

Article

# Quarterly mortality report, England: April to June 2018

Provisional death registration and death occurrence data for England, broken down by sex and age. This publication was produced with support from Public Health England and the Department of Health and Social Care.

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# 1 . Main points

- There were 120,645 deaths registered in England in Quarter 2 (Apr to June) 2018, which was 2,968 more deaths than the five-year average (2013 to 2017).
- However, the number of deaths registered in Quarter 2 2018 was 3,623 deaths fewer than expected if the Quarter 2 five-year average (2013 to 2017) mortality rate continued in 2018.
- The age-standardised mortality rate for deaths registered in Quarter 2 2018 was 916 deaths per 100,000 population, which was significantly higher than Quarter 2 2017 but significantly lower than Quarter 2 2015 and Quarter 2 2016.
- The year-to-date age-standardised mortality rate for deaths registered from 1 January to 30 June 2018 was 1,050 deaths per 100,000 population, which was significantly higher than the five-year average (2013 to 2017).
- Looking at the number of deaths that occurred in Quarter 2 2018, there were specific instances of increased mortality that coincided with periods of increased temperature in England; the question of deaths which might be attributable to a heatwave will be addressed in the next quarterly release.

## 2 . Statisticians quote

Office for National Statistics statistician, Annie Campbell, said:

“Although the provisional data currently available appear to show a high number of deaths at the end of June 2018, we cannot confirm the heatwave is the cause. The question of deaths which might be attributable to a heatwave will be addressed in our next quarterly release, due to be published later this year.”

## 3 . 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. Through comparative analyses with previous quarters, we report patterns of change in mortality; specifically, whether mortality has increased, remained stable or decreased. This report includes data up to and including Quarter 2 (Apr to June) 2018, which covers the period 1 April to 30 June 2018. Year-to-date figures are also reported, which cover the period 1 January to 30 June.

This report is based primarily on death registrations, with a section on death occurrences towards the end of the report. 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 are always somewhat incomplete, especially for deaths that occurred towards the end of the quarter.

This publication was produced with support from Public Health England and the Department of Health and Social Care.

### Please note

On 17 September 2018 a statistician's quote was added to this release after it was published, due to media interest.

## **4 . Mortality rates for deaths registered in Quarter 2 2018 were significantly higher than 2017 but significantly lower than 2015 and 2016**

There were 120,645 deaths registered in Quarter 2 (Apr to June) 2018, which was 2,968 more deaths than the five-year average (2013 to 2017). Of the deaths registered in Quarter 2 2018, 60,313 were male and 60,332 were female.

### **Number of deaths in Quarter 2 2018 lower than expected if previous five-year average rates had continued**

Since the population increases in size each year and the number of elderly people is increasing, we would expect there to be more deaths each year, even if age-specific death rates remained unchanged.

To account for the effect of these population changes, 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 2 2013 to Quarter 2 2017) to the Quarter 2 2018 population and obtain expected numbers of deaths in 2018. We then compare the actual number of deaths in 2018 with the expected number to determine the number of additional deaths in 2018 that can be attributed to the changed mortality rates, rather than to the changed population structure.

There were 120,645 deaths in Quarter 2 2018 but had the age-specific mortality rates in Quarter 2 2018 been the same as the Quarter 2 five-year average rates, we would have expected 124,268 deaths. This means if the five-year average mortality rate had continued, we would have expected to see 3,623 more deaths in Quarter 2 2018 than were actually registered. That is, the number of deaths registered in Quarter 2 2018 was less than expected (based on the average age-specific mortality rates between 2013 and 2017).

