

Estimates of the Very Old (including Centenarians), 2002-2011, England and Wales



Coverage: **England and Wales**

Date: **21 March 2013**

Geographical Area: **Country**

Theme: **Population**

Key Points

- In 2011 there were estimated to be 440,290 people aged 90 and over living in England and Wales, just under 1% of the total population.
- Between 2002 and 2011, there was a 26% increase in the number of people aged 90 and over.
- In 2011 in England and Wales, the number of centenarians (those aged 100 and over) was estimated to be 11,700.
- In 2011 in England and Wales there were estimated to be 2.7 women per man aged 90 and over and 6.0 women per man aged 100 and over.

Introduction

2002–2011 [Estimates of the Very Old \(including Centenarians\) for England and Wales](#) are published today. These estimates provide annual mid year estimates by sex and single year of age for persons aged 90 to 104 and for the 105 and over age-group for England and Wales as a whole.

2011 estimates are published for the first time today, while estimates for 2002 to 2010 are revised.

The timetabling of this release is later than usual in order to take account of the impact of rebasing of population estimates from 2002-2010 in line with the results of the 2011 Census.

This release does not include estimates for the United Kingdom, as corresponding figures are not available for Scotland and Northern Ireland at this time. Estimates for the UK will be produced by Winter 2013 / Spring 2014.

ONS publishes [Mid Year Estimates \(MYE\) of the population for England and Wales and for the UK](#) by single year of age up to age 89 and for the 90 and over age group. To provide users with a consistent set of age estimates by single year of age up to age 105 and over the Estimates of the Very Old (including Centenarians) series is constrained to the 90 and over totals in the MYE.

Estimates of the Very Old for England and Wales and for the UK were formerly named Estimates of the Very Elderly. The name has been changed to reflect concerns that the term 'elderly' has negative connotations.

Background

Interest in population estimates at the oldest ages by single year of age has increased as life expectancy has risen and the number of those aged 90 and over has grown.

Until 2006 the Government Actuary's Department calculated population estimates for single years of age beyond 90 for each of the UK countries. Although these estimates were made available for research purposes, they were not officially published. Since 2006 these estimates have been produced by the Office for National Statistics (ONS).

In 2007, in recognition of increased user demand for population estimates at the oldest ages by single year of age, ONS began to publish estimates of the 90 and over age group by single year of age for persons aged 90 to 104 and for the 105 and over age-group for England and Wales as experimental statistics. Since 2010 ONS has also published these estimates at UK level.

In 2011 the estimates were assessed by the UK Statistics Authority and have since been published as National Statistics.

Uses and Users of Estimates of the Very Old (including Centenarians)

Within ONS, Estimates of the Very Old are primarily used in the production of [national interim life tables](#) and [National Population Projections](#). Other uses include:

- answering parliamentary questions,
- responding to media interest, and
- responding to customer queries.

External uses include:

- formulating or assessing future policy on pensions and health care (including work by the Department for Work and Pensions, the Department of Health, and HM Treasury), and
- research by demographers, actuaries, medical researchers and others interested in population estimates at the highest ages.

Methodology

Estimates of the Very Old are produced using the Kannisto-Thatcher (KT) method.

The KT method produces estimates of population at older ages using age at death data taken from death registrations. These data are used to build up distribution profiles of the numbers of older people in England and Wales. For example, if someone dies in 2006 aged 105, then this means that they were alive and aged 104 in 2005, 103 in 2004 and so on. By collating 'age at death' data for a series of years, it becomes possible to make an estimate of the number of people of a given age alive in any particular year and so create age distribution profiles, assuming that migration at these oldest ages is minimal.

To make estimates for the latest year, it is not possible to use death data, as we are interested in the population who are currently or very recently alive. So for each cohort the KT method uses an average of the last 5 years of 'age at death' information to produce an estimate of the number of survivors for the current year.

Each year as more recent deaths data become available to inform the age distribution profiles, estimates for the back years are recalculated and become more accurate. For this reason Estimates of the Very Old (including Centenarians) are always published as 'provisional'.

The estimates for the current year and the recalculated back years are constrained to sum to the 90 and over totals in the MYE for males and females separately for the current year and previous years.

The 2002–2011 Estimates of the Very Old (including Centenarians) published in this release take account of the revisions made to the 2002–2010 MYE as a result of the 2011 Census.

