



England & Wales mortality monitor – end of 2021

Summary

Mortality in 2021 was high, due to the coronavirus pandemic, particularly during the first month of the year. It fell to record lows for the time of year during the second quarter before rising in the second half of the year above the level of recent years apart from 2020.

At the end of 2021, the cumulative standardised mortality rate for 2021 was 1.3% above the 2011-2020 average and 6.9% above 2019, the last full year before the pandemic. The cumulative mortality improvement was +5.7% between 2020 and 2021 and –6.9% between 2019 and 2021.

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 31 December 2021 (i.e. week 52 of 2021), published by the Office for National Statistics (ONS) on 11 January 2022. We intend to publish the next quarterly update, for data to Q1 of 2022, in April 2022.

During the coronavirus pandemic, we are also publishing more regular shorter updates which focus on “excess mortality”. Summary versions are published weekly, with a more detailed version every four or five weeks. The week 52 pandemic monitor update uses the same data as this quarterly monitor, and shows more detail of excess mortality during the past quarter.

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 2021 with 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 2011-2020, 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.

Chart F shows the mortality improvement between 2019 and 2021, consistent with Section 7 of [Working Paper 147](#), which indicates how mortality in 2021 may affect life expectancies produced by CMI_2021.

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

Full details of the methods used are included in [Working Paper 111](#).



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.

Please also see the reliances and limitations, disclaimer, and copyright notice on the final page of this document.

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 31 December 2021, 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 early 2019. It rose rapidly because of the coronavirus pandemic, reaching 1.45% in September 2020, and the latest value is 1.31%.

The quarterly average SMR shows that mortality typically peaks near the start of each year. However during the pandemic the quarterly average SMR peaked at 1.76% in week 15 of 2020; higher than any time since early 2005, and higher than the quarterly average SMR in week 15 in any other year shown. In contrast, the low of 1.06% in week 31 of 2020 is the lowest ever seen. In 2021, the quarterly average SMR reached a peak of 1.73% and a low of 1.08%, both figures being close to the extremes of 2020. The latest value is 1.33%.

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

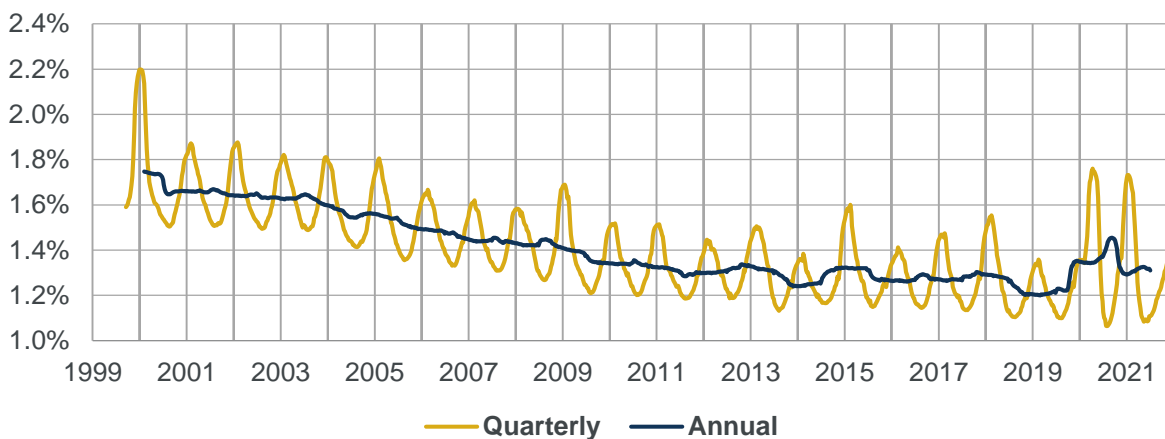


Chart B shows the same information as Chart A, magnified to show the current year and the previous five years more clearly.

