



England & Wales mortality monitor – COVID-19 update – week 23 of 2020

Background

During the coronavirus pandemic we are publishing weekly updates to the CMI Mortality Monitor. This update shows the position as at 5 June 2020 (week 23 of 2020), based on provisional deaths data published by the Office for National Statistics (ONS) on 16 June 2020. All updates are publicly available from the CMI pages of the Institute and Faculty of Actuaries website: <https://www.actuaries.org.uk/learn-and-develop/continuous-mortality-investigation/other-cmi-outputs/mortality-monitor>.

Summary

There have been around 63,000 more deaths in the UK from the start of the pandemic to 5 June 2020 than if mortality rates were similar to those experienced in 2019. At this stage of the pandemic, we prefer to focus on registered rather than estimated 'excess' deaths figures as estimates of 'excess' deaths could now be materially affected by non-COVID sources of variance.

There were 4% more deaths registered in England & Wales in week 23 of 2020 than if standardised mortality rates had been the same as week 23 of 2019. The difference was 17% in week 22 and 18% in week 21.

The cumulative mortality improvement in England & Wales for 2020 is –11.0% as at 5 June 2020, compared to +0.1% as at 20 March 2020, before the coronavirus pandemic had a material impact. More recent data issued by Public Health England (PHE) and the Department of Health and Social Care (DHSC) for later periods suggests that the cumulative improvement may fall further over the coming weeks.

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 allow for changes in the age and gender distribution of the population over time.

We have included versions of Charts D and E from the standard quarterly monitor, which show results for males and females combined, for ages 20-100:

- Chart 1 (like Chart D from the quarterly report) shows cumulative standardised mortality for each year, relative to the average for 2010-2019.
- Chart 2 (like Chart E from the quarterly report) shows cumulative standardised mortality improvements for each year (i.e. the progression of annual mortality improvements over the course of each year).
- 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 in recent weeks deaths may have been registered earlier or later than in previous years. Consequently, comparisons of mortality between 2020 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.

Use of this document

Please note that 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

Chart 1 shows cumulative standardised mortality rates compared to the 2010-2019 average. Cumulative mortality to week 23 of 2020 is higher than cumulative mortality to week 23 in any year since 2005, and is 7.4% above the 2010-19 average. It was 1.9% below the 2010-19 average at week 12, before the coronavirus pandemic had a material impact.

Chart 1: Cumulative standardised mortality rate compared to the 2010-2019 average

