

Article

Quarterly mortality report, England: July to September 2018

Provisional death registration and death occurrence data for England, broken down by sex and age.

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1 . Main points

- There were 110,360 deaths registered in England in Quarter 3 (July to Sept) 2018, which was 342 more deaths than the five-year average (2013 to 2017) for this quarter.
- When looking at the Quarter 3 five-year average (2013 to 2017) mortality trend, the number of deaths registered in Quarter 3 2018 was 5,797 deaths fewer than expected.
- The mortality rate in Quarter 3 2018 was 824 deaths per 100,000 population, which was statistically significantly lower than the Quarter 3 mortality rate for all years since 2001.
- The year-to-date mortality rate for deaths registered from 1 January to 30 September 2018 was 974 deaths per 100,000 population, which was statistically significantly higher than the mortality rate in the same period of 2017.
- The exceptionally hot weather experienced on 26 and 27 July coincided with a sharp increase in the daily death count, which substantially exceeded the five-year average on those days.

2 . Things you need to know about this release

The purpose of this report is to provide timely surveillance of mortality in England, based on the best available provisional data. We compare mortality with the same quarter of previous years and report patterns of change in mortality; specifically, whether mortality has increased, remained stable or decreased. This report includes data for Quarter 3 2018, which covers the period 1 July to 30 September 2018 as well as year-to-date figures, which cover the period 1 January to 30 September.

This report is based primarily on death registrations, with a section on death occurrences towards the end. Death occurrences show the number of deaths that occurred within a calendar period and give a better indication than registrations of exactly when deaths were at their highest. This allows mortality to be related to other factors such as influenza activity and weather patterns. Due to registration delays, the quarterly data is always somewhat incomplete, especially for deaths that occurred towards the end of the quarter. More details on registration delays are available in the [Background information section](#).

The term “significant” is used throughout this release and refers to statistically significant changes or differences. As a general rule, statistical significance is determined by the 95% confidence intervals, where non-overlapping confidence intervals between figures demonstrates that the difference is unlikely to be due to random fluctuation.

We provide early access for quality assurance purposes to a small number of analysts within Public Health England (PHE) and Department of Health and Social Care (DHSC). The analysts are not permitted to share the findings or the report more widely in their organisations. The report is provided for the analysts to provide technical comment on our findings. However, Office for National Statistics (ONS) itself independently produces these statistics, including determining the focus, content, commentary, illustration and interpretation of these measures presented and the comments provided by PHE and DHSC are purely advisory.

3 . Mortality rates in Quarter 3 2018 were significantly lower than mortality rates of the same quarter for all years since 2001

There were 110,360 deaths registered in Quarter 3 (July to Sept) 2018, which were 342 more deaths than the five-year average (2013 to 2017) for this quarter. Of the deaths registered in Quarter 3 2018, 55,445 were male and 54,915 were female.

Number of deaths registered in Quarter 3 2018 were lower than expected if the five-year average mortality rate for Quarter 3 had continued in 2018

During the 21st century, England's population has been increasing each year and now contains a sizable proportion of people aged 75 years and over. This increase in population size, generally and at older ages, means the number of deaths would increase each year as there are more people at risk of death, even if the risk of death itself remained unchanged in the population.

To account for the effect of changes to the population size and age structure, we calculate an expected number of deaths based on previous years' mortality rates. We apply the age-specific mortality rates for the five-year average (Quarter 3 2013 to Quarter 3 2017) to the Quarter 3 2018 population to obtain the expected numbers of deaths in 2018. We then compare the actual number of deaths in 2018 to that expected, to determine the number of additional deaths in 2018 that can be attributed to a change in the risk of death, rather than a change to the population size and structure.

There were 110,360 deaths registered in Quarter 3 2018, but if the age-specific mortality rates in Quarter 3 2018 had been the same as the five-year average rates for Quarter 3, we would have expected 116,157 registered deaths. This means that if the five-year average mortality rates had continued, we would have expected to see 5,797 more deaths in Quarter 3 2018 than were registered. That is, the number of deaths registered in Quarter 3 2018 was less than expected (based on the average age-specific mortality rates between 2013 and 2017).