Older People in England and Wales

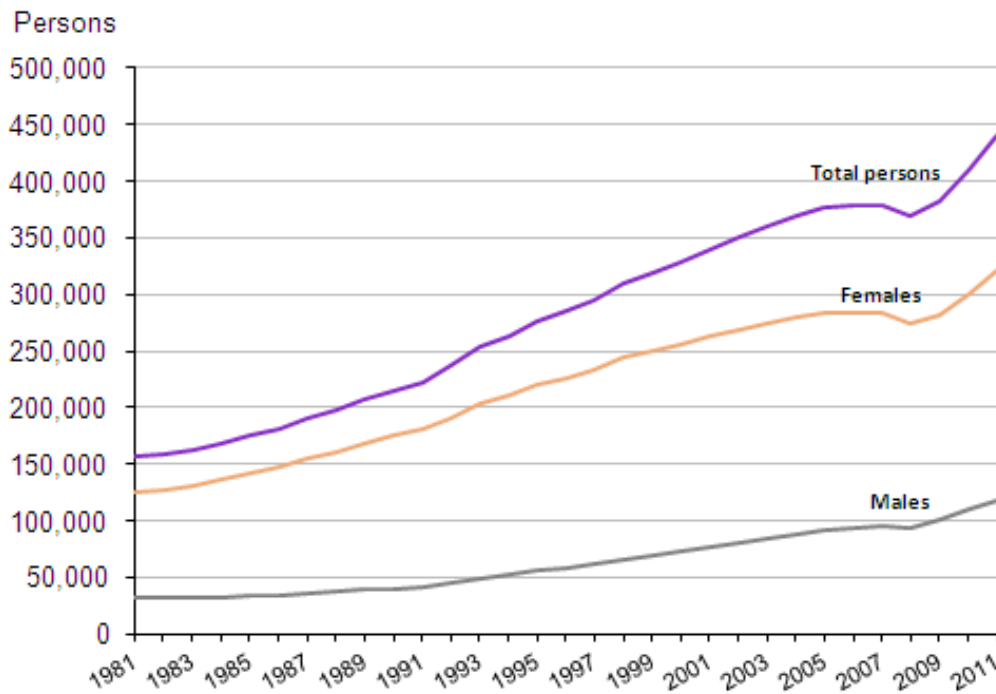
[Life expectancy](#) continues to increase for both males and females in England and Wales with improvements in the recent decades mainly due to improvements in mortality at older ages. This has resulted in increasing numbers of people aged 90 and over in the population.

Growth in the numbers of the 'oldest old' is of policy interest because of implications for pensions, health and social care.

In 2011 there were estimated to be 440,290 people aged 90 and over living in England and Wales, 0.8% of the total population. (Figure 1)

Although they still account for only a very small proportion of the population, over the last thirty years the number of those aged 90 and over has almost tripled. Between 2002 and 2011 alone, there was a 26% increase.

The dip in the 90 and over population in 2008 reflects low birth numbers 90 years previously. For more details see 'The 90 and over population by single year of age' section.

