



Public Health
England

Protecting and improving the nation's health

Recent Trends in Life Expectancy at Older Ages

February 2015

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Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

PHE's knowledge and intelligence teams produce high quality public health intelligence and insight to protect and improve the nation's health and reduce health inequalities.

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Foreword

This report on life expectancy among those aged 65 and over in England summarises the relevant trends and provides some context for those trying to assess the significance of recent apparent changes.

The report confirms an overall upward trend in life expectancy in this age group in England since the early 1980s. However, the data also show that there was a small fall in female life expectancy at age 65, 75, 85 and 95 in 2012 compared with 2011, and a small fall in male life expectancy at ages 85 and 95. There were no further falls in 2013 compared with 2012. There has been significant interest and concern already expressed over these findings. However, the analysis presented in this report suggests it is too early to conclude that there has been a significant change in the overall upward trend in life expectancy at older ages. PHE will continue to monitor these trends closely and will report on the figures for 2014 as soon as they are available.

It is striking that the fall in life expectancy at older ages in 2012 was also seen in many other European countries. Possible reasons for this fall are considered in the report, including statistical artefact, influenza and the weather. However, it is clear that further research will be needed to confirm or refute the potential contribution of these and other factors to the observed short-term trends in life expectancy.

We have also made trends available for individual local authorities in England, using recently released data from the Office for National Statistics. Due to the small populations in older age groups in many local authorities, more year-on-year fluctuation in life expectancy is to be expected than in the national figures. Comparing 2008-10 and 2011-13, 89% of lower tier and unitary local authorities had an increase in male life expectancy at 65 years, and 81% had an increase in female life expectancy at this age.

PHE is planning further analysis of these recent trends in life expectancy and mortality. We will be inviting external experts to join a steering group for this work and publishing the results of further work as soon as it is available.

In the meantime, I hope this report provides a clear summary of what is currently known about the most recent data.

Professor John Newton
Chief Knowledge Officer

Key points

- over the last 30 years there has been an upward trend in life expectancy at older ages in England. Life expectancy among those aged 65 has increased at an average rate of 1.2% per year for men and 0.7% per year for women
- within England, although female life expectancy at age 65, 75, 85 and 95 fell in 2012, and for males it fell at ages 85 and 95 and remained static at ages 65 and 75, it is too early to say whether this represents a slowing down in the upward trend or the start of a downward trend
- the overall upward trend and the fall described for 2012 in England were reflected across many of the countries of the European Union
- between 2008 to 2010 and 2011 to 2013, 89% of lower tier and unitary local authorities had an increase in male life expectancy at 65 years, and 81% had an increase in female life expectancy at this age. There does not appear to be a relationship between change in life expectancy at age 65 and the level of life expectancy in 2008 to 2010 or level of deprivation for a local authority. Local authorities that did not show an increase are not confined to specific areas of the country
- PHE will continue to monitor life expectancy and mortality in England and other geographies, and will make the findings available in future reports

Life expectancy in England

Over the last 30 years there has been an upward trend in life expectancy at older ages in England. Figures 1 and 2 show life expectancy in England at ages 65, 75, 85 and 95 from 1981 to 2013.

Trend lines have been fitted to the data which show the upward trend in life expectancy for all four ages for both sexes. Although the trend line for life expectancy at age 95 appears relatively flat in the chart, the average growth rates in Table 1 show that there has been an increase, although not as great as for the other three ages.

Table 1 also shows that at each age, life expectancy for males is increasing at a faster rate than for females. Consequently the gap in life expectancy between the sexes at older ages is narrowing.

Table 1. Average annual growth rates in life expectancy at ages 65, 75, 85 and 95, England, 1981 to 2013

| Life expectancy at age | Males | Females |
|------------------------|-------|---------|
| 65 | 1.2% | 0.7% |
| 75 | 1.2% | 0.8% |
| 85 | 1.0% | 0.7% |
| 95 | 0.3% | 0.2% |

Source: PHE analysis of data from Office for National Statistics

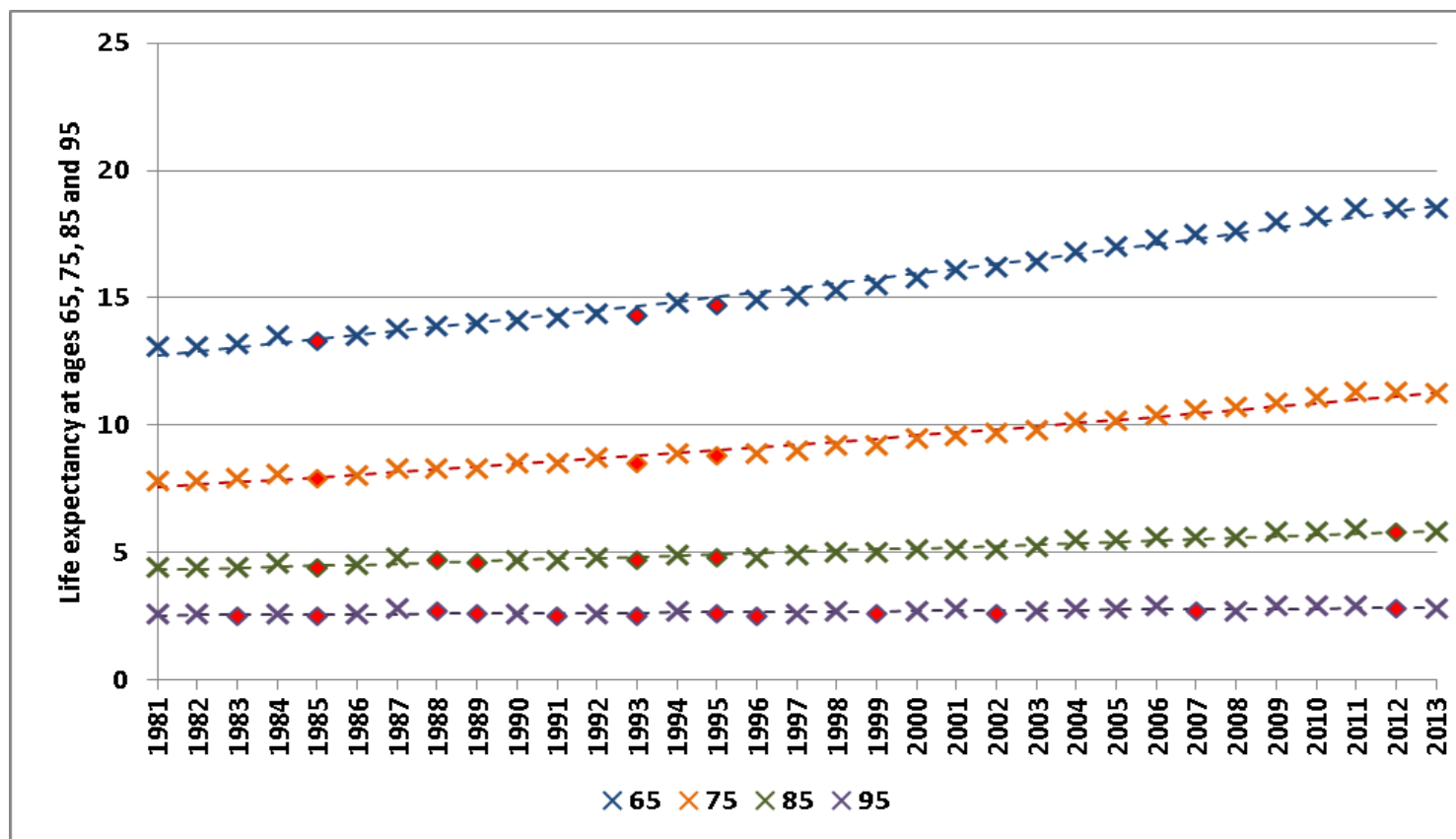
The data points shaded red in Figures 1 and 2 indicate where life expectancy in that year was lower than in the previous year, indicating that there is some fluctuation in life expectancy at these age groups, although the overall trend has been upwards. In recent years, male life expectancy was lower in 2012 than 2011 at ages 85 and 95 (but not at ages 65 and 75), but there was no further fall in 2013.

