Office for National Statistics

Article

Comparisons of all-cause mortality between European countries and regions: 28 December 2019 to week ending 1 July 2022

Comparisons of all-cause excess mortality on a weekly basis since the start of the coronavirus (COVID-19) pandemic. Measures include relative age-standardised mortality rates and relative cumulative age-standardised mortality rates.

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1 . Main points

- Between the week ending 3 January 2020 (week 1 2020) and the week ending 1 July 2022 (week 26 2022), the UK's relative cumulative excess mortality was 3.1% above the average of 2015 to 2019; this was over a third less than the cumulative excess mortality in the week ending 18 June 2021 (week 24 2021; the period of the previous article), at 5.8%.

- The UK had the 16th highest relative cumulative excess mortality of the 33 countries analysed (UK, its constituent countries, and 28 European countries), and 15th highest of 28 countries when constituent countries are removed.

- The majority of European countries analysed (25 of 33) experienced above average relative cumulative excess mortality for the whole period, with eight countries showing relative cumulative mortality below average.

- Bulgaria had the highest relative cumulative excess mortality at 18.2% above average, followed by Poland (13.3% above average) and Romania (12.2% above average); Norway had the lowest with 4.1% below average, followed by Sweden (4.0% below average) and Iceland (3.9% below average).

- The majority of European countries (22 of 33) had higher relative cumulative excess mortality in those aged 65 years and over compared with those aged under 65 years.

- The UK had the fifth highest relative cumulative excess mortality rate in those aged under 65 years (8.3% above average); in those aged 65 years and over in the UK, the cumulative excess mortality rate was the 19th highest (2.2% above average).

- Overall, 19 of the 33 European countries had a decrease in their relative cumulative excess mortality rates since the last release (week ending 18 June 2021), including the UK and constituent countries; the largest decrease was in Czechia (5.4 percentage points lower), whereas the largest increase was in Cyprus (5.4 percentage points higher).

This article looks at all-cause mortality as a comparable international indicator of the impact of the coronavirus (COVID-19) pandemic and does not specifically analyse deaths due to COVID-19.

2 . Comparability of the data

The most effective way of comparing the mortality impact of the coronavirus (COVID-19) pandemic internationally is by looking at all-cause mortality compared with the five-year average. Not all countries will record COVID-19 deaths in the same way, so using all-cause mortality means that robust comparisons can be made. It also considers the indirect impact of the coronavirus pandemic, such as deaths from other causes that might be related to delayed access to healthcare.

We have sourced European mortality and population data, except data for the UK, from databases published by Eurostat. There are strict criteria that data must meet to be included, so analysing data from this source provides an opportunity to be as comparable as possible. This means we are reliant on the availability of data submitted to Eurostat by participating countries, for example, Ireland and Germany have not been included because of availability of data. Mortality data for England and Wales are sourced from the Office for National Statistics, for Scotland from the National Records of Scotland, and for Northern Ireland from the Northern Ireland Statistics and Research Agency. Population data for the UK are sourced from the Office for National Statistics' mid-year population estimates and mid-year population projections. More information about the data used in this article can be found in our accompanying Comparing all-cause mortality between European countries and regions methodology.

As well as our accompanying methodology, we have also released an article comparing different available methods of measuring international excess mortality and comparisons of causal factors affecting excess mortality before and during the coronavirus pandemic.

This article presents comparisons of relative age-standardised mortality rates (rASMRs) and relative cumulative age-standardised mortality rates (rcASMRs). rASMRs are used for comparing an individual week's age-standardised mortality rate (ASMR) to the five-year average ASMR of that week, whereas rcASMRs are used to compare the total excess mortality from the week ending 3 January 2020 (week 1 2020) with a specified week. Further information on these methods can be found in Section 3: Relative age-standardised mortality rates and Section 4: Relative cumulative age-standardised mortality rates.

Comparisons in this release are made up to the week ending 1 July 2022 (week 26 2022), however the accompanying dataset contains figures for some countries to the week ending 26 August 2022 (week 34 2022).

3 . Relative age-standardised mortality rates

Age-standardised mortality rates (ASMRs) calculate the number of deaths observed per 100,000 people, considering differences in population size and age structure between places and over time.

