

# Information paper

## Summary Quality Report for 'Life expectancy at birth and at age 65 by local areas in the United Kingdom'

### 1 Introduction

This report is part of a rolling programme of quality reports being introduced by the Office for National Statistics (ONS). The full programme of work being carried out on [Statistical Quality](#)<sup>1</sup> is available on the ONS website. Summary Quality Reports are overview notes which pull together key qualitative information on the various dimensions of quality as well as providing a summary of methods used to compile the output.

Period life expectancy 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.

Period life expectancy at birth is also not a guide to the remaining expectation of life at any given age. For example, if female life expectancy at birth was 80 years for a particular area, the life expectancy of women aged 65 years in that area would exceed 15 years. This reflects the fact that survival from a particular age depends only on the mortality rates beyond that age, whereas survival from birth is based on mortality rates at every age.

Figures for life expectancy at birth and at age 65 are calculated as three-year rolling averages (for example 2007–09), produced using numbers of deaths and mid-year population estimates for each period, to provide large enough numbers to ensure that the figures presented are sufficiently robust. A [life table template](#)<sup>2</sup> which shows how life expectancy is calculated is available on the ONS website.

Figures are available for males and females for the UK, constituent countries, Government Office Regions, counties, and unitary and local authorities for 1991–93 onwards.

### 2 Summary of Quality

#### 2.1 Relevance

*The degree to which the statistical product meets user needs for both coverage and content.*

Life expectancy at birth has been used as a measure of the health status of the population of England and Wales since the 1840s. It was employed in some of the earliest reports of the Registrar General to illustrate the great differences in mortality experienced by populations in different parts of the country.

This tradition of using life expectancy as an indicator of geographic inequalities in health has been continued by ONS in recent years with the annual publication of [results for local areas in the UK](#).<sup>3</sup>

The output covers administrative geographical areas, including constituent countries, Government Office Regions, counties, and unitary and local authorities. Figures are not calculated for City of London or Isles of Scilly due to small numbers of deaths and populations.

On 1 April 2009, there was a reorganisation of local governments in England which created nine new unitary authorities (based on the merging of 37 local authorities). [Figures based on both the old and new boundaries](#)<sup>3</sup> are available on the ONS website.

Figures are available for life expectancy at birth for 1991–93 onwards (apart from counties which are available for 2000–02 onwards) and for life expectancy at age 65 for 2000–02 onwards (apart from areas in Scotland which are available for 2004–06 onwards).

Figures are published annually in October for the preceding three-year period, following the release of death registrations data and mid-year population estimates (usually by the end of August).

Life expectancy figures are not routinely calculated by ONS for areas smaller than local authorities due to small numbers of deaths and populations. More information can be found in a report titled [Life expectancy at birth: methodological options for small populations](#),<sup>4</sup> which is available on the ONS website.

In June 2006, [experimental ward-level life expectancy figures for the 1999–2003 period](#)<sup>5</sup> were published by ONS following a one-off study to test the feasibility of producing figures for small geographical areas. [Experimental statistics](#)<sup>6</sup> are produced for testing purposes and are not fully developed. They do not meet the requirements of the [Code of Practice for Official Statistics](#)<sup>7</sup> and are not National Statistics.

A number of limitations were highlighted in a [report accompanying the ward-level life expectancy figures](#),<sup>8</sup> including wide confidence intervals and extreme results produced as a result of small numbers of deaths and populations, and the impact of communal establishments on mortality rates within some wards. Confidence intervals show the level of precision around a statistical estimate and provide the lower and upper values in which the estimate falls. The wider the confidence interval, the lower the precision.

Since this study, no further work has been undertaken by ONS to produce life expectancy figures below local authority level.

Life expectancy provides users with an indicator of health which can be used to inform policy, planning and research in both public and private sectors in areas such as health, population, pensions and insurance.

Key users include the Department of Health, primary care organisations, public health observatories, local authorities, and private pensions and insurance companies.

In 2001, the government introduced a national health inequalities Public Service Agreement (PSA) target to reduce inequalities in health outcomes by 10 per cent as measured by infant mortality and life expectancy at birth by 2010. This was underpinned by a more detailed objective to reduce by at least 10 per cent the gap in life expectancy between the fifth of areas with the worst health and deprivation indicators ([the Spearhead group](#)<sup>9</sup>) and the population as a whole.

