NHS Outcomes Framework

Domain 1
Preventing people from dying prematurely

Indicator Specifications

Version: 1.21
Date: May 2018
Author: Clinical Indicators Team
## Document Management

### Revision history

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<td>Person-level indicator values added for all breakdowns and years</td>
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|1.21|May 2018|
|All|Updated to reflect new name for Ministry of Housing, Communities & Local Government|
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1a.i Potential years of life lost (PYLL) from causes considered amenable to healthcare – adults

Indicator assurance

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Overview

Indicator title
1a.i Potential years of life lost from causes considered amenable to healthcare – adults

Indicator family name
NHS Outcomes Framework: Domain 1 – Preventing people from dying prematurely

Overarching indicator

Outcome sought
Reduced premature mortality from causes amenable to healthcare.

Detailed Descriptor
Plain English description
The number of years of life lost by every 100,000 adults aged 20 and over dying from conditions which are usually treatable, measured in a way which allows for comparisons between populations with different age profiles and over time.

Technical description
Directly age-standardised potential years of life lost (PYLL) rate from amenable causes for adults.

Data sources

Denominator
Office for National Statistics (ONS) mid-year population estimates of the relevant age group and gender based on the 2011 Census - National Statistics. Published annually (calendar years) by the ONS. Usually available in June following year-end.
NHS Outcomes Framework: 1a.i - Potential years of life lost (PYLL) from causes considered amenable to healthcare - adults

Numerator
Avoidable mortality data by cause - National Statistics (Used to determine amenable conditions - see appendix 1) Published annually by the ONS. Available in autumn following year-end.

Primary care mortality database (PCMD) - Managed by NHS Digital. Bespoke extract taken annually, usually in September each year

Period life expectancy tables - National Statistics. Published every two years by ONS. See appendices 2a and 2b for the most recently published life expectancy tables.


Construction

Introduction
The PYLL rate is calculated by weighting the number of ‘amenable’ deaths in a given year by the number of additional years the person who died might have been expected to live in the presence of timely and effective healthcare.

The average age-specific life expectancies for each five-year age band are used to weight the number of deaths in that age band to give the average number of years of life lost for that age band. The life expectancy for the 90+ age band is calculated as an average of the single-year life expectancies for ages 90 to 100. This is then applied to the number of deaths for people aged 90 or over. The age-specific period life expectancy is different for each year and gender and can be found in appendices 2a and 2b. The total number of years of life lost for males and females is summed for each age band and the result is expressed as a European age-standardised rate per 100,000 population. For person-level PYLL values the total number of years of life lost for males and females is added up to get a years of life lost (YLL) value for all persons. This is then expressed as a European age-standardised rate per 100,000 population as for males and females.

The 2013 European standard population is used, which can be seen in appendix 3.

Data fields
The data fields and filters used within the ONS mortality data are as follows:

- CALCULATED_AGE_UNIT
- CALCULATED_AGE
- SEX
- DATE_OF_REGISTRATION
- LSOA_OF_RESIDENCE_CODE
- UNDERLYING_CAUSE_OF_DEATH

Data Filters

1. Field Name  CALCULATED_AGE_UNIT
Conditions: When CALCULATED_AGE_UNIT equals 2, 3 or 4 recode age to zero years

Rationale: The calculated age unit is used to specify whether the CALCULATED_AGE field refers to years (1), months (2), weeks (3) or days (4) of life.

2. Field Name: CALCULATED_AGE
   Conditions: Is greater than 19. For upper age limit please see appendix 1.
   Rationale: Selects all adults over the age of 19. The relevant upper age limits for each condition group are presented in appendix 1.

3. Field Name: DATE_OF_REGISTRATION
   Conditions: Is between 1 January and 31 December of the respective calendar year inclusive.
   Rationale: Selects only those deaths registered during the relevant calendar year.

4. Field Name: SEX
   Conditions: Is equal to 1 or 2
   Rationale: A valid sex field is required when directly standardising by age and sex.

5. Field Name: LSOA_OF_RESIDENCE_CODE
   Conditions: Is equal to a valid English Lower Super Output Area (LSOA).
   Rationale: This restricts data to patients resident in England. A valid English LSOA starts with the letter ‘E’.

6. Field Name: UNDERLYING_CAUSE_OF_DEATH
   Conditions: See appendix 1
   Rationale: A list of ICD-10 codes, which define causes considered amenable to healthcare for this indicator and the relevant age limits can be seen in appendix 1.

Calculation
Denominator
ONS mid-year population estimates of the population aged 20 years and over.
NHS Outcomes Framework: 1a.i - Potential years of life lost (PYLL) from causes considered amenable to healthcare - adults

**Numerator**

Number of deaths, where the individual was aged 20 years and over, from causes considered amenable to healthcare multiplied by the age-specific life expectancy for the relevant age group and gender.

**European age-standardised PYLL calculation**

\[
\text{PYLL Rate} = \frac{\sum_i \left( w_i \cdot \frac{a_i d_i}{n_i} \right)}{\sum_i w_i} \times 100,000
\]

where:

- \(i\) is the age group (20-24, 25-29, 30-34, ..., 70-74, 75-79, 80-84, 85-89, 90+);
- \(d_i\) is the observed number of deaths in the subject population age group \(i\);
- \(a_i\) is the weight, or average age-specific life expectancy, for that age-group and that gender in that year;
- \(n_i\) is number of individuals in the subject population in age group \(i\);
- \(w_i\) is the number of individuals in the standard population in age group \(i\).

**Confidence Intervals for Directly Standardised Rates (DSRs)**

95% confidence intervals are calculated using Dobson’s\(^1\) and Byar’s\(^2\) methods. Byar’s method is recommended for larger counts whereas for smaller numerators (less than 389) a more exact method based on the Poisson distribution (Dobson’s method) is used:

\[
\begin{align*}
\text{DSR}_{\text{lower}} &= \text{DSR} + \sqrt{\frac{\text{Var}(\text{DSR})}{\text{Var}(O)}} (O_{\text{lower}} - O) \\
\text{DSR}_{\text{upper}} &= \text{DSR} + \sqrt{\frac{\text{Var}(\text{DSR})}{\text{Var}(O)}} (O_{\text{upper}} - O)
\end{align*}
\]

where:

- \(O\) is the total number of years of life lost in the subject population.