### **Mortality rate in Quarter 2 2018 significantly lower than the same period in 2015 and 2016**

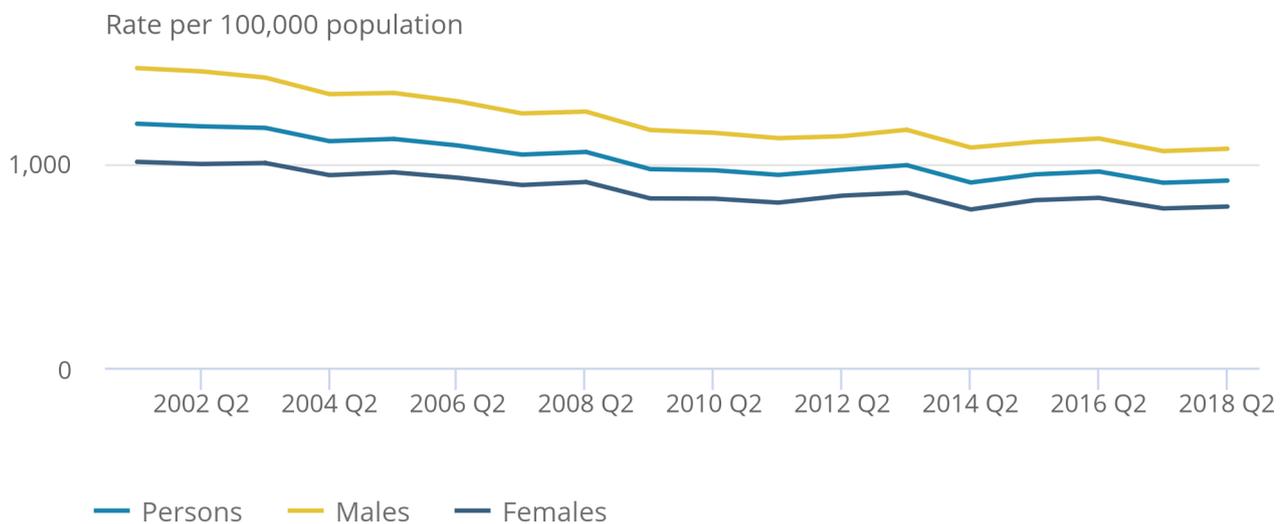
To assess how deaths registered in Quarter 2 (April to June) 2018 compare with earlier years, Figure 1 shows the age-standardised mortality rate for deaths that were registered in each Quarter 2 from 2001 to 2018. The age-standardised rate accounts for changes in the size and age structure of the population over time.

Since the beginning of the 21st century, Quarter 2 mortality rates were generally falling from a peak in 2001 of 1,195 deaths per 100,000 population (or 1,467 deaths per 100,000 males and 1,008 deaths per 100,000 females), to a low in Quarter 2 2014 of 907 deaths per 100,000 population (or 1,078 deaths per 100,000 males and 775 deaths per 100,000 females). Rates have fluctuated since then with mortality rates for deaths registered in Quarter 2 2018 at 916 deaths per 100,000 population (or 1,072 deaths per 100,000 males and 789 deaths per 100,000 females). This was a significant increase from Quarter 2 2017 for all persons taken together, but non-significant increases for males and females counted separately. This discrepancy is due to the increased precision around mortality rates when all persons are taken together, making it easier to detect significant changes in rates compared with rates calculated for males and females separately.

The mortality rate in Quarter 2 2018 was significantly lower than the mortality rate in Quarter 2 2015 and Quarter 2 2016 for persons and by sex. More information about how mortality rates have changed over time can be found in a recent [ONS analysis of the changing mortality trends](#).

**Figure 1: Age-standardised mortality rates by sex, deaths registered in Quarter 2 (Apr to June), 2001 to 2018, England**

Figure 1: Age-standardised mortality rates by sex, deaths registered in Quarter 2 (Apr to June), 2001 to 2018, England



**Source: Office for National Statistics**

**Notes:**

1. Age-standardised mortality rates per 100,000 population, standardised to the 2013 European Standard Population.
2. Q2 refers to Quarter 2 (1 April to 30 June).
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 2018 so far (January to June) higher than the five-year average**

To monitor how mortality is looking in 2018 so far compared with previous years, we have calculated year-to-date figures based on deaths registered from 1 January to 30 June for 2018 and the five-year average (2013 to 2017).

