

Article

# Quarterly mortality report, England: Quarter 3 (July to September) 2017

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## Table of contents

1. [Main Points](#)
2. [Things you need to know](#)
3. [England registers 111,849 deaths in Quarter 3 2017](#)
4. [Deaths registered so far this year exceed five-year average](#)
5. [Number of deaths registered consistently higher in females than in males](#)
6. [Mortality rates most volatile among females aged 90 and over](#)
7. [Trends in death occurrences for Quarter 3 \(July to Sept\)](#)
8. [Quality and methodology](#)

# 1 . Main Points

- There were 111,849 deaths registered in England between 1 July and 30 September 2017, fewer than in the same period in 2016 but more than in 2015 and the five-year average.
- The number of deaths registered in the year-to-date (1 January to 30 September 2017) is higher than the same period in the years 2012, 2013, 2014 and 2016, but is 1,274 fewer than in 2015 (a particularly high year).
- The age-standardised mortality rate for the latest four-quarter period was 1,107.7 deaths per 100,000 for males and 830.5 per 100,000 for females; this has changed very little since the four-quarter period ending Quarter 1 2016.
- Males aged 90 and over had the highest age-specific mortality rates in the latest rolling four-quarter period.
- There were two periods in Quarter 3 where the number of deaths that occurred was higher than the five-year average (5 to 7 July and 13 to 29 September); however, these days did not coincide with any periods of extreme weather.

## 2 . Things you need to know

The purpose of this report is to provide timely surveillance of mortality in England. This report serves as a snapshot of deaths that were registered within the most recent quarter using the best available data. Through comparative analyses with previous quarters and with the use of rolling four-quarter totals, it aims to inform patterns of change in mortality; specifically whether mortality has increased, remained stable or decreased.

This report includes data up to and including Quarter 3 (July to September) 2017, which covers the period 1 July to 30 September 2017. In addition to reporting on deaths that were registered in Quarter 3 we also report quarterly rolling four-quarter death counts and mortality rates that encompass all quarters of the year. The most recent rolling four-quarter period is Quarter 4 2016 to Quarter 3 2017 (October 2016 to September 2017).

In keeping with the Quarter 2 (April to June) report, this edition will primarily be based on death registrations with a section on death occurrences. Death occurrences report the number of deaths that occurred within a reference period to allow period-specific comparisons and thereby aim to enable timely judgements on the direction and magnitude of change. We can only know when a death occurred once it has been registered. However, due to registration delays, death occurrences data can often be incomplete, especially towards the end of the quarter.

Death registrations data for 2017 are provisional; however, we would only expect very small changes to death registration counts once data are made final. A provisional extract of death registrations and death occurrences data for Quarter 3 (1 July to 30 September) 2017 was created on 30 October 2017, roughly four weeks after the end of the reporting period.

The quarterly populations used in the rate calculations here are adjusted using mid-year population estimates or a combination of mid-year population estimates (2001 to 2016) and population projections (2017) to estimate what the likely population would have been at the mid-point of the quarter. More detail is provided in the technical notes at the end of this report.

The statistics reported here are [Experimental Statistics](#) and allow us to demonstrate to users some of the analyses possible in the future and to seek feedback to inform the future presentation of timely mortality data. We welcome feedback from users on this report at [mortality@ons.gov.uk](mailto:mortality@ons.gov.uk).

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

### 3 . England registers 111,849 deaths in Quarter 3 2017

From 1 July to 30 September 2017 there were 111,849 deaths registered in England. This is higher than the same quarter in both 2015 and the average of the previous five years but 383 lower than the number of deaths registered in the same quarter in 2016 (Table 1a).

**Table 1a: Number of observed deaths, England, Quarter 3 (July to Sept) 2015 to Quarter 3 2017 and Quarter 3 2012 to Quarter 3 2016 average**

	Q3 2012 to Q3 2016 average	Q3 2015	Q3 2016	Q3 2017 <sup>P</sup>
Number of deaths	108,859	110,615	112,232	111,849
Excess deaths in Q3 2017 compared with previous years	2,990	1,234	-383	0

Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional.
2. Q3 refers to Quarter 3 (July to Sept).

