



England & Wales mortality monitor – Quarter 2 of 2020

Summary

Mortality during the second quarter of 2020 was exceptionally high, due to the coronavirus pandemic, but has returned to close to normal levels in recent weeks.

- The annual average SMR reached a peak higher than any time since mid-2010.
- The quarterly average SMR peaked in the week to 10 April 2020 (week 15). It was higher than any time since early 2005, and higher than the quarterly average SMR in week 15 in any other year for which we have weekly data (2000 onwards).
- At the start of the quarter, cumulative standardised mortality for 2020 was below the 2010-2019 average and similar to mortality in 2019. During the quarter it has risen to 7.0% above the ten-year average.
- The cumulative mortality improvement for 2020 was -0.1% at the start of the quarter, but fell to -10.9% at the quarter end – far lower than in any other year for which we have weekly data.
- The impact of the pandemic has been greatest for older ages, and for males.

Background

This is the latest in a series of quarterly updates monitoring mortality in England & Wales. It is based on provisional weekly deaths data to 26 June 2020 (i.e. week 26 of 2020), published by the Office for National Statistics (ONS) on 7 July 2020. We intend to publish the next quarterly update, for data to the end of week 39 of 2020, in October 2020.

During the coronavirus pandemic, we are also publishing more regular updates; these are shorter, and focussed on the pandemic. The week 26 update uses the same data as this quarterly monitor, and shows more detail of excess mortality during the past quarter. It includes analysis of the shape of mortality by age during the pandemic, and how mortality has varied by index of multiple deprivation (IMD).

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>.

The same page has “beta” mortality monitor software, which is available to Authorised Users. This enables users to produce their own ad hoc updates to the results of this report.

Notes

We have used our standard approach in producing this report, basing it on data published by the Office for National Statistics. Our calculations rely on data for registered deaths, and we are conscious that during the coronavirus pandemic deaths may have been registered later than in previous years, due to restrictions on movement and increased pressure on the medical profession. Consequently, comparisons of mortality between 2020 and earlier years may not be entirely on a like-for-like basis.

All of our analysis in this update is based on Standardised Mortality Rates (SMRs). These adjust the provisional weekly deaths data published by the Office for National Statistics to control for changes in the size and age and gender distribution of the population over time.

Contents

Charts A, B and C show centred averages of weekly SMRs. The annual averages smooth out seasonal variations. The quarterly averages smooth short-term variations but still show seasonal patterns, allowing the identification of, for example, winters with particularly heavy or light mortality.

Chart D shows cumulative standardised mortality (cSMR) for each year, relative to the average for 2010-2019, and Chart E shows cumulative standardised mortality improvements (cSMRI) for each year (i.e. the progression of annual mortality improvements over the course of each year). Charts D2 and E2 show the same information as charts D and E respectively in a different format and may be easier to interpret for those with colour vision deficiency.



Charts A to E show results for males and females combined, for ages 20-100. Charts F and G show variations in the cSMR and cSMRI by gender and age band.

Full details of the methods used are included in [Working Paper 111](#). Page 11 of this report considers the impact of two aspects of the methods:

- Whether to use deaths data for more or less detailed age bands.
- Whether to revise population estimates to reflect known excess mortality during 2020.

The numerical results underlying the charts are provided in an accompanying spreadsheet, together with further results, including SMRs by gender and age band.

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 quarterly updates.

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This document is categorised as a “Research Report” as defined in the Terms and Conditions.

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.



Smoothed mortality at a point in time

Chart A shows quarterly (13-week) and annual (53-week) centred averages of SMR, since weekly deaths data became available. Note that although we have used data from 31 July 1999 to 26 June 2020, the quarterly and annual averages start 6 and 26 weeks later and stop 6 and 26 weeks earlier.

The annual average SMR shows a fairly steady fall from 1.75% in early 2000 to 1.30% by mid-2011. From mid-2011 to mid-2018, the annual average SMR was fairly flat, remaining within the range from 1.24% to 1.34%, but it reached a new low of 1.20% in 2019. It has since risen rapidly, reaching 1.35% which is higher than any time since mid-2010.

The quarterly average SMR shows that mortality peaks each winter. Winter mortality in 2019/20 was lower than average, and broadly similar to 2018/19. The quarterly average SMR reached a peak of 1.76% in the week to 10 April 2020 (week 15), higher than any time since early 2005, and higher than the quarterly average SMR in week 15 in any other year shown.