There were 274,362 deaths from 1 January to 30 June 2018. If the age-specific mortality rates in 2018 had remained the same as the same period in the five-year average, we would have expected 267,231 deaths, that is, the number of deaths registered in 2018 so far was larger than expected by 7,131 deaths.

The year-to-date age-standardised mortality rate for 2018 so far was 1,050 deaths per 100,000 population. This was significantly higher than the five-year average (1,020 deaths per 100,000 population). These differences are driven by the [increased number of deaths observed in Quarter 1 \(Jan to Mar\) 2018](#) where there were 18,145 more deaths than the five-year average.

## **5 . Mortality rate improvements stagnating in those aged 75 years and over**

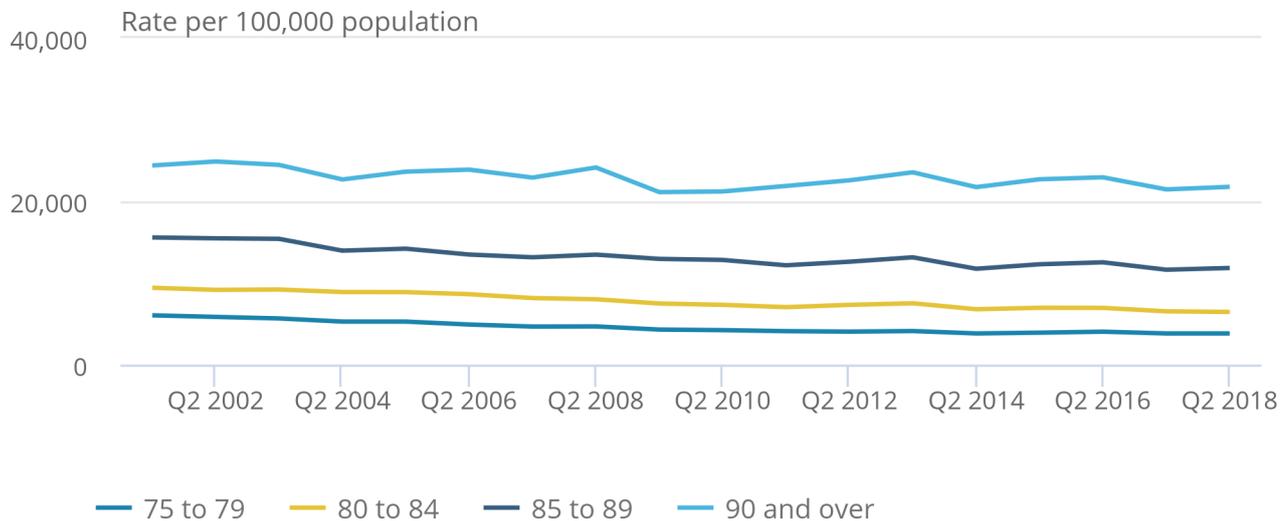
Figures 2a and 2b show that in the first part of the 21st century, mortality rates for Quarter 2 (Apr to June) were generally declining for both males and females aged 75 years and over and reached a low in Quarter 2 2014 and Quarter 2 2017.

Since then, trends have differed by age. For males and females aged 75 to 79 and 80 to 84 years, mortality rates have remained stable with rates reported in Quarter 2 2018 at a similar level to Quarter 2 2014 and Quarter 2 2017. The only significant change in mortality rate was observed in males aged 80 to 84 years, where the Quarter 2 2018 rate was significantly lower than the Quarter 2 2014 rate.

Mortality rates for males and females aged 85 to 89 years and 90 years and over follow slightly different trends to their younger counterparts. Mortality rates in Quarter 2 2018 have increased since Quarter 2 2017, however, these increases were not significant. In comparison with the low observed in Quarter 2 2014, the mortality rate for females aged 90 years and over in Quarter 2 2018 was significantly higher.