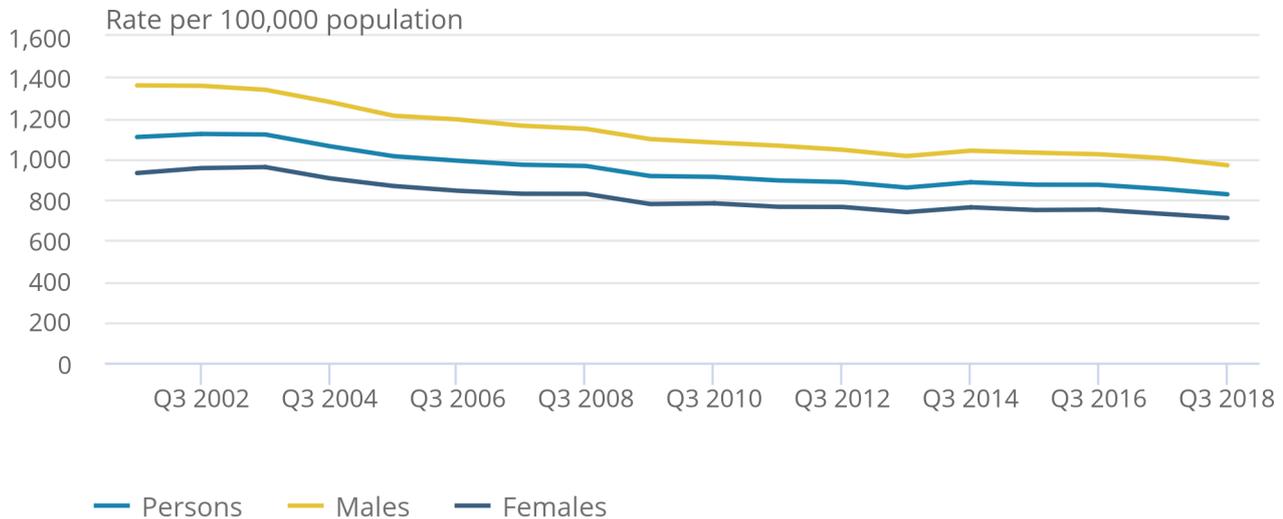
Mortality rates in Quarter 3 2018 were significantly lower than Quarter 3 mortality rates for all years since 2001

To assess how deaths registered in Quarter 3 (July to Sept) 2018 compare against previous years, Figure 1 shows the age-standardised mortality rates for deaths registered in each Quarter 3 between 2001 and 2018.

Quarter 3 mortality rates have fallen from an initial 1,105 deaths per 100,000 population (or 1,358 deaths per 100,000 males and 929 deaths per 100,000 females) in 2001 to 824 deaths per 100,000 population (or 967 deaths per 100,000 males and 709 deaths per 100,000 females) in 2018. The mortality rate in Quarter 3 2018 was statistically significantly lower than all Quarter 3 periods since 2001 (when the data series began). More information about how mortality rates have changed over a longer time period with a slowdown in recent years can be found in recent [Office for National Statistics \(ONS\)](#) and [Public Health England \(PHE\) analyses of the mortality trends in England](#).

Figure 1: Age-standardised mortality rates by sex, deaths registered in Quarter 3 (July to September), 2001 to 2018, England

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Source: Office for National Statistics

Notes:

1. Age-standardised mortality rates per 100,000 population, standardised to the 2013 European Standard Population.
2. Q3 refers to Quarter 3 (1 July to 30 September).
3. Figures are for deaths registered rather than deaths occurring in each period.
4. Figures for 2018 are based on provisional mortality data and projected populations.
5. Figures exclude non-residents.

Mortality rates for the first three quarters of 2018 were significantly higher than the mortality rates for the same period in 2017

To monitor mortality trends, we have calculated the year-to-date mortality figures from the number of deaths registered from 1 January to 30 September for 2018, 2017 and the five-year average (2013 to 2017).

