



## England & Wales mortality monitor – COVID-19 update – week 21 of 2020

### Background

During the coronavirus pandemic we are publishing weekly updates to the CMI Mortality Monitor. This update shows the position as at 22 May 2020 (week 21 of 2020), based on provisional deaths data published by the Office for National Statistics (ONS) on 2 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

We estimate that there have been around 64,500 more deaths in the UK from the start of the pandemic to 1 June 2020 than if mortality rates were similar to those experienced in 2019. This comprises 61,000 excess deaths to 22 May 2020, and a further 2,000 to 4,500 by 1 June 2020.

There were 18% more deaths registered in England & Wales in week 21 of 2020 than if standardised mortality rates had been the same as week 21 of 2019. The difference was 40% in week 20 and 38% in week 19. We note that the timing of public holidays in week 19 (on Friday in 2020, but on Monday in 2019) will have reduced the estimate of excess deaths in week 19 and increased it in week 20, but will have had little impact in week 21.

The cumulative mortality improvement in England & Wales for 2020 is –10.6% as at 22 May 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

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### 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 21 of 2020 is higher than cumulative mortality to week 21 in any year since 2005, and is 7.2% 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**

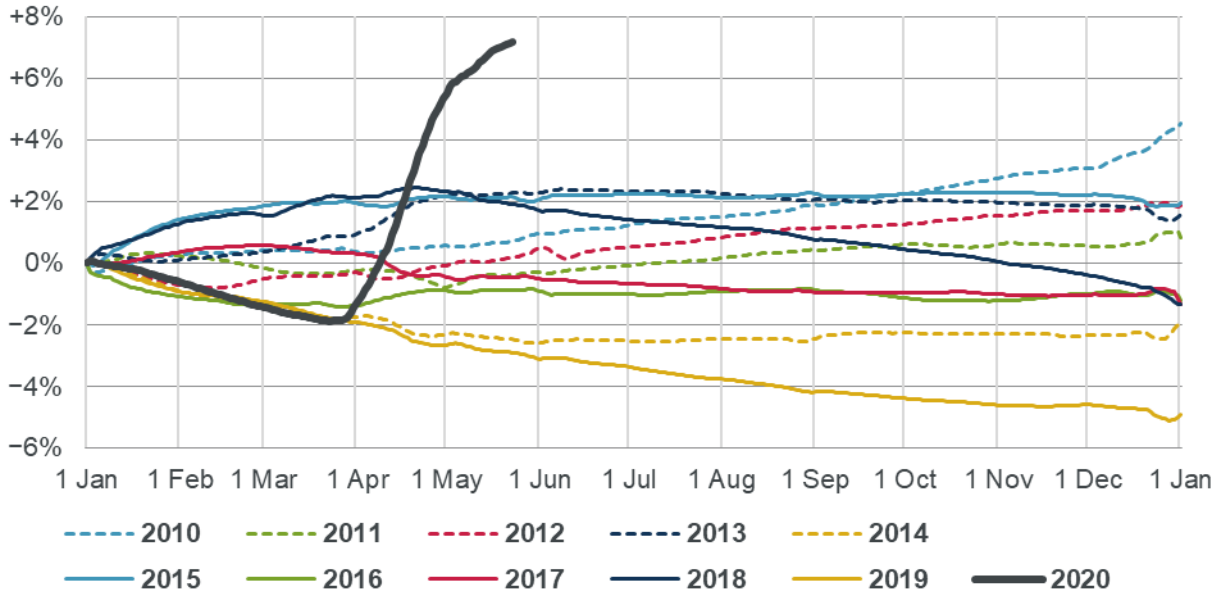
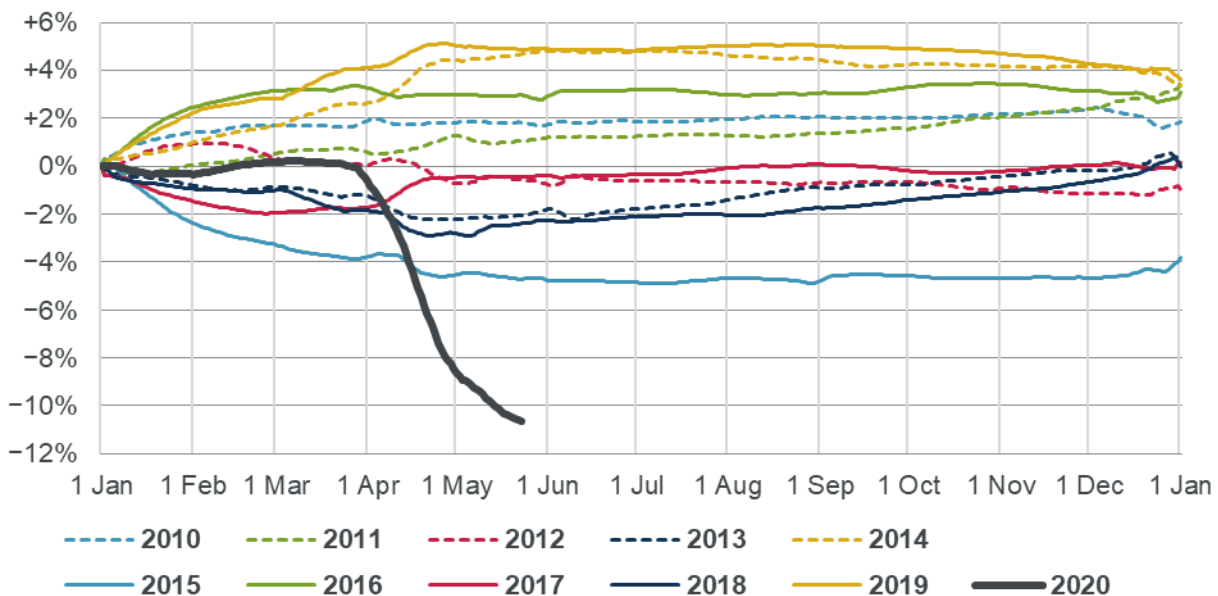