For females, life expectancy at all four ages was lower in 2012 than 2011. At age 65, this was the first fall since 1995, and at age 75 the first fall since 2003. At ages 85 and 95, there have been frequent occasions when life expectancy in a year was lower than in the previous year. In the period from 1981 to 2013 there were five individual years when life expectancy at all four of these ages was lower than in the previous year. Compared with 2012, there was no further fall in life expectancy at any of these ages in 2013.

The life expectancy data illustrated in Figures 1 and 2 were produced by the Office for National Statistics (ONS). ONS does not routinely publish confidence intervals for its national level life expectancy outputs as the level of variance is expected to be very small. Confidence intervals were calculated by PHE, using a published method (see Methodology note) which confirmed this to be the case for life expectancy in England. Despite this, the falls in female life expectancy between 2011 and 2012 at ages 65, 75 and 85 were all statistically significant, as was the fall in male life expectancy at 85. Although these small falls were statistically significant, the overall trend has been upwards and this does not point to a change in the overall trend.

To conclude, despite some annual fluctuations in life expectancy at older ages, the long-term trend has been upwards. Although female life expectancy at all four ages fell in 2012, and for males it fell at ages 85 and 95 and remained static at ages 65 and 75, it is too early to say whether this represents a slowing down in the upward trend or the start of a downward trend. Fluctuations in life expectancy at older ages have occurred in the last 30 years and despite this the trend analysis shows that the overall trend has been upwards.