An expected number of deaths in Quarter 3 (July to Sept) 2017 can be calculated by applying the mortality rate for earlier periods to the 2017 population (Table 1b). Despite the relatively high number of observed deaths, there were fewer deaths registered in Quarter 3 2017 than we would have expected. For example, there were 3,141 fewer deaths in Quarter 3 2017 than would be expected based on the Quarter 3 2012 to 2016 average mortality rate.

**Table 1b: Number of expected deaths, England, Quarter 3 (July to Sept) 2015 to Quarter 3 2017 and Quarter 3 2012 to Quarter 3 2016 average**

	Using Q3 2012 to Q3 2016 average rate	Using Q3 2015 rate	Using Q3 2016 rate	Observed deaths in Q3 2017
Expected deaths	114,990	114,607	114,294	111,849
Excess deaths in Q3 2017 compared with expected deaths for Q3 2017 using previous year's rates	-3,141	-2,758	-2,445	0

Source: Office for National Statistics

Footnotes

1. Data for 2017 are provisional.
2. Q3 refers to Quarter 3 (July to Sept).

## 4 . Deaths registered so far this year exceed five-year average

To assess how the number of deaths registered in 2017 so far compares with recent years, Figure 1 shows the number of deaths that have been registered in Quarters 1, 2 and 3 (the period January to September) combined, for the years 2012 to 2017. As shown in Figure 1, the number of deaths registered so far in 2017 (373,199 deaths) was higher than in 2012, 2013, 2014 and 2016 but lower than 2015 (a particularly high year), with 1,274 fewer deaths in 2017 than in 2015. There were 15,086 more deaths in Quarters 1 to 3 in 2017 than the average of the same period over the previous five years.

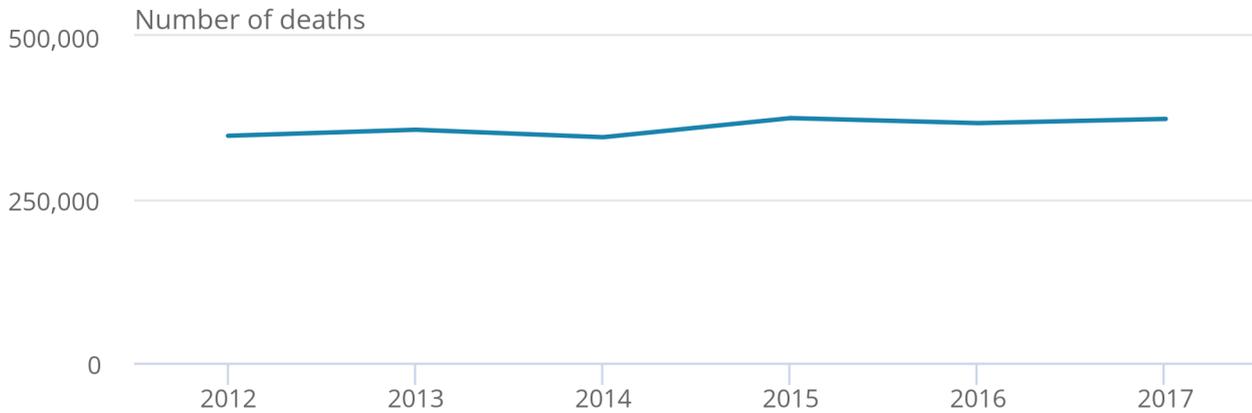
However, as shown in Table 3 of the accompanying datasets, there were fewer deaths than were expected in 2017 Quarters 1 to 3 combined if based on the 2012 to 2016 five-year average mortality rate.

The table also shows that there were 718 more deaths than were expected in 2017 Quarters 1 to 3 based on the mortality rate over the same period in 2016. This is 0.2% more than anticipated given the rate for 2016. However, there were fewer deaths than expected in 2017 Quarters 1 to 3 based on the mortality rate over the same period in 2015.

The high number of deaths registered in 2017 so far appears to be driven by higher than average numbers of deaths in the winter period as shown in the [Quarterly Mortality Report](#) for Quarter 1 (Jan to Mar) and the [excess winter mortality report](#). The number of deaths registered in Quarters 2 and 3 of 2017 are much closer to the five - year average than those registered in Quarter 1.

