Coronavirus and mortality in England and Wales methodology

Quality and methodology information for deaths registered weekly and monthly in England and Wales data. Includes strengths and limitations, methods used, comparability with other sources, definitions and the effects of the coronavirus (COVID-19) pandemic.

Contact:
Danielle Cornish and Rachel Rushton
health.data@ons.gov.uk
+44 1329 444110

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1 . Measuring weekly deaths provisional data

Because of the coronavirus (COVID-19) pandemic, our regular Deaths registered weekly in England and Wales release now provides a separate breakdown of the number of deaths involving COVID-19. That is, where COVID-19 or suspected COVID-19 was mentioned anywhere on the death certificate, including in combination with other health conditions.

If a death certificate mentions COVID-19, it will not always be the underlying (main) cause of death, but may be a contributory factor. The weekly deaths bulletin summarises the latest weekly information and will be updated each week during the pandemic.

Timeliness

To meet user needs, we publish very timely but provisional counts of death registrations in England and Wales in our Deaths registered weekly in England and Wales, provisional dataset. These are presented:

- by sex

- by age group

- by region (within England)

- for Wales as a whole

To allow time for registration and processing, figures in the weekly bulletin are published 11 days after the week ends. Because of the rapidly changing situation, in the weekly deaths bulletin, we also give provisional updated totals for death occurrences based on the latest available death registrations.

Data coverage

The data for 2020 are based on a 53-week year. Because the number of days in a week is 7, when there are 52 weeks, we only cover 364 days of the 365 days in the year, which results in one remaining day each calendar year not included in the 52 weeks.

With the occurrence of leap years, it is sometimes necessary to add a 53rd week to the end of the calendar, which was the case in 2020. This happens every five years – the last time there was a Week 53 was in 2015. Given the low frequency of Week 53, it is more appropriate to compare the 2020 figures with the average for Week 52, than to compare it with a single year from five years previous.

We will publish accompanying articles periodically, giving enhanced information such as age-standardised and age-specific mortality rates for recent time periods and breakdowns of deaths involving COVID-19 by associated pre-existing health conditions.

Our User guide to mortality statistics provides further information on data quality, legislation and procedures relating to mortality and includes a glossary of terms.

Additions to the analysis

From 3 November 2020, we added two additional analyses into the weekly bulletin.

Previously, we did not include a breakdown of deaths involving COVID-19 into those where COVID-19 was the underlying cause of death ("due to COVID-19") and those where it was a contributory factor ("involving COVID-19") in the weekly deaths bulletin; because of high public interest, this distinction is now shown in the weekly bulletin.

Influenza and Pneumonia has been included for comparison, as a well-understood cause of death involving respiratory infection that is likely to have somewhat similar risk factors to COVID-19.

2 . Measuring monthly deaths provisional data

The [monthly mortality analysis bulletin](#) provides timely surveillance of mortality in England and Wales, based on the best available provisional data, including all-cause mortality and deaths where the coronavirus (COVID-19) was the underlying cause.

Analysis by month of death registration is consistent with the [weekly death registrations release](#) and allows for a more timely analysis than would be possible using death occurrences. For more information see the Registration delays subsection of [Section 3](#).

Additions to the analysis

More in-depth analysis on deaths due to COVID-19 and involving COVID-19 is included in the bulletin in some months to meet user needs. In the November 2020 edition, we added analysis of [deaths due to COVID-19 by local area and deprivation](#) (these were reduced in June 2021 because of small numbers) and in December 2020, we added mortality rates for [deaths involving COVID-19 for the UK](#). In January 2021, we added an analysis of [pre-existing conditions of deaths due to COVID-19](#).

Data sources

This bulletin is based primarily on death registrations, with a section on death occurrences for surveillance of recent mortality trends. Death occurrences show the number of deaths that occurred within a calendar period and give a better indication than registrations of exactly when deaths were at their highest. This allows mortality to be related to other factors such as weather patterns.

A provisional extract of death registrations and death occurrences data is taken on the first working day after the 8th of the month, to allow time for deaths to be registered.

Mortality rates

We publish the mid-year population estimates used for calculating rates; these are currently available up to 2020. For 2021 onwards, population projections were used.

To calculate mortality rates for monthly deaths that are comparable with annual rates, adjustments must be made to annual population estimates. We calculate an annual population centred on the midpoint of the month using two years' worth of population estimates (or where these are not available, population projections). For the first half of the year (January to June), populations for the current year and the previous year are used; for the second half of the year (July to December), populations for the current year and the following year are used.

