



## England & Wales mortality monitor – week 26 of 2023

### Summary

**For the first time, this version of the mortality monitor makes allowance for the impact of results of the 2021 census. See Appendix 2 for further information.**

There have been around 200,100 excess deaths from all causes in the UK from the start of the pandemic to 30 June 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 26 of 2023, there were 5% 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.

### 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 30 June 2023 (week 26 of 2023), based on provisional deaths data published by the Office for National Statistics (ONS) on 11 July 2023.

In future weeks, we plan to publish:

- A summary weekly monitor. The next is planned for week 27 of 2023 on Tuesday 18 July 2023.
- More detailed information quarterly. The next is planned for week 39 of 2023 in October 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.

We have included analysis of the difference between when deaths were registered and when they occurred in Appendix 1.

**Our previous mortality monitor calculations have not taken account of the impact of the 2021 census in England & Wales on views of mortality rates and improvements. For the first time, this version of the mortality monitor does make allowance for the 2021 census.** We have updated the results to use the same dataset as the latest version of the CMI Mortality Projections Model, CMI\_2022. The impact of the change is generally to increase SMRs (with larger increases in later years) and also to increase cumulative excess mortality. Appendix 2 describes the new dataset and compares key results between the new dataset and the previous dataset.

We note that the ONS expects to publish its revised mid-year population for mid-2012 to mid-2020 in September 2023. This will use a more detailed method and more detailed data to assess the 2012 to 2020 population than the CMI\_2022 dataset that we use for this monitor. We intend to analyse the impact of the ONS dataset on the mortality monitor once it is available.



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## **TAS compliance**

This paper is intended to translate publicly available demographic information published by the Office for National Statistics and similar bodies into indicative mortality measures to illustrate recent mortality experience primarily in England & Wales. The paper is intended for use by actuaries and other parties interested in detailed mortality statistics and is for information only.

The paper complies with the principles in the Financial Reporting Council's Technical Actuarial Standard "TAS 100: General Actuarial Standards". 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.

During the second quarter of 2023, standardised mortality has been similar to 2022, higher than 2018, 2019 and 2021, and significantly lower than 2020.

**Chart 1: Weekly standardised mortality rates for 2011 to 2023**

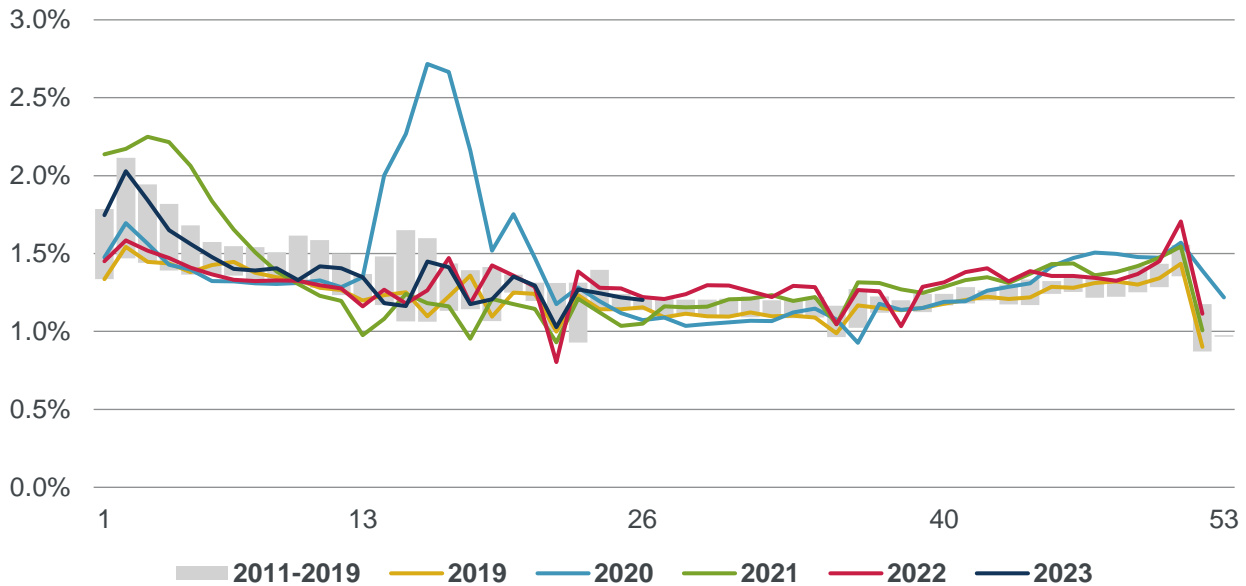
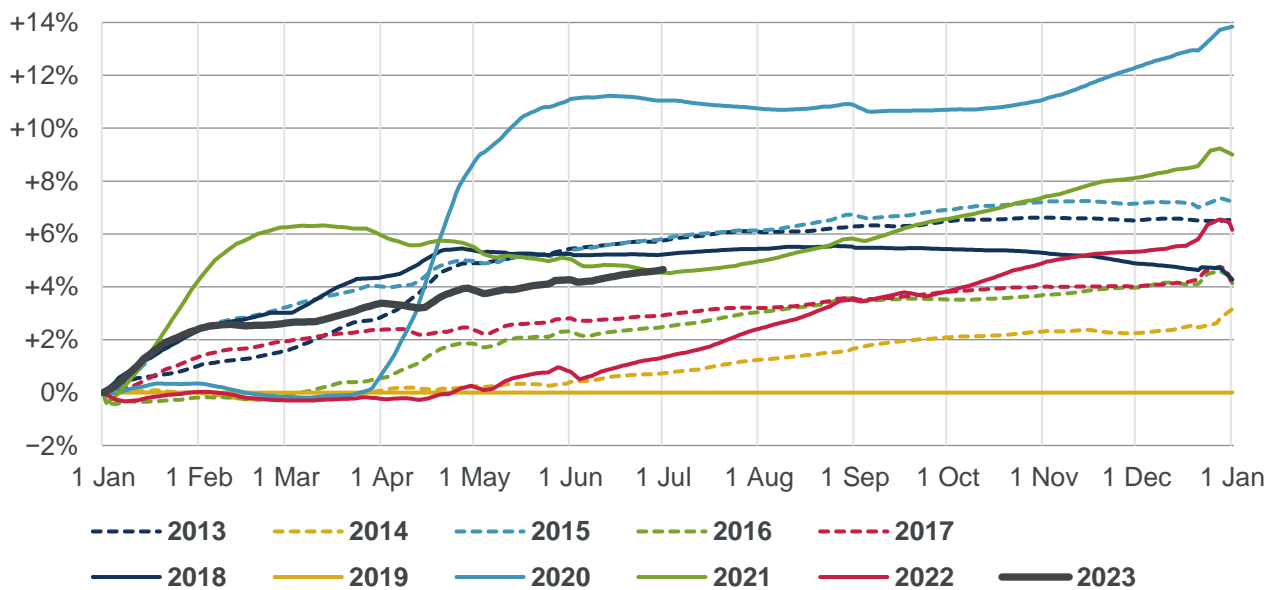


Chart 2 shows cumulative standardised mortality rates relative to 2019, as a proportion of mortality for 2019 as a whole<sup>1</sup>. Cumulative mortality to the end of Q2 2023 was 4.7% higher than in 2019.