Figure 1. Male life expectancy at ages 65, 75, 85, and 95, England, 1981 to 2013

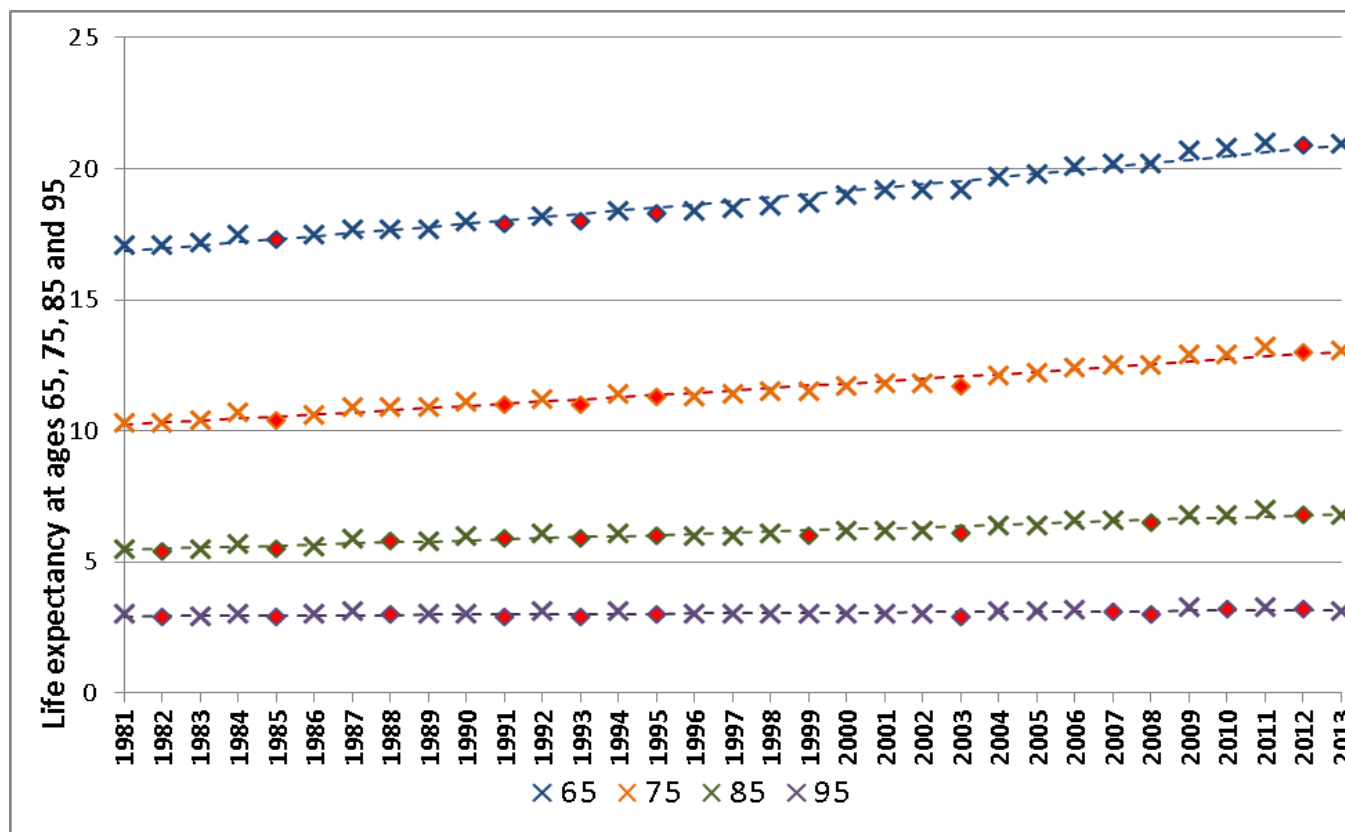


----- Each dotted line illustrates the fitted trend line

◆ Life expectancy lower than previous year

Source: PHE analysis of data from ONS

Figure 2. Female life expectancy at ages 65, 75, 85 and 95, England, 1981 to 2013



----- Each dotted line illustrates the fitted trend line

◆ Life expectancy lower than previous year

Source: PHE analysis of data from ONS

Life expectancy in the European Union

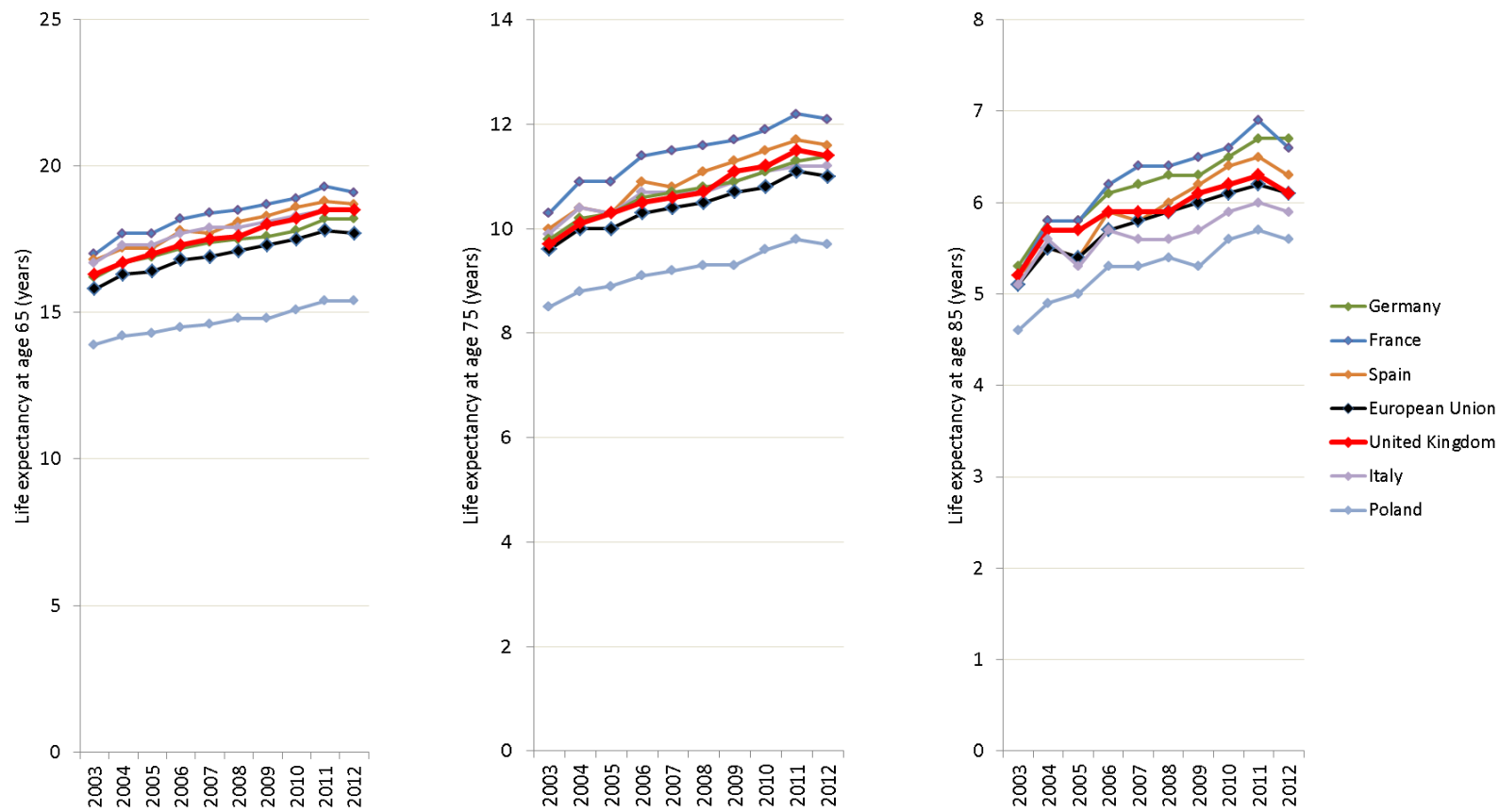
In the EU there has been an overall upward trend in life expectancy at older ages. The charts in Figures 3 and 5 show this for male and female life expectancy at ages 65, 75 and 85 for the EU as a whole and its largest countries, including the UK.

In 2012, however, there was a fall in life expectancy at older ages for the EU, when compared with life expectancy in 2011. This fall was reflected in many of the largest countries in the EU (Figures 3 and 5). At age 85, male life expectancy fell by 0.1 years in the EU, and female life expectancy by 0.2 years.

The charts in Figures 4 and 6 show changes between 2011 and 2012 for all EU countries for life expectancy at ages 65, 75 and 85. It is striking that the fall in 2012 occurs across the majority of EU countries. For male life expectancy at age 85, only four of the EU's 28 countries had an increase between 2011 and 2012 (Denmark, Greece, Estonia and Luxembourg). In all other countries, life expectancy at 85 either fell or remained the same. For female life expectancy at age 85, only four of the 28 countries had an increase between 2011 and 2012 (Malta, Slovenia, Denmark and Estonia).