Figure 1: Population aged 90 and over, 1981-2011, England and Wales

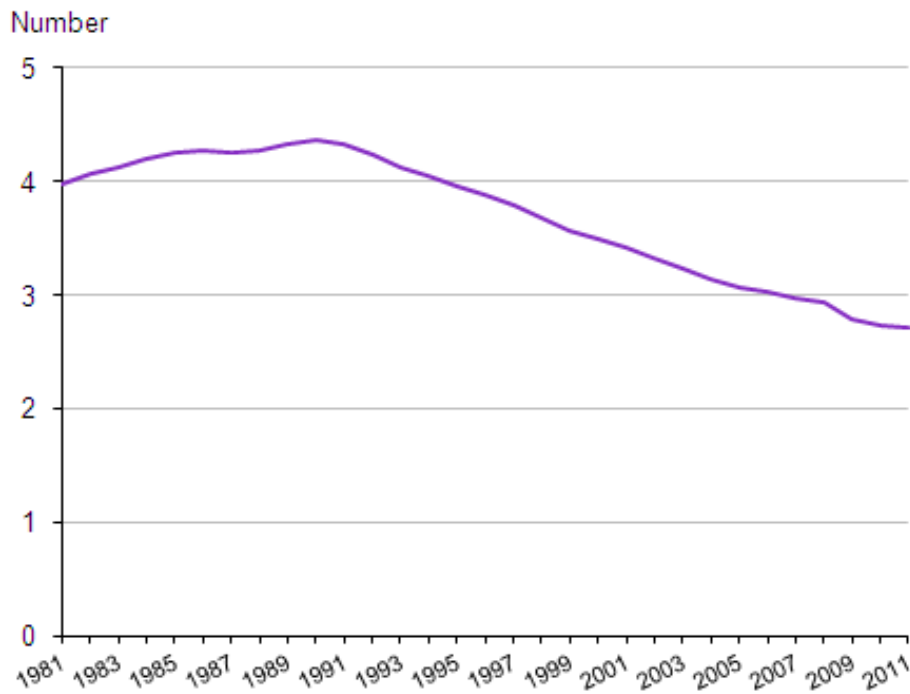
Source: Office for National Statistics

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There are more women aged 90 and over than men. This is because females have longer life expectancy than males. However over the last 30 years the percentage increase in the number of men of this age has been greater than for women, narrowing the gap between the sexes. This is mainly due to relatively greater improvements in male mortality compared to female mortality at older ages in recent decades. Figure 2 shows that in 1981 there were 4.0 women per man aged 90 and over. By 2002 this had reduced to 3.3 and by 2011 the ratio was 2.7 women per man aged 90 and over.

Figure 2: Women aged 90 and over per man aged 90 and over, 1981-2011, England and Wales

Source: Office for National Statistics

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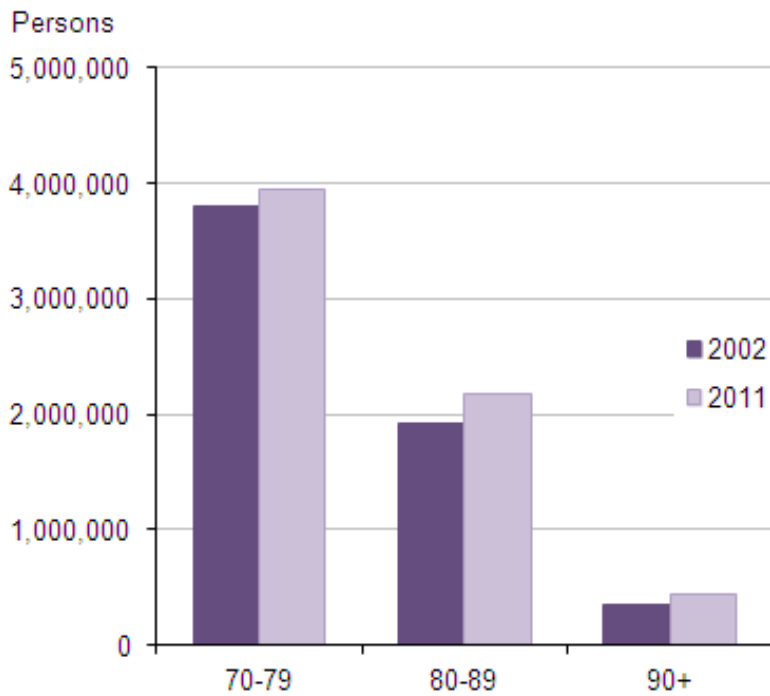
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Not only has the number of those aged 90 and over increased, the size of the 90 and over age group as a proportion of the older population itself has also increased from 2002 to 2011. In 2002, 6% of the population aged 70 and over in England and Wales was aged 90 and over; by 2011 this had increased to 7%.

This progressive ageing of the older population is evident in the relative percentage increases in different age groups over the period. Between 2002 and 2011 in England and Wales, there was a 4% increase in those aged 70-79; a 13% increase in those aged 80-89 and a 26% increase in those aged 90 and over. (Figure 3)

