



England & Wales mortality monitor – Q3 2022

Summary

Mortality in the third quarter of 2022 has been unusually high for the time of year – higher than in any third quarter since 2010.

At the end of the third quarter of 2022, the cumulative standardised mortality rate for 2022 was 2.2% below the 2012-2021 average, but 2.6% above 2019.

The cumulative mortality improvement for 2022 was +2.4% at the end of the third quarter of 2022.

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 30 September 2022 (i.e. week 39 of 2022), published by the Office for National Statistics (ONS) on 11 October 2022. We intend to publish the next quarterly update, for data to the end of 2022, in January 2023.

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 quarterly. The week 39 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 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 160](#), which indicates how mortality in 2022 may affect life expectancies produced by 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](#), and 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 30 September 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, but has since fallen. The latest figure is 1.27%.

The quarterly average SMR shows that mortality peaks each winter. Winter mortality in 2021/22 was broadly similar to the 2018/19 and 2019/20 winters, all of which had mortality considerably below the COVID peaks in spring 2020 and winter 2020/21. The latest value for the quarterly SMR is 1.20%.

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

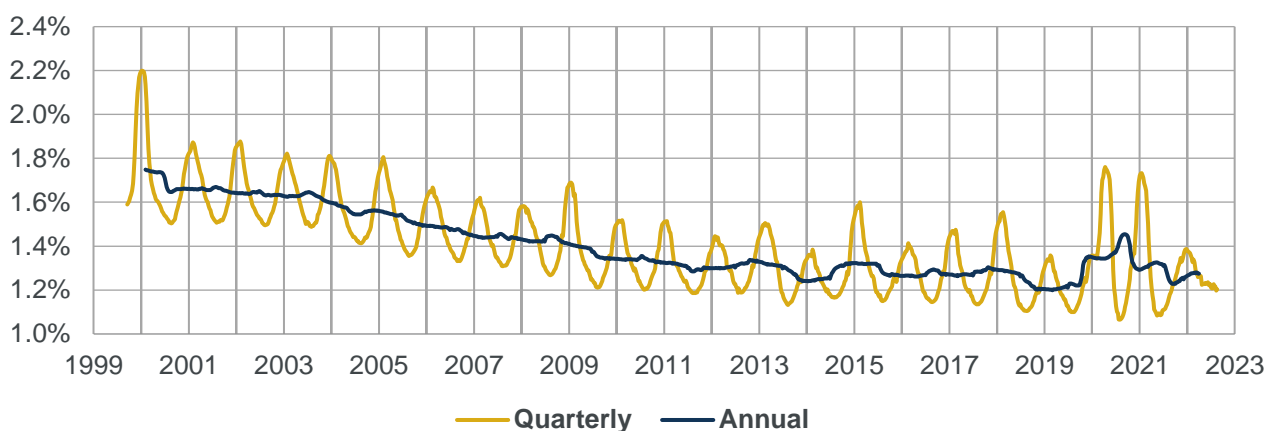


Chart B shows the same information as Chart A, magnified to show the current year and the previous five years more clearly.

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

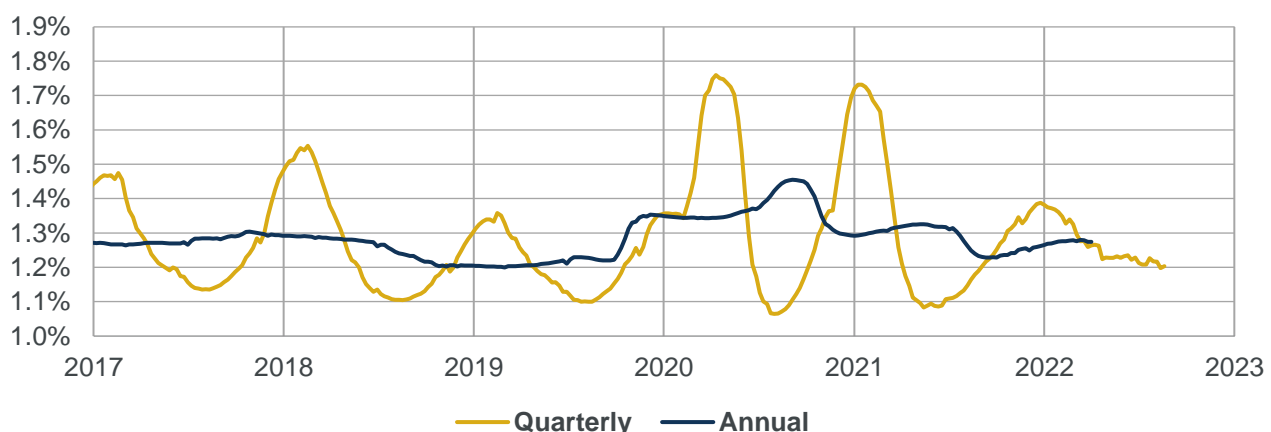
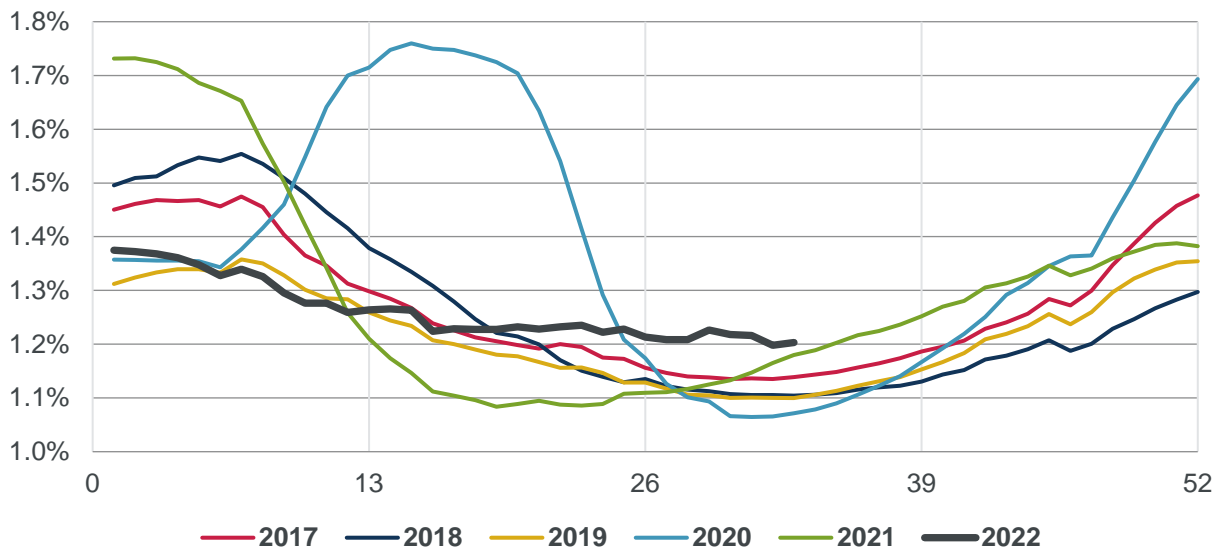