---


\[ V_{\text{ar}}(DSR) = \frac{\sum_i a_i^2 w_i^2 O_i}{n_i^2 (\sum_i w_i)^2} \]

where:
- \( a_i \) is the life expectancy for age group \( i \)
- \( w_i \) is the reference (standard) population for age group \( i \)
- \( O_i \) is the observed number of deaths in age group \( i \)
- \( n_i \) is the denominator population for age group \( i \)

\[ V_{\text{ar}}(O) = \sum_i O_i \]

\( O_{\text{lower}} \) and \( O_{\text{upper}} \) are the lower and upper confidence limits for the observed number of events;

When \( O < 389 \) then,

\[ O_{\text{lower}} = \frac{\chi^2_{\text{lower}}}{2} \]
\[ O_{\text{upper}} = \frac{\chi^2_{\text{upper}}}{2} \]

where:
- \( \chi^2_{\text{lower}} \) is the 97.5\(^{\text{th}}\) percentile value from the \( \chi^2 \) distribution with 2\( O \) degrees of freedom;
- \( \chi^2_{\text{upper}} \) is the 2.5\(^{\text{th}}\) percentile value from the \( \chi^2 \) distribution with 2\( O+2 \) degrees of freedom.

When \( O \geq 389 \) then,

\[ O_{\text{lower}} = O \left( 1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}} \right)^3 \]
\[ O_{\text{upper}} = (O + 1) \left( 1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}} \right)^3 \]

where:
- \( z \) is the 97.5\(^{\text{th}}\) percentile value from the Standard Normal distribution.

**Confidence Intervals for Crude Rates**

Where the indicator values are broken down by age and gender direct standardisation is not possible and crude rates are calculated instead. Although still based on the Dobson’s and Byar’s method, in these cases 95% confidence intervals are calculated using a different methodology:

\[ n_{\text{lower}} = \frac{O_{\text{lower}}}{n} \]
Potential years of life lost (PYLL) from causes considered amenable to healthcare - adults

\[ r_{upper} = \frac{O_{upper}}{n} \]

where:

- \( r \) is the crude rate and \( r_{lower} \) and \( r_{upper} \) are the lower and upper confidence limits for the crude rate;
- \( O \) is the total number of years of life lost in the subject population and \( O_{lower} \) and \( O_{upper} \) are the lower and upper confidence limits for the total number of years of life lost;
- \( n \) is the number of individuals in the subject population.

The confidence intervals for the total number of years of life lost are given by the following formulas.

When \( O < 389 \) then,

\[ O_{lower} = \frac{\chi^2_{lower}}{2} \]
\[ O_{upper} = \frac{\chi^2_{upper}}{2} \]

where:

- \( \chi^2_{lower} \) is the 97.5\(^{th} \) percentile value from the \( \chi^2 \) distribution with \( 2O \) degrees of freedom;
- \( \chi^2_{upper} \) is the 2.5\(^{th} \) percentile value from the \( \chi^2 \) distribution with \( 2O+2 \) degrees of freedom.

When \( O \geq 389 \), then,

\[ O_{lower} = O \left(1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}}\right)^3 \]
\[ O_{upper} = (O + 1) \left(1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}}\right)^3 \]

where:

- \( z \) is the 97.5\(^{th} \) percentile value from the Standard Normal distribution.

**Deprivation breakdown**

The deprivation breakdowns for this indicator have all been derived using the 2015 Index of Multiple Deprivation (IMD) scores which are based on 2011 lower super output area (LSOA) boundaries. These data are published by the Ministry of Housing, Communities & Local Government (MHCLG) department, the latest publication can be found here: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015
To create the deprivation breakdowns, both numerator and denominator data need to be available at LSOA level.

Between 2009 and 2011, the numerator (mortality) data were sourced directly from ONS and a postcode of residence was included but LSOA of residence was not. For these data, NHS Digital used a reference table from ONS’s open geography portal to derive the LSOA from the postcode. From 2012 onwards, the numerator data were sourced from the NHS Digital PCMD, from which the LSOA of residence is already included.

For the denominator (population) values, data for all years are sourced from ONS at LSOA level.

Once all numerator and denominator data have LSOAs allocated, NHS Digital then uses the IMD data published by MHCLG to derive the deprivation deciles from the LSOAs.

**Presentation**

**Breakdowns**

**Time periods**
Annual data from 2003.

**Demographic**
Gender: Males, females and all persons for England, age, lower tier local authority, region and condition (by calendar year)
Age: 5-year age bands from age 20 for males, females and all persons (by calendar year)
Deprivation: Deciles from ‘1 – Most deprived’ to ‘10 – Least deprived’ for males, females and all persons (by calendar year from 2009)

**Geographic**
England: Male, female and all persons (by calendar year)
Local authority: Male, female and all persons (by calendar year)
Region: Male, female and all persons (by calendar year)

**Other**
Condition: Male, female and all persons by amenable cause group (by calendar year)

**Disclosure control**
From 2013 onwards, combined indicator values have been calculated for Cornwall and Isles of Scilly and Hackney and City of London. These were previously suppressed. For calendar years 2003 to 2012 the suppression has been relaxed to reflect the new disclosure rules, however, where either Isles of Scilly or City of London have a numerator of 0,1 or 2 for this
time period they have remained suppressed along with another local authority within the region. This is to reduce the risk of one suppressed number being identifiable in isolation. All other local authority values with a numerator between 0 and 2 (inclusive) that have previously been suppressed have been published for the first time in November 2014. This is due to an update of the ONS disclosure control rules:


Further, denominator figures sourced from the relevant ONS mid-year population estimates are rounded to the nearest 100.

