

Article

Quarterly mortality report, England: Quarter 2 (Apr to June) 2017

This series of quarterly releases, produced with support from Public Health England (PHE), will report on death registrations and occurrences in England to provide the most up-to-date national analysis of recent trends.

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Release date:
21 September 2017

Next release:
To be announced

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1 . Main points

- Between 1 April and 30 June 2017, there were 117,220 deaths registered in England, lower than in the same period in 2013, 2015 and 2016.
- The number of deaths registered so far in 2017 is lower than in 2015 (a particularly high year) but is higher than 2012, 2013, 2014 and 2016.
- From Quarter 2 (Apr to June) 2001 to Quarter 2 2017, age-standardised mortality rates have decreased by 28% for males and 23% for females; since 2011, despite some year-on-year increases in rate, there has been an overall 6% decrease for males and 4% decrease for females.
- The number of deaths that occurred between 22 and 27 May, and 17 and 21 June 2017 were considerably higher than the five-year average; these coincided with periods of increased temperature in England relative to the five-year average.

2 . Things you need to know about this release

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, it aims to inform patterns of change in mortality; specifically whether mortality has increased, remained stable or decreased.

This report will mainly focus on Quarter 2, which covers 1 April to 30 June. Throughout the report, all mentions of years refer to Quarter 2 of that specific year. The only exception is section 5 of the report, which looks at an annual count of rolling quarterly deaths across all quarters of the year (Quarter 1 to Quarter 4). In this instance, the specific quarter will be stated alongside the year where Quarter 1 is January to March, Quarter 2 is April to June, Quarter 3 is July to September and Quarter 4 is October to December.

Previous quarterly reports have been based on death occurrences rather than death registrations. 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 has 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. Due to user feedback this current report will be based mainly on death registrations. This is in line with typical mortality statistics, which are usually based upon the date on which a death was registered (death registrations) rather than the date it occurred (death occurrences).

Death registrations data for 2017 are provisional; however, we would only expect very small changes to death counts once data are made final. A provisional extract of death registrations and death occurrences data for Quarter 2 (1 April to 30 June) 2017 was created on 28 July 2017, roughly 4 weeks after the end of the reporting period.

The quarterly populations used in rate calculations are adjusted using mid-year population estimates or a combination of mid-year population estimates (2001 to 2016) and population projections (2016 for those aged 90 and over and 2017 for all ages) to estimate what the likely population would have been at the mid-point of the quarter. More detail is provided in the background information 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.gsi.gov.uk

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

3 . There were 117,220 deaths registered in Quarter 2 (Apr to June) 2017 in England

From 1 April to 30 June 2017, there were 117,220 deaths registered in England, which was higher than the same quarter in both 2012 and 2014 but lower than that for 2013, 2015 and 2016. The 2017 provisional estimate had 130 (0.1%) more deaths registered compared with the average of the previous five years (Table 1a).

An expected number of deaths in 2017 can be calculated by applying the mortality rate of earlier years to the 2017 population (Table 1b). Using this method there are fewer deaths than we would have expected in 2017. For example, there were 7,460 fewer deaths in Quarter 2 (Apr to June) 2017 than would be expected if the population in 2017 had the same mortality rate as the 2012 to 2016 average, despite there being slightly more deaths.

Table 1a: Number of observed deaths, England, Quarter 2 (Apr to June) 2012 to Quarter 2 2017 and Quarter 2 2012 to Quarter 2 2016 average^{1,2}

	Q2 2017 ^P	Q2 2016	Q2 2015	Q2 2014	Q2 2013	Q2 2012	Q2 2012 to Q2 2016 average
Number of deaths	117,220	121,849	118,288	111,667	119,329	114,318	117,090
Excess deaths in Q2 2017 compared with previous years	0	-4,629	-1,068	5,553	-2,109	2,902	130

Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional.
2. Q2 refers to Quarter 2 (April to June).

Table 1b: Number of expected deaths, England, Quarter 2 (Apr to June) 2012 to Quarter 2 2017 and Quarter 2 2012 to Quarter 2 2016 average^{1,2}

	Observed deaths in Q2 2017	Expected number of deaths in Q2 2017 if previous year's mortality rate held in 2017					
		Using Q2 2016 rate	Using Q2 2015 rate	Using Q2 2014 rate	Using Q2 2013 rate	Using Q2 2012 rate	Using average Q2 2012 to Q2 2016 rate
Expected deaths	117,220	125,030	123,518	118,504	129,714	126,701	124,680
Excess deaths in Q2 2017 compared with expected deaths for Q2 2017 using previous year's rates	0	-7,810	-6,298	-1,284	-12,494	-9,481	-7,460

Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional.
2. Q2 refers to Quarter 2 (April to June).

4 . Trends in Quarter 2 (Apr to June) age-standardised mortality rates since 2001

From 2001 to 2017, there was an overall decline in mortality rates for both males and females with a 28% decrease for males and 23% decrease for females across the 17-year period. This is with the exception of small increases from 2004 to 2005 and 2007 to 2008 and since 2011, when mortality rates have been more volatile. There were consecutive year-on-year rises in mortality rates from 2011 to 2013 (which were both statistically significant for females, and significant for males between 2012 and 2013) and between 2014 and 2016 (statistically significant for both sexes). Subsequent to these periods of increase, mortality rates fell significantly between 2013 and 2014 and again between 2016 and 2017. By contrast, within the period 2001 to 2010 there were no consecutive year-on-year increases in mortality rates.