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

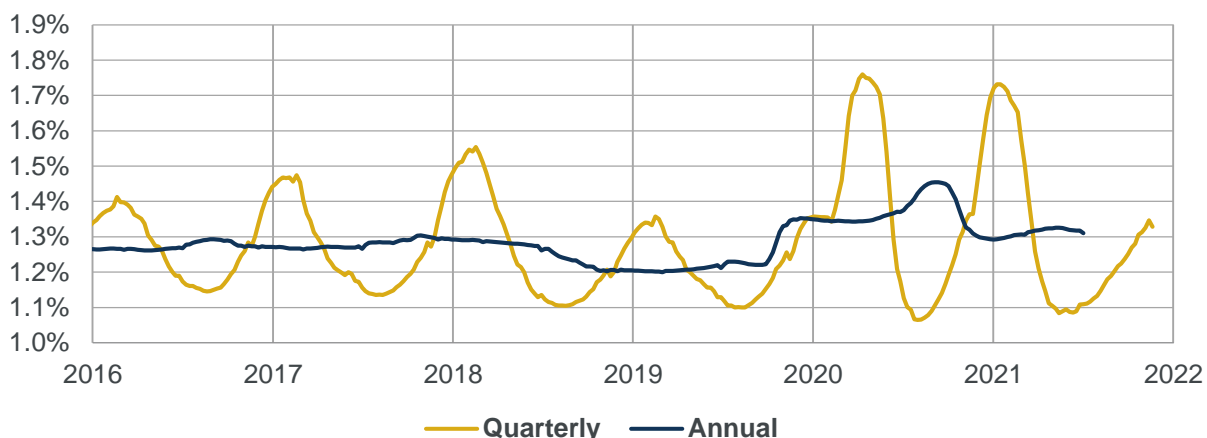
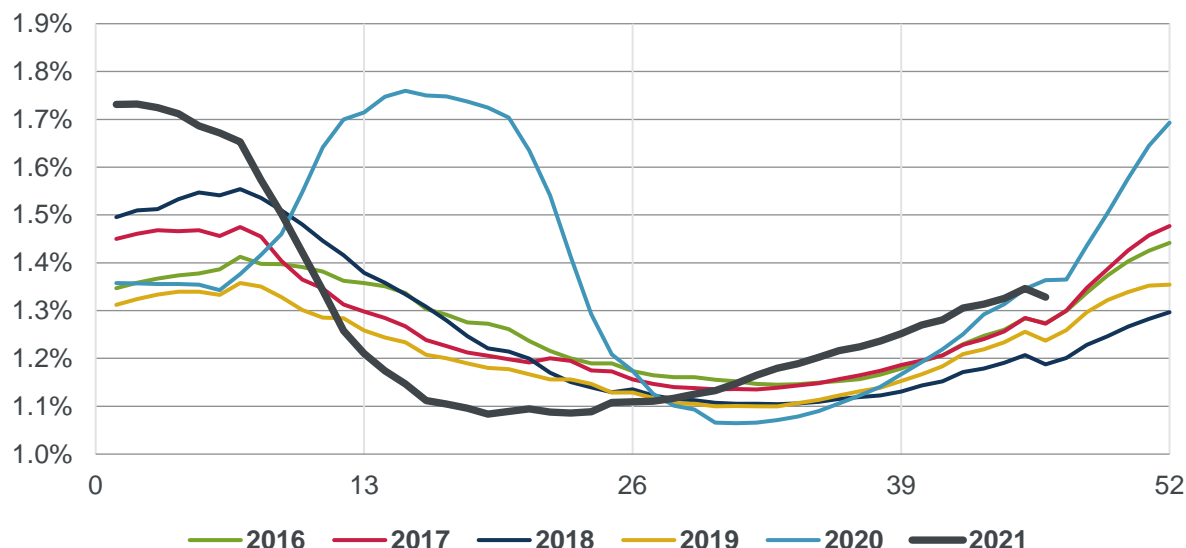


Chart C shows the quarterly average SMRs from Chart B for each year, with values plotted by week number to aid comparison. We note that although lines are labelled by calendar year, the quarterly averages for weeks towards the start and end of each year will be affected by mortality in earlier and later years respectively. The chart again illustrates the exceptional nature of mortality during the pandemic, with highs in Q2 of 2020 and Q1 of 2021, and lows in Q3 of 2020 and Q2 of 2021. The latest figure shown is higher than at the same point in 2016 to 2019, and is slightly lower than at the same point in 2020.