**Excel and CSV output**

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1a.ii Potential years of life lost (PYLL) from causes considered amenable to healthcare – children and young people

Indicator assurance

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Overview

Indicator title
1a.ii Potential years of life lost from causes considered amenable to healthcare – children and young people

Indicator family name
NHS Outcomes Framework: Domain 1 – Preventing people from dying prematurely
Overarching indicator

Outcome sought
Reduced premature mortality from causes amenable to healthcare.

Detailed Descriptor
Plain English description
The number of years of life lost by every 100,000 persons aged 0 to 19 dying from conditions which are usually treatable, measured in a way which allows for comparisons between populations with different age profiles and over time.

Technical description
Directly age-standardised potential years of life lost (PYLL) rate from amenable causes for children.
Data sources

Denominator
Office for National Statistics (ONS) mid-year population estimates of the relevant age group and gender based on the 2011 Census - National Statistics. Published annually (calendar years) by the ONS. Usually available in June following year-end.

Numerator
Avoidable mortality data by cause - National Statistics (Used to determine amenable conditions - see appendix 1). Published annually by the ONS. Available in autumn following year-end.

Primary care mortality database (PCMD) - Managed by NHS Digital. Bespoke extract taken annually, usually in September each year

Period life expectancy tables - National Statistics. Published every two years by the ONS. See appendices 2a and 2b for the most recently published life expectancy tables.

Standard population
2013 European standard population. See appendix 3.

Construction

Introduction
The PYLL rate is calculated by weighting the number of ‘amenable’ deaths in a given year by the number of additional years the person who died might have expected to live in the presence of timely and effective healthcare.

The average age-specific life expectancies for each five-year age band are used to weight the number of deaths in that age band to give the average number of years of life lost for that age band. The age-specific period life expectancy is different for each year and gender and can be found in appendices 2a and 2b. The total number of years of life lost for males and females is summed for each age band and the result is expressed as a European age-standardised rate per 100,000 population. For person-level PYLL values the total number of years of life lost for males and females is added up to get a years of life lost (YLL) value for all persons. As for males and females, this is then expressed as a European age-standardised rate per 100,000 population.

The 2013 European standard population is used, which can be seen in appendix 3.

Data fields
The data fields and filters used within the ONS mortality data are as follows:

CALCULATED_AGE_UNIT
CALCULATED_AGE
SEX
**DATA_FILTERS**

1. **Field Name:** CALCULATED_AGE_UNIT  
   **Conditions:** When CALCULATED_AGE_UNIT equals 2, 3 or 4 recode age to zero years  
   **Rationale:** The calculated age unit is used to specify whether the CALCULATED_AGE field refers to years (1), months (2), weeks (3) or days (4) of life.

2. **Field Name:** CALCULATED_AGE  
   **Conditions:** See appendix 1  
   **Rationale:** Combined with the recoded zero ages from CALCULATED_AGE_UNIT selects the relevant age limits for each condition group as presented in appendix 1.

3. **Field Name:** DATE_OF_REGISTRATION  
   **Conditions:** Is between 1 January and 31 December of the respective calendar year inclusive.  
   **Rationale:** Selects only those deaths registered during the relevant calendar year.

4. **Field Name:** SEX  
   **Conditions:** Is equal to 1 or 2  
   **Rationale:** A valid sex field is required when directly standardising by age and sex.

5. **Field Name:** UNDERLYING_CAUSE_OF_DEATH  
   **Conditions:** See appendix 1  
   **Rationale:** A list of ICD-10 codes, which define causes considered amenable to healthcare for this indicator and the relevant age limits can be seen in appendix 1.
Calculation

Denominator

ONS mid-year population estimates of the population aged 19 years and under.

Numerator

Number of deaths, where the individual was aged 19 years and under, from causes considered amenable to healthcare multiplied by the age-specific life expectancy for the relevant age group and gender.

European age-standardised PYLL calculation

\[
PYLL \text{ Rate} = \frac{\sum_{i} \left( w_i \cdot \frac{a_i d_i}{n_i} \right)}{\sum_{i} w_i} \times 100,000
\]

where:

- \(i\) is the age group (0-4, 5-9, 10-14, 15-19);
- \(d_i\) is the observed number of deaths in the subject population age group \(i\);
- \(a_i\) is the weight, or average age-specific life expectancy, for that age group and that gender in that year;
- \(n_i\) is number of individuals in the subject population in age group \(i\);
- \(w_i\) is the number of individuals in the standard population in age group \(i\).

Confidence Intervals for Directly Standardised Rates (DSRs)

95% confidence intervals are calculated using Dobson's\(^3\) and Byar's\(^4\) methods. Byar's method is recommended for larger counts whereas for smaller numerators (less than 389) a more exact method based on the Poisson distribution (Dobson's method) is used:

\[
DSR_{\text{lower}} = DSR + \sqrt{\frac{\text{Var}(DSR)}{\text{Var}(O)}} (O_{\text{lower}} - O)
\]

\[
DSR_{\text{upper}} = DSR + \sqrt{\frac{\text{Var}(DSR)}{\text{Var}(O)}} (O_{\text{upper}} - O)
\]

where:


\( \mathcal{O} \) is the total number of years of life lost in the subject population.

\[
Var(DSR) = \frac{\sum_i a_i^2 w_i^2 O_i}{\left(\sum_i w_i\right)^2}
\]

where:

- \( a_i \) is the life expectancy for age group \( i \)
- \( w_i \) is the reference (standard) population for age group \( i \)
- \( O_i \) is the observed number of deaths in age group \( i \)
- \( n_i \) is the denominator population for age group \( i \)

\[
Var(\mathcal{O}) = \sum_i O_i
\]

\( O_{lower} \) and \( O_{upper} \) are the lower and upper confidence limits for the observed number of events;

When \( \mathcal{O} < 389 \) then,

\[
O_{lower} = \frac{\chi^2_{lower}}{2}
\]

\[
O_{upper} = \frac{\chi^2_{upper}}{2}
\]

where:

\( \chi^2_{lower} \) is the 97.5\textsuperscript{th} percentile value from the \( \chi^2 \) distribution with 2\( O \) degrees of freedom;

\( \chi^2_{upper} \) is the 2.5\textsuperscript{th} percentile value from the \( \chi^2 \) distribution with 2\( O + 2 \) degrees of freedom.