The trends are similar to the [trends observed for Quarter 1 \(Jan to Mar\) since 2001](#). However, the pattern since 2011 has been more erratic. For Quarter 1, there was an increase in death registrations from 2016 to 2017, whereas for Quarter 2 the number of deaths registered decreased from 2016 to 2017. Similarly, Quarter 1 2015 had a considerably higher number of death registrations than surrounding years, whereas for Quarter 2 2015 this was not the case.

Figure 1a: Percentage change in age-standardised mortality rates from Quarter 2 (Apr to June) 2001, by sex, all ages

England, Quarter 2 2001 to Quarter 2 2017

Figure 1a: Percentage change in age-standardised mortality rates from Quarter 2 (Apr to June) 2001, by sex, all ages

England, Quarter 2 2001 to Quarter 2 2017



Source: Office for National Statistics

Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional.
2. Q2 refers to Quarter 2 (April to June).

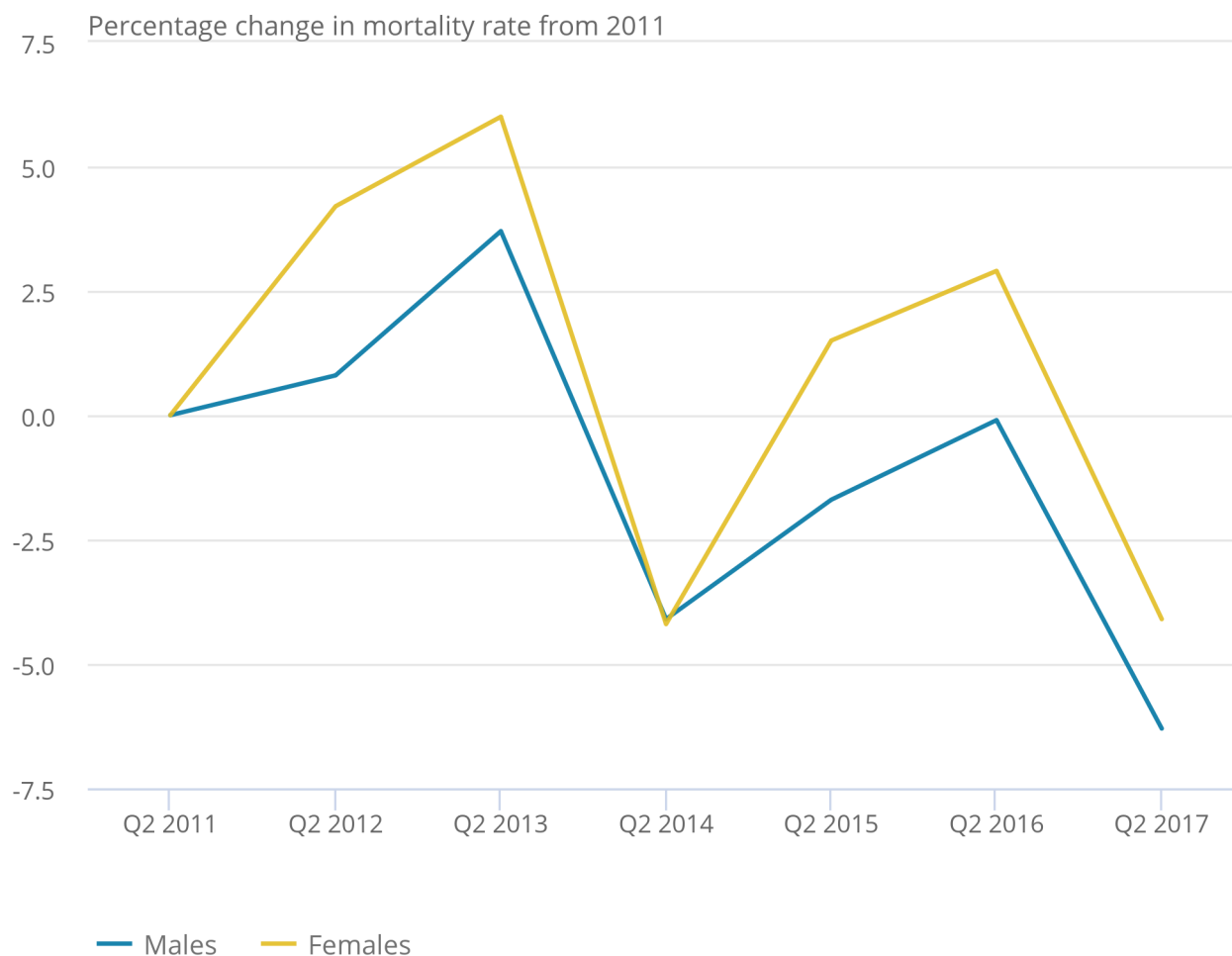
The extent of the volatility in age-standardised rates for males and females since 2011 is explored further in Figure 1b. Mortality rates for both sexes have fluctuated greatly, but despite the year-on-year increases noted previously, across the six-year period there was an overall decrease of 6% from 2011 to 2017 in males and a 4% decrease in females.

