Office for National Statistics

Article

Provisional analysis of death registrations: 2015

Analysis of the increase in provisional 2015 death registrations by age, gender and underlying cause.

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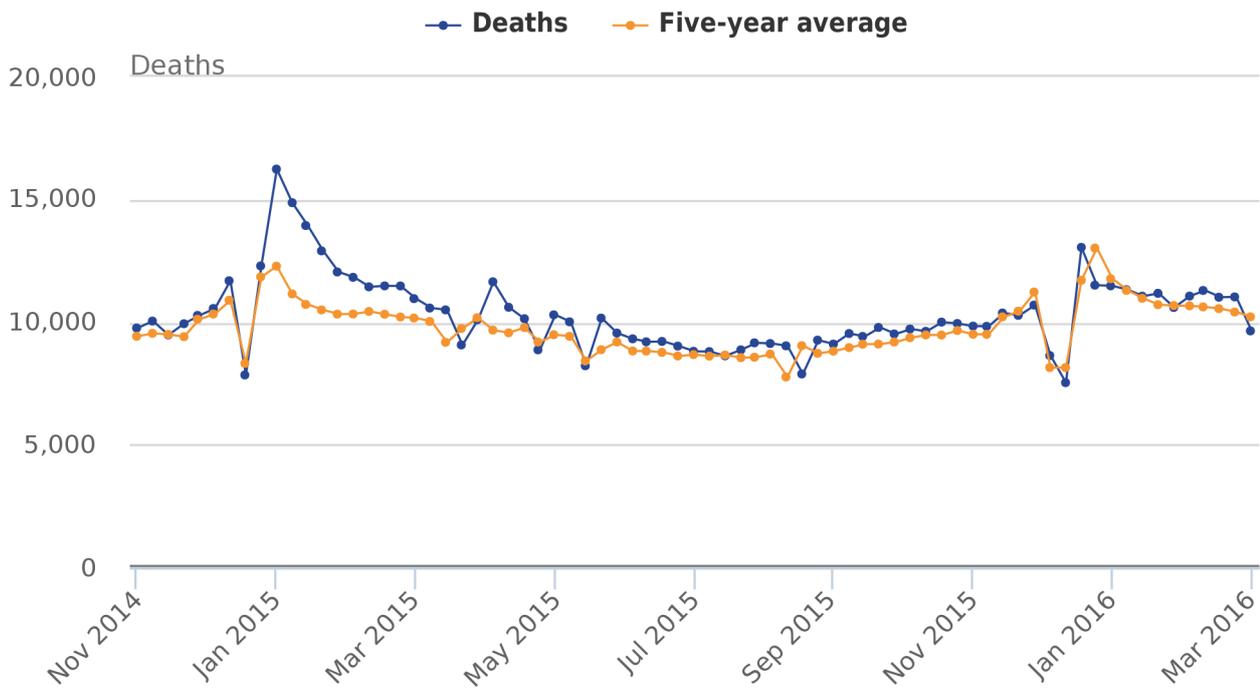# 1. Provisional analysis of the increase in death registrations in 2015

Provisional death registration figures for England and Wales in 2015 show an increase of 28,189 deaths (5.6%), from 501,424 deaths in 2014 to 529,613 deaths in 2015. The 2015 provisional figure is the highest since 2003 when there were 539,151 deaths. The increase in 2015 was the largest year-on-year percentage increase seen since the change from 1967 to 1968 (6.3%). This article provides further detail on deaths in 2015 using a provisional extract of 2015 death registrations and 2015 population projections. Final mortality data and mid-year population estimates for 2015 will be released in summer 2016.

Majority of extra deaths were registered early in the year

Comparing deaths across 2014 and 2015 shows that most of the increase in deaths took place in the first three months of 2015 and coincided with the peak in flu activity for the 2014/15 season, as can be seen from the annual Public Health England flu report and the latest ONS excess winter mortality bulletin. There were 24,065 more deaths registered in the first three months of 2015 compared with the same period in 2014, with 11,865 of these extra deaths registered in January alone, when flu was circulating at its highest levels.

This excess in deaths at the start of the year can also be seen in comparisons with the average of the previous five years. The number of deaths remained much higher than the 5-year average until June 2015, before dropping much closer to, but still higher than, the 5-year average throughout the rest of 2015.