**Chart 2: Cumulative standardised mortality rate compared to 2019**



<sup>1</sup> 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.

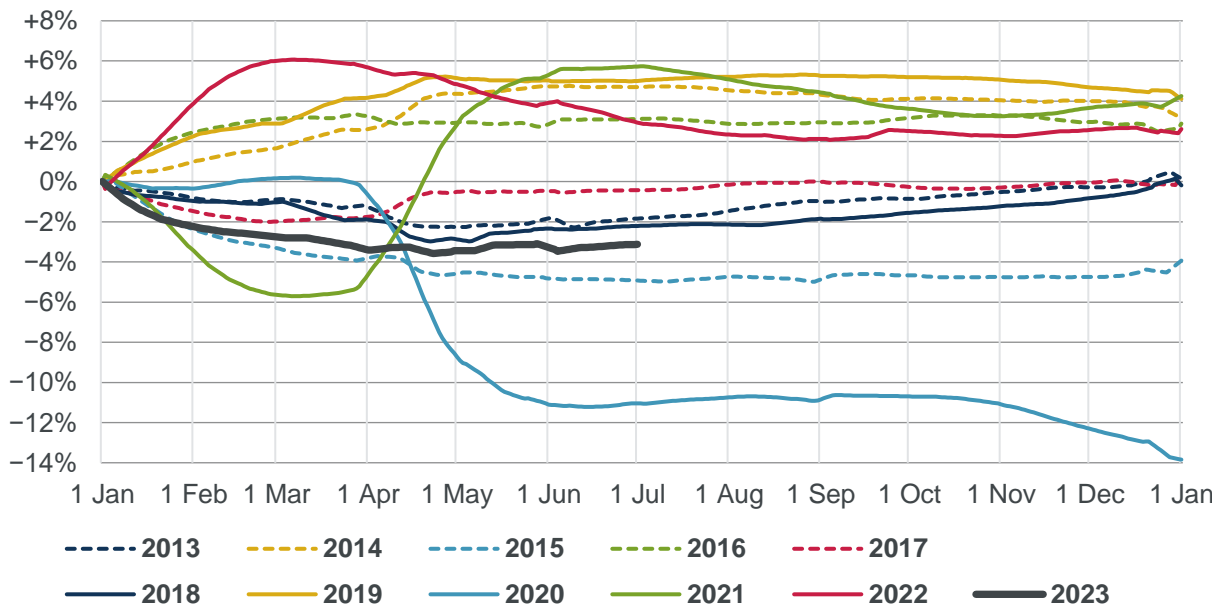


Chart 3 shows the cumulative annual standardised mortality improvement for 2023 and the previous ten years. The cumulative mortality improvement to the end of Q2 2023 was  $-3.1\%$ .

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 129 deaths registered during week 26 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 to the week 1 of 2023 monitor.

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 26 of 2023 compared to week 25 of 2023:

- Actual deaths in week 26 of 2023 were 452 higher than expected: 2% higher than expected for males and 7% higher than expected for females.
- In week 25 of 2023 deaths were 6% higher than expected: 7% higher than expected for males and 6% higher than expected for females.

**Table 1: Comparison of COVID-19 deaths and “excess” deaths**

Description	Week 26 of 2023			Week 25 of 2023
	Male	Female	Total	Total
“Expected” registered deaths	5,220	4,701	<b>9,921</b>	9,864
Actual registered deaths, from all causes	5,340	5,033	<b>10,373</b>	10,472
“Excess” registered deaths (actual minus expected)	120	332	<b>452</b>	608
Registered deaths where COVID-19 was mentioned on the death certificate	69	60	<b>129</b>	154
Excess as a proportion of expected	2%	7%	<b>5%</b>	6%



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.

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

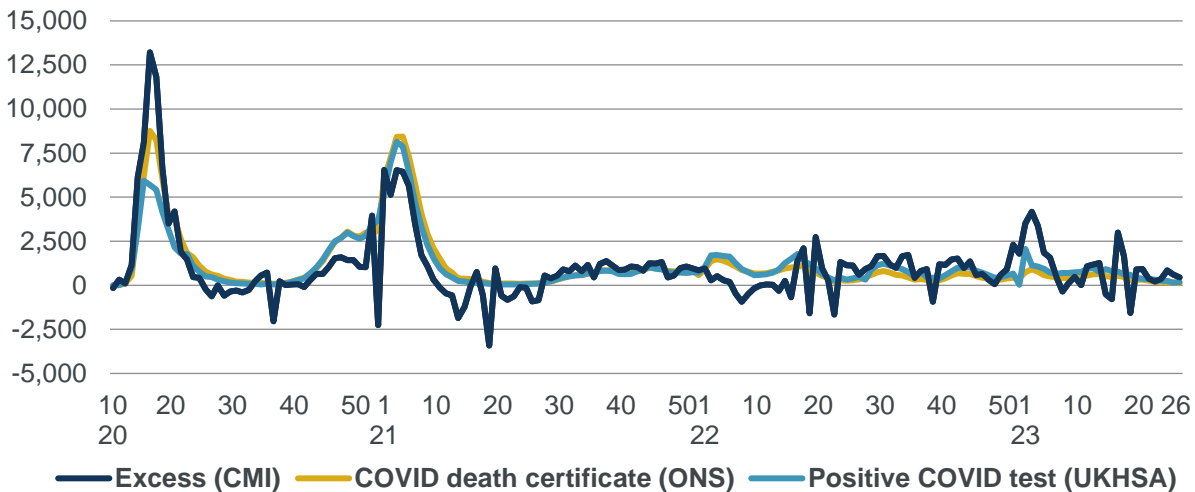
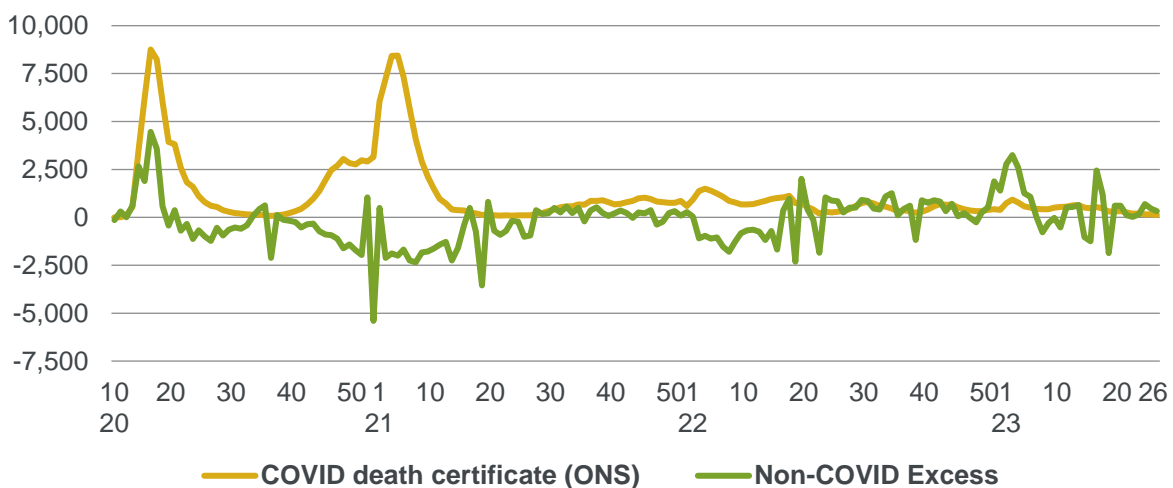


