



## England & Wales mortality monitor – end of 2022

### Summary

Mortality in the second half of 2022 was higher than in the second half of any year since 2010.

For 2022 as a whole, mortality was lower than in 2020 or 2021, but higher than in 2019.

At the end of 2022, the cumulative standardised mortality rate for 2022 was 0.8% below the 2012-2021 average but 4.5% above 2019, the last full year before the pandemic.

### Background

This is the latest in a series of quarterly updates monitoring mortality in England & Wales. It is based on provisional weekly deaths data published by the Office for National Statistics (ONS) up to 6 January 2023 (i.e. week 1 of 2023) on 17 January 2023. We intend to publish the next quarterly update, for data to Q1 of 2023, in April 2023.

We are also publishing weekly updates which focus on “excess mortality”. Summary versions are published weekly, with a more detailed version every quarter. The monitor for week 1 of 2023 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 the timing of registration of deaths may have differed from previous years. Consequently, comparisons of mortality between years may not be entirely on a like-for-like basis.

Our calculations do not take account of the 2021 census in England & Wales. [Our blog](#) discusses the implications of the initial census results. We intend to analyse the impact of the census on the mortality monitor once the ONS has published revised mid-year population for mid-2012 to mid-2020, expected in early 2023.

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 2012-2021, 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 2022, consistent with Section 7 of [Working Paper 147](#), which indicates how mortality in 2022 may affect life expectancies produced by CMI\_2022 in the absence of a change in method. However, we note that the CMI is due to consult with Authorised Users of the Model shortly on the method and parameters to use for CMI\_2022.



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.

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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 31 December 2022, 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, but has since fallen. The latest value is 1.29%.

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 and 1.73% in weeks 1 and 2 of 2021. In contrast, the low of 1.06% in week 31 of 2020 was the lowest ever seen. In 2022, the highest quarterly average SMR was 1.38% in week 47, the latest value. The low of 1.20% in week 32 was unusually high compared to recent years.

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

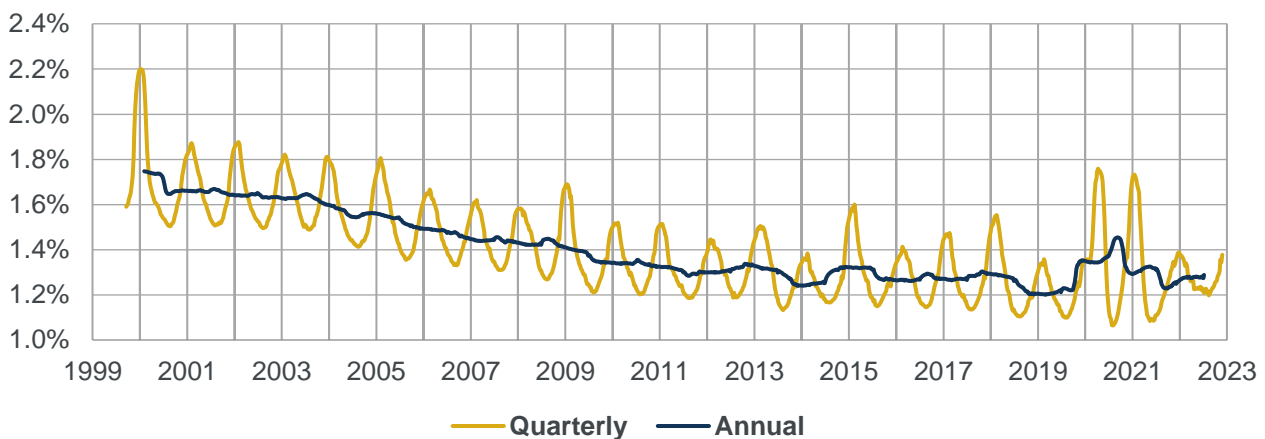


Chart B shows the same information as Chart A, magnified to show the current year and the previous five years more clearly.

