

# User guide to mortality statistics

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

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# 1 . Introduction

We produce mortality statistics in line with the [Code of Practice for Statistics](#), which are free from any political interference.

This guide provides information on the collection, production, and quality of mortality statistics.

## Provisional counts of death registrations

To meet user needs, very timely but provisional counts of death registrations in England and Wales are published as follows.

- [Provisional counts of weekly death registrations](#) by sex, age group and regions (published each Wednesday, 12 days after the week ends); death registration counts are also included for selected causes of death (including coronavirus (COVID-19)).
- [Monthly mortality analysis](#) provides timely surveillance of mortality in England and Wales, with provisional death registration and death occurrence data broken down by sex, age, and country; this also includes age-standardised rates for deaths due to COVID-19 and analysis of the leading causes of death in each month (please note that monthly mortality analysis has been discontinued as of August 2023, when the [July 2023 edition](#) was published).
- [Provisional rate and number of suicide deaths](#) registered in England per quarter; includes registrations and provisional data from 2001 for Quarter 1 (Jan to Mar) to Quarter 4 (Oct to Dec).per quarter; includes registrations and provisional data from 2001 for Quarter 1 (Jan to Mar) to Quarter 4 (Oct to Dec).
- [Provisional quarterly rates and numbers of alcohol-specific deaths](#) caused by diseases known to be a direct consequence of alcohol misuse; includes registrations from 2001, with provisional registrations for Quarter 1 (Jan to Mar) to Quarter 4 (Oct to Dec); provisional figures have not been subject to the full quality assurance process.

## Annual mortality statistics

Annual mortality statistics (based on deaths registered in a calendar year, using finalised mortality data) are published in separate packages to enable the timely release of statistics.

- [Deaths registered in England and Wales \(Series DR\)](#) is the first release of finalised mortality data each year and provides death registration statistics for the reference year by cause, sex, age, and marital status in England and Wales, as well as the leading causes of death (note that prior to 2006 these were published in annual reference volumes [DH1](#), [DH2](#) and [DH4](#); for information on comparability over time see our [Mortality Statistics Quality and Methodology Information](#)).
- Our [21st Century mortality dataset](#) provides death registration statistics for England and Wales by sex, age group and underlying cause from 2001 onwards, and our [20th Century mortality files](#) provides these data for years 1901 to 2000; please note that the 21st Century mortality dataset has been discontinued as of December 2023, when the [2022 edition](#) was published.
- Our [Impact of registration delays on mortality statistics in England and Wales, 2022 article](#) provides an analysis of the time taken to register deaths, by cause of death, area of usual residence, age, sex, and certification type; please note that our Impact of registration delays on mortality statistics in England and Wales article series has been discontinued as of July 2024, when the [2022 edition](#) was published. The data table is published alongside our Deaths registered in England and Wales (Series DR) release.

Detailed annual mortality statistics are available in a [Nomis explorable dataset](#) for England and Wales including:

- number of deaths by age group, sex, area of usual residence, leading cause of death and detailed underlying cause
- number of deaths by regions, local authorities, and Middle layer Super Output Areas (MSOAs)
- age-standardised and age-specific mortality rates

We also publish more detailed annual mortality statistics on specific topics in the following releases:

- [Deaths related to drug poisoning](#)
- [Alcohol-related deaths in the UK](#)
- [Suicides in the UK](#)
- [Avoidable mortality](#)
- [Excess winter mortality](#)
- [Deaths of homeless people](#)
- [Child and infant mortality in England and Wales](#)
- [Infant mortality \(birth cohort\) tables](#)
- [Unexplained deaths in infancy](#)
- [Vital statistics: population and health reference tables](#)

## Other sources

Mortality statistics for Scotland are available on the [National Records of Scotland \(NRS\) Vital Events page](#). User guidance on mortality statistics for Scotland is available on the [background information page](#).

Mortality statistics for Northern Ireland are available on the [Northern Ireland and Statistics Research Agency \(NISRA\) Births, Deaths, Marriages statistics page](#). Information about the causes of death in Northern Ireland is available on [the Cause of Death Information in Northern Ireland: A user guide](#) webpage.

A summary of mortality statistics also appears in the World Health Organization (WHO) [Annual World Health Statistics](#) and [World Health Report](#).

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

The [Office for National Statistics \(ONS\) policy on protecting confidentiality in tables of birth and death statistics](#) is available.

Our website provides a comprehensive source of freely available statistics on [life events](#) and other ONS products.

Special extracts and tabulations of mortality data for England and Wales are available to order (subject to legal frameworks, disclosure control, resources and our [charging policy](#), where appropriate). Enquiries should be made to the Health Analysis and Pandemic Insight Customer Services team ([health.data@ons.gov.uk](mailto:health.data@ons.gov.uk) or telephone: +44 1329 444110). All [user-requested data](#) will be published onto the website.

## 2 . Information collected at death registration

The registration of life events (births, deaths, marriages and civil partnerships) is a service carried out by the Local Registration Service in partnership with the [General Register Office \(GRO\)](#).

Mortality statistics are based on information recorded when deaths are certified and registered. Most deaths are certified by a medical practitioner, using the Medical Certificate of Cause of Death (MCCD), which can be found in [Annex A \(PDF, 224KB\)](#). This certificate is taken to a registrar by an informant - usually a near relative of the deceased.

Deaths should be registered within five days of the date that a death occurred, although there are a number of situations when the registration of a death will be delayed, as described in [Section 6: Certification of cause of death](#). Data for death occurrences in recent periods are therefore less complete than death registrations data for the same period. Most mortality publications use registration data, rather than occurrence data, to allow the production of timely statistics that are stable over time, and comparable across locations.

In certain cases, deaths are referred to, and sometimes then investigated by, a coroner. The coroner sends information to the registrar, and this is used instead of that on the MCCD to register the death. In some cases, additional information provided on Part B of the coroner's certificate ([Annex C \(PDF, 171KB\)](#)) is forwarded to the Office for National Statistics (ONS) by the registrar. Accordingly, the information used in ONS mortality statistics normally comes from one of four sources:

- details supplied by the doctor when certifying a death, for example, whether the body was seen after death, cause of death, when the deceased was last seen alive and whether a post-mortem was carried out
- details supplied by the informant to the registrar, for example, occupation of deceased, sex, usual address, date and place of birth, marital status, date of death and place of death
- details supplied by a coroner to the registrar following investigation, for example, cause of death (following post-mortem), place of accident (following inquest); in the case of deaths certified after inquest, the coroner supplies the registrar with all the particulars that would have been supplied by the informant
- details derived from information supplied by one of the other three sources, for example, age of deceased is derived from date of birth and coded cause of death

Details are also supplied by the informant on the spouse of the deceased (only if the deceased is either married or civil partnered), for example, name, date of birth, occupation and employment status. If the deceased was a child, the full names and occupation of the parents will be required. If these details are supplied by the coroner rather than the informant, then occupation and employment status will not be supplied. [Occupation is classified using the Standard Occupation Classification \(SOC\)](#).

The [death registration process in Northern Ireland](#) is similar to that in England and Wales, where deaths must be registered within five days, with the exception of those referred to a coroner. However, Scotland has a slightly different process, which [allows up to eight days for the registration of a death](#), in which time the [cause of death for accidental, sudden or suspicious deaths may not yet be established](#). These deaths are still registered within this period, where cause of death would later be updated in the [Register of Corrected Entries \(now the Register of Corrections Etc \(RCE\)\)](#), following an investigation.

### 3 . Occurrences, registrations and the standard dataset

The majority of mortality publications are now based on registrations. The Office for National Statistics (ONS) continues to take an annual extract of death occurrences in the autumn following the data year, which is used for seasonal analysis of mortality data and several infant mortality outputs.

Since 2006, [Series DR](#) has been based on the number of deaths registered in the calendar year. Between 1993 and 2005, the figures in annual reference volumes relate to the number of deaths that occurred in the reference period. Prior to 1993, publications gave numbers of deaths registered in the period. More details on these changes can be found in [Mortality statistics: deaths registered in 2006](#).

The numbers of registrations for a year that actually occurred in previous years are shown in Table 1.

Table 1: Number of deaths that were registered and occurred in each calendar year, England and Wales, 2001 to 2023

Annual dataset year for registrations	Number of registrations	Number registered which occurred in that year	Percentage of those registered that occurred in that year	Number registered which occurred in previous years	Percentage of those registered that occurred in previous years
2023	581,363	530,801	91.3%	50,562	8.7%
2022	577,160	541,771	93.9%	36,389	6.1%
2021	586,334	553,741	94.4%	32,593	5.6%
2020	607,922	577,143	94.9%	30,779	5.1%
2019	530,841	502,030	94.6%	28,811	5.4%
2018	541,589	509,829	94.1%	31,760	5.9%
2017	533,253	505,452	94.8%	27,801	5.2%
2016	525,048	501,882	95.6%	23,166	4.4%
2015	529,655	504,483	95.2%	25,172	4.8%
2014	501,424	477,752	95.3%	23,672	4.7%
2013	506,790	482,658	95.2%	24,132	4.8%
2012	499,331	478,733	95.9%	20,598	4.1%
2011	484,367	463,450	95.7%	20,917	4.3%
2010	493,242	473,661	96.0%	19,581	4.0%
2009	491,348	471,113	95.9%	20,235	4.1%
2008	509,090	488,764	96.0%	20,326	4.0%
2007	504,052	485,068	96.2%	18,984	3.8%
2006	502,600	485,203	96.5%	17,397	3.5%
2005	512,993	497,603	97.0%	15,390	3.0%
2004	514,250	499,081	97.1%	15,169	2.9%
2003	539,151	524,827	97.3%	14,324	2.7%
2002	535,356	520,849	97.3%	14,507	2.7%
2001	532,498	517,010	97.1%	15,488	2.9%

Source: User guide to mortality statistics from the Office for National Statistics

#### Notes

1. Of the 581,363 deaths registered in 2023, 530,801 occurred in 2023, 46,252 occurred in 2022, 3,179 occurred in 2021 and 1,131 occurred prior to 2021.

The numbers of late registrations not included in the death occurrence dataset are shown in Table 2.

Table 2: Number of late registrations not included in the annual death occurrence dataset, England and Wales, 2001 to 2022

<b>Year death occurred</b>	<b>Number of late registrations not included in occurrence dataset</b>
2022	2,325
2021	5,034
2020	4,520
2019	5,538
2018	3,058
2017	2,512
2016	3,474
2015	2,676
2014	2,914
2013	3,006
2012	3,863
2011	3,145
2010	3,064
2009	3,313
2008	3,450
2007	3,473
2006	1,721
2005	2,424
2004	2,239
2003	2,028
2002	1,792
2001	1,372

Source: User guide to mortality statistics from the Office for National Statistics

#### Notes

1. This table is updated annually. The figures were last updated in October 2024.

The numbers of late registrations by year of occurrence are subject to future revisions because of the likely addition of late registrations; revisions could extend back a number of years. Our [Impact of registration delays on the mortality statistics bulletin](#) provides further information on the time taken to register deaths in England and Wales.

## 4 . Base populations

## Annual populations

The [population estimates](#) used to calculate mortality rates are mid-year estimates of the resident population of England and Wales, based on the [census](#). Our mid-year population estimates are updated figures using the most recent census, allowing for births, deaths, net migration and ageing of the population. When population estimates are not available for a current year, population projections are used, as such, figures for 2024 are based on projected populations.

The population estimates used are the most up to date when rates are produced. The specific population estimates used to calculate rates are detailed alongside published tables. Sometimes it is necessary to revise mortality rates following population estimate revisions. Any revisions to mortality rates are footnoted on tables. Further information on [population estimates](#) and their methodology is available.

