterly excess deaths (from week 10 of 2020)

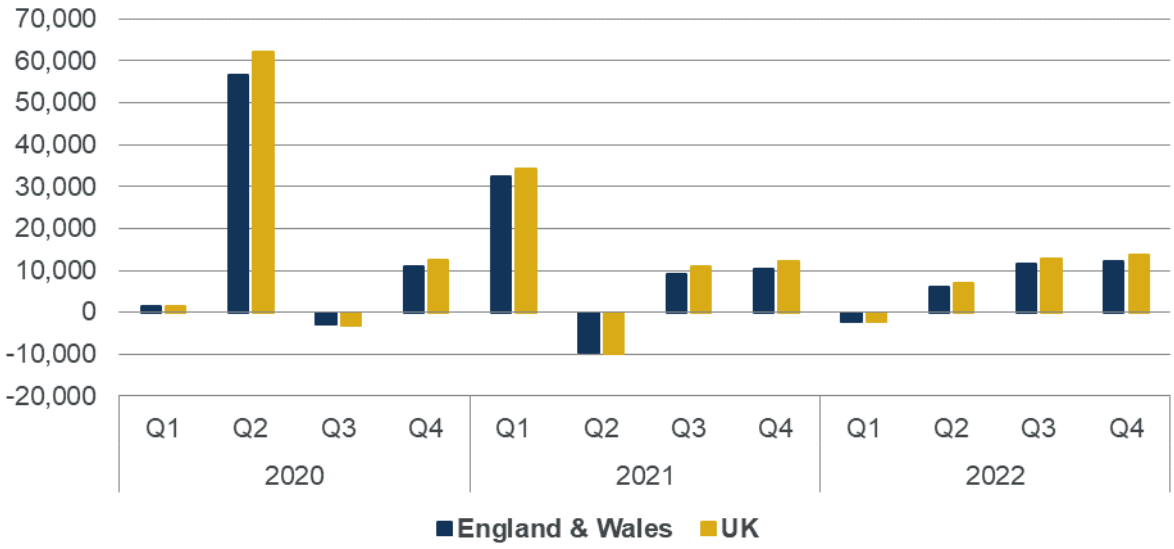


Table 3: Annual excess deaths

Year (weeks)	England & Wales	United Kingdom
2020 (10-53)	+66,200	+72,900
2021 (1-52)	+41,900	+47,500
2022 (1-52)	+27,600	+31,000

As in earlier sections, excess deaths compare registered deaths to those that we would have seen if standardised mortality rates were the same as in the corresponding period in 2019. Our calculations use data for all-cause mortality from National Records Scotland (NRS) and the Northern Ireland Statistics and Research Agency (NISRA) in addition to the ONS data.

[2] The cumulative figures since the start of the pandemic are for deaths registered from week 10 of 2020 onwards; i.e. from 29 February 2020.

Data sources

The provisional weekly deaths are available from:

- ONS (England & Wales)
  https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/datasets/weeklyprovisionalfiguresondeathsregisteredinenglandandwales
- NRS (Scotland)
  https://www.nrscotland.gov.uk/covid19stats
- NISRA (Northern Ireland)
  https://www.nisra.gov.uk/publications/weekly-deaths

The daily UKHSA data for deaths of people within 28 days of a positive test result for COVID-19 are available from https://coronavirus.data.gov.uk/details/deaths

Appendix: Expected deaths for 2023

Our weekly mortality monitors include estimates of "expected" deaths, intended to represent the broad level of deaths that we might have seen in the absence of the pandemic. The choice of measure of expected deaths is somewhat subjective, and different measures lead to different estimates of expected and hence excess deaths. This is considered in an appendix to the mortality monitor for week 53 of 2020.

In all of our weekly mortality monitors to date, we have used SMRs in 2019 as our measure of expected deaths. We initially chose this measure because of the similarity of SMRs in the first 12 weeks of 2019 and 2020, before the pandemic had a material impact on mortality.

We have decided to continue to use mortality in 2019 to estimate expected deaths in 2023.

