



England & Wales mortality monitor – COVID-19 update – week 17 of 2020

Background

During the coronavirus pandemic we are publishing weekly updates to the CMI Mortality Monitor. This update shows the position as at 24 April 2020 (week 17 of 2020), based on provisional deaths data published by the Office for National Statistics (ONS) on 5 May 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 51,000 to 59,000 excess registered deaths in the UK by 4 May 2020.

There were 116% more deaths registered in England & Wales in week 17 of 2020 than if standardised mortality rates had been the same as week 17 of 2019. The difference was 144% in week 16 and 77% in week 15.

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 –7.4% as at 24 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 24 April 2020 (week 17 of 2020) is 4.4% above the 2010-19 average. This is higher than cumulative mortality to week 17 in any year since 2006. 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

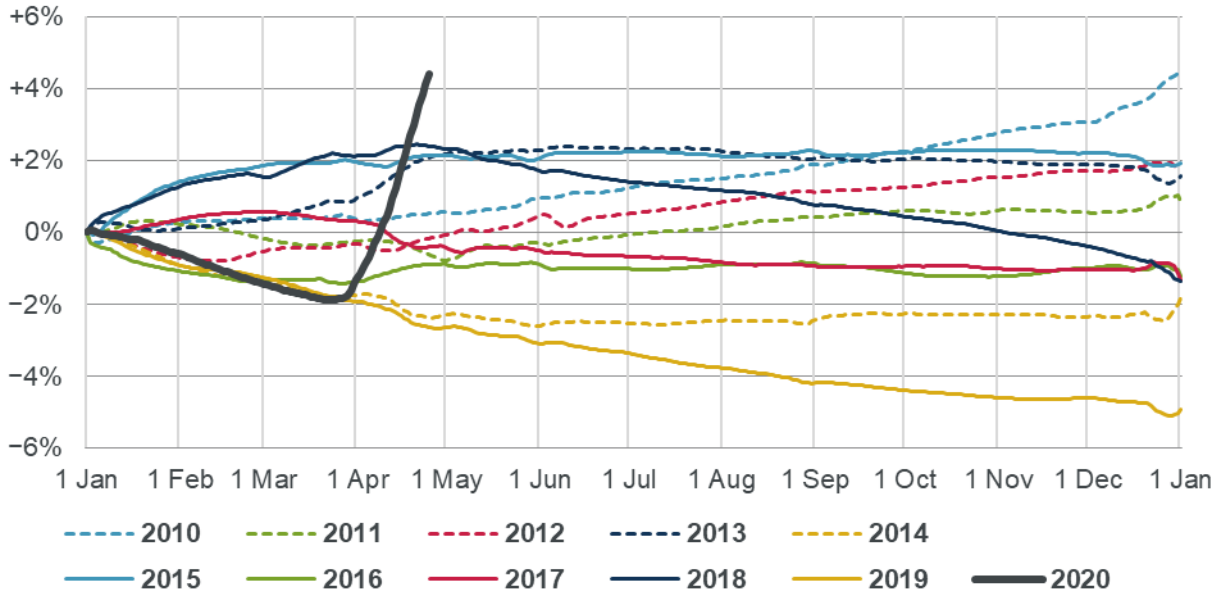
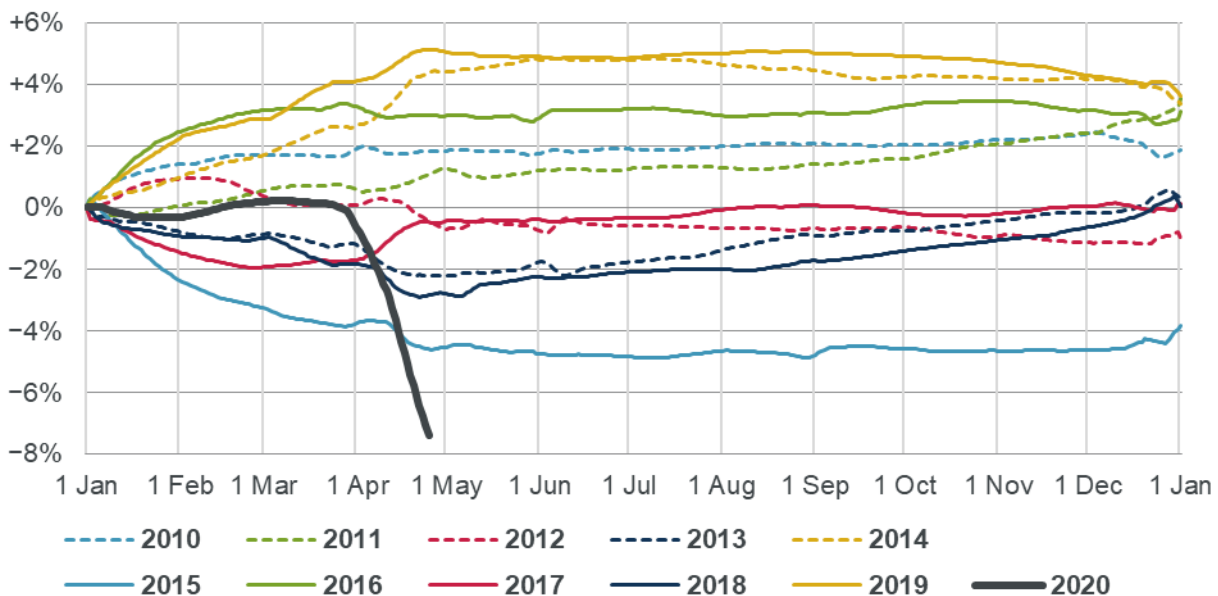