Life expectancy at older ages in the UK is very similar to the EU average (Figures 3 and 5) and the trends in the UK are consistent with the overall EU trend.

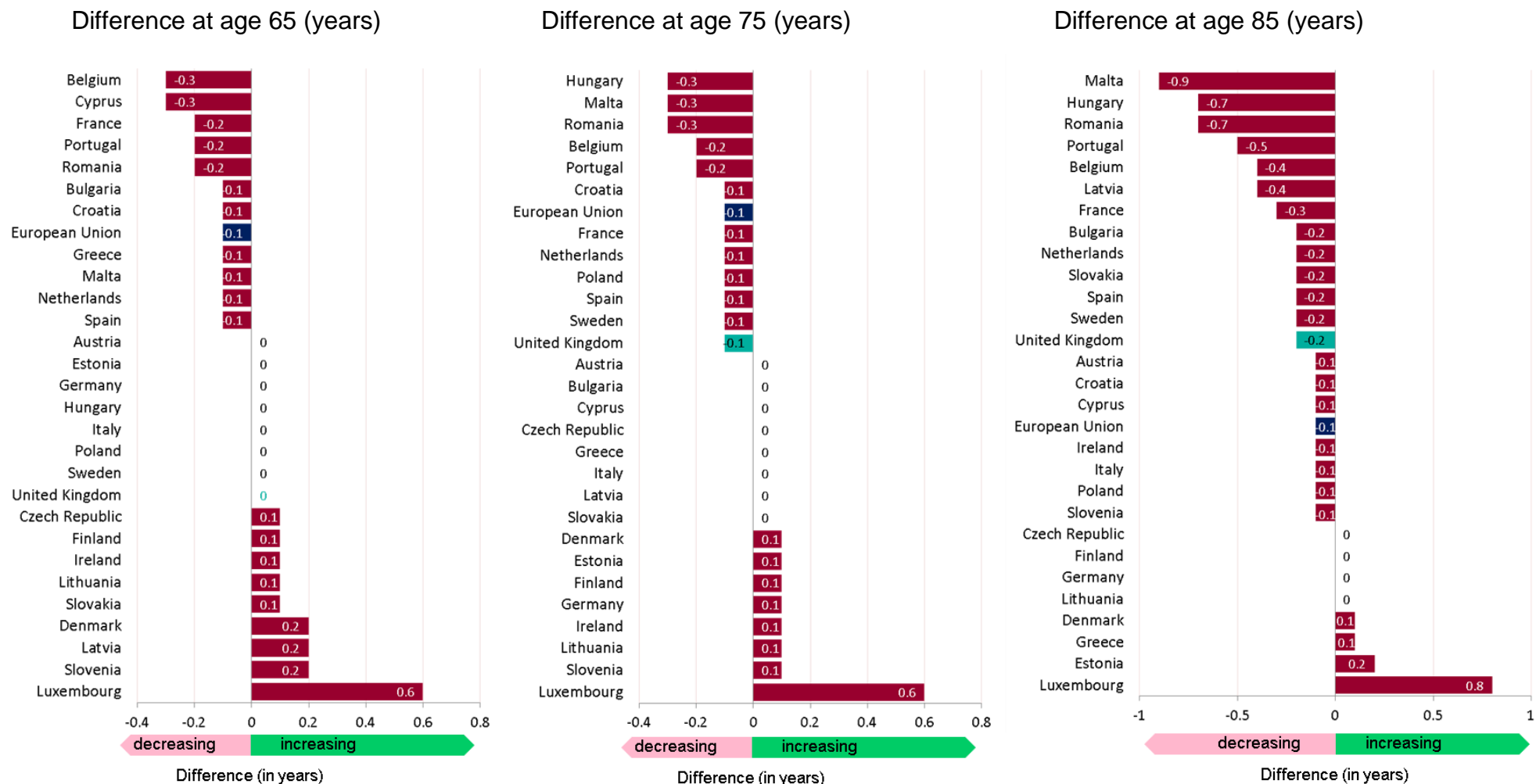
Figure 3. Trends in male life expectancy at ages 65, 75 and 85, selected EU countries,* 2003 to 2012