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

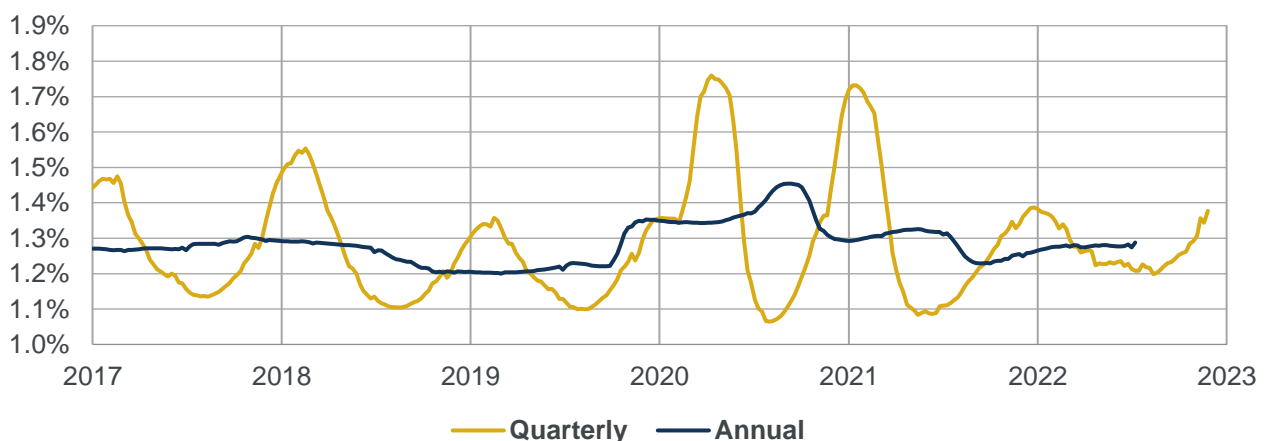
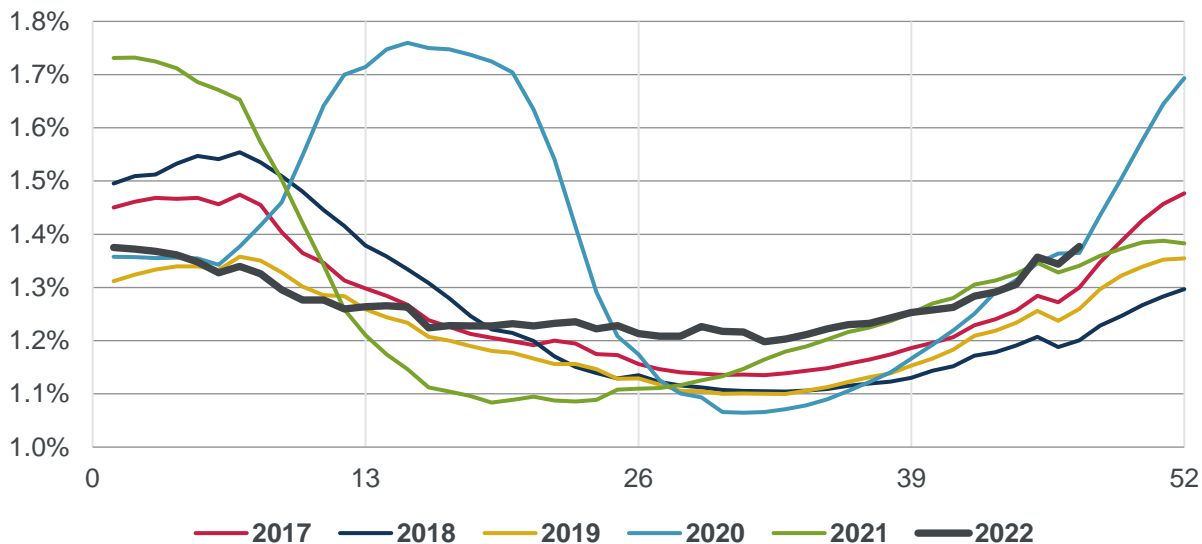


Chart C shows the quarterly average SMRs from Chart B for each year, with values plotted by week number to aid comparison. Although lines are labelled by calendar year, the quarterly averages for weeks towards the start and end of each year will be affected by mortality in earlier and later years respectively. 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. Mortality was unusually high in the summer of 2022 and the Q3 average was the highest seen since 2010. The latest figure shown is higher than at the same point of any year since 2010.