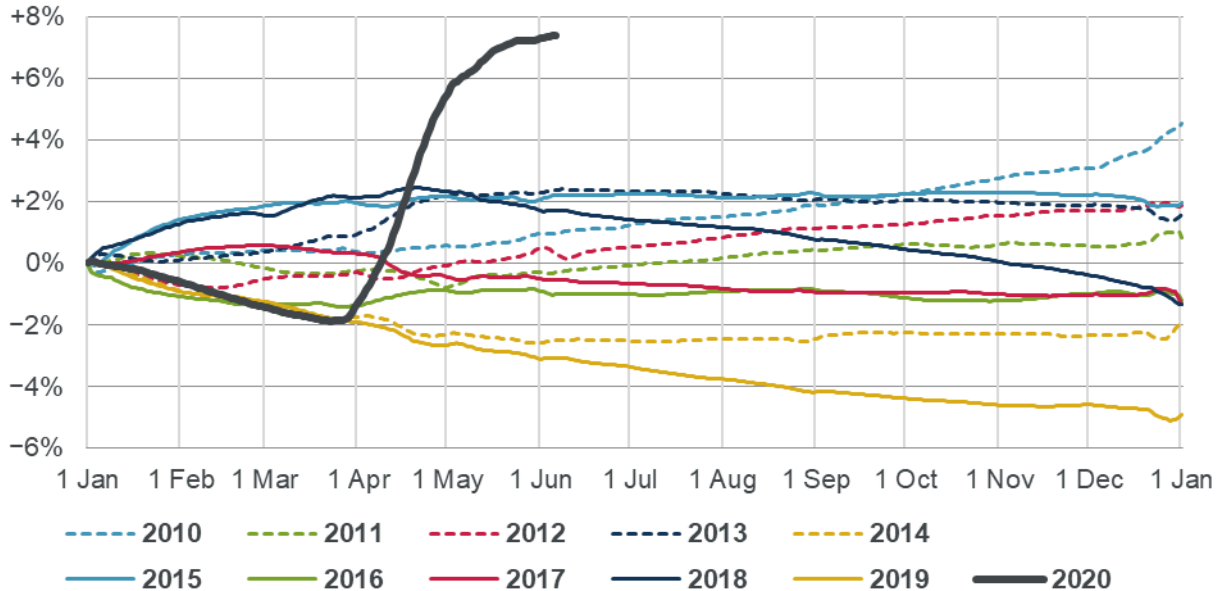
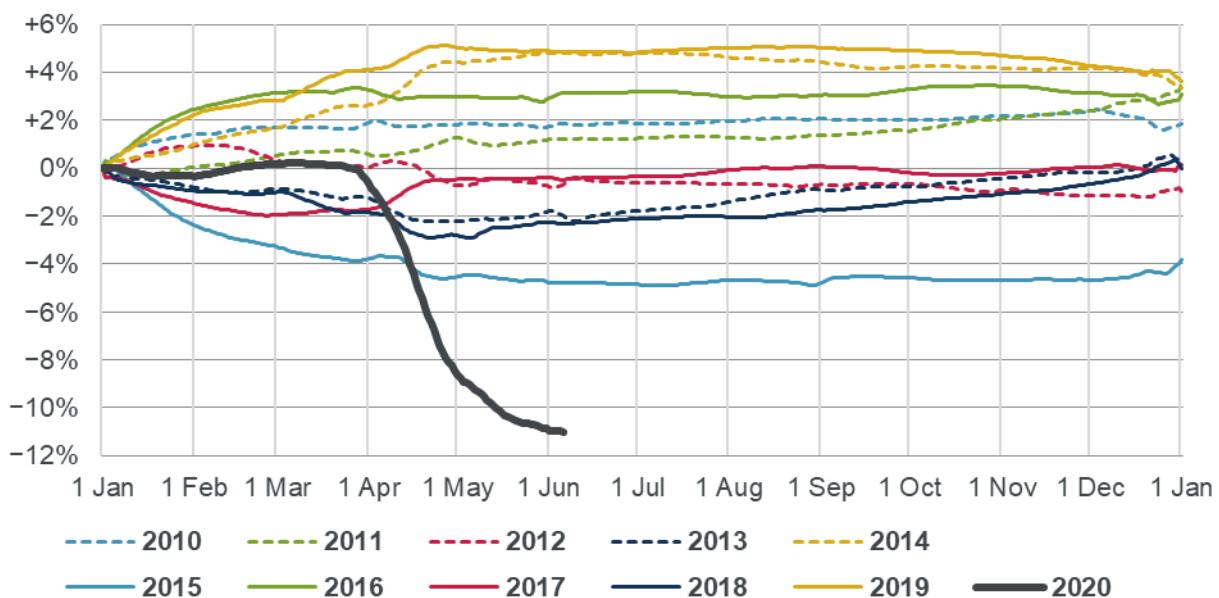


Chart 2 shows the cumulative annual standardised mortality improvement for 2020 and for the previous ten years. Note that Chart 2 shows cumulative improvements, so a higher value represents a higher improvement and lower mortality; whereas in Chart 1 a higher value represents higher mortality.

The cumulative mortality improvement is -11.0% as at 5 June 2020 (week 23 of 2020), compared to +0.1% as at week 12, before the coronavirus pandemic had a material impact, and -10.8% as at week 22.