Chart A: Quarterly and annual centred average SMRs – whole period

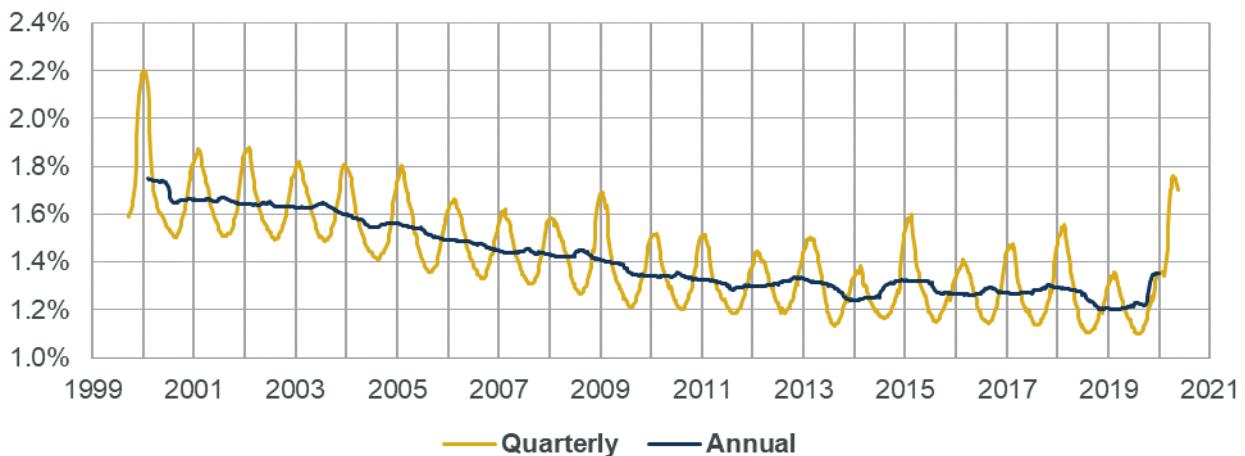


Chart B shows the same information as Chart A, magnified to show the current year and the previous five years more clearly.

Chart B: Quarterly and annual centred average SMRs – current and previous five years

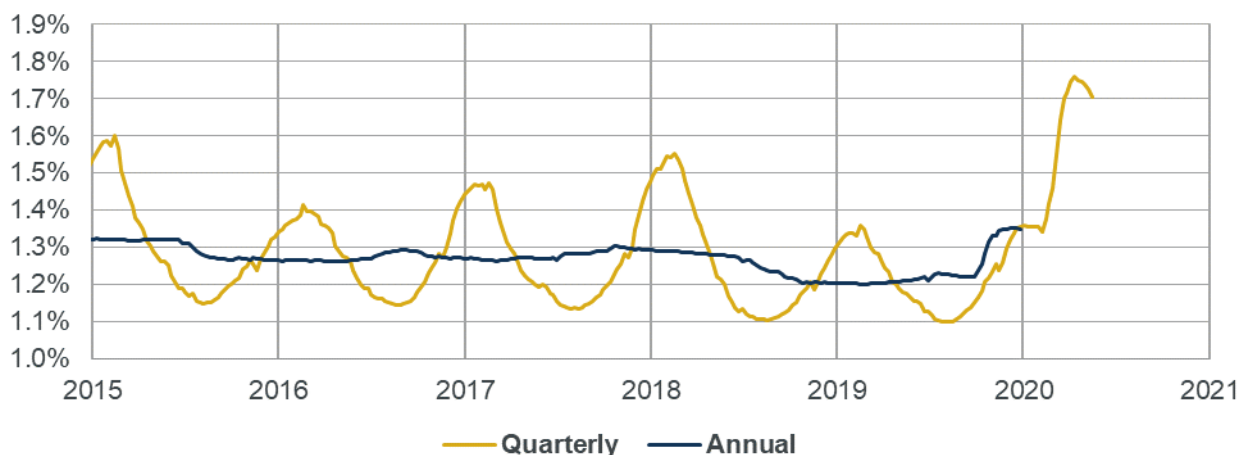
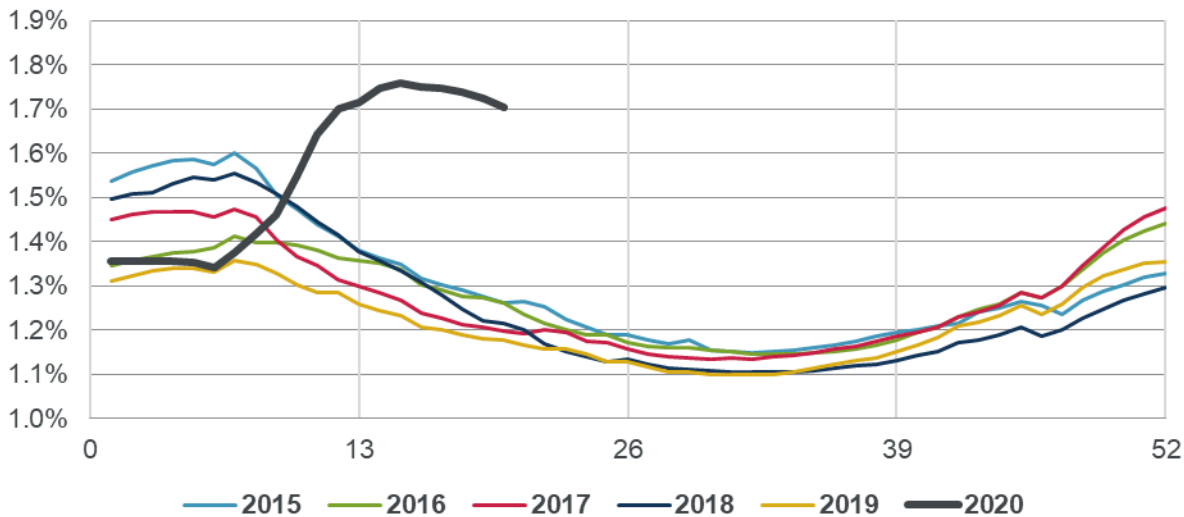




Chart C shows the quarterly average SMRs from Chart B for each year, with values plotted by week number to aid comparison. We note that although lines are labelled by calendar year, the quarterly averages for weeks towards the start and end of each year will be affected by mortality in earlier and later years respectively. The chart again illustrates the relatively low level of mortality in the early part of 2020, and the exceptional level of mortality in the second quarter.

