



CMI mortality monitor – week 52 of 2023

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

This update is for week 52 of 2023, ending on 29 December 2023 and published on 9 January 2024. The [CMI website](#) has details of the calculation methods and previous updates.

The mortality monitor now makes allowance for revised population estimates following the 2021 census, published in November 2023. Appendix 1 has further information.

Results are based on the date of registration of deaths. Using date of occurrence would give different results, particularly since late 2022. Appendix 2 discusses this and estimates the impact.

Appendix 3 reminds users of our intention to stop calculating excess deaths after week 1 of 2024.

Table 1: Deaths registered in England & Wales in week 52 of 2023

	Male	Female	Total
“Expected” registered deaths (based on week 52 of 2019)	3,854	4,189	8,043
Actual registered deaths, from all causes	3,649	3,798	7,447
Excess deaths (and as a percentage of expected)	-205 (-5%)	-391 (-9%)	-596 (-7%)
Mentions of COVID-19 on the death certificate	106	75	181

Table 2: Cumulative excess deaths

	England & Wales	United Kingdom
From the start of the pandemic (29 Feb 2020 to 29 December 2023)	155,400	173,600
From week 1 of 2023 (31 Dec 2022 to 29 December 2023)	19,600	22,000

Chart 1: Weekly standardised mortality rates in England & Wales for 2012 to 2023

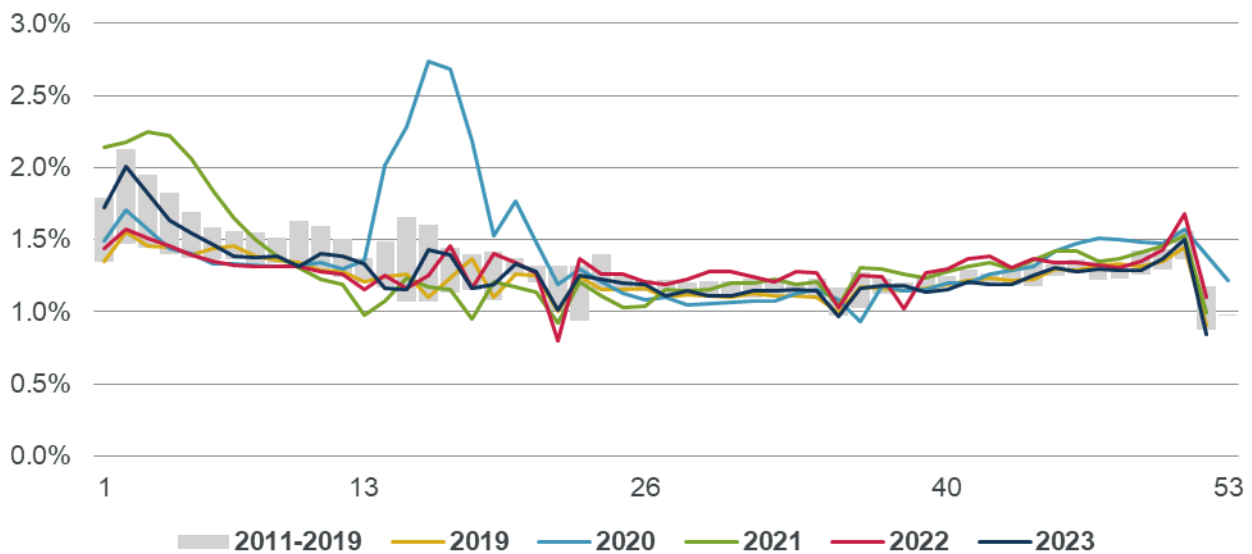




Chart 2: Weekly excess deaths and deaths with COVID on the death certificate – in the past 26 weeks

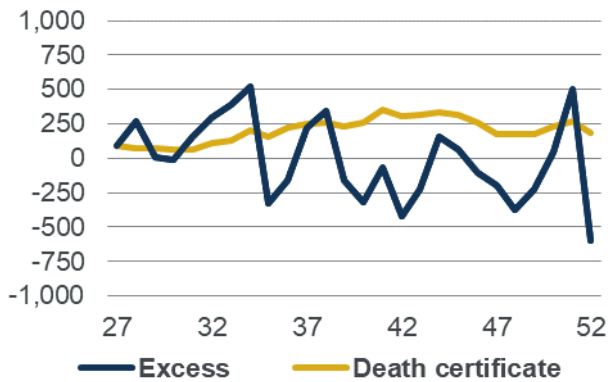


Chart 3: Weekly COVID deaths and Non-COVID excess (Excess minus COVID deaths) – in the past 26 weeks