The Spearhead group consists of the 70 local authority areas that are in the bottom fifth nationally for three or more of the following five factors:

- Male life expectancy at birth
- Female life expectancy at birth
- Cancer mortality rate in under 75s
- Cardiovascular disease mortality rate in under 75s
- Index of Multiple Deprivation 2004 average score

For life expectancy, the 'bottom fifth' means those with the lowest figures; for mortality rates and deprivation scores, it means those with the highest figures.

Life expectancy figures (including specific Spearhead group figures) have been provided to the Department of Health each year to enable them to monitor progress against the PSA targets. In 2010, progress was reported in their [Mortality Monitoring Bulletin](#)<sup>10</sup> and also as part of [The Marmot Review](#).<sup>11</sup>

As part of the Government's Spending Review 2010, the PSA targets will be replaced with a new Public Services Transparency Framework.

Life expectancy figures are used at regional and local levels to focus on health monitoring and planning in specific areas. They are also published as part of the [Regional Health Profiles](#),<sup>12</sup> which are produced by the Association of Public Health Observatories (APHO) with funding from the Department of Health. The profiles comprise an important package of indicators which are designed to support action by local governments and primary care trusts to tackle health inequalities and improve people's health.

In the private sector, life expectancy figures are used by pensions and insurance companies for planning their financial services.

In addition to the annual Statistical Bulletin, life expectancy figures are also reported in a number of other ONS publications including [Neighbourhood Statistics](#),<sup>13</sup> [Regional Trends](#)<sup>14</sup> and [Pension Trends](#).<sup>15</sup>

## 2.2 Accuracy

*The closeness between an estimated result and the (unknown) true value.*

All figures are period life expectancies. 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.

Period life expectancy at birth is also not a guide to the remaining expectation of life at any given age. For example, if female life expectancy at birth was 80 years for a particular area, the life expectancy of women aged 65 years in that area would exceed 15 years. This reflects the fact that survival from a particular age depends only on the mortality rates beyond that age, whereas survival from birth is based on mortality rates at every age.

To calculate life expectancy, abridged (based on five-year age groups) life tables are constructed using standard methods,<sup>16,17</sup> through procedures which have been extensively tested. These are more suitable than complete life tables (based on single year of age) for calculating sub-national life expectancy due to small numbers of deaths by single year of age, particularly among younger ages and in smaller local authorities.

Separate tables are constructed for males and females. They are created using numbers of deaths registered in calendar years and mid-year population estimates. Life expectancy figures are calculated as three-year rolling averages to provide large enough numbers to ensure that the results are sufficiently robust.

A [template](#)<sup>2</sup> which shows how abridged life tables are calculated is available on the ONS website.

Life expectancy is an estimate and is therefore subject to some margin of error. Consequently, 95 per cent confidence intervals are calculated for the results to give an indication of the size of this error.

In May 2010, ONS published [revised mid-year population estimates](#)<sup>18</sup> for England and Wales for the years 2002 to 2008. Consequently, life expectancy figures for 2000–02 to 2006–08 were also revised and published at the same time as the release of 2007–09 figures in October 2010.

Before the annual release, life expectancy figures for local and unitary authorities are calculated as part of the process for quality assuring mid-year population estimates for England and Wales. The analyses highlight potential outliers in the distribution of new life expectancy estimates and compare results with those calculated for the previous period.

For information about the underlying mortality and population data used for life expectancy calculations, please see the following links:

[Deaths registered in England and Wales](#)<sup>19</sup>

[Deaths registered in Scotland](#)<sup>20</sup>

[Deaths registered in Northern Ireland](#)<sup>21</sup>

[Mid-year population estimates](#)<sup>22</sup>

### **2.3 Timeliness and Punctuality**

*Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the time lag between the actual and planned dates of publication.*

The annual release of life expectancy figures is announced on the [UK National Statistics Publication Hub](#)<sup>23</sup> 12 months in advance.

Results are published in October each year (10 months after the end of the reference period), following the release of annual death registrations data and mid-year population estimates for the previous year (usually by the end of August). Results are produced on a three-year rolling average basis, to provide large enough numbers to ensure that the figures are sufficiently robust.

Life expectancy figures are released at the same time every year and have always been punctual.