**Figure 1: Number of deaths registered in Quarters 1, 2 and 3 (Jan to Sept), England, 2012 to 2017**

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Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional.

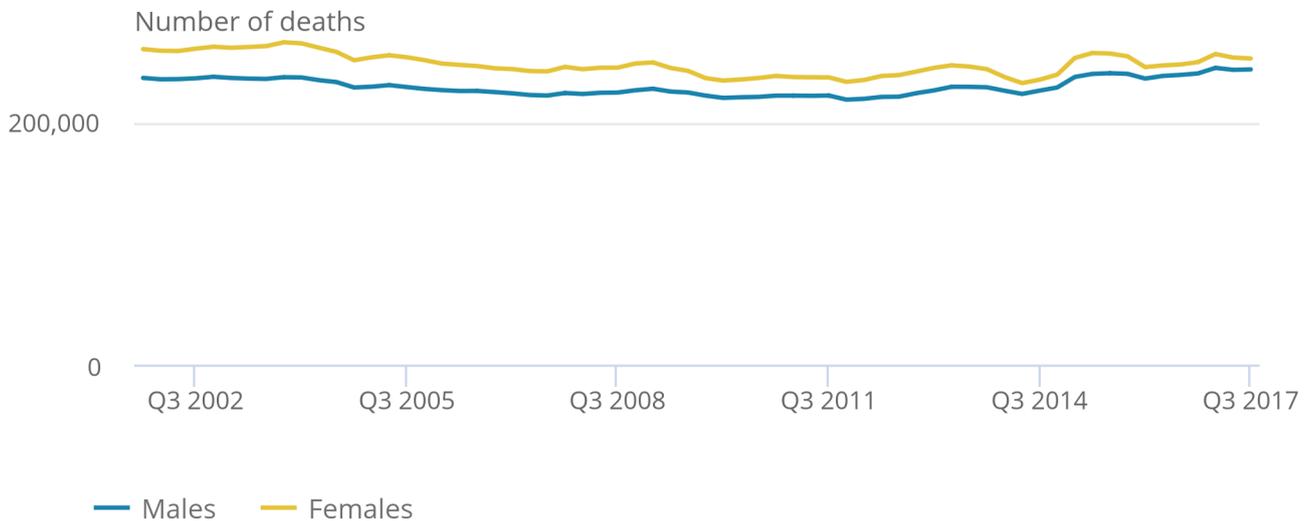
## 5 . Number of deaths registered consistently higher in females than in males

There were 497,177 deaths registered in England between October 2016 and September 2017 (the latest rolling four-quarter period). An overall decrease in the number of deaths registered in rolling four-quarter periods was observed for both males and females from 2001 to 2011 (Figure 2a). However, for both sexes the trend since 2011 has been more volatile. The latest rolling four-quarter period had a higher number of deaths than the same period in 2015 to 2016 but a lower number of deaths than the same period in 2014 to 2015.

The number of deaths registered is consistently higher in females than in males; however, the difference in the number of deaths between males and females has decreased over time since 2001. For males, the number of deaths registered in the latest four-quarter period is higher than those registered in the four-quarter period ending Quarter 4 (Oct to Dec) 2001. For females, the number of deaths in the latest four-quarter period is lower than that observed in the period ending Quarter 4 2001.

**Figure 2a: Number of death registrations, England, rolling four-quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017**

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**Source: Office for National Statistics**