Chart 5 shows the split of excess deaths into deaths where COVID-19 was mentioned on the death certificate and “Non-COVID excess” (i.e. excess deaths minus deaths with COVID-19 mentioned on the death certificate). For most of the period, the Non-COVID excess has tended to be negative; i.e. deaths from 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 and in recent weeks.

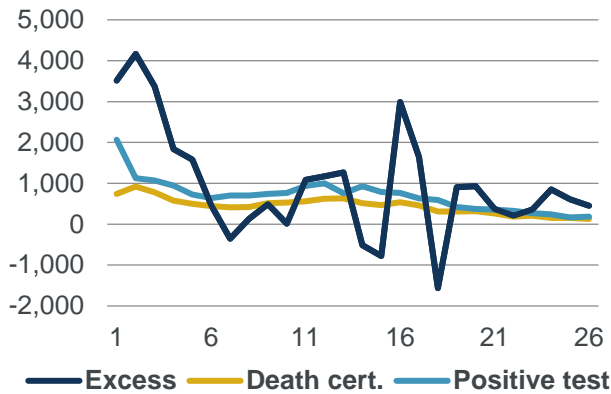
**Chart 5: Split of Excess deaths into COVID and Non-COVID Excess**





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**

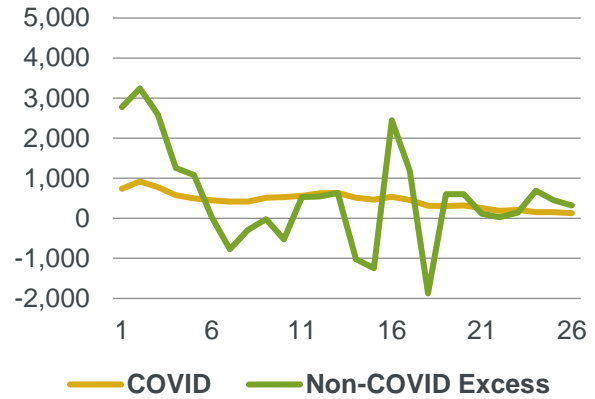
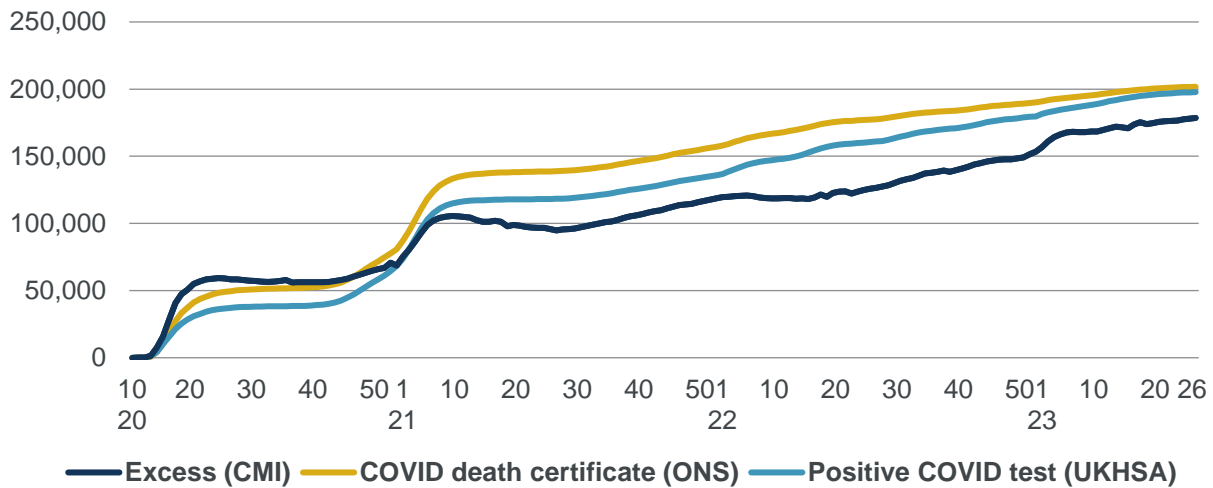


Chart 6 is similar to Chart 4, but shows cumulative numbers of deaths since week 10 of 2020. In the earlier part of the period shown, the cumulative number of excess deaths from all causes was higher than both the cumulative number of deaths where COVID-19 was mentioned on the death certificate, and 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. Excess deaths as a proportion of expected were higher for the 85+ older age group at the start of 2023 but the pattern by age is less clear for 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)

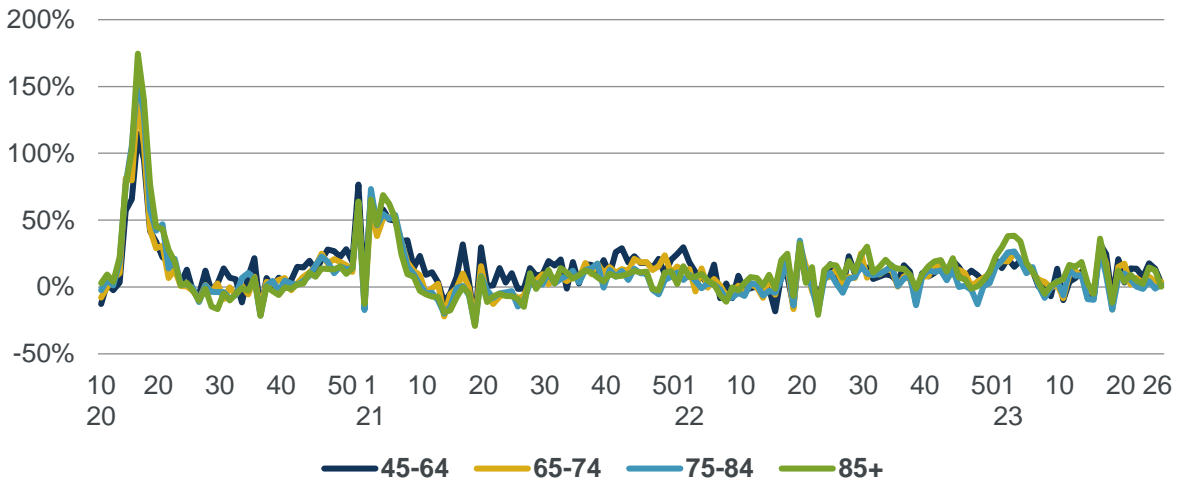


Chart 8: Excess as a proportion of expected in each week – females (see text for details)