* EU countries with population over 35 million

Source: PHE analysis of data from Eurostat

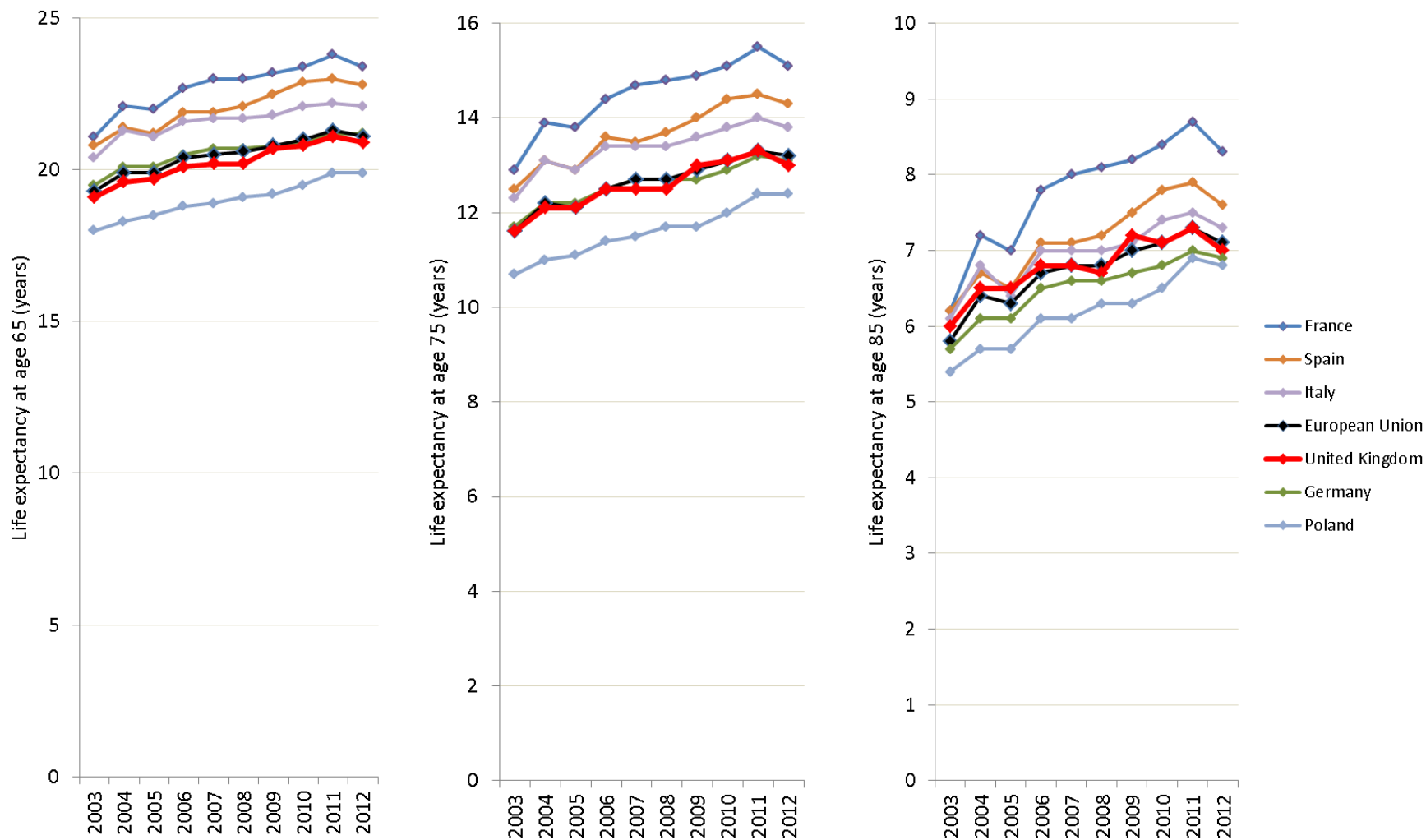
Figure 4. Difference in male life expectancy in years, 2012 compared with 2011, for EU 28 countries¹



¹ There was a break in the comparable time series for Hungary between 2011 and 2012

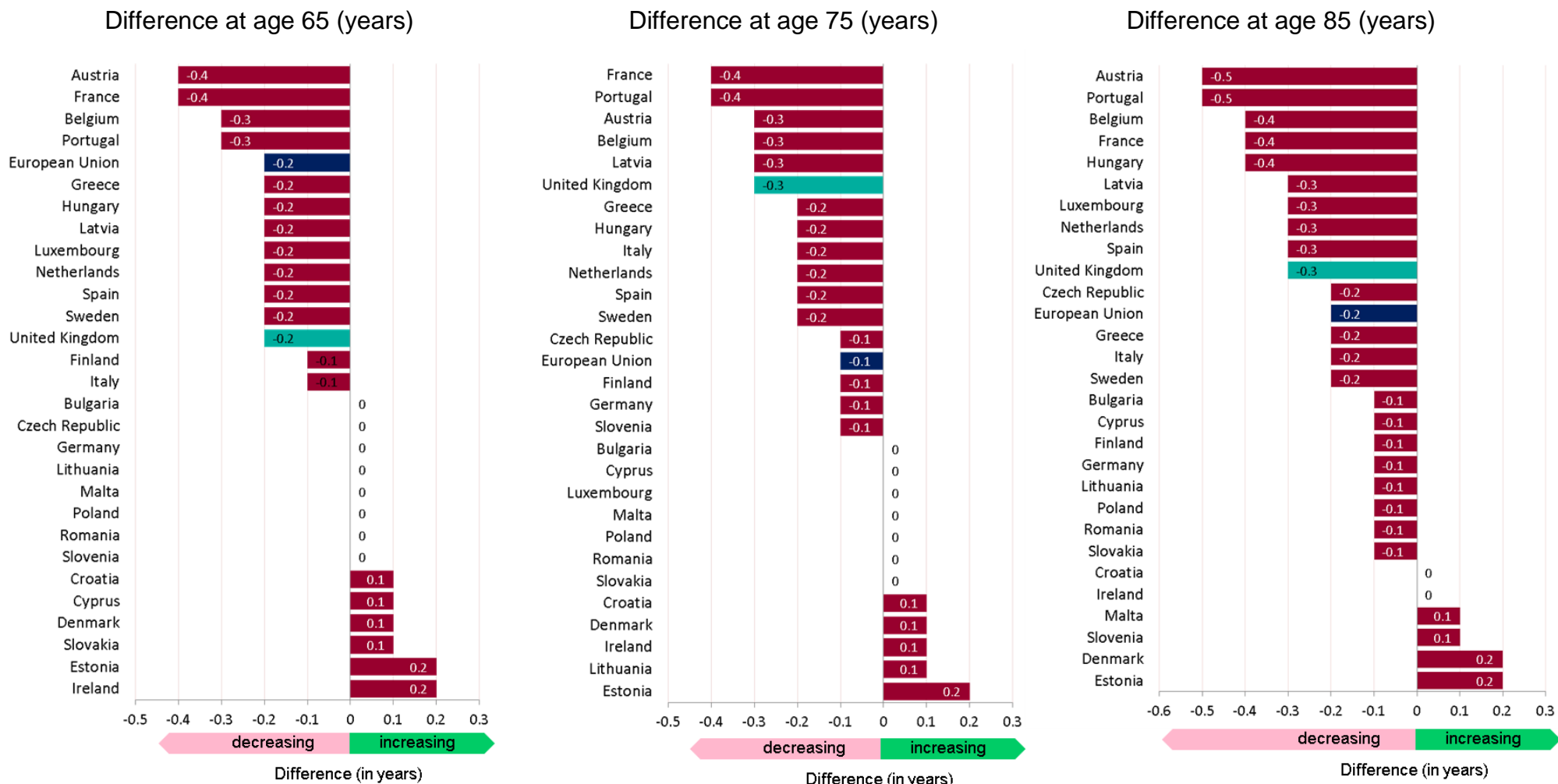
Source: PHE analysis of data from Eurostat

Figure 5. Trends in female life expectancy at ages 65, 75 and 85, selected EU countries,* 2003 to 2012



* EU countries with population over 35 million
 Source: PHE analysis of data from Eurostat