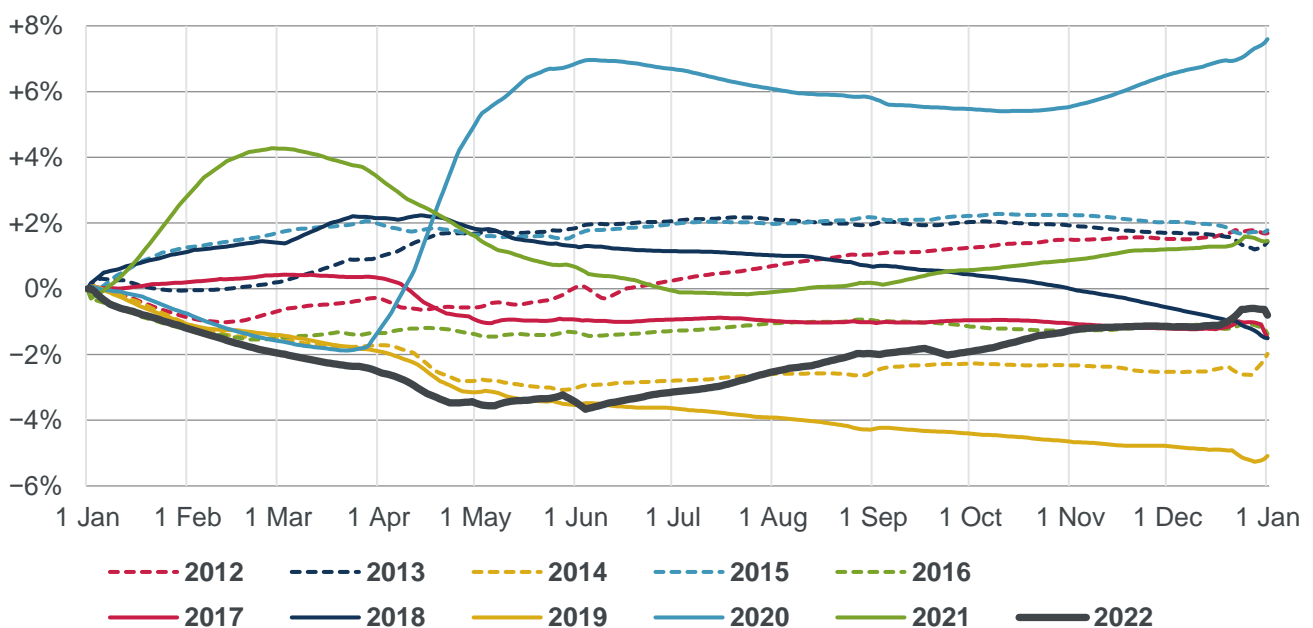
**Chart C: Quarterly centred average SMRs, by week number**



## Cumulative mortality

Chart D shows cumulative standardised mortality rates for 2022 and the previous ten years compared to the 2012-2021 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 2012-2021 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 2012-2021 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).

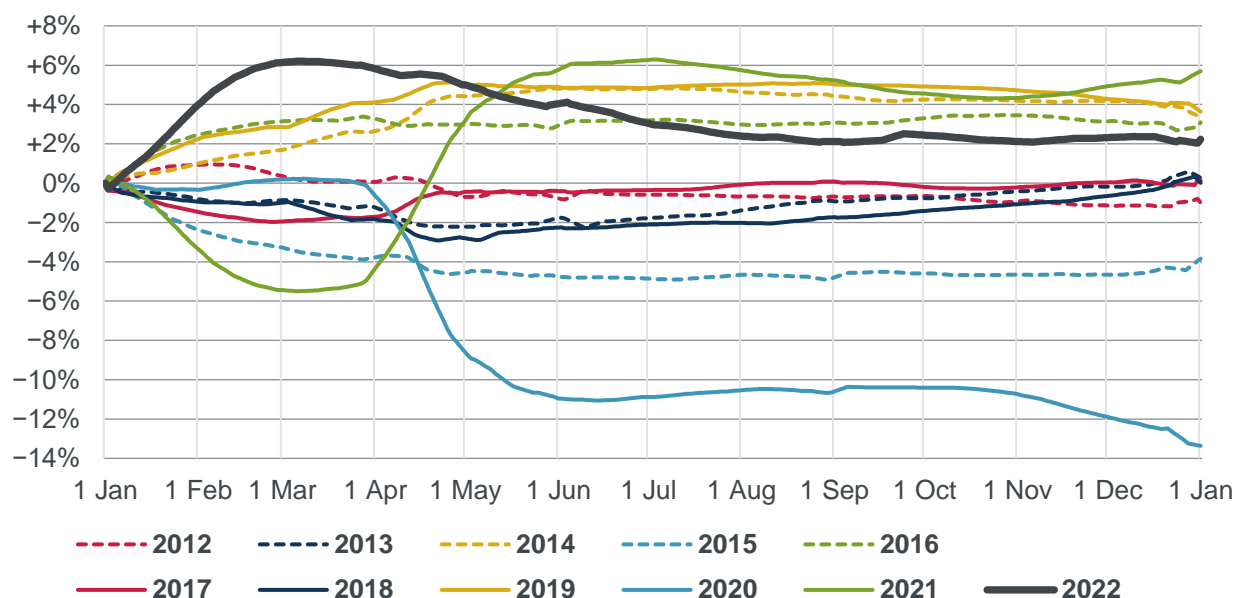
Chart D shows that cumulative standardised mortality in the first four months of 2022 was well below the ten-year average. Cumulative standardised mortality reached a low of 3.7% below the ten-year average, but rose during the rest of the year. It ended the year at 0.8% below the ten-year average, equivalent to 4.5% above 2019.