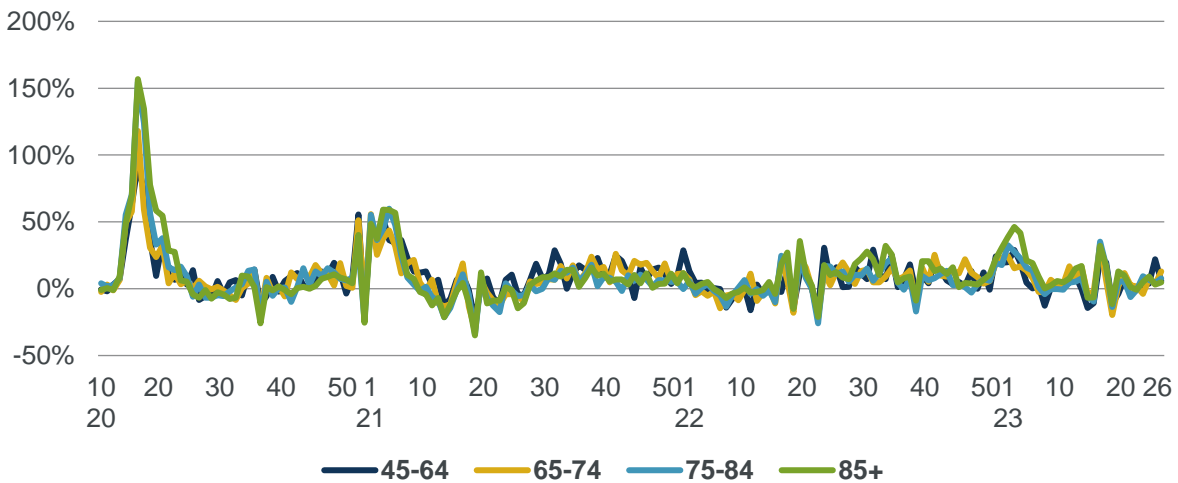


Chart 7B: Recent detail of Chart 7 – males

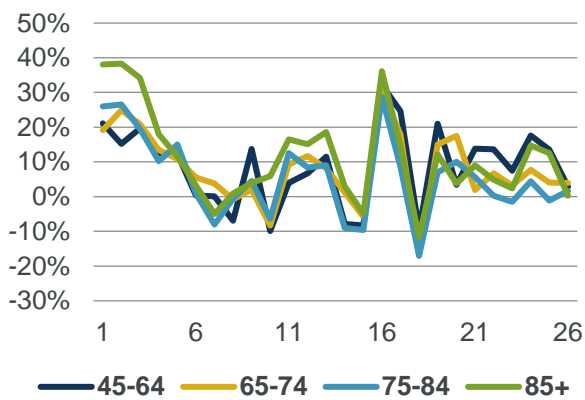
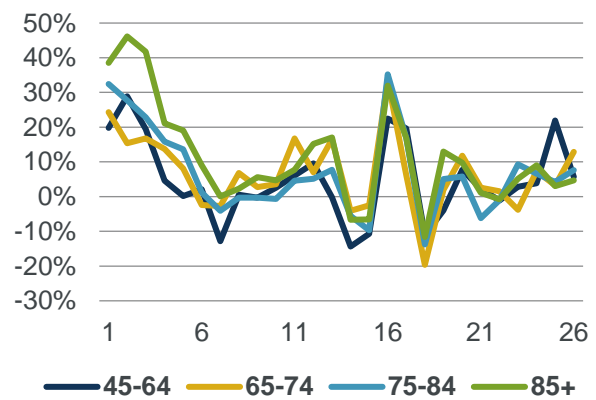


Chart 8B: Recent detail of Chart 8 – females





## Results – Excess deaths for the United Kingdom

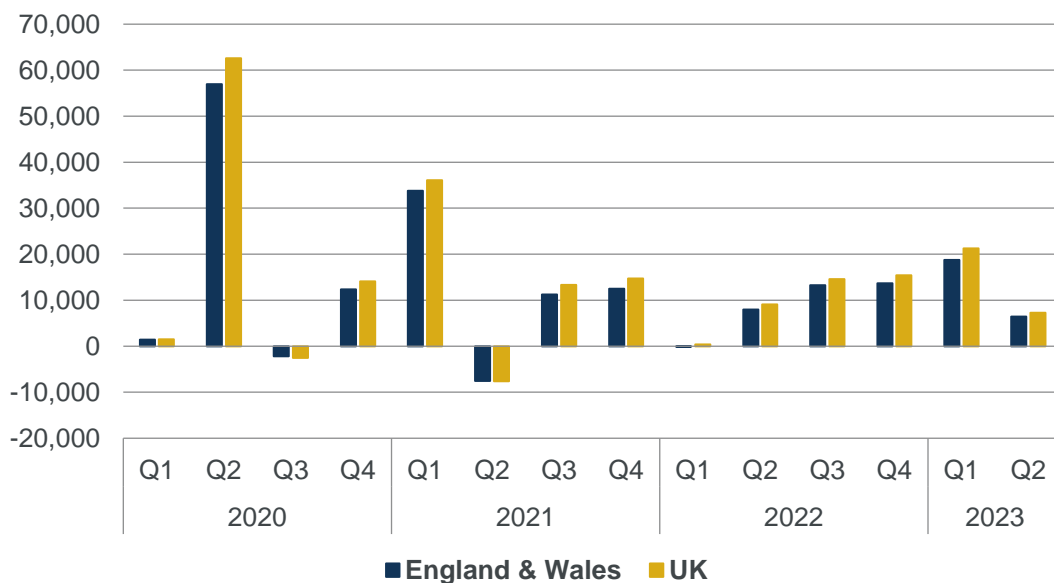
The previous sections of this report are based on registered deaths data for England & Wales to 30 June 2023, published by the ONS. In this section we extend our analysis to the United Kingdom as a whole.

We estimate that the numbers of excess deaths from the start of the pandemic to 30 June 2023 are:

- 178,500 for England & Wales<sup>2</sup>; and
- 200,100 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 2 shows the split by calendar year.