**Notes:**

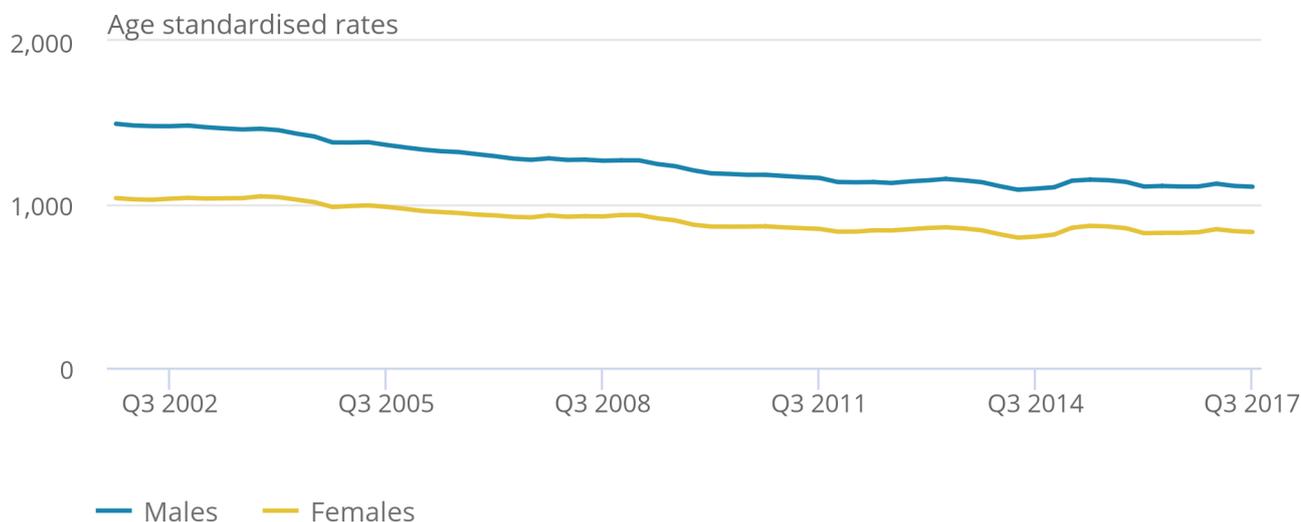
1. Data for 2017 are provisional, therefore the sum of male and female death counts may not equal the total reported elsewhere as some death registrations are not yet fully coded.
2. Population data for 2017 are projected.
3. Q1 refers to year ending Quarter 1 (Apr to Mar), Q2 refers to year ending Quarter 2 (Jul to Jun), Q3 refers to year ending Quarter 3 (Oct to Sept) and Q4 refers to year ending Quarter 4 (Jan to Dec).

Although numbers of deaths have increased over recent years the age-standardised mortality rates for both males and females decreased over time from 2001 to 2011, but have since been relatively flat (Figure 2b). The increase in the number of deaths is strongly influenced by the increasing size and age of the population.

Despite having higher numbers of deaths than males, females consistently have lower age-standardised mortality rates than males. For both sexes, following elevated age-standardised rates in 2015, there has been a slight decrease in mortality rates and since 2016 they have remained relatively stable.

**Figure 2b: Age-standardised mortality rate, England, rolling four-quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017**

Figure 2b: Age-standardised mortality rate, England, rolling four-quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017



Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional, therefore the sum of male and female death counts may not equal the total reported elsewhere as some death registrations are not yet fully coded.
2. Population data for 2017 are projected.
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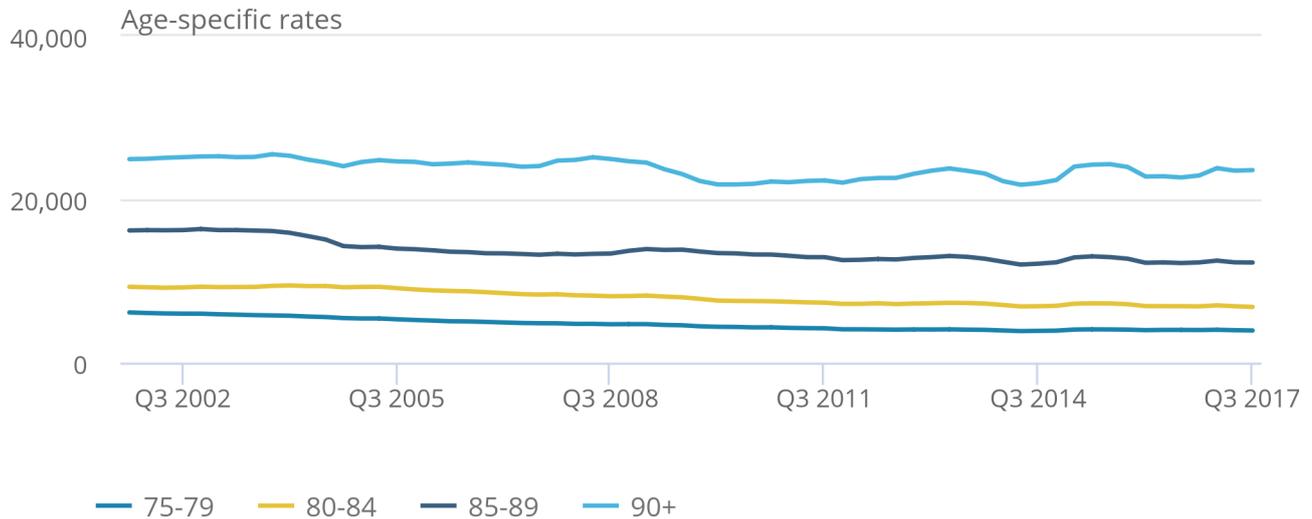
## 6 . Mortality rates most volatile among females aged 90 and over