Figure 6. Difference in female life expectancy in years, 2012 compared with 2011, for EU 28 countries¹



¹ There was a break in the comparable time series for Hungary between 2011 and 2012

Source: PHE analysis of data from Eurostat

Life expectancy in the English regions

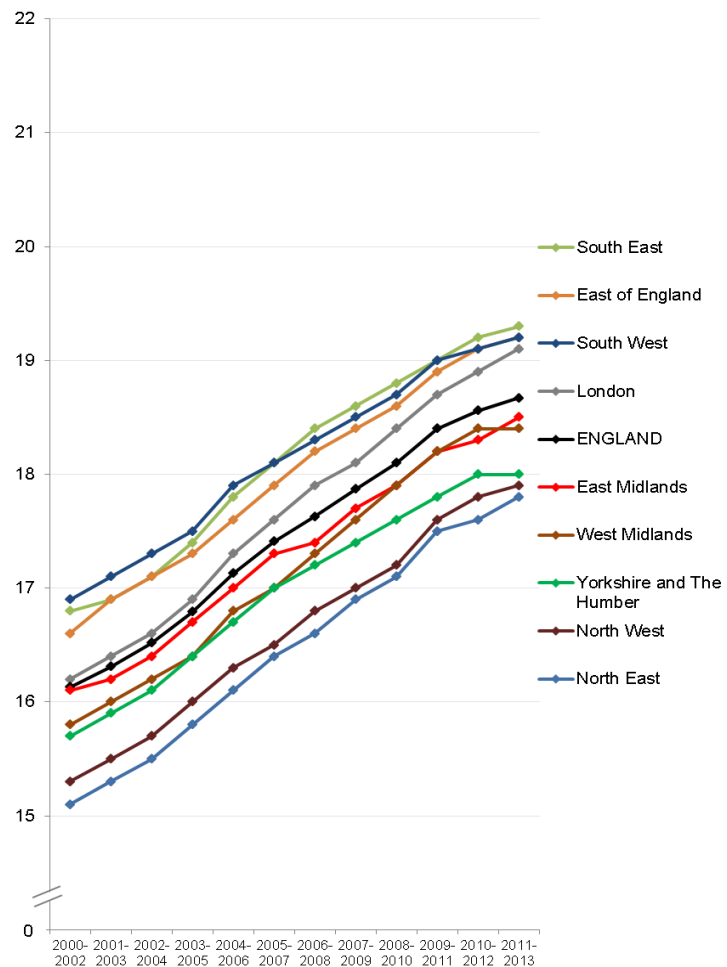
Life expectancy at age 65 has been increasing in all English regions for both sexes (Figure 7). The regional life expectancy figures are not directly comparable with the England figures reported in Figures 1 and 2, partly because they are based on three-years of data rather than single years of data, but also because a different life table methodology is used by ONS. Further details are in a methodology note at the end of this report. Between the two most recent independent periods (2008 to 2010 and 2011 to 2013), life expectancy increased in all regions, and this change was statistically significant for both sexes in all regions. For males, the largest percentage increase was in the North East and the North West (4.1%). For females, the largest percentage increase was in London (2.8%).

In no regions was there a fall in life expectancy at age 65 between 2010 to 2012 and 2011 to 2013, although as can be seen in Figure 7, for some regions there was little change. This is particularly evident for females and this flattening off is likely to reflect the effect of lower life expectancy in 2012. This will impact on the regional life expectancy figures for 2010 to 2012 and 2011 to 2013, as well as the results for 2012 to 2014 when those become available later in 2015.

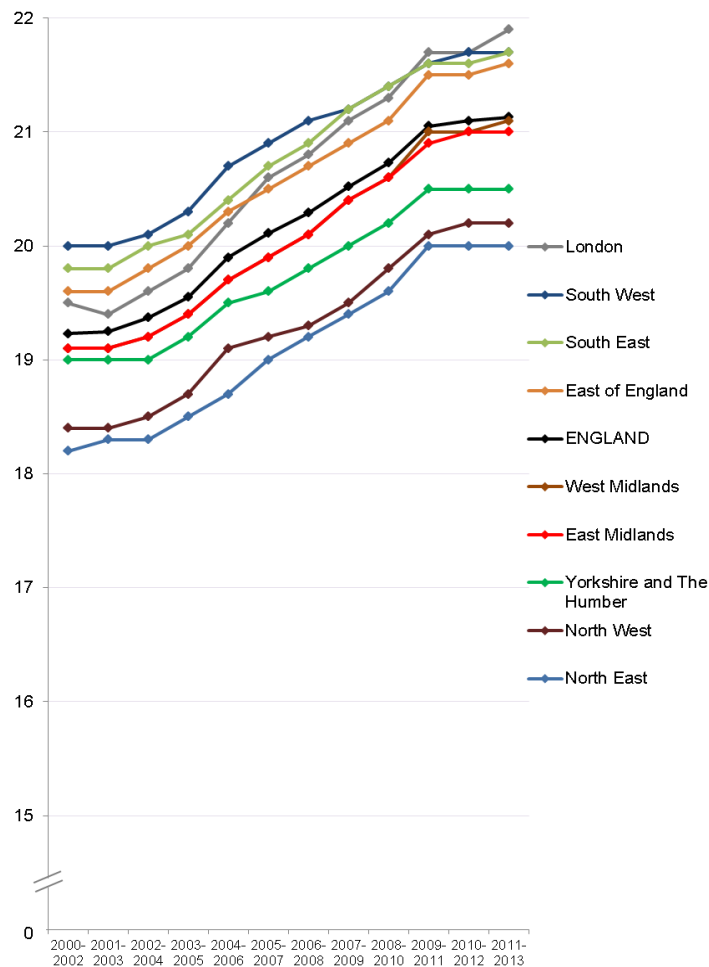
Life expectancy data is not routinely available for those aged 75 and 85 for the English regions.

Figure 7. Life expectancy at age 65, English regions, 2000-02 to 2011-13

Male life expectancy at age 65



Female life expectancy at age 65



Source: PHE analysis of data from ONS

Life expectancy in English local authorities

Life expectancy at age 65 increased in all English local authorities between 2000 to 2002 and 2011 to 2013. The local authority life expectancy figures are produced following the same methodology as the regional figures and are therefore not directly comparable with the figures for England. Further details are in a methodology note at the end of this report.