There were 384,722 deaths from 1 January to 30 September 2018. If the age-specific mortality rates in the first three quarters of 2018 had remained the same as those in 2017, we would have expected 379,474 deaths. This means that the number of deaths registered in 2018 so far was higher than expected by 5,248 deaths. If the age-specific mortality rate in the first three quarters of 2018 remained the same as the five-year average (2013 to 2017) we would have expected 383,497 deaths. This means that the number of deaths registered in 2018 so far was greater than expected by 1,225 deaths.

The year-to-date age-standardised mortality rate for 2018 was 974 deaths per 100,000 population. This was statistically significantly higher than 2017 (961 deaths per 100,000 population) but not significantly higher than the five-year average (968 deaths per 100,000 population).

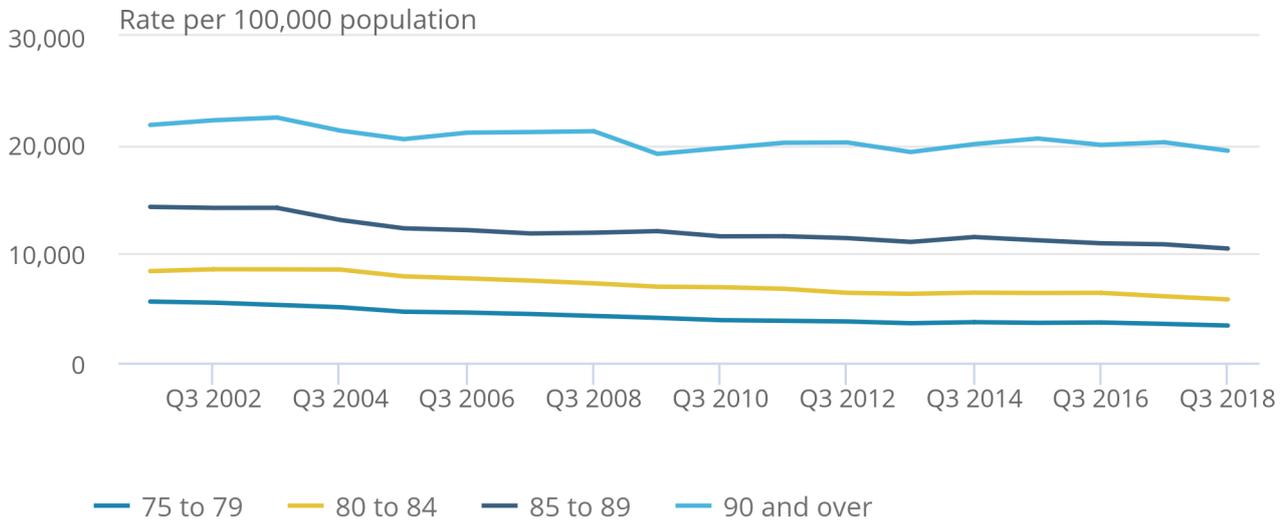
4 . Mortality rates decrease in those aged 75 years and over

Figures 2a and 2b show that since Quarter 3 (July to Sept) 2001, mortality rates have generally declined in both males and females aged 75 years and over. In comparison with Quarter 3 2017, decreases in males and females across all older age groups were observed in Quarter 3 2018, however, decreases were only statistically significant in males aged 80 to 84 years, and females aged 75 to 79 years and 90 years and over.

For ages 75 to 89 years, male and female mortality rates in Quarter 3 2018 were the lowest observed since Quarter 3 2001, as for all ages. For ages 90 years and over, the lowest mortality rates were observed in 2009 (males) and 2013 (females); however, the pattern observed in the oldest age group tends to be more variable.