In both sexes the highest age-specific mortality rates were observed in the 90 and over age group. This group's mortality pattern is more volatile and fluctuates considerably, showing no discernible trend over time since 2001 in comparison to the other age groups. However, care must be taken when interpreting the age-specific rates for the 90 and over age group as this includes deaths of all individuals aged 90 and over so will have the largest range of ages.

Age-specific mortality rates in females aged 90 and over are more volatile than those of males in the same age group.

**Figure 3a: Age-specific mortality rates, males, England, rolling-four quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017**

Figure 3a: Age-specific mortality rates, males, England, rolling-four quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017



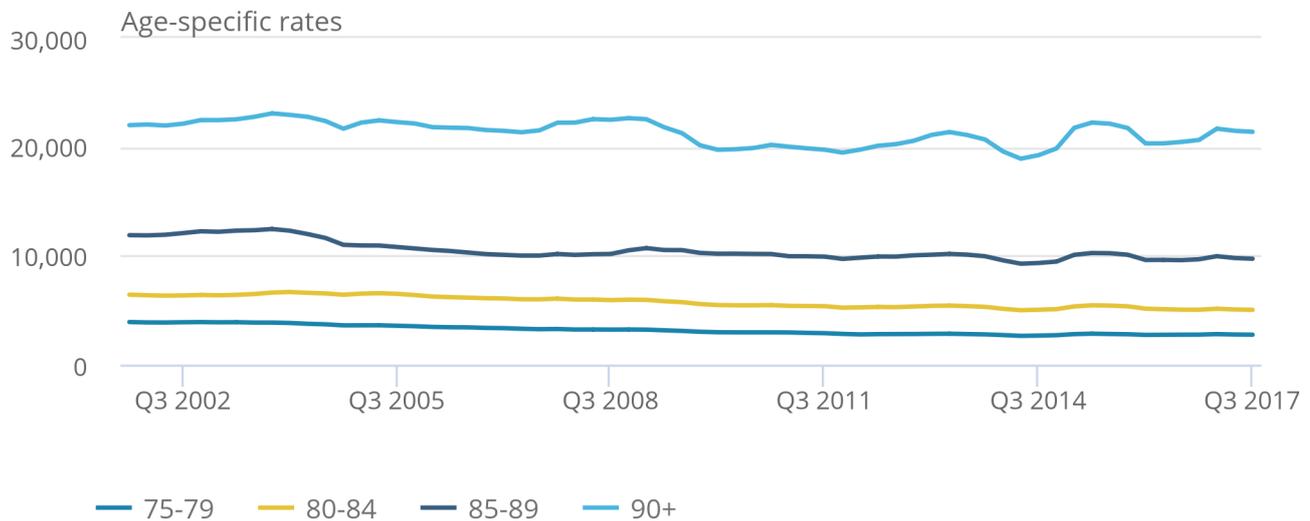
**Source: Office for National Statistics**

**Notes:**

1. Death registrations data for 2017 are provisional.
2. Population data for 2017 are projected.
3. Q1 refers to year ending Quarter 1 (Apr to Mar), Q2 refers to year ending Quarter 2 (Jul to Jun), Q3 refers to year ending Quarter 3 (Oct to Sept) and Q4 refers to year ending Quarter 4 (Jan to Dec).