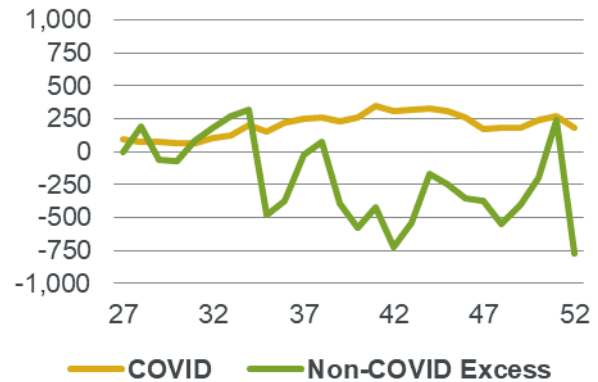


Chart 4 shows cumulative standardised mortality rates relative to cumulative mortality in 2019, as a proportion of mortality for 2019 as a whole. We use 2019 as the comparator as this is consistent with the excess deaths calculation above.

Under this measure, cumulative standardised mortality to week 52 of 2023 is 3.6% above 2019.

Chart 4: Cumulative standardised mortality rate compared to 2019

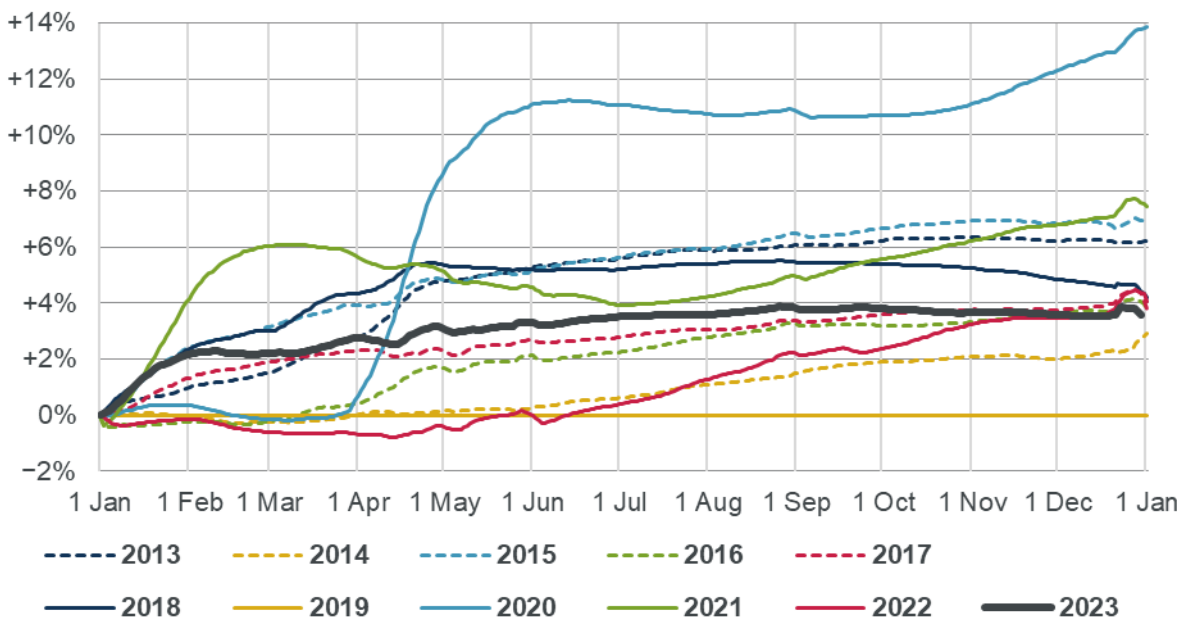
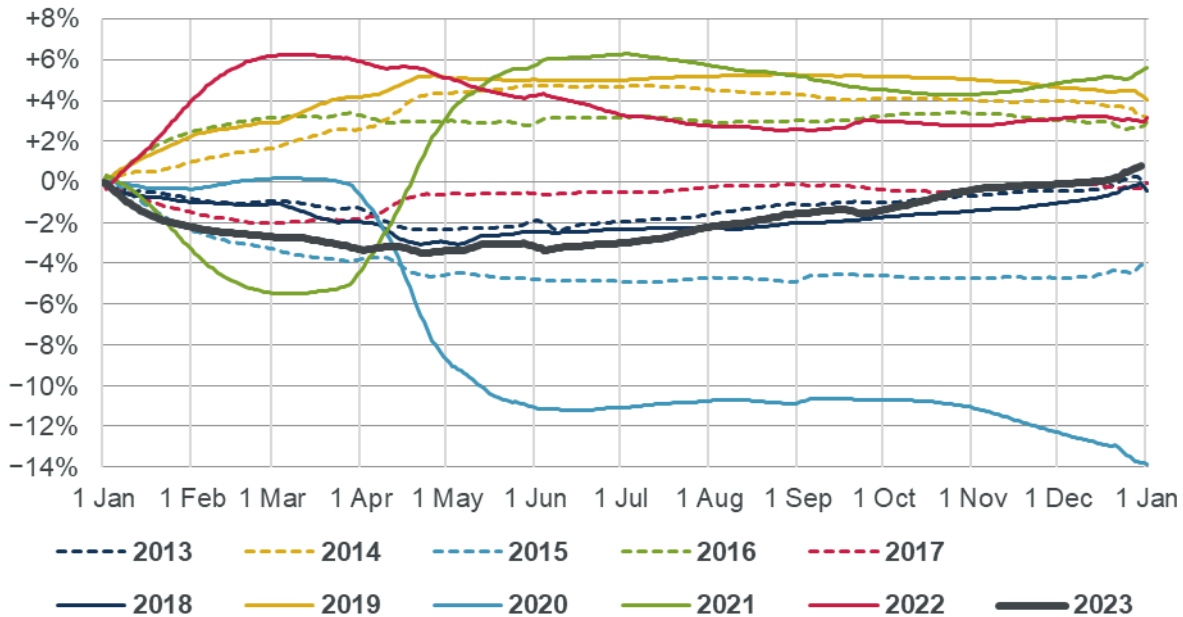