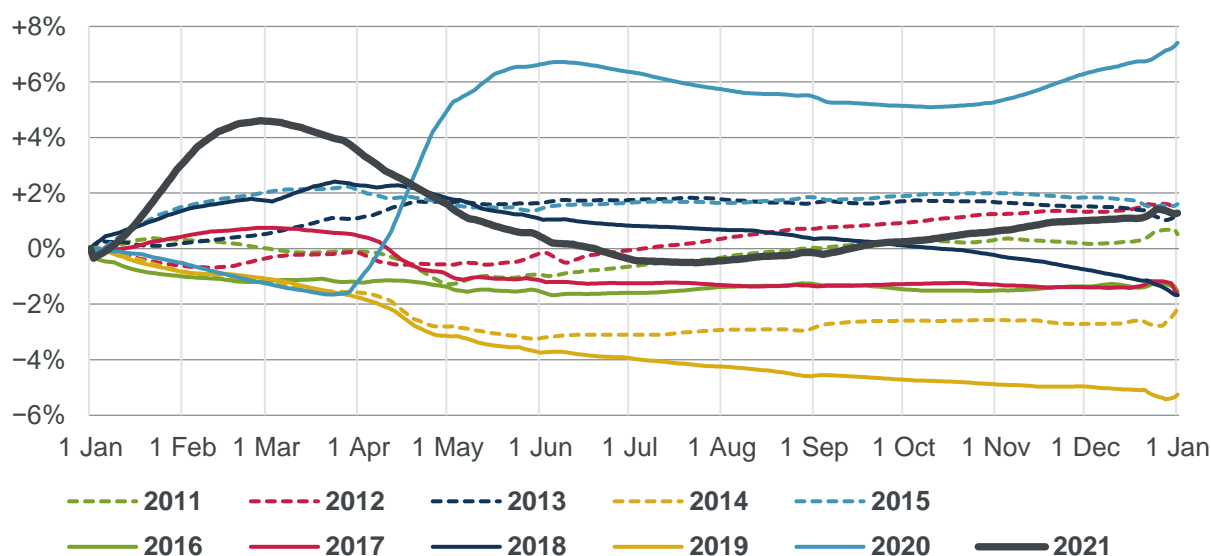
Chart C: Quarterly centred average SMRs, by week number



Cumulative mortality

Chart D shows cumulative standardised mortality rates for the first quarter of 2021 and for the previous ten years compared to the 2011-2020 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 2011-2020 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 2011-2020 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 and highest in 2020 (of the years shown).

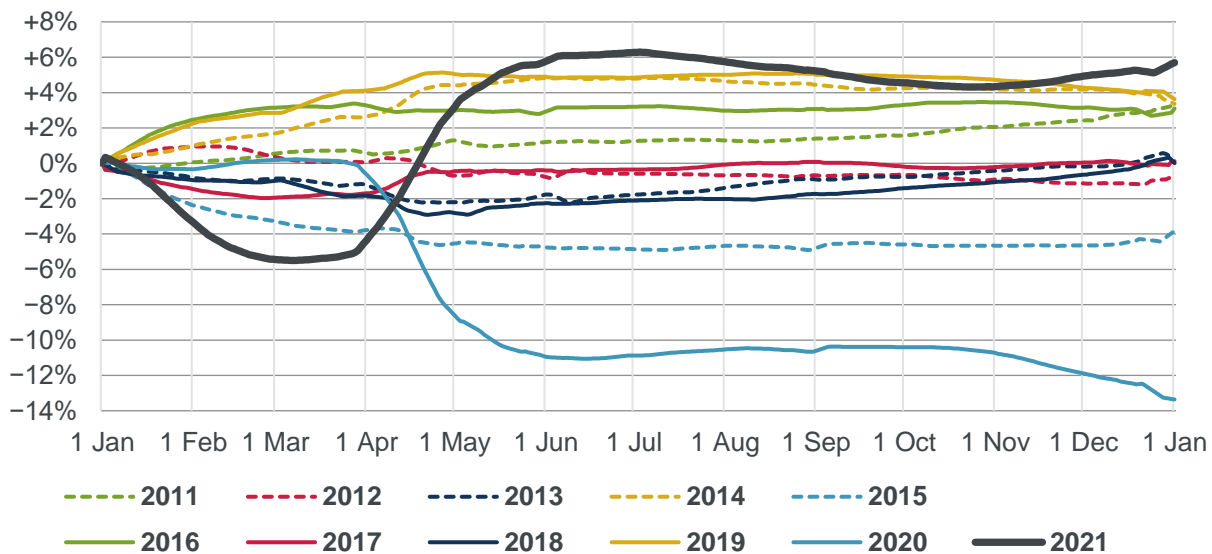
Chart D shows that cumulative standardised mortality in the first quarter of 2021 was well above the ten-year average, continuing the exceptional mortality observed at the end of 2020. Cumulative standardised mortality reached 4.6% above the ten-year average, but fell below the ten-year average by the end of the second quarter. It has since risen to 1.3% above the ten-year average at week 52 of 2021, equivalent to 6.9% above 2019.