Figure 1: Weekly death registrations and 5-year average, England and Wales, Nov 2014 to Mar 2016

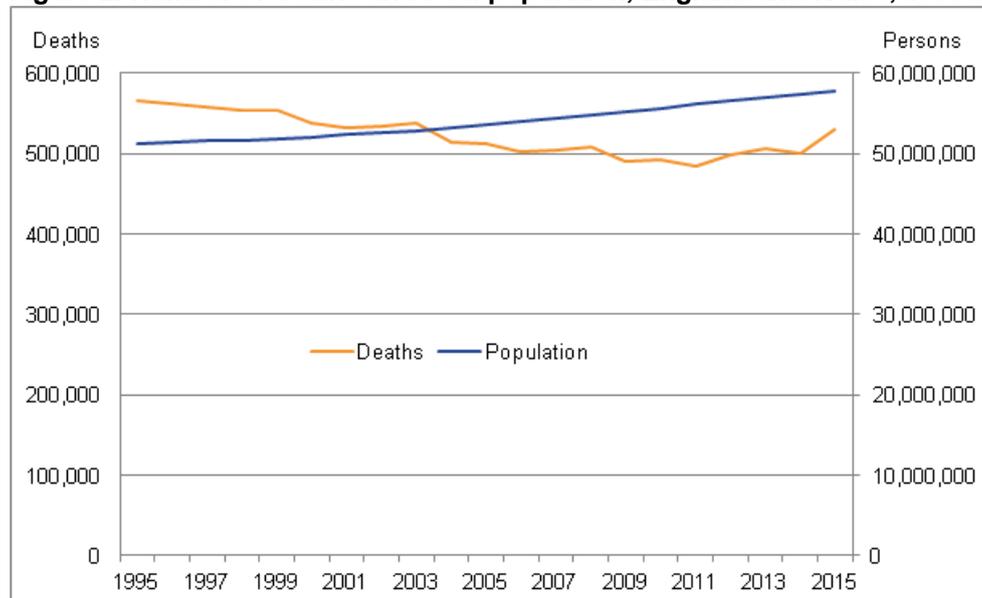**Source: Office for National Statistics**

Notes:

1. Figures are for deaths registered rather than deaths occurring in each calendar week

2. Five-year averages are based on the actual number of death registrations recorded for each corresponding week over the previous five years. Moveable public holidays, when register offices are closed, affect the number of registrations made in the published weeks and in the corresponding weeks in previous years

3. Figures exclude deaths of non-residents and so annual totals will not match those referred to in this article

4. Figures are taken from the "Weekly provisional figures on deaths registered in England and Wales" series

It should be noted that bank holidays cause a drop in death registrations (when register offices are closed) followed by a sharp increase. This can be seen most clearly in late December and early January during the Christmas and New Year period.

Significant increase in mortality rates in 2015

People are tending to live longer for a variety of reasons, including improved lifestyles and medical advances in the treatment of many illnesses and diseases. This has resulted in the population increasing in size over time, and the number of deaths generally decreasing. This trend has altered in recent years with deaths increasing between 2011 and 2015.