Figure 3: Population in older age groups, 2002 and 2011, England and Wales



Source: Office for National Statistics

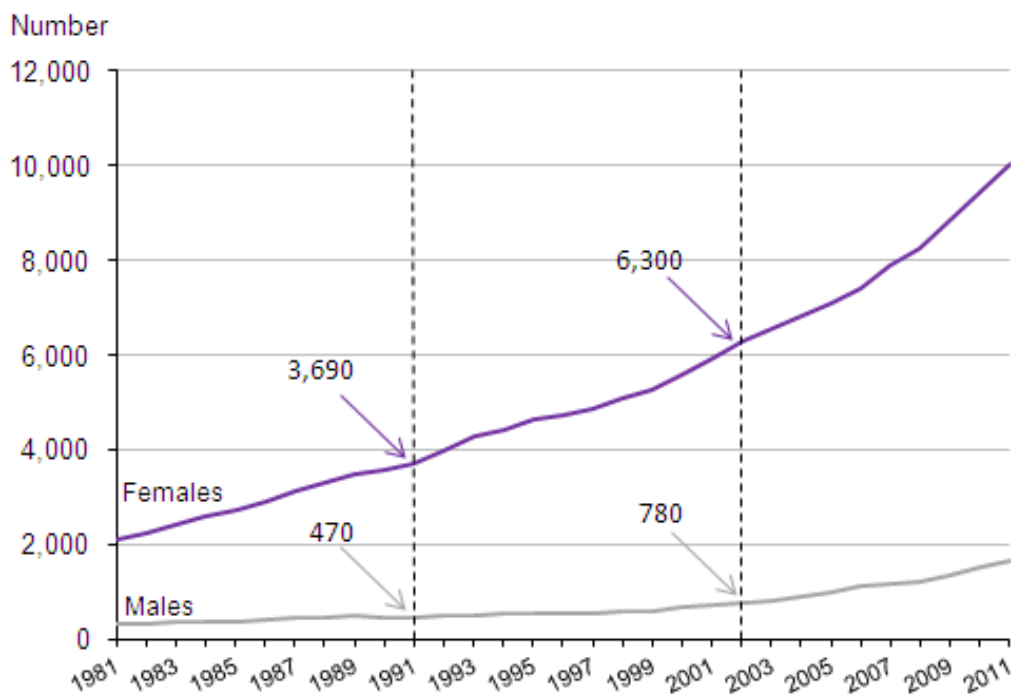
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Centenarians

In 2011 in England and Wales, the number of centenarians (those aged 100 and over) was estimated to be 11,700. (Figure 4) Of these, 570 were estimated to be aged 105 or more.

Over the last 30 years, there has been a five fold increase in the number of centenarians in England and Wales.

Figure 4: Centenarians by sex, 1981-2011, England and Wales

Source: Office for National Statistics

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In 1981 there were estimated to be only 2,420 persons aged 100 and over, of which 310 were men and 2,110 were women. By 1991 numbers had risen to an estimated 470 male centenarians and 3,690 female centenarians.

Since 2002 the estimated number of male centenarians in England and Wales has more than doubled, from 780 in 2002 to 1,660 in 2011, while the estimated number of female centenarians has increased by 59%, from 6,300 in 2002 to 10,040 in 2011.

Female centenarians continue to outnumber males due to women's higher life expectancy; however the ratio of male to female centenarians is changing.

In 2002 there were eight women aged 100 and over for every man aged 100 and over. By 2005 this had reduced to seven and by 2011 there were estimated to be six female centenarians for every male centenarian in England and Wales.

These recent falls in the ratios of women to men at older ages are mainly due to relatively greater improvements in male mortality than female mortality at older ages in recent years.

The 90 and over population by single year of age

The number of people aged 90 and over by single year of age in the population of England and Wales in 2002-2011 is largely determined by past and current mortality rates but also reflects the number of births 90 years ago and earlier. Past migration patterns and major events like war will also affect numbers.

Figure 5 shows the percentages of single year ages (up to age 99 and grouped for age 100 and over) that make up the total 90 and over population over the period 2002-2011. As would be expected, proportions decrease with age, in other words in every year there are higher proportions of 90 year olds than 91 year olds, 91 year olds than 92 years olds and so on.

A distinct birth cohort pattern is also apparent. (A birth cohort is all people born in the same year). This is an echo of birth patterns in the years leading up to, during and just after the First World War.

Looking at Figure 5 there is a steady decline in the proportion of 90 year olds over the period, 2004 to 2008. These people would have been born during the First World War years, 1914 to 1918¹ so this reflects the steady decline in births in England and Wales during the war. Following these cohorts over time as they age, we can see a decline in the proportion of 91 year olds in the period 2005 to 2009; 92 year olds in the period 2006 to 2010 and 93 year olds in the period 2007 to 2011.