Figure 2a: Age-specific mortality rates, deaths registered in Quarter 3 (July to September), 2001 to 2018, males aged 75 years and over, England

Figure 2a: Age-specific mortality rates, deaths registered in Quarter 3 (July to September), 2001 to 2018, males aged 75 years and over, England



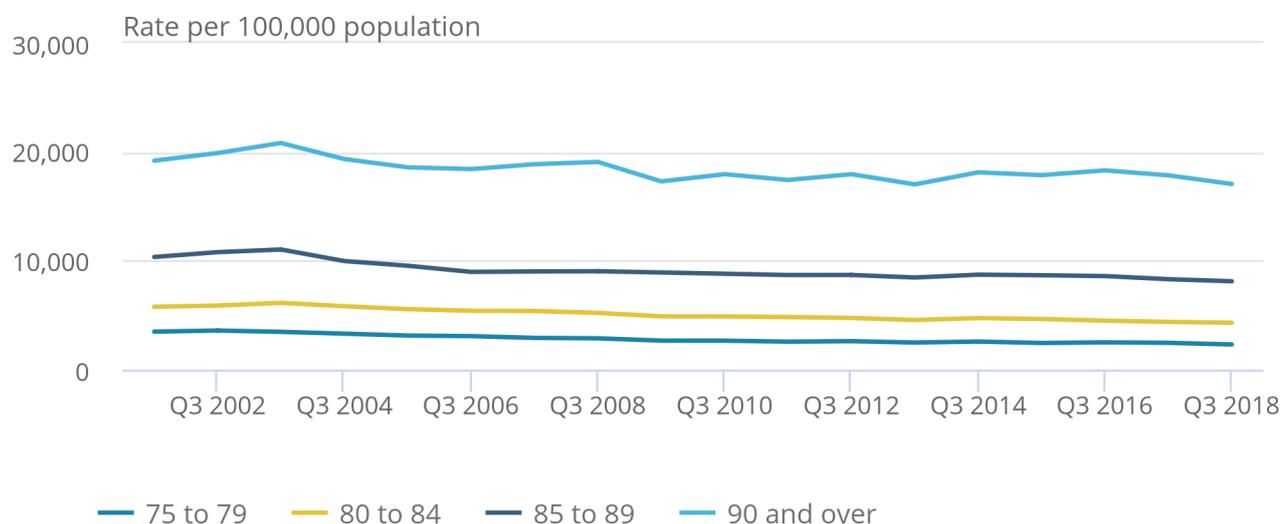
Source: Office for National Statistics

Notes:

1. Age-specific mortality rates per 100,000 population.
2. Q3 refers to Quarter 3 (1 July to 30 September).
3. Figures are for deaths registered rather than deaths occurring in each period.
4. Figures for 2018 are based on provisional mortality data and projected populations.
5. Figures exclude non-residents.

Figure 2b: Age-specific mortality rates, deaths registered in Quarter 3 (July to September), 2001 to 2018, females aged 75 years and over, England

Figure 2b: Age-specific mortality rates, deaths registered in Quarter 3 (July to September), 2001 to 2018, females aged 75 years and over, England



Source: Office for National Statistics

Notes:

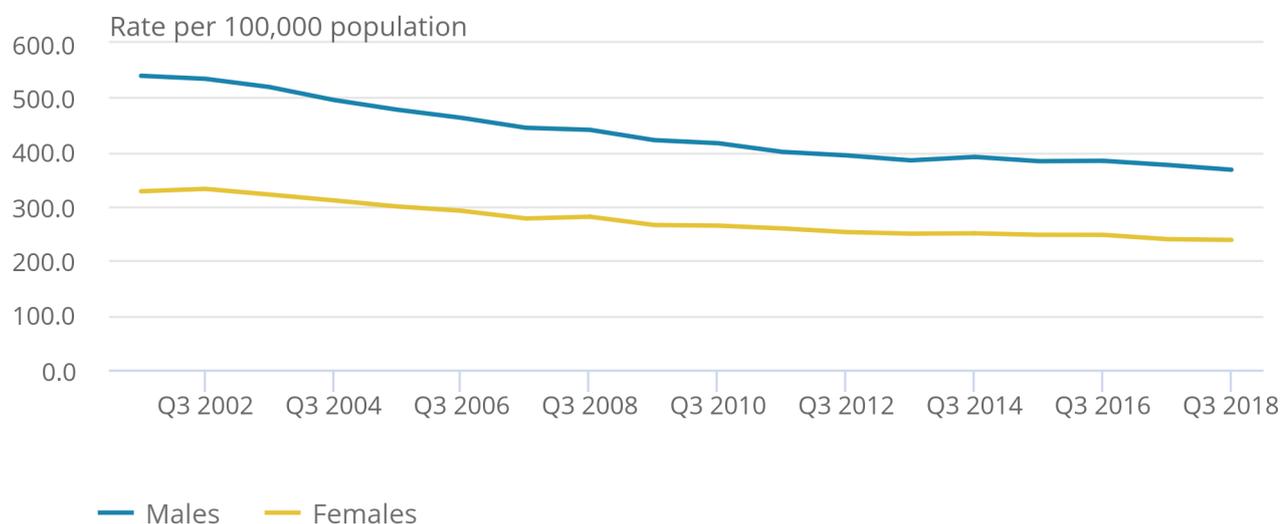
1. Age-specific mortality rates per 100,000 population.
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Figure 2c shows a definite decrease in mortality rates for males and females aged 0 to 74 years since 2001, with the lowest rates observed in Quarter 3 2018. As with the older ages, males aged 0 to 74 years have a higher mortality rate than females (367 deaths per 100,000 males and 238 deaths per 100,000 females). More recently, mortality rates in Quarter 3 2018 decreased from Quarter 3 2017 for both males and females, however, these decreases were not statistically significant.

Whilst the overall Quarter 3 2018 mortality rate was statistically significantly lower than all yearly observations since 2001, the rate of improvement observed in those aged 0 to 74 years has not been sustained in recent years for both sexes. More information regarding the slowdown in mortality rates can be found in recent [Office for National Statistics \(ONS\)](#) and [Public Health England \(PHE\) analyses of the mortality trends in England](#).

Figure 2c: Age-standardised mortality rates by sex, deaths registered in Quarter 3 (July to September), 2001 to 2018, ages 0 to 74 years, England

Figure 2c: Age-standardised mortality rates by sex, deaths registered in Quarter 3 (July to September), 2001 to 2018, ages 0 to 74 years, England



Source: Office for National Statistics

Notes:

1. Age-standardised mortality rates per 100,000 population, standardised to the 2013 European Standard Population.
2. Q3 refers to Quarter 3 (1 July to 30 September).
3. Figures are for deaths registered rather than deaths occurring in each period.
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5. Figures exclude non-residents.

5 . Trends in death occurrences for Quarter 3 2018

Data reported in this section are based on deaths that occurred between 1 July and 30 September, rather than deaths that were registered in this period (as in the rest of the report). To ensure comparability between years, deaths that occurred in Quarter 3 (July to Sept) of previous years were only included if they were registered by 30 October in the same year. For example, we have included deaths that occurred between July and September 2013, which were registered before 30 October 2013. Further information about registration delays can be found in [Impact of registration delays on mortality statistics](#) and also in the [Background information section](#) of this report.

There were 104,103 deaths that occurred between 1 July and 30 September 2018 in England, 513 more than the five-year average (2013 to 2017) for that quarter. The number of deaths occurring each day during Quarter 3 2018 were predominately within the range of the number of deaths occurring each day in Quarter 3 of the last five years.

On 27 July 2018, there were 251 more deaths than the five-year average number for the same day, with the death count rising well above the maximum number of deaths seen on that day in the preceding five-year period (2013 to 2017). This period coincided with the highest reported temperature of the year reaching a [maximum of 30.7 degrees Celsius on 26 July and 29.7 degrees on 27 July](#). Public Health England warn that [excess heat-related deaths may begin to become apparent when ambient temperatures exceed 24.5 degrees \(PDF, 1.7MB\)](#).