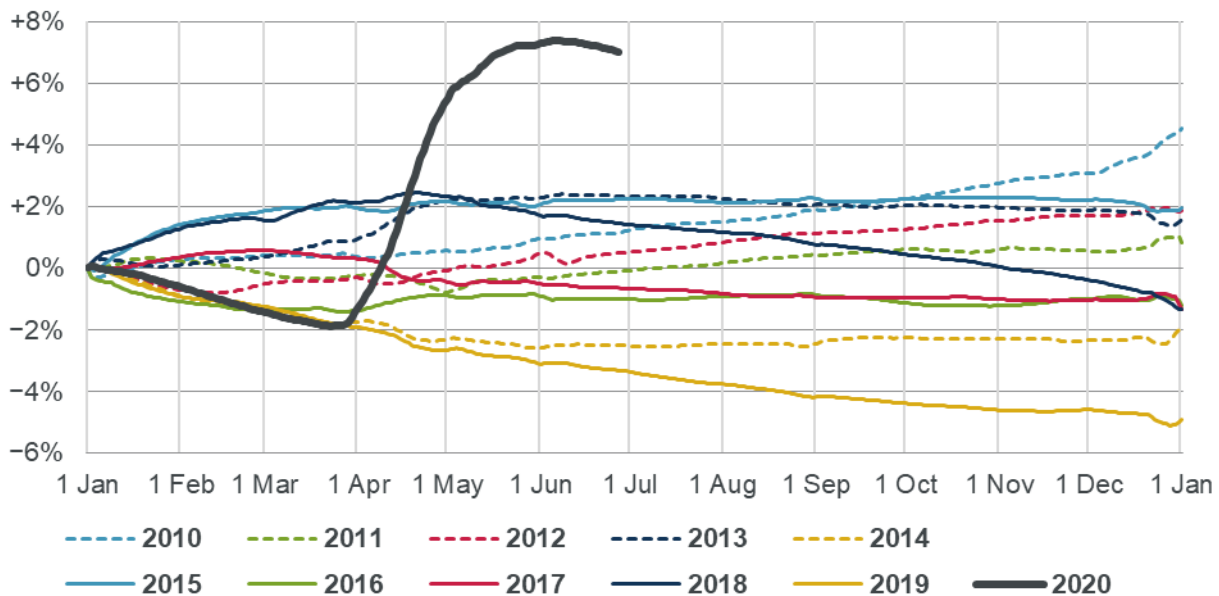
Chart C: Quarterly centred average SMRs, by week number



Cumulative mortality

Chart D shows cumulative standardised mortality rates for the first quarter of 2020 and for the previous ten years compared to the 2010-2019 average. (The calculation method is described in Section 4.2 of Working Paper 111.) Chart D2 (in the appendix) shows the same information in a different format and may be easier for those with colour vision deficiency.

Chart D: Cumulative standardised mortality rate (cSMR) compared to the 2010-2019 average





All years have a value of 0% at the start of the year, by definition, as there has been no mortality at that point of the year; the year-end values show how mortality for each year as a whole compares to the 2010-2019 average; and intermediate points show how mortality has developed during the year, relative to the average. If mortality improvements had been constant throughout the period considered then the lines for each year would form a “fan”, with the end-year values decreasing steadily from year to year. While we saw a decrease of this sort in the years up to 2011, there is no clear pattern to the end-year values for later years, as mortality has been volatile with low improvements. Mortality for complete calendar years was lowest in 2019.