**Figure 3b: Age-specific mortality rates, females, England, rolling four-quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017**

Figure 3b: Age-specific mortality rates, females, England, rolling four-quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017



**Source: Office for National Statistics**

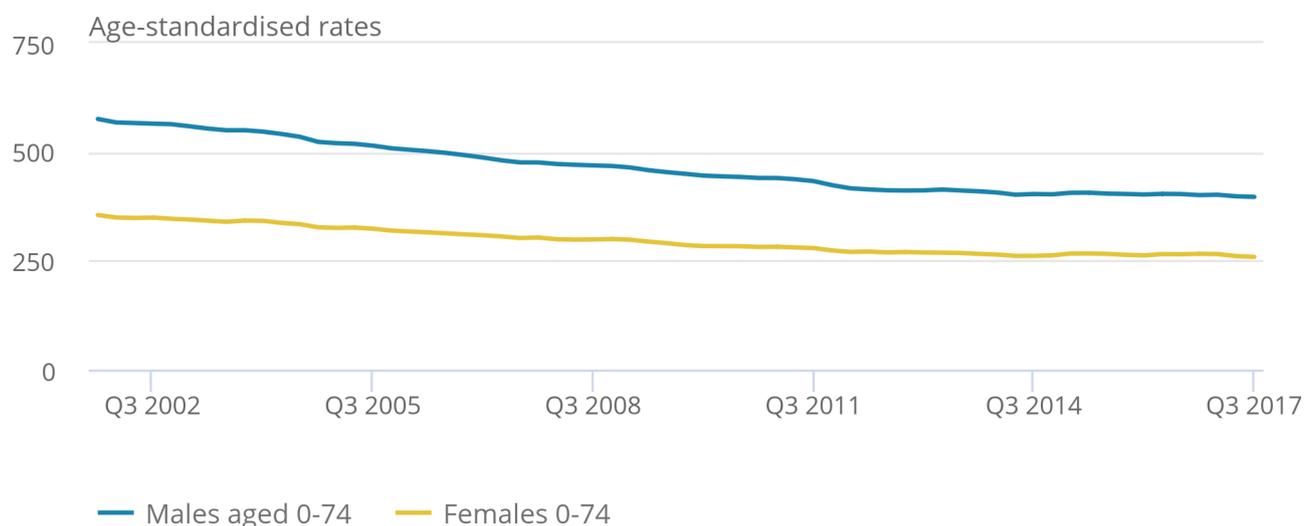
**Notes:**

1. Death registrations data for 2017 are provisional.
2. Population data for 2017 are projected.
3. Q1 refers to year ending Quarter 1 (Apr to Mar), Q2 refers to year ending Quarter 2 (Jul to Jun), Q3 refers to year ending Quarter 3 (Oct to Sept) and Q4 refers to year ending Quarter 4 (Jan to Dec).

For both males and females, age-specific mortality rates in those aged 0 to 74 have decreased over time up until 2011 and have remained stable in recent years. The rate of improvement observed between 2001 and 2011 has clearly halted for those aged 0 to 74.

**Figure 3c: Age-standardised mortality rates, by sex, ages 0 to 74, England, rolling four-quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017**

Figure 3c: Age-standardised mortality rates, by sex, ages 0 to 74, England, rolling four-quarter periods from period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 3 (July to Sept) 2017



**Source: Office for National Statistics**

**Notes:**

1. Death registrations data for 2017 are provisional.
2. Population data for 2017 are projected.
3. Q1 refers to year ending Quarter 1 (Apr to Mar), Q2 refers to year ending Quarter 2 (Jul to Jun), Q3 refers to year ending Quarter 3 (Oct to Sept) and Q4 refers to year ending Quarter 4 (Jan to Dec).

Single year of age mortality rates for deaths registered in Quarter 3 (July to Sept) for those aged 75 and over can be found in the accompanying datasets. Caution must be used when interpreting these rates given [birth cohort effects following World War 1](#).