## Rebased mid-year population estimates following Census 2021

Our mid-year population estimates for the years 2012 to 2020 previously used data from 2011 Census, and figures for 2021 were previously based on projected populations. As of November 2023, revised population estimates for the years 2012 to 2021 have been calculated using Census 2021. We have therefore revised age-standardised mortality rates for the affected years accordingly in our [Deaths Registered in England and Wales: 2022](#) release.

## Populations for other time periods

For other time periods, adjustments are made to interpolate between annual population estimates based on how far a target date is between the dates of the two closest annual population estimates. For example, for monthly populations, we calculate an interpolated 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.

The output is used as the population denominator in calculations of age-standardised and age-specific mortality rates.

For example:

$$population2020(i) + \left( (population2021(i) - population2020(i)) \times \left( \frac{m}{M} \right) \right)$$

June 2021 population equals

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 June 2021 inclusive
- M is the number of days in 2021
- (i) is the age group

$$population2021(i) + \left( (population2022(i) - population2021(i)) \times \left( \frac{m}{M} \right) \right)$$

July 2021 population equals

Where:

- m is the number of days from 1 July 2021 (the start of the mid-year for the population estimate) to the midpoint of July 2022 inclusive
- M is the number of days in 2021
- (i) is the age group



## 5 . Area coverage

### Non-residents

Published mortality statistics are based on deaths registered in England and Wales, so include some deaths of residents of other UK countries and of visitors, where the death occurred in England and Wales.

Deaths of those whose usual residence is outside England and Wales are included in total figures for "England and Wales" overall but are excluded from any smaller geographical breakdowns. Table 3 gives recent numbers of deaths of non-residents, that were registered in England and Wales.

Table 3: Number of deaths of non-residents registered in England and Wales, 2015 to 2023

<b>Year of registration</b>	<b>Number of deaths from all causes</b>	<b>of which, deaths of residents outside England and Wales</b>	<b>Percentage of deaths of residents outside England and Wales</b>
2023	581,363	1,255	0.2%
2022	577,160	1,133	0.2%
2021	586,334	850	0.1%
2020	607,922	823	0.1%
2019	530,841	1,288	0.2%
2018	541,589	1,324	0.2%
2017	533,253	1,123	0.2%
2016	525,048	1,191	0.2%
2015	529,655	1,148	0.2%

Source: User guide to mortality statistics from the Office for National Statistics

## Area of usual residence

Prior to 2016, the Office for National Statistics (ONS) assigned "area of usual residence" using a look-up product (the National Statistics Postcode Directory). This product associated postcodes with several geographic levels (for example, local authority or region). The postcode was allocated to each level of geography using a point-in-polygon methodology. Although this method is spatially accurate, it does not provide the stable building blocks needed for comparing geographies at different levels.

From the 2011 data year, we have assigned "area of usual residence" by first linking each postcode to an output area using this same point-in-polygon methodology and then linking to all higher geographies by using a population-weighted, best-fit look-up to output area, (The National Statistics Postcode Lookup, NSPL). This means that postcodes are allocated to a higher geography based on where the output area population-weighted centroid lies. This is in line with the [Geography Policy for National Statistics](#).

Switching to the new area allocation method had negligible impact on mortality statistics down to local authority level. However, the new method improved comparability of mortality statistics for subnational areas over time.

For more information about these methods, see [National Statistics Postcode Products](#). A paper investigating the [impact of the new method on life events data](#) was published in March 2013.

Until the 2016 data year, annual mortality statistics by area of usual residence were produced using the boundaries that were in place during the year the death was registered. For 2017 data onwards, figures are produced based on the latest boundaries available at the time of publication.

Details of the usual residence of the deceased are supplied by the informant to the registrar. Prior to 1993, there were rules determining the validity of one competing address over another for the purpose of registering the usual place of residence of the deceased. Previous annual reference volumes contain details of these rules. Since 1993, the informant can decide what address to give if more than one might be applicable.

Each year, there are a small number of cases (around 0.1%) where no usual residence is provided by the informant. This may be because the deceased had no fixed abode or their address was unknown. In such cases, the usual residence is coded to where the death took place.

## Deaths overseas (including war deaths)

The law requires all deaths that occurred in England and Wales to be registered, after certification of the cause of death by a doctor or in some cases, investigation by a coroner. ONS mortality statistics are based on these registrations, and therefore do not include deaths abroad, for example, members of the armed forces serving overseas, international transport accidents (unless within the relevant territory) or individuals taken ill on holiday or business in another country.

Deaths of usual residents of England and Wales that occur elsewhere are not required to be registered in England and Wales, and the information provided by the civil registration systems of foreign countries varies in its timeliness and quality. However, [the General Register Office does receive notifications of many deaths abroad and provides access to individual records through their website](#).

## Place of occurrence

As a result of improvements in the classification and coding of communal establishments, the place of death definition that we use was revised in 2011. These changes were implemented for 2010 mortality statistics.

In particular, the classification was changed to specifically identify local authority and non-local-authority care homes. The categories for NHS and non-NHS psychiatric hospitals, other hospitals and communal establishments for the care of the sick have also been replaced with a category for all hospitals. This reflects current user needs.

Further improvements to how deaths are allocated to individual establishments and to how these are assigned to place of death categories is an ongoing exercise, which will improve the quality of this new classification.

The groups used for the place where death occurred are:

- home (those at the usual residence of the deceased (according to the informant), where this is not a communal establishment)
- care home (whether local authority or non-local authority)
- hospitals and communal establishments for the care of the sick (excluding psychiatric hospitals and hospices) (whether NHS or other than NHS)
- hospices (whether NHS or other than NHS)
- other communal establishments: includes schools, convents and monasteries, nurses' homes, university and college halls of residence, young offender institutions, secure training centres, detention centres, prisons and remand homes elsewhere: includes all places not covered in this list such as deaths on a motorway; at the beach; climbing a mountain; walking down the street; at the cinema; at a football match; while out shopping; or in someone else's home

To calculate death figures by place of death, we use information collected on the death certificate to determine where the death occurred and where the deceased lived. When these two variables are the same location, and this location is not a communal establishment, we create the group for deaths at home (sometimes referred to as "private homes").

Where the individual died in a communal establishment, we link the mortality data to a communal establishment file via a unique identifier assigned by the registrar. This allows us to collect information on the type of establishment, by breaking the list into over 80 types of organisation. Using these, we group the organisations into the categories described previously.

Where the deceased did not die in their own home, or in a communal establishment, they are included in figures for "elsewhere", which covers all other locations.

Figures on [deaths of care home residents](#) are also published, which differ to deaths in care homes. The term "care home resident" refers to all deaths where either (a) the death occurred in a care home or (b) the death occurred elsewhere but the place of residence of the deceased was recorded as a care home.

## 6 . Certification of cause of death

When a death occurs, the attending doctor completes a Medical Certificate of Cause of Death (MCCD) ([Annex A \(PDF, 224KB\)](#)). This is normally taken to the local registrar of births and deaths in the district in which the death occurred. Since April 1997, information may be provided to a registrar in a different district. This is known as the registration of deaths by declaration and is used mostly for the deaths of infants. Further details about deaths by declaration are available in [Section 7: Registration of deaths by declaration](#).

Usually, the certifying doctor must have seen the deceased during the last two weeks of life to complete a MCCD. This is normally delivered to the registrar by the informant (often a relative of the deceased), within five days of the date of death, as required by law. The majority of deaths are registered in this way. A specimen of the draft death entry completed by the registrar at the time of registration is reproduced at [Annex B \(old, PDF, 153KB\)](#) and [Annex I \(new, PDF, 276KB\)](#).

In an emergency period, such as the coronavirus (COVID-19) pandemic, any doctor can complete the MCCD, when it is impractical for the attending doctor to do so. This may, for example, be when the attending doctor is self-isolating, unwell, or has pressure to attend to patients. In these circumstances, it may be practical to allow a medical examiner or recently retired doctor returning to work to complete the MCCD. Further details about death certification during emergency periods are available in the [Guidance for doctors completing Medical Certificates of Cause of Death in England and Wales \(PDF, 383KB\)](#).

There are circumstances when a MCCD cannot be issued immediately, such as those deaths reported to a coroner, and the registration is consequently delayed. Some examples of these situations are given in the following subsections.

## Referral to the coroner

For some deaths, the doctor may certify the cause and report the case to the coroner or the registrar may report it. Deaths that should be referred to a coroner include those where:

- the cause is unknown
- the deceased was not seen by the certifying doctor either after death or within the 14 days before death
- the death was violent, unnatural or suspicious
- the death may have been due to an accident (whenever it occurred)
- the death may have been due to self-neglect or neglect by others
- the death may have been due to an industrial disease or related to the deceased's employment
- the death occurred during an operation or before recovery from the effects of an anaesthetic
- the death may have been a suicide
- the death occurred during or shortly after detention in police or prison custody
- there was no doctor available who was legally qualified to certify the death

Following a significant increase in applications for [Deprivation of Liberty Safeguards \(DoLS\)](#) between 2013 and 2015, and a consequent increase in coroner investigations and inquests into deaths where a DoLS was in place, [it was recommended that these deaths were removed from the "in state detention" category \(PDF, 77KB\)](#). Since [changes to the Policing and Crime Act 2017](#), deaths under DoLS that occurred on or before 3 April 2017 should be treated outside the context of state detention and should only be reported to the coroner where one or more other conditions are met. As a result, we saw the number of inquests on natural deaths decrease from 2009 onwards (a reversal of the earlier trend).

Coroners have several possible courses of action once a death has been referred. If they are satisfied that the death was due to natural causes and the cause has been correctly certified by a medical practitioner, the local registrar is notified (Form 100A - [Annex D \(PDF, 88KB\)](#)) and they can then register the death using the cause given on the MCCD. In rare cases where no medical certificate is available, the death will be registered as uncertified and the cause taken from Form 100A ([Annex D \(PDF, 88KB\)](#)).

Alternatively, the coroner may order a post-mortem examination. This may happen if the death was sudden and the cause unknown, if there was no doctor in attendance, or if the death has been referred directly to the coroner by the police. If the post-mortem shows unequivocally that the death was due to natural causes, the coroner notifies the registrar that they do not intend to hold an inquest (Form 100B - [Annex E \(PDF, 133KB\)](#)). In such cases, the cause of death given by the coroner on Form 100B is based on the information from the post-mortem held by the pathologist.

## Coroners' inquests

If an inquest is necessary, the death can usually be registered only after the inquest has taken place. In a small number of cases, the coroner holds an inquest without a post-mortem. In most cases, the inquest concludes the investigation and the death is then certified by the coroner (Form 99(REV) - [Annex C \(PDF, 171KB\)](#)). This provides the registrar with details of the deceased and the inquest findings as to cause of death.

If someone is to be charged with an offence in relation to the death, the coroner must adjourn the inquest until those legal proceedings are completed. Since 1978 (see [Section 9: Cause of death coding](#); subsection: Accelerated registrations), it has been possible to register these deaths at the time of adjournment, when the coroner issues Form 120 ([Annex F \(PDF, 160KB\)](#)). This form includes details of injuries that led to the death but no conclusion. In the case of motor vehicle incidents, there is enough information to code the cause of death. Other deaths, such as possible homicides, are given a temporary code for underlying cause of death (U50.9) until final information becomes available. This is supplied by the coroner to the registrar on Form 121 ([Annex G \(PDF, 172KB\)](#)).