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



**Table 2: Annual excess deaths**

Year (weeks)	England & Wales	United Kingdom
2020 (10-53)	+68,600	+75,600
2021 (1-52)	+50,000	+56,500
2022 (1-52)	+34,800	+39,400
2023 (1-26)	+25,200	+28,500

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.

<sup>2</sup> 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 1 – Death registrations and occurrences

The calculations in the mortality monitor are based on the number of deaths registered in a period, rather than the number of deaths that occurred. This appendix considers how analysis based on the two measures may differ.

Our analysis is based on [ONS data](#) since 2020. This does not have the same level of detail by age or gender as the registrations data we use for the mortality monitor so we have restricted our analysis to considering death counts rather than SMRs. This should not be a material limitation if our focus is on how occurrences and registrations compare over short periods during which populations should not change greatly.

The analysis includes data from week 10 of 2020, the point from which we calculate cumulative measures in the mortality monitor, to week 26 of 2023, the latest available.

Chart 10 shows the weekly numbers of deaths based on occurrences and registrations. While they have a similar broad pattern over time:

- registrations tend to be more volatile than occurrences, as deaths cannot be registered if register offices are closed due to public holidays; and
- peaks for registrations tend to be later than the corresponding peaks for occurrences.

**Chart 10: Weekly deaths – occurrences and registrations**

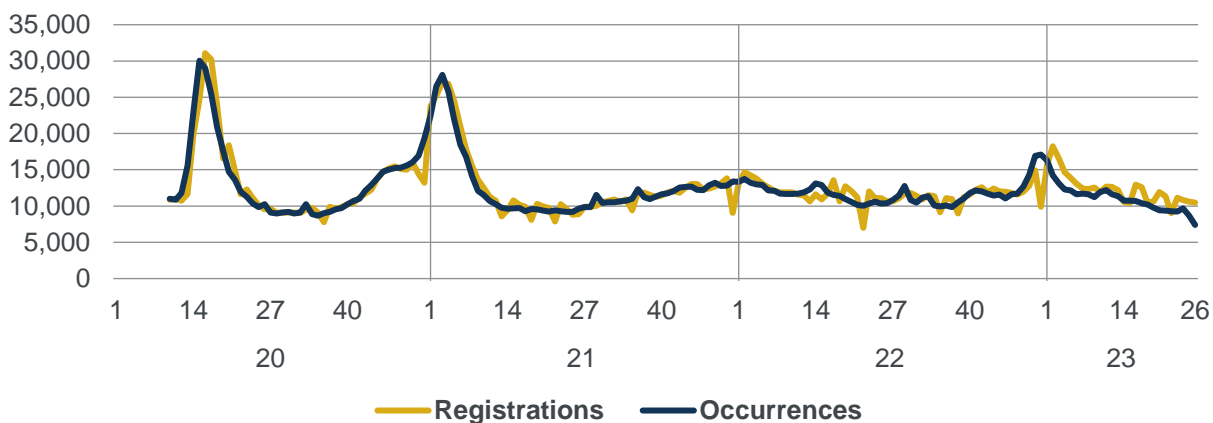


Chart 11 shows the difference between occurrences and registrations (occurrences minus registrations). The differences are greatest for weeks around the two pandemic peaks and at the end of 2021 and the end of 2022. Of these, the biggest difference is at the end of 2022. The second quarter of 2023 shows a persistent negative difference (occurrences less than registrations) suggesting that a material number of deaths that occurred during that period had not been reported by the time the data was published.

**Chart 11: Weekly deaths – occurrences minus registrations**

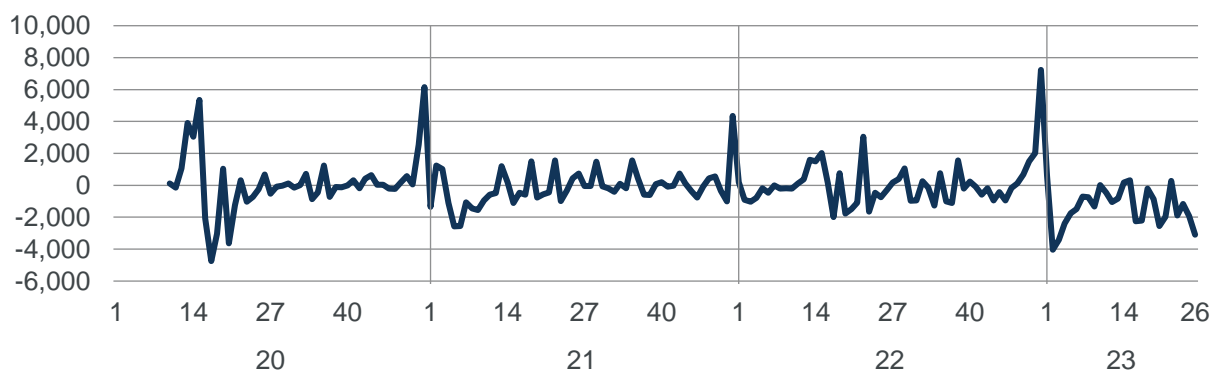
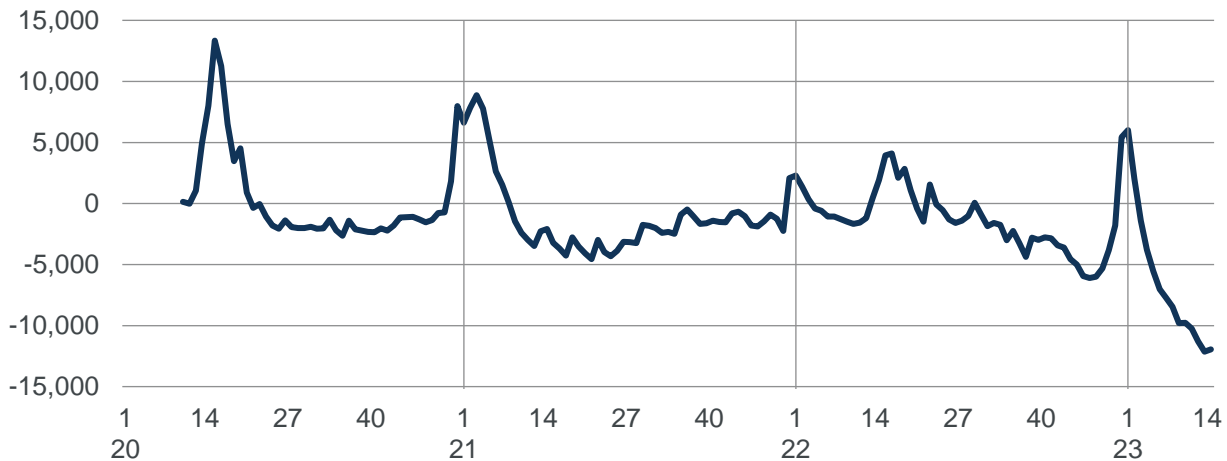




Chart 12 shows the cumulative difference (since week 10 of 2020) between occurrence and registrations. This is close to zero for much of the period, but shows bigger changes for the two pandemic peaks and at the end of 2022. **The fall in the cumulative figure towards the right of the chart is due to deaths which have occurred but not been registered yet.**

**Chart 12: Weekly deaths – cumulative occurrences minus registrations**



The difference between occurrences and registrations was particularly great around the end of 2022. This means that a significant proportion of the excess mortality for 2023 shown in Chart 2 (on a registrations basis) took place in late December (on an occurrences basis).