### **2.4 Accessibility and Clarity**

*Accessibility is the ease with which users are able to access the data, also reflecting the format(s) in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the metadata, illustrations and accompanying advice.*

The [life expectancy](#)<sup>3</sup> figures and formats detailed below can be accessed free of charge on the ONS website.

A Statistical Bulletin is released annually, containing commentary and tables showing the areas with the highest and lowest life expectancies at birth and at age 65 for males and females. It also provides a link to a MS Excel table ([Table 6](#)<sup>24</sup>) which contains life expectancy figures at birth and at age 65 for males and females for the UK, constituent countries, Government Office Regions, counties, and unitary and local authorities (including the rank order of unitary and local authorities from 1 to 404), for the latest period. The Bulletin includes details about the methods used to calculate life expectancy figures and how to interpret them, as well as information on how they differ from the [national interim life table](#)<sup>25</sup> figures (see 2.6 below).

Life expectancy figures for the whole time series (with and without confidence intervals) are available in four [MS Excel datasets](#)<sup>3</sup> as follows:

Results for the United Kingdom  
Results for England and Wales  
Results for Scotland  
Results for Northern Ireland

The 'Results for the United Kingdom' and 'Results for England and Wales' datasets contain notes relating to the revisions of mid-year population estimates and the local government reorganisation which came into effect on 1 April 2009. Figures based on the old and new local and unitary authorities are available within the 'Results for England and Wales' dataset.

Life expectancy at birth figures for males and females are available as a set of [interactive animated maps](#)<sup>26</sup> which compare results for local areas with those for the UK and show changes over time from 1991–93 onwards.

An annotated [life table template](#)<sup>2</sup> which shows how life expectancy figures and confidence intervals are calculated is available on the ONS website.

[Previous releases](#)<sup>27</sup> of life expectancy figures, which include those for 2000–02 to 2006–08 based on the superseded mid-year population estimates, are also available on the ONS website.

For further information about life expectancy at birth and at age 65 for local areas in the UK, please contact:

Health Geography Team (Room 1.364)  
Office for National Statistics  
Government Buildings  
Cardiff Road  
Newport  
NP10 8XG

Telephone: 01633 456736  
E-mail: [healthgeog@ons.gsi.gov.uk](mailto:healthgeog@ons.gsi.gov.uk)

## 2.5 Comparability

*The degree to which data can be compared over time and domain.*

Life expectancy is an indicator of mortality which takes into account differences in the age structures of populations. Results for local areas can therefore be meaningfully compared, as can results for males and females.

All figures for life expectancy at birth and at age 65 for 1991–93 onwards were calculated using the same method and are therefore comparable.

Life expectancy figures for 2000–02 to 2006–08 were revised in October 2010 following revisions in the mid-year population estimates for 2002 to 2008. Results for 1991–93 onwards are all based on the latest population estimates available.

Individual deaths are assigned to geographical areas by linking the postcode of usual residence of the deceased to the latest version of the National Statistics Postcode Directory (NSPD). This means that figures for each three-year period may be based on slightly different boundaries, where, for example, postcodes are re-allocated from one area into another. The impact on life expectancy results is minimal and comparability over time is not therefore affected. (Figures for 2000–02 to 2007–09 were published in October 2010 and are all based on the August 2010 version of the NSPD.)

The [national interim life tables](#)<sup>23</sup> provide the definitive life expectancy figures for the UK and constituent countries. These are calculated using complete life tables (based on single year of age) and should be used when comparing results with other countries.

Life expectancy figures for European countries are published by [Eurostat](#).<sup>28</sup>

## 2.6 Coherence

*The degree to which data that are derived from different sources or methods, but which refer to the same phenomenon, are similar.*

*National life expectancy figures*

The [national interim life tables](#)<sup>23</sup> provide the definitive period life expectancy figures for the entire UK and constituent countries. National interim life tables are calculated using complete life tables (based on single years of age) and are published separately. These figures are available for 1980–82 onwards.

To provide comparisons for regional and local area figures, national life expectancy results are also produced within this output using the same method as the sub-national results, with abridged life tables in which death and population data are aggregated into quinary (five-year) age groups. Therefore, the two sets of national figures may differ very slightly (usually around 0.1 years).

