



England & Wales mortality monitor – COVID-19 update – week 16 of 2020

Background

During the coronavirus pandemic we are publishing weekly updates to the CMI Mortality Monitor. This update shows the position as at 17 April 2020 (week 16 of 2020), based on provisional deaths data published by the Office for National Statistics (ONS) on 28 April 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 could have been 41,000 to 48,000 excess registered deaths in the UK by 27 April 2020.

There were 144% more deaths registered in England & Wales in week 16 of 2020 than if standardised mortality rates had been the same as week 16 of 2019. The difference was 77% in week 15 and 59% in week 14.

We note that Easter being one week earlier in 2020 than in 2019 may have increased the estimate of excess deaths in week 16, and reduced it in week 15.

The cumulative mortality improvement in England & Wales for 2020 is –5.1% as at 17 April 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) for later periods suggests that the cumulative improvement will fall further.

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 17 April 2020 (week 16 of 2020) is 2.4% 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

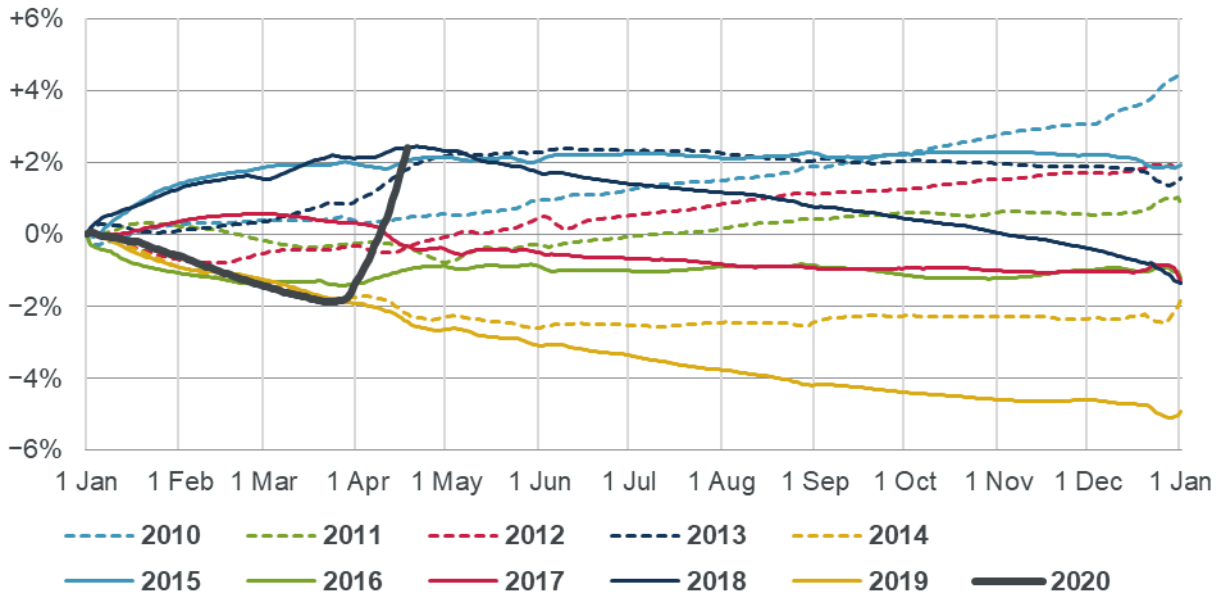
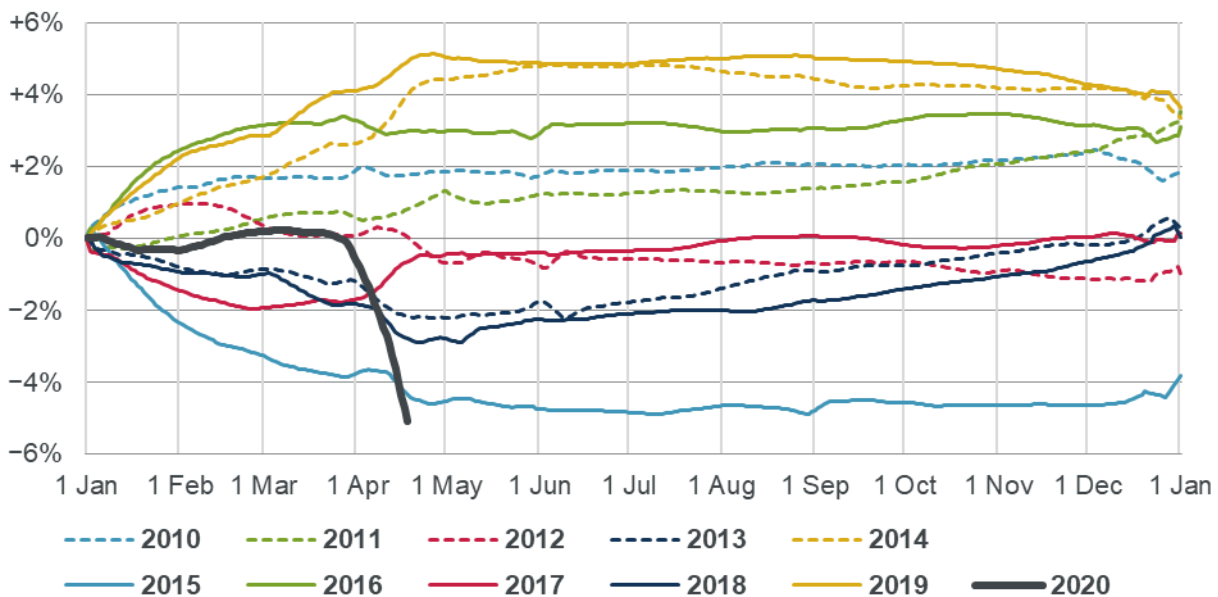