## Legally uncertified deaths

A very small percentage of deaths remain legally uncertified ([An analysis of legally uncertified deaths in England and Wales, 1979 to 2002](#)). In recent years, this figure has remained around 0.5% of all deaths registered in England and Wales, but in 2021, this figure dropped to 0.2%. In 2022, 1.4% of deaths were legally uncertified. The number of legally uncertified deaths has continued to rise to 2.4% in 2023.

We receive copies of at least one certificate of cause of death for these cases, which are registered and coded as normal. This group includes deaths for which the doctor, who completed the medical certificate, did not fulfil all the legal requirements for doing so. For example, where the doctor was not in attendance with the deceased during the last illness (please note that [this was not a requirement during the coronavirus pandemic \(PDF, 383KB\)](#)), or did not see the body, and the coroner did not order a post-mortem but issued Form 100A ([Annex D \(PDF, 88KB\)](#)). It also includes deaths of foreign military personnel in England and Wales where the certifying doctor was not a registered medical practitioner for the purpose of issuing medical certificates.

Table 4 gives relevant numbers of deaths by type of certification for 2017 to 2023.

Table 4: Relevant numbers of deaths by type of certification for 2017 to 2023

	Number of deaths registered 2017	Percentage of deaths registered 2017	Number of deaths registered 2018	Percentage of deaths registered 2018	Number of deaths registered 2019	Percentage of deaths registered 2019	Number of deaths registered 2020	Percentage of deaths registered 2020	Number of deaths registered 2021
<b>Total deaths</b>	<b>533,253</b>	<b>100.0%</b>	<b>541,589</b>	<b>100.0%</b>	<b>530,841</b>	<b>100.0%</b>	<b>607,922</b>	<b>100.0%</b>	<b>586,333</b>
<b>Certified by doctor:</b>	433,682	81.3%	444,724	82.1%	437,013	82.3%	512,529	84.3%	489,083
<b>with coroner not involved,</b>	331,884	62.2%	346,065	63.9%	345,893	65.2%	426,781	70.2%	416,033
<b>without post-mortem, or post mortem information missing</b>	330,959	62.1%	345,119	63.7%	344,994	65.0%	425,283	70.0%	414,403
<b>with post-mortem</b>	935	0.2%	946	0.2%	899	0.2%	1,498	0.2%	1,631
<b>After referral to coroner:</b>	101,798	19.1%	98,659	18.2%	91,120	17.2%	85,748	14.1%	73,043
<b>registered with no post-mortem or inquest, or post-mortem information missing.</b>	101,545	19.0%	98,375	18.2%	90,854	17.1%	85,481	14.1%	72,751
<b>with post-mortem</b>	253	0.0%	284	0.1%	266	0.1%	267	low	292
<b>Certified by coroner:</b>	97,569	18.3%	94,610	17.5%	91,114	17.2%	92,627	15.2%	95,963
<b>Coroner's post-mortem held, with no inquest</b>	63,651	11.9%	63,713	11.8%	59,813	11.3%	61,510	10.1%	63,058
<b>Coroner's inquest completed, with or without post-mortem, or post-mortem information missing</b>	32,789	6.1%	29,920	5.5%	30,348	5.7%	30,203	5.0%	31,904

<b>Coroner's inquest adjourned</b>	1,129	0.2%	977	0.2%	952	0.2%	914	0.2%	1,001
<b>Uncertified</b>	2,002	0.4%	2,255	0.4%	2,714	0.5%	2,766	0.5%	1,290

Source: User guide to mortality statistics from the Office for National Statistics

## Notes

1. This table is updated annually. The figures were last updated in October 2024.
2. Low denotes a non-true zero because of rounding

## 7 . Registration of deaths by declaration

Since April 1997, it has been possible for relatives to provide information about the deceased to a registrar in a different district from that in which the death occurred. This is known as registration of a death by declaration and is similar to the arrangement already in place for births. The registrar completes a Form 400 ([Annex H \(PDF, 162KB\)](#)) as well as the usual Form 310 ([Annex B \(PDF, 153KB\)](#) or [Annex I \(PDF, 276KB\)](#)) and sends them to a registrar in the district where the death took place; the second registrar then carries out the actual registration.

Between 2010 and 2012, the use of registration by declaration decreased but had since been gradually increasing, with 1% of deaths registered by declaration in 2019. In March 2020 the [Coronavirus Act 2020](#) came in enabling deaths to be registered by telephone to the relevant district where the death occurred, reducing the number of deaths by declaration. In 2020, deaths registered by declaration was lower than in recent years (0.3%). This fell to less than 0.01% in 2021. The Coronavirus Act ended in March 2022. In 2022, 1.8% of deaths were registered by declaration, and in 2023, 2.6% were registered by declaration.

The greater frequency for infant deaths is explained by the practice of referring infants or pregnant women with serious or unusual health problems to regional care units where appropriate, which may often be some distance from the parents' home address.

## 8 . Presumption of death

On 1 October 2014, the [Presumption of Death Act 2013 \(PDF, 258KB\)](#) came into force in England and Wales. This means that an application can be made to the High Court for a declaration ([Annex J \(PDF, 440KB\)](#)) that a missing person is presumed to be dead where the person who is missing is thought to have died or has not been known to be alive for a period of at least seven years.

Table 5: Number of presumed deaths, England and Wales, 2015 to 2023

<b>Annual dataset year for registrations</b>	<b>Total deaths</b>	<b>Number of presumed deaths</b>
2023	581,363	13
2022	577,160	14
2021	586,334	21
2020	607,922	20
2019	530,841	28
2018	541,589	18
2017	533,253	21
2016	525,048	18
2015	529,655	16

Source: User guide to mortality statistics from the Office for National Statistics

## 9 . Cause of death coding



# Coding the underlying cause of death

## Automated cause coding

Since 1993, the majority (approximately 80%) of Office for National Statistics (ONS) mortality data have been coded by automatic cause coding software. Specific text terms from the death certificate are converted to International Classification of Diseases (ICD) codes, and then selection and modification rules (see later in this section) are used to assign the underlying cause of death. Using computer algorithms to apply rules increases the consistency and improves the international and temporal comparability of mortality statistics. The cause coding of deaths certified after inquest is done manually by experienced coders, as the software could not code the free text format used by coroners.

International Classification of Diseases, 10th edition (ICD-10) was introduced in England and Wales in January 2001. Since then, various amendments have been authorised by the World Health Organization (WHO). Amendments may, for example, correct errors in the software supporting automatic coding, accommodate new codes in response to new conditions, such as coronavirus (COVID-19) or incorporate advances in medical knowledge of the relationship between conditions.

Between 2001 and 2010, the ONS used the Mortality Medical Data System (MMDS) ICD-10 version 2001.2 software provided by the United States National Centre for Health Statistics (NCHS) to code cause of death. In January 2011, this was updated to version 2010, which incorporated most of the WHO amendments authorised up to 2009.

The main changes in ICD-10 version 2010 were amendments to the modification tables and selection rules. Overall, the impact of these changes is small, although some cause groups are affected more than others. For further information, see the [results of the bridge coding study](#). There is also another study looking at the impact on [stillbirths and neonatal deaths](#).

On 1 January 2014, we changed the software used to code cause of death to a package called [IRIS](#) (version 2013). The development of IRIS was supported by Eurostat, the statistical office of the EU and is now managed by the IRIS Institute hosted by the German Institute of Medical Documentation and Information in Cologne.

IRIS software version 2013 incorporated all official updates to ICD-10 approved by WHO, which were timetabled for implementation before 2014. These updates included changes to the use of codes within the neoplasms (cancer) chapter (ICD-10 codes C00 to D48). In addition, a small number of changes were made to the coding of specific conditions, to bring previous coding practice in line with international coding rules and changes were made to the coding of neonatal deaths and stillbirths.

On 1 January 2022, we again updated the IRIS software to the Multicausal and Unicausal Selection Engine (MUSE) (IRIS version 5.8). The MUSE operates based on internationally agreed decision tables that reflect the most recent version of ICD-10. This system also increases the automation of coding compared with the previous software.

Further information on the impacts of changes to cause of death coding software is available:

- [Impact of the Implementation of IRIS Software for ICD-10 Cause of Death Coding on Mortality Statistics](#)
- [Impact of the implementation of IRIS software for ICD-10 cause of death coding on stillbirth and neonatal death statistics](#)
- [Cause of death coding in mortality statistics. software changes: January 2020](#)
- [Cause of death coding in mortality statistics. software changes: January 2022](#)

The death certificate ([Annex A \(PDF, 224KB\)](#)) used in England and Wales is compatible with that recommended by WHO. It is set out in two parts. Part I gives the condition or sequence of conditions leading directly to death, while Part II gives details of any associated conditions that contributed to the death but are not part of the causal sequence.

The selection of the underlying cause of death is based on ICD rules and is made from the condition or conditions reported by the certifier, as recorded on the certificate. The underlying cause of death is defined by WHO as the disease or injury that initiated the train of events directly leading to death or the circumstances of the accident or violence that produced the fatal injury.

Deaths attributed to accidents, poisonings and violence are examined, firstly according to the underlying cause of death (external cause) and secondly by the nature of injury or main injury. External cause of injury codes are taken from Chapter XX of the ICD (prefixes U50.9 and V01 to Y89, where U50.9 is a temporary code and not included in Chapter XX) and nature of injury codes are from Chapter XIX (prefixes S00 to T98) or from a smaller number of other post-procedural codes not within Chapter XIX.

## **Selection and modification rules**

The selection of the underlying cause of death is generally made from the condition or conditions entered in the lowest completed line of Part I of the Medical Certificate of Cause of Death (MCCD). If the death certificate has not been completed correctly - for example, if there is more than one cause on a single line with no indication of sequence or the conditions entered are not an acceptable causal sequence - it becomes necessary to apply one or more of the selection rules in the ICD-10.

Even where the certificate has been completed properly, there are particular conditions, combinations or circumstances when modification rules have to be applied to select the correct underlying cause of death. On some death certificates, for example, when two or more causes are listed and then linked together, these may point to another cause (not mentioned directly on the certificate) as underlying (an inferred underlying cause). This happens in a minority of cases and these are most commonly related to diseases of the circulatory system and late effects of cerebrovascular disease. In other cases, the underlying cause of death can be selected from Part II of the MCCD.

In summary, the purpose behind the selection and modification rules is to derive the most useful information from the death certificate and to do it uniformly so that data will be comparable between places and times and each death certificate produces one, and only one, underlying cause of death.

## **Underlying cause of death versus contributory causes**

Coding rules ensure that each recorded item on the certificate is coded independently of all others on the same certificate. All mentioned causes (the underlying cause of death and any other causes that were mentioned on the death certificate as contributing to the death) have been coded routinely since 1993.

Most of the regular ONS mortality tables analyse the underlying cause of death, often referred to as deaths "due to" a particular cause. In some publications we also refer to deaths "involving" a particular cause. This is a broader category that includes all deaths that had the cause mentioned on the death certificate, whether as the underlying cause or a contributory cause.

## ICD-10 implementation

ICD-10 was implemented in England and Wales in 2001. The main differences between ICD-9 and ICD-10 are outlined in [Results of the ICD-10 bridge coding study, England and Wales, 1999](#).

The vast majority of deaths in ICD-9 remained in comparable chapters in ICD-10. However, there were some discontinuities in the data because of the application of new rules for assigning underlying cause in ICD-10, most notably for deaths due to pneumonia. [Section 16: Background and history of mortality data](#) (subsection: Historical changes in mortality data) provides further details about sources of information on the changes to ICD-10.

Historically, the rule that changed cause of death statistics most was the introduction of Rule 3 (see [Section 16: Background and history of mortality data](#) (subsection: Legislation) for further details). In ICD-10, the list of conditions affected by Rule 3 is more clearly defined than in ICD-9 and is also broader in scope.