Figure 2: Number of deaths and total population, England and Wales, 1995 to 2015
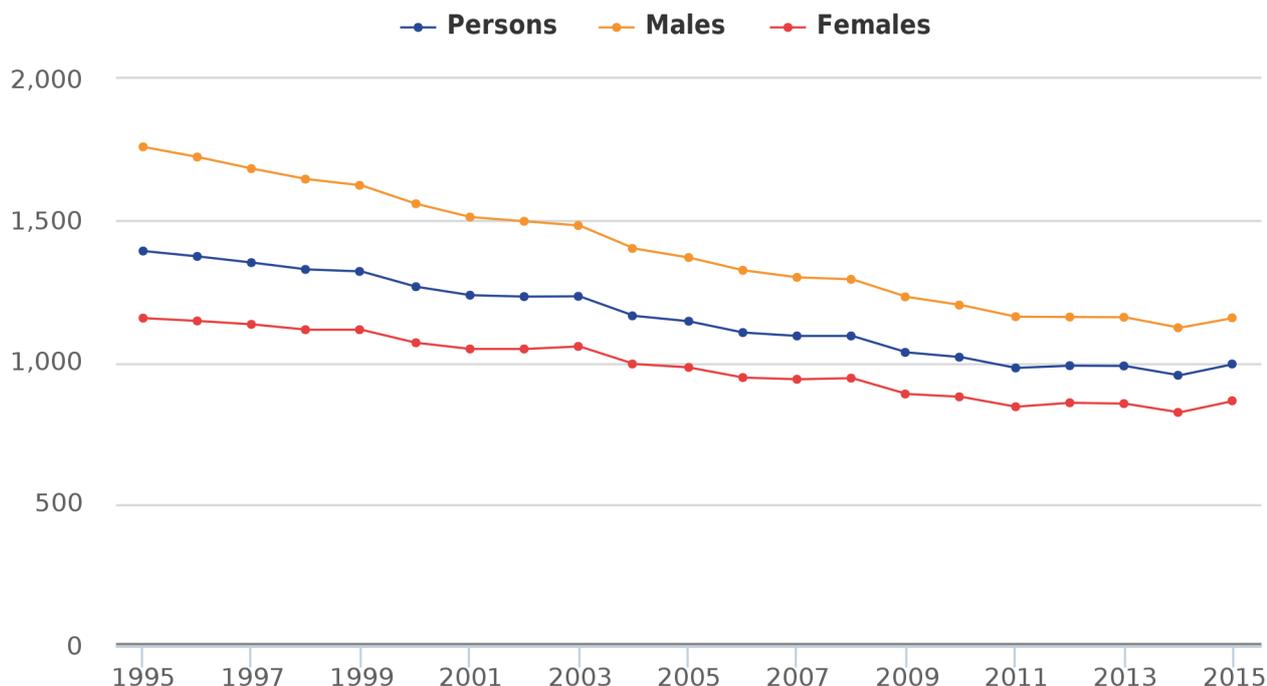

However, as the population ages, we might expect the number of deaths to increase, so to examine trends it is important to look at mortality rates as well as the number of deaths. Age-standardised mortality rates are a better measure of the level of mortality than simply looking at the number of deaths, as they take into account the population size, its age structure and the age distribution of deaths. There may be 2 years which have a similar total number of deaths, but have very different age-standardised mortality rates.

Comparing 2015 with 2003, when deaths were at a similar level, shows that the overall mortality rate was 20% lower in 2015. Although there has been some increase in the population, this indicates that the age distribution of the deaths in 2015 is also different from 2003 with a larger proportion of deaths in the very old age groups. For more information on the calculation of age-standardised mortality rates, see Background note 3.

Mortality rates have generally been decreasing over the last 20 years, but there was a significant increase between 2014 and 2015 for all persons and both sexes. In the data presented since 1995, this was the first increase in the male rate. The female rate increased in 2003, 2008 and 2012, but these increases were smaller than the rise in 2015. The mortality rate for all persons increased from 953 deaths per 100,000 population in 2014, to 993 deaths per 100,000 population in 2015.

Figure 3: Age-standardised mortality rate by sex, England and Wales, 1995 to 2015

Source: Office for National Statistics

Notes:

1. Death figures are based on deaths registered rather than deaths occurring in a calendar year

2. Deaths for 2015 are provisional and will be finalised with the release of the 'Death Registrations Summary Tables' in July 2016

3. Age-standardised mortality rates per 100,000 population, standardised to the 2013 European Standard Population. Age-standardised rates are used to allow comparison between populations which may contain different proportions of people of different ages

4. The lower and upper confidence limits have been provided. These form a confidence interval, which is a measure of the statistical precision of an estimate and shows the range of uncertainty around the estimated figure. Calculations based on small numbers of events are often subject to random fluctuations. As a general rule, if the confidence interval around one figure overlaps with the interval around another, we cannot say with certainty that there is more than a chance difference between the two figures

5. Populations used in the calculation of rates for 2015 are 2014-based population projections. These will be finalised with the release of the 2015 mid-year population estimates in June 2016