Chart 2: Cumulative annual standardised mortality improvement





Impact of coronavirus on total deaths

The ONS data shows 1,588 deaths registered in week 23 “where COVID-19 was mentioned on the death certificate”. The overall impact of the coronavirus pandemic on total deaths may be different:

- 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 the coronavirus.
- There may have been “forward mortality displacement”: some deaths that occurred earlier in the pandemic would otherwise have occurred in this week.
- There may have been indirect impacts on deaths due to restrictions on movement due to the coronavirus; for example, changes in traffic, pollution and mental health.

To consider the possible impact of the pandemic on total deaths, we have estimated the number of deaths that we would have seen in week 23 of 2020 if the SMRs for each gender and age-group had been the same in week 23 of 2020 as in week 23 of 2019. As mortality in the first 12 weeks of 2019 and 2020 was similar, as seen in Charts 1 and 2, this gives a broad indication of “expected” mortality in the absence of the coronavirus pandemic¹. 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.

We have not made any adjustment for differences in the timing of public holidays in 2019 and 2020. While such differences may affect expected, actual and excess results for individual weeks, positive and negative impacts for different weeks should cancel out over time in cumulative results.

- The timing of Easter is likely to have reduced the estimated excess in week 15 and increased it in week 16.
- The timing of the early May bank holiday, on Monday of week 19 in 2019, but on Friday of week 19 in 2020, will have reduced the estimated excess in week 19 and increased it in week 20.
- The bank holidays on Monday of week 22 in 2019 and 2020 are likely to have reduced expected, actual and excess registered deaths, but had little impact on the ratios between them.

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

| Description | Deaths in week 23 of 2020 | | |
|---|---------------------------|--------|--------|
| | Male | Female | Total |
| “Expected” registered deaths, if SMRs were the same in 2019 and 2020 | 5,318 | 4,962 | 10,280 |
| Actual registered deaths, from all causes | 5,343 | 5,366 | 10,709 |
| “Excess” registered deaths (actual minus expected) | 25 | 404 | 429 |
| Registered deaths where COVID-19 was mentioned on the death certificate | 784 | 804 | 1,588 |
| Excess as a proportion of expected | 0.5% | 8% | 4% |
| Excess as a proportion of where COVID-19 was on the death certificate | 3% | 50% | 27% |

¹ Our calculation of excess deaths depends on the historical period that we use to estimate expected deaths. If we had used the average standardised mortality rates for 2015-19 rather than only 2019 to calculate expected deaths, without allowing for mortality improvements, then this would have reduced the excess deaths by 189 in week 23, and reduced the cumulative excess at week 23 (shown in Chart 4) from 58,269 to 53,257, a difference of 9%. We reiterate our preference for using 2019 to estimate expected deaths in the absence of a pandemic, as 2019 and 2020 had similar mortality experience for weeks 1 to 12.



Table 1 shows that:

- Actual deaths in week 23 are 4% higher than expected: 0.5% higher than expected for males and 8% higher for females, compared to 17% for males, 18% for females, and 17% overall in week 22.
- The 429 “excess” deaths in week 23 are 27% of the 1,588 registered deaths reported by the ONS where COVID-19 was mentioned on the death certificate. Excess deaths were 80% of mentions of COVID-19 in week 22 and 72% of mentions of COVID-19 in week 21.

Chart 3 compares “excess” registered deaths and registered deaths where COVID-19 was mentioned on the death certificate in each week since week 13. While there were some deaths in weeks 11 and 12 where COVID-19 was mentioned on the death certificate, the level of excess deaths in those weeks is small compared to typical weekly volatility in deaths, so cannot be reliably estimated. Chart 4 is similar, but plots the cumulative numbers of deaths, since week 13.

The number of excess deaths was much higher than the number of deaths where COVID-19 was mentioned on the death certificate in weeks 13 to 17, but this is not the case in later weeks, and excess deaths have been lower than mentions of COVID-19 in weeks 21 to 23.