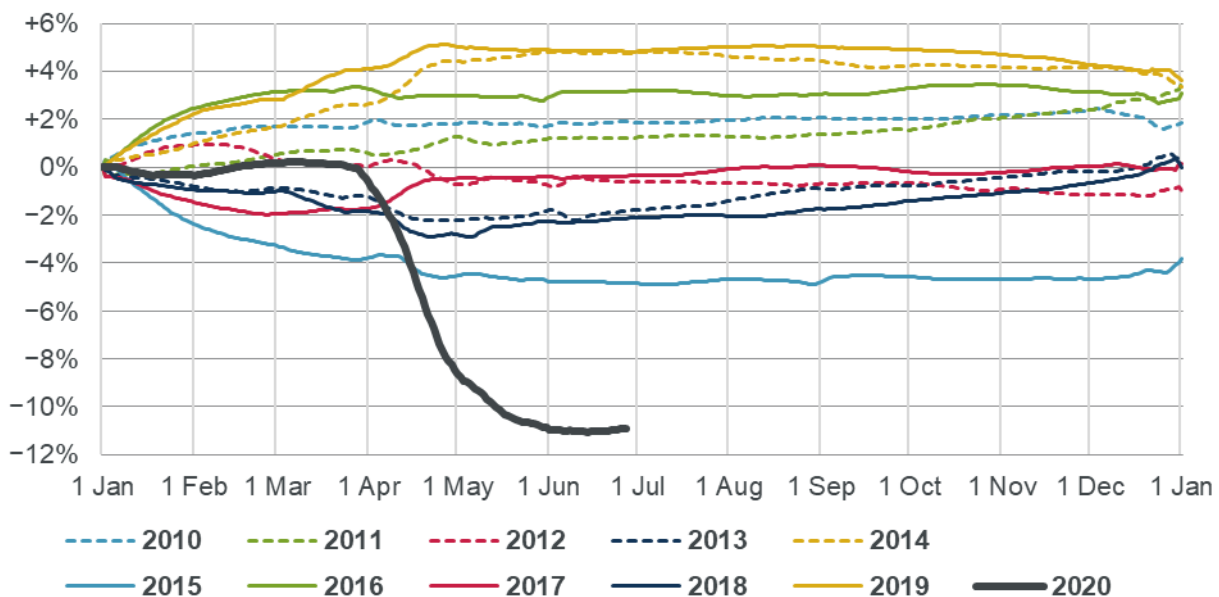
Chart D shows that cumulative standardised mortality in the first quarter of 2020 was well below the ten-year average, and similar to mortality in 2019. Mortality has been above average since then, particularly in April 2020, and cumulative standardised mortality to week 26 is 7.0% above the ten-year average.

Chart E shows the cumulative annual standardised mortality improvement (also described in Section 4.2 of Working Paper 111) for 2020 and for the previous ten years. Chart E2 (in the appendix) shows the same information in a different format and may be easier for those with colour vision deficiency.

All years have a value of 0% at the start of the year, by definition, as there has been no mortality at that point of the year; the year-end values show how mortality for each year as a whole compares to the previous year; and intermediate points show how mortality improvements have developed during the year.

Note that Chart E shows cumulative improvements, so a higher value represents a higher improvement and lower mortality; whereas in Chart D a higher value represents higher mortality.

Chart E: Cumulative annual standardised mortality improvement (cSMRI)



The cumulative mortality improvement for the first quarter of 2020 was -0.1%, but fell to -10.9% at week 26. This is far lower than in any other year shown.

Note that:

- The cumulative values at the end of the year in Charts D and E may not necessarily agree precisely with the corresponding values based on annual data. This is because some weeks span two years, requiring us to estimate in which year those deaths were registered.
- Mortality improvements vary by age (as shown later in this report) and the mortality improvements shown in Chart E are sensitive to the age distribution of the chosen standard population.



Implication for CMI_2020

The exceptional mortality of 2020 to date means that if the next version of the CMI Mortality Projections Model, CMI_2020, is a “business as usual” update then it would be highly unlikely to meet Subscribers’ needs. A mortality of improvement of -10.9% for 2020 would lead to life expectancy at age 65, using S3PxA mortality tables, falling by 4.8% for males and 3.9% for females compared to CMI_2019. This does not reflect our view, or industry expectations, of how life expectancies should respond to recent experience.

Because of that, we are currently considering a number of other options for CMI_2020. We plan to consult with Subscribers in late-summer or early-autumn, and confirm our intentions for CMI_2020 later this year.

The quarterly mortality monitor usually shows possible outcomes from the next version of the Model for different levels of mortality improvement in the current year, assuming no change in method. As there will be some changes for CMI_2020, we have not included that analysis in this report.

Variation by gender and age

Charts F and G shows how cSMR and cSMRI have varied by gender and age band. Tables 1 and 2 show the values at 26 June 2020 (week 26).

Table 1: Cumulative standardised mortality rate (cSMR) compared to the 2010-2019 average, by gender and age-band, at 26 June 2020 (week 26)

Gender	Ages 0-64	Ages 65-84	Ages 85+	Ages 20-100
Male	+5.4%	+6.5%	+9.5%	+7.6%
Female	+3.8%	+4.7%	+8.7%	+6.3%
Combined	+4.8%	+5.7%	+9.1%	+7.0%

Table 2: Cumulative annual standardised mortality improvement (cSMRI), by gender and age-band, at 26 June 2020 (week 26)

Gender	Ages 0-64	Ages 65-84	Ages 85+	Ages 20-100
Male	-6.4%	-11.0%	-13.6%	-11.4%
Female	-5.6%	-9.1%	-12.8%	-10.3%
Combined	-6.1%	-10.2%	-13.2%	-10.9%

For the period from 2010 to 2019:

- The spread of mortality rates over the period from 2010 to 2019 is widest for ages 65-84 and narrowest for ages 85+, for both genders.
- Mortality improvements in the 2010-2019 period have been most volatile for the 85+ age band, particularly for females.

For the first half of 2020:

- Mortality rates and mortality improvements are outside the range of 2010-2019 for males and females for all age bands shown.
- Mortality compared to the 2010-2019 average has been particularly high for males in the 85+ age group, and mortality improvements for that group have been correspondingly low.
- The week 26 mortality monitor analyses mortality during the pandemic for more detailed age bands, and shows that mortality has been lower than usual for ages below 30.