Figures for England will also differ slightly from the national interim life table results because of a difference in the handling of deaths of non-residents. For this output, the deaths of non-residents are included in the mortality figures for England and Wales, but are excluded from the figures for England and Wales separately. However, for the national interim life tables, the deaths of non-residents in England and Wales are included in the mortality data for England, but not in Wales.

#### *Differences between period and cohort life expectancies*

Expectations of life can be calculated in two ways: period life expectancy (as used in this output) and cohort life expectancy.

Cohort life expectancies are calculated using age-specific mortality rates which allow for known or projected changes in mortality in later years and are therefore regarded as a more appropriate measure of how long a person of a given age would be expected to live, on average, than period life expectancy.

For example, period life expectancy at age 65 in 2000 would be worked out using the mortality rate for age 65 in 2000, for age 66 in 2000, for age 67 in 2000, and so on. Cohort life expectancy at age 65 in 2000 would be worked out using the mortality rate for age 65 in 2000, for age 66 in 2001, for age 67 in 2002, and so on.

Period life expectancies are a useful measure of mortality rates actually experienced over a given period and, for past years, provide an objective means of comparison of the trends in mortality over time, between areas of a country and with other countries. Official life tables in the UK and in other countries which relate to past years are generally period life tables for these reasons. Cohort life expectancies, even for past years, usually require projected mortality rates for their calculation and so, in such cases, involve an element of subjectivity.

More information on the [differences between period and cohort life expectancies](#)<sup>29</sup> can be found on the ONS website.

### **3 Summary of Methods Used to Compile the Output**

To calculate life expectancy, abridged (based on five-year age groups) life tables are constructed using standard methods,<sup>16,17</sup> through procedures which have been extensively tested. Separate tables are constructed for males and females. They are created using numbers of deaths registered in calendar years and mid-year population estimates. Life expectancy figures are calculated as three-year rolling averages to provide large enough numbers to ensure that the results are sufficiently robust.

Results and 95 per cent confidence intervals are calculated using an internal Stata programme and checked using a [life table template](#)<sup>2</sup> in MS Excel. The template provides a detailed description of the standard methods and notation associated with the calculation of life expectancy.

## 4 References

|    | Title of Reference   | Website Location  |
|----|--|---|
| 1  | Office for National Statistics - Quality   | <a href="http://www.ons.gov.uk/about-statistics/methodology-and-quality/quality/index.html">http://www.ons.gov.uk/about-statistics/methodology-and-quality/quality/index.html</a>   |
| 2  | Office for National Statistics - Life table templates  | <a href="http://www.statistics.gov.uk/statbase/ssdataset.asp?vlnk=6949">http://www.statistics.gov.uk/statbase/ssdataset.asp?vlnk=6949</a>   |
| 3  | Office for National Statistics - Life expectancy at birth and at age 65 by local areas in the United Kingdom   | <a href="http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=8841">http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=8841</a>   |
| 4  | Office for National Statistics - Life expectancy at birth: methodological options for small populations  | <a href="http://www.statistics.gov.uk/statbase/Product.asp?vlnk=10626">http://www.statistics.gov.uk/statbase/Product.asp?vlnk=10626</a>   |
| 5  | Office for National Statistics - Life expectancy at birth for wards in England and Wales (experimental)  | <a href="http://www.statistics.gov.uk/statbase/Product.asp?vlnk=14466">http://www.statistics.gov.uk/statbase/Product.asp?vlnk=14466</a>   |
| 6  | Office for National Statistics - Guide to Experimental Statistics  | <a href="http://www.statistics.gov.uk/CCI/nugget.asp?ID=173&amp;Pos=&amp;ColRank=1&amp;Rank=374">http://www.statistics.gov.uk/CCI/nugget.asp?ID=173&amp;Pos=&amp;ColRank=1&amp;Rank=374</a>                                   |
| 7  | UK Statistics Authority - Code of Practice for Official Statistics   | <a href="http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html">http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html</a>   |
| 8  | Office for National Statistics - Life expectancy at birth for wards in England and Wales, 1999-2003 (experimental statistics)  | <a href="http://www.statistics.gov.uk/downloads/theme_health/Ward_LE_report.pdf">http://www.statistics.gov.uk/downloads/theme_health/Ward_LE_report.pdf</a>   |
| 9  | Department of Health (2004) 'Tackling health inequalities: the spearhead group of Local Authorities and Primary Care Trusts'   | <a href="http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4101455">http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4101455</a> |
| 10 | Department of Health (2010) 'Mortality Monitoring Bulletin (Life expectancy, all-age-all-cause mortality, and mortality from selected causes, overall and inequalities)' | <a href="http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_120638">http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_120638</a>                 |
| 11 | The Marmot Review (2010) <i>Fair Society, Healthy Lives: The Marmot Review</i>   | <a href="http://www.marmotreview.org/">http://www.marmotreview.org/</a>   |
| 12 | Association of Public Health Observatories - Regional Health Profiles  | <a href="http://www.apho.org.uk/default.aspx?QN=P_HEALTH_PROFILES">http://www.apho.org.uk/default.aspx?QN=P_HEALTH_PROFILES</a>   |
| 13 | Office for National Statistics - Neighbourhood Statistics  | <a href="http://www.neighbourhood.statistics.gov.uk/">http://www.neighbourhood.statistics.gov.uk/</a>   |
| 14 | Office for National Statistics - Regional Trends   | <a href="http://www.statistics.gov.uk/regionaltrends/">http://www.statistics.gov.uk/regionaltrends/</a>   |
| 15 | Office for National Statistics - Pension Trends  | <a href="http://www.statistics.gov.uk/pensiontrends/">http://www.statistics.gov.uk/pensiontrends/</a>   |
| 16 | Shyrock, H.S. and Siegel, J.S. (1976) <i>The Methods and Materials of Demography</i> (abridged edition), Academic Press: New York, not available online.                 |   |
| 17 | Newell, C. (1994) <i>Methods and Models in Demography</i> , John Wiley & Sons: Chichester, not available online.   |   |
| 18 | Office for National Statistics - Population estimates for UK, England and Wales, Scotland and Northern Ireland – current datasets  | <a href="http://www.statistics.gov.uk/statbase/Product.asp?vlnk=15106">http://www.statistics.gov.uk/statbase/Product.asp?vlnk=15106</a>   |
| 19 | Office for National Statistics -   | <a href="http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=15096">http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=15096</a>   |