When \( \mathcal{O} \geq 389 \) then,

\[
O_{lower} = O \left(1 - \frac{1}{9O} \right)^3
\]

\[
O_{upper} = (O + 1) \left(1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}}\right)^3
\]

where:

\( z \) is the 97.5\textsuperscript{th} percentile value from the Standard Normal distribution.
NHS Outcomes Framework: 1a.ii– Potential years of life lost (PYLL) from causes considered amenable to healthcare – children and young people

Presentation

Breakdowns

Time periods
Annual data from 2003.

Demographic
Gender: Males, females and all persons for England (by calendar year)

Disclosure control
Suppression rules are currently not applicable as the indicator values are only published at national level and broken down by gender.

Denominator figures sourced from the relevant ONS mid-year population estimates are rounded to the nearest 100.

Excel and CSV output

<table>
<thead>
<tr>
<th>Column name</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Calendar year</td>
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<tr>
<td>Period of coverage</td>
<td>Period of coverage for the calendar year (1/1 to 31/12 for the respective year)</td>
</tr>
<tr>
<td>Breakdown</td>
<td>England, gender</td>
</tr>
<tr>
<td>Level</td>
<td>Level of breakdown</td>
</tr>
<tr>
<td>Level description</td>
<td>Description of breakdown level</td>
</tr>
<tr>
<td>Gender</td>
<td>Person, male, female</td>
</tr>
<tr>
<td>Indicator value</td>
<td>Directly European age-standardised rate of the potential years of life lost due to causes considered amenable to healthcare</td>
</tr>
<tr>
<td>Lower CI</td>
<td>Lower limit of 95% confidence interval</td>
</tr>
<tr>
<td>Upper CI</td>
<td>Upper limit of 95% confidence interval</td>
</tr>
<tr>
<td>Years of life lost</td>
<td>Years of life lost due to deaths amenable to healthcare (numerator)</td>
</tr>
<tr>
<td>Population</td>
<td>Population count (denominator)</td>
</tr>
<tr>
<td>Observed deaths</td>
<td>Number of observed deaths amenable to healthcare</td>
</tr>
</tbody>
</table>
1b.i and 1b.ii Life expectancy at age 75 for males and females

Indicator assurance

<table>
<thead>
<tr>
<th>Status</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methodology Review Group (MRG) recommended</td>
<td>April 2011</td>
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<tr>
<td></td>
<td>September 2016 reviewed and health inequality measure introduced</td>
</tr>
<tr>
<td>Indicator Governance Board (IGB) assured</td>
<td>April 2011</td>
</tr>
</tbody>
</table>

Overview

Indicator title
1b Life expectancy at 75: i. males and ii. females

Indicator family name
NHS Outcomes Framework: Domain 1 – Preventing people from dying prematurely
Overarching indicator

Outcome sought
Increased life expectancy at age 75, for males and females separately.

Detailed Descriptor

Plain English description
The average number of additional years a man or woman aged 75 can be expected to live if they continue to live in the same place and the death rates in their area remain the same for the rest of their life.

Technical description
Period expectation of life at age 75.

Data sources
The three-year average life expectancies at national, regional and local authority level come directly from the pivot table released with the ONS publication “Health state life expectancy - All ages, UK”:
https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifelongevity/healthstatelifeexpectancyallagesuk

The three-year average life expectancies for the deprivation breakdowns are provided fully calculated by ONS in a bespoke file but are derived using the same methodology as above.
The deprivation breakdowns are based on the 2015 Index of Multiple Deprivation (IMD) scores for England which use the Lower Super Output Area (LSOA) boundaries created in 2011. These data are produced by the Ministry of Housing, Communities & Local Government (MHCLG) department roughly every three years:

The one-year average life expectancies for this indicator, available at national level only, are sourced directly from the ONS publication "Expectation of Life, Principal Projection, England":
http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/datasets/expectationoflifeprincipalprojectionengland

Construction

Period life expectancies use mortality rates from a single year (or group of years) and assume that those rates apply throughout the remainder of a person’s life. This means that any future changes to mortality rates would not be taken into account. 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. Also, when looking at specific geographical areas, the method makes no allowance for the different areas people may live in for at least some part of their lives which may have different mortality rates.

However, period life expectancies are used in this indicator because they provide 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.

A cohort life expectancy is calculated using a combination of observed mortality rates for past years and projections about mortality rates for a group of people born in a certain year in future years. Cohort life expectancies are thus regarded as a more appropriate measure of how long a person would be expected to live than period life expectancies. Cohort life expectancies are commonly found in ONS publications but they are not used in the NHS OF indicator files.

For example, period life expectancy at age 75 in 2013 would be worked out using the mortality rate for age 75 in 2013, for age 76 in 2013, for age 77 in 2013, and so on. Cohort life expectancy at age 75 in 2013 would be worked out using the mortality rate for age 75 in 2013, for age 76 in 2014, for age 77 in 2015, and so on.

Calculation

Life tables are calculated for males and females separately. Combined tables are not calculated as the mortality experience is sufficiently different between genders. The figures are calculated using the deaths registered in each calendar year and the mid-year population estimates. Further information about the methodologies used to create the data sources can be found on the ONS website using the links above.

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Deprivation-related inequality in life expectancies

Using the indicator values for deprivation deciles supplied by ONS, a set of summary measures describing deprivation-related inequality have been calculated.
The slope index of inequality (SII) is a measure of the social gradient for life expectancy, i.e. how much do life expectancies vary between people living in different deprivation deciles. It takes account of inequality across the range of deprivation deciles and summarises this in a single number. This represents the difference in life expectancy across the social gradient from most to least deprived, based on a statistical analysis of the relationship between life expectancy and deprivation across all deprivation deciles.