Figure 1b: Percentage change in age-standardised mortality rates from Quarter 2 (Apr to June) 2011, by sex, all ages

England, Quarter 2 2011 to Quarter 2 2017

Figure 1b: Percentage change in age-standardised mortality rates from Quarter 2 (Apr to June) 2011, by sex, all ages

England, Quarter 2 2011 to Quarter 2 2017



Source: Office for National Statistics

Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional.
2. Q2 refers to Quarter 2 (April to June).

Taking a closer look at the trend in mortality rates from 2001 to 2017, Figures 1c and 1d look at change in mortality rates for males and females aged 75 and over.

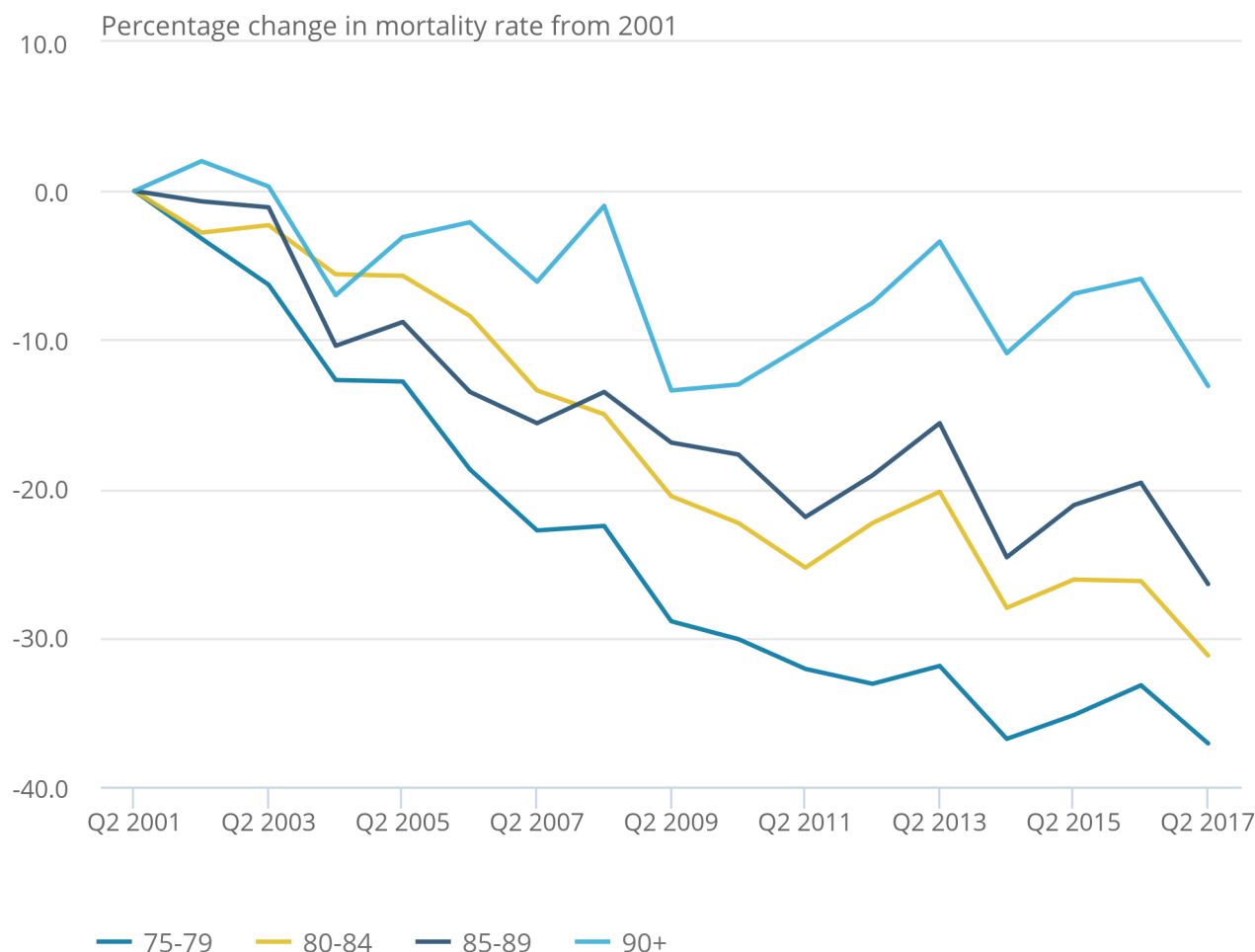
There was a larger percentage change in mortality rates across the 17-year period for those aged 75 to 79 with an overall decrease of 37% in males and 32% in females. The smallest percentage change across this period was for those aged 90 and over with a decrease from 2001 to 2017 of 13% for males and 10% for females. However, this group's mortality pattern fluctuated sizably, particularly during the period 2007 to 2013 compared with other age groups. Caution is required when interpreting the age-specific rates for the 90 and over age group though, as this category covers all deaths for any age 90 and over so may encompass a wider range of ages.