Chart C shows the quarterly average SMRs from Chart B for each year, with values plotted by week number to aid comparison. We note that although lines are labelled by calendar year, the quarterly averages for weeks towards the start and end of each year will be affected by mortality in earlier and later years respectively. Mortality in the first quarter of 2022 was low compared to previous years, but mortality in the third quarter of 2022 was higher than in any third quarter since 2010. The chart also shows the exceptional level of mortality in the second quarter of 2020, the fourth quarter of 2020 and the first quarter of 2021 compared to recent years.

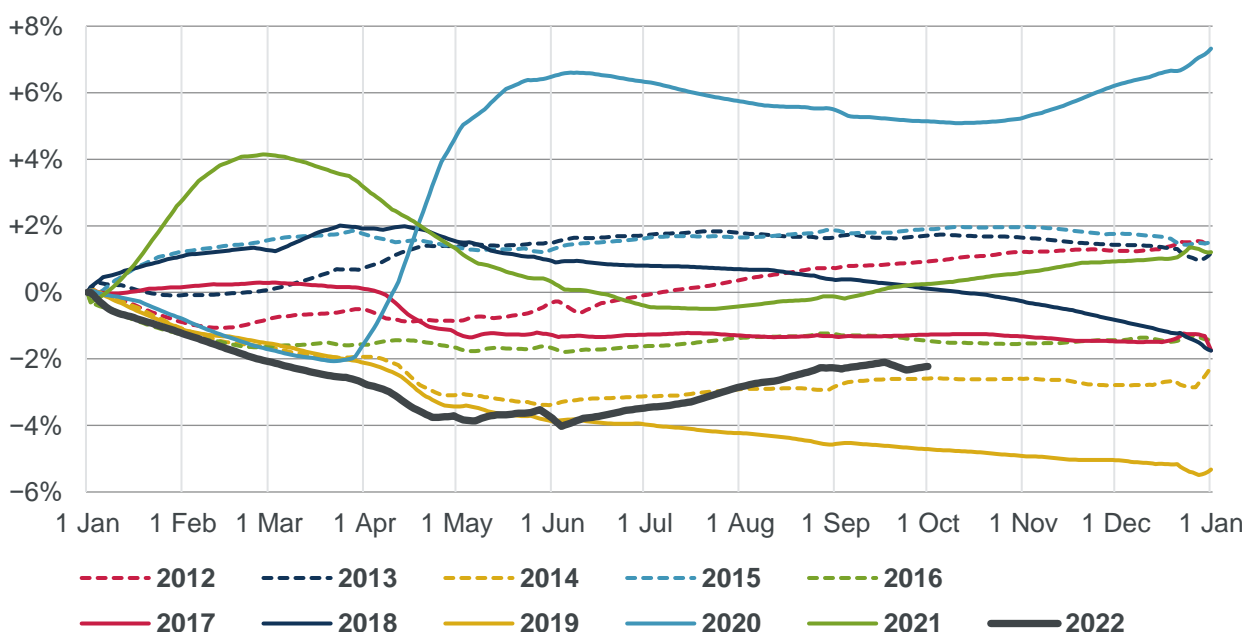
Chart C: Quarterly centred average SMRs, by week number



Cumulative mortality

Chart D shows cumulative standardised mortality rates for the first quarter of 2022 and for 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 shown was lowest in 2019 and highest in 2020.