Chart 5 shows the cumulative annual standardised mortality improvement for 2023 and the previous ten years. The cumulative improvement for year N is the reduction in cumulative mortality from year N-1 to year N, as a proportion of full-year mortality for year N-1.

The cumulative mortality improvement to week 52 of 2023 (relative to 2022) is +0.8%.

The cumulative mortality improvement between 2019 and 2023 is -3.6% to week 52 of 2023.

Chart 5: Cumulative annual standardised mortality improvement



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/statistics/death-statistics/weekly-death-registrations-northern-ireland>

Notes on method and data

Full details of the methods used for results based on the ONS data were originally published 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).

We have revised the population data used to produce the mortality monitor. We have also revised our approach to ONS deaths data – using more granular age bands for 2022 onwards, and refining our approach for assigning deaths to single years of age. Appendix 1 describes the changes and the impact on results.

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.

The difference between occurrences and registrations of deaths was particularly great around the end of 2022. We discuss this, and further evidence that the pattern of registrations in 2023 differs from earlier years, in Appendix 2.



Our calculations of excess and expected deaths are based on mortality in 2019. The monitor for week 1 of 2023 has further information on our choice of 2019 and Appendix 3 reminds users of our intention to stop calculating excess deaths after week 1 of 2024.

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 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.

Reliances and limitations

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

The mortality monitor reports on all-cause and COVID-19 mortality. It does not offer any view on other causes of death or reasons for changes in mortality rates.

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 are unable to quantify the impact on the results of the monitor of any future revisions to provisional data.
- 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.
- Population estimates for the latest years reflect our own estimates and are less certain than published ONS figures for earlier years.



Appendix 1 – Impact of updated population estimates on results

Versions of the mortality monitor from week 26 of 2023 to week 51 of 2023 made approximate allowance for the impact of results of the 2021 census in England & Wales on views of mortality rates and improvements. Those versions used the same dataset as the latest version of the CMI Mortality Projections Model, CMI_2022. The dataset was based on an estimate of the mid-2021 population published by the ONS and the CMI's estimate of implied revisions to the populations from mid-2012 to mid-2020.

We have further updated the dataset used for the mortality monitor to reflect:

- the ONS's own estimates of the mid-2012 to mid-2020 populations;
- the ONS's revised estimates of the mid-2021 population;
- the ONS's estimate of the mid-2022 population;
- our own revised estimates of the mid-2023 and mid-2024 populations; and
- changes to the way we allocate age-grouped deaths for 2020 onwards to single years of age.