Deaths from 1979 to 2000, which appear in tables containing historical data, are coded to ICD-9 and have been grouped to reflect ICD-10 categories. To achieve this broad comparability, the ranges of ICD-9 codes used for some of the groupings differ from those published in annual volumes prior to 2001. Particular causes affected include leukaemia, diseases of the liver and land transport accidents.

### Note on coding of acute rheumatic fever (ICD-9 390 to 392, ICD-10 I00 to I02)

In 1999, we found that, in some circumstances, deaths from rheumatic and valvular heart diseases were wrongly coded to acute rheumatic fever by the automated cause coding system introduced in 1993. All deaths in 1998 and 1999 with any mention of acute rheumatic fever were checked and recoded manually, if necessary. From 2000, routine checks were set in place to correct any deaths miscoded to acute rheumatic fever. Therefore, published data on deaths between 1993 and 1997 assigned to acute rheumatic fever should be regarded as highly unreliable.

### Note on coding influenza due to identified avian or swine influenza virus (ICD-10 J09)

Following guidance from WHO, the ICD-10 code J09 "Influenza due to identified avian influenza virus" has been used to record H1N1 swine influenza. For ease of use, J09 has been renamed to "Influenza due to identified avian or swine influenza virus" in the mortality tables since 2009.

The number of deaths with an underlying cause of "Influenza due to identified avian or swine influenza virus" (J09) differ from figures reported by [Public Health England \(PHE\)](#).

### Note on coding of the coronavirus (COVID-19)

Following guidance from WHO, the ICD-10 codes U07.1 (COVID-19, virus identified) and U07.2 (COVID-19, virus not identified) have been used to record deaths from COVID-19 since 2020. In February 2021, two further codes were implemented following additional guidance from WHO: U09.9 (Post-COVID condition, unspecified) and U10.9 (Multisystem inflammatory syndrome associated with COVID-19, unspecified).

## Two codes for certain conditions

### The "dagger and asterisk" system

ICD-10 has continued the system introduced in ICD-9 whereby there are two codes for diagnostic descriptions that contain information about both an underlying generalised disease (given a dagger (†) code) and a local manifestation in a particular organ or site that is a clinical problem in its own right (given an asterisk (\*) code). This system was introduced because previously the underlying disease alone did not allow for analysis of the manifestation of a disease that was the reason for receiving medical care.

Conditions with dagger codes are used in assigning underlying causes, whereas asterisk codes are not used in this way so will not appear in tables including underlying cause of death only. Asterisk codes appear as categories for the same conditions occurring when a particular disease is not specified as the underlying cause. For example, codes G20 and G21 (not asterisk codes) are for forms of Parkinsonism that are not manifestations of other diseases assigned elsewhere, while category G22\* is for "Parkinsonism in diseases classified elsewhere". Corresponding dagger codes are given for conditions mentioned in asterisk categories; for example, for syphilitic Parkinsonism in G22\*, the dagger code is A52.1† (symptomatic neurosyphilis).

For further information on the dagger and asterisk system, see Section 3.1.3 of the [ICD-10 instruction manual \(PDF, 2.1MB\)](#).

### Secondary causes

Deaths where the underlying cause is assigned to an external cause (ICD-10 Chapter XX, U50.9 to Y89) are also assigned at least one nature of injury code (Chapter XIX, S00 to T98) or a post-procedural code not within Chapter XIX. This means it is possible to have more than one nature of injury code for a single death.

For example, a car occupant injured in a transport accident (V40 to V49) may have suffered a fracture to the skull (S02) and femur (S72) as well as injuries of the spleen (S36). However, it is necessary to select which one of the nature of injury codes is to be identified as the one causing death. This one cause code is referred to by the ONS as the secondary cause. To do this, WHO provides guidelines or "rules" to ensure that the most useful information is derived from the death certificate and that it is done uniformly.

The move from ICD-9 to ICD-10 had an impact on the allocation of secondary causes. The ONS published an [assessment of this impact](#). In ICD-10, when more than one body region is involved, coding is made to the relevant category of injuries involving multiple body regions (T00 to T07). Therefore, in the previous example of an occupant injured in a transport accident, under ICD-10 the secondary cause would be classified as "other specified injuries involving multiple body regions" (T06.8), whereas under ICD-9 the secondary cause would be more specifically classified as a fracture of the skull (ICD-9 800).

An update by WHO was implemented for 2014 data whereby if more than one serious injury is reported on the relevant part of the certificate, the main injury must be selected from the [Priority Ranking of ICD-10 Nature-of-Injury Codes \(PDF, 1.0MB\)](#) list. The update indicates that when more than one of the serious injuries reported in the relevant part of the certificate have the same and highest rank, select the first mentioned of these injuries; however, we prefer a specific injury over an injury from the block T00 to T07 (injuries involving multiple body regions) with the same priority rank.

Information on injuries is derived from the coroners' forms that are supplied to the ONS, in particular the coroner's certificate of cause of death after inquest (Form 99 (Rev) A - [Annex C \(PDF, 171KB\)](#)). This form was revised in May 1993 to bring it into line with the MCCD and with WHO recommendations. Because the revised form no longer includes specific questions about type of injury and parts of body injured, some coroners now often provide less detail than before. The result is that some deaths are assigned to residual codes for nature of injury. For example, in ICD-10 the statement "head injury" is coded to "unspecified injury of head" (S09.9), whereas with more detail it might be assigned to "fracture of skull and facial bones" (S02.n).

## Final cause of death

The conditions mentioned on the death certificate are used to derive an underlying cause of death. In some cases, more information on cause of death may become available at a later stage after the death has been registered such that the underlying cause may be subsequently amended. Around 0.05% of deaths have their underlying cause amended (Table 6). This amended or final cause is used in mortality statistics. Sometimes, the later information becomes available only after publication. Users with access to individual records of deaths as shown in the public record (which is never amended) may consequently find some differences with published statistics.

Table 6: Number of deaths where original cause was amended for final cause, England and Wales, 2023

Deaths	Percent	Analysis
1	low	Original 'Diseases of the respiratory system' cause amended for final cause
2	low	Original 'Neoplasm' cause amended for final cause
2	low	Original 'Diseases of the circulatory system' cause amended for final cause
4	low	Other original cause amended for final cause
6	low	3-digit ICD-10 codes for original and final cause match
48	low	4-digit ICD-10 codes for original and final cause match
145	low	Pending conclusion deaths resolved and final cause submitted
581,153	99.96%	No final cause information submitted (includes neonatal deaths)

Source: User guide to mortality statistics from the Office for National Statistics

### Notes

1. Low denotes a non-true zero because of rounding.

In summary, further details on the causes of death can be obtained in one or other of the following ways.

Deaths certified by doctors may have their cause amended as a result of a post-mortem or of tests initiated before death. The certifier sends this additional information directly to the cause coding team at the ONS, where it is only used for statistical purposes and does not appear in the public record. Less than 1% of deaths certified by a doctor have a post-mortem and in the majority of cases, the certified cause remains unchanged. In addition, the ONS cause coders may contact the certifier for more information if the certificate is unclear or they cannot code the underlying cause; this is very rare.

When a death has been certified by a coroner after post-mortem (with no inquest), further information may be available once they have results of bacteriology or histopathology. This is also very rare. Following an inquest, coroners may submit to the ONS details of how a fatal accident occurred. This is rare, as coroners normally only certify the cause of death after their investigations are complete, so the first and only information the ONS receives about these deaths is the final underlying cause. Coroners may also provide a final underlying cause of death and conclusion much later for an accelerated registration following an adjourned inquest (see next subsection).

## Accelerated registrations

On 1 January 1978, certain provisions of the [Criminal Law Act 1977](#), the [Coroners \(Amendment\) Rules 1977](#) and the [Registration of Births, Deaths and Marriages \(Amendment\) Regulations 1977](#) came into force. These meant that in cases where an inquest was adjourned, the death could be registered as an accelerated registration, without the need to await the outcome of criminal proceedings.

Accelerated registrations that are not transport incidents are assigned to code U50.9 (event awaiting determination of event); prior to 2007, they were assigned to code Y33.9 (other specified events, undetermined intent). Most of these are eventually reassigned to assault (X85 to Y09), but the delays before this happens can affect the published figures in the under-estimation of deaths from assault ([Death certification and the epidemiologist](#)). For this reason, ONS statistics on deaths from assault usually include ICD-10 code U50.9 (see next section).

Accelerated registrations related to deaths involving motor vehicle incidents are assigned to a code in the range V01 to V89 (land transport accidents) if sufficient information is available on the coroner's certificate of adjournment.

## Assault and intentional self-harm

### Numbers of deaths from assault (homicide in ICD-9)

It is possible to make alternative assessments about the number of deaths that may be attributed to assault. There are two estimates presented in standard tables. The first is the number coded to X85 to Y09; this is the basic ICD classification to which all assaults should eventually be assigned. The second is the number coded to X85 to Y09 plus those coded to U50.9 (event awaiting determination of intent); this takes account of accelerated registrations, most of which are eventually coded to an assault code.

### Numbers of deaths from intentional self-harm (suicide in ICD-9)

As with assault, it is possible to make two separate estimates of the number of deaths annually from intentional self-harm. The first is the number coded to X60 to X84; this is the basic ICD classification to which all definite intentional self-harm conclusions are assigned. The second is the National Statistics definition of suicide, which includes the number coded to X60 to X84 plus those coded to Y10 to Y34 (event of undetermined intent); this takes account of most deaths, excluding 10- to 14-year-olds, where an open inquest conclusion was returned, but it excludes all deaths that are pending investigation.

The National Statistics definition of suicide was revised in January 2016 to include deaths from intentional self-harm in children aged 10 to 14 years. Previously, we did not include suicides in young children because of the very small numbers involved. However, after discussions with Public Health England and the constituent countries of the UK, it was decided that it was appropriate to include them.

Deaths from an event of undetermined intent in 10- to 14-year-olds are not included in these suicide statistics, because although for older teenagers and adults we assume that in these deaths the harm was self-inflicted, for younger children it is not clear whether this assumption is appropriate. This new definition has been applied to the full back series from 1981 to the latest year of death registrations. For more information on the suicides definition, please see our [Suicides in the UK statistical bulletin](#).

## 10 . ONS short list of cause of death

The cause of death codes shown in detailed cause of death tables are those where at least one death was coded to that underlying cause during the relevant reference period.

The Office for National Statistics (ONS) short list for cause of death is based on a standard tabulation list developed by the ONS, in consultation with the Department of Health (now the Department of Health and Social Care, DHSC). This list of over 100 conditions was based on the following:

- all conditions given in the World Health Organization (WHO) basic tabulation list, with the exception of a few conditions that are so rare as certified causes of death in England and Wales that they could safely be excluded from the list
- totals for each International Classification of Diseases, 10th edition (ICD-10) chapter
- conditions used in monitoring public health targets
- other conditions often cited by the ONS

The aim was to provide a standard listing for tables of mortality statistics containing conditions frequently referred to by all users of the data. In this way, users could find the same conditions in different tables and in different annual publications.

Many tables also contain statistics for conditions in the standard list as well as others of particular interest. The standard listing follows. Note that from 1993 to 2000, conditions related to HIV infection were coded to ICD-9 042 to 044. This replaced the previously used ICD-9 code of 279.1 (deficiency of cell-mediated immunity) for these conditions. From 2001, conditions related to HIV infection have been coded to the ICD-10 codes B20 to B24.