Chart E shows the cumulative annual standardised mortality improvement (also described in Section 4.2 of Working Paper 111) for 2022 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 2022, relative to 2021, reached a high of +6.2% in the first quarter, but subsequently fell and ended the year at +2.2%.

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 2022. The calculation in this chart is consistent with the method for 2022 used for Chart E, other than the starting mortality year being 2019 rather than 2021.

For the first five months of 2022, mortality was broadly similar to 2019 so the mortality improvements compared to 2019 were small. Since then, mortality deteriorated relative to 2019 and the mortality improvement between 2019 and 2022 ended the year at  $-4.5\%$ .

**Chart F: Cumulative standardised mortality improvement between 2019 and 2022**



### Implication for CMI\_2022

The exceptional mortality in 2020 and 2021 led the CMI to place no weight on that data in the Core version of CMI\_2021.

The CMI is minded to place some weight on data for 2022 in CMI\_2022 and intends to consult with Authorised Users of the Model later in January 2023, on its proposed method and parameter values for CMI\_2022. We intend to publish CMI\_2022 by the end of June 2023. This is later than usual in order to incorporate revised population estimates figures for mid-2012 to mid-2020, which the ONS plans to publish to take account of the results of the 2021 census.

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. However, as the method for CMI\_2022 has not been confirmed at this stage, 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 2022.

**Table 2: Cumulative standardised mortality rate (cSMR) compared to the 2012-2021 average, by gender and age-band, at 31 December 2022**

	0-64	65-84	85+	20-100	20-44	45-64	65-74	75-84
Male	+1.7%	-2.6%	+0.6%	-0.7%	+3.2%	+1.5%	-0.6%	-3.7%
Female	+1.5%	-1.9%	-0.8%	-1.0%	+6.0%	+0.8%	-1.0%	-2.5%
Combined	+1.6%	-2.3%	-0.0%	-0.8%	+4.2%	+1.2%	-0.8%	-3.2%

**Table 3: Cumulative annual standardised mortality improvement (cSMRI), by gender and age-band, at 31 December 2022**

	0-64	65-84	85+	20-100	20-44	45-64	65-74	75-84
Male	+7.8%	+4.0%	-2.0%	+2.4%	+5.5%	+8.8%	+3.8%	+4.2%
Female	+5.2%	+2.8%	-0.1%	+1.9%	+2.4%	+6.1%	+3.5%	+2.4%
Combined	+6.8%	+3.5%	-1.1%	+2.2%	+4.4%	+7.7%	+3.7%	+3.4%

For the period from 2011 to 2019:

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

Mortality rose during 2020 and 2021 due to the coronavirus pandemic:

- For ages 65 and above, mortality was higher in 2020 than in 2021.
- For ages 0-64, mortality was higher in 2021 than in 2020.

In 2022:

- Cumulative mortality rates for the older age groups are below the 2012-2021 average, but those for 20-44 are well above the 2012-2021 average.
- Cumulative mortality improvements are positive for almost all groups (the exception being the 85+ age group for both males and females) and are particularly high for the 45-64 age group.



Chart G: Cumulative standardised mortality rate (cSMR) compared to the 2012-2021 average, by gender and age-band