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

- the results for week 52 of 2023 in the body of this mortality monitor, using the “new” population estimates; and
- illustrative results based on the “previous” population estimates used for monitors for weeks 26 to 51 of 2023.

Results

Chart 6 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 7 is a version of Chart 4, showing cumulative mortality rates relative to 2019. Differences in results between the two datasets are more apparent than for Chart 6, with the end-year figures for 2021 and 2022 being higher relative to 2019 in Chart 7 (using the previous dataset) than in Chart 4 (using the new dataset).

Chart 6: (Like Chart 1) Weekly standardised mortality rates for 2011 to 2023 – using the previous dataset

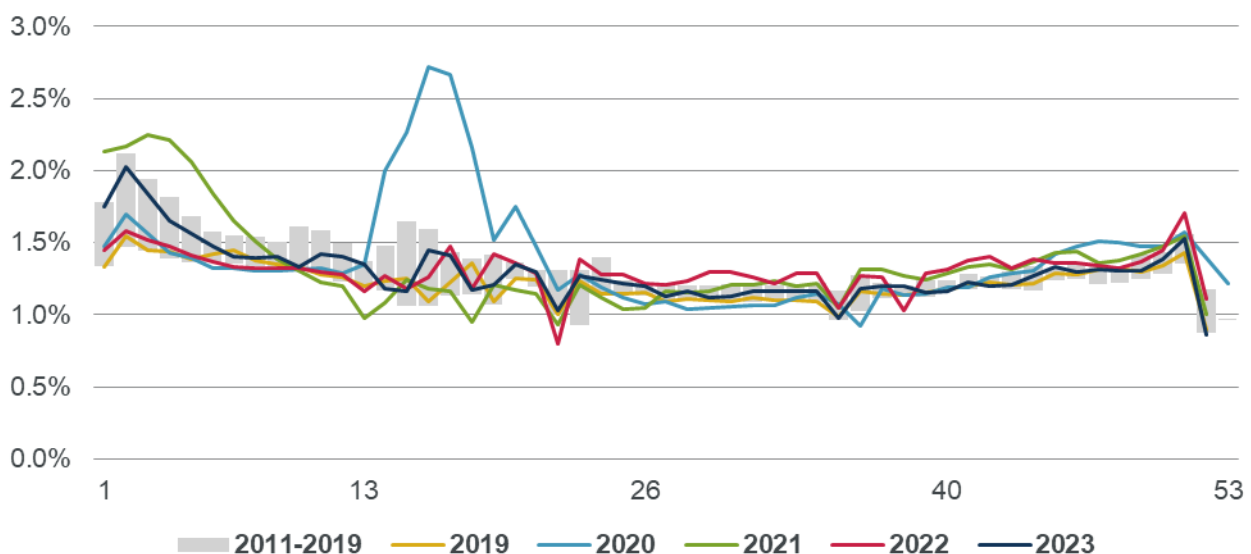




Chart 7: (Like Chart 4) Cumulative standardised mortality rate compared to 2019 – using the previous dataset