Relative age-standardised mortality rates (rASMRs) are measures of excess mortality. They are expressed as the percentage difference in the observed week (in 2020, 2021 or 2022) from the five-year average (2015 to 2019) age-standardised mortality rate. Our accompanying methodology describes how these are calculated. In the majority of releases, the Office for National Statistics (ONS) uses a five-year average of 2016 to 2019 and 2021 for comparisons of excess mortality with 2022 mortality data. More information on this can be found in our blog, Understanding excess deaths during a pandemic. As the coronavirus (COVID-19) pandemic has affected each European country differently and at different times, this release continues to use the pre-pandemic five-year average of 2015 to 2019, to avoid varying large excess deaths in 2020 or 2021 affecting the excess calculation.

A negative rASMR value indicates the observed weekly ASMR was below the 2015 to 2019 five-year average for that week. In contrast, a positive value indicates a weekly ASMR above the five-year average.

This release will mainly focus on analysis from the week beginning 19 June 2021 (week 25 2021) to the week ending 1 July 2022 (week 26 2022). Analysis for weeks prior to this period can be found in our previous release.

Improvements have been made to the methodology used (described in our accompanying methodology article), and some countries will have revised their deaths figures since our previous release. Therefore, numbers may differ in this release compared with our previous release.

Country overview since week beginning 19 June 2021 (week 25 2021)

This analysis includes the UK as a whole, its four constituent countries and a further 28 European countries. Of the 33 countries analysed, the majority of countries (20 countries) had at least half of their weeks display a positive rASMR since the week beginning 19 June 2021 (week 25 2021). In other words, 20 countries had excess mortality in the majority of weeks since the end of the reporting period of the previous article. The rASMRs ranged from 0.1% to 120.2% above what we would expect.

Since the last report, over half of the countries had at least one other new period with a large increase of mortality above average. Austria, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Greece, Hungary, Iceland, Latvia, Lithuania, the Netherlands, Poland, Romania, Slovakia and Slovenia displayed sustained periods of more than two weeks where the weekly rASMR was at least 25.0% above what we would expect. Luxembourg, Malta, Northern Ireland, Portugal and Spain had one- or two-week periods where the rASMR exceeded 25.0% above average. However, most of these excess mortality rates were smaller than peaks seen earlier in the coronavirus pandemic.

Figure 1: Over half of the selected European countries displayed a peak of mortality above average between mid-2021 and mid-2022

Relative age-standardised mortality rates by week, persons, all ages, week ending 3 January 2020 to week ending 1 July 2022

Notes:

1. Data are provisional.
2. Figures are ordered by UK and constituent countries, then by alphabetical order of country name.
3. The reference line on the figures indicates week ending 18 June 2021 (week 24 2021), the last week of analysis in our previous report.
4. For the UK countries, non-residents are excluded for figures from England, Scotland and Wales but are included for Northern Ireland. However, the numbers of non-residents included are very small.
5. Information about whether non-residents are included for countries outside the UK is not provided by Eurostat.
6. UK data are based on date of death registration rather than date of death occurrence. Most other European countries are based on date of death occurrence.
7. Age-standardised mortality rates are standardised to the 2013 European Standard Population.
8. Relative age-standardised mortality rates (rASMRs) are expressed as the percentage change per week from the average age-standardised mortality rate in 2015 to 2019.

Download the data

.xlsx

Figure 2: Out of the 33 countries analysed, the majority had a greater proportion of weeks with excess mortality in those aged 65 years and over than those aged under 65 years

Proportion of weeks with a positive rASMR, persons, all ages, week beginning 19 June 2021 to week ending 1 July 2022

Notes:

1. Data are provisional.

2. For the UK countries, non-residents are excluded for figures from England, Scotland and Wales but are included for Northern Ireland. However, the numbers of non-residents included are very small.

3. Information about whether non-residents are included for countries outside the UK is not provided by Eurostat.

4. UK data are based on date of death registration rather than date of death occurrence. Most other European countries are based on date of death occurrence.

5. Age-standardised mortality rates are standardised to the 2013 European Standard Population.

6. Relative age-standardised mortality rates (rASMRs) are expressed as the percentage change per week in from the average age-standardised mortality rate in 2015 to 2019.

Download the data

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For this breakdown, any positive rASMR is included as above average. This means that in some cases the week could only be slightly above average (for example, 0.1% above), which in turn could be because of the random fluctuations seen in mortality.