Chart 2 shows the cumulative annual standardised mortality improvement for 2020 and for the previous ten years. Note that Chart 2 shows cumulative improvements, so a higher value represents a higher improvement and lower mortality; whereas in Chart 1 a higher value represents higher mortality.

The cumulative mortality improvement is -5.1% as at 17 April 2020 (week 16 of 2020), compared to $+0.1\%$ as at week 12, before the coronavirus pandemic had a material impact, and -2.7% as at week 15. The change in cumulative mortality improvement in week 16 is the largest weekly change that we have seen in the weekly deaths data that is available since 1999.

Chart 2: Cumulative annual standardised mortality improvement





Impact of coronavirus on total deaths

The ONS data shows 8,758 deaths registered in week 16 “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 from other causes may have been indirectly linked to COVID-19; for example, if pressure on medical resources caused deaths that would not have occurred in the absence of the coronavirus.
- 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 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 16 of 2020 if the SMRs for each gender and age-group had been the same in week 16 of 2020 as in week 16 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. We note that Easter was one week earlier in 2020 than in 2019 and the Coronavirus Act 2020 allowed register offices to remain open over Easter this year. These affect the estimates of excess deaths, and are likely to have reduced the estimated excess in week 15 and increased it in week 16. While differences in the timing of public holidays may affect results for individual weeks, positive and negative impacts for different weeks should cancel out over time in cumulative results.

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

Description	Deaths in week 16 of 2020		
	Male	Female	Total
“Expected” registered deaths, if SMRs were the same in 2019 and 2020	4,617	4,538	9,154
Actual registered deaths, from all causes	11,445	10,906	22,351
“Excess” registered deaths (expected minus actual)	6,828	6,368	13,197
Registered deaths where COVID-19 was mentioned on the death certificate	5,057	3,701	8,758
Excess as a proportion of expected	148%	140%	144%
Excess as a proportion of where COVID-19 was on the death certificate	135%	172%	151%

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 1,876 in week 16, and reduced the cumulative excess at week 16 (shown in Chart 4) from 28,516 to 24,880, a difference of 13%. 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 16 are 144% higher than expected: 148% higher than expected for males and 140% higher for females, compared to 88% for males, 66% for females, and 77% overall in week 15.
- The 13,197 “excess” deaths in week 16 are 51% higher than the figure of 8,758 registered deaths reported by the ONS where COVID-19 was mentioned on the death certificate. The corresponding figures for earlier weeks were 30% for week 15 and 76% for week 14.

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 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.