An SII value of 3.0 in the context of this indicator shows that the range in life expectancy at age 75 across the social gradient from most to least deprived is 3.0 years. Reducing the SII value is desirable; a value of zero indicates equality.

**SII calculation**

The SII is calculated using population-weighted linear regression. To allow for differences in population size between deprivation deciles, each is given a rank score based on the midpoint of its range in the cumulative distribution of the population. The deciles are first ordered from most deprived to least deprived. If decile 1 contains 12% of the population, its rank score would be 12/2=6. If decile 2 includes 10% of the population, its rank score would be 12+(10/2)=17. Life expectancy is plotted against this rank score and a population-weighted regression line is fitted to the data by the least squares method. The SII is the gradient of the resulting fitted line.

The calculation of the SII is performed using the inequalities calculation tool supplied by the Association of Public Health England (PHE)\(^5\).

Explicitly, the SII is calculated as:

\[
SII = \frac{\sum wxy - (\sum wx \cdot \sum wy)}{\sum wx^2 - (\sum wx)^2}
\]

Where:

- \(w\) is the percentage of the population in the deprivation group
- \(x\) is the cumulative proportion of the population at the mid-point of the deprivation group
- \(y\) is the indicator value of the deprivation group

**SII confidence interval calculation**

Confidence intervals for the slope index values are calculated by a simulation method.

The slope index value is calculated many times, and the confidence intervals are selected from the resulting distribution of SII values. The life expectancies for each deprivation decile for each time period and gender are generated 1,000,000 times, and SII\(_s\) are then calculated for each of these simulations giving 1,000,000 SII values for each time period and gender combination. These are then ranked and the 25,000\(^{th}\) and 975,000\(^{th}\) values are selected as the 95% lower and upper confidence intervals for the SII respectively.

In order to generate the life expectancies on which the SII are based, the standard error of each life expectancy indicator value is calculated as follows:

---

\(^5\) https://fingertips.phe.org.uk/documents/PHE%20Inequalities%20Calculation%20Tool.xls
\[ SE = \frac{UCI - LCI}{z} \]

Where

UCI and LCI are the 95% upper and lower confidence intervals of the life expectancy indicator value respectively.

\( z \) is the 97.5 percentile point of the normal distribution.

A random number generator is then used to generate 1,000,000 random values from a normal distribution with mean 0 and standard deviation 1. These values \( b \) are then used to calculate 1,000,000 life expectancies \( LE_{sim} \) for each deprivation decile as follows:

\[ LE_{sim1...1,000,000} = LE + SE \times b_{1...1,000,000} \]

Where

\( LE \) is the life expectancy indicator value for the respective deprivation decile.

\( SE \) is the standard error for the life expectancy value.

An SII is then calculated for each life expectancy set using the SII formula described earlier in this section.

**RII calculation**

The SII measures the absolute extent of difference in life expectancy between the most and least deprived deciles. For example, if life expectancy for all deprivation deciles increased by 10 per cent, then the SII would increase by 10 per cent, i.e. the absolute difference between the most and least deprived decile has widened.

The Relative Index of Inequality (RII) provides a different perspective on the level of health inequality by considering how the level of health inequality compares with the overall level of the indicator.

In the example above, where all values increase by 10 per cent, the RII would remain constant, indicating that although there is a growing inequality it is the case that the extent of the inequality is stable when compared to the mean life expectancy.

An increase in the RII value indicates that the extent of the inequality is increasing as a proportion of the overall indicator value. A reduction of the RII over time is therefore desirable. The relative index is calculated as the slope index divided by the mean weighted indicator value (\( Y \)):

\[ RII = \frac{SII}{wY} \]

Where:
w is the percentage of the population in the deprivation group
y is the indicator value

The confidence intervals of the RII are calculated from the SII confidence intervals as:

\[
RII \text{ CI lower} = \frac{\text{CI lower}}{w \cdot y}
\]

\[
RII \text{ CI upper} = \frac{\text{CI upper}}{w \cdot y}
\]

Presentation

Breakdowns

Time periods

One-year estimates from 1990 onwards
Three-year estimates from 2001-03 onwards

Demographic

Deprivation decile: Male and female

Geographic

England: Male and female
Local authority: Male and female
Region: Male and female
Slope index of inequality: Male and female
Relative index of inequality: Male and female

Disclosure control

Life expectancy figures are not calculated for City of London or Isles of Scilly due to small numbers of deaths and populations. This is denoted by the symbol *.

Excel and CSV output

<table>
<thead>
<tr>
<th>Column name</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Calendar year and 3-year period</td>
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<tr>
<td>Period of coverage</td>
<td>1/1 to 31/12 of respective period</td>
</tr>
<tr>
<td>Breakdown</td>
<td>England, local authority, region, deprivation decile</td>
</tr>
<tr>
<td>Level</td>
<td>Level of breakdown</td>
</tr>
<tr>
<td>Level description</td>
<td>Description of breakdown category</td>
</tr>
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<td>Gender</td>
<td>Male or female</td>
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<tr>
<td>Indicator value</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Lower CI</td>
<td>Lower limit of 95% confidence interval where applicable</td>
</tr>
<tr>
<td>Upper CI</td>
<td>Upper limit of 95% confidence interval where applicable</td>
</tr>
<tr>
<td>Population</td>
<td>Population count aged 75 and over</td>
</tr>
<tr>
<td>SII</td>
<td>Slope Index of Inequality</td>
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<tr>
<td>CI Lower – SII</td>
<td>95% lower confidence interval of SII</td>
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<tr>
<td>CI Upper - SII</td>
<td>95% upper confidence interval of SII</td>
</tr>
<tr>
<td>RII</td>
<td>Relative Index of Inequality</td>
</tr>
<tr>
<td>CI Lower – RII</td>
<td>95% lower confidence interval of RII</td>
</tr>
<tr>
<td>CI Upper - RII</td>
<td>95% upper confidence interval of RII</td>
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1c Neonatal mortality and stillbirths (formerly indicator 1.6.ii)

Indicator assurance

<table>
<thead>
<tr>
<th>Status</th>
<th>Date</th>
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</thead>
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<tr>
<td>Methodology Review Group (MRG) recommended</td>
<td>April 2011</td>
</tr>
<tr>
<td>Indicator Governance Board (IGB) assured</td>
<td>April 2011</td>
</tr>
</tbody>
</table>

Overview

Indicator title
1c Neonatal mortality and stillbirths

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Overarching indicator

Outcome sought
Reduced neonatal mortality and stillbirths.