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

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



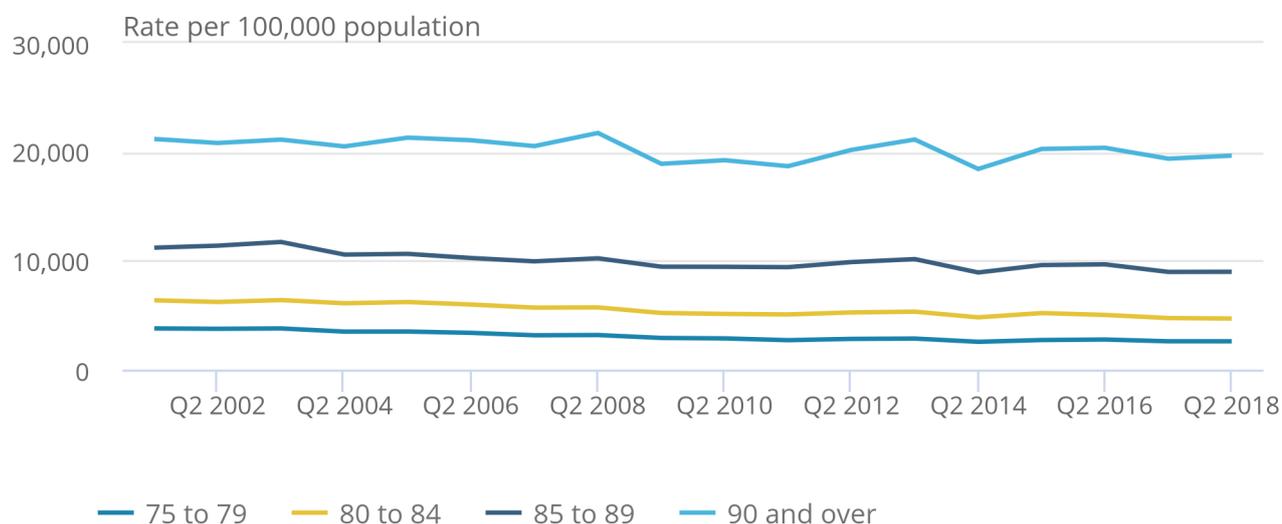
**Source: Office for National Statistics**

**Notes:**

1. Age-standardised mortality rates per 100,000 population, standardised to the 2013 European Standard Population.
2. Q2 refers to Quarter 2 (1 April to 30 June).
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 2 (Apr to June), 2001 to 2018, females aged 75 years and over, England**

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



Source: Office for National Statistics

Notes:

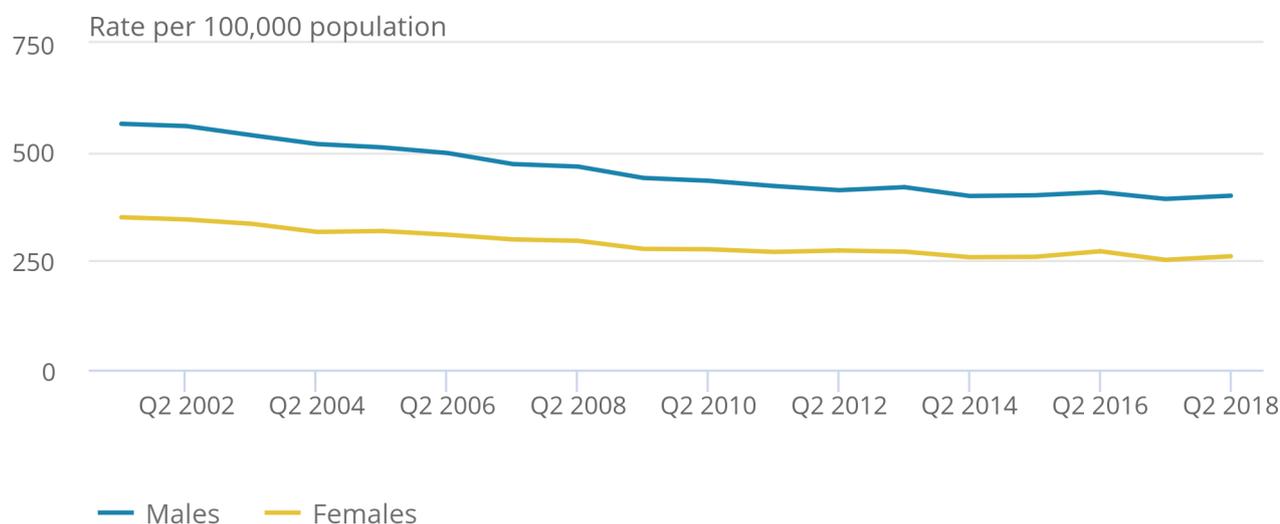
1. Age-standardised mortality rates per 100,000 population, standardised to the 2013 European Standard Population.
2. Q2 refers to Quarter 2 (1 April to 30 June).
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Figure 2c shows a definite decrease in mortality rates since 2001 for persons aged 0 to 74 years, with the lowest rates occurring in Quarter 2 2017 for both males and females. As with the older ages, males aged 0 to 74 years have a higher mortality rate than females (399 deaths per 100,000 males and 260 deaths per 100,000 females). Mortality rates in Quarter 2 2018 increased from the previous year for both males and females, however, this increase was only significant in females.

The trends for those aged 0 to 74 years share characteristics with those observed in the aged 75 years and over population in Quarter 2 and indicate a lack of significant improvement in recent mortality rates when compared with the start of the 21st century. More information can be found in a recent [ONS analysis of the changing mortality trends](#).

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

Figure 2c: Age-standardised mortality rates by sex, deaths registered in Quarter 2 (Apr to June), 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. Q2 refers to Quarter 2 (1 April to 30 June).
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.

## 6 . Trends in death occurrences for Quarter 2 (Apr to June)

Data reported in this section are based on deaths that occurred between 1 April and 30 June, 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 2 (Apr to June) of previous years were only included if they were registered by 30 July in the same year. For example, we have included deaths that occurred between April and June 2013, which were registered on or before 30 July 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 108,537 deaths that occurred between 1 April to 30 June 2018 in England, 497 deaths fewer than the five-year average (2013 to 2017). The number of deaths occurring each day during Quarter 2 (Apr to June) 2018 largely did not differ from the five-year average apart from a few specific exceptions.