This is then multiplied by the number of days within the month as a proportion of the total number of days within that year. The output is used as the population denominator in calculations of age-standardised and age-specific mortality rates.

For example:

June 2020 population equals

$$\left(population2019(i) \; + \; \left((population2020(i) \; - \; population2019(i)) \; \times \; \left(\frac{m}{M}\right)\right)\right) \times \left(\frac{N}{M}\right)$$

Where:

- m is the number of days from 1 July 2019 (the start of the mid-year for the population estimate) to the midpoint of June 2020 inclusive

- N is the number of days in June 2020

- M is the number of days in 2020

- (i) is the age group

July 2020 population equals

$$\Big(population2020(i) \ + \ \big((population2021(i) \ - \ population2020(i)) \ \times \ \big(\tfrac{m}{M}\big)\big)\Big) \times \Big(\tfrac{N}{M}\Big)$$

Where:

- m is the number of days from 1 July 2020 (the start of the mid-year for the population estimate) to the midpoint of July 2020 inclusive

- N is the number of days in July 2020

- M is the number of days in 2020

- (i) is the age group

For geographies where population projections are not available (such as deprivation deciles and quintiles, which are based on Lower-layer Super Output Areas), we calculate the proportion of the country-level population that is within each geography. Then we apply this proportion to the country-level population projections to estimate a population projection for that area. This estimated projection is then used in the monthly population method previously described.

To calculate the proportions, the most up-to-date mid-year population estimates available at the time are used. The monthly population method for geographies below country level was updated in the January 2021 edition and the data back series revised. For more information see the [accompanying dataset](#).

3 . Strengths and limitations

Registration delays

The weekly and monthly deaths data are based mainly on the date deaths are registered, not the date of death, because of the [time taken for a death to be registered](#). Deaths in England and Wales are normally registered within five days, but there can be a considerably longer delay in some circumstances, particularly when the death is referred to a coroner. More information on this issue can be found in our [impact of registration delays release](#).

In both bulletins, we include some analysis by date of death occurrence, as this allows mortality to be related to other factors such as the weather. However, because of registration delays, death occurrence data are always somewhat incomplete, especially for the most recent dates.

Statistical modelling

We have developed a statistical model to estimate the number of deaths likely to have occurred in each week, based on previous experience of the pattern of registration delays, including the effects of bank holidays. The method is described in [Predicting total weekly death occurrences in England and Wales: methodology](#) and the results are shown in the tab, "Estimated total deaths 2021", of the [weekly deaths accompanying dataset](#).

Provisional data are used

Provisional death registrations and death occurrences data are used in the weekly deaths bulletin and the monthly mortality analysis bulletin. This enables timely analysis to be completed to monitor mortality trends. However, as the data for 2020 and 2021 are provisional, they are subject to change; we would only expect very small changes to the data once they are finalised.

More quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in the Mortality statistics in England and Wales QMI.

4 . Comparability with other deaths data and sources

The figures in the weekly deaths bulletin are different from the daily surveillance figures on COVID-19 deaths published by the Department of Health and Social Care (DHSC) on the GOV.UK website, for the UK as a whole and its constituent countries. Figures in the weekly deaths bulletin are derived from the formal process of death registration and may include cases where the doctor completing the death certificate diagnosed possible cases of COVID-19, for example, where this was based on relevant symptoms but no test for the virus was conducted.

From 29 April 2020, the DHSC started to publish as their daily announced figures on deaths from COVID-19 for the UK a new series that uses improved data for England produced by Public Health England (PHE). These figures provide a count of all deaths where a positive test for COVID-19 has been confirmed, wherever that death has taken place – a change from previously reporting only confirmed COVID-19 deaths in hospitals.

Figures for Scotland, Wales and Northern Ireland had already begun to include deaths outside hospitals so this change ensured that the UK-wide series had a shared and common definitional coverage. A statement was published by the Office for National Statistics (ONS), which provides more detail of the changes.

On 12 August 2020, the PHE data series was revised to include two measures: deaths of positively tested individuals where the death occurred within 28 days and deaths within 60 days of a positive test. More information on these changes can be found in their technical summary (PDF, 854KB).

In contrast to the GOV.UK figures, we include only deaths registered in England and Wales, which is the legal remit of the ONS. Section 6 and Section 7 provide an overview of the differences in definitions between sources.