6. Figures include deaths of non-residents

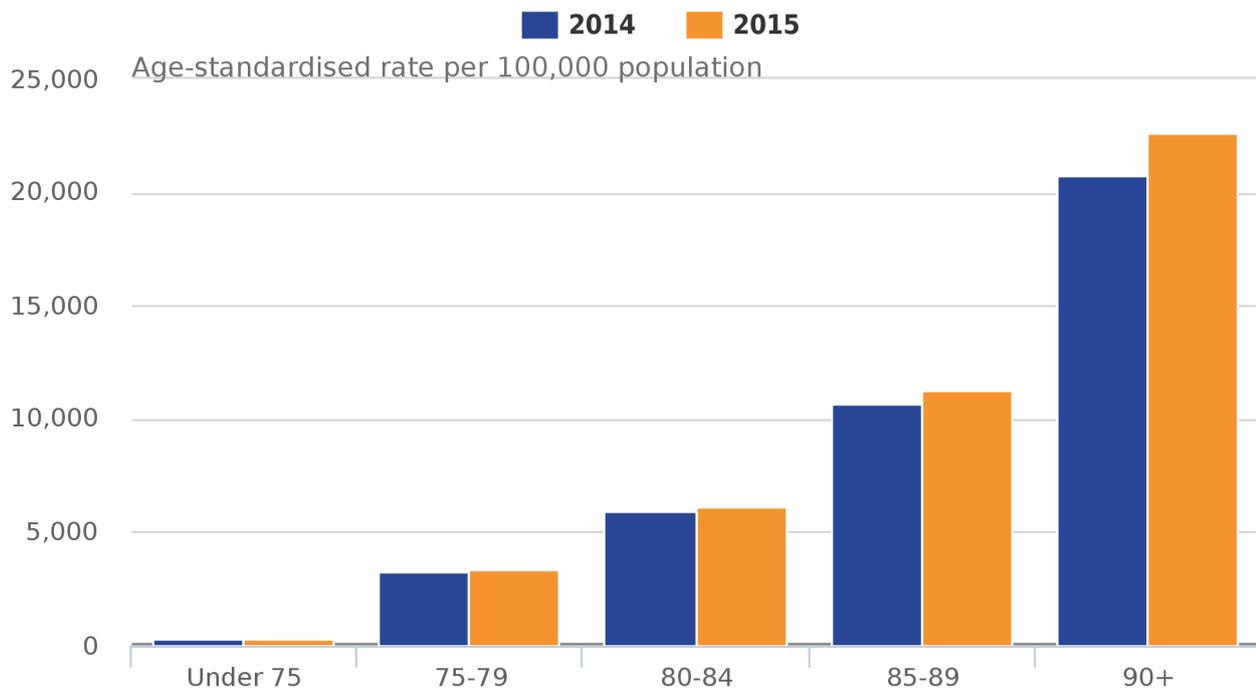## Larger increase in female death rates than males

Overall, the mortality rate increased by 4.2% between 2014 and 2015, but the increase was larger in females than in males. The female mortality rate increased by 5.0% and the male rate increased by 3.1%. Despite this, the male age-standardised mortality rate was still significantly higher than the female rate (1,156 and 863 deaths per 100,000 population respectively).

Most extra deaths were in people aged 75 and over

Generally around two-thirds of all deaths occur in people aged 75 and over. This was true of deaths in 2015 (69% of all 2015 deaths were in those aged 75 and over). However, this age group made up a greater proportion of the increase between 2014 and 2015. There were 24,201 extra deaths in the 75 and over age group – 86% of the total increase. Mortality rates were significantly higher in 2015 compared with 2014 for people aged 75 and over, but were similar to the 2014 mortality rates in people under 75.

There were almost 11,000 more deaths in people aged 90 and over in 2015 than in the previous year, and the age-specific rate in this age group was 9.3% higher than in 2014. These deaths make up 38% of the total increase in 2015.