Detailed Descriptor

Plain English description
The number of babies stillborn or dying before 28 days old for every 1,000 that were born alive or stillborn.

Technical description
The number of stillbirths and deaths under 28 days, per 1,000 live births and stillbirths.

Data sources
The national and regional data for England are published annually (calendar years) by the Office for National Statistics (ONS) in the Childhood Mortality publication (National Statistics), available approximately 14 months after the end of the reporting year. The latest data and publication can be found here:
https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/childhoodinfantandperinatalmortalityinenglandandwales/previousReleases

The age of mother, local authority and deprivation data for England are not routinely published by ONS and are provided separately in a bespoke file.
Construction

Introduction
Data for this indicator are sourced from ONS.

Data filters
The England numbers excluding non-residents of England and Wales are selected for the national indicator.

Calculation
The raw data are sourced from ONS and the indicator rates are calculated by NHS Digital.

The rate is per thousand live births and stillbirths. The numerator is the number of stillbirths and deaths under 28 days occurring during the year. The denominator is the number of live births and stillbirths occurring during the year. A full definition of each can be found in the original ONS publications.

The indicator values are rounded to one decimal place.

Neonatal deaths at local authority, region, mother’s age and deprivation quintile level which make up part of this indicator’s numerator are sourced from a linked dataset which ascertains these characteristics from the birth record. The linked dataset is a live system which is continuously updated.

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Presentation

Breakdowns

Time periods
Annual data from 1/1/1999 to 31/12/1999 onwards

Demographic
Gender: Male and female level data from 1/1/1999 to 31/12/1999 onwards
Age: Age of mother in age bands under 20, 20 to 24, 25 to 29, 30 to 34, 35 to 39 and 40 and over from 1/1/1999 to 31/12/1999 onwards
Deprivation: Deprivation quintiles from 1/1/1999 to 31/12/1999 onwards

Geographic
England: England level data from 1/1/1999 to 31/12/1999 onwards
Local authority: Local authority level data from 1/1/1999 to 31/12/1999 onwards
Region: Region level data from 1/1/1999 to 31/12/1999 onwards

Disclosure control

Values for Cornwall and Isles of Scilly and Hackney and City of London have been combined and no values are currently suppressed. This is in line with the ONS Childhood Mortality publication. Stillbirth values between 0 and 2 (inclusive) and the neonatal mortality and stillbirth rates based on these, which were previously suppressed, were published for the first time in November 2014. This is due to an update of the ONS disclosure control rules:

https://www.ons.gov.uk/methodology/methodologytopicsandstatisticalconcepts/disclosurecontrol/guidanceforbirthanddeathsstatistics

Excel and CSV output

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<thead>
<tr>
<th>Column name</th>
<th>Output</th>
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<td>The exact dates of coverage</td>
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<tr>
<td>Breakdown</td>
<td>England, gender, age of mother, local authority, region, deprivation quintile</td>
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<td>The level of each breakdown</td>
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<td>Level description</td>
<td>Description of each level</td>
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<td>Neonatal mortality and stillbirth rate per 1,000 live births and stillbirths</td>
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<td>The number of live births in the time period</td>
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<tr>
<td>Stillbirths</td>
<td>The number of stillbirths in the time period</td>
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<tr>
<td>Neonatal deaths</td>
<td>The number of neonatal deaths in the time period</td>
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1.1 Under 75 mortality rate from cardiovascular disease

Indicator assurance

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<tr>
<th>Status</th>
<th>Date</th>
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<tbody>
<tr>
<td>Methodology Review Group (MRG) recommended</td>
<td>April 2011</td>
</tr>
<tr>
<td>Indicator Governance Board (IGB) assured</td>
<td>April 2011</td>
</tr>
</tbody>
</table>

Overview

**Indicator title**
1.1 Under 75 mortality rate from cardiovascular disease

**Indicator family name**
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature mortality from the major causes of death

**Outcome sought**
Reduced premature mortality from cardiovascular disease.

**Detailed Descriptor**

**Plain English description**
A measure of the likelihood of dying of heart disease under the age of 75, which allows for comparisons between populations with different age profiles and over time.

**Technical description**
Directly age-standardised mortality rate from cardiovascular disease for people aged under 75.

**Alignment with other Outcomes Frameworks**
Shared with Public Health Outcomes Framework Indicator 4.04i
Data sources

Denominator
Mid-year population estimates of the relevant age group and gender, based on the 2011 Census – National Statistics
Published annually (calendar years) by the Office for National Statistics (ONS).
Usually available in June following year-end.

Numerator
Primary care mortality database (PCMD) - Managed by NHS Digital
Bespoke extract taken annually, usually in September each year

Standard population
2013 European standard population, see appendix 3.

Construction

Introduction
The method used for this indicator is direct standardisation. The mortality rates are directly standardised to the 2013 European Standard Population to allow international comparison.

Data fields
The data fields and filters used within the ONS mortality data are as follows:

CALCULATED_AGE_UNIT
CALCULATED_AGE
SEX
DATE_OF_REGISTRATION
LSOA_OF_RESIDENCE_CODE
UNDERLYING_CAUSE_OF_DEATH

Data Filters
1. Field Name  CALCULATED_AGE_UNIT
   Conditions When CALCULATED_AGE_UNIT equals 2, 3 or 4 recode age to zero years
   Rationale: The calculated age unit is used to specify whether the CALCULATED_AGE field refers to years (1), months (2), weeks (3) or days (4) of life.