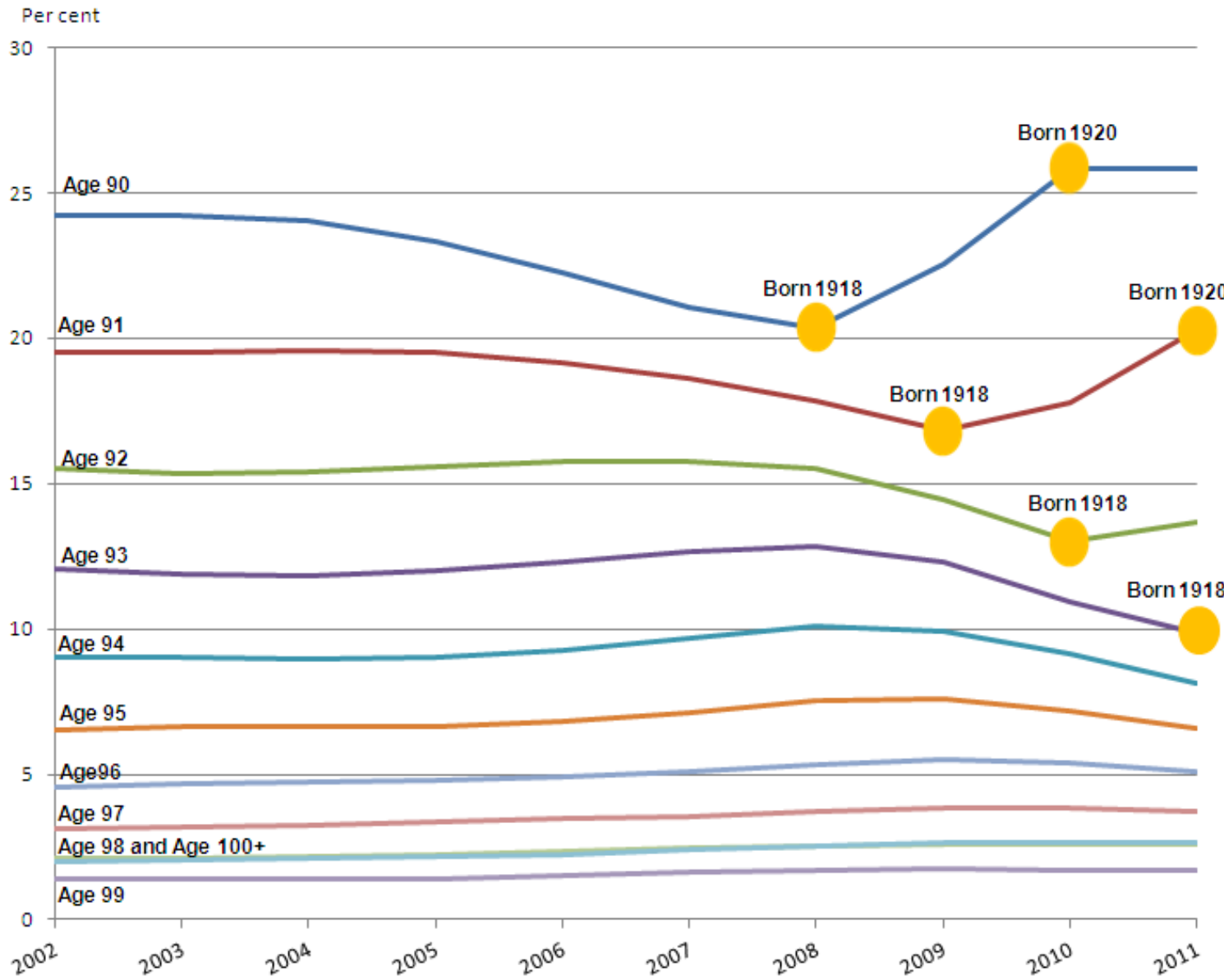
The lowest number of births recorded around the First World War was in 1918². Those born at this time appear in the 2008 estimate of 90 year olds. Figure 5 shows the proportion of 90 year olds is lowest in 2008 reflecting this cohort's low birth numbers. Following this cohort over time we can see that the lowest proportion of 91 year olds is in 2009, the lowest proportion of 92 year olds is in 2010 and the lowest proportion of 93 year olds is in 2011.

The low point in births in 1918 was followed by a large increase in births post war. In total in 1920 in England and Wales there were 957,782 births compared with 662,661 in 1918 and 692,438 in 1919 – a huge difference.