From 1 January 2007, a new ICD-10 code (U50.9) has been used by the ONS for deaths involving adjourned inquests that would previously have been coded to Y33.9. This has made the tabulation of deaths from undetermined intent, and estimates of suicide, easier to produce.

## **ONS short list of cause of death ICD-10 codes and names**

- A00 to R99, U00 to Y89: All causes

### **A00 to B99: ICD Chapter I Certain infectious and parasitic diseases**

- A00 to A09: Intestinal infectious diseases
- A15 to A16: Respiratory tuberculosis
- A17 to A19: Other tuberculosis
- A39: Meningococcal infection
- A40 to A41: Sepsis
- B15 to B19: Viral hepatitis
- B20 to B24: Human immunodeficiency virus [HIV] disease
- B90: Sequelae of tuberculosis

### **C00 to D48: ICD Chapter II Neoplasms**

- C00 to C97: Malignant neoplasms
- C00 to C14: Malignant neoplasms of lip, oral cavity and pharynx
- C15: Malignant neoplasm of oesophagus
- C16: Malignant neoplasm of stomach
- C18: Malignant neoplasm of colon
- C19 to C21: Malignant neoplasm of rectosigmoid junction, rectum and anus
- C22: Malignant neoplasm of liver and intrahepatic bile ducts
- C23 to C24: Malignant neoplasm of gallbladder and biliary tract
- C25: Malignant neoplasm of pancreas
- C32: Malignant neoplasm of larynx
- C33 to C34: Malignant neoplasm of trachea, bronchus and lung
- C43: Malignant melanoma of skin
- C44: Other malignant neoplasms of skin
- C45: Mesothelioma
- C46: Kaposi sarcoma
- C50: Malignant neoplasm of breast
- C53: Malignant neoplasm of cervix uteri
- C54 to C55: Malignant neoplasm of other and unspecified parts of uterus
- C56: Malignant neoplasm of ovary
- C61: Malignant neoplasm of prostate
- C62: Malignant neoplasm of testis
- C64: Malignant neoplasm of kidney, except renal pelvis
- C67: Malignant neoplasm of bladder
- C71: Malignant neoplasm of brain
- C81: Hodgkin lymphoma
- C82 to C85: Non-Hodgkin lymphoma
- C90: Multiple myeloma and malignant plasma cell neoplasms
- C91 to C95: Leukaemia
- C97: Malignant neoplasms of independent (primary) multiple sites
- D00 to D48: In situ and benign neoplasms, and neoplasms of uncertain or unknown behaviour



## **D50 to D89: ICD Chapter III Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism**

- D50 to D64: Anaemias

## **E00 to E90: ICD Chapter IV Endocrine, nutritional and metabolic diseases**

- E10 to E14: Diabetes mellitus

## **F00 to F99: ICD Chapter V Mental and behavioural disorders**

- F01, F03: Vascular and unspecified dementia
- F10 to F19: Mental and behavioural disorders due to psychoactive substance use

## **G00 to G99: ICD Chapter VI Diseases of the nervous system**

- G00, G03: Meningitis (excluding meningococcal)
- G12.2: Motor neuron disease
- G20: Parkinson disease
- G30: Alzheimer disease
- G35: Multiple sclerosis
- G40: Epilepsy

## **H00 to H59: ICD Chapter VII Diseases of the eye and adnexa**

## **H60 to H95: ICD Chapter VIII Diseases of the ear and mastoid process**

## **I00 to I99: ICD Chapter IX Diseases of the circulatory system**

- I05 to I09: Chronic rheumatic heart diseases
- I10 to I15: Hypertensive diseases
- I20 to I25: Ischaemic heart diseases
- I21 to I22: Acute myocardial infarction
- I26 to I51: Other heart diseases
- I60 to I69: Cerebrovascular diseases
- I60 to I62: Intracranial haemorrhage
- I63: Cerebral infarction
- I64: Stroke, not specified as haemorrhage or infarction
- I70: Atherosclerosis
- I71: Aortic aneurysm and dissection

### **J00 to J99: ICD Chapter X Diseases of the respiratory system**

- J09: Influenza due to certain identified influenza virus
- J10 to J11: Influenza
- J12 to J18: Pneumonia
- J40 to J44: Bronchitis, emphysema and other chronic obstructive pulmonary disease
- J45 to J46: Asthma

### **K00 to K93: ICD Chapter XI Diseases of the digestive system**

- K25 to K27: Gastric and duodenal ulcer
- K40 to K46: Hernia
- K57: Diverticular disease of intestine
- K70 to K77: Diseases of the liver

### **L00 to L99: ICD Chapter XII Diseases of the skin and subcutaneous tissue**

### **M00 to M99: ICD Chapter XIII Diseases of the musculoskeletal system and connective tissue**

- M05 to M06, M08: Rheumatoid arthritis and juvenile arthritis
- M80 to M81: Osteoporosis

### **N00 to N99: ICD Chapter XIV Diseases of the genitourinary system**

- N00 to N15: Glomerular and renal tubulo-interstitial diseases
- N17 to N19: Renal failure
- N40: Hyperplasia of prostate

## **O00 to O99: ICD Chapter XV Pregnancy, childbirth and the puerperium**

## **P00 to P96: ICD Chapter XVI Certain conditions originating in the perinatal period**

## **Q00 to Q99: ICD Chapter XVII Congenital malformations, deformations and chromosomal abnormalities**

- Q20 to Q28: Congenital malformations of the circulatory system

## **R00 to R99: ICD Chapter XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified**

- R54: Senility
- R95: Sudden infant death syndrome
- R99: Other ill-defined and unspecified causes of mortality

## **S00 to T98: ICD Chapter XIX Injury, poisoning and certain other consequences of external causes**

- S00 to S19: Injuries to the head and the neck
- S20 to S29: Injuries to the thorax
- S30 to S39: Injuries to the abdomen, lower back, lumbar spine and pelvis
- S72: Fracture of femur
- T20 to T32: Burns and corrosions
- T39.1: Poisoning by 4-Aminophenol derivatives
- T40: Poisoning by narcotics and psychodysleptics [hallucinogens]
- T42: Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs
- T43: Poisoning by psychotropic drugs, not elsewhere classified
- T50.9: Poisoning by other and unspecified drugs, medicaments and biological substances
- T51 to T65: Toxic effects of substances chiefly nonmedicinal as to source
- T58: Toxic effect of carbon monoxide
- T71: Asphyxiation
- T75.1: Drowning and nonfatal submersion

## V01 to Y89 (inc U50.9): ICD Chapter XX External causes of morbidity and mortality

- V01 to X59: Accidents
- V01 to V99, Y85: Transport accidents
- V01 to V89: Land transport accidents
- W00 to W19: Falls
- W65 to W74: Accidental drowning and submersion
- X00 to X09: Exposure to smoke, fire and flames
- X40 to X49: Accidental poisoning by and exposure to noxious substances
- X41: Accidental poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified
- X42: Accidental poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified
- X44: Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances
- X59: Accidental exposure to unspecified factor
- X60 to X84: Intentional self-harm [note 1]
- X85 to Y09: Assault [note 1]
- Y10 to Y34: Event of undetermined intent
- X60 to X84, Y10 to Y34: Intentional self-harm; and event of undetermined intent
- U50.9, X85 to Y09: Assault; death from injury or poisoning, event awaiting determination of intent (inquest adjourned)

### Notes

1. The production of statistics on numbers of assault and intentional self-harm deaths occurring in a particular year is complicated by matters of definition and delay resulting from legal proceedings. Further details can be found in [Section 9: Cause of death coding](#); subsection: Assault and intentional self-harm.

## 11 . Childhood mortality

## Stillbirths

The [Still-Birth \(Definition\) Act 1992](#) defines a stillbirth as "a child which has issued forth from its mother after the 24th week of pregnancy, and which did not at anytime after becoming completely expelled from its mother breathe or show other signs of life".

This definition has been in use since 1 October 1992. Prior to this, the [Births and Deaths Registration Act 1953](#) defined a stillbirth as at 28 or more weeks completed gestation, rather than 24. Figures for stillbirths from 1993 are, therefore, not comparable with those for previous years. From 28 May 2012, the restriction to register a stillbirth within three months from the date of occurrence has been removed and stillbirths can be registered at any time.

## Infant deaths

Infant deaths (under 1 year) at various ages are defined as:

- early neonatal - deaths under seven days
- perinatal - stillbirths and early neonatal deaths
- neonatal - deaths under 28 days
- postneonatal - deaths between 28 days and one year

Linked data refer to infant death records that have been successfully matched to their corresponding birth record; see the annual publications [Child and infant mortality statistics](#), [Infant mortality \(birth cohort\) tables](#) and [Unexplained deaths in infancy](#) for further details.

## Neonatal deaths

The tabulations of deaths by cause exclude neonatal deaths (deaths of infants aged under 28 days). In January 1986, a neonatal death certificate was introduced, from which it is not possible to assign an underlying cause of death. This certificate follows recommendations of the World Health Organization (WHO) in the International Classification of Diseases (ICD) (WHO, 1992 to 1994), whereby causes of death are given separately in the following categories:

- main diseases or conditions in fetus or infant
- other diseases or conditions in fetus or infant
- main maternal diseases or conditions affecting fetus or infant
- other maternal diseases or conditions affecting fetus or infant
- other relevant causes

While conditions arising in the mother that affected the fetus or infant could be mentioned on certificates prior to 1986, no provision was made for those cases in which the certifier considered that both maternal and fetal conditions contributed to the death. The certificate introduced in 1986 overcame this problem. However, since equal weighting is now given to main conditions in the fetus and in the mother, it is no longer possible to identify a single underlying cause of death for neonatal deaths (and stillbirths).

For this reason, most Office for National Statistics (ONS) mortality publications that include cause breakdowns exclude deaths of neonates. Together with a team of experts in the field, the ONS developed a hierarchical classification for classifying causes of neonatal deaths and stillbirths in ICD-10, known as the "ONS cause groups". More details can be found in our latest [Child and infant mortality statistics bulletin](#).

In-depth information on the quality and methodology of these statistics can be found in our [Child and infant mortality statistics QMI](#).

## 12 . Quality of mortality data

Mortality statistics in England and Wales are derived from the registration of deaths certified by a doctor or a coroner. The data pass through a number of processes ([Annex K \(PDF, 15KB\)](#)) before becoming usable for analysis. These processes are complex and involve a wide range of people, organisations and computer systems.

To produce mortality outputs based on final data, annual extracts are taken from the deaths database. These extracts are then used to produce annual tables and files of individual death records for other government departments and health authorities, as provided for by relevant legislation. Prior to these annual extracts, provisional extracts are taken to allow for more timely analysis, such as [weekly deaths](#) and [quarterly suicides](#).

More quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in our [Mortality statistics in England and Wales QMI](#) and the [Office for National Statistics \(ONS\) policy on protecting confidentiality in tables of birth and death statistics](#) is available.

## 13 . Registration of deaths

### Completing medical certificates of cause of death

For around three-quarters of deaths, one of the doctors involved in the patient's care for the illness from which they died completes a Medical Certificate of Cause of Death (MCCD). Many thousands of general practitioners (GPs), hospital consultants, junior doctors in training and doctors in other clinical posts all complete MCCDs.

The nature and amount of training they have had in death certification vary greatly. Not all medical schools in the UK include questions on death certification in their exams. However, "issuing death certificates" is included as a competency that newly qualified doctors should be able to demonstrate during their training in Foundation Years 1 and 2.

Doctors already in practice are required to keep their knowledge and skills up to date through continuous professional education. However, there are constant changes in clinical knowledge, practice and guidelines to keep abreast of, so death certification may not often be a priority.

