



England & Wales mortality monitor – COVID-19 update – week 15 of 2020

Background

During the coronavirus pandemic we are publishing weekly updates to the CMI Mortality Monitor. This update shows the position as at 10 April 2020 (week 15 of 2020), based on provisional deaths data published by the Office for National Statistics (ONS) on 21 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 were 77% more deaths registered in week 15 of 2020 than the number of expected deaths if standardised mortality rates had been the same as week 15 of 2019. The difference was 59% in week 14.

However, we note that week 15 of 2020 contains a public holiday but week 15 of 2019 does not. This may have reduced the estimate of excess deaths in week 15, even though the Coronavirus Act 2020 allowed register offices to remain open over Easter.

The cumulative mortality improvement for 2020 is -2.7% as at 10 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 10 April 2020 (week 15 of 2020) is 0.4% 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

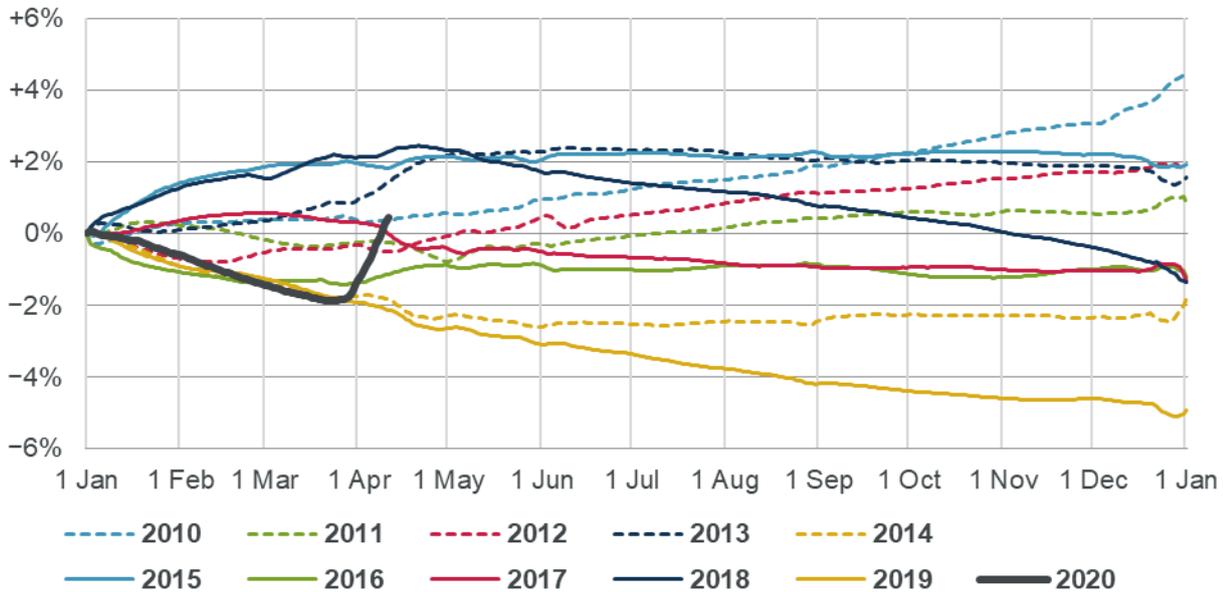
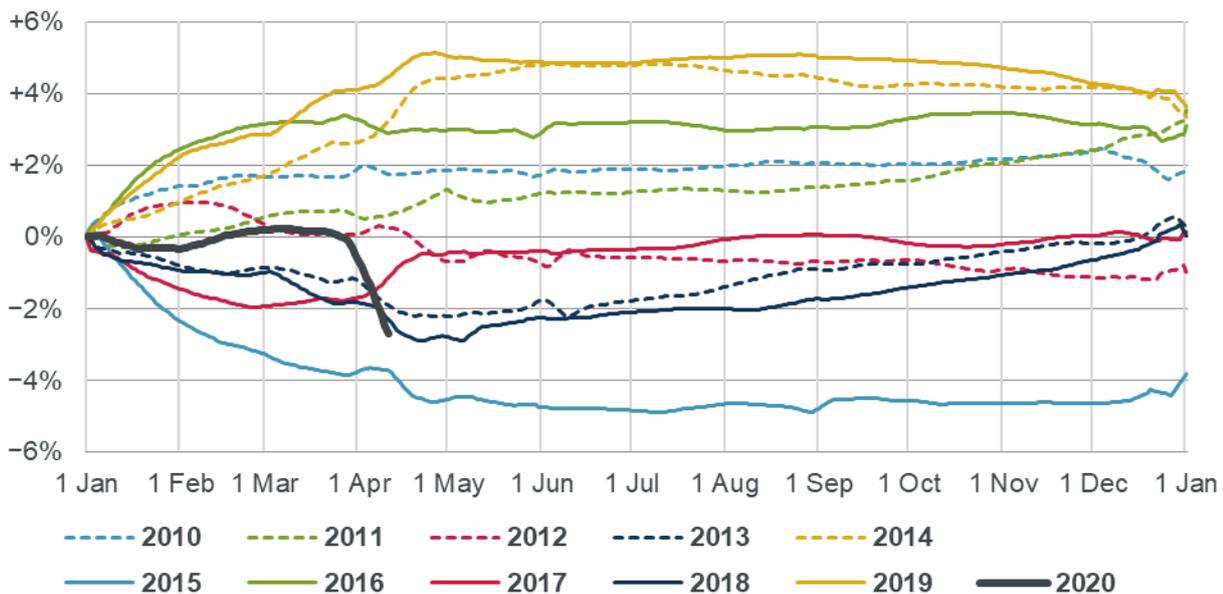


Chart 2 shows the cumulative annual standardised mortality improvement for 2020 and for the previous ten years. Note that Chart 2 shows cumulative improvements, so a higher value represents a higher improvement and lower mortality; whereas in Chart 1 a higher value represents higher mortality.