- This may be helpful to note when forming a view on likely excess mortality to the end of 2023.
- Whether excess mortality falls in the end of one calendar year or the start of another might not have much impact on the CMI Model if equal weight was placed on each year. But the timing of excess mortality might have a bigger impact on the results of CMI\_2023 if we place more weight on data for 2023 than on data for 2022.



## Appendix 2 – Impact of the 2021 census on results

Our previous mortality monitor calculations have not taken account of the impact of the 2021 census in England & Wales on views of mortality rates and improvements. For the first time, this version of the mortality monitor does make allowance for the 2021 census. We have updated the results to use the same dataset as the latest version of the CMI Mortality Projections Model, CMI\_2022.

We note that the ONS expects to published its revised mid-year population for mid-2012 to mid-2020 in September 2023. This will use a more detailed method and more detailed data to assess the 2012 to 2020 population than the CMI\_2022 dataset that we use for this monitor. We intend to analyse the impact of the ONS dataset on the mortality monitor once it is available.

This appendix provides an indication of the impact of updating the dataset used for the monitor by comparing:

- the results in the body of this mortality monitor, which make allowance for the impact of the census, using the CMI\_2022 dataset; and
- illustrative results, which use the same method but the dataset used for earlier mortality monitors that do not allow for the impact of the census on population estimates.

### Datasets

When calculating the mortality rate for a specific week, we need to estimate the population for that week. We do so by interpolating between the mid-year populations estimates either side of that week. For example, our calculations for results in the first half of 2023 require us to interpolate between the mid-2022 and mid-2023 populations. The ONS has not yet published estimates for these years, so we need to make our own estimate, based on ONS data for deaths and populations in earlier years.

For previous versions of the mortality monitor we followed the principle, set out in Working Paper 111 when we consulted in the first mortality monitor, that “once rates have been published, they will not be restated”. While the change to the dataset that we are making now is contrary to that principle, we think the change is clearly in the interest of users of the monitor.

Because of the previous principle of not restating published rates:

- The “previous” monitor dataset, used for the calculations in earlier mortality monitors, make no allowance for the impact of the 2021 census; and
- Populations for recent years in that dataset do not match ONS estimates published subsequently. For example, the mid-2020 population in the monitor dataset was estimated before the ONS published its estimate for mid-2020 and has not been revised since.

Results in this mortality monitor are based on a “new” dataset, which is consistent with the data that was used to calibrate the latest version of the CMI Mortality Projections Model, CMI\_2022, which was published alongside [Working Paper 177](#) which is restricted to Authorised Users. The new dataset is based on the [mid-2021 population published by the ONS](#) in December 2022 so does allow for the impact of the 2021 census, although we have had to make our own estimates for 2022 and 2023.

Because the ONS has not yet published its revised population estimates for 2012 to 2020, we have made our own estimates for these years, taking into account the ONS estimate for 2021. We note in Working Paper 177 that: “We have consciously taken a simple and pragmatic approach and recognise that [our] approach may not reflect changes to mortality and migration in light of the pandemic and Brexit. The ONS approach is likely to be more detailed and differ from ours, mainly due to the ONS having access to additional non-public information regarding migration and more granular data in respect of the census and deaths.”

### Results

This section shows the results from a version of the mortality monitor that uses the “previous” dataset and comparisons these to results from the “new” dataset.

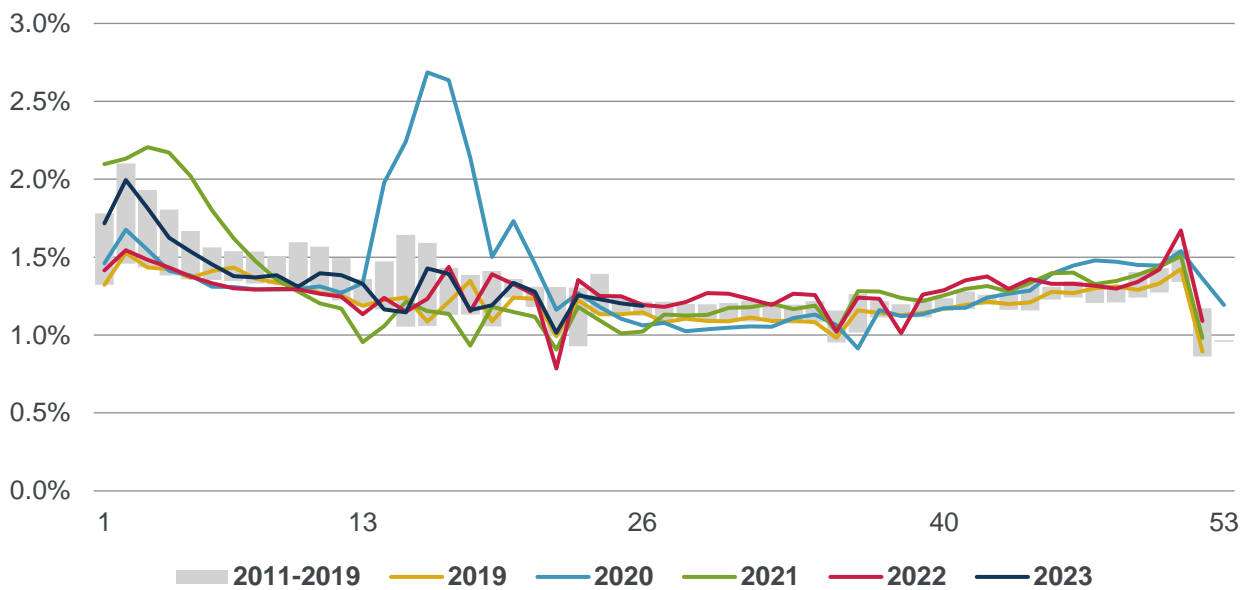


We emphasise that while results based on the new dataset provide an indication of how the 2021 census changes views of past mortality rates and improvements, we expect a further change in view once the ONS figures are available, as noted above.