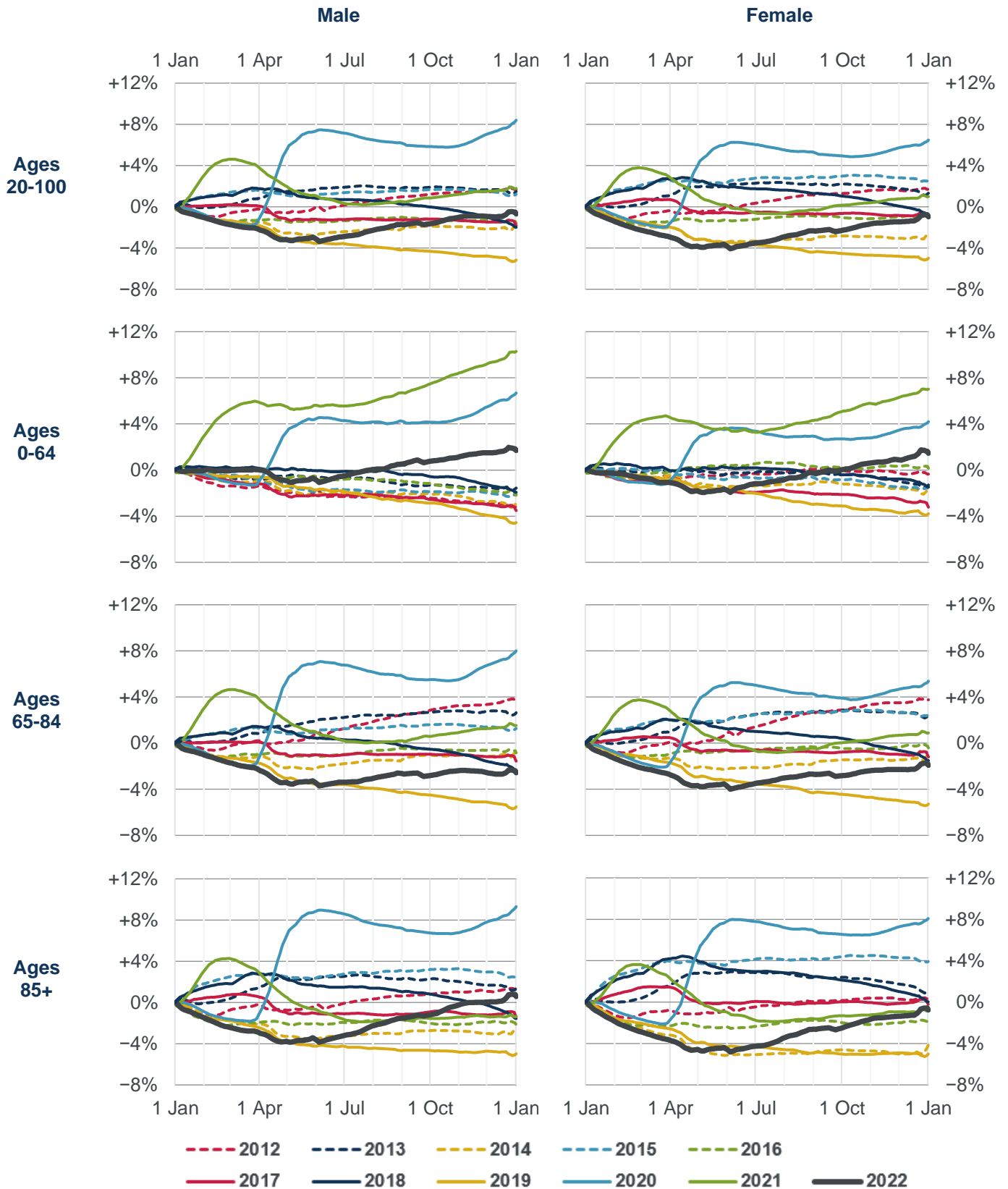




Chart G (cont): Cumulative standardised mortality rate (cSMR) compared to the 2012-2021 average, by gender and age-band