Chart 2 shows the cumulative annual standardised mortality improvement for 2020 and for the previous ten years. Note that Chart 2 shows cumulative improvements, so a higher value represents a higher improvement and lower mortality; whereas in Chart 1 a higher value represents higher mortality.

The cumulative mortality improvement is -7.4% as at 24 April 2020 (week 17 of 2020), compared to +0.1% as at week 12, before the coronavirus pandemic had a material impact, and -5.1% as at week 16.

Chart 2: Cumulative annual standardised mortality improvement





Impact of coronavirus on total deaths

The ONS data shows 8,237 deaths registered in week 17 “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 17 of 2020 if the SMRs for each gender and age-group had been the same in week 17 of 2020 as in week 17 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 17 of 2020		
	Male	Female	Total
“Expected” registered deaths, if SMRs were the same in 2019 and 2020	5,120	5,083	10,203
Actual registered deaths, from all causes	11,228	10,769	21,997
“Excess” registered deaths (expected minus actual)	6,108	5,686	11,794
Registered deaths where COVID-19 was mentioned on the death certificate	4,554	3,683	8,237
Excess as a proportion of expected	119%	112%	116%
Excess as a proportion of where COVID-19 was on the death certificate	134%	154%	143%

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 777 in week 17, and reduced the cumulative excess at week 17 (shown in Chart 4) from 40,310 to 35,898, a difference of 11%. 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 17 are 116% higher than expected: 119% higher than expected for males and 112% higher for females, compared to 148% for males, 140% for females, and 144% overall in week 16.
- The 11,794 “excess” deaths in week 17 are 43% higher than the 8,237 registered deaths reported by the ONS where COVID-19 was mentioned on the death certificate. The corresponding figures for earlier weeks were 51% for week 16 and 30% for week 15.

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)

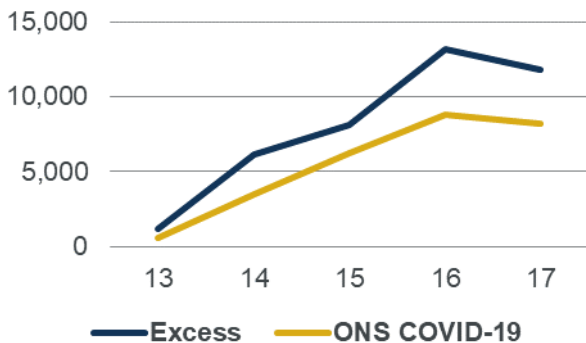


Chart 4: Comparison of cumulative registered deaths (see text for details)

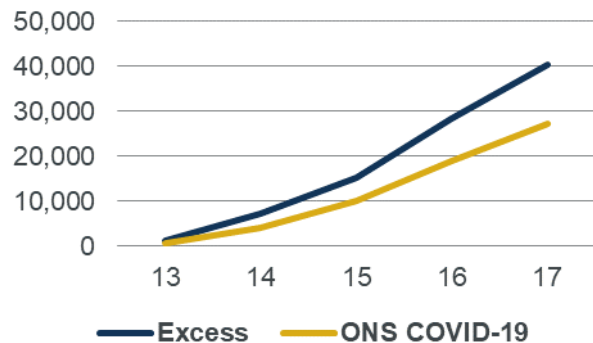


Table 2 is similar to Table 1 but shows variations by age band. The ratios of excess to expected deaths are higher for males than females in each age band, and the highest ratios of excess to expected deaths are for the 85+ age bands, for both males and females. The age and gender profiles of excess 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 17 of 2020