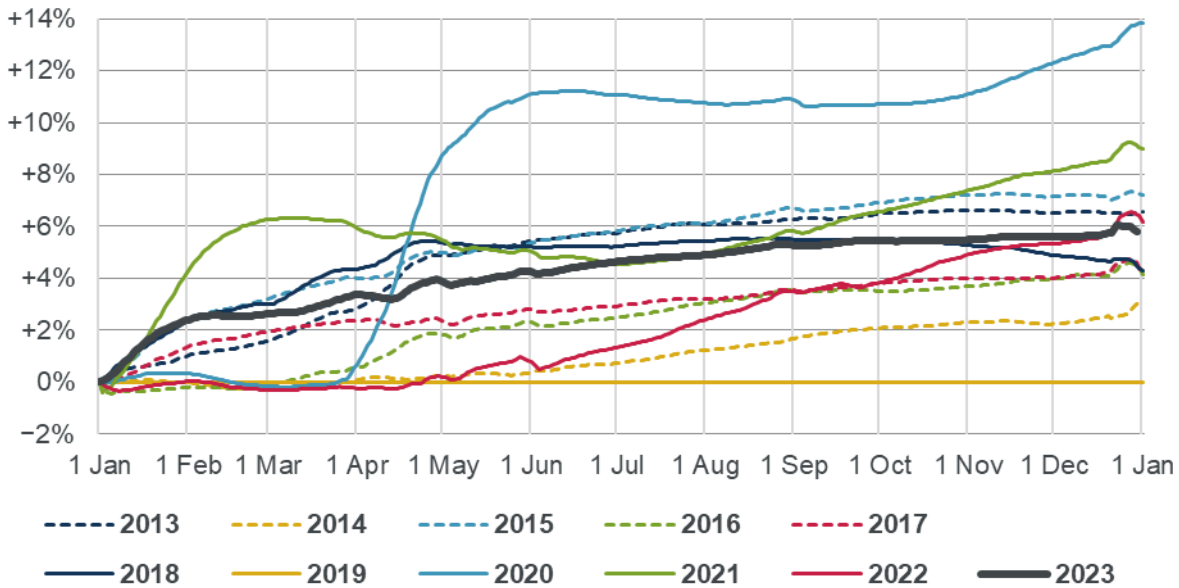


Chart 8 compares full year cumulative standardised mortality rates compared to 2019 from the two datasets directly to make the differences clearer. It shows that the difference in SMRs relative to 2019 between the two datasets is greatest in 2021, 2022 and 2023.

Chart 8: Annual SMRs for 2011-2023, relative to 2019 – comparing new and previous datasets. (The figure for 2023 is to 29 December.)

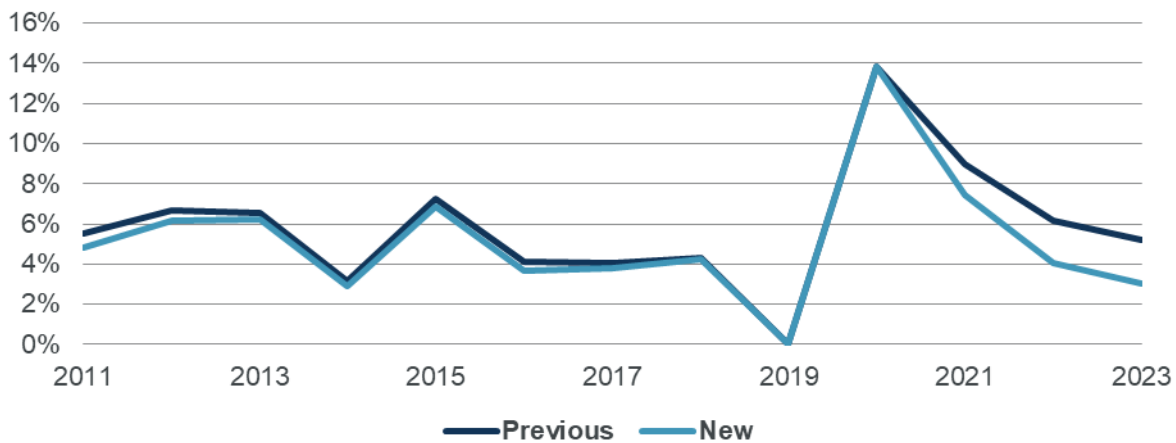




Chart 9 compares weekly excess mortality between the two datasets. The weekly differences in excess between the two datasets are hard to see by eye. The new dataset leads to a lower excess in most weeks than the previous dataset with the difference being up to 281 (in week 51 of 2023).

Chart 10 compares the cumulative excess between the two datasets since the start of the pandemic. Although the weekly differences in Chart 12 are small, the cumulative difference for the UK is over 32,000 and for England & Wales is over 28,000.

Using the new dataset leads to a cumulative excess of:

- 155,400 for England & Wales, compared to 184,000 using the previous dataset; and
- 173,600 for the UK, compared to 206,300 using the previous dataset.

The change is primarily due to changes to population estimates rather than changes to the way we allocate age-grouped deaths for 2020 onwards to single years of age. The UK cumulative excess changes by 28,000 due to mid-year populations and 4,700 due to how we allocate deaths.