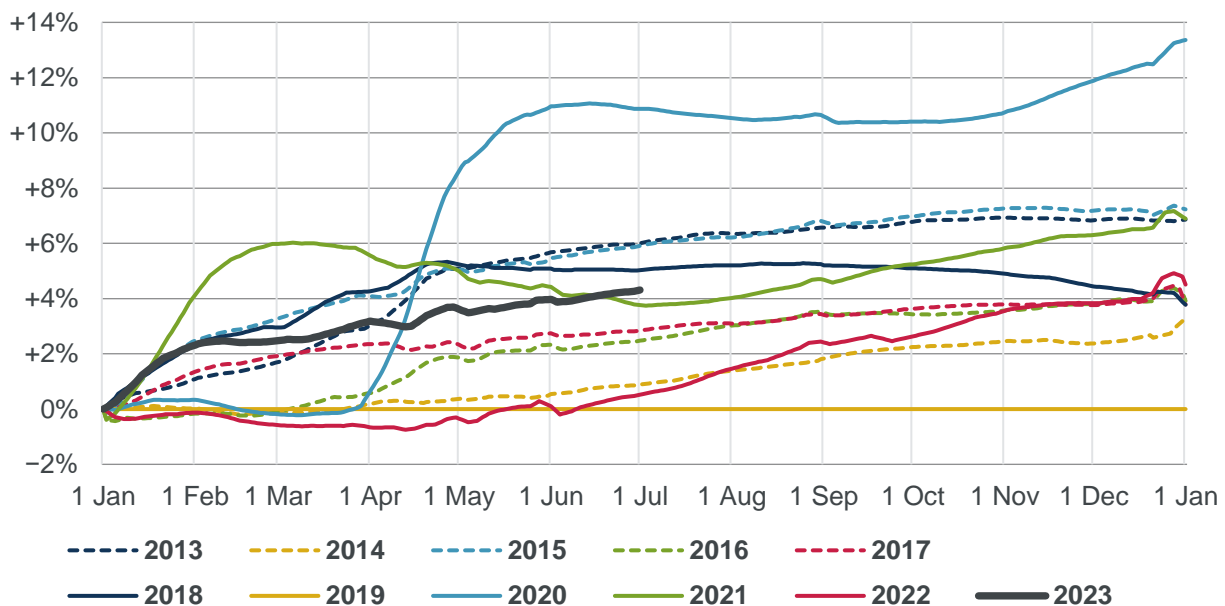
Chart 13 is a version of Chart 1, showing weekly standardised mortality rates, but using the previous dataset. The results are qualitatively similar to the version in the body of this monitor, which uses the new dataset, and differences are hard to distinguish by eye.

Chart 14 is a version of Chart 2, showing cumulative mortality rates relative to 2019. Differences in results between the two datasets are more apparent than for Chart 13, with the end-year figures for 2021 and 2022 being lower relative to 2019 in Chart 14 (using the previous dataset) than in Chart 2 (using the new dataset).

**Chart 13: (Like Chart 1) Weekly standardised mortality rates for 2011 to 2023 – using the previous dataset**



**Chart 14: (Like Chart 2) Cumulative standardised mortality rate compared to 2019 – using the previous dataset**

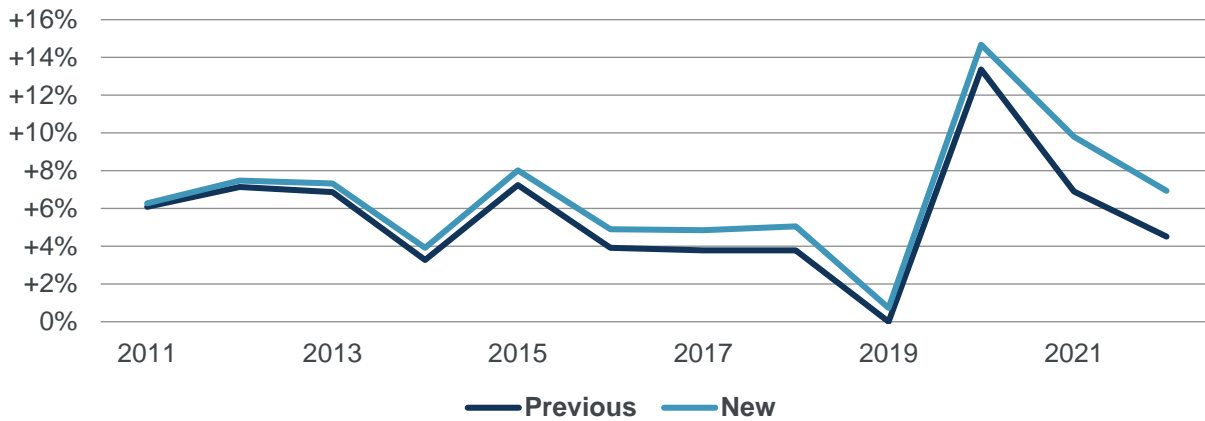




Charts 15 and 16 compare results from the two datasets directly to make the differences clearer:

- Chart 15 shows that the difference in SMRs relative to 2019 between the two datasets is also greatest in 2021 and 2022.
- Chart 16 shows that the difference in mortality improvements between the two datasets is greatest in 2021. All other years shown have a difference of 0.5% or less.