Figure 1c: Percentage change in age-specific mortality rates from Quarter 2 (Apr to June) 2001, males, ages 75 and over

England, Quarter 2 2001 to Quarter 2 2017

Figure 1c: Percentage change in age-specific mortality rates from Quarter 2 (Apr to June) 2001, males, ages 75 and over

England, Quarter 2 2001 to Quarter 2 2017



Source: Office for National Statistics

Source: Office for National Statistics

Notes:

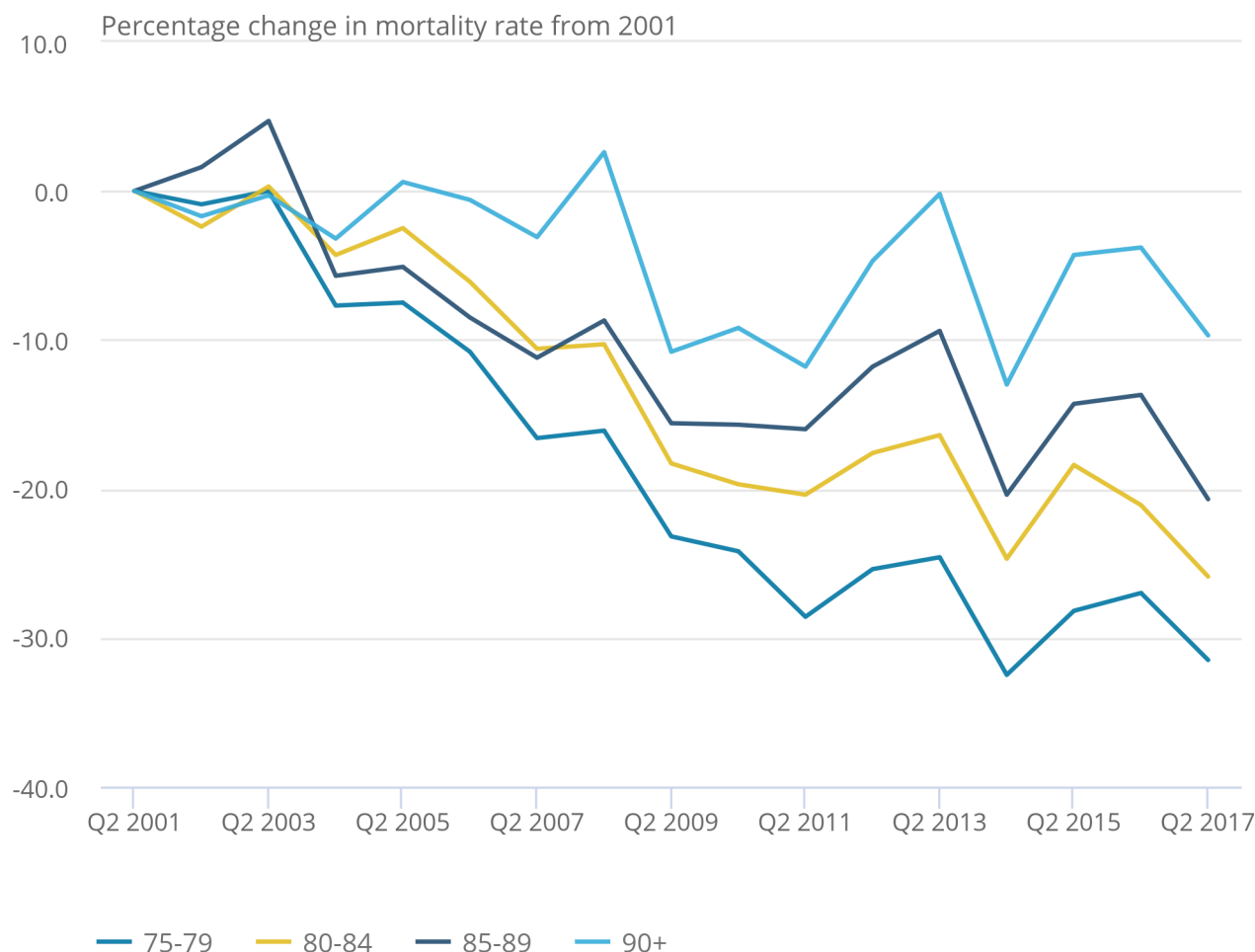
1. Data for 2017 are provisional.
2. Q2 refers to Quarter 2 (April to June).

Figure 1d: Percentage change in age-specific mortality rates from Quarter 2 (Apr to June) 2001, females, ages 75 and over

England, Quarter 2 2001 to Quarter 2 2017

Figure 1d: Percentage change in age-specific mortality rates from Quarter 2 (Apr to June) 2001, females, ages 75 and over

England, Quarter 2 2001 to Quarter 2 2017



Source: Office for National Statistics

Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional.
2. Q2 refers to Quarter 2 (April to June).