All mortality rates and 95% confidence intervals can be found in the dataset accompanying this release.

## 7 . Trends in death occurrences for Quarter 3 (July to Sept)

Data reported in this section are based on deaths that occurred within the period 1 July to 30 September rather than deaths that were registered in this period (as in the rest of the report). Death occurrences data from years prior to 2017 are based on the same extraction date of 30 October. This extraction date is applied to occurrences data for previous years for each respective year. Using death occurrences data with a similar extraction date allows for comparability between years whilst minimising any registration delay effects. The median delay for death registrations is five days for all causes of death.

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. Death occurrences data for 2016 and 2017 are provisional and numbers will increase over time as further deaths that occurred in the period are registered.

Table 2 shows the number of death occurrences with a similar extraction date of 30 October for each respective year of 2015 to 2017 and the five-year average. This is calculated as the number of deaths that occurred in Quarter 3 (July to Sept) and were registered on or before 30 September in each year.

From 1 July to 30 September 2017, there were 106,123 death occurrences in England, which was higher than 2015 and 2016. Compared with the average of the previous five years, 2017 had an additional 3,408 death occurrences. This is 3% greater than the five-year average.

**Table 2: Number of deaths that occurred with a similar extraction date, England, Quarter 3 (July to September) 2015 to Quarter 3 2017 and Quarter 3 2012 to Quarter 3 2016 average**

	Q3 2012 to Q3 2016 average	2015	2016 <sup>P</sup>	2017 <sup>P</sup>
Number of deaths	102,715	103,848	105,235	106,123
Excess deaths in Q3 2017 compared with previous years	3,408	2,275	888	0

Source: Office for National Statistics

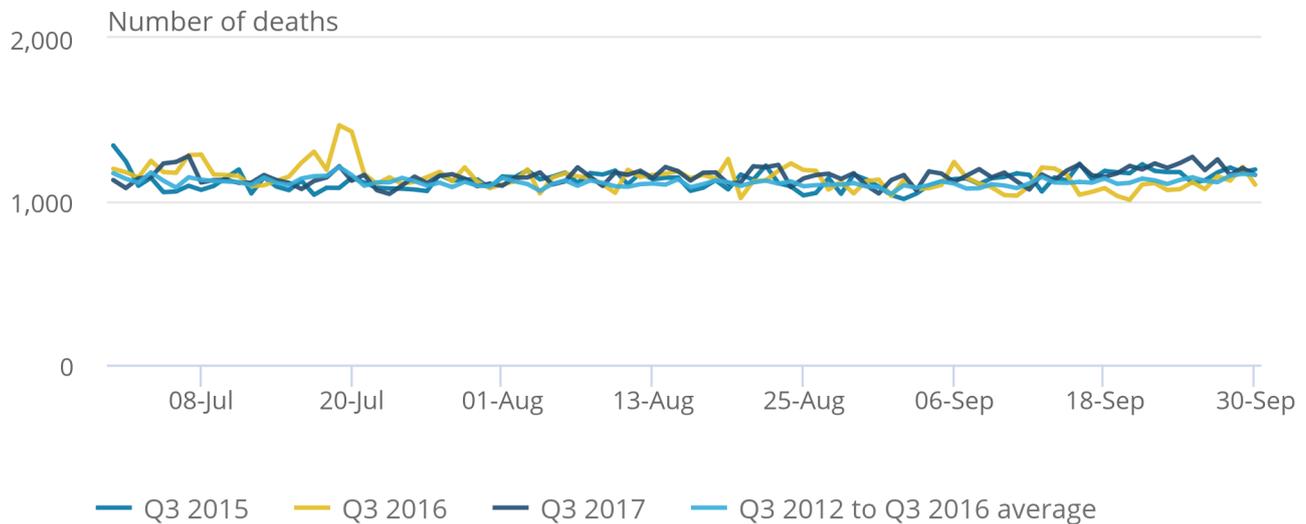
Notes:

1. Data are based on death occurrences
2. Data for 2016 and 2017 are provisional.
3. Q3 refers to Quarter 3 (July to September).