Chart 9: Weekly excess mortality – comparing new and previous datasets

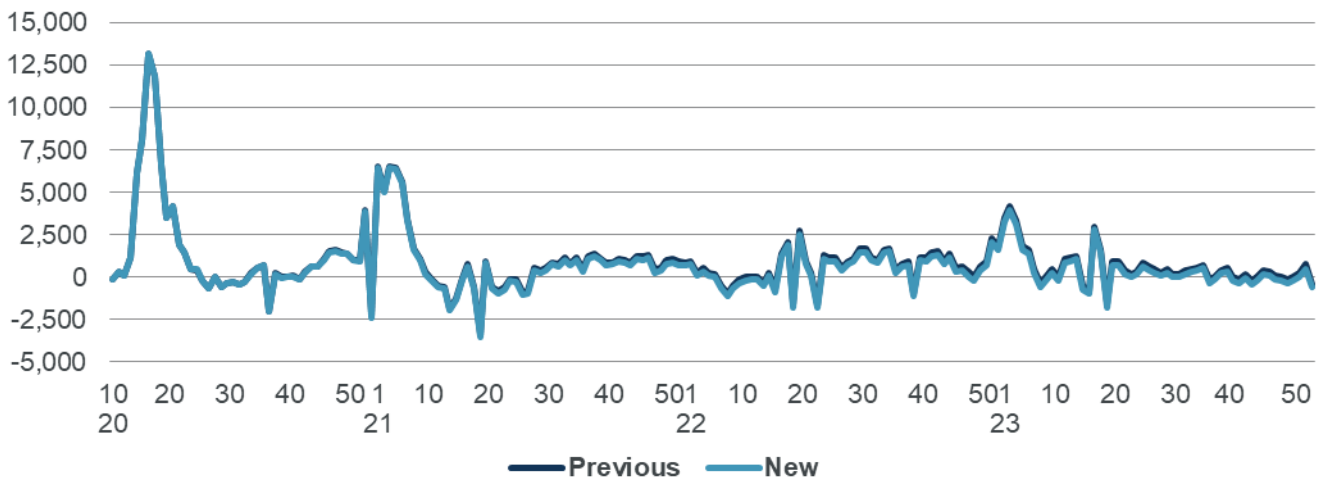
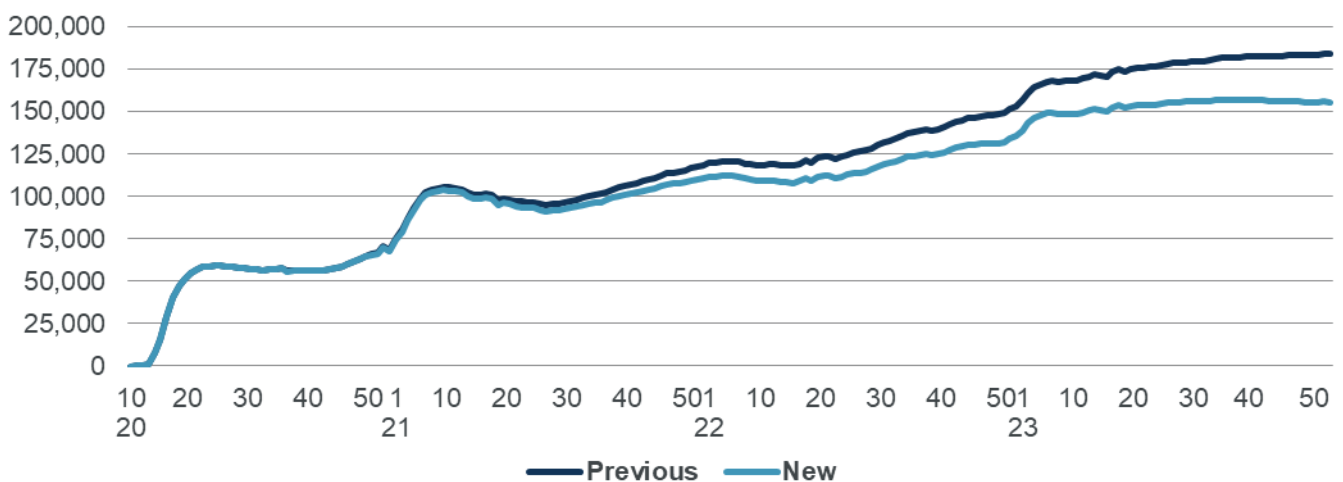


Chart 10: Cumulative excess mortality – comparing new and previous datasets





Appendix 2 – Estimated results on an occurrences basis

This appendix considers how the results of the monitor for England & Wales would differ if they were based on death occurrences rather than death registrations. It largely reproduces the appendix from the monitor for week 39 of 2023. We have not updated the analysis as the ONS has not published updated monthly occurrences data, and the analysis has not been updated to reflect the revised population estimates published by the ONS in November 2023.