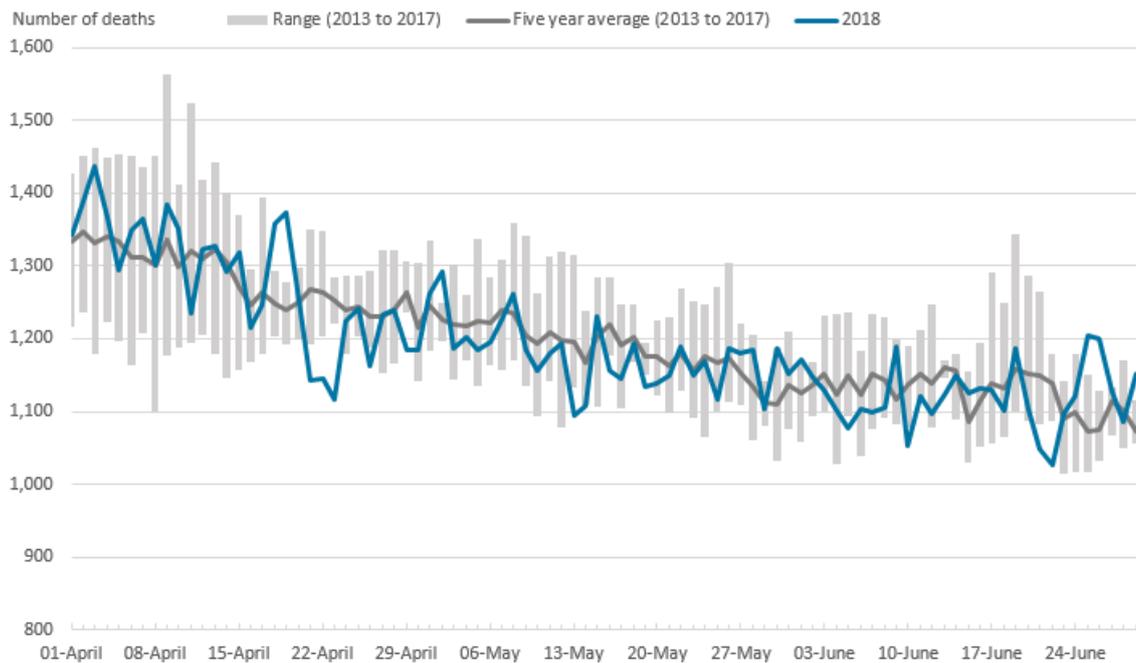
Between 18 and 19 April 2018, 243 more deaths were observed than the five-year average for the same period and rose well above the maximum number of deaths seen on those dates from 2013 to 2017. Following almost immediately, between 21 and 23 April 2018, 378 fewer deaths were observed than the five-year average for the same period. This sharp rise then fall in the number of deaths coincided with a period of [higher than average temperature between 18 and 19 April 2018](#).

One possible explanation for a temporary increase in mortality and then subsequent temporary decrease is [short-term mortality displacement](#). This is where an event that frail individuals are especially vulnerable to (for example, a heatwave) occurs and the resultant high mortality causes temporary depletion of the pool of those individuals who would have died in the short-term regardless.

Between 21 and 22 June 2018, 214 fewer deaths occurred than the five-year average for the same period, followed by the occurrence of 259 more deaths than the five-year average between 25 and 26 June 2018. This sudden trough then peak in deaths coincided with a slightly colder spell between 21 and 22 June 2018 and then with high temperatures that triggered a heatwave alert from 25 June 2018 to the end of the quarter. From 25 June 2018 onwards, maximum temperatures exceeded 24.5 degrees Celsius, the level at which [Public Health England](#) warns that excess heat-related deaths may begin to become apparent. In that time, 382 more deaths occurred than the average for the same period from 2013 to 2017.

Despite steady increases in population from 2013 to 2018, overall fewer deaths occurred in Quarter 2 2018 compared with the five-year average. This indicates that factors unrelated to population change have caused a decrease in death occurrences for this quarter, despite the higher numbers associated with short periods of high temperature.

**Figure 3: Number of deaths occurring on each day in Quarter 2 (Apr to June), 2013 to 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 July of each respective year.
2. Q2 refers to Quarter 2 (1 April to 30 June).
3. The range is the difference between the minimum and maximum value seen on each day in Quarter 2 in the five-year period from 2013 to 2017.
4. Figures exclude non-residents.

## 7 . Background information

### Deaths data sources

Provisional extracts of death registrations and death occurrences data for Quarter 2 (1 April to 30 June) 2018 were created on 30 July 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 July (this is known as a registration delay). So, for this reason, we would expect the number of death occurrences in Quarter 2 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 July 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 2016 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 2017 and 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 2 (2018) population*

= (*population 2017 (i)*)

+  $\left( (\text{population 2018 (i)} - \text{population 2017 (i)}) * \left( \frac{m}{M} \right) \right) * \left( \frac{N}{M} \right)$

where m is the number of days from 1 July 2017 (the start of the mid-year for the population estimate) to the midpoint of Quarter 2 inclusive, N is the number of days in Quarter 2 2018 and M is the number of days in 2018 and (i) is the age group.

## 8 . 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.