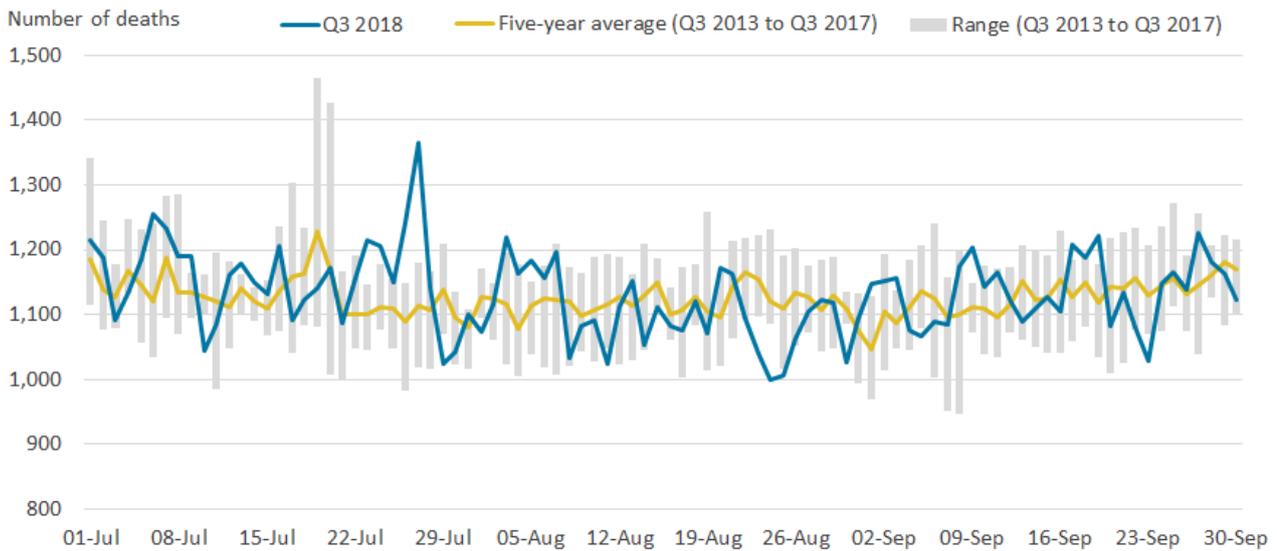
In contrast, on 29 July 2018, there were 114 fewer deaths than the five-year average (2013 to 2017) number for that day, with the maximum temperature at its lowest for July 2018 (20.3 degrees on 28 July and 21.0 degrees on 29 July).

One possible explanation for a short increase in mortality and then a subsequent decrease is [short-term mortality displacement](#). This is where an event (for example, a heatwave) occurs and the resultant high mortality causes a temporary increase in mortality among frail individuals who are especially vulnerable.

Between 23 and 25 August 2018, approximately 339 fewer deaths than the five-year average for the same period were observed and fell below the minimum number of deaths seen on those dates from 2013 to 2017. The reduction in number of deaths in this period corresponded with a [drop in the maximum temperature](#) in England.

The range of death occurrences for Quarter 3 2013 to 2017 refers to the difference between the lowest and highest number of deaths seen on each individual day in Quarter 3 of 2013 to 2017. Several spikes in the size of the range were observed in Figure 3, in particular, 1 July, which was driven by a high number of deaths on 1 July 2015 and 19 to 20 July, which was driven by a high number of deaths in the same period of 2016.

Figure 3: Number of deaths occurring on each day in Quarter 3 (July to September): 2018, five-year average and range, all ages, England



Source: Office for National Statistics

Notes:

1. Deaths occurring on each day, which were registered by 30 October of each respective year.
2. Q3 refers to Quarter 3 (1 July to 30 September).
3. The range is the difference between the minimum and maximum value seen on each day in Quarter 3 in the five-year period from 2013 to 2017.
4. Figures exclude non-residents.

6 . Background information

Deaths data sources

Provisional extracts of death registrations and death occurrences data for Quarter 3 (1 July to 30 September) 2018 were created on 30 October 2018, roughly four weeks after the end of the reporting period. Some deaths that occurred during this period would not have been registered by 30 October (this is known as a registration delay). So, for this reason, we would expect the number of death occurrences in Quarter 3 2018 reported in future articles to be higher than the number reported here.