Figure 4: Age-specific mortality rate, England and Wales, 2014 to 2015

Source: Office for National Statistics

Notes:

1. Age-specific rates for the under 1 age-group uses live births as a denominator

2. Figures are for deaths registered rather than deaths occurring in each calendar week

3. Deaths for 2015 are provisional and will be finalised with the release of the 'Death Registrations Summary Tables' in July 2016

4. Age-specific mortality rate per 100,000 population

5. The lower and upper confidence limits have been provided. These form a confidence interval, which is a measure of the statistical precision of an estimate and shows the range of uncertainty around the estimated figure. Calculations based on small numbers of events are often subject to random fluctuations. As a general rule, if the confidence interval around one figure overlaps with the interval around another, we cannot say with certainty that there is more than a chance difference between the two figures

6. Populations used in the calculation of rates for 2015 are 2014-based population projections. These will be finalised with the release of the 2015 mid-year population estimates in June 2016

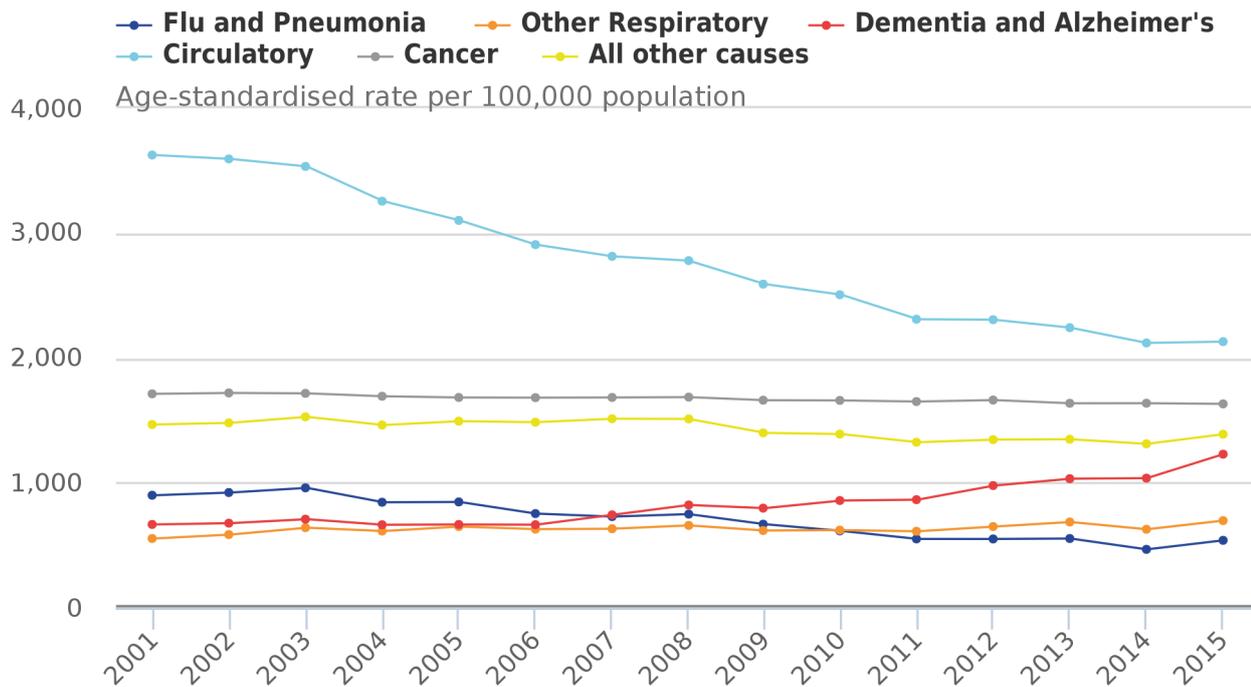7. Figures include deaths of non-residents

As mortality rates were similar between 2014 and 2015 for those aged under 75, the analysis by cause of death in this article will focus on deaths in people aged 75 and over.

Dementia/Alzheimer's and respiratory disease caused most of the increase in deaths

Most of the increase in deaths in people aged 75 and over in 2015 was made up of deaths with an underlying cause of dementia/Alzheimer's disease or respiratory diseases, which includes flu and pneumonia. Compared with 2014, there were 24,201 extra deaths of people in this age group registered in 2015. Of these, 41% had an underlying cause of dementia or Alzheimer's disease and 31% had an underlying cause of respiratory disease. The mortality rates associated with these causes increased significantly in 2015.

Respiratory disease deaths in those aged 75 and over were far higher than the 5-year average in the first few months of 2015 and fluctuated above and below the average throughout the rest of the year. However, these numbers will be an underestimate of those who had respiratory disease, at or around the time of death, as it is not always recorded as the underlying cause of death.