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

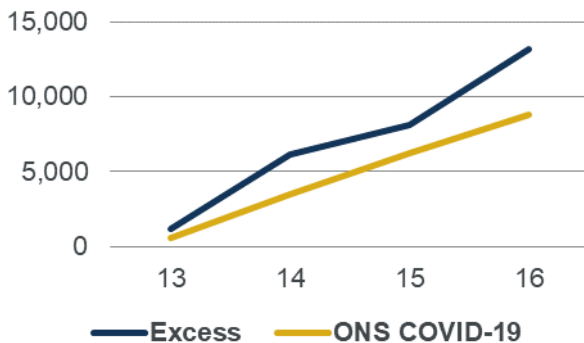


Chart 4: Comparison of cumulative registered deaths (see text for details)

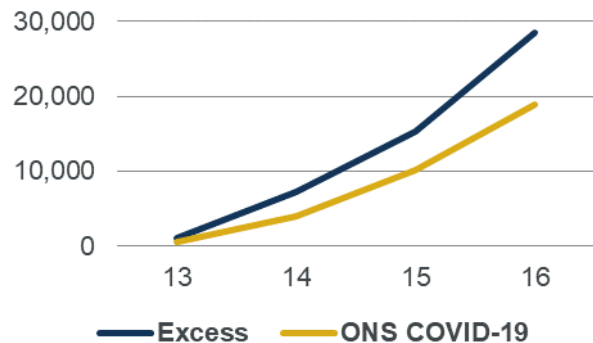


Table 2 is similar to Table 1 but shows variations by age band. The ratios of excess to expected deaths are higher for males than females in each age band, and the highest ratios of excess to expected deaths are for the 85+ age bands, for both males and females. The age and gender profiles of excess deaths appear broadly consistent with what has been reported for COVID-19 elsewhere. (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.)

Table 2: Comparison of actual, expected and excess registered deaths by age-band in week 16 of 2020

	Male				Female			
	45-64	65-74	75-84	85+	45-64	65-74	75-84	85+
“Expected”	653	861	1,458	1,463	463	602	1,150	2,184
Actual	1,401	2,071	3,735	3,990	893	1,309	2,922	5,611
“Excess”	748	1,210	2,277	2,527	430	707	1,772	3,427
Excess divided by expected	114%	141%	156%	173%	93%	118%	154%	157%

Deaths not reported yet

We intend to publish weekly updates to the mortality monitor during the coronavirus pandemic. The results in this update use ONS data on registered deaths to 17 April 2020, but Public Health England (PHE) publishes daily information on deaths of those hospitalised who tested positive for the coronavirus.

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 appears narrower than the ONS definition, PHE may report on deaths before they have been registered.



Table 3 compares the PHE figures reported during weeks 14 to 16 to our estimates of excess mortality, from all causes, in those weeks. It shows that the relationship between the PHE and CMI figures varies significantly between weeks. This may be due to the timing of public holidays affecting the CMI figures based on registered deaths more than the PHE figure for reported deaths.

The table also shows the PHE figures for earlier and later periods; our assumptions for the relationship between the PHE and CMI excess figures in those periods, based on weeks 14 to 16; and our resulting estimates of excess registered deaths, in the final column. The PHE figures are those issued on 27 April 2020, for deaths in England & Wales reported by 5pm on 26 April 2020.

Table 3: Comparison of PHE's reported COVID-19 deaths with CMI's estimate of excess deaths

Period	PHE reported	CMI excess	Actual CMI ÷ PHE	Assumed CMI ÷ PHE	Estimated Excess
Later (18 - 27 April 2020)	5,905	n/a	n/a	1.62-2.53	9,564 - 14,957
Week 16 (11 - 17 April 2020)	5,210	13,197	2.53	n/a	13,197
Week 15 (4 - 10 April 2020)	4,986	8,076	1.62	n/a	8,076
Week 14 (28 March - 3 April 2020)	2,730	6,112	2.24	n/a	6,112
Earlier (to 27 March 2020)	713	n/a	n/a	1.62-2.53	1,155 - 1,806
TOTAL	19,544	n/a	n/a	n/a	38,104 - 44,148

Our analysis suggests that:

- there could have been in the range of 38,000 to 45,000 cumulative excess registered deaths in England & Wales by 27 April 2020; and
- applying the same method to the PHE figure for UK deaths suggests 41,000 to 48,000 excess registered deaths in the UK.

These calculations are sensitive to the assumed relationship between the PHE and CMI figures, particularly for the “later” period in Table 3. The calculations do not allow for deaths which may have occurred by 27 April 2020 but were not reported by then.

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/>



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 allow 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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