In addition, because an “artificial” extraction date is used to ensure occurrence data are consistent throughout the time period, if a different artificial extraction date is used in future reports, the number of occurrences reported will be different from the number reported here.

In a small number of cases there can also be a delay between when a death is registered and when it is entered onto the Office for National Statistics (ONS) mortality database. Therefore, provisional registration data for 2018 will change slightly in subsequent reports. Registrations data for years prior to 2018 are final and will not change.

Impact of registration delays on occurrence data

In England, deaths should be registered within five days of the death occurring, but there are some circumstances that result in the registration of the death being delayed. Deaths considered unexpected, accidental or suspicious will be referred to a coroner who may order a post mortem or carry out a full inquest to ascertain the reasons for the death. The time taken for a coroner to investigate the circumstances of the death often means that a death is registered more than five days after it occurred and this is referred to as a registration delay.

While [92.5% of deaths registered in England and Wales are registered within a month](#) of the death and 61.2% are registered within five days, registration delays for a small proportion of deaths can extend into years, particularly for deaths from external causes (accidents or violence) when inquests are held. We are only aware of a death and able to include it in the statistics once it has been registered.

Deaths of young people tend to have longer registration delays because external causes of death are more common in these ages. However, in general, deaths at such ages are relatively rare and make up only a small percentage of all deaths.

Registration delays mean that death occurrence data are technically never complete, as a handful of new deaths may be registered years after they occurred. Occurrence data become gradually more complete over time – so the most recent 2018 occurrence data will be the most incomplete.

Where death occurrences have been used in this report, deaths for previous years have been extracted using a similar “artificial” extraction date as the 2018 occurrences data. That is, we included deaths that occurred in each year and were registered by 30 October of the same year (this is about four weeks after the end of the period). This aims to ensure that all the occurrence data are similarly incomplete, thus minimising the impact of registration delays and allowing comparability across years. In subsequent reports, a different artificial extraction date will be used, meaning the number of deaths occurring in each period will change for all years.

Expected deaths methodology

For each respective year, single year of age mortality rates were calculated. These age-specific mortality rates were then applied to the population of the latest quarter to calculate the number of expected deaths at each age, for each respective year. These were then summed to calculate the total number of expected deaths in each period. From this we can calculate excess deaths in the latest quarter compared with earlier years.

Quarterly population denominators

We publish the [mid-year population estimates](#) used for calculating rates. For 2018, the [2016-based ONS population projections](#) were used.

Single year of age populations for the oldest ages (90 years to 100 years and over) for 2002 to 2017 were taken from the [Mid-year population estimates of the very old](#) publication. For 2001, the [Population estimates for ages 90 years and over](#) were used and for 2018 the [2016-based ONS population projections](#) were used.

Calculation of mortality rates for quarterly deaths requires adjustments to be made to annual population estimates to ensure quarterly rates are comparable with annual rates.

We calculate an annual population centred on the mid-point of the quarter using two years’ worth of population estimates or projections. This is then multiplied by the number of days within the quarter as a proportion of the total number of days within that year. The output is used as the population denominator in calculations of age-standardised and age-specific mortality rates:

Quarter 3 (2018) population

$$= \left(\text{population2018}(i) + \left(\text{population2019}(i) - \text{population2018}(i) \right) * \left(\frac{m}{M} \right) \right) * \left(\frac{N}{M} \right)$$

where m is the number of days from 1 July 2018 (the start of the mid-year for the population estimate) to the midpoint of Quarter 3 inclusive, N is the number of days in Quarter 3 2018 and M is the number of days in 2018 and (i) is the age group.

7 . Quality and methodology

The [Mortality statistics Quality and Methodology Information report](#) contains important information on:

- the strengths and limitations of the data and how it compares with related data
- uses and users of the data
- how the output was created
- the quality of the output including the accuracy of the data

The [User guide to mortality statistics](#) is also a useful resource to help users understand Office for National Statistics (ONS) mortality statistics and includes more detailed information on cause of death coding and the impact on mortality statistics.