Chart E shows the cumulative annual standardised mortality improvement (also described in Section 4.2 of Working Paper 111) for 2021 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 2021, relative to 2020, reached a low of -5.5% in the first quarter, rose to +6.3% during the second quarter, and ended the year at +5.7%.

Note that:

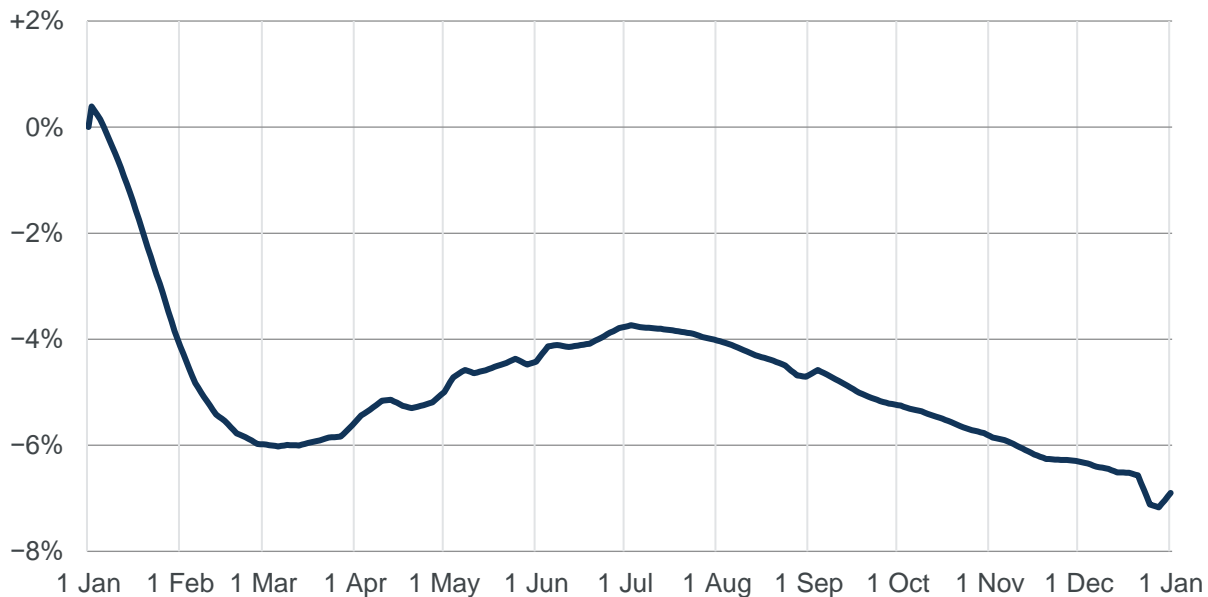
- The cumulative values at the end of the year in Charts D and E may not necessarily agree precisely with the corresponding values based on annual data. This is because some weeks span two years, requiring us to estimate in which year those deaths were registered.
- Mortality improvements vary by age (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.



Chart F shows the cumulative standardised mortality improvement between 2019 and 2021. The calculation in this chart is consistent with the method for 2021 used for Chart E, other than the starting mortality year being 2019 rather than 2020. By comparing to 2019, this chart avoids the uptick in mortality for 2020 seen in Chart E.

For the first two months of 2021, mortality improvements for 2021 compared to 2019 are very similar to the mortality improvements for 2021 shown in Chart E, due to the similarity of mortality at the start of 2019 and 2020. Charts E and F differ materially after the first quarter. The mortality improvement between 2019 and 2021 reached a low point of -6.0% , rose to -3.7% and ended the year at -6.9% .

Chart F: Cumulative standardised mortality improvement between 2019 and 2021



Implication for CMI_2021

The exceptional mortality in 2021 to date means that a version of CMI_2021 that took account of mortality data for 2021 in the usual way would be likely to show substantial falls in life expectancy, which we think would be in excess of what most users of the Model would consider reasonable.

Because of that, we will place no weight on the mortality data for 2020 or 2021 in the Core version of CMI_2021. [Working Paper 157](#) has further information on this decision.

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 mortality in 2021 will not influence the results of CMI_2021, due to no weight being placed on it, we have not included that analysis in this report.

Variation by gender and age

Charts G and H shows how cSMR and cSMRI have varied by gender and age band. Tables 2 and 3 show the values at 31 December 2021.