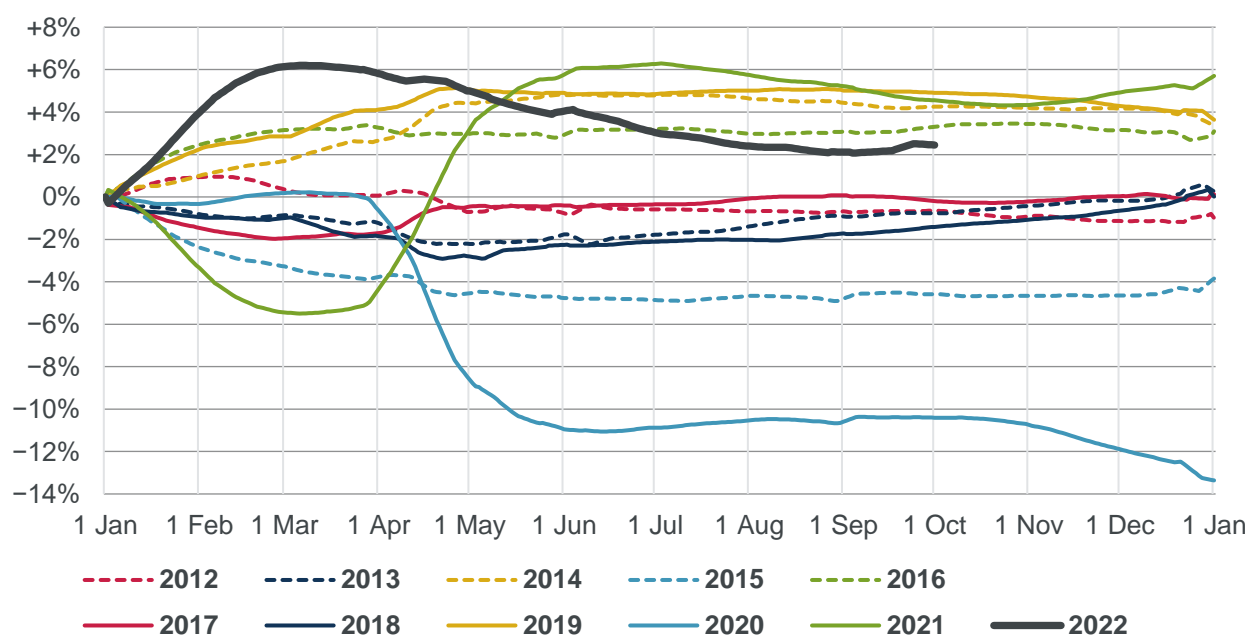
Chart D shows that cumulative standardised mortality for 2022 reached 3.9% below the ten-year average in June, the lowest at that point of any of the years shown. By the end of the third quarter, cumulative standardised mortality was 2.2% below the ten-year average but 2.6% above 2019.

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 reached a peak of +6.2% in March, but has since fallen and was +2.4% at the end of the third quarter.

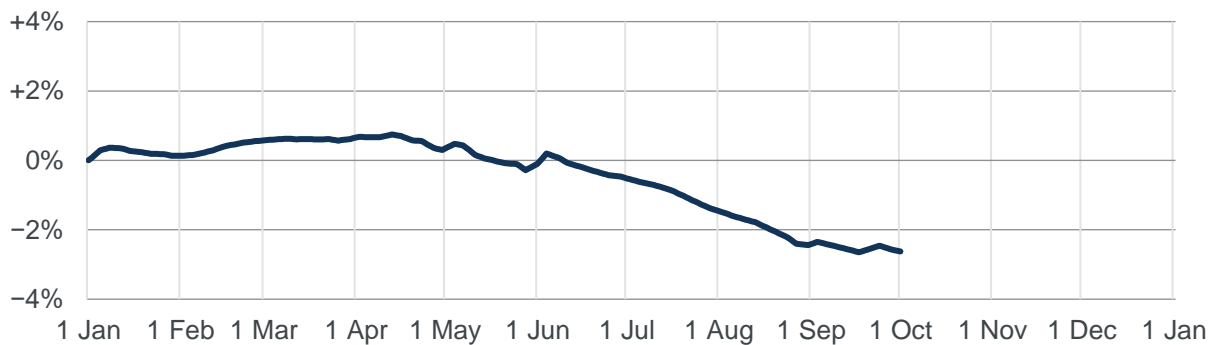
Note that:

- 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. By comparing to 2019, this chart informs the “Implication for CMI_2022” section below.

The mortality improvement between 2019 and 2022 reached a peak of +0.7% but has since fallen to –2.6%.

Chart F: Cumulative standardised mortality improvement between 2019 and 2022



Implication for CMI_2022

The analysis in this section shows possible outcomes from CMI_2022 for a range of mortality scenarios. We currently expect that CMI_2022 will use the same method as CMI_2021, with a suitable choice for the weight placed on data for 2022. However, it is possible that we may need to make further changes to the method so that CMI_2022 meets Subscribers’ needs. We aim to confirm our intentions for CMI_2022 by the end of 2022.

We also note that results of the 2021 census in England & Wales are likely to affect our views of population estimates, which would affect the results of CMI_2022. While we do not yet have detailed census results, [our blog](#) discusses the implications of the initial census results and suggests that the census is likely to lead to lower estimates of life expectancy.

Table 1 is based on Section 7 of [Working Paper 160](#) (which includes further detail on the methods used) and shows how life expectancy might change between CMI_2021 and hypothetical versions of CMI_2022, based on a range of possible mortality improvements between 2019 and 2022 (consistent with Chart F above) and assuming no change in method. The first five rows show illustrative results for overall mortality improvements between 2019 and 2022 of +6%, +3%, 0%, –3% and –6%, with an illustrative weight of 100% for 2022 data. The final row shows the potential impact of a weight of 0% for 2022 data. This would lead to a small fall in life expectancy between CMI_2021 Core and CMI_2022.