Chart 3: Comparison of deaths registered in each week (see text for details)

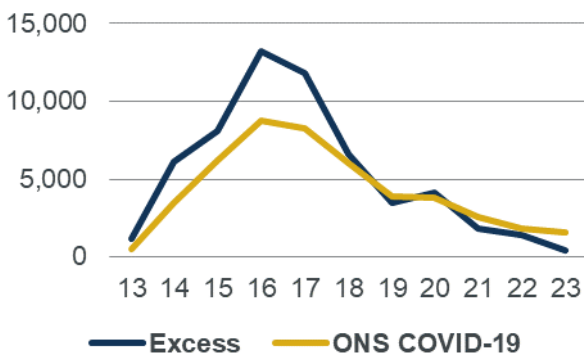
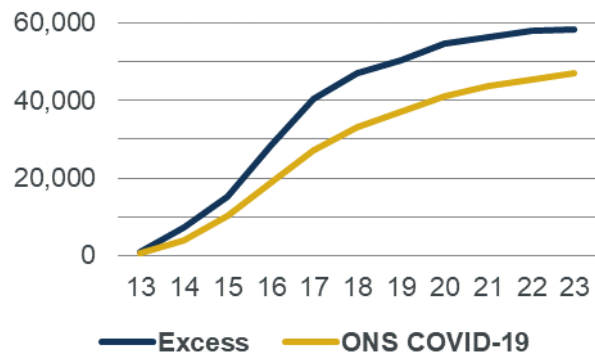


Chart 4: Comparison of cumulative registered deaths (see text for details)



Charts 5 and 6 show excess deaths as a proportion of expected deaths by age band for each week. This has tended to be higher for older age bands throughout the pandemic. 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. Similarly, we no longer show a table of excess mortality by age band, as the figures have become more uncertain as the numbers of deaths have reduced.

Chart 5: Excess as a proportion of expected in each week – males (see text for details)

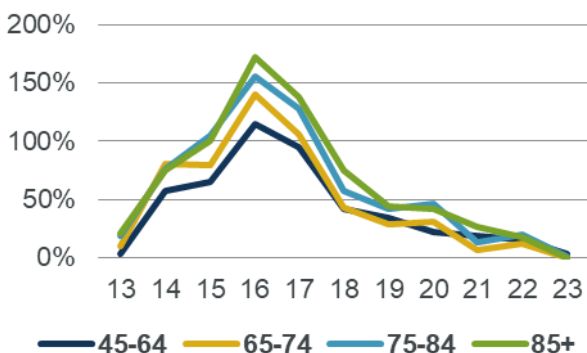
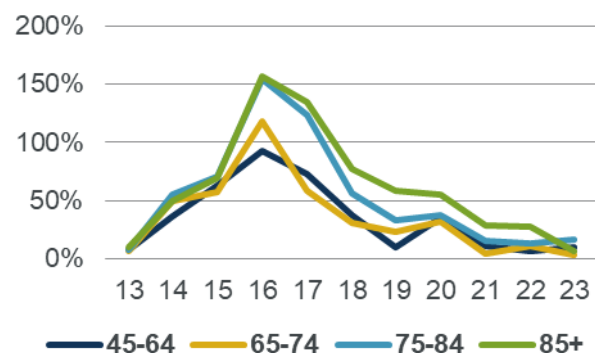


Chart 6: Excess as a proportion of expected in each week – females (see text for details)





Deaths not reported yet

We have previously published up-to-date estimates of excess deaths, beyond the period covered by the ONS data, based on COVID-19 deaths from other sources. These estimates were reasonable earlier in the pandemic when large numbers COVID-19 deaths were being reported after the period covered by ONS data, but have now become less relevant and reliable. At this stage of the pandemic, excess deaths could be materially affected not only by COVID-19 deaths, but also by improvements in non-COVID mortality rates, misattribution of cause of death, mortality acceleration, and statistical noise. We have included estimated deaths in this section, using the same method as in earlier weeks, but we now prefer to focus on registered rather than estimated deaths.