Occurrences, registrations, and delays

Deaths data for a particular time period can be based on “occurrences” (when the deaths occurred) or based on “registrations” (when the death was registered).

There is typically a “registration delay” between the date of occurrence and date of registration. The registration delay is often short, as UK deaths should be registered within five days unless referred to a coroner, but delays of several years are possible in some cases.

Why we use registrations

The number of deaths in a period on an occurrences basis is uncertain for some time after that period due to registration delays. While it is possible to estimate the number of occurrences sooner, based on typical registration delays, these estimates are themselves uncertain.

Registrations are a timely and reasonable proxy for occurrences, as long as registration delays are stable, or reasonably stable, over time.

The mortality data published weekly by the ONS provides much more detail on a registrations basis than on an occurrences basis. The registrations data provides splits by gender and five-year age band, while the occurrences data only provides a total figure.

Registration delays

Chart 11 shows registration delays in the month following occurrence, based on monthly data published by the ONS¹. For deaths occurring in each month, we show the number of deaths registered in the following month as a percentage of the number registered within the month of occurrence. For example, data to the end of December 2022 shows 48,164 deaths occurring in December 2022, while data to the end of January 2023 shows 61,286 deaths occurring in December 2022, which is 27% higher. A higher percentage indicates a longer delay in registering deaths.

Chart 11: Registration delays in the month following occurrence – see text for details



The chart shows a fairly steady pattern for the first half of the period, but with the registration delay drifting upwards. The pattern changes dramatically in the later months shown, with large registration delays in December 2022, March 2023, and April 2023.

¹ <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/datasets/monthlymortalityanalysisenglandandwales>

We have also looked at registration delays for later periods (e.g. between the following month and three months later, or between three months later and a year later). These delays are smaller and show a more stable pattern, without the sharp peaks of recent months.

Estimated recent occurrences and registrations

We have estimated the number of occurrences in each month based on the number of occurrences registered by 31 July 2023 with an allowance for a typical historical pattern of monthly registration delays after that point. These estimates are necessarily uncertain, particularly for more recent periods where registration delays form a larger proportion of the estimate.

Chart 12 compares monthly death registrations with our estimate of monthly occurrences. Registrations and estimated occurrences tend to show peaks and troughs at similar times, but there are some notable differences, particularly for December 2022.

Chart 12: Estimated occurrences and registrations

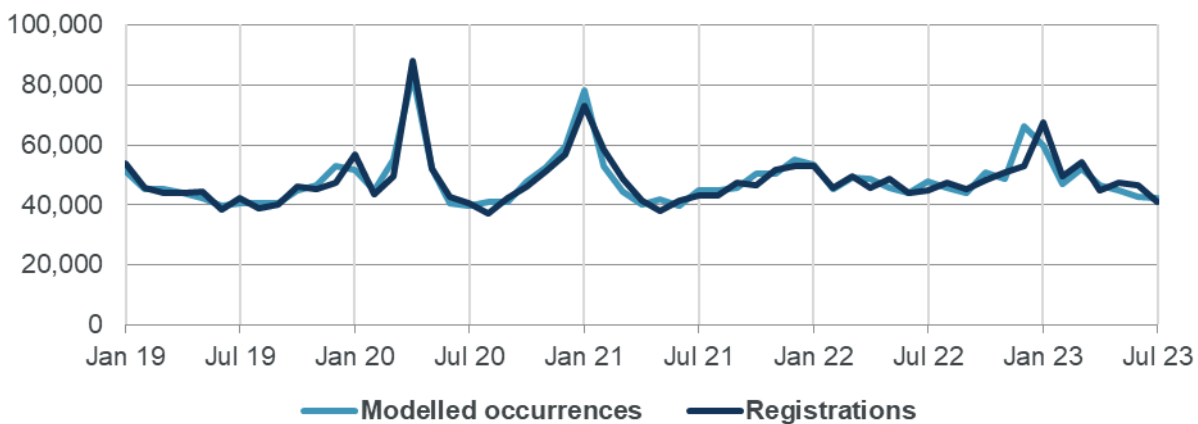


Table 2 considers the difference between modelled occurrences and registrations for calendar years 2019 to 2022 and for 1 January 2023 to 31 July 2023.