Table 2 compares life expectancy at age 65, 75 and 85 for the two most recent independent (ie non-overlapping) time periods: 2008 to 2010 and 2011 to 2013. For the 324 lower tier and unitary authorities,ⁱ life expectancy increased at age 65 in 89% of areas for men and 81% of areas for women. At age 75, there were increases in 82% of areas for men and 76% of areas for women. The number of local authorities where life expectancy increased at age 85 was lower: 60% of areas for men and 48% of areas for women.

Given that the trend in life expectancy in England as a whole has been upwards over this period, it is expected that life expectancy in many local authorities would increase between these time points. However, due to the small populations in older age groups in many local authorities, more year-on-year fluctuation in life expectancy is to be expected than in the national figures. There does not appear to be a relationship between change in life expectancy at age 65 and the level of life expectancy in 2008 to 2010 or level of deprivation for a local authority. Local authorities that did not show an increase are not confined to specific areas of the country.

The data for each individual local authority can be found on the PHE website with this report.

ⁱ Unitary authorities, country districts, metropolitan county districts and London boroughs

Table 2. Life expectancy at ages 65, 75 and 85 in English local authorities, 2011 to 2013 compared with 2008 to 2010

| | No of areas ¹ | Sex | Life expectancy at age | Life expectancy higher in 2011 to 2013 than 2008 to 2010 | Life expectancy same in 2011 to 2013 as 2008 to 2010 | Life expectancy lower in 2011 to 2013 than 2008 to 2010 |
|---|--------------------------|---------|------------------------|--|--|---|
| Lower tier local authorities² | 324 | Males | 65 | 288 (89%) | 8 (2%) | 28 (9%) |
| | 324 | Females | 65 | 264 (81%) | 19 (6%) | 41 (13%) |
| Counties | 27 | Males | 65 | 27 (100%) | 0 | 0 |
| | 27 | Females | 65 | 27 (100%) | 0 | 0 |
| Lower tier local authorities² | 324 | Males | 75 | 267 (82%) | 23 (7%) | 34 (10%) |
| | 324 | Females | 75 | 245 (76%) | 23 (7%) | 56 (17%) |
| Counties | 27 | Males | 75 | 27 (100%) | 0 | 0 |
| | 27 | Females | 75 | 27 (100%) | 0 | 0 |
| Lower tier local authorities² | 324 | Males | 85 | 193 (60%) | 22 (7%) | 109 (34%) |
| | 324 | Females | 85 | 154 (48%) | 41 (13%) | 129 (40%) |
| Counties | 27 | Males | 85 | 20 (74%) | 3 (11%) | 4 (15%) |
| | 27 | Females | 85 | 14 (52%) | 6 (22%) | 7 (26%) |

¹ Data is not available for City of London and Isles of Scilly

² Unitary authorities, country districts, metropolitan county districts and London boroughs

Source: PHE analysis of data from the ONS

Discussion

The data presented in this report shows there has been an overall upward trend in life expectancy at older ages in England since the early 1980s. More recent data from the early 2000s onwards shows there has also been an upward trend in the EU, the English regions and English local authorities. However, as noted, there are some fluctuations in these figures from year to year, particularly for the oldest age groups and for individual local authorities.

There was a fall in life expectancy at older ages in England in 2012 that is reflected across the EU. On the whole, data for 2013 does not show any further falls, although for some age groups there was not a return to 2011 levels, which were the highest to date. The upward trend in life expectancy in recent years has also flattened in some English regions, particularly for females.

Age-standardised mortality rates for England published by ONS show a progressive decline from 1983 to 2013 although there has been a flattening of the trend from 2011 to 2013.¹ ONS has also reported that overall excess deaths in winter, when compared with the non-winter months, were at a record low level in 2013/14 in England and there were similar low levels in each of the years 2009/10, 2010/11, and 2011/12.² There was a somewhat higher number of excess winter deaths in 2012/13 but the peak occurred in 2013 not in 2012.³

There could be several possible explanations for an apparent fall in life expectancy at older ages within England in 2012.

It is important to consider that it is possible that it is caused by an anomaly in the data or a methodological issue. The calculation of life expectancy involves the use of deaths data and population data and is therefore dependent on the accuracy of both of these datasets. The mortality data for England used for this report are based on the number of deaths registered in a year rather than deaths which occurred in a year. We know that the total number of death registrations in a year will be influenced by the number of days available to register a death and whether it is a leap year, although we expect the effect of these differences to be small.⁴

The accuracy of the population estimates is also important. For example, for the cohorts born around the world wars, where there was a particularly rapid change in the birth rate, the population estimates may be suboptimal.⁵ The effect of the world wars will have significant impact on age specific mortality rates, but the impact on life expectancy (which is calculated from multiple age-specific mortality rates) is likely to be small. ONS also report on uncertainty associated with their local authority area mid-year population estimates.⁶

Other factors, which might affect many European countries at the same time and which could conceivably have an impact on life expectancy, include environmental factors, the level of influenza type illness circulating in the population, and the economic recession. A first step towards any explanation is to monitor the trend to see whether any further falls in life expectancy occur, and if so at what ages and in which areas.

A PHE report examining the level of influenza type illness in the population also concludes that there were no excess all-cause deaths in the winter of 2011/12 (using a different methodology to ONS and defined as excess over what is expected in winter months).⁷ The winter of 2012/13 had the highest excess since 2008/09, however, the majority of the excess was seen in March and April 2013.⁸ These findings are consistent with those published by ONS. We expect the impact of these seasonal fluctuations in mortality on the overall long-term trends in life expectancy to be small.

Preliminary analysis of the number of deaths in England in those aged over 65 and over 85 for 2014, indicates that there is unlikely to be a rise in the overall number when compared with 2013, but equally that there will have been no return to the lower numbers occurring in 2010 and 2011. However, it is not possible to estimate the effect on life expectancy without an estimate of the age-specific population for 2014. This will be calculated as soon as the population data are available, currently expected in June 2015.

Therefore, despite the recent fluctuations described here, the main conclusion remains that the overall trend in life expectancy at older ages has been upwards and similar fluctuations have been observed in the past. It is therefore too soon to say whether these fluctuations represent a change in the overall trend.