Since the week beginning 19 June 2021 (week 25 2021), Greece had the highest proportion of weeks where their rASMR was positive (for instance, the weekly ASMR was above the five-year average for that week), with 94.4% for all ages combined. This was also the case when looking at those aged under 65 years (90.7%) and aged 65 years and over (94.4%). Sweden had the lowest proportion of weeks displaying a positive rASMR, at 3.7% for all ages. Again, this was true when looking at those aged under 65 years (9.3%) and aged 65 years and over (3.7%).

The UK had the 16th highest proportion of weeks where mortality rates were above expected (55.6%), however it had the second-highest proportion of weeks with a positive rASMR in those aged under 65 years (79.6% of weeks). However, this measure only looks at the number of weeks a country has excess; Section 4: Relative cumulative age-standardised mortality rates and our accompanying dataset provide rcASMRs by age group, which will show how the countries' excess to date compare with each other.

Cities (NUTS3 regions of selected countries in Europe)

The following interactive shows rASMRs by nomenclature of territorial units for statistics 3 (NUTS3) regions of Europe for the 33 countries in this analysis from the week ending 3 January 2020 (week 1 2020) to the week ending 1 July 2022 (week 26 2022), where data were available.

Figure 3: Relative age-standardised mortality rates by week for local authorities (NUTS3 regions) of Europe, by age group

Interactive map, persons, all ages and broad age group, week ending 3 January 2020 to week ending 1 July 2022

Notes:

1. Data are provisional.

2. For the UK countries, non-residents are excluded for figures from England, Scotland and Wales but are included for Northern Ireland. However, the numbers of non-residents included are very small.

3. Information about whether non-residents are included for countries outside the UK is not provided by Eurostat.

4. UK data are based on date of death registration rather than date of death occurrence. Most other European countries are based on date of death occurrence.

5. Age-standardised mortality rates are standardised to the 2013 European Standard Population.

6. Relative age-standardised mortality rates (rASMRs) are expressed as the percentage change per week from the average age-standardised mortality rate in 2015 to 2019.

Download the data

.xlsx

4 . Relative cumulative age-standardised mortality rates

This section calculates relative cumulative age-standardised mortality rates (rcASMRs) to measure cumulative excess mortality compared with the 2015 to 2019 average mortality rates. Measures of cumulative mortality evaluate the total extent of mortality from one time point to another in the observed period, relative to the equivalent period's mortality rate of the five-year average. The week ending 3 January 2020 (week 1 2020) is used as the start point in this article.

The rcASMRs for 2020 to 2022 show whether age-standardised mortality since the week ending 3 January 2020 was above or below average up to that point. The rcASMR expresses this difference as a percentage, relative to the average for an equivalent period in 2015 to 2019. A zero value for rcASMR indicates that age-standardised mortality for the period was equal to the average. A positive value indicates higher than average mortality, and a negative value indicates lower than average mortality. The rcASMR can increase or decrease over time.

By using an age-standardised rate-based measure of cumulative excess mortality, we are accounting for differences in the age structure, population size and seasonal mortality patterns of countries analysed. Our accompanying methodology contains further details of how rcASMRs are calculated.

Country overview

Figure 4: Bulgaria was the country with the highest rcASMR, while Norway had the lowest

Relative cumulative age-standardised mortality rates, persons, all ages, weeks ending 3 January 2020 to 18 June 2021 (week 24 2021) and to 1 July 2022 (week 26 2022), European countries

Notes:

1. Data are provisional.

2. For the UK countries, non-residents are excluded for figures from England, Scotland and Wales but are included for Northern Ireland. However, the numbers of non-residents included are very small. Non-residents are included in the overall UK figures.

3. Information about whether non-residents are included for countries outside the UK is not provided by Eurostat.

4. UK data are based on date of death registration. Most other European countries are based on date of death occurrence.

5. Age-standardised mortality rates are standardised to the 2013 European Standard Population.

6. Relative cumulative age-standardised mortality rates (rcASMRs) are expressed as the percentage change per week of the cumulative age-standardised mortality rate from the average age-standardised mortality rate in 2015 to 2019.

Download the data

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The week ending 1 July 2022 (week 26 2022) is the most recent week with data for all countries at the time of this analysis.