Table 2: Comparison of modelled occurrences and registration by year

Period	Modelled occurrences minus registrations		
	Number	Relative to 2019	Relative to 2019 (%)
2019	+4,800	-	-
2020	+1,600	-3,200	-0.6%
2021	+3,000	-1,800	-0.3%
2022	+13,400	+8,700	+1.6%
2023 – to 31 July	-16,200	-12,700	-2.4%

In 2019, 2020 and 2021 the difference between modelled occurrences and registrations was less than 1%. The differences are more material for 2022 and for 2023, due to the unusual registration delays shown in Chart 6.

We have not calculated ASMRs on an occurrences basis, due to a lack of detailed occurrences data by age and gender. If registration delays had the same impact on ASMRs as on deaths, then:

- The cumulative ASMR for 2022 relative to 2019, would be 1.6% higher, so around +5.7% rather than +4.1%.



- The cumulative ASMR for 2023 relative to 2019 would depend on the difference between registrations and occurrences after 31 July 2023. If the difference was the same as in the corresponding part of 2019, then the cumulative ASMR to date would be 2.4% lower, so around +1.2% rather than +3.6%.
- We emphasise that these figures are uncertain as we do not know how registration delays may have varied by age and gender, and what registration delays have been after 31 July 2023.



Appendix 3 – Stopping calculations of excess deaths

We currently publish two types of mortality monitor:

- We have published “quarterly” mortality monitors since Q4 of 2018.
- We introduced “weekly” monitors in April 2020 containing additional information on the impact of the COVID-19 pandemic. We currently publish a detailed version of the weekly monitor once a quarter and a summary version (like the body of this one) each week.

The weekly monitors currently include an estimate of excess deaths, comparing actual deaths to those that would have been expected if mortality rates had been the same as in the corresponding week of 2019. We propose:

- to retain the current format of weekly mortality monitors up to and including week 1 of 2024 (the next detailed weekly monitor); but
- not to include any measure of expected or excess deaths in the weekly monitor after then.

We do not intend to change the content of quarterly monitors at that time.

Our measure of excess deaths was informative during the earlier part of the pandemic, but the comparison to mortality in 2019 has become less relevant over time as mortality is affected by a range of factors and we would typically have expected mortality rates to reduce over time in the absence of the pandemic.

We will still include standardised mortality rates in the monitor, so users will be able to see how mortality in each year compares, but we will stop making the comparison to 2019 such a prominent feature of our outputs.

We propose to have a single format for weekly monitors in 2024, as the current differences in content between the detailed and summary weekly monitors all relate to excess deaths in some way. The proposed content is shown below where the first chart number corresponds to the current summary monitor and the number in brackets corresponds to the current detailed monitor:

- Chart 1 [1] – In its current format
- Chart 4 [2] – Amended to show results relative to the ten-year average (e.g. 2014-2023 in the 2024 monitors) rather than 2019. The purpose of showing relative mortality rather than absolute mortality is to make it easier to make comparisons between years, and the choice of comparator does not affect the relative level of mortality in different years. We emphasise that we will use the ten-year average for simplicity and consistency with the quarterly monitor and it is not intended to be a measure of “expected” or “normal” mortality.
- Chart 5 [3] – In its current format



Disclaimer: This document has been prepared by and/or on behalf of Continuous Mortality Investigation Limited (CMI). The CMI does not accept any responsibility and/or liability whatsoever for the content or use of this document. Whilst care has been taken during the development of the document, CMI does not (i) warrant its accuracy; or (ii) guarantee any outcome or result from the application of this document or of any of CMI's work (whether contained in or arising from the application of this document or otherwise). You assume sole responsibility for your use of this document, and for any and all conclusions drawn from its use. CMI hereby excludes all warranties, representations, conditions and all other terms of any kind whatsoever implied by statute or common law in relation to this document, to the fullest extent permitted by applicable law. If you are in any doubt as to using anything produced by CMI, please seek independent advice.

Copyright: You may reproduce the contents of this document free of charge in any format or medium provided it is:

1. reproduced accurately and is unaltered;
2. not used in a misleading context; and
3. correctly referenced and includes both CMI's Disclaimer notice set out above and CMI's copyright notice, as follows:

© Continuous Mortality Investigation Limited.

Continuous Mortality Investigation Limited ("CMI") is registered in England & Wales
Company number: 8373631
Registered Office: 1-3 Staple Inn Hall, High Holborn, London, WC1V 7QJ

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.