Table 2: Cumulative standardised mortality rate (cSMR) compared to the 2011-2020 average, by gender and age-band, at 31 December 2021

Gender	Ages 0-64	Ages 65-84	Ages 85+	Ages 20-100
Male	+12.0%	+0.6%	−1.4%	+1.6%
Female	+7.8%	+0.1%	−0.6%	+0.9%
Combined	+10.4%	+0.4%	−1.1%	+1.3%

Table 3: Cumulative annual standardised mortality improvement (cSMRI), by gender and age-band, at 31 December 2021

Gender	Ages 0-64	Ages 65-84	Ages 85+	Ages 20-100
Male	−3.4%	+6.0%	+9.8%	+6.1%
Female	−2.7%	+4.3%	+8.2%	+5.1%
Combined	−3.1%	+5.3%	+9.1%	+5.7%

For the period from 2011 to 2020:

- The spread of mortality rates is widest for ages 65-84 and narrowest for ages 0-64, for both genders.
- Mortality improvements have been most volatile for the 85+ age band.

In 2021:

- Cumulative relative mortality rates for males and females ages 65-84 and 85+ reached a peak in the first quarter and have since fallen. For these age groups, the peak is lower than observed at the peak of the first wave of the pandemic in the second quarter of 2020.
- In contrast, cumulative relative mortality rates for males and females ages 0-64 have passed the peak of the first wave in 2020 and continued to rise.
- Cumulative mortality improvements (relative to 2020) at the end of the year vary significantly by age, being negative for ages 0-64, but strongly positive for older age groups.



Chart G: Cumulative standardised mortality rate (cSMR) compared to the 2011-2020 average, by gender and age-band