In the late 1990s, the Office for National Statistics (ONS) developed a set of training materials on death certification with the help and oversight of a wide range of stakeholders through the ONS Death Certification Advisory Group (DCAG).

There have been several well-publicised proposals for reform of death certification since the [Shipman case in 1998 \(PDF, 1.45MB\)](#). Legislation implementing the reform of the process of death certification in England and Wales is included in the [Coroners and Justice Act 2009](#), which received Royal Assent on 12 November 2009. This will reform the process of death certification by introducing a single unified system for both burials and cremations, and appointing medical examiners to provide an independent scrutiny of the cause of death.

Previously, guidance to doctors completing MCCDs in England and Wales was updated by the ONS DCAG and the Chief Medical Officer notified all registered doctors of new guidance. Under the Coroners and Justice Act 2009, guidance is now given to doctors completing MCCDs in England and Wales by the DHSC and agreed by the ONS, General Register Office (GRO) and [National Medical Examiner](#) (currently Dr Alan Fletcher, who was appointed in March 2019).

Coroners certify about a quarter of all deaths. Coroners can only certify cause of death following a post-mortem by a pathologist, an inquest or both. Training for coroners is organised through the Ministry of Justice. The process of referral to a coroner and how referred deaths are dealt with varies between coroners' areas.

### Registration of the death

Data items other than the cause of death depend largely on information supplied by the informant. For deaths certified after inquest, police officers or other witnesses may supply this information, which cannot later be checked by the registrar. For some items of information, for example, occupation, there may be no absolute way of checking its accuracy. For others, validity (age and date of birth) or "reasonableness" (age and cause of death) may be checked. Some details may also be verified later, for example, date of birth, with records held at health service data sources.

## **Entry of data**

### **Registration Service Software (RSS; pre-July 2009)**

Registration Service Software (RSS) was rewritten in 1998 and issued to register offices in 1999. It was replaced by the Registration Online (RON) system on 1 July 2009. The deaths statistical fields used in RSS were validated in three respects:

- range: checking that codes fall into an expected range of values
- data type: checking that text appears where it should and numeric values appear where they should
- logic: cross-checking with values in one or more other fields

Cross-validations are carried out by checking logical consistency between various items recorded by the registrar. These include information collected on type of certification, referral to coroner, and whether a post-mortem was carried out.

### **Registration Online (RON; July 2009 onwards)**

In November 2006, a pilot for an online system of registering life events (RON) commenced in five registration districts. Following the success of this pilot, RON was implemented in most register offices on 26 March 2007. However, as a result of significant performance problems, the system was suspended on 10 April 2007 resulting in around half of registrars reverting back to using the previous electronic system, RSS. From 8 May 2007, almost all register offices were submitting data electronically using either RON or RSS. Any remaining death registrations that were held only on paper at register offices were later entered onto the RON system by the GRO or by the local registration service. RON was fully implemented in register offices on 1 July 2009.

## **Other checks made by the Registration Service**

Checks are also made on death registration details at various times by registrars, superintendent registrars and account managers from GRO.

### **At the time of registration**

When someone attends to register a death, the registrar is instructed to make the following checks:

- a medical certificate (or coroner's document) is presented
- the death is in their area
- the death occurred within the last 12 months
- the informant is qualified to give information
- the correct medical certificate has been used
- the certificate relates to the correct person
- the certificate has been filled in properly - that is, it is signed, not amended in any way, the doctor's qualifications filled in, the last date seen alive and whether or not the certifier saw the deceased after death is shown
- the death does not need to be referred to the coroner

The registrar then carries out the registration and reviews the recorded detail with the informant before the register page is signed by the informant and registrar. The signed register page is normally a computer-generated print, replicating the detail held on computer, but when the computerised system is unavailable it is a handwritten page.

## **By superintendent registrars and account managers**

Superintendent registrars carry out the following quarterly checks:

- the Quarterly Certified Copy (QCC) entries agree with each register entry
- the entries appear to be in sequence
- there is a medical certificate or coroner's form to accompany each death entry, as appropriate
- each entry has been signed by an informant (if required) and by the registrar
- for any manual entries, a general check on any apparent erasure or illegibility

Account managers visit registration districts on a periodic basis and as part of the process will typically include the following inspection activity:

- sitting in on actual registrations to check questioning technique
- examining a sample of register entries, and supporting documentation and draft entries
- examining computerised records held

## **14 . Checking and validation of registration data at ONS Titchfield**

### **Receipt of death registration data at Office for National Statistics (ONS) Titchfield office**

Details of deaths are received from register offices electronically. Routine and automated checks are carried out on each file and the combined data are then loaded onto the deaths database. Regular receipt and diagnostic reports are produced, resulting in weekly contacts with the identified registrars to resolve any problems.

Examples of checks include:

- identification of missing entries, so that death registration details are received in sequence
- checks for duplicate records
- checking for misplaced records, for example, verifying that each registrar is using the register allocated
- for paper records - that date of death and date of registration are in the correct range
- for paper records - records are checked for completeness prior to keying
- checks on registrars whose returns have not been received by the fourth working day after the end of each week

### **Validation processes**

Once on the database, the data are passed through a series of validation processes that are carried out automatically with any inconsistencies highlighted. Simple validations include examination of dates or employment status to ensure that they are likely. More complicated validations include checks for consistency between dates of birth, death and registration or between age and marital status.



## Routine checks in Titchfield

All deaths accepted onto the database that need routine coding are identified and coded as required by the Life Events Processing Branch (LEP). The detailed routine coding falls into five main areas:

- coding of postcodes to give usual residence of deceased
- occupation of the deceased (or spouse, civil partner, or mother and/or father; see [Section 2: Information collected at death registration](#) for further details)
- communal establishment coding for place of death of deceased
- place of birth of deceased
- cause of death (see following checks)

Routine automated and manual checks of cause of death data are carried out on all records on a monthly basis. These include:

- checking cause fields against inquest conclusion fields for compatibility
- the presence or absence of original and final cause of death fields
- codes for Office for National Statistics (ONS) cause groups are present for neonatal deaths and absent for non-neonatal (see [Section 11: Childhood mortality](#); subsection: Neonatal deaths)
- validity of suicides at very young ages
- mentioned conditions on death certificate are compatible with sex
- the derived underlying cause of death is mentioned in Part I or Part II of the death certificate

Once coding of the cause of death is complete, checks are carried out on variables such as date of death, sex, year of birth, marital status and communal establishments. These checks evolve continuously during exploratory surveillance of data quality and some of these are later incorporated as routine checks.

## Automated cause coding

Automated cause coding (see [Section 9: Cause of death coding](#); subsection: Coding the underlying cause of death) is used to derive codes for each medical condition on the certificate and to identify the underlying cause. The accuracy of automated coding is checked regularly within data quality check requirements. Periodical reports on persistent coding problems are referred to a medical epidemiologist and authors of the software to highlight areas of concern for the new releases.

## Checks before and after extraction of data for analysis

The first of these are carried out as a final check of what is held on the deaths database before an annual extract of data is taken. These comprise frequency checks for a range of fields, covering age, sex, underlying cause and area of residence. Also checked are possibly incorrect combinations of fields. Any apparent errors or inconsistencies result in checks of individual cases by coders who make amendments, as required. Some of these checks are also carried out routinely every month.

Further examinations are carried out once the data extract has been taken. They include checks similar to those done before extraction, to ensure that corrections made at that stage were properly carried out. After the annual extract used for mortality analyses has been produced, a further set of frequency counts and two-way tables are prepared to ensure that no new errors have been introduced. These checks are to ensure that the frequency distributions are both valid and plausible and broadly similar to those for the previous year's data.

## Checks on routine outputs

These include:

- systematic checks of totals (row, column, and other) against known correct figures
- checks of individual cells against correct figures
- checking figures are consistent and plausible, that is, that they are what would be expected compared with the previous year's tables

## 15 . Death rates, ratios and standardisation

Death rates are derived from total deaths registered in England and Wales in the specific calendar year and corresponding mid-year population estimates.

It is the Office for National Statistics (ONS) practice not to calculate rates where there are small numbers of deaths in a cell, as rates based on such low numbers are susceptible to inaccurate interpretation. Age-standardised rates are not calculated where there are fewer than 10 deaths in a cell and crude rates are not calculated when there are fewer than 3 deaths in a cell; both of these are noted by (x). Rates that are based on fewer than 20 deaths are displayed in tables but are denoted by (u) as a warning to the user that the measure may be unreliable because of the small number of events.

Prior to July 2014, age-standardised rates were not calculated where there were fewer than three deaths in a cell. Rates in tables calculated from between 3 and 19 deaths were distinguished by italic type.

### Annualisation of rates

For all types of rates outlined in this section, the basic unit would be "deaths per N population per X days" where N might commonly be 1,000 or 100,000, and X is the number of days within the period being considered (for example, seven days if weekly). To allow for easier comparison of rate values between periods of different length, unless otherwise stated in individual publications, rates are adjusted to be a consistent unit of "deaths per N population per year", using the following equation:

$$\text{adjusted rate} = \text{rate} \times \left( \frac{y}{d} \right)$$

Where:

- rate is the unadjusted rate, based on deaths and population figures for the specified time period (per week, month or quarter).
- Y is the number of days in the year that the period falls within (365 or 366 for non-leap years and leap years, respectively)
- d is the number of days covered by the unadjusted period (for example, 7 if one week, 31 if May)

### Crude death rate

Crude death rate is defined as total deaths per 1,000 population, or:  
(Total deaths divided by Total population) multiplied by 1,000

## Age-specific death rates

Age-specific death rates may be calculated for each age group. These are defined as the number of deaths in the age group per 1,000 population in the same age group or:

$$M_k = (d_k \text{ divided by } p_k) \text{ multiplied by } 1,000$$

Where:

M = age-specific death rate for age group k

d = deaths in age group k

p = population in age group k (mid-year population estimates with the exception for the rate for those aged under 1 year where the number of live births are used instead)  
= age

Age-specific rates may be calculated separately for males and females or for both sexes combined.

## Age-standardised mortality rates (ASMRs)

Age-standardised mortality rates (ASMRs) allow for differences in the age structure of populations and therefore allow valid comparisons to be made between geographic areas, over time and between sexes. Using the direct method, the age-standardised rate for a particular condition is that which would have occurred if the observed age-specific rates for the condition had applied in a given standard population.

Thus:

$$\text{age-standardised rate} = \left\{ \sum P_k m_k \right\} \text{ divided by } \sum P_k$$

Where:

P = standard population in sex or age group k

m = observed mortality rate (deaths per million persons) in sex or age group k (mid-year population estimates are used to calculate all age-specific rates prior to standardisation)

= age or sex group 0, 1 to 4, 5 to 9, ..., 85 to 89, 90 years and over

(From the 2015 data year, ASMRs are calculated using population estimates for all age groups. Prior to the 2015 data year, the number of live births were used for the population at age under 1 year old. This change has had no significant impact on the rates.)

The age-standardised rate for “all causes” includes deaths at all ages, while the same rates for specific causes exclude neonatal deaths (infants aged under 28 days). Classification by underlying cause is not possible for neonatal deaths (see [Section 11: Childhood mortality](#); subsection: Neonatal deaths).

The standard population used is the European Standard Population (ESP); it is the same for both males and females. The ESP is a hypothetical population used to weight ASMRs.

The ESP was originally published in 1976 and was updated by Eurostat in 2013. The 2013 ESP structure allocates a greater weight to older ages to better reflect the ageing population. This change has had a significant impact; consequently, ASMRs based on the 1976 ESP are not comparable with those based on the 2013 ESP. Further [information about the change in methods](#) is available.