5 . Definition of COVID-19 deaths

In England and Wales, the doctor certifying a death can list all causes in the chain of events that led to the death and pre-existing conditions that may have contributed to the death. Using this information, we determine an underlying cause of death. A doctor can certify the involvement of COVID-19 based on symptoms and clinical findings – a positive test result is not required. Definitions of COVID-19 for deaths in Scotland and Northern Ireland are similar to England and Wales.

We use the term "due to COVID-19" when referring only to deaths with an underlying cause of death of COVID-19. When taking into account all of the deaths that had COVID-19 mentioned anywhere on the death certificate, whether as an underlying cause or not, we use the term "involving COVID-19".

Our definition of COVID-19 (regardless of whether it was the underlying cause or mentioned elsewhere on the death certificate) includes some cases where the certifying doctor suspected the death involved COVID-19 but was not certain. For example, a doctor may have clinically diagnosed COVID-19 based on symptoms, but this diagnosis may not have been confirmed because no test was available, or the test result was inconclusive.

Information on the number and proportion of COVID-19 deaths that were classified as "suspected" is available in the Measuring the data section of our monthly mortality analysis bulletin.

6 . Differences in definitions of COVID-19 deaths between sources

There are three main sources of COVID-19 deaths data for England and Wales. These are from:

- [Department for Health and Social Care (DHSC) data](#), based on information from Public Health England (PHE) and Public Health Wales (PHW)

- Office for National Statistics (ONS) deaths registered data

- ONS death occurrences (actual date of death) data

More detail on the coverage, inclusion and timeliness of each data source in provided in this section.

DHSC COVID-19 (on GOV.UK) before 29 April 2020

Coverage: UK (however we only include England and Wales breakdowns for comparable coverage with ONS data).

Inclusion: Deaths in hospital where the patient tested positive for COVID-19 at any time before death.

Timeliness: Provided daily but not officially registered.

DHSC COVID-19 (on GOV.UK) between 29 April and 12 August 2020

Coverage: UK (however we only include England and Wales breakdowns for comparable coverage with ONS data).

Inclusion: Any place of death, including care homes and community, and deaths where the patient has tested positive for COVID-19.

Timeliness: Provided daily but not officially registered.

DHSC COVID-19 (on GOV.UK) from 12 August 2020

Coverage: UK (however we only include England and Wales breakdowns for comparable coverage with ONS data).

Inclusion: Any place of death, including care homes and community. Deaths where the patient died within 60 days of testing positive for COVID-19 or after 60 days but COVID-19 was mentioned on the death certificate. Also includes deaths where the patient died within (equal to or less than) 28 days of testing positive for COVID-19.

Timeliness: Provided daily but not officially registered.

ONS COVID-19 deaths registered

Coverage: Deaths registered in England and Wales by date of death registration. Selected UK figures are included in the weekly and monthly releases; where UK data are included, data for Scotland and Northern Ireland are provided by [National Records of Scotland](#) and [Northern Ireland Statistics and Research Agency](#), respectively.

Inclusion: Any place of death, including care homes and community and deaths where COVID-19 has been mentioned on the death certificate.

Timeliness: Our first release (weekly deaths) is published 11 days after the reference period because of the time taken to register, process and publish.

ONS COVID-19 death occurrence (actual date of death)

Coverage: Deaths registered in England and Wales by date of death occurrence.

Inclusion: Any place of death, including care homes and community and deaths where COVID-19 has been mentioned on the death certificate.

Timeliness: Our first release (weekly deaths) is published 11 days after the reference period because of the time taken to register, process and publish. Weekly occurrences analysis includes deaths that were registered up to the Saturday prior to publication.

7 . Differences in definitions of COVID-19 deaths in care homes between sources

There are three main sources of data for coronavirus (COVID-19) deaths in care homes. These are:

- Office for National Statistics (ONS) deaths registered data

- Care Quality Commission deaths in care homes (date of notification received) data

- Care Inspectorate of Wales deaths in care homes (date of notification received) data

More detail on the coverage, inclusion and timeliness of each data source in provided in this section.

ONS COVID-19 deaths registered

Deaths registered weekly in England and Wales

Coverage: Registrations in England and Wales.

Inclusion: Deaths that occur in care homes where COVID-19 has been mentioned on the death certificate. Does not cover deaths to care residents that occur outside a care home.