Figure 5 shows the largest proportion of 90 year olds in 2010, those born in the high birth year 1920. Again following this cohort over time we can see that the highest proportion of 91 year olds is in 2011.

The pattern of changes in the proportions of single year ages over the period 2002-2011 for males and females aged 90 and over separately follow the same pattern over time as for all persons. However the proportions of females in the oldest ages are higher than for males, reflecting their higher life expectancy.

Figure 5: Population by single year of age as a percentage of total persons aged 90 and over, England and Wales, 2002-2011



Source: Office for National Statistics

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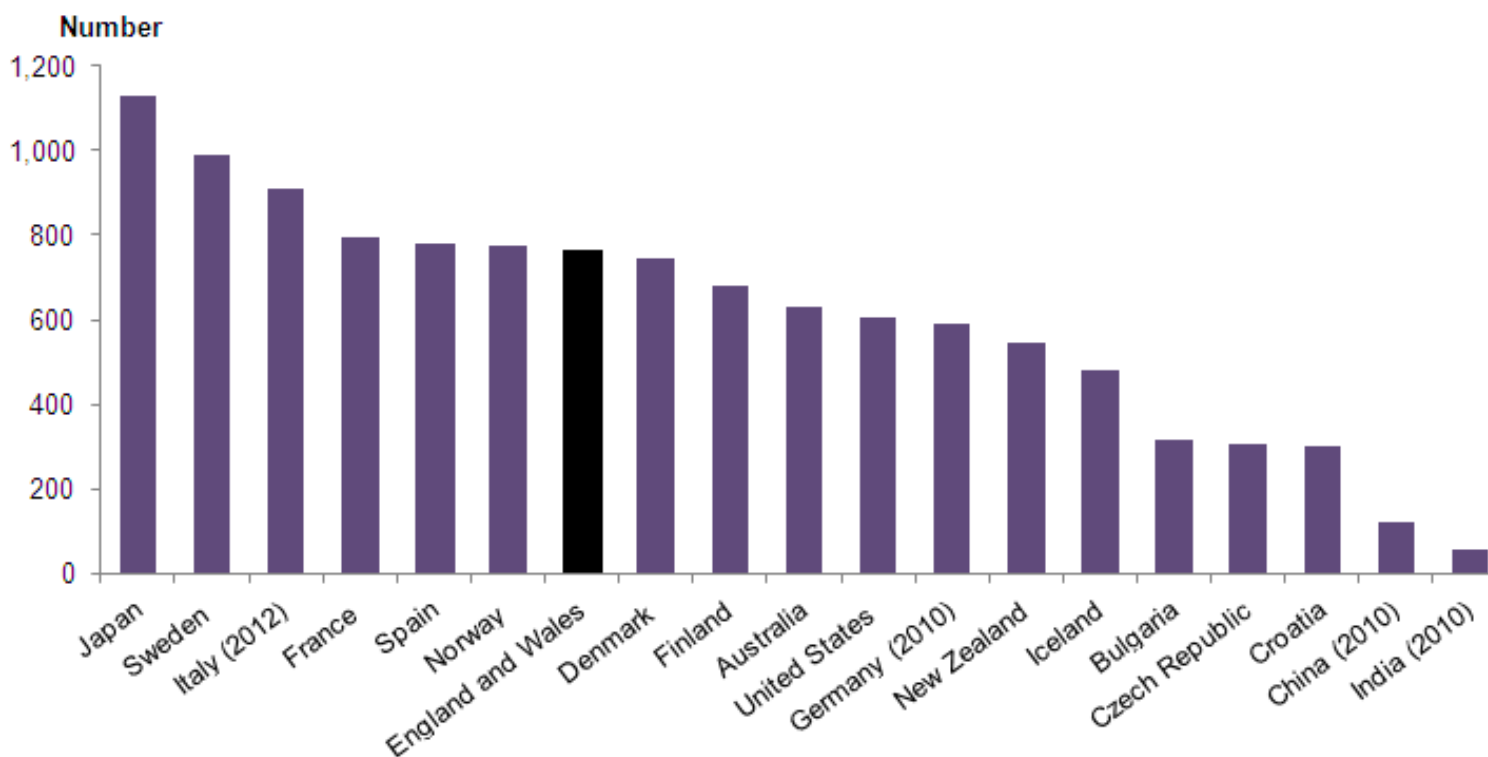
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Notes for The 90 and over population by single year of age

1. The years of birth are approximate. For instance a person aged 90 in 2011 could have been born in 1920 or 1921; for simplicity however such persons are regarded as belonging to the 1920 birth cohort.
2. Population estimates are mid year; total births are for calendar years.