Figure 5: Age-standardised mortality rate by cause, persons aged 75 years and over, England and Wales, 2001 to 2015

Source: Office for National Statistics

Notes:

1. Data is for persons aged 75 years and older

2. Cause of death was defined using the International Classification of Diseases version 10 (ICD-10). Codes used to define cause of death can be found in Box 1 on the definitions tab

3. Changes to the coding of underlying cause of death can have an impact on the number of deaths recorded with a specific underlying cause. Two major coding changes occurred in 2011 and 2014. Comparability ratios have been applied to the number of deaths to account for this impact to allow for a more consistent time trend. These ratios can be found in Table 9 of the accompanying reference tables. For more information, see background note 5

4. Death figures are based on deaths registered rather than deaths occurring in a calendar year

5. Deaths for 2015 are provisional and will be finalised with the release of the 'Death Registrations Summary Tables' in July 2016

6. Age-standardised mortality rates per 100,000 population, standardised to the 2013 European Standard Population. Age-standardised rates are used to allow comparison between populations which may contain different proportions of people of different ages

7. The lower and upper confidence limits have been provided. These form a confidence interval, which is a measure of the statistical precision of an estimate and shows the range of uncertainty around the estimated figure. Calculations based on small numbers of events are often subject to random fluctuations. As a general rule, if the confidence interval around one figure overlaps with the interval around another, we cannot say with certainty that there is more than a chance difference between the two figures

8. Populations used in the calculation of rates for 2015 are 2014-based population projections. These will be finalised with the release of the 2015 mid-year population estimates in June 2016

9. Figures include deaths of non-residents

The predominant circulating flu virus in 2015 was influenza A(H3N2), a strain known to predominantly affect older people. There were numerous reported outbreaks in care homes, higher than expected numbers of admissions to hospital and intensive care for flu, and evidence that the flu vaccine was less effective than in previous years. The peak in influenza admissions to intensive care occurred in January, at the same time as the peak increase in deaths.
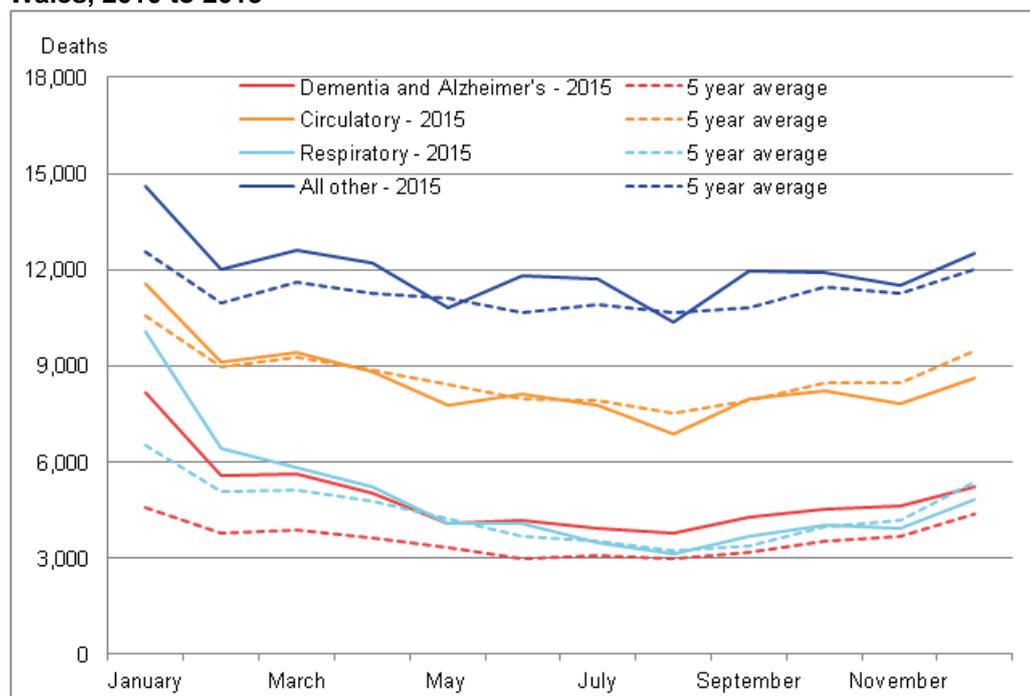
Deaths from dementia/Alzheimer's above average throughout the year