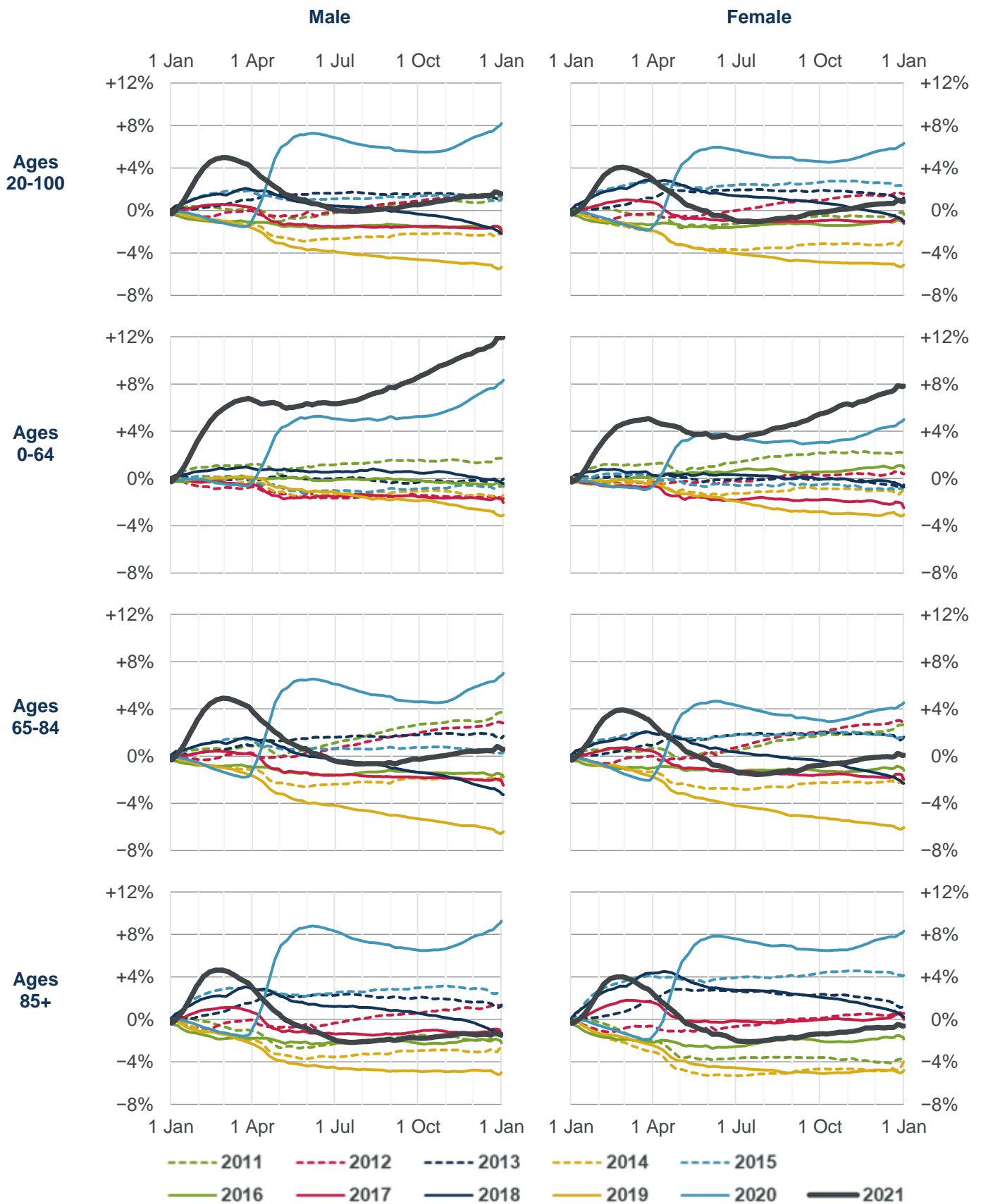
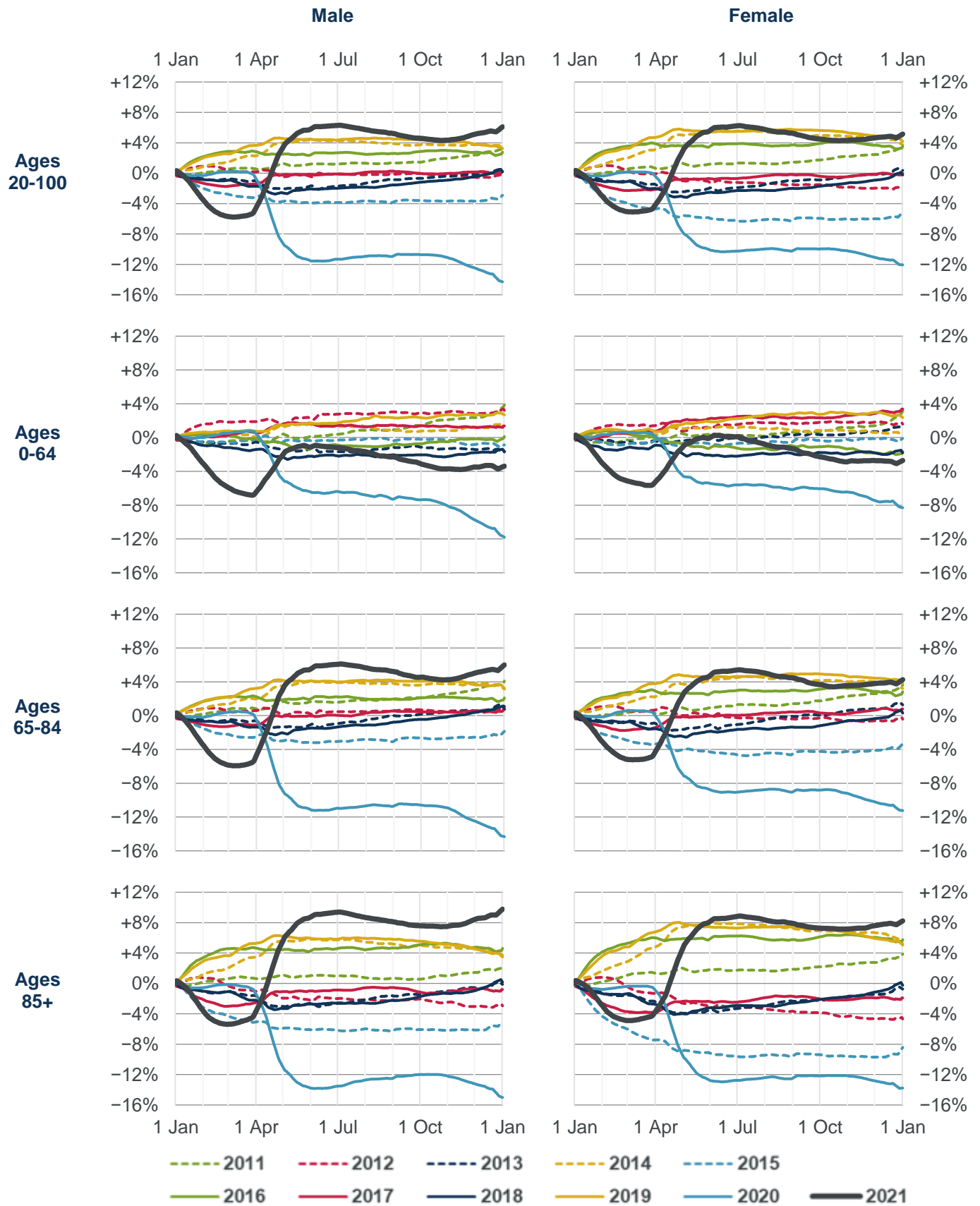