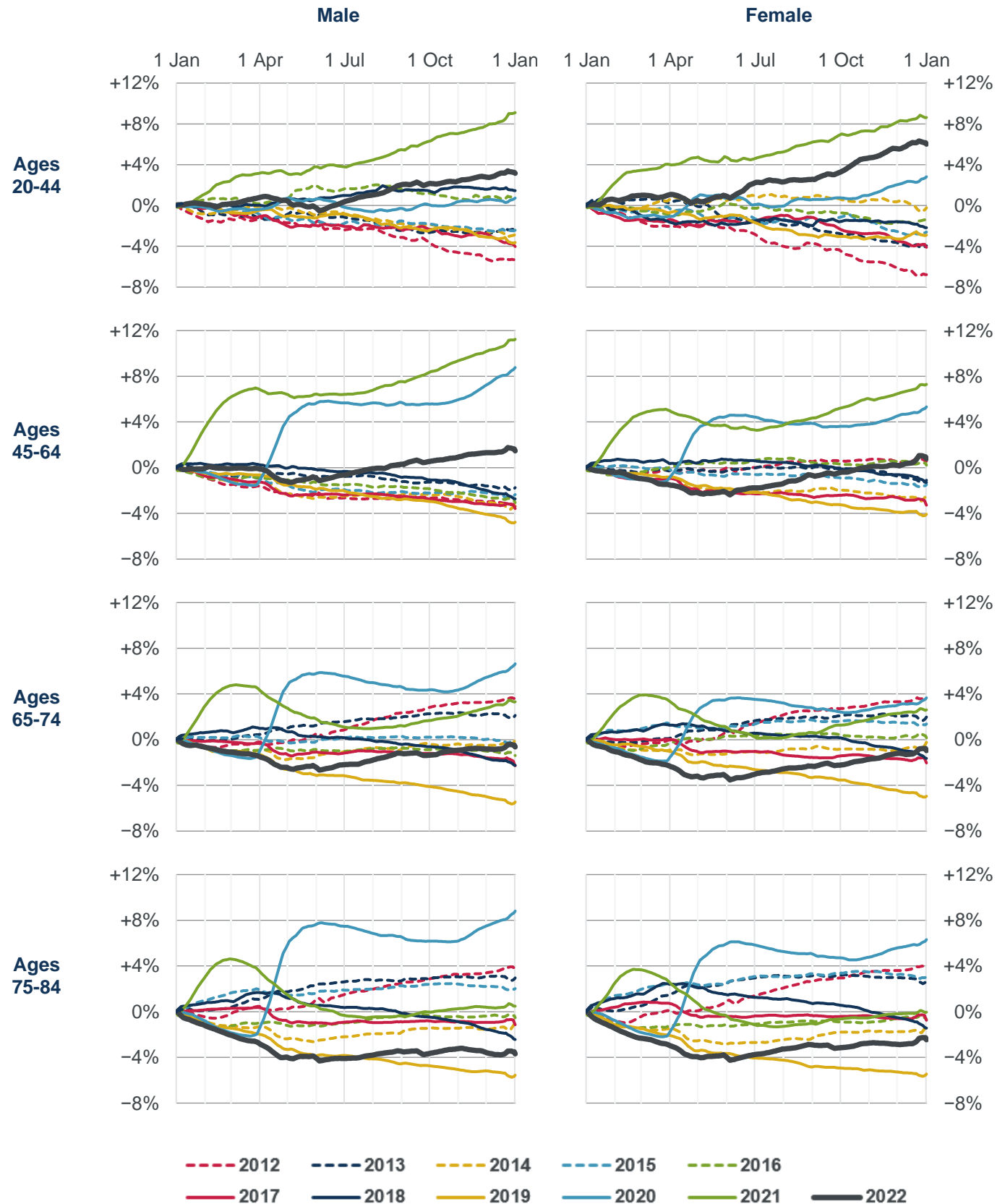




Chart H: Cumulative annual standardised mortality improvement (cSMRI), by gender and age band