International Comparisons

Figure 6: International comparison of the number of persons age 90 and over per 100,000 of the population, 2011.



Notes:

1. Countries have been selected based on the availability of data for 2011.
2. Source: Statistics Denmark, Australian Bureau of Statistics, The National Institute of Statistics Italy, Statistics Sweden, National Statistical Institute of Bulgaria, Czech Statistical Office, Statistics Finland, Croatian Bureau of Statistics, Statistics Iceland, Statistics Bureau of Japan, Statistics New Zealand, National Statistics Institute of Spain, US Census Bureau, National Institute of Statistics and Economic Studies - France, ONS and the United Nations.

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The number of older people in a country's population is largely a result of past fertility patterns coupled with life expectancy for that country, while recent fertility patterns influence the relative

proportions of younger and older people. Past major events such as war will also affect numbers and proportions.

Median age (the age at which half the population is younger and half is older) is an indicator of the age profile of a country. Developing countries have much younger profiles, as indicated by their median ages, than developed countries.

Even in the most aged countries, the population aged 90 and over represents a very small proportion of the overall population. In 2010, at 44.7 years, Japan had the highest median age of all countries in the world; however only 1.1% of the population was aged 90 and over in 2011.

Given these very small proportions, comparing the number of those aged 90 and over per 100,000 in the population more readily enables international comparison (Figure 6).

In 2011 in England and Wales there were 765 persons aged 90 and over per 100,000 of the population.

Japan had by far the highest number of persons aged 90 and over per 100,000 population in 2011 at 1,131. With the exception of Japan, countries in Western Europe tend to have the highest numbers of persons aged 90 and over per 100,000 population compared to other regions of the world. Among Western European countries, Sweden and Italy had above average numbers aged 90 and over per 100,000 population. In Sweden there were 988 persons aged 90 and over per 100,000 population and in Italy (2012) the equivalent figure was 908.

Germany and Iceland had lower than average numbers of persons aged 90 and over; 592 per 100,000 in Germany and 480 per 100,000 in Iceland. Both these countries have relatively low life expectancy at older ages among Western nations¹.

Eastern European countries tend to have lower numbers of people aged 90 and over per 100,000 population than Western European countries. For example, in Bulgaria in 2011 there were 318 persons aged 90 and over per 100,000; in the Czech Republic the figure was 304 and in Croatia 302. Life expectancy at older ages in Eastern European countries is noticeably lower than in Western European countries.

Australia, New Zealand and the United States have lower numbers of persons aged 90 and over per 100,000 population than many countries in Western Europe. This is despite Australia having one of the world's highest life expectancies at older ages¹ and New Zealand and the United States having higher life expectancies at older ages than many Western European countries. However, all three countries have younger age profiles (lower median ages) meaning older people make up a smaller proportion of the population than in Western European countries with older profiles.

Countries with more recently emerging economies such as China and India have relatively low numbers of persons aged 90 and over per 100,000 population. They have younger age profiles and also have lower life expectancies than nations that have been developed for a longer period of time.

Africa is the least aged region of the world owing to both higher fertility and much lower life expectancy than other world regions. The average number of persons aged 90 and over for the continent as a whole is 26 per 100,000.

Notes for International Comparisons

1. [International comparisons - National Interim Life tables](#)

Quality

There is some degree of uncertainty around all population estimates, including Census estimates. As an illustration, [confidence intervals around the 2011 Census estimates](#) indicate that the true value for the population aged 85 and over in England and Wales will lie within + or – 0.33 per cent of the estimate for males and females separately at the 95% confidence level.

In addition to non-response, other possible sources of error in the census estimate for people aged 90 and over include inaccuracies in reporting of dates of birth (for example proxy reporting by carers). Such inaccuracies have been documented in previous censuses ^{1,2}.

The mid-year population estimates (MYE) are produced by rolling forward the census population estimates allowing for ageing, births, deaths and migration. Any error in the 90 and over census estimate is thereby carried forward to future years in inter-censal population estimates.