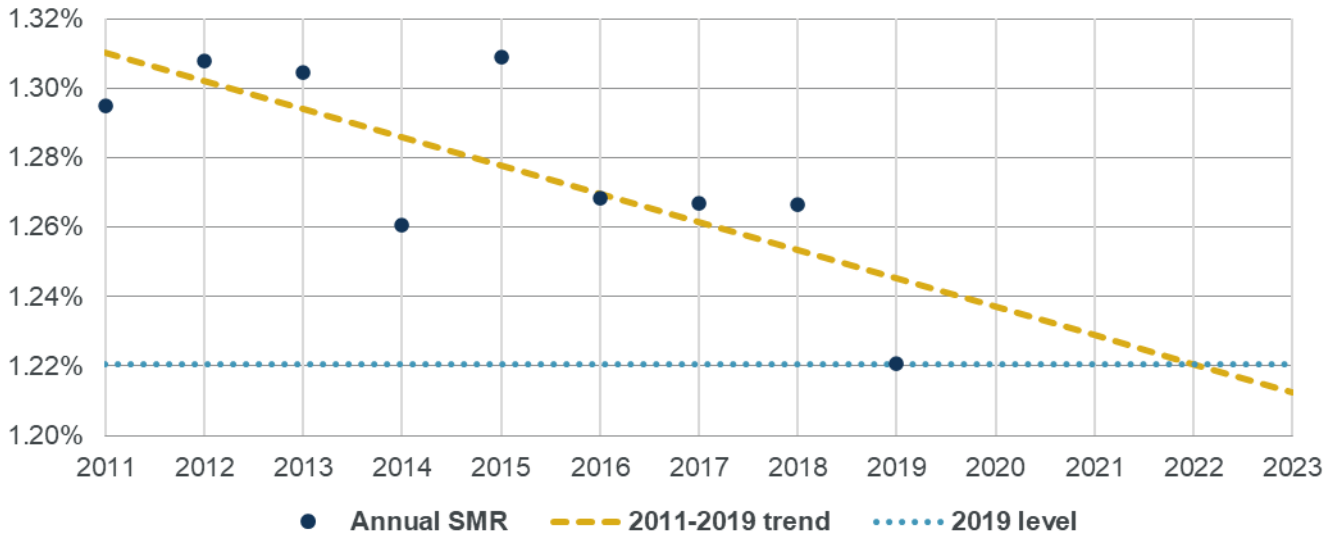
We considered whether to use another measure, primarily to reflect the mortality improvements that we might have seen between 2019 and 2023 in the absence of the pandemic. To consider this, Chart 9 plots annual SMRs for 2011-2019, compared to the 2011-2019 linear trend. The chart shows that extrapolating the 2011-2019 trend to 2023 would lead to a broadly similar mortality rate as that in 2019. This suggests that:

- mortality in 2023 might not have been too different to that in 2019 in the absence of the pandemic; and
- if we are to use historical mortality to calculate expected deaths, then it is better to use 2019 than an earlier year or an average of multiple years.

Continuing to use SMRs in 2019 as our measure of expected deaths has the further advantages that:

- it is simple to explain; and
- using the same measure of expected deaths in 2023 as in earlier years means that excess deaths in 2023 will be directly comparable with those in 2020, 2021 and 2022.

Chart 10: Standardised mortality rates for calendar years 2011 to 2019, and the 2011-2019 linear trend



Reliances and limitations

The purpose of the weekly mortality monitor is to provide regular updates on standardised mortality in England & Wales, adjusting ONS data to allowing for changes in the size and age of the population.

The CMI aims to produce high-quality outputs and takes considerable care to ensure that the mortality monitor and the accompanying spreadsheet of results are accurate. However:

- We cannot guarantee their accuracy (see the Disclaimer).
- There is a reliance on the data published by third parties, particularly the ONS data which is described as "provisional".
- We have also applied judgement and assumptions in deciding on the calculation methods and the presentation of results.
- Anyone using the results of the mortality monitor should ensure that it is appropriate for their particular use, and note that care is needed when estimating full year experience from partial year experience. This is particularly true during the coronavirus pandemic.

Continuous Mortality Investigation Limited ("CMI") is registered in England & Wales
Company number: 8373631
Registered Office: 7th floor, Holborn Gate, 326-330 High Holborn, London, WC1V 7PP

Correspondence address: Two London Wall Place, 123 London Wall, London, EC2Y 5AU
Email: info@cmilimited.co.uk
Tel: 020 7776 3820

Website: www.cmilimited.co.uk (redirects to www.actuaries.org.uk)

Continuous Mortality Investigation Limited is wholly owned by the Institute and Faculty of Actuaries.