The cumulative mortality improvement is -2.7% as at 10 April 2020 (week 15 of 2020), compared to +0.1% as at week 12, before the coronavirus pandemic had a material impact, and -1.2% as at week 14. The change in cumulative mortality improvement in week 15 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 6,213 deaths registered in week 15 “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 15 of 2020 if the SMRs for each gender and age-group had been the same in week 15 of 2020 as in week 15 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 Good Friday was in week 15 of 2020, but there was no public holiday in week 15 of 2020. This may have reduced the estimate of excess deaths, even though although the Coronavirus Act 2020 allowed register offices to remain open over Easter. Differences in the timing of public holidays may affect results for individual weeks, but 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 15 of 2020		
	Male	Female	Total
“Expected” registered deaths, if SMRs were the same in 2019 and 2020	5,291	5,149	10,440
Actual registered deaths, from all causes	9,948	8,568	18,516
“Excess” registered deaths (expected minus actual)	4,657	3,419	8,076
Registered deaths where COVID-19 was mentioned on the death certificate	3,819	2,394	6,213
Excess as a proportion of expected	88%	66%	77%
Excess as a proportion of where COVID-19 was on the death certificate	122%	143%	130%

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 598 in week 15, and reduced the cumulative excess at week 15 (shown in Chart 4) from 15,320 to 13,560, 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 15 are 77% higher than expected: 88% higher than expected for males and 66% higher for females, compared to 71% for males, 48% for females, and 59% overall in week 14.
- The 8,076 “excess” deaths in week 15 are 30% higher than the figure of 6,213 registered deaths reported by the ONS where COVID-19 was mentioned on the death certificate. The corresponding figure for week 14 was considerably higher, 76%.

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)

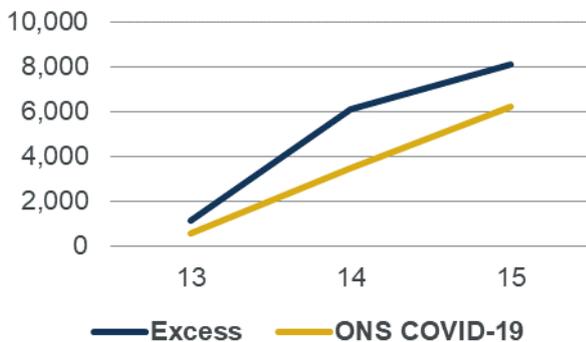


Chart 4: Comparison of cumulative registered deaths (see text for details)

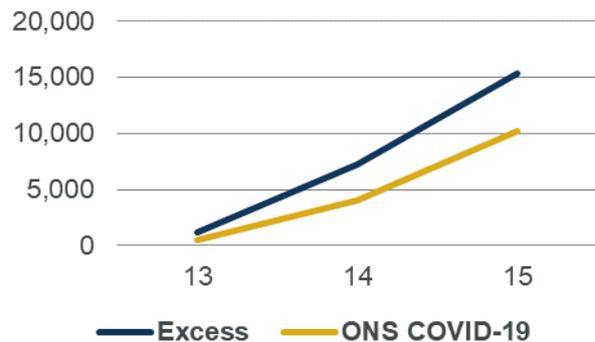


Table 2 is similar to Table 1 but shows variations by age band. For both genders, the highest ratios of excess to expected deaths are for the 75-84 and 85+ age bands, with actual deaths for males in these age bands being just over twice the expected deaths. (We do not show results for ages below 45 as 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 15 of 2020

	Male				Female			
	45-64	65-74	75-84	85+	45-64	65-74	75-84	85+
“Expected”	794	1,006	1,585	1,668	489	726	1,392	2,422
Actual	1,315	1,804	3,246	3,347	796	1,142	2,367	4,115
“Excess”	521	798	1,661	1,679	307	416	975	1,693
Excess divided by expected	66%	79%	105%	101%	63%	57%	70%	70%

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 10 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 and 15 to our estimates of excess mortality, from all causes, in those weeks. It shows that the relationship between the PHE and CMI figures is significantly



different in weeks 14 and 15. This may be due to the public holiday in week 15 reducing the CMI figure based on registered deaths by 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 and 15; and our resulting estimates of excess deaths, in the final column. The PHE figures are those issued on 20 April 2020, for deaths in England & Wales reported by 5pm on 19 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 (11-20 April 2020)	6,983	n/a	n/a	1.62 - 2.24	11,311 - 15,635
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 - 2.24	1,155 - 1,596
TOTAL	15,412	n/a	n/a	n/a	26,654 - 31,419

Our analysis suggests that there could already have been around 26,000 to 32,000 cumulative excess deaths in England & Wales. Applying the same method to the PHE figure for UK deaths suggests around 28,000 to 34,000 excess 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.

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.

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: 7th floor, Holborn Gate, 326-330 High Holborn, London, WC1V 7PP

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.