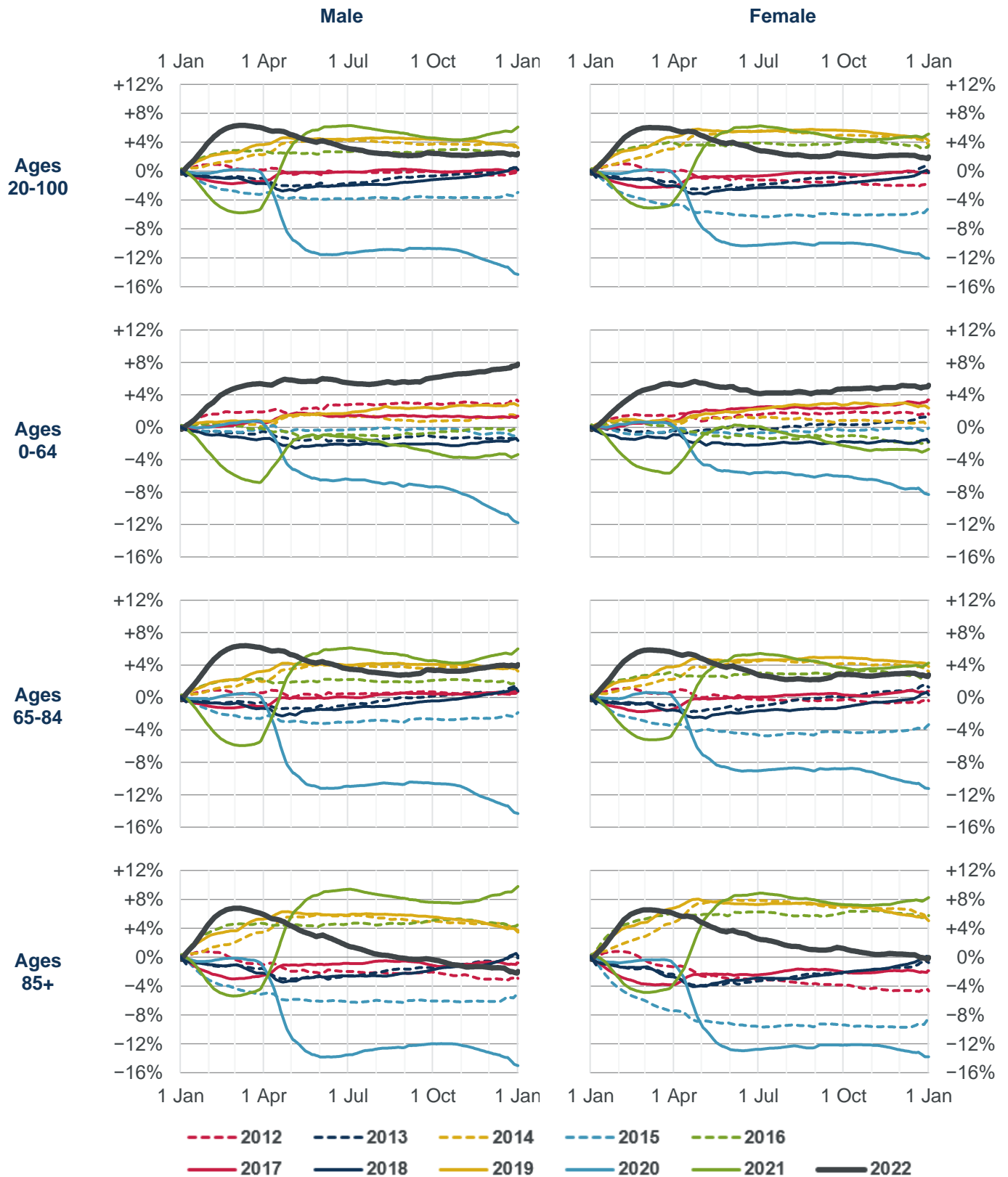
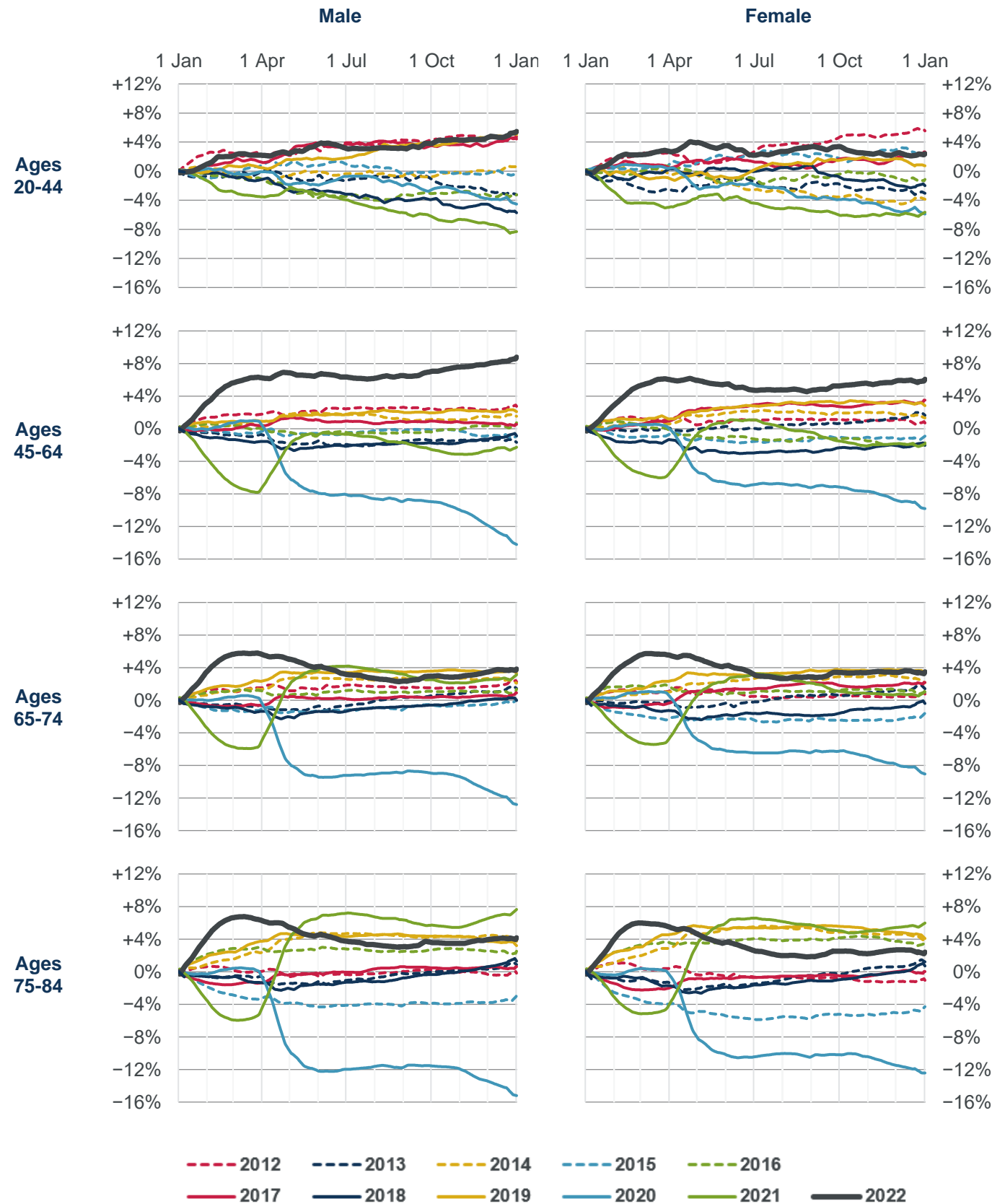