Chart 2 shows the cumulative annual standardised mortality improvement for 2020 and for the previous ten years. Note that Chart 2 shows cumulative improvements, so a higher value represents a higher improvement and lower mortality; whereas in Chart 1 a higher value represents higher mortality.

The cumulative mortality improvement is -10.6% as at 22 May 2020 (week 21 of 2020), compared to +0.1% as at week 12, before the coronavirus pandemic had a material impact, and -10.3% as at week 20.

**Chart 2: Cumulative annual standardised mortality improvement**





## Impact of coronavirus on total deaths

The ONS data shows 2,589 deaths registered in week 21 “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 21 of 2020 if the SMRs for each gender and age-group had been the same in week 21 of 2020 as in week 21 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 pandemic<sup>1</sup>. 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. There will be some registrations in week 20 that would otherwise have been reported in week 19.

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

Description	Deaths in week 21 of 2020		
	Male	Female	Total
“Expected” registered deaths, if SMRs were the same in 2019 and 2020	5,222	5,204	10,427
Actual registered deaths, from all causes	6,097	6,191	12,288
“Excess” registered deaths (expected minus actual)	875	987	1,861
Registered deaths where COVID-19 was mentioned on the death certificate	1,291	1,298	2,589
Excess as a proportion of expected	17%	19%	18%
Excess as a proportion of where COVID-19 was on the death certificate	68%	76%	72%

<sup>1</sup> 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 in week 21, and reduced the cumulative excess at week 21 (shown in Chart 4) from 56,391 to 51,772, a difference of 8%. 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.



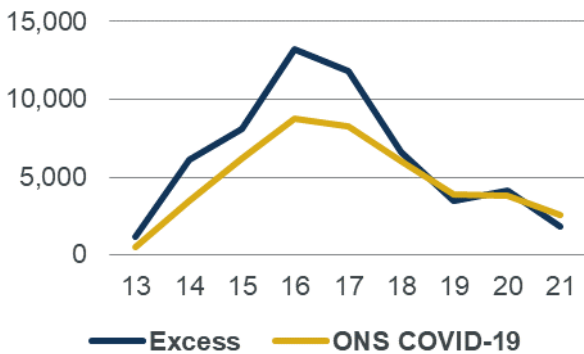
Table 1 shows that:

- Actual deaths in week 21 are 18% higher than expected: 17% higher than expected for males and 19% higher for females, compared to 36% for males, 44% for females, and 40% overall in week 20.
- The 1,861 “excess” deaths in week 21 are 28% lower than the 2,589 registered deaths reported by the ONS where COVID-19 was mentioned on the death certificate. Excess deaths were 9% higher than mentions of COVID-19 in week 20 and 12% lower in week 19. As noted earlier, the excess in weeks 19 and 20 will have been affected by the public holiday on Friday of week 19 in 2020.

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.