	Male				Female			
	45-64	65-74	75-84	85+	45-64	65-74	75-84	85+
“Expected”	734	980	1,585	1,625	490	770	1,294	2,399
Actual	1,434	2,015	3,621	3,865	849	1,223	2,892	5,628
“Excess”	700	1,035	2,036	2,240	359	453	1,598	3,229
Excess divided by expected	95%	106%	129%	138%	73%	59%	123%	135%

Charts 5 and 6 show the weekly progression of the “excess divided by expected” ratios from Table 2, for males and females respectively. This ratio has tended to be higher for older age bands throughout the pandemic.



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

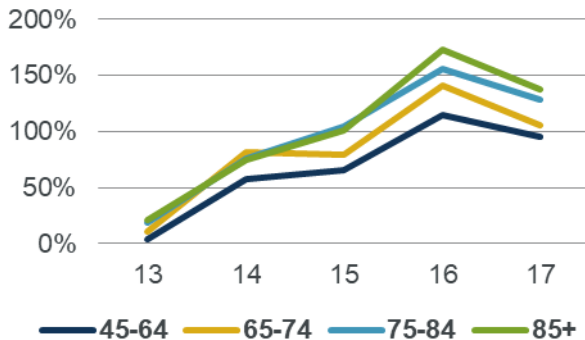
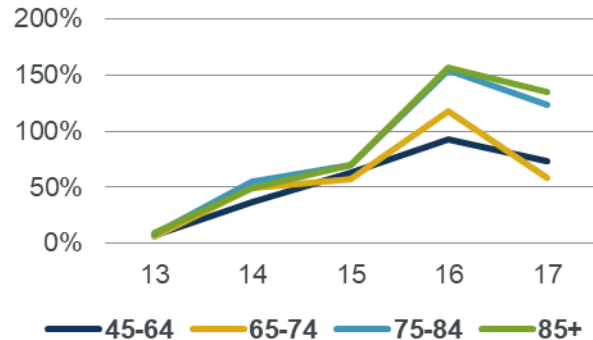


Chart 6: Excess as a proportion of expected in each week – females (see text for details)



Deaths not reported yet

We 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 24 April 2020, but Public Health England (PHE) publishes daily information on deaths of people who have had a positive test result for the coronavirus confirmed by a Public Health or NHS laboratory.

Note that PHE has changed the way that it reports COVID-19 data. The PHE data used in this section of the week 14 to week 16 updates of the mortality monitor was only for deaths of those hospitalised who tested positive for the coronavirus. This version of the monitor allows for the revised PHE figures.

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 3 compares the PHE figures reported during weeks 14 to 17 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 17; and our resulting estimates of excess registered deaths, in the final column. The PHE figures are those issued on 4 May 2020, for deaths in England & Wales reported by 5pm on 3 May 2020.



Table 3: 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 (25 April - 4 May 2020)	5,373	n/a	n/a	1.36-2.31	7,315 – 12,415
Week 17 (18 - 24 April 2020)	5,467	11,794	2.16	n/a	11,794
Week 16 (11 - 17 April 2020)	5,711	13,197	2.31	n/a	13,197
Week 15 (4 - 10 April 2020)	5,932	8,076	1.36	n/a	8,076
Week 14 (28 March - 3 April 2020)	3,173	6,112	1.93	n/a	6,112
Earlier (to 27 March 2020)	1,126	n/a	n/a	1.36-2.31	1,533 - 2,602
TOTAL	26,782	n/a	n/a	n/a	48,027 - 54,196

Our analysis suggests that:

- there could have been in the range of 48,000 to 55,000 cumulative excess registered deaths in England & Wales by 4 May 2020; and
- applying the same method to the PHE figure for UK deaths suggests 51,000 to 59,000 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 that may have occurred by 4 May 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/>

² Figures in the week 17 update reflect the revision made by PHE to include deaths outside of a hospital setting. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/882565/Technical_Summary_PHE_Data_Series_COVID-19_Deaths_20200429.pdf



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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