Public Health England (PHE), for England, and the Department of Health and Social Care (DHSC), for the devolved administrations of Northern Ireland, Scotland and Wales, publish daily information on deaths of people who have had a positive test result for the coronavirus confirmed by a Public Health or NHS laboratory. We refer to this data as just “PHE data” in this report for brevity.

The PHE figures are not directly comparable to the ONS figures, and could be higher or lower for any given week. That is because, although the PHE definition for COVID-19 deaths is narrower than the ONS definition (as it is limited to those who have tested positive for the coronavirus), PHE may report on deaths before they have been registered.

Table 2 compares the PHE figures reported during weeks 10 to 23 to our estimates of excess mortality, from all causes, in those weeks. It shows that the relationship between the CMI and PHE figures varies significantly between weeks. The ratio has tended to fall over time, and is affected by public holidays.

The table also shows the PHE figures since week 23; our assumption for the relationship between the CMI excess and PHE figures in that period; and our resulting estimate of excess registered deaths, in the final column. The range of estimated excess registered deaths reflects variations in the ratio between the CMI excess and PHE figures in recent weeks rather than the whole period, as the ratios in recent weeks have tended to be lower than earlier in the pandemic.

The PHE figures are those issued on 15 June 2020, for deaths in England & Wales reported by 5pm on 14 June 2020. The calculations do not allow for deaths that may have occurred by 15 June 2020 but were not reported by then.

Our analysis suggests that:

- there could have been in the range of 58,500 to 61,000 cumulative excess registered deaths in England & Wales by 15 June 2020; and
- applying the same method to the PHE figure for UK deaths suggests 63,000 to 65,500 excess registered deaths in the UK by 15 June 2020.

It is possible that excess deaths could be outside the range shown if the ratio of CMI excess to PHE deaths moves outside its historical range. Indeed, this occurred in the last week. The estimates above are 500 lower than the corresponding estimates to 8 June 2020 in the week 22 monitor, due to the ratio of CMI excess to PHE deaths being unusually low in week 23 compared to earlier weeks.

Data sources

The ONS provisional weekly deaths are available from <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/datasets/weeklyprovisionalfiguresondeathsregisteredinenglandandwales>

The PHE figures are available from <https://coronavirus.data.gov.uk/>



Table 2: Comparison of PHE’s reported COVID-19 deaths with CMI’s estimate of excess deaths

| Period | PHE reported ² | CMI excess | Actual CMI ÷ PHE | Assumed CMI ÷ PHE | Estimated Excess |
|--|---------------------------|---------------|------------------|-------------------|------------------------|
| Later (30 May - 8 June 2020) | 1,886 | n/a | n/a | 0.27-1.68 | 386 – 2,374 |
| Week 23 (30 May – 5 June 2020) | 1,572 | 429 | 0.27 | n/a | 429 |
| Week 22 (23 – 29 May 2020) | 2,088 | 1,449 | 0.69 | n/a | 1,449 |
| Week 21 (16 - 22 May 2020) | 2,134 | 1,861 | 0.87 | n/a | 1,861 |
| Week 20 (9 - 15 May 2020) | 2,480 | 4,157 | 1.68 | n/a | 4,157 |
| Week 19 (2 - 8 May 2020) | 3,369 | 3,475 | 1.03 | n/a | 3,475 |
| Week 18 (25 April - 1 May 2020) | 4,279 | 6,587 | 1.54 | n/a | 6,587 |
| Weeks 14-17 (28 March - 24 April 2020) | 20,283 | 39,179 | 1.93 | n/a | 39,179 |
| Weeks 10-13 (29 February - 27 March 2020) | 1,126 | 1,350 | 1.20 | n/a | 1,350 |
| TOTAL | 38,747 | 58,487 | n/a | n/a | 58,874 – 60,861 |

² These figures reflect the revisions made by PHE to include deaths outside of a hospital setting, and cases identified through “pillar 2” testing: <https://coronavirus.data.gov.uk/about>



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 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 the ONS and 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.

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