**Chart 15: Annual SMRs for 2011-2022, relative to 2019 – comparing new and previous datasets**



**Chart 16: Annual mortality improvements for 2011-2022– comparing new and previous datasets**

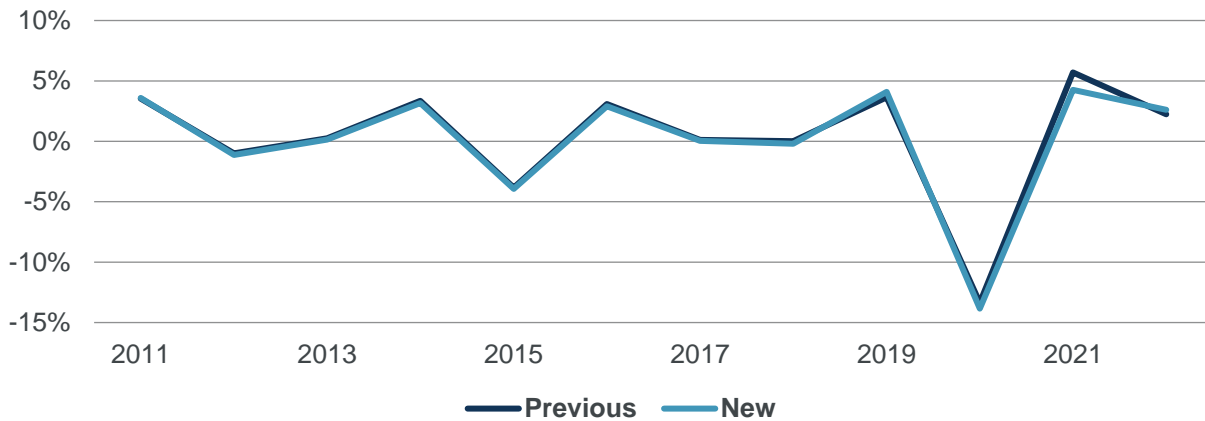




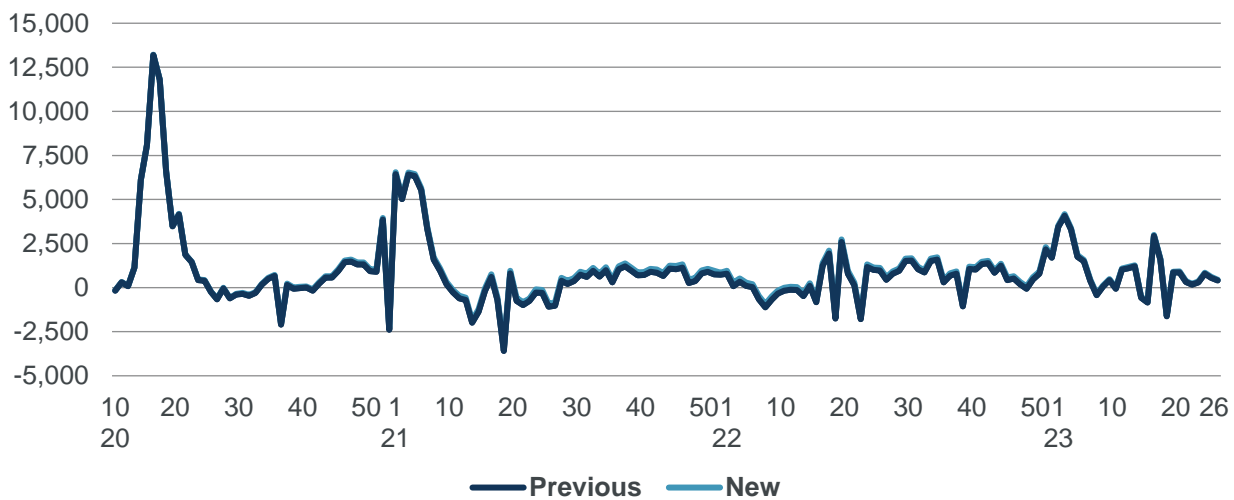
Chart 17 compares weekly excess mortality between the two datasets. The line for the new dataset is the same as in Chart 4. The weekly differences in excess between the two datasets are hard to see by eye. The new dataset leads to a higher excess in each week than the previous dataset with the difference ranging from 16 (at the start of the period) to 194 (near the end of 2021).

Chart 18 compares the cumulative excess between the two datasets since the start of the pandemic. The line for the new dataset is the same as in Chart 6. Although the weekly differences in Chart 17 are small, the cumulative difference for England & Wales is over 19,000.

Using the new dataset leads to a cumulative excess of:

- 178,500 for England & Wales, compared to 159,300 using the previous dataset; and
- 200,100 for the UK, compared to 178,100 using the previous dataset.

**Chart 17: (Like Chart 4) Weekly excess mortality – comparing new and previous datasets**



**Chart 18: (Like Chart 6) Cumulative excess mortality – comparing new and previous datasets**

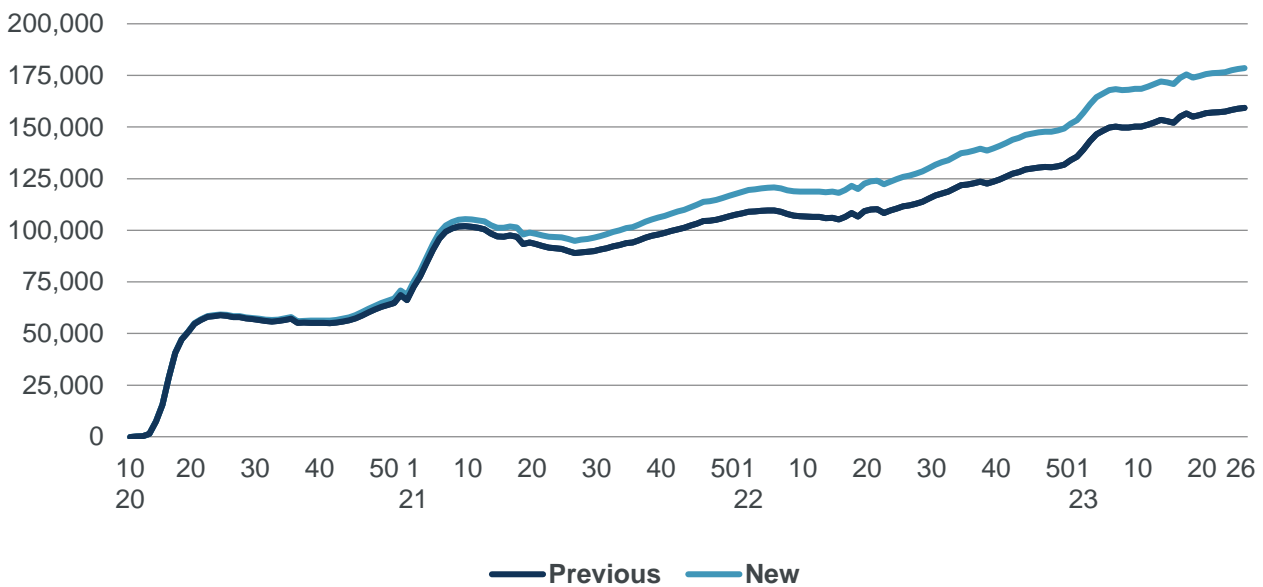






Chart 19 compares the cumulative standardised mortality improvement between 2019 and 2023 between the two datasets. Using the previous dataset leads to a cumulative improvement at 30 June 2023 of -4.3% rather than -4.7% when using the new dataset. The difference between them is nil at the start of the year, by definition, and has grown fairly steadily through the year, so we would expect a larger difference between results for the two datasets at the end of the year.

**Chart 19: (Like Chart F of the Q2 2023 mortality monitor) Cumulative standardised mortality improvement between 2019 and 2023 – comparing new and previous datasets**



Table 4 compares the cumulative mortality improvement at 30 June 2023 between the two datasets for different age ranges. The difference is notably larger for the age 85+ age band than for other ages.

**Table 3: (Like Table 3 of the Q2 2023 mortality monitor) Cumulative mortality improvement at 30 June 2023 by age band, comparing datasets**

Dataset	0–64	65–84	85+	20–100	20–44	45–64	65–74	75–84
Previous	-2.9%	-3.0%	-4.6%	-3.6%	-4.2%	-2.5%	-3.0%	-2.9%
New	-2.8%	-2.8%	-3.6%	-3.1%	-4.1%	-2.4%	-2.9%	-2.7%
Difference	+0.1%	+0.2%	+1.0%	+0.5%	+0.1%	+0.1%	+0.1%	+0.2%



## 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.
- While the results allow for the 2021 census data published to date by the ONS, populations for years after 2011 are our own estimates. The final revised estimates published by the ONS are due in September 2023.

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