Chart H (cont): Cumulative annual standardised mortality improvement (cSMRI), by gender and age band





## Appendix – Accessible versions of charts D and E

Chart D2: Cumulative standardised mortality rate (cSMR) compared to the 2012-2021 average, showing 2012-2022 and highlighting individual years

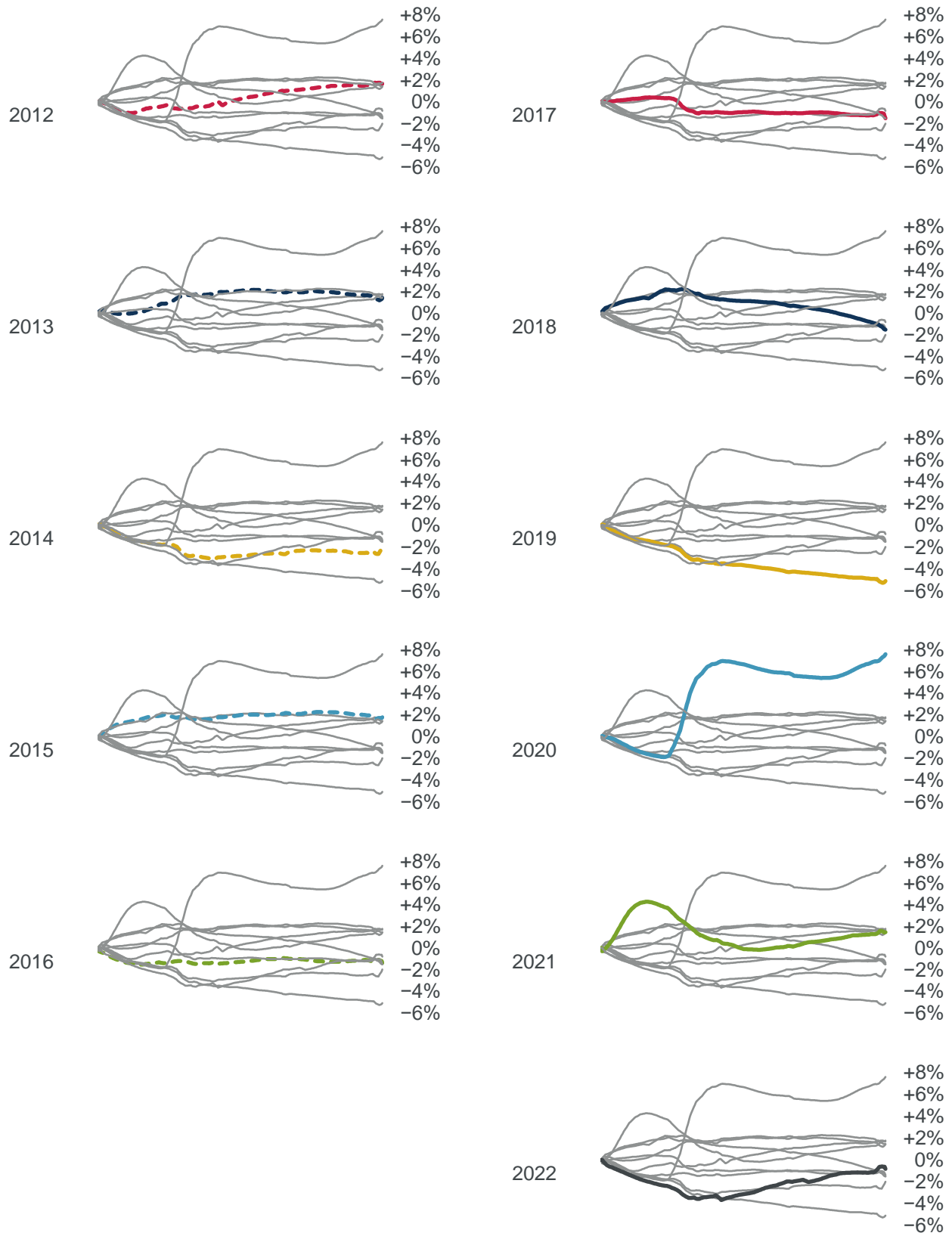




Chart E2: Cumulative annual standardised mortality improvement (cSMRI) for 2012-2022, highlighting individual years





## 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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