2. Field Name  CALCULATED_AGE
Conditions Is between (inclusive): 0 and 74
Rationale Combined with the recoded zero ages from CALCULATED_AGE_UNIT selects only those aged under 75 years at the time of death

3. Field Name DATE_OF_REGISTRATION
Conditions Is between 1 January and 31 December of the respective calendar year inclusive.
Rationale Selects only those deaths registered during the relevant calendar year.

4. Field Name SEX
Conditions Is equal to 1 or 2
Rationale A valid sex field is required when directly standardising by age and sex.

5. Field Name LSOA_OF_RESIDENCE_CODE
Conditions Is equal to a valid English Lower Super Output Area (LSOA).
Rationale This restricts data to patients resident in England. A valid English LSOA starts with the letter ‘E’.

6. Field Name UNDERLYING_CAUSE_OF_DEATH
Conditions ICD-10 codes I00-I99
Rationale Selects those whose underlying cause of death was coded on the death certificate as cardiovascular disease.

**Calculation**

**Denominator**

2011 Census-based mid-year population estimates for all calendar years.

**Numerator**

Number of deaths for which cardiovascular disease is given as the underlying cause of death (ICD-10 I00-I99), registered in the respective calendar year(s). The data are based on the original causes of death recorded on the death certificate rather than the final amended causes.

**Direct Standardisation**

The directly age-standardised rate is the rate of events that would occur in a standard population if that population were to experience the age-specific rates of the subject population. Explicitly:
NHS Outcomes Framework: 1.1 - Under 75 mortality rate from cardiovascular disease

\[ DSR = \frac{\sum w_i r_i}{\sum w_i} \times 100,000 \]  
(expressed per 100,000 population)

where:
- \( w_i \) is the number, or proportion, of individuals in the standard population in age group \( i \);
- \( r_i \) is the crude age-specific rate in the subject population in age group \( i \), given by:

\[ r_i = \frac{O_i}{n_i} \]

where:
- \( O_i \) is the observed number of events in the subject population in age group \( i \);
- \( n_i \) is the number of individuals in the subject population in age group \( i \).

The standard population used for the direct standardisation method is the 2013 European Standard Population. The age groups used are: 0-4, 5-9, ..., 70-74 (for this indicator ages 75 and above are not needed). The 2013 European Standard Population is detailed in appendix 3.

The same standard population is used for males, females and persons. This means that rates can be compared across gender but also that rates for persons are standardised for age only, and not for sex.

Age group indicator values are crude rates and not directly standardised. Direct standardisation to the European Standard Population is not possible at this level.

**Confidence Intervals for Directly Standardised Rates (DSRs)**

95% confidence intervals are calculated using Dobson’s⁶ and Byar’s⁷ methods. Byar’s method is recommended for larger counts whereas for smaller numerators (less than 389) a more exact method based on the Poisson distribution (Dobson’s method) is used:

---

where:

\( O \) is the total number of observed deaths in the subject population

\[
Var(DSR) = \frac{\sum_i w_i^2 O_i}{(\sum_i w_i)^2}
\]

\[
Var(O) = \sum_i O_i
\]

\( O_{\text{lower}} \) and \( O_{\text{upper}} \) are the lower and upper confidence limits for the observed number of events;

When \( O < 389 \) then,

\[
O_{\text{lower}} = \frac{\chi^2_{\text{lower}}}{2}
\]

\[
O_{\text{upper}} = \frac{\chi^2_{\text{upper}}}{2}
\]

where:

\( \chi^2_{\text{lower}} \) is the 97.5\textsuperscript{th} percentile value from the \( \chi^2 \) distribution with 2\( O \) degrees of freedom;

\( \chi^2_{\text{upper}} \) is the 2.5\textsuperscript{th} percentile value from the \( \chi^2 \) distribution with 2\( O + 2 \) degrees of freedom.

When \( O \geq 389 \) then,

\[
O_{\text{lower}} = O \left(1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}}\right)^3
\]

\[
O_{\text{upper}} = (O + 1) \left(1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}}\right)^3
\]

where:

\( z \) is the 97.5\textsuperscript{th} percentile value from the Standard Normal distribution.

**Confidence Intervals for Crude Rates**

Where the indicator values are broken down by age and gender direct standardisation is not possible and crude rates are calculated instead. Although still based on the Dobson’s and
Byar’s method, in these cases 95% confidence intervals are calculated using a different methodology:

\[ r_{\text{lower}} = \frac{O_{\text{lower}}}{n} \]
\[ r_{\text{upper}} = \frac{O_{\text{upper}}}{n} \]

where:
- \( r \) is the crude rate and \( r_{\text{lower}} \) and \( r_{\text{upper}} \) are the lower and upper confidence limits for the crude rate;
- \( O \) is the total number of observed deaths in the subject population and \( O_{\text{lower}} \) and \( O_{\text{upper}} \) are the lower and upper confidence limits for the total number of observed deaths;
- \( n \) is the number of individuals in the subject population.

The confidence intervals for the total number of observed deaths are given by the following formulas.

When \( O < 389 \) then,

\[ O_{\text{lower}} = \frac{\chi^2_{\text{lower}}}{2} \]
\[ O_{\text{upper}} = \frac{\chi^2_{\text{upper}}}{2} \]

where:
- \( \chi^2_{\text{lower}} \) is the 97.5\(^{\text{th}} \) percentile value from the \( \chi^2 \) distribution with \( 2O \) degrees of freedom;
- \( \chi^2_{\text{upper}} \) is the 2.5\(^{\text{th}} \) percentile value from the \( \chi^2 \) distribution with \( 2O+2 \) degrees of freedom.