Chart F: Cumulative standardised mortality rate (cSMR) compared to the 2010-2019 average, by gender and age-band

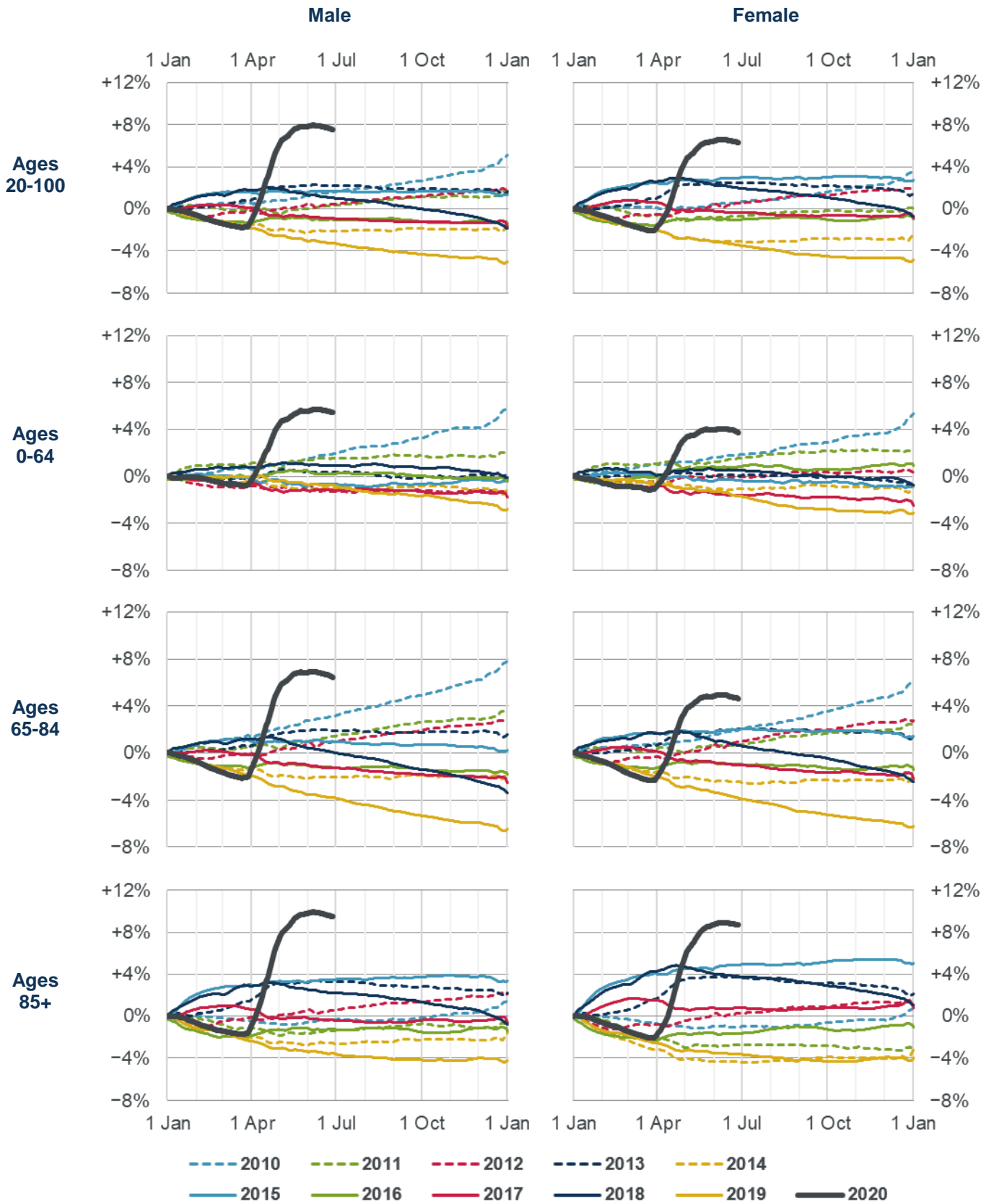
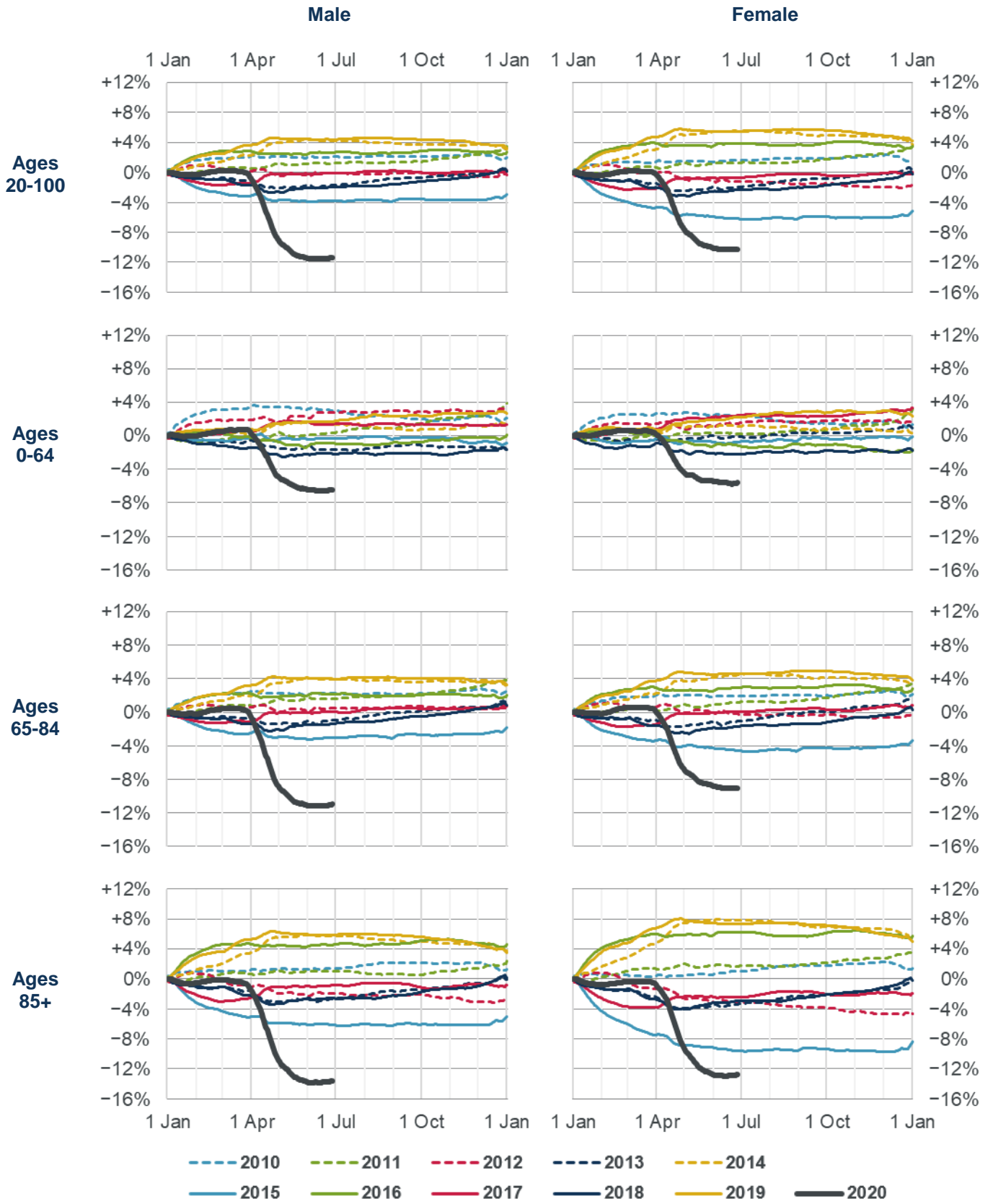