|    |   |   |
|----|---|---|
|    | Mortality Statistics: Deaths Registered in England and Wales (Series DR)  |   |
| 20 | General Register Office for Scotland, Vital Events - Deaths   | <a href="http://www.gro-scotland.gov.uk/statistics/theme/vital-events/deaths/index.html">http://www.gro-scotland.gov.uk/statistics/theme/vital-events/deaths/index.html</a> |
| 21 | Northern Ireland Statistics and Research Agency - Deaths  | <a href="http://www.nisra.gov.uk/demography/default.asp10.htm">http://www.nisra.gov.uk/demography/default.asp10.htm</a>   |
| 22 | Office for National Statistics - Population estimates for UK, England and Wales, Scotland and Northern Ireland                        | <a href="http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=601">http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=601</a>   |
| 23 | UK National Statistics Publication Hub  | <a href="http://www.statistics.gov.uk/hub/">http://www.statistics.gov.uk/hub/</a>   |
| 24 | Office for National Statistics - Table 6 - Life expectancy at birth and at age 65 and rank order of local areas in the United Kingdom | <a href="http://www.statistics.gov.uk/downloads/theme_population/table-6.xls">http://www.statistics.gov.uk/downloads/theme_population/table-6.xls</a>                       |
| 25 | Office for National Statistics - Interim Life Tables  | <a href="http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=14459">http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=14459</a>                                     |
| 26 | Office for National Statistics - Animated maps - life expectancy at birth by local authority in the United Kingdom                    | <a href="http://www.statistics.gov.uk/life-expectancy/default.asp">http://www.statistics.gov.uk/life-expectancy/default.asp</a>   |
| 27 | Office for National Statistics - Life expectancy at birth by health and local authorities in the United Kingdom – Previous Releases   | <a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=10860">http://www.statistics.gov.uk/statbase/product.asp?vlnk=10860</a>                                     |
| 28 | Eurostat  | <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home">http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home</a>                           |
| 29 | Office for National Statistics - Period and cohort life expectancy tables   | <a href="http://www.statistics.gov.uk/statbase/Product.asp?vlnk=15098">http://www.statistics.gov.uk/statbase/Product.asp?vlnk=15098</a>                                     |