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



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

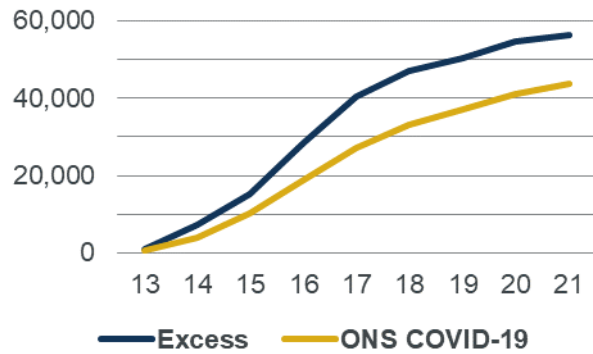


Table 2 is similar to Table 1 but shows variations by age band. The ratios of excess to expected deaths tend to increase with age, but the variations by age and gender are less clear than in previous weeks, as the numbers of excess deaths are smaller. We do not show results for ages below 45 as the relatively low numbers of deaths at those ages means that estimates of expected deaths would be unreliable.

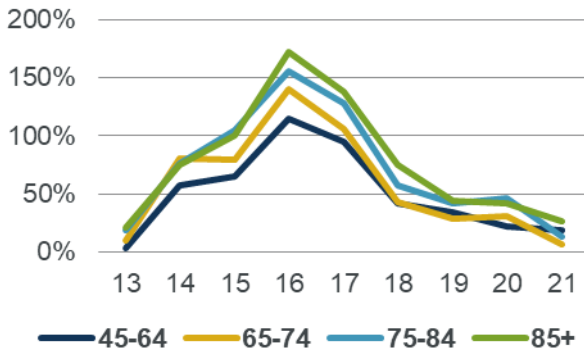
**Table 2: Comparison of actual, expected and excess registered deaths by age-band in week 21 of 2020**

	Male				Female			
	45-64	65-74	75-84	85+	45-64	65-74	75-84	85+
“Expected”	762	1,056	1,606	1,565	519	731	1,410	2,398
Actual	906	1,124	1,822	1,985	575	759	1,633	3,078
“Excess”	144	68	216	420	56	28	223	680
Excess divided by expected	19%	6%	13%	27%	11%	4%	16%	28%

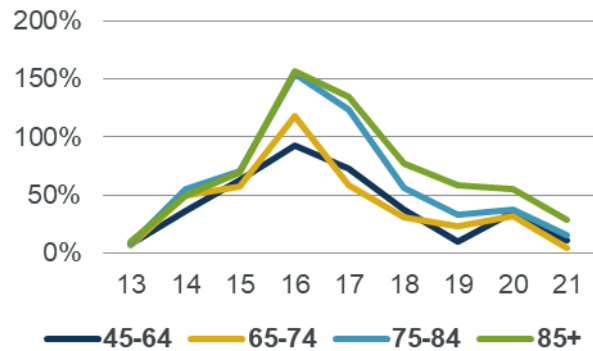


Charts 5 and 6 show the weekly progression of the “excess divided by expected” ratios from Table 2, for males and females respectively. This ratio has tended to be higher for older age bands throughout the pandemic.

**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 22 May 2020, but 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.

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. Updates from week 17 onwards allow for the revised PHE figures, and are not limited to hospitalised cases.
- The PHE data used in this section of the week 14 to week 19 updates relates to “pillar 1” tests, in NHS and PHE laboratories. The data in this update, from 24 May 2020, also includes 445 deaths relating to “pillar 2” tests, by commercial partners.

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 10 to 21 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 since week 21; our assumption for the relationship between the PHE and CMI excess 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 PHE and CMI excess 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. It is possible that excess deaths could be outside the range shown if that ratio moves outside its historical range.

The PHE figures are those issued on 1 June 2020, for deaths in England & Wales reported by 5pm on 31 May 2020.



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

Period	PHE reported <sup>2</sup>	CMI excess	Actual CMI ÷ PHE	Assumed CMI ÷ PHE	Estimated Excess
Later (23 May - 1 June 2020)	2,489	n/a	n/a	0.87-1.68	2,171 - 4,172
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
<b>TOTAL</b>	<b>36,160</b>	<b>56,609</b>	n/a	n/a	<b>58,780 - 60,782</b>

Our analysis suggests that:

- there could have been in the range of 58,000 to 61,000 cumulative excess registered deaths in England & Wales by 1 June 2020; and
- applying the same method to the PHE figure for UK deaths suggests 63,000 to 66,000 excess registered deaths in the UK.

These estimates have increased only slightly since week 20, as the ratio of PHE to CMI excess deaths was lower in week 21 than in any earlier week.

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 1 June 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/>

<sup>2</sup> These figures 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](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 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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