Next steps

Further work on the monitoring of life expectancy and mortality in England and other geographies is important. PHE has a developing work programme to monitor such changes in mortality and life expectancy:

1. Population estimates for 2014 are expected in June 2015. Once these are available PHE will calculate provisional life expectancy for England to monitor change
2. In order to fully understand trends in life expectancy it is necessary to understand trends in age-specific and cause-specific mortality as well. Future reports on these are planned

References

- 1 Office for National Statistics (2014) Mortality in the United Kingdom, 1983-2013: <http://www.ons.gov.uk/ons/rel/mortality-ageing/mortality-in-the-united-kingdom/1983-2013/mortality-in-the-united-kingdom--1983-2013.html>
- 2 Office for National Statistics (2014) Excess Winter Mortality in England and Wales, 2013/14 (Provisional) and 2012/13 (Final): <http://www.ons.gov.uk/ons/rel/subnational-health2/excess-winter-mortality-in-england-and-wales/2013-14--provisional--and-2012-13--final-/stb.html>
- 3 Office for National Statistics (2013) Excess Winter Mortality in England and Wales, 2012/13 (Provisional) and 2011/12 (Final): <http://www.ons.gov.uk/ons/rel/subnational-health2/excess-winter-mortality-in-england-and-wales/2012-13--provisional--and-2011-12--final-/index.html>
- 4 Devis T and Rooney C (1997) The time taken to register a death. *Population Trends*, 88: 48-55
- 5 Cairns A, Blake D, Dowd K and Kessler A (2014) Phantoms Never Die: Living with Unreliable Mortality Data. Pensions Institute, Discussion Paper PI-1410
- 6 Office for National Statistics (2012) Uncertainty in local authority mid-year population estimates: <http://www.ons.gov.uk/ons/guide-method/method-quality/imps/latest-news/uncertainty-in-la-mypes/index.html>
- 7 Public Health England (2014) Surveillance of influenza and other respiratory viruses in the United Kingdom: Winter 2013/14
- 8 Public Health England (2013) Surveillance of influenza and other respiratory viruses, including novel respiratory viruses, in the United Kingdom: Winter 2012/13
- 9 Eayres D and Williams ES (2004) Evaluation of methodologies for small area life expectancy estimation. *J Epidemiol Community Health*, 58: 243-249

Definitions

The figures presented in this report are all period life expectancies, as defined by ONS: *Period expectation of life at a given age for an area in a given time period is an estimate of the average number of years a person of that age would survive if he or she experienced the particular area's age-specific mortality rates for that time period throughout the rest of his or her life. The figure reflects mortality among those living in the area in each time period, rather than mortality among those born in each area. It is not therefore the number of years a person in the area in each time period could actually expect to live, both because the death rates of the area are likely to change in the future and because many of those in the area may live elsewhere for at least some part of their lives.*

Data sources

Data for life expectancy at single year of age for individual years (Figures 1 and 2) from 1981 to 2012 is from the ONS release *Historic and Projected Mortality Data from the Period and Cohort Life Tables 2012-based, UK, 1981-2062*. The life expectancy results used are from the Period Life Tables and are based on historic, not projected, mortality data: <http://www.ons.gov.uk/ons/rel/lifetables/historic-and-projected-data-from-the-period-and-cohort-life-tables/2012-based/stb-2012-based.html>

ONS revised this output in spring 2014 to incorporate revised estimates for Scotland (and therefore the UK): <http://www.ons.gov.uk/ons/rel/lifetables/historic-and-projected-data-from-the-period-and-cohort-life-tables/2012-based-revised/index.html>

The figures for England were not changed in this revision and the first link contains more commentary on the release.

Data for 2013 at single year of age was provided by ONS as an ad-hoc request for PHE and published on the ONS website on 8 January 2015: <http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/pop/january-2015/index.html>

Sub-national life expectancy data are published by ONS for English regions and local authorities (upper and lower tier). These are based on rolling three year periods, with the most recent data currently available for 2011 to 2013. Figures are published for life expectancy at birth and at age 65: <http://www.ons.gov.uk/ons/rel/subnational-health4/life-expectancy-at-birth-and-at-age-65-by-local-areas-in-england-and-wales/2011-13/stb-life-expectancy-at-birth-2011-13.html>

Figures for life expectancy at age 75 and 85 for English local authorities were provided by ONS as an ad-hoc request for PHE and published on the ONS website on 21 January 2015: <http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/health/january-2015/index.html>

Figures for life expectancy in the European Union are available from Eurostat (a directorate of the European Commission). The Eurostat statistical database provides data on life expectancy for the EU as a whole and individual countries, by sex and single year of age from birth to 85. The most recent year of data currently available is 2012: <http://ec.europa.eu/eurostat/data/database>

Methodology

ONS uses different methods to calculate its national and sub-national life tables. The national life expectancy results illustrated in Figures 1 and 2 were calculated using a single-year life table. This is based on death rates by single year of age from 0 to 100+.

For sub-national life expectancy outputs, ONS uses an abridged life table that is based on death rates in five-year age groups, up to 85+. A copy of the template is on the ONS website: <http://www.ons.gov.uk/ons/rel/subnational-health4/life-expectancy-at-birth-and-at-age-65-by-local-areas-in-england-and-wales/2011-13/stb-life-expectancy-at-birth-2011-13.html#tab-Methods>

Using this abridged method, for the final age group the probability of survival is zero (as everyone in the 85+ age band must die). As the probability of survival is zero, this method assumes that the associated variance is also zero. If there is no variance for the final age band, there can be no confidence intervals for life expectancy at age 85.

The abridged life tables currently used by PHE follow a recommendation that for the final age band in an abridged life table, variance should be based not on the probability of survival but on the mean length of survival.⁹ This assumption is employed in the abridged life table template used by PHE:

<http://www.sepho.org.uk/viewResource.aspx?id=8943>

PHE is in discussion with ONS about the methods used to calculate abridged life tables, including raising the upper age band from 85+ to 90+ and adopting a common method for calculating confidence intervals.

Acknowledgements

PHE would like to acknowledge the considerable help provided by colleagues at ONS in providing data for this report.