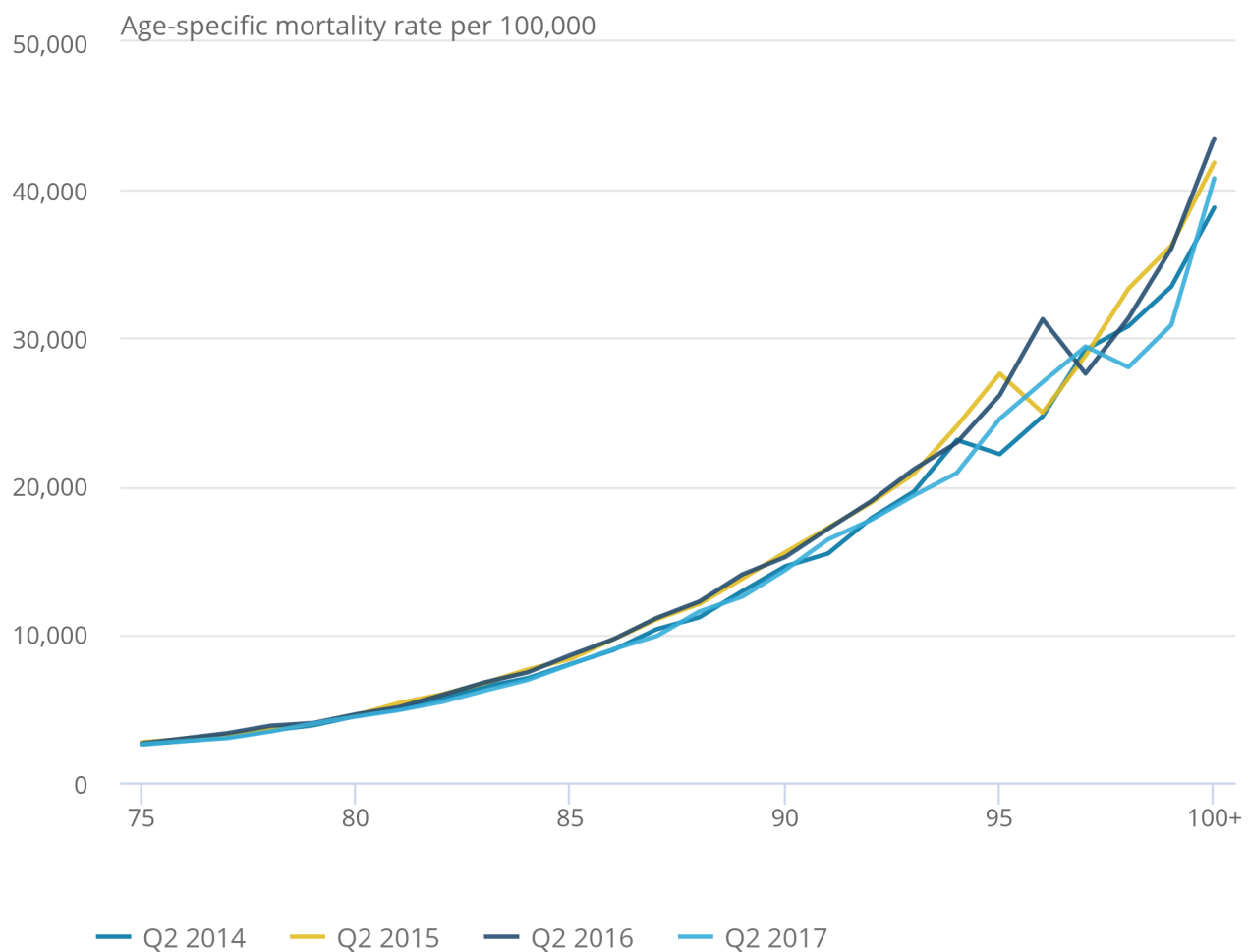
Differences in mortality rates were also observed when the 75 and over age groups were broken down into single year of age (Figure 2). Quarter 2 2017 was observed to have the lowest mortality rate for those aged 94, 98 and 99 compared with the previous three years.

Figure 2: Single year of age mortality rates, ages 75 and over

England, Quarter 2 (Apr to June) 2014 to Quarter 2 2017

Figure 2: Single year of age mortality rates, ages 75 and over

England, Quarter 2 (Apr to June) 2014 to Quarter 2 2017



Source: Office for National Statistics

Source: Office for National Statistics

Notes:

1. Data for 2017 are provisional.
2. Q2 refers to Quarter 2 (April to June).

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

5 . Count of death registrations for rolling four-quarter periods

Figure 3 plots the rolling four-quarter count of death registrations from the period Quarter 1 (Jan to Mar) 2001 to Quarter 4 (Oct to Dec) 2001 up to the period Quarter 3 (July to Sept) 2016 to Quarter 2 (Apr to June) 2017.

The death count over rolling four-quarter periods provides further analysis of the trend in death registrations across all quarters with the advantage of smoothing the data and reducing seasonality in mortality.

Population data has steadily increased from 49.5 million in the four quarters ending Quarter 4 2001 (Quarter 1 2001 to Quarter 4 2001) to a projection of 55.6 million in the four quarters ending Quarter 2 2017 (Quarter 3 2016 to Quarter 2 2017). With the population increasing, it would be expected that the number of deaths would also increase if there were no improvements to health and life expectancy; however, from the four-quarter period ending Quarter 4 2003, death registrations started to decline while the population at risk was growing. This decrease in deaths continued until the four quarters ending Quarter 4 2011 (Quarter 1 2011 to Quarter 4 2011). Since then the number of deaths in the following four-quarter rolling periods were higher than the period ending Quarter 4 2011.

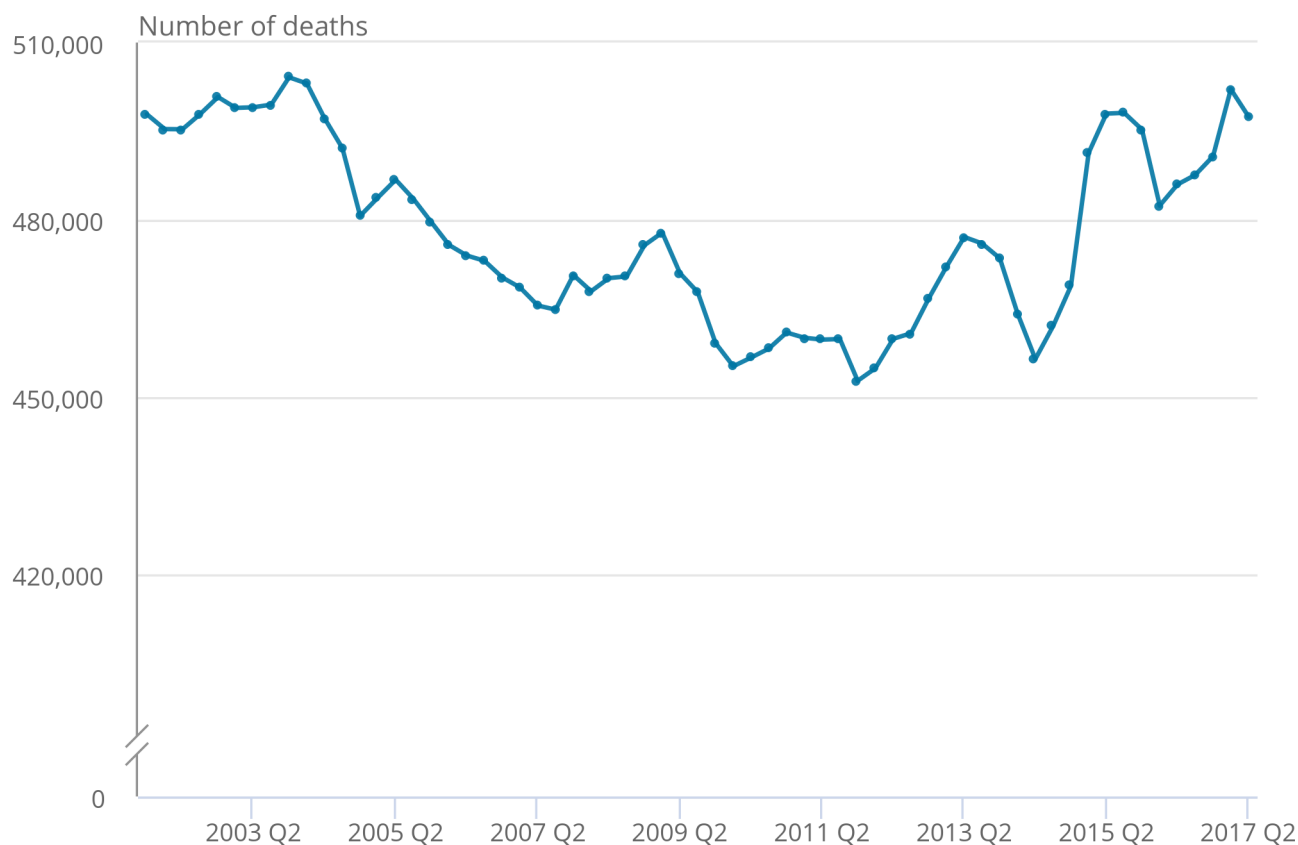
In the four quarters ending Quarter 2 2017 (Quarter 3 2016 to Quarter 2 2017), there were 497,492 deaths registered in England. This was a decrease from the quarters ending Quarter 1 2017 with 4,629 fewer death registrations. Death registrations in the four quarters ending Quarter 2 2017 were of a similar magnitude to the first data point in Figure 3, period ending Quarter 4 2001 (Quarter 1 2001 to Quarter 4 2001), which had 497,878 death registrations. However, as Figures 1a to 1d illustrate, although number of deaths are similar now to 2001, the age-standardised rates are considerably lower as the population has aged and has increased in size over this time.

Figure 3: Four-quarter period count of rolling quarterly death registrations

England, period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 2 (Apr to June) 2017

Figure 3: Four-quarter period count of rolling quarterly death registrations

England, period ending Quarter 4 (Oct to Dec) 2001 to period ending Quarter 2 (Apr to June) 2017



Source: Office for National Statistics

Source: Office for National Statistics

Notes:

1. Death registrations data for 2017 are provisional.
2. Q1 refers to four-quarter period ending Quarter 1, Q2 refers to four-quarter period ending Quarter 2, Q3 refers to four-quarter period ending Quarter 3 and Q4 refers to four-quarter period ending Quarter 4.

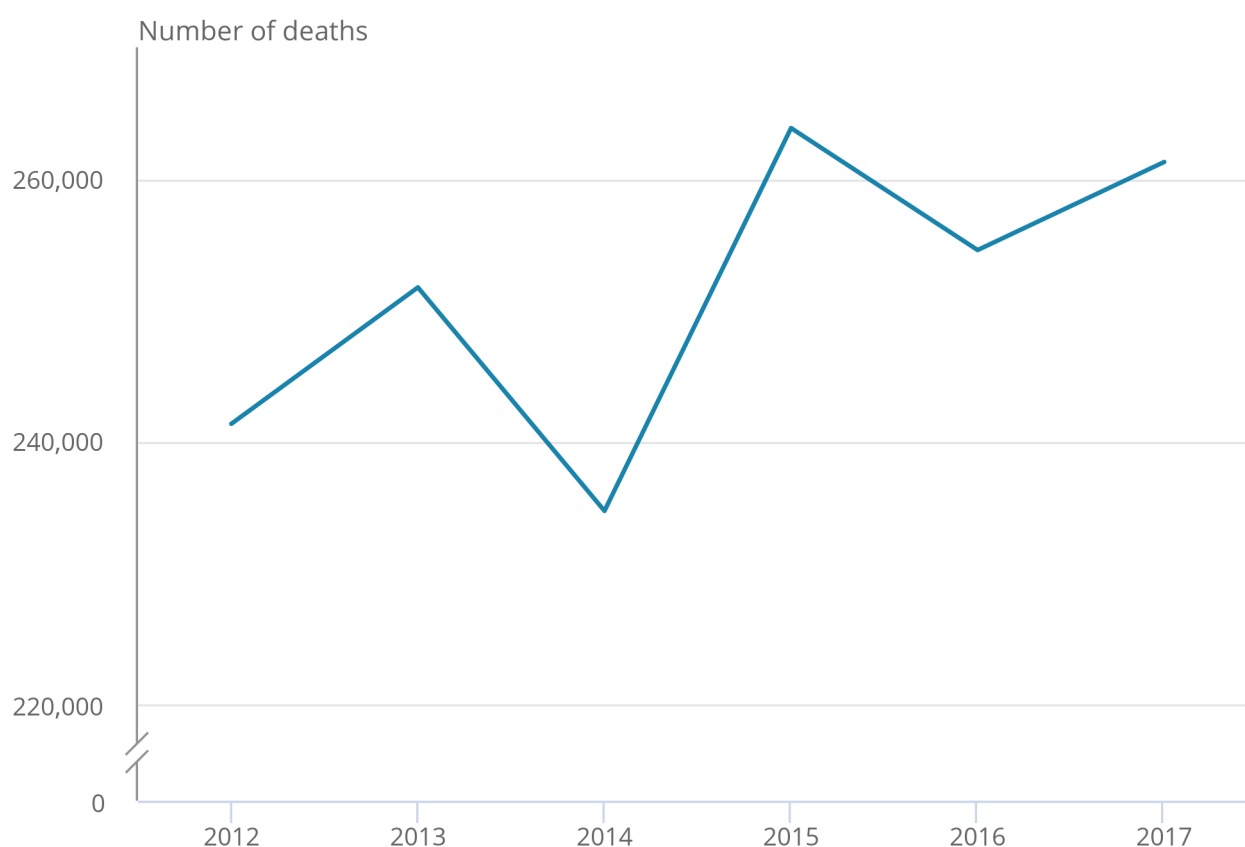
To assess whether the number of deaths registered in 2017 so far are higher than in recent years, Figure 4 shows the sum of the number of deaths that have been registered in both Quarters 1 and 2 (the period January to June) for the years 2012 to 2017. As shown in Figure 4, the number of deaths registered so far in 2017 was lower than in 2015 (a particularly high year) but higher than 2012, 2013, 2014 and 2016. However, these death counts do not account for changes in population size and structure. We will explore this in future quarterly reports using age-standardised rates.

Figure 4: Number of deaths registered in the period January to June, England, 2012 to 2017

England, 2012 to 2017

Figure 4: Number of deaths registered in the period January to June, England, 2012 to 2017

England, 2012 to 2017



Source: Office for National Statistics

Source: Office for National Statistics

Notes:

1. Data for 2016 and 2017 are provisional.

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

Data reported in this section are based on deaths that occurred within the period 1 April to 30 June 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 a similar extraction date of 28 July. This same 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 will increase over time as further deaths that occurred in the period are registered. The background information section of this report provides more information regarding this.

Table 2 shows the number of death occurrences with a similar extraction date of 28 July for each respective year of 2012 to 2017 and the five-year average. This is calculated as the number of deaths that occurred in Quarter 2 (Apr to June) and were registered on or before 28 July in each year.

From 1 April to 30 June 2017, there were 108,954 death occurrences in England, which was higher than 2012 and 2014 but lower than 2013, 2015 and 2016. This was the same ranking as 2017 death registrations. Compared with the average of the previous five years, 2017 had an additional 161 death occurrences.

Table 2: Number of deaths that occurred with a similar extraction date, England, Quarter 2 (April to June) 2012 to Quarter 2 2017 and Quarter 2 2012 to Quarter 2 2016 average

	Q2 2017 ^P	Q2 2016 ^P	Q2 2015	Q2 2014	Q2 2013	Q2 2012	Q2 2012 to Q2 2016 average
Number of deaths	108,954	110,974	110,315	104,795	109,679	108,204	108,793
Excess deaths in Q2 2017 compared with previous years	0	-2,020	-1,361	4,159	-725	750	161

Source: Office for National Statistics

Notes

1. Data are based on death occurrences
2. Data for 2016 and 2017 are provisional.
3. Q2 refers to Quarter 2 (April to June).

Daily death occurrences using a similar extraction date show that for April, the number of deaths in 2017 was below the five-year average (Figure 5). During May the number of deaths in 2017 was generally above the five-year average and often experienced peaks where it had the highest number of deaths compared with previous years.

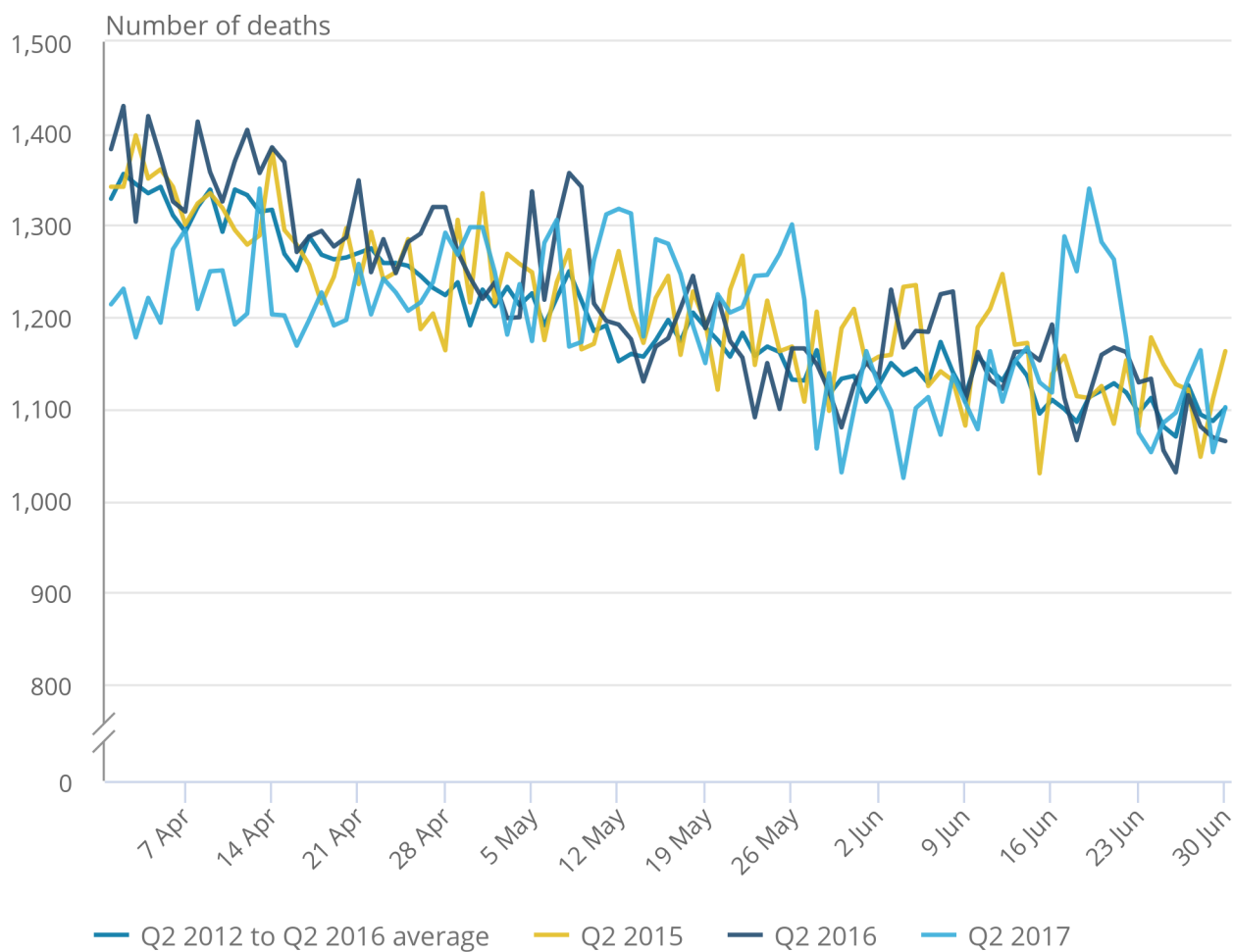
Towards the end of May and throughout June, the number of deaths in 2017 was generally lower than average with the exception of 22 to 27 May and 17 to 21 June, which had occurrences above the five-year average and previous years. These periods, where death counts were higher than the five-year average, coincided with periods of very warm weather where the daily temperatures were substantially higher than any other days in the quarter and also the five-year average temperature for these days ([Met Office Hadley Centre, 2017](#)).

Figure 5: Number of deaths occurring on each day in Quarter 2 (Apr to June)

England, 2015 to 2017 and 2012 to 2016 average

Figure 5: Number of deaths occurring on each day in Quarter 2 (Apr to June)

England, 2015 to 2017 and 2012 to 2016 average



Source: Office for National Statistics

Source: Office for National Statistics

Notes:

1. Based on death occurrences with a similar extraction date of 28 July for each respective year.
2. Deaths for 2016 and 2017 are provisional.

7 . Background information

Deaths data sources

A provisional extract of death registrations and death occurrences data for Quarter 2 (1 April to 30 June) 2017 was created on 28 July 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 28 July 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 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 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, the [2014-based ONS population projections](#) were used. Care should be taken when using the 2014-based population projections as they will not take into account the high number of deaths in 2015.

Single year of age populations for the oldest ages (90 to 100 and over) for 2002 to 2015 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 2016 and 2017 the [2014-based ONS 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 years' 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 morality rates. This is calculated using the following formula:

$$\begin{aligned} & \text{Quarter 2 (2017) population} \\ &= (\text{population 2016 } (i)) \\ &+ \left(\left(\text{population 2017 } (i) - \text{population 2016 } (i) * \left(\frac{m}{M} \right) \right) \right) * \left(\frac{N}{M} \right) \end{aligned}$$

Where m is the number of days from 1 July 2016 (the start of the mid-year for the population estimate) to the midpoint of the relevant quarter, inclusive, N is the number of days in Quarter 2 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](#).

8 . Quality and methodology

The [Mortality 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 when reporting mortality statistics.