Chart H: Cumulative annual standardised mortality improvement (cSMRI), by gender and age band



Appendix – Accessible versions of charts D and E

Chart D2: Cumulative standardised mortality rate (cSMR) compared to the 2011-2020 average, showing 2011-2021 and highlighting individual years

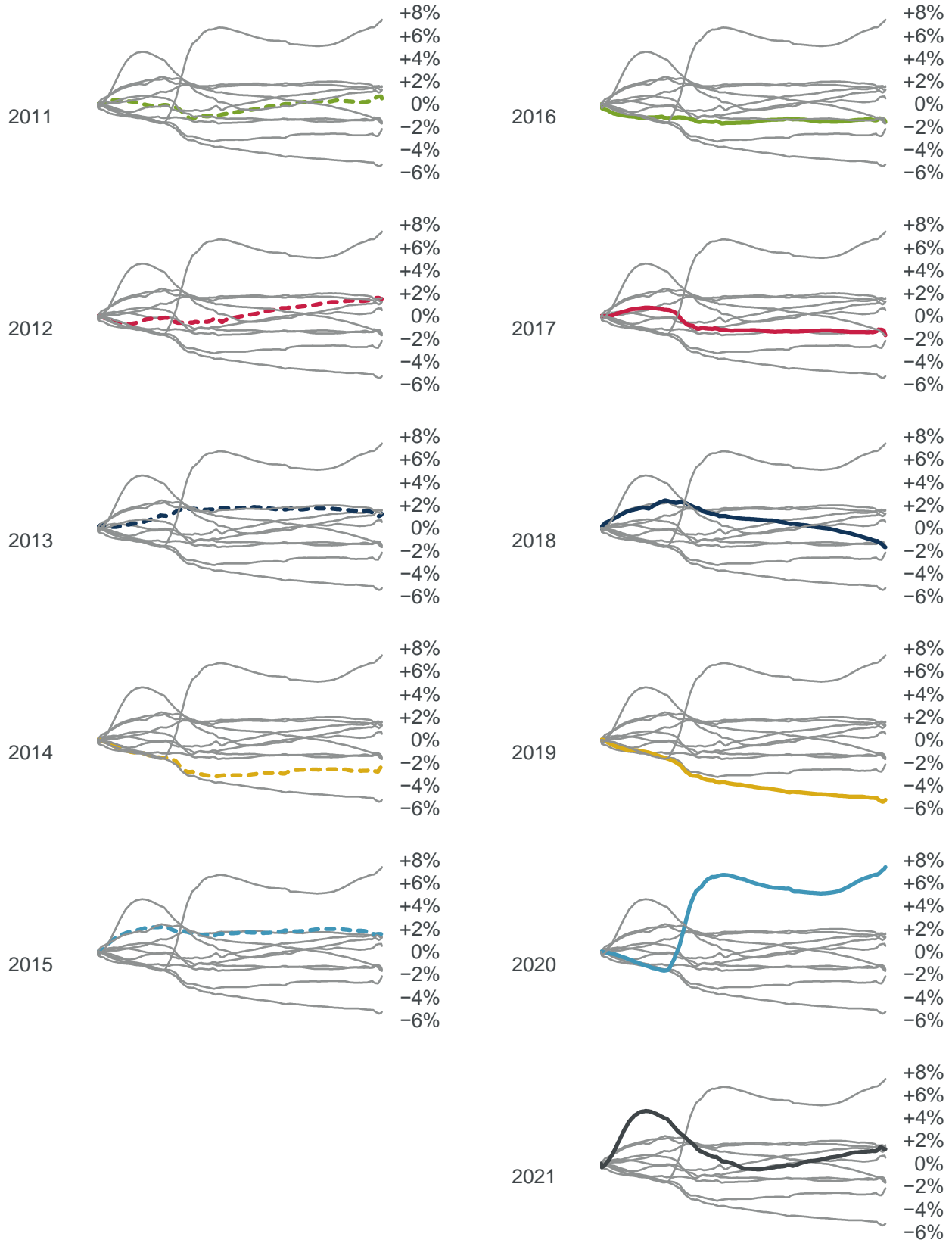
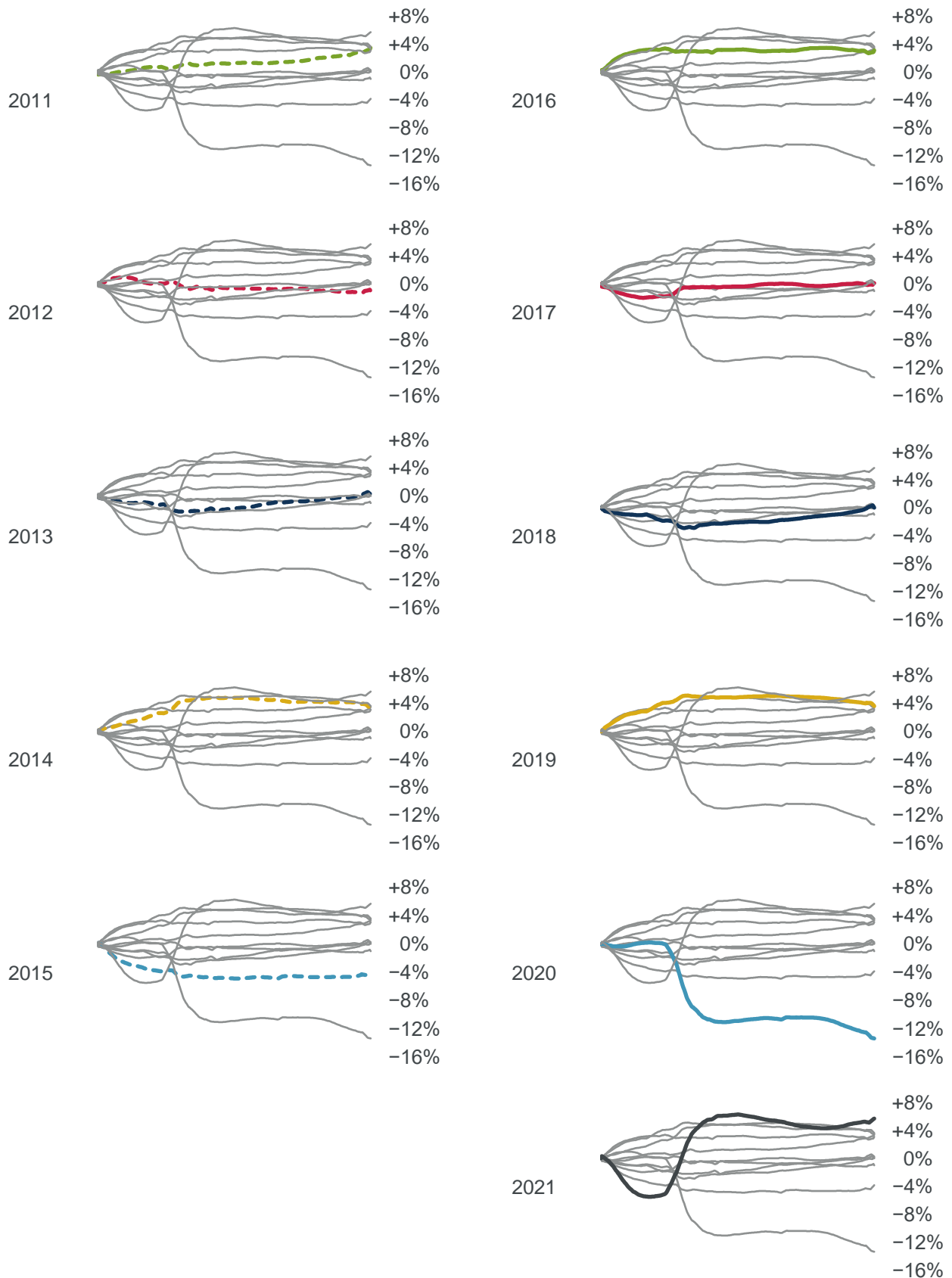




Chart E2: Cumulative annual standardised mortality improvement (cSMRI) for 2011-2021, highlighting individual years





Reliances and limitations

The purpose of the mortality monitor is to provide regular updates on standardised mortality in England & Wales, adjusting ONS data to allowing 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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