Table 7: Distribution of the European Standard Population for 1976 and 2013

<b>Age</b>	<b>1976 ESP [note 1]</b>	<b>2013 ESP [note 2]</b>
Under 1 years	1,600	1,000
1 to 4 years	6,400	4,000
5 to 9 years	7,000	5,500
10 to 14 years	7,000	5,500
15 to 19 years	7,000	5,500
20 to 24 years	7,000	6,000
25 to 29 years	7,000	6,000
30 to 34 years	7,000	6,500
35 to 39 years	7,000	7,000
40 to 44 years	7,000	7,000
45 to 49 years	7,000	7,000
50 to 54 years	7,000	7,000
55 to 59 years	6,000	6,500
60 to 64 years	5,000	6,000
65 to 69 years	4,000	5,500
70 to 74 years	3,000	5,000
75 to 79 years	2,000	4,000
80 to 84 years	1,000	2,500
85 years and over	1,000	z
85 to 89 years	z	1,500
90 to 94 years	z	800
95 years and over	z	200
Total	100,000	100,000

Source: Revision of the European Standard Population (ESP): Report of Eurostat's task force from Eurostat, and Revised European Standard Population: 2013 ESP from the European Union

#### Notes

1. Revision of the European Standard Population: Report of Eurostat's task force.
2. Revised European Standard Population: 2013 ESP.
3. "z" denotes that this figure is not applicable.

For [Accredited Official statistics](#) publication of mortality and cancer incidence, the ONS is currently using an abridged ESP with a 90 years and over upper age band. Accredited Official statistics population estimates are only currently available for upper age limit of 90 years and over.

## Perinatal mortality rate

Perinatal mortality rate is the number of deaths at ages under seven days (early neonatal deaths) plus stillbirths per 1,000 live births and stillbirths in the same period.

## Infant mortality rate

Infant mortality rate is the number of deaths at ages under 1 year per 1,000 live births.

## Years of life lost

Analyses of the effects of premature death assume that everyone may live to a defined age and that death at a younger age means that some future years of life have been lost. Calculations of Years of Life Lost (YLL) are made for deaths from selected causes with the aim of illustrating the relative effects from different diseases. From the 2023 edition onwards, the age group used is 1 to 74 years of age. These exclude deaths under 1 year of age, and at high ages where the cause may be uncertain. Prior to the 2023 edition, the "cut-off" ages used were 65, 75 and 85 years of age.

This approach, but with a "cut-off" age of 65 years, is also used to calculate Years of Working Life Lost (YWLL) due to premature death. From the 2012 data year onwards, the period of working life covers ages 16 to 64 years. Prior to the 2012 data year, the period of working life covered ages 15 to 64 years. This change has a negligible impact on the comparability of statistics over time:

$$YLL = \sum (A - a_i) d_i$$

$$YWLL = \left[ \sum (65 - a_j) d_j \right] + 49 \sum d_k$$

Where:

d, d, d = number of deaths in age group i, j or k

a, a, a = age i, j or k + 0.5

A = 75 years

= 1 to 74 years

= 16 to 64 years

= 1 to 15 years

The mean age at death may be included as a further indicator of the relative effects of premature death. It is based on the sum of ages at death for each person. From the 2023 edition, this was calculated based on single years of age 1 to 119, 120 and over. Prior to the 2023 edition this included those under 1 year of age. This change has a negligible impact on the comparability of statistics over time:

$$\text{Mean age at death} = \frac{\sum (a_i d_i)}{d}$$

Where:

a = age + 0.5

d = number of deaths at age i

= single years of age 1 to 119, 120 and over

d = total number of deaths

## Crude rate of years of life lost

Crude rate of years of life lost is defined as the number of Years of Life Lost for the specified ages (those aged 1 to 74 years) for the population of England Wales for those specified ages. It is given per 100,000 population:

$$\text{Crude rate of YLL} = \frac{YLL_i}{P} * 100,000$$

Where:

YLL = number of years for given ages

P = population of England and Wales for given ages

## Potential years of life lost

Potential years of life lost (PYLL) is a measure of the potential number of years lost when a person dies prematurely from any cause. The basic concept of PYLL is that deaths at younger ages are weighted more heavily than those at older ages. The advantage in doing this is that deaths at younger ages may be seen as less important if cause-specific death rates were just used on their own in highlighting the burden of disease and injury, since conditions such as cancer and heart disease usually occur at older ages and have relatively high mortality rates.

To enable comparisons between areas and over time, age-standardised PYLL rates, also known as SYLL rates, are calculated. These rates represent the PYLL if the population of England and Wales had the same population structure as the 2013 European Standard Population (ESP). SYLL rates are presented as years of life lost per 100,000 population.

PYLL is calculated as the sum of the mortality rate in each age group weighted by the potential number of years of life lost as indicated by remaining life expectancy for each age group. To calculate SYLL, this is then standardised to the 2013 ESP as shown in the equation:

$$SYLL = \frac{\sum_i \left( w_i \frac{a_i d_i}{n_i} \right)}{\sum_i w_i} \times 100,000$$

Where:

= age group (less than 1 year, 1 to 4 years, 5 to 9 years, 10 to 14 years, ..., 85 to 89 years, and 90 years and over)

d = number of deaths in age group

a = weight or average age-specific period life expectancy in age group for a given year

n = population in age group

w = number of individuals in the standard population in age group

## 16 . Background and history of mortality data

### Redevelopment of mortality statistics

In the early 1990s, there was an extensive redevelopment of collection and processing systems for population, health and registration data - in particular, for births and deaths. For deaths, this included: the progressive computerisation of registration in local offices, the move to a large deaths database to hold all deaths data from 1993 and the introduction of automated coding of cause of death.

Further information about these changes follows, with more details in the annual volume in the [DH2](#) series for 1993 and 1994. Changes to the rules for selecting and coding cause of death brought England and Wales into line with international practice in 1993.

## The deaths databases

In the deaths processing system that has been used within the Office for National Statistics (ONS) since the early 1990s, there are two deaths databases, one for register information and the other for statistical data.

The registration database contains mainly textual information that appears on the death certificate. This corresponds to most of the details supplied by informants to a registrar, available to applicants requesting a copy of the death certificate.

The deaths statistical database contains only coded details of each death. When outputs are required, the statistical database can supply information on individual deaths or provide datasets for tabulation. The statistical database is continually updated and amended as further information becomes available.

In 1999, we developed a database to facilitate research into deaths related to drug poisoning and to aid the identification of specific substances involved in these deaths. The database currently contains data on all deaths on the annual data files for England and Wales between 1993 and the latest available year, where the underlying cause of death is regarded as resulting from drug-related poisoning, according to the current [Accredited Official statistics](#). The database covers accidents and suicides involving drug poisoning as well as poisonings due to drug abuse and drug dependence but not other adverse effects of drugs.

## Legislation

The existing provisions for the registration of deaths and the processing, reporting and analysis of mortality data appear in different legislation that reflects the distinct and separate roles of the Registrar General for England and Wales and the UK Statistics Authority.

The Registrar General is guided by the following:

- [Population \(Statistics\) Act 1938](#): deals with the statistical information collected at registration
- [Births and Deaths Registration Act 1953](#): covers all aspects of the registration of births, stillbirths and deaths
- [Population \(Statistics\) Act 1960](#): makes further provision for collecting statistical detail at registration
- [Registration of Births and Deaths Regulations 1987](#): cover further aspects of the registration of births and deaths
- [Coroners Act 1988](#): sets out the procedures to be followed by coroners in handling deaths
- [Still-Birth \(Definition\) Act 1992](#): altered the definition of a stillbirth to 24 or more weeks completed gestation, instead of the previous definition of 28 or more weeks
- [The Deregulation \(Still-Birth and Death Registration\) Order 1996](#): allows for the registration of deaths by declaration
- [National Health Service Act 2006](#) (amended 2013) and [National Health Service \(Wales\) Act 2006](#): consolidated legislation relating to the health service and separate provision of the health service in Wales from that in England; the Acts require notification of a birth or death to the local authority and the clinical commissioning group (local health board in Wales) where the birth or death occurred - both Acts include provision for the supply of information on individual deaths to the NHS by the Registrar General
- [Presumption of Death Act 2013](#): application can be made to the High Court for a declaration that a missing person is presumed to be dead where the person who is missing is thought to have died or has not been known to be alive for a period of at least seven years
- [Coronavirus Act 2020](#): temporary modifications related to registration of deaths and stillbirths, and so on, and reviews to legislation relating to death certification and cremations in the UK during the coronavirus (COVID-19) pandemic.

The UK Statistics Authority is guided by the following:



- [Registration Service Act 1953](#): in Section 19, this required the Registrar General to produce annual abstracts of the number of live births, stillbirths and deaths
- [Statistics and Registration Service Act 2007](#): transferred some of the statistical functions of the Registrar General, including the production of an annual abstract, to the Statistics Board, also known as the UK Statistics Authority, and the ONS, which became the executive office of the UK Statistics Authority; the 2007 Act also provides the Registrar General with a power to disclose any information about a birth, death or a stillbirth to the UK Statistics Authority for statistical purposes; it also enables the UK Statistics Authority to produce and publish statistics relating to any matter; the Act also includes a provision for the UK Statistics Authority to supply individual birth and death records to the Secretary of State for Health and certain NHS bodies

When the Statistics and Registration Service Act 2007 came into force on 1 April 2008, the arrangement where the National Statistician was also the Registrar General for England and Wales ended. At the same time, the General Register Office (GRO) also stopped being part of the ONS and was moved to the Identity and Passport Service. The NHS Central Register (NHSCR), formerly part of the ONS, also transferred to the Health and Social Care Information Centre (HSCIC), which is now known as NHS Digital.

The responsibility for the production of mortality statistics is now a function of the UK Statistics Authority, which is required to produce an annual abstract of mortality statistics in order that the Minister for the Cabinet Office can lay it before Parliament.

## Historical changes in mortality data

Users should note certain changes to the collection and coding of deaths data over the years may affect their interpretation of trends in mortality. These changes include the following.

### 1979

Introduction of the International Classification of Diseases (ICD), ninth edition. This replaced the eighth edition, used from 1968 to 1978. A 25% sample of death certificates for 1978 was selected and coded to both the eighth and ninth editions to give a guide to the effect of these changes on specific categories.

### 1981 to 1982

Industrial action taken by registration officers affected the quality of information about deaths from injury and poisoning. Details normally supplied by coroners were not available; the statistics were significantly affected. Figures on injury and poisoning for 1981, with the exception of suicides, should be treated with caution. Categories such as "transport accidents" and "homicide" were significantly understated, whereas "non-specific accidents" and "undetermined injuries" were overstated. Statistics relating to nature of injury were less affected by the absence of the coroners' information. Although industrial action extended into 1982, the coroners' information was collected retrospectively for that year, enabling more accurate figures to be produced. However, complete details to help code the cause of death were still unavailable in 1982. This resulted in more deaths than usual being assigned to "unspecified" categories.

### 1984

Our interpretation of World Health Organization (WHO) Rule 3 was amended in the assignment of underlying cause of death. [Series DR for 2006](#) has more detail. It resulted in a decrease in the numbers of deaths coded to pneumonia and a few other causes and an increase in deaths from many other conditions - most of the latter being small increases. The background to this change is given in the annual volume DH2 number 11 for 1984, which includes a table assessing the numerical effects of changes, by underlying cause. Deaths from injury and poisoning were excluded from this exercise.