Daily death occurrences using a similar extraction date show that for Quarter 3 2017, three-quarters of the days of the period (69 out of 92) had a higher number of deaths than the five-year average for those days (Figure 4). During the beginning of July and towards the end of September the number of deaths in 2017 was substantially above the five-year average. The two days with the highest number of deaths in these periods were 7 July (1,278 deaths) and 25 September (1,272 deaths). However, these periods did not coincide with any extreme weather so it is not clear what caused these rises above the five-year average.

**Figure 4: Number of deaths occurring on each day, England, Quarter 3 (Jul to Sept) 2015 to Quarter 3 2017 and Quarter 3 2012 to Quarter 3 2016 average**

Figure 4: Number of deaths occurring on each day, England, Quarter 3 (Jul to Sept) 2015 to Quarter 3 2017 and Quarter 3 2012 to Quarter 3 2016 average



**Source: Office for National Statistics**

**Notes:**

1. Based on death occurrences with a similar extraction date of 30 October for each respective year.
2. Deaths for 2016 and 2017 are provisional.

## 8. Quality and methodology

### Deaths data sources

A provisional extract of death registrations and death occurrences data for Quarter 3 (1 July to 30 September) 2017 was created on 30 October 2017, roughly four weeks after the end of the reporting period. For this reason, we would expect death occurrences to increase, because of registration delays, which will not be accounted for by 30 October 2017. In exceptional circumstances there may also be changes to the number of registrations but these would be very small. Registrations data for years prior to 2017 are final, whereas occurrences data prior to 2016 are final.

### Registration delays on occurrences

In England, deaths should be registered within five days of the death occurring, but there are some circumstances which 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 coroner can only register the death once any investigation is concluded and they are satisfied that the death was natural and that the cause of death has been certified correctly. If the coroner is not satisfied that the death was from natural causes then an inquest will normally be held to determine the cause of death. The time taken to investigate the circumstances of the death can often result in a death

registration exceeding the five-day grace period and these are defined as registration delays. While delays are commonly only a few days, registration delays can extend into years, particularly for deaths from external causes when inquests are held. We are only aware of a death and able to include it in the statistics once it has been registered.

Those at younger ages are disproportionately affected by registration delays due to external causes of death being more common in these ages. However, in general, deaths at such ages are not very common and make up only a small percentage of all deaths.

The death occurrences dataset for 2017 will not hold all deaths that occurred in the quarter due to late registrations. Where death occurrences have been used in this report, deaths for previous years have been extracted using a similar extraction date as the 2017 occurrences data. This allows for control over registration delays.

## Expected deaths methodology

For each respective year, single year of age mortality rates were calculated. These were then applied to the population projections for 2017 to calculate the number of expected deaths in each single year of age using the mortality rate from the respective year. From this we were able to calculate the difference between observed and expected deaths in 2017.

## Quarterly population denominators

We publish the [mid-year population estimates](#) used for calculating rates. For 2017, our [2016-based national population projections](#) were used.

Single year of age populations for the oldest ages (90 to 100 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 and over](#) were used and for 2017 the [2016-based national population projections](#) were used.

Calculation of mortality rates for quarterly deaths requires adjustments to be made to annual population estimates in order to calculate rates that are comparable with annual rates.

We calculate an annual population centred on the mid-point of the quarter using two year's worth of population estimates or projections. This is then multiplied by the proportion of the number of days within a quarter 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 (2017) population*

$$\begin{aligned} &= (\text{population}_{2017}(i) \\ &+ \left( (\text{population}_{2018}(i) - \text{population}_{2017}(i)) * \left( \frac{m}{M} \right) \right) * \left( \frac{N}{M} \right) \end{aligned}$$

Where  $m$  is the number of days from 1 July 2016 (the start of the mid-year for the population estimate) to the mid-point of the relevant quarter, inclusive,  $N$  is the number of days in Quarter 2 (Apr to June) 2017 and  $M$  is the number of days in 2017 and  $(i)$  is the age group.

This method is very similar to that used to calculate population denominators for [quarterly conception rates](#).

The [Mortality Quality and Methodology Information document](#) 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 when reporting mortality statistics.