Dementia and Alzheimer's disease deaths were well above the 5-year average throughout the year, particularly so between January and March 2015, and have shown a general upward trend over the last decade. The reasons for this may be partly related to attempts across the health system to improve the diagnosis of people with dementia. For example, in 2013/14 incentives were put in place to encourage the identification and diagnosis of dementia among older people who had had an episode of emergency or unplanned hospital care. More recently, in February 2015, the Prime Minister issued a challenge on dementia and the Government's mandate to NHS England now includes an agreed ambition that two-thirds of the estimated number of people with dementia in England should have a diagnosis.

This excess at the start of the year is in keeping with the findings of the excess winter mortality bulletin, which found that excess winter deaths from dementia reached a record high in winter 2014/15. The reasons for the seasonal pattern in deaths from dementia and Alzheimer's disease are not clear. However, it may be related to the greater vulnerability of people with these conditions to respiratory diseases, difficulties with self-care, and falls, all of which may be more important in winter months. Generally, over a third of all deaths with an underlying cause of dementia or Alzheimer's disease also have a respiratory disease mentioned on the death certificate. This was true of deaths in 2015.

Deaths from circulatory diseases were also above average in the first few months of the year, but dropped below the 5-year average for most of the rest of the year. Deaths from all other causes were higher than the 5-year average for most of the year. This will require further investigation when the final mortality data is released in Summer 2016.

Figure 6: Number of deaths by month of registration, persons aged 75 years and over, England and Wales, 2010 to 2015

PHE and ONS continue to monitor changes in weekly deaths and flu in their weekly reports.

The number of deaths increased in most local authorities

Compared with the 5-year average for 2010 to 2014, in 2015 the number of deaths increased in all English regions and in Wales. Increases ranged from 4.9% in Yorkshire and the Humber and the North West, to 8.7% in the East Midlands.

Of the 348 local and unitary authorities in England and Wales, 19 had a fall in the total number of deaths between 2010 to 2014 and 2015, while the remaining 329 had an increase. Between 2010 to 2014 and 2015, the number of deaths at age 75 and over also increased in all English regions and in Wales. Among the English regions, increases ranged from 6.8% in Yorkshire and the Humber to 10.8% in the East Midlands, while the increase in Wales was 6.4%.

Of the 348 local and unitary authorities in England and Wales, 14 had a fall in the number of deaths at age 75 and over between 2010 to 14 and 2015, while the remaining 334 had an increase.

Between 2014 and 2015, there was a fall in life expectancy at birth and at older ages, for both sexes

Period life expectancies are a useful summary measure of mortality rates as they are age-standardised, and therefore take into account differences in the age structure of populations, allowing valid comparisons to be made over time and between different geographical areas. For more information on the life expectancy calculations used in this article, see Background note 6.

The increase in mortality rates in 2015 is reflected in the provisional period life expectancy at birth estimates for England and Wales, which fell by 0.2 years for males and 0.3 years for females between 2014 and 2015 to 79.3 years and 82.9 years respectively.

In England, life expectancy at birth fell by 0.2 years for both sexes between 2014 and 2015. For males, this was the first fall since 1993. Female life expectancy at birth last fell in 2012. For males in England, between 2014 and 2015 life expectancy at ages 65, 75, 85 and 95 fell by 0.2 years. This was the first year-on-year fall for male life expectancy at age 65 and 75 since 1995. Life expectancy at ages 85 and 95 last fell between 2011 and 2012.

For females in England, between 2014 and 2015 life expectancy fell by 0.4 years at age 65 and by 0.3 years at ages 75, 85 and 95. Life expectancy at all these ages also fell between 2011 and 2012.

These figures are not the final life expectancy estimates for 2015 as they are based on a provisional extract of deaths and population figures for 2015 taken from the ONS principal population projections. Official ONS life expectancy figures are produced using 3 years worth of aggregated data.