When \( O \geq 389 \) then,

\[ O_{\text{lower}} = O \left( 1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}} \right)^3 \]
\[ O_{\text{upper}} = (O + 1) \left( 1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}} \right)^3 \]

where:
- \( z \) is the 97.5\(^{\text{th}} \) percentile value from the Standard Normal distribution.

**Deprivation breakdown**

The deprivation breakdowns for this indicator have all been derived using the 2015 Index of Multiple Deprivation (IMD) scores which are based on 2011 lower super output area (LSOA)
boundaries. These data are published by the Ministry of Housing, Communities & Local Government (MHCLG) department, the latest publication can be found here: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

To create the deprivation breakdowns, both numerator and denominator data need to be available at LSOA level.

Between 2009 and 2011, the numerator (mortality) data were sourced directly from ONS and a postcode of residence was included but LSOA of residence was not. For these data, NHS Digital used a reference table from ONS’s open geography portal to derive the LSOA from the postcode. From 2012 onwards, the numerator data were sourced from the NHS Digital PCMD, from which the LSOA of residence is already included.

For the denominator (population) values, data for all years are sourced from ONS at LSOA level.

Once all numerator and denominator data have LSOAs allocated, NHS Digital then uses the IMD data published by MHCLG to derive the deprivation deciles from the LSOAs.

**Presentation**

**Breakdowns**

**Time periods**

Annual data from 2003

**Demographic**

Age: 5-year age bands from age 0 to 74 for males, females and all persons (by calendar year)

Gender: Male, female and all persons for England and region from 2003

Deprivation: Deciles from ‘1- Most deprived’ to ’10 – Least deprived’ for males, females and all persons (by calendar year from 2009)

**Geographic**

England: Male, female and all persons from 2003

Male and female by 5-year age bands from age 0 from 2003

Region: Male, female and all persons from 2003

**Disclosure control**

No disclosure control is currently applied to these data, the lowest geography presented is region level and therefore counts are sufficiently large.
Excel and CSV output

<table>
<thead>
<tr>
<th>Column name</th>
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<td>Year</td>
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<tr>
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<td>England, region, deprivation decile</td>
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<tr>
<td>Age</td>
<td>5-year age group</td>
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<td>Indicator value</td>
<td>Directly standardised rate as defined under ‘Direct standardisation’</td>
</tr>
<tr>
<td>Lower CI</td>
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<td>Numerator value</td>
</tr>
<tr>
<td>Denominator</td>
<td>Denominator value</td>
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</table>
1.2 Under 75 mortality rate from respiratory disease

Indicator assurance

<table>
<thead>
<tr>
<th>Status</th>
<th>Date</th>
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<tbody>
<tr>
<td>Methodology Review Group (MRG) recommended</td>
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</tr>
<tr>
<td>Indicator Governance Board (IGB) assured</td>
<td>April 2011</td>
</tr>
</tbody>
</table>

Overview

**Indicator title**
1.2 Under 75 mortality rate from respiratory disease

**Indicator family name**
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature mortality from the major causes of death

**Outcome sought**
Reduced premature mortality from respiratory disease.

**Detailed Descriptor**

**Plain English description**
A measure of the likelihood of dying of respiratory disease under the age of 75, which allows for comparisons between populations with different age profiles and over time.

**Technical description**
Directly standardised mortality rate from respiratory disease for people aged under 75.

**Alignment with other Outcomes Frameworks**
Shared with Public Health Outcomes Framework Indicator 4.07i.

**Data sources**

**Denominator**
Mid-year population estimates of the relevant age group and gender based on the 2011 Census – National Statistics
Published annually (calendar years) by the Office for National Statistics (ONS).
Usually available in June following year-end.
Numerator
Primary care mortality database (PCMD) - Managed by NHS Digital
Bespoke extract taken annually, usually in September each year
Standard population
2013 European standard population, see appendix 3.

Construction
Introduction
The method used for this indicator is direct standardisation.
The mortality rates are directly standardised to the 2013 European Standard Population to allow international comparison.

Data fields
The data fields and filters used within the ONS mortality data are as follows:

- CALCULATED_AGE_UNIT
- CALCULATED_AGE
- SEX
- DATE_OF_REGISTRATION
- LSOA_OF_RESIDENCE_CODE
- UNDERLYING_CAUSE_OF_DEATH

Data Filters

1. Field Name: CALCULATED_AGE_UNIT
   Conditions: When CALCULATED_AGE_UNIT equals 2, 3 or 4 recode age to zero years
   Rationale: The calculated age unit is used to specify whether the CALCULATED_AGE field refers to years (1), months (2), weeks (3) or days (4) of life.

2. Field Name: CALCULATED_AGE
   Conditions: Is between (inclusive): 0 and 74
   Rationale: Combined with the recoded zero ages from CALCULATED_AGE_UNIT selects only those aged under 75 years at the time of death
3. **Field Name**: DATE_OF_REGISTRATION  
**Conditions**: Is between 1 January and 31 December of the respective calendar year inclusive.  
**Rationale**: Selects only those deaths registered during the relevant calendar year.

4. **Field Name**: SEX  
**Conditions**: Is equal to 1 or 2  
**Rationale**: A valid sex field is required when directly standardising by age and sex.

5. **Field Name**: LSOA_OF_RESIDENCE_CODE  
**Conditions**: Is equal to a valid English Lower Super Output Area (LSOA).  
**Rationale**: This restricts data to patients resident in England. A valid English LSOA starts with the letter ‘E’.

6. **Field Name**: UNDERLYING_CAUSE_OF_DEATH  
**Conditions**: ICD-10 codes J00-J99  
**Rationale**: Selects those whose underlying cause of death was coded on the death certificate as respiratory disease.

**Calculation**  
**Denominator**  
2011 Census-based mid-year population estimates for all calendar years.

**Numerator**  
Number of deaths for which respiratory disease is given as the underlying cause of death (ICD-10 J00-J99), registered in the respective calendar year(s). The data are based on the original causes of death recorded on the death certificate rather than the final amended causes.

**Direct Standardisation**  