Chart G: Cumulative annual standardised mortality improvement (cSMRI), by gender and age band





Appendix – Accessible versions of charts D and E

Chart D2: Cumulative standardised mortality rate (cSMR) compared to the 2010-2019 average, showing 2010-2020 and highlighting individual years

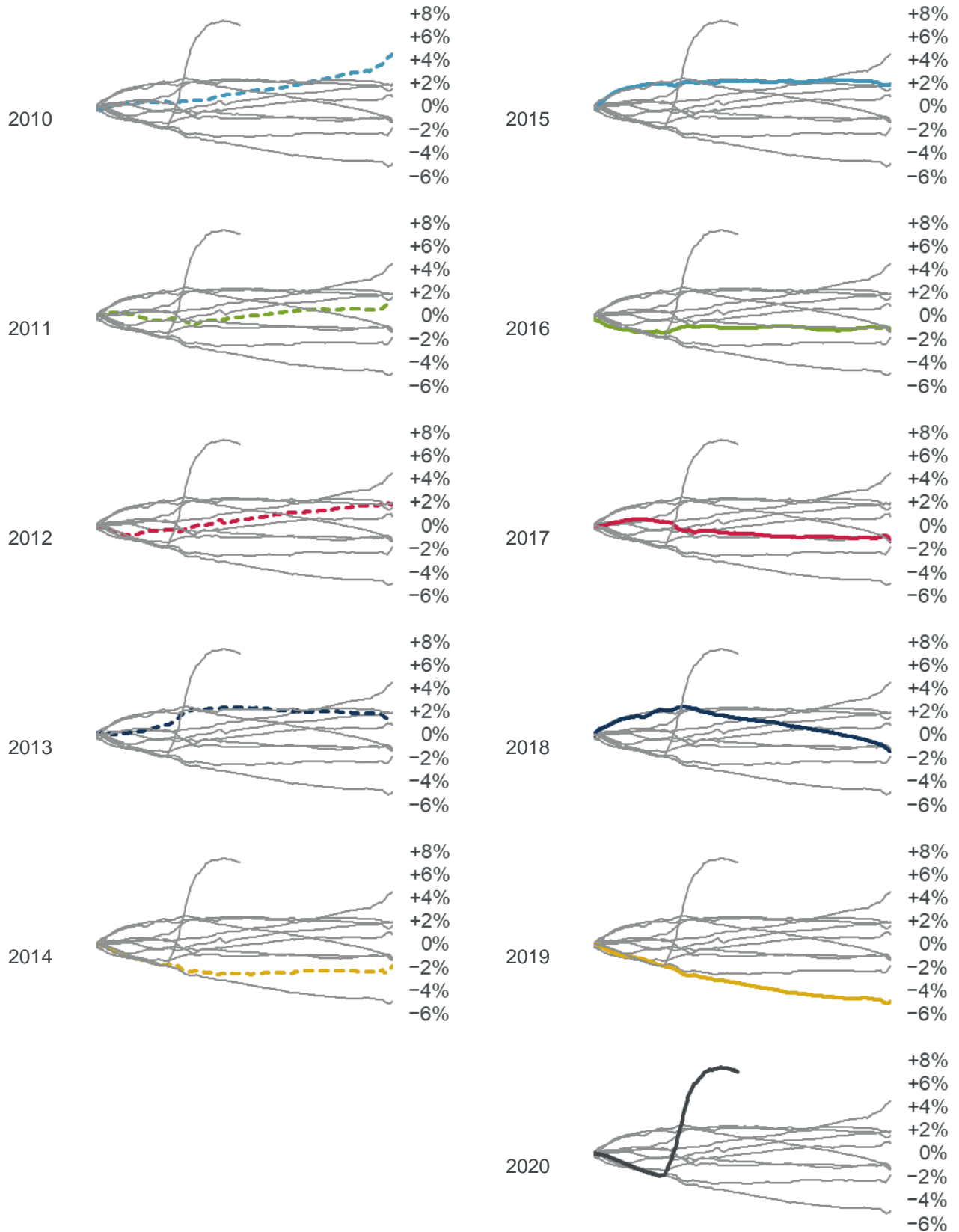
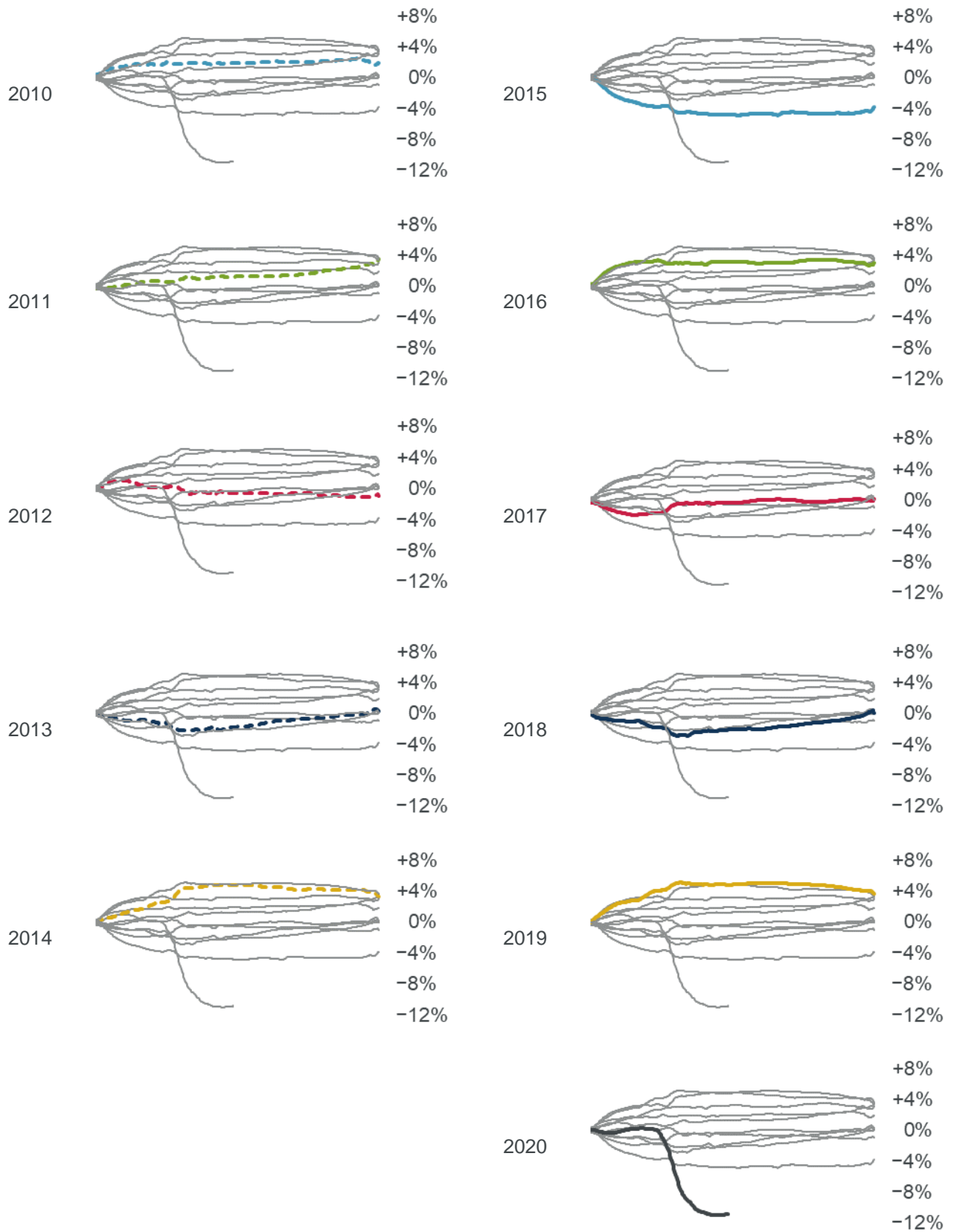