The majority of countries (25 of 33) displayed a positive rcASMR by the week ending 1 July 2022. This means that from the week ending 3 January 2020 (week 1 2020) to the week ending 1 July 2022 (week 26 2022), there were more deaths over the period than expected, when taking into account population size and age structure. Between the week ending 3 January 2020 and the week ending 1 July 2022, Bulgaria had the highest rcASMR at 18.2% above expected. This was followed by Poland (13.3% above average) and Romania (12.2% above average). The lowest rcASMR was in Norway with 4.1% below average, closely followed by Sweden (4.0% below average) and Iceland (3.9% below average).

Out of the 33 countries, 14 had an increase in rcASMR between the week ending 18 June 2021 (week 24 2021) and the week ending 1 July 2022. The largest change in rcASMR was in Cyprus, with a 5.4 percentage point increase in rcASMR compared with the week ending 18 June 2021, from 1.0% below average to 4.4% above average. Czechia also had a 5.4 percentage point change in rcASMR, but instead showed a decrease, from 13.8% above average to 8.4% above average.

Cyprus was one of only two countries to show a change in excess mortality from either above or below what we would expect to the other. Switzerland also showed a reversal of trend, from 0.8% above average in the week ending 18 June 2021 to 0.7% below in the week ending 1 July 2022.

The UK had the 16th highest rcASMR in the week ending 1 July 2022, with 3.1% above average, which is almost half of what was seen in the week ending 18 June 2021 (5.8% above average). All constituent countries of the UK displayed rcASMRs above their five-year average in the week ending 1 July 2022, however, these were lower than the countries' respective rcASMRs in the week ending 18 June 2021. England displayed the highest rcASMR, with 3.2% above average (15th highest rcASMR), followed by Scotland with 3.0% (17th), Wales with 2.1% (21st) and then Northern Ireland with 1.7% (23rd).

The UK saw the 4th largest decrease in rcASMR between the week ending 18 June 2021 (week 24 2021) and the week ending 1 July 2022, with 2.7 percentage points. This was behind Czechia (5.4 percentage points), and Italy and England (both with 3.1 percentage points difference).

Broad age comparisons

Most countries (22 of 33) had a higher rcASMR in those aged 65 years and over, compared with those aged under 65 years by the week ending 1 July 2022.

The highest rcASMRs in those aged under 65 years were Bulgaria (19.4% above average), Cyprus (14.9% above average) and Romania (12.3% above average). The lowest rcASMRs were Denmark (9.8% below average), Sweden (9.3% below average) and Norway (8.2% below average).

The highest rcASMRs in those aged 65 years and over were Bulgaria (18.0% above average), Poland (14.9% above average) and Romania (12.1% above average). The lowest rcASMRs were Iceland (4.7% below average), Norway (3.5% below average) and Sweden (3.3% below average)

The largest differences in rcASMR between the older and younger age group were in Cyprus and Slovenia. Cyprus had the second-highest rcASMR in those aged under 65 years (14.9% above average); in contrast, it had the 16th highest rcASMR in those aged 65 years and over, with 3.1% above average. Slovenia had the 4th lowest rcASMR in those aged under 65 years, with 5.5% below average, but had the 8th highest rcASMR in those aged 65 years and over (6.9% above average).

The UK and constituent countries all displayed above average rcASMRs in the week ending 1 July 2022 for both older and younger age groups.

The UK had the 5th highest rcASMR for those aged under 65 years (8.3% above average) but the 19th highest for those aged 65 years and over (2.2% above average). For those aged under 65 years, England was the constituent country with the highest rcASMR, at 8.7% above average (4th highest rcASMR), followed by Scotland with 8.3% (5th), Wales with 4.8% (12th) and then Northern Ireland with 3.3% (16th). In those aged 65 years and over, the highest rcASMR was in England with 2.3% (18th), followed by Scotland with 1.9% (21st), and then Northern Ireland and Wales, both with 1.5% above average (joint 24th).

The UK had the 7th largest decrease in rcASMRs in those aged under 65 years between the week ending 18 June 2021 (week 24 2021) and the week ending 1 July 2022, with 1.6 percentage points. For those aged 65 years and over, the UK had the 4th highest decrease in rcASMR with 2.9 percentage points.

Information by both sex and age is available in our accompanying dataset.