The figures in Table 1 do not make any allowance for results of the 2021 census.

The CMI has not yet made a decision on the weight for 2022 data in CMI_2022. Based on the table:

- Should the cumulative standardised mortality improvement remain at the current level of –2.6% relative to 2019, in the absence of any change in method and if full weight is placed on data for 2022, we might expect a similar decrease in life expectancy to that shown in the –3% improvement row. However, as illustrated in Chart E, users should be mindful that the cumulative standardised mortality improvement can vary significantly during the year.
- If a weight of 0% is used for 2022 data, then this would lead to a more modest fall in cohort life expectancy between CMI_2021 and CMI_2022.



Table 1: Percentage difference in life expectancy between CMI_2021 Core and CMI_2022 for different levels of mortality improvement between 2019 and 2022, assuming no change in method

Gender and age	Male 45	Female 45	Male 65	Female 65	Male 85	Female 85
+6% improvement	+1.5%	+1.4%	+2.3%	+2.1%	+2.8%	+3.2%
+3% improvement	+0.5%	+0.6%	+0.7%	+0.8%	+0.8%	+1.3%
Nil improvement	-0.6%	-0.3%	-0.9%	-0.5%	-1.3%	-0.6%
-3% improvement	-1.7%	-1.2%	-2.6%	-1.9%	-3.3%	-2.5%
-6% improvement	-2.9%	-2.1%	-4.3%	-3.3%	-5.4%	-4.4%
0% weight for 2022	-0.2%	-0.2%	-0.3%	-0.3%	-0.4%	-0.3%



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 30 September 2022.

Table 2: Cumulative standardised mortality rate (cSMR) compared to the 2012-2021 average, by gender and age-band, at 30 September 2022

	0-64	65-84	85+	20-100	20-44	45-64	65-74	75-84
Male	+1.1%	-3.4%	-1.4%	-1.9%	+2.8%	+0.9%	-1.8%	-4.3%
Female	+0.0%	-3.4%	-2.8%	-2.6%	+4.1%	-0.5%	-2.7%	-3.7%
Combined	+0.7%	-3.4%	-2.0%	-2.2%	+3.2%	+0.3%	-2.1%	-4.1%

Table 3: Cumulative annual standardised mortality improvement (cSMRI), by gender and age-band, at 30 September 2022

	0-64	65-84	85+	20-100	20-44	45-64	65-74	75-84
Male	+6.1%	+3.4%	-0.4%	+2.5%	+3.8%	+7.0%	+2.9%	+3.6%
Female	+4.7%	+2.8%	+1.2%	+2.4%	+3.4%	+5.2%	+3.4%	+2.5%
Combined	+5.6%	+3.1%	+0.3%	+2.4%	+3.7%	+6.3%	+3.1%	+3.2%

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.

In 2022, to the end of the third quarter:

- Cumulative mortality rates for the older age groups are below the 2012-2021 average, but those for 20-44 are well above the 2012-21 average.
- Cumulative mortality improvements are positive for almost all groups (the exception being males aged 85+) 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