Chart E2: Cumulative annual standardised mortality improvement (cSMRI) for 2010-2020, highlighting individual years





Technical appendix: Impact on SMRs of using ONS data for more detailed age bands

The ONS data for provisional weekly deaths in 2020 uses more detailed age bands than for earlier years. For the mortality monitor, we have grouped the data for 2020 into the broader age bands of earlier years in order to produce consistent results. In this section, we consider the impact on SMRs of using the more or less detailed age bands for 2020 data.

Table 3 shows the relative impact on the SMRs of using the more detailed age bands for 2020. For example:

- The average SMR for males aged 85+ in weeks 1 to 26 of 2020, using the broader age bands, is 22.714%.
- The average SMR for males aged 85+ in weeks 1 to 26 of 2020, using the detailed age bands, is 22.876%.
- The relative change in SMR from using the detailed age bands is $22.876\% \div 22.714\% - 1 = +0.71\%$

Table 3: Relative impact on SMRs of using more detailed age bands for 2020

Age group	20-100	0-64	65-84	85+
Male	+0.31%	+0.04%	+0.01%	+0.71%
Female	+0.01%	+0.10%	-0.08%	+0.05%
Total	+0.18%	+0.06%	-0.03%	+0.42%

The differences between the SMRs are very small for females. They are more noticeable for males, particularly for the 85+ age band. However, even for males aged 85+, the relative difference is less than 1%. We consider this to be acceptable for the purpose of the mortality monitor.



Technical appendix: Impact of not updating population estimates

Section 3.5 of Working Paper 111 notes the Committee’s intention that once figures have been published in the mortality monitor, they will not be restated. In particular, population estimates for mid-2020 were calculated in time for the Q2 2019 mortality monitor and population estimates for mid-2021 were calculated in time for the Q2 2020 mortality monitor.

With hindsight, the higher than expected mortality in 2020 means that these population estimates are too high, and hence SMRs for 2020 are too low.

We have estimated the size of the impact on the SMRs for week 26 of 2020 by comparing SMRs based on two population estimates for that week:

- The “standard” population estimate, based on estimates for mid-2019 and mid-2020, made before the coronavirus pandemic.
- An “adjusted” population estimate, which reduces the standard population estimate at each age by excess deaths during the pandemic.

Table 4 shows the relative impact on the SMRs of adjusting the population estimate. For example:

- The standard SMR for males aged 85+ in week 26 of 2020 is 14.331%.
- The adjusted SMR, reducing the population to allow for excess deaths in 2020, is 14.738%
- The relative increase in SMR caused by the adjustment is $14.738\% \div 14.331\% - 1 = +2.84\%$

The relative impact, rather than the absolute impact, is relevant when considering the impact on the mortality improvement for 2020. If SMRs for all weeks in 2020 were 1.19% higher, then the mortality improvement for the year would be about 1.19% lower. In practice, the difference will be smaller for earlier weeks in 2020, and the difference in later weeks will depend on mortality in the remainder of the year.

Table 4: Relative impact on SMRs of adjusting the 2020 population to allow for excess mortality

Age group	20-100	0-64	65-84	85+
Male	1.30%	0.05%	0.50%	2.84%
Female	1.05%	0.03%	0.31%	2.20%
Total	1.19%	0.04%	0.42%	2.55%

The 2021 population will also be over-estimated, but we should be able to produce a reasonable estimate for 2022 and later years if mortality improvements return to more normal levels (subject to any changes following a likely 2021 census). This could lead to an overestimate of mortality improvements in 2022, corresponding to the under-estimate in 2020.

We have considered whether to adjust the figures to allow for the impact not re-estimating the 2020 population to allow for 2020 mortality, but have decided not to:

- This is consistent with the intention, stated in Working Paper 111, that we would not modify exposure estimates in light of actual experience, or restate published figures in any way.
- While a difference in mortality improvement of 1.26% is quite large, the difference between mortality improvements of (say) -11% and -12% does not change the broad message that the mortality improvement in 2020 has differed greatly from previous years.
- In other years, accurately monitoring the mortality improvement during the year is helpful, as it can be used to predict the results of the next version of the Model. However, this is less important in 2020 as we will amend the method for CMI_2020 to reduce the impact of the exceptional mortality in 2020.



Reliances and limitations

The purpose of the mortality monitor is to provide regular updates on standardised mortality in England & Wales, adjusting ONS data to allow for changes in the size and age of the population. This can be used to inform a view on the outcome of the next version of the CMI Model, in the absence of any change in method.

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 underlying 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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