5 . Comparisons of all-cause mortality across European countries data

Comparisons of all-cause mortality between European countries and regions
Dataset | Released 20 December 2022
All-cause mortality rates of selected European countries and regions. Breakdowns include sex and broad age group for selected countries and cities.

6 . Glossary

Age-standardised mortality rate

Age-standardised mortality rates (ASMRs) are used to allow comparisons between populations that may contain different proportions of people of different ages. The 2013 European Standard Population is used to standardise rates. See our accompanying methodology for how these are calculated.

Relative age-standardised mortality rate

Relative age-standardised mortality rates (rASMRs) are expressed as the percentage change per week from the average age-standardised mortality rate in 2015 to 2019.

A negative value indicates a weekly 2020 ASMR below what is expected given the five-year average. In contrast, a positive value indicates a weekly ASMR above the five-year average.

Relative cumulative age-standardised mortality rate

Relative cumulative age-standardised mortality rates (rcASMRs) are expressed as the percentage change per week of the weekly cumulative age-standardised mortality rate from the average cumulative age-standardised mortality rate in 2015 to 2019.

A nil value for rcASMR indicates that age-standardised mortality for the period has been equal to the average. A positive value indicates worse than average mortality, and a negative value indicates better than average mortality.

7 . Data sources and quality

Measuring the data

We use weekly all-cause death registration data published by Eurostat from contributing nations of the European Union and European Free Trade Association. There are clear criteria set out by Eurostat for data to be submitted to their database, based on official recording of deaths occurring in all settings, to maximise comparability.

For the UK, we use Office for National Statistics (ONS) data for England and Wales, National Records of Scotland (NRS) data for Scotland, and Northern Ireland Statistics and Research Agency (NISRA) data for Northern Ireland.

Analysis of all-cause mortality allows us to examine the impact of the coronavirus (COVID-19) pandemic not only from deaths due to COVID-19 but also excess deaths that have occurred as a result of the wider impacts of the virus on healthcare systems and society. Given the widely differing practices in recording and reporting deaths relating to COVID-19, it is not possible at this time to conduct accurate international comparisons of deaths involving COVID-19 specifically.

More information can be found in our accompanying methodology.

Strengths and limitations

The data provided to Eurostat have a strict measuring criteria, which means that we can get comparable data for all European countries that submit to Eurostat. As we look at age-standardised mortality rates, rather than numbers of deaths, we are able to make robust comparisons across countries as we take into account the population size and age structure of each country and regions within countries.

As we rely on data provided to Eurostat, we are limited to the countries that provide information and can only make comparisons across Europe as we standardised our rates to the European Standard Population.

More information can be found in our accompanying methodology.

This report measures excess deaths and mortality rates compared with the five-year average. Other methods for determining expected mortality are also used within England, and each have their advantages and disadvantages. Information on different measures of excess mortality can be found in our article, Comparing different international methods of measuring excess mortality.

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8 . Related links

International comparisons of possible factors affecting excess mortality
Article | Released 20 December 2022
Comparisons of select pre-existing causal factors that may result in all-cause and cause-specific excess mortality before and during the coronavirus pandemic.

Comparing different international methods of measuring excess mortality
Article | Released 20 December 2022
Outlines the different statistical measures used to calculate all-cause excess mortality and outlines their strengths and limitations depending upon the context and geographical coverage for their application.

Eurostat data explorer
Webpage | Updated regularly
Deaths by week, five-year age group and nomenclature of territorial units for statistics 3 (NUTS 3) region.

NISRA Weekly deaths
Webpage | Updated weekly
Weekly death registrations in Northern Ireland from the Northern Ireland Statistics and Research Agency (NISRA).

Weekly and Monthly Data on Births and Deaths Registered in Scotland
Webpage | Updated weekly
Summary weekly and monthly data on births and deaths. All the figures for 2022 are provisional and may be revised.

Deaths registered weekly in England and Wales, provisional
Bulletin | Updated weekly
Provisional number of deaths registered in England and Wales, including deaths involving coronavirus (COVID-19), in the latest weeks.

Excess mortality and mortality displacement in England and Wales: 2020 to mid-2021
Article | Released 15 October 2021
Deaths registered in England and Wales by week, from 28 December 2019 to 2 July 2021. Breakdowns include country, sex, age group, region, place of death, and leading cause. Includes analysis of excess deaths and relative cumulative age-standardised mortality rates.

9 . Cite this article

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