Timeliness: Weekly registrations are 11 days behind because of the time taken to register, process and publish.

Weekly provisional figures of care home resident deaths registered in England and Wales

Coverage: Registrations in England and Wales.

Inclusion: The term "care home resident" used in this dataset refers to all deaths where either the death occurred in a care home or the death occurred elsewhere but the place of residence of the deceased was recorded as a care home.

Timeliness: Weekly registrations are 11 days behind because of the time taken to register, process and publish.

Care Quality Commission deaths in care homes (date of notification received)

Coverage: Death notifications sent by registered care home operators in England to the Care Quality Commission (CQC).

Inclusion: Deaths in care homes – deaths of care home residents that occurred elsewhere are also collected. Deaths where the care home provider has stated COVID-19 as a suspected or confirmed cause of death on the death notification

Timeliness: Daily deaths notifications by date of notification – these take on average four days to receive and process. Data are published weekly by the ONS.

Care Inspectorate Wales deaths in care homes (date of notification received)

Coverage: Death notifications sent by registered care home operators in Wales to the Care Inspectorate Wales (CIW).

Inclusion: Deaths in care homes – deaths of care home residents that occurred elsewhere are also collected. Deaths where the care home provider has stated COVID-19 as a suspected or confirmed cause of death on the death notification.

Timeliness: Daily deaths notifications by date of notification. Data are published fortnightly by the Welsh Government.

8 . International Classification of Diseases codes for COVID-19

The following ICD-10 codes and definitions are used to define deaths due to COVID-19 and involving COVID-19:

- U07.1: COVID-19, virus identified

- U07.2: COVID-19, virus not identified

- U09.9: Post-COVID condition, unspecified (this cannot be assigned to the underlying cause of death so is not included in the "deaths due to COVID-19" definition)

- U10.9: Multisystem inflammatory syndrome associated with COVID-19, unspecified

ICD-10 codes U09.9 (Post-COVID condition, where the acute COVID had ended before the condition immediately causing death occurred) and U10.9 (Multisystem inflammatory syndrome associated with COVID-19 (also called Kawasaki-like syndrome), a specific, uncommon effect of COVID-19 in children) were issued by the World Health Organization (WHO) in early 2021 and implemented in the February 2021 monthly mortality bulletin and the Week 8 of 2021 weekly deaths bulletin.

There are several ICD-10 codes not included in our definitions of deaths due to COVID-19 and deaths involving COVID-19. These are:

- U08.9: Personal history of COVID-19, unspecified

- U11.9: Need for immunisation against COVID-19, unspecified

- U12.9: COVID-19 vaccines causing adverse effects in therapeutic use, unspecified

ICD-10 code U08.9 is used to record an earlier episode of COVID-19 when the person no longer suffers from COVID-19. ICD-10 codes U11.9 and U12.9 relate to COVID-19 vaccines rather than COVID-19 itself.

U11.9 is an optional code that may be used when a person encounters health services for the specific purposes of receiving a COVID-19 vaccine, and U12.9 covers deaths caused by an adverse effect of the COVID-19 vaccine.

Although these three codes are not included in our figures for deaths "due to" or "involving" COVID-19, a summary of deaths for these codes is available in Table 12 of the monthly mortality analysis, England and Wales dataset.

9 . Related links

Deaths registered weekly in England and Wales, provisional

Bulletin | Released weekly

Provisional counts of the number of deaths registered in England and Wales, including deaths involving the coronavirus (COVID-19), by age, sex and region, in the latest weeks for which data are available.

Monthly mortality analysis, England and Wales

Bulletin | Released monthly

Provisional death registration data for England and Wales, broken down by sex, age and country. Includes analysis of deaths due to COVID-19 compared with the leading causes of death. Datasets include deaths due to COVID-19 by local area and socioeconomic deprivation.

Mortality statistics in England and Wales QMI

Methodology | Last revised 1 July 2020

Quality and methodology information for mortality statistics in England and Wales, detailing the strengths and limitations of the data, methods used, and data uses and users.

User guide to mortality statistics

Methodology | Last revised 28 September 2020

Supporting information for mortality statistics, which present figures on deaths registered in England and Wales in a specific week, month, quarter or year.

Impact of registration delays on mortality statistics in England and Wales

Article | Released 11 December 2020

An analysis of the time taken to register deaths, by cause of death, area of usual residence, age, sex and certification type.