### 1986

Since January 1986, registrars have recorded the following information on the draft entry form:

- the date when the certifying doctor last saw the deceased alive
- whether the deceased was seen after death by a medical practitioner
- whether the death was reported to a coroner and by whom
- whether the certifying practitioner indicated that death might have been linked to the deceased's employment

The first three items had been recorded on the medical certificate for many years for legal and administrative purposes. The fourth resulted from legislation passed in 1985.

## 1986

New stillbirth and neonatal death certificates were introduced in January 1986. The new neonatal certificate included both maternal and fetal conditions. This means that it is not possible to assign an underlying cause for deaths under 28 days. From 1986, therefore, tables of deaths by cause and age do not include neonates, although the all-cause total for neonates is often given. Details of neonatal deaths by cause can be found in our [Child and infant mortality statistics bulletin](#).

## 1993

We reverted to the internationally accepted interpretation of Rule 3 operating in England and Wales before 1984 (see [Section 16: Background and history of mortality data](#); subsection: The deaths databases).

## 1993

Redevelopment of our collection and processing systems, which took effect on published mortality data from January 1993. Changes included:

- the computerisation of registration, with registrars in most local offices entering details on computers and supplying data to the ONS on floppy disk
- the automation of cause of death coding, so that procedures for assigning codes to underlying cause are now automatic for about 80% of all deaths but not used for deaths certified after inquest
- the use of a dynamic database to hold all deaths data, for easy retrieval of up-to-date information; these and other changes are described in [Death certification and the epidemiologist](#)

## 1993

A revised coroner's certificate of cause of death after inquest was introduced in May 1993, which resulted in less detail for many deaths from injury and poisoning (ICD-9 E800 to E999) - both for the description of injury sustained and for the classification of some suicides.

Following the introduction of the revised certificate, problems were identified relating to the processing of deaths certified after inquest because of the non-receipt of some data that contained additional detail about some accidental deaths. This resulted in more deaths being assigned to residual categories such as "other and unspecified causes" (ICD-9 E928.9). For this reason, the number of deaths coded to suicide and self-inflicted poisoning by motor vehicle gas exhaust (ICD-9 E952.0) declined substantially, while those from suicide and self-inflicted poisoning by other carbon monoxide (ICD-9 E952.1) rose.

To resolve this problem, we amended our systems and manually coded all deaths that resulted in a coroner's inquest or adjourned inquest. Data were re-coded where necessary for 1993 and 1994. Changes were concentrated in the external causes of the ICD, while the effect on other causes was limited.

## 1993

Ending of medical enquiries to obtain more precise information on the underlying cause of death.

## 1997

Provision for registration of a death by declaration was introduced in April 1997, whereby details of a death could be supplied to a registrar in a district other than that where the death took place. Analysis shows that this provision is most likely to be used for deaths of infants and for neonatal deaths in particular.

## 2001

Introduction of the ICD-10 for coding cause of death on 1 January 2001. This replaced the ICD-9 used from 1979 to 2000. There are some significant differences between the ICD versions. The main differences are:

- a change in format of the code and an expansion in the number of codes used
- a movement of some diseases and conditions between broad groups called ICD chapters
- changes to the rules governing the selection and coding of the underlying cause of death, especially Rule 3, which has had a large effect

We coded the 1999 registration dataset to both the ICD-9 and ICD-10 to give a guide to the effect of changes on specific categories of cause of death. [Results of the ICD-10 bridge coding study, England and Wales, 1999](#) were published in 2002. Research specifically examining the effect on injury and poisoning was published in [The effect of the introduction of ICD-10 on trends in mortality from injury and poisoning in England and Wales](#).

Further information about [Understanding the changes to mortality statistics following the move to coding cause of death to ICD-10](#) is also available.

## 2002

Introduction of the GRO Network (GRONET) to register offices began, allowing for births and deaths registration details to be sent directly to the ONS via email.

## 2006

Introduction of Registration Online (RON) pilot areas enabling registrars to record births, stillbirths, deaths and civil partnerships online instead of using Registration Service Software (RSS).

## 2007

RON was implemented and, because of significant performance problems, suspended. This resulted in around half the registrars reverting back to using the previous electronic system, RSS.

## 2009

RON was fully implemented on 1 July 2009. Of all registrations in 2009, there were 83% recorded on RON.

## 2010

All deaths recorded using RON.

## 2011

In January 2011, the software used for cause of death coding was updated from the ICD-10 version 2001.2 to version 2010. The main changes in ICD-10 version 2010 are amendments to the modification tables and selection rules. Modification tables and selection rules are used to ascertain a causal sequence and consistently assign underlying cause of death from the conditions recorded on the death certificate. Overall, the impact of these changes is small although some cause groups are affected more than others. For further information, see the [results of the bridge coding study](#). There is also another study looking at the impact on [stillbirths and neonatal deaths](#).

## 2014

On 1 January 2014, the software used to code cause of death was changed. The new IRIS software version 2013 incorporates official updates to ICD-10 that are approved by WHO. Further information on IRIS can be found in [Section 9: Cause of death coding](#); subsection: Coding the underlying cause of death. A [dual coding study](#) looked at the impact on mortality statistics; a further study looked into the [impact of the coding changes on stillbirths and neonatal deaths](#).

## 2014

On 1 October 2014, the [Presumption of Death Act 2013](#) came into force in England and Wales. This means that an application can be made to the High Court for a declaration that a missing person is presumed to be dead where the person who is missing is thought to have died or has not been known to be alive for a period of at least seven years.

## 2017

[Changes to the Policing and Crime Act 2017](#) removed the requirement for a coroner's inquest for every death where Deprivation of Liberty Safeguards (DoLS) were in place. Deaths under DoLS that occurred on or before 3 April 2017 should be treated outside the context of state detention and should only be reported to the coroner where one or more other conditions are met. This should result in a decrease in the number of inquests for natural deaths.

## 2020

[The Coronavirus Act 2020](#) included temporary changes to death registration legislation during the COVID-19 pandemic.

## 2022

On 1 January 2022, the software used to code cause of death was changed to the successor of IRIS, which is known as the Multicausal and Unicausal Selection Engine (MUSE) (IRIS version 5.8). The MUSE operates based on internationally agreed decision tables that reflect the most recent version of ICD-10. Further information can be found in our [Cause of death coding in mortality statistics, software changes: January 2022 article](#).

The Coronavirus Act 2020 ended in March 2022.

# 17 . Glossary

## Accelerated registrations

Accelerated registrations is the process by which a death can be registered at the time of adjournment of an inquest instead of having to await the outcome of criminal proceedings.

## Age-standardised rates

Age-standardised rates is a statistical measure to allow more precise comparisons between two or more populations by eliminating the effects in age structure by using a "standard population".

## Annual extract

The annual extract is the dataset taken from the main deaths database from which tabulations are derived. Sometimes it is referred to as the "standard" extract.

## Assault

In the International Classification of Diseases (ICD), 10th edition, assault refers to homicide and injuries inflicted by another person with intent to injure or kill, by any means (excluding deaths from legal intervention and operations of war).

## Bridge coding

Bridge coding is an exercise in which the same group of deaths are independently classified according to two different classifications or coding methods.

## Contributory cause of death

A contributory cause of death is a cause mentioned on the death certificate but not as the underlying cause of death (see Underlying cause of death definition). This could be a pre-existing condition that contributed to the death or part of the sequence of events that lead to the death.

## Comparability ratios

Comparability ratios are measures, expressed as ratios, indicating the net effect of the change in classification (from ICD-9 to ICD-10) on a particular cause of death.

## Coronaviruses

The World Health Organization (WHO) defines coronaviruses as "a large family of viruses that are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS)". Between 2001 and 2018, there were 12 deaths in England and Wales due to a coronavirus infection, with a further 13 deaths mentioning the virus as a contributory factor on the death certificate.

## Coronavirus (COVID-19)

COVID-19 refers to the "coronavirus disease 2019" and is a disease that can affect the lungs and airways. It is caused by a type of coronavirus. [Further information is available from the WHO.](#)

## Coroner

A coroner is a public official responsible for the investigation of violent, sudden or suspicious deaths.

## Declaration

The declaration is the method by which an informant can register a death in a different district from that in which the death occurred.

## Dual coding

Dual coding is the coding of the same data twice, using different methods of coding to assess inconsistencies.

## Early neonatal

Early neonatal relates to infants aged under seven days.

## Epidemiologist

An epidemiologist is a person concerned with the incidence and distribution of diseases and other factors, including the environment, relating to health.

## External cause

An external cause of death refers either to an accident or violence. It is an alternative term for the underlying cause of death. ICD codes from Chapter XX; see Secondary causes.

## Hierarchical classification

The hierarchical classification is the Office for National Statistics's (ONS's) method for classifying the causes of neonatal deaths and stillbirths using groups of ICD codes referred to as "ONS cause groups".

## **Informant**

An informant is the person who provides the registrar with the information required to register a death.

## **Inquest**

An inquest is an inquiry into the cause of an unexplained, sudden or violent death held by a coroner.

## **Modification rules**

Modification rules are rules used in ICD-10 to select the correct underlying cause of death.

## **Neonatal**

Neonatal relates to infants aged under 28 days.

## **Perinatal**

Perinatal includes stillbirths and early neonatal deaths.

## **Pre-existing condition**

A pre-existing condition is defined as any condition that either preceded the disease of interest (for example, coronavirus (COVID-19)) in the sequence of events leading to death or was a contributory factor in the death but was not part of the causal sequence.

## **Quarterly Certified Copy (QCC)**

A Quarterly Certified Copy (QCC) is a copy made of each Register, sent to the General Register Office (GRO) at Southport.

## **Registrar**

A registrar is a statutory officer responsible for the registration of births, deaths, and marriages.

## **Registrar General**

The Registrar General is a statutory appointment with responsibility for the administration of the Registration Acts in England and Wales and other related functions as specified by the relevant legislation.

## **Registration Online (RON)**

Registration Online (RON) is a web-based system that enables registrars to record births, stillbirths, deaths, marriages and civil partnerships online.

## **Registration Service Software (RSS)**

Registration Service Software (RSS) is a system of collecting data electronically at the registration of a birth or death. Used prior to RON.

## **Rule 3**

Rule 3 is one of the rules used to select the correct underlying cause of death; its different use in ICD-10 results in significant differences from ICD-9 for some causes; see Selection rules.

## **Secondary cause**

The secondary cause is the nature of injury, or main injury, that caused death (where the underlying cause is assigned to an external cause from Chapter XX in ICD-10, V01 to Y89). Nature of injury codes are taken mostly from Chapter XIX (prefixes S and T).

## Selection rules

Selection rules are rules used in the ICD to determine the correct selection of the underlying cause of death; see Rule 3.

## Sequela (sequelae)

A sequela (or sequelae) is a (are) condition (or conditions) reported as the result of a previous injury - a "late effect" (under ICD-9) or that occurs as a late effect one year or more after the originating event.

## Standard population

The standard population is used in the calculation of the age-standardised death rates; this is an element of the population (such as age and sex) that is "held constant" to control its effect, for example, the European Standard.

## Stillbirth

Refer to the [Still-Birth \(Definition\) Act 1992](#); a stillbirth is a child born after 24 or more weeks completed gestation who did not show any signs of life at any time after being born.

## Superintendent registrar

A superintendent registrar is a statutory officer with responsibilities relating to births, deaths, marriage and other registration functions, as specified in the relevant legislation.

## UK Statistics Authority

The UK Statistics Authority is an independent body operating at arms' length from government as a non-ministerial department, directly accountable to Parliament. It was established on 1 April 2008 by the [Statistics and Registration Service Act 2007](#).

## Underlying cause of death

The underlying cause of death is "the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury" in accordance with the rules of the ICD.