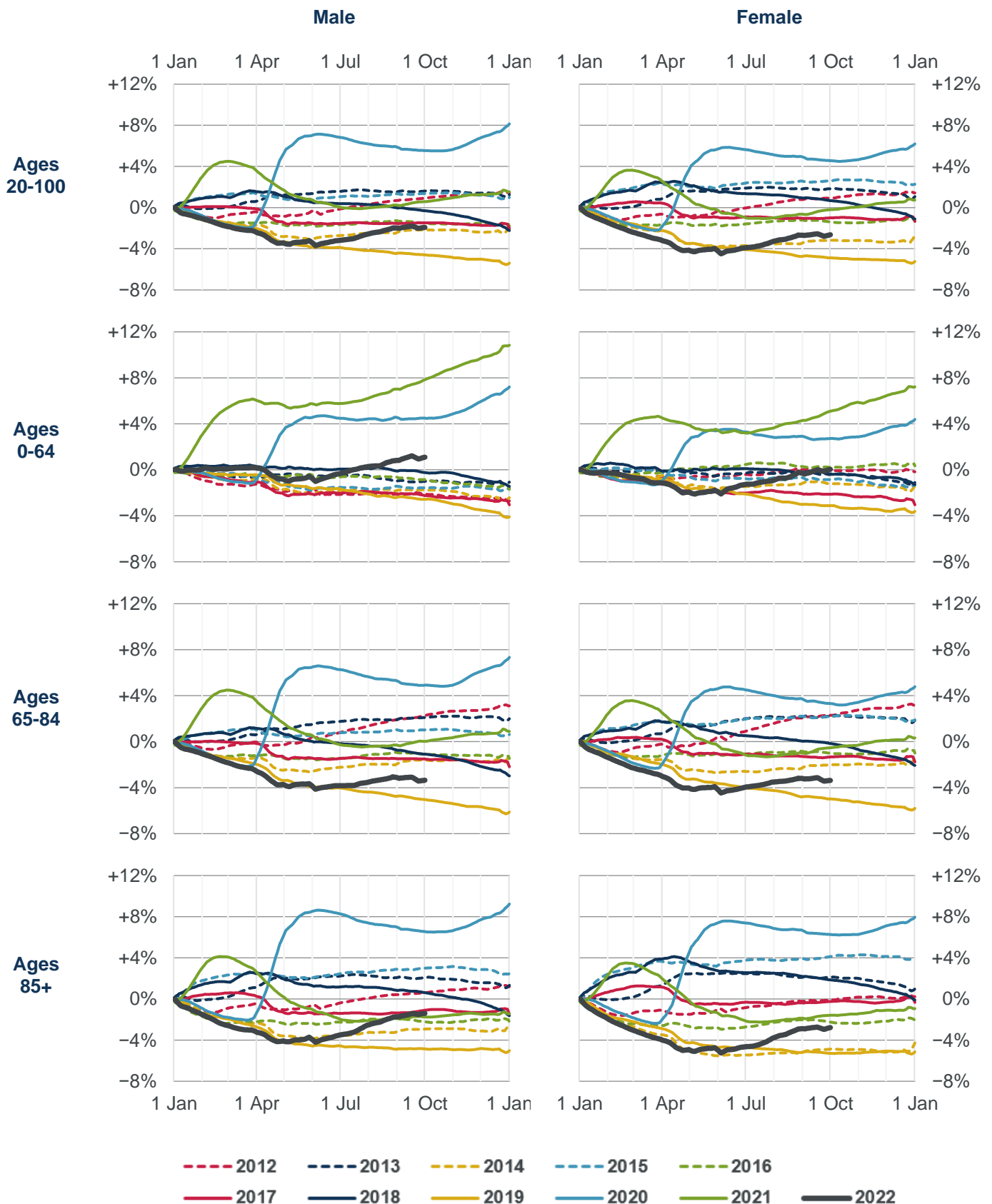




Chart G (cont): Cumulative standardised mortality rate (cSMR) compared to the 2012-2021 average, by gender and age-band

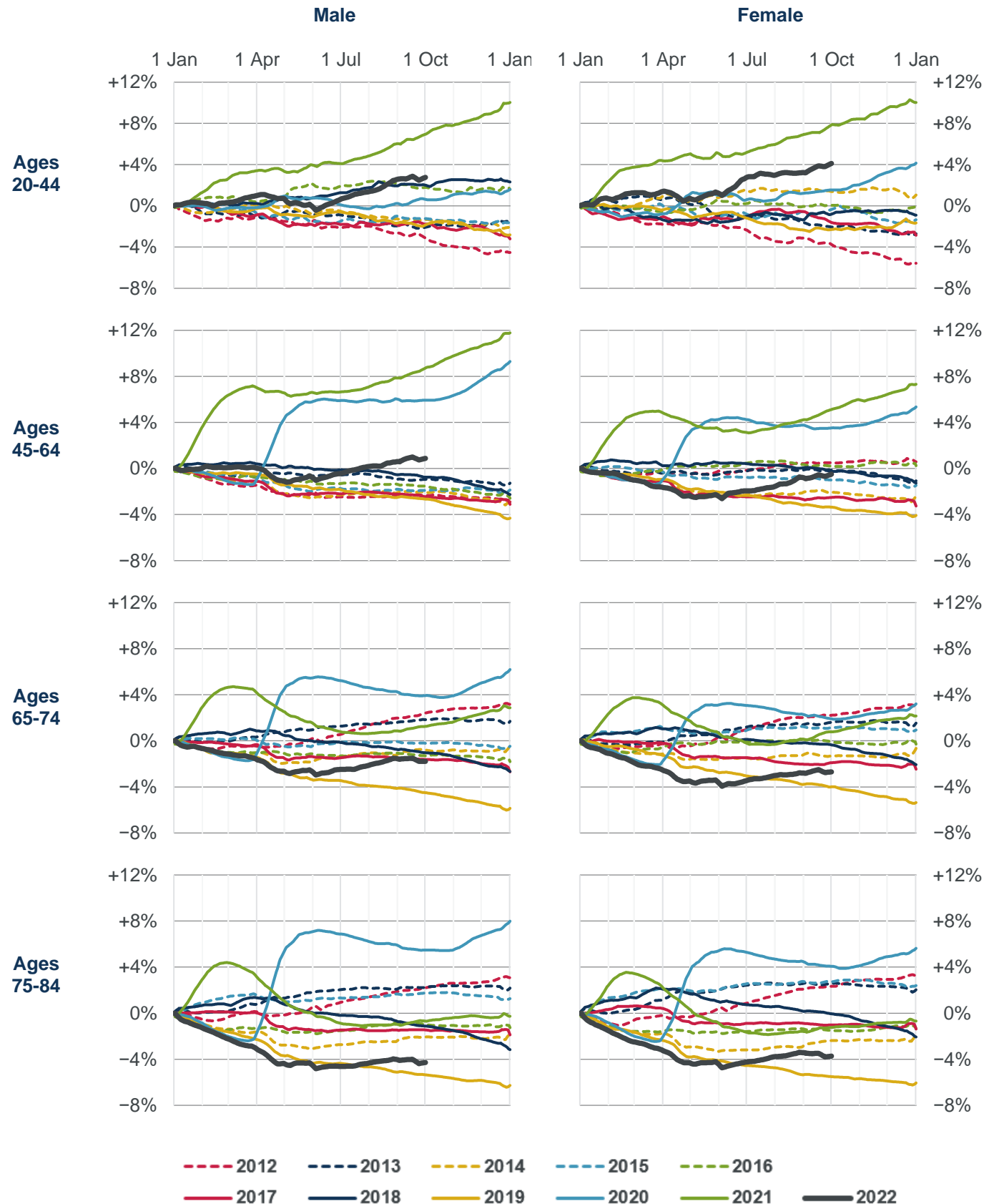




Chart H: Cumulative annual standardised mortality improvement (cSMRI), by gender and age band

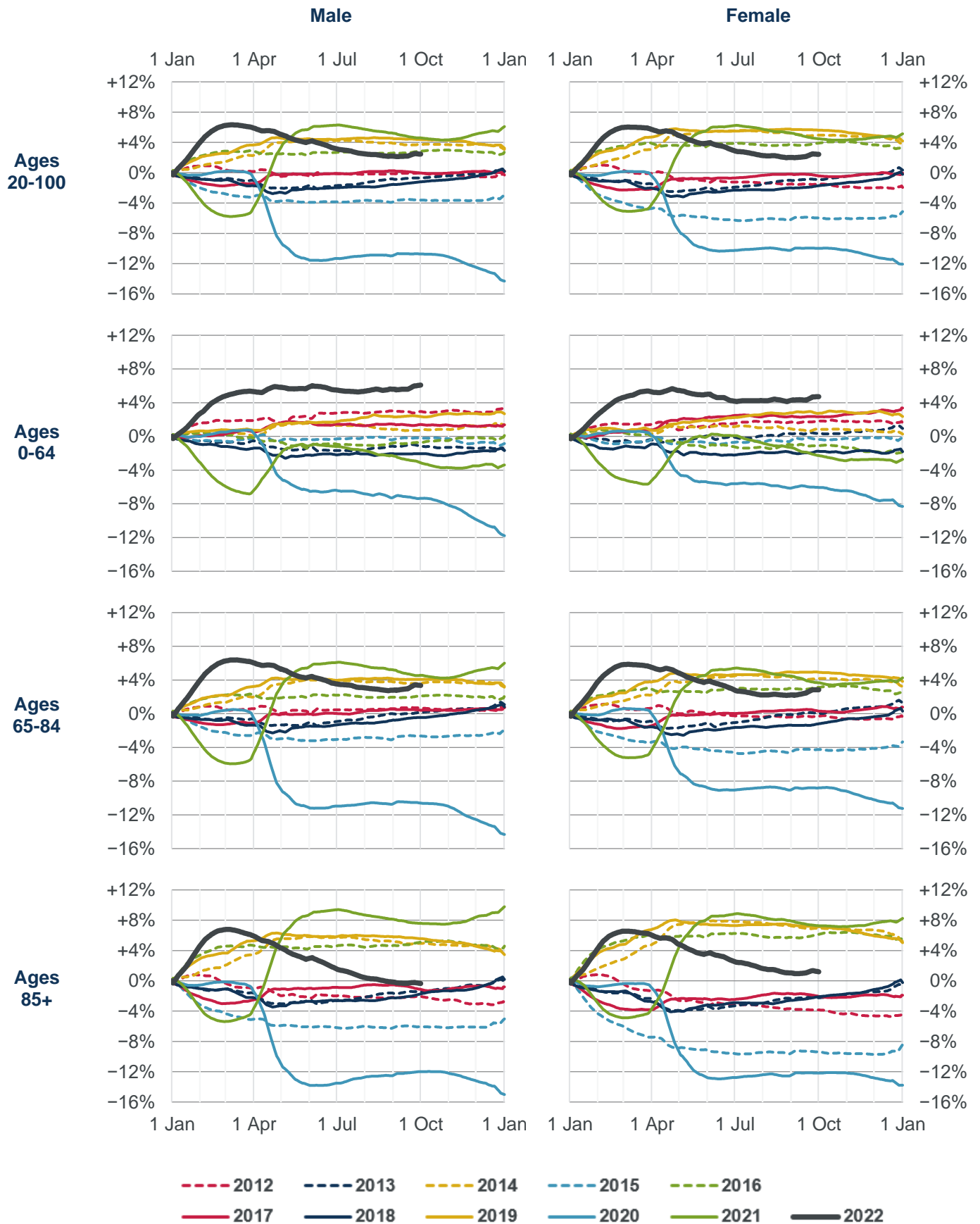
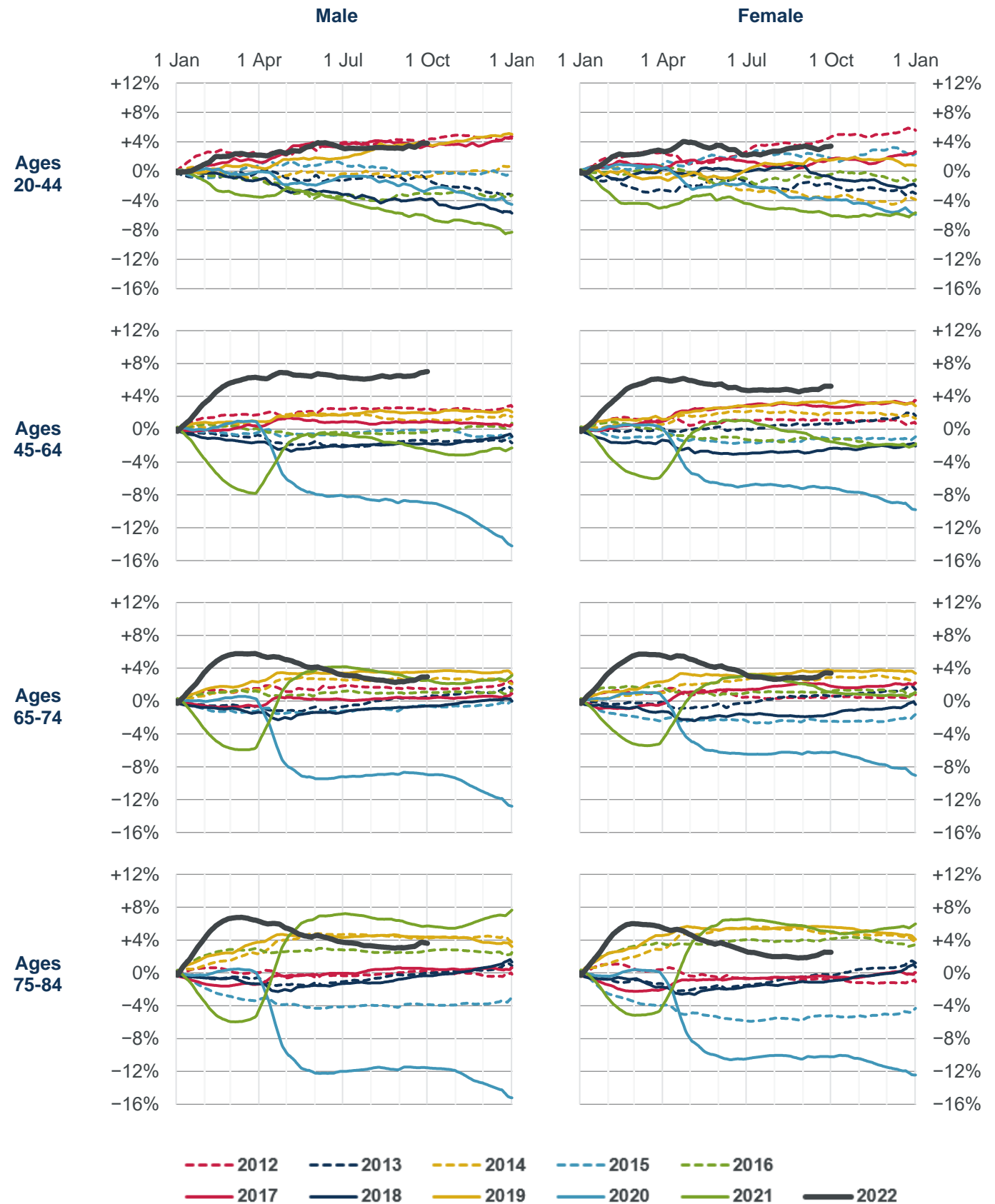




Chart H (cont): Cumulative annual standardised mortality improvement (cSMRI), by gender and age band



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

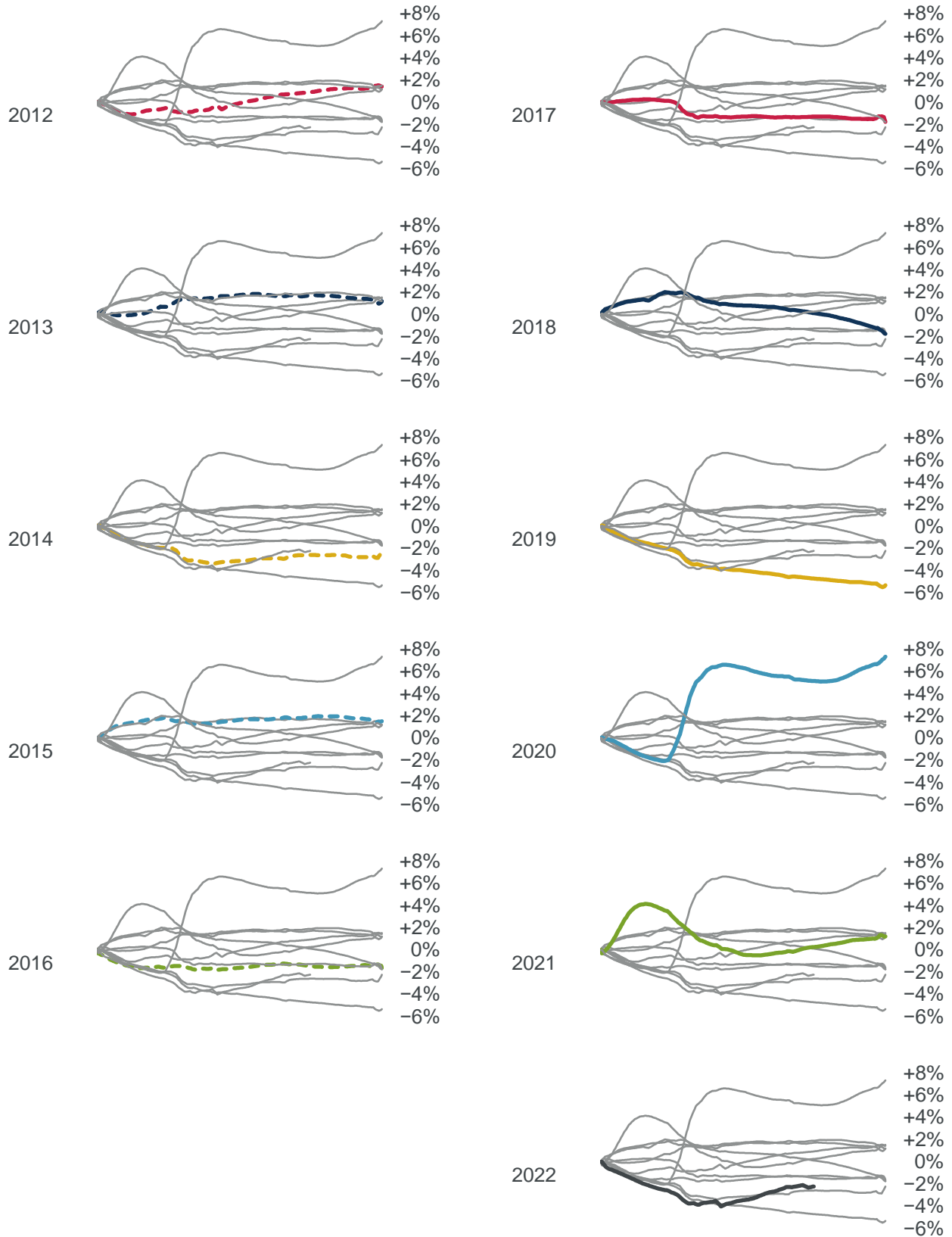
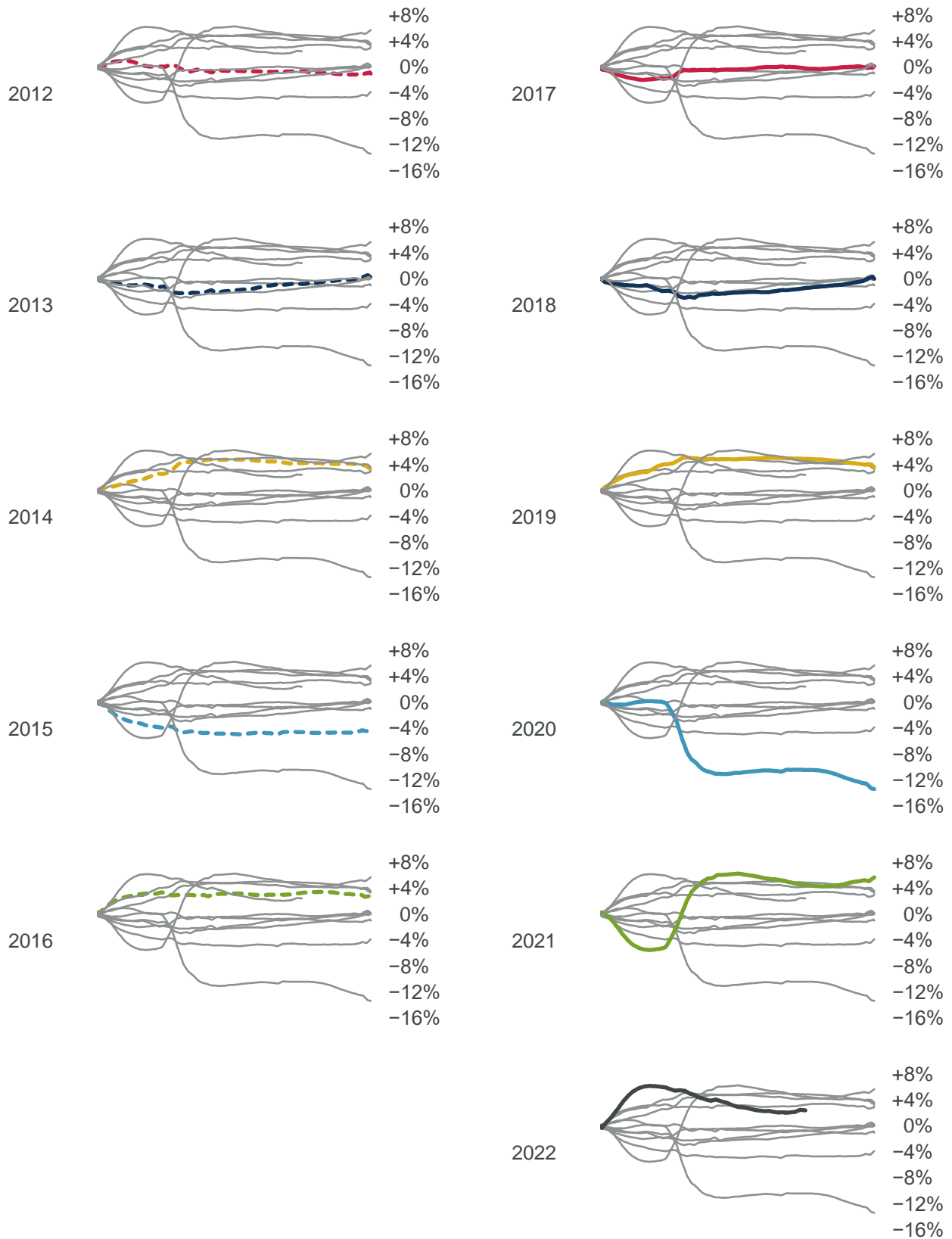




Chart E2: Cumulative annual standardised mortality improvement (cSMRI) for 2012-2022, highlighting individual years





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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