Estimates of the Very Old are produced from death registrations (see Methodology section). Recording of date of birth at death registration may be more accurate than reporting of date of birth in the census, however as date of birth on death certificates is not validated there are also likely to be some inaccuracies in this data source.

As the methodology used to produce the Estimates of the Very Old (including Centenarians)³ includes assumptions, (namely no migration at older ages and accuracy of the deaths registration data) the estimates it produces are also uncertain. It initially results in a lower estimate of the total population aged 90 and over for England and Wales in 2011 than the 90 and over estimate in the 2011 mid-year estimates. However in order to provide users with a consistent set of single year estimates beyond age 89, the Estimates of the Very Old for ages 90 and over are constrained to sum to the 90 and over totals in the MYE for males and females separately.

Differences between the MYE 90 and over totals and the Estimates of the Very Old 90 and over totals (prior to constraining) for England and Wales increased over the period 2002 to 2010 as the 2001 Census 90 and over estimate was rolled forward. Revisions made to the 90 and over mid-year estimates for 2002-2010 following the 2011 Census reduce these differences.

ONS is planning a review of methods used to produce estimates for the 90 and over population. This will include research into 2011 Census sampling errors at age 90 and over, accuracy of the death registration data, and the optimum period to use in the calculation of cohort survivors for current year estimates (see Methodology section).

A paper showing preliminary results of this review will be published in autumn 2013.

Notes for Quality

1. Thatcher, R. (Summer 1999). 'The demography of centenarians in England and Wales', Population Trends, No. 96 pp5-12
2. [2001 Census Quality Report](#).
3. [Quality and methodology Information for Estimates of the Old](#).

Differences between the 2002-2010 and the 2002-2011 Estimates of the Very Old (including Centenarians)

[2002–2011 Estimates of the Very Old \(including Centenarians\) for England and Wales](#) are published today, 21st March 2013.

Estimates for 2011 for England and Wales are published for the first time; estimates published for 2002 to 2010 (March 2013) update those published in September 2011 for England and Wales.

There are small differences between the previously published estimates for the years 2002-2010 and the updated estimates for 2002-2010 published today.

There are two reasons for the differences:

- the method used to produce the estimates updates the back years so that the figures for previous years are revised each time estimates are produced for the latest year (see Methodology section), and
- 2011 Census estimates of the 90 and over population were lower than the mid year estimates (MYE) estimates of the 90 and over population rolled forward from 2001. As a result 90 and over totals were reduced in the revisions to the 2002-2010 MYE. As the Estimates of the Very Old are constrained to the MYE 90 and over totals, these reductions are also a source of difference.

Most of these differences are negative, that is to say the revised estimates are lower than the previous estimates. The differences for males are slightly larger than for females and the differences are larger for later years. This is to be expected as progressively larger revisions are made to the 90 and over totals in the mid year estimates (MYE) the further forward in years from the previous Census. In percentage terms none of the positive differences exceed 0.1% and none of the negative differences exceed -0.4% for either males or females for all ages and all years.

Background notes

1. The [population estimates for mid-2002 to mid-2010](#) have been revised following the rebasing of the mid-2011 population estimates to the 2011 Census. The census is the most complete source of information about the population and produces a high-quality population estimate to which the annual mid-year estimates are rebased each decade.

As the population is moved forward from the census base, uncertainty accumulates because of the estimation in each of the components particularly those relating to migration. The 2011 Census identified a 464,000 shortfall in the estimates of the population of England and Wales over the decade. (See [‘Explaining the Difference Between the 2011 Census Estimates and the Rolled-Forward Population Estimates’](#)).

The revised mid-2002 to mid-2010 population estimates for England and Wales are based on the rolled-forward series of estimates updated to account for the 464,000 difference between the mid-2011 rolled-forward and mid-2011 Census-based estimates. The revised estimates reflect the estimated distribution of this difference across the decade and between components of population change and complete the consistent time-series of annual estimates for England and Wales to mid-2011. The estimates form the official series of population estimates and are certified as National Statistics by the UK Statistics Authority.

2. Estimates of the Very Old (including Centenarians) for the United Kingdom will be produced in winter 2013 or spring 2014, once 90+ estimates for each of the constituent countries are available.
3. Follow ONS on [Twitter](#) and [Facebook](#).
4. Details of the policy governing the release of new data are available by visiting www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html or from the Media Relations Office email: media.relations@ons.gsi.gov.uk

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