Acknowledgements

2. Background notes

1. **Sources of data**

   ONS holds mortality and populations data for England and Wales. Mortality data for 2015 is provisional and will be finalised with the release of the 'Deaths Registrations Summary Tables' in July 2016. Populations for 2015 are 2014-based population projections. These will be finalised with the release of the 2015 mid-

year population estimates in June 2016. All other populations are mid-year population estimates available from our website.

2. **Mortality metadata**

   Information about the underlying mortality data, including details on how the data is collected and coded are available in the [mortality metadata](#).

3. **Calculation of age-standardised rates**

   This bulletin presents age-standardised (also known as "directly-standardised") rates, standardised to the 2013 European Standard Population (ESP). These are presented as deaths per 100,000 population. Age-standardised rates make allowances for differences in the size and age structure of the population, over time, between sexes and across different geographical areas. The age-standardised rate for a particular cause of death is that which would have occurred if the observed age-specific rates for that cause had applied in the given standard population. A template demonstrating how to calculate age-standardised rates using both the [1976 ESP](#) and the [2013 ESP](#) can be found on our website.

4. **Confidence intervals**

   Within this bulletin, a difference which is described as "significant" has been assessed using 95% confidence intervals. Confidence intervals are a measure of the statistical precision of an estimate and show the range of uncertainty around the estimated figure. Calculations based on small numbers of events are often subject to random fluctuations. As a general rule, if the confidence interval around 1 figure overlaps with the interval around another, we cannot say with certainty that there is more than a chance difference between the 2 figures.

5. **Impact of coding changes**

   We code cause of death using the World Health Organization's (WHO) [International Classification of Diseases](#), Tenth Revision (ICD-10). Where possible, deaths are automatically coded using specialist software, with the remaining deaths being manually coded. ICD-10 was introduced in England and Wales in January 2001. Since then various amendments to the ICD-10 have been authorised by WHO and we have updated cause coding software to incorporate these changes. Between 2001 and 2010, we used software version 2001.2; between 2011 and 2013, version 2010 was used and on 1 January 2014, we changed the software to a package called IRIS (version 2013). IRIS software version 2013 incorporates all official updates to ICD-10 approved by WHO, which were timetabled for implementation before 2014.

   To understand the impact of these changes on mortality statistics, we carried out bridge coding studies in which samples of deaths that had previously been coded using the old software were then independently recoded using the new version of ICD-10 (ONS, [2011](#) and [2014a](#)). This dual-coded data can be used to produce comparability ratios that can be applied to data to account for the changes to allow more consistent times series to be produced. ONS do not ordinarily publish data that have had comparability ratios applied, but for the purposes of this article, comparability ratios for deaths in people aged 75 and over have been calculated and applied. The full set of ratios and their confidence intervals can be found in the accompanying reference tables.

6. **Life expectancy calculations**

   Age-specific mortality rates for 2015 have been used to produce provisional estimates of period life expectancy. Period expectation of life at a given age in a given time period is an estimate of the average number of years a person of that age would live if he or she experienced the age-specific mortality rates for that time period throughout the rest of his or her life. In other words, life expectancy for 2015 measures how long people will live if mortality rates stay at the 2015 level.

   The provisional estimates for 2015 are based solely on the mortality rates experienced in 2015. The estimates make no allowance for any projected changes in mortality. In practice, death rates are likely to change in the future, so period life expectancy does not therefore give the number of years someone could actually expect to live.

   Official life expectancy figures for 2013-2015 will be calculated by ONS using the final annual release deaths and mid-year population estimates for 2013 to 2015. These official figures will be available with the release of the annual "Life Expectancy at Birth and at Age 65 by Local Areas in England and Wales" statistical bulletin in late 2016.

7. **Special extracts**

Special extracts and tabulations of mortality data for England and Wales are available to order (subject to legal frameworks, disclosure control, resources and agreement of costs, where appropriate). Such requests or enquiries should be made to:

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Email: mortality@ons.gsi.gov.uk

The charging policy can be found on our website.

8. **Life Events user feedback**

As a user of our statistics, we would welcome your feedback on this publication. Please get in touch either via email at mortality@ons.gsi.gov.uk or telephone on +44 (0)1633 455867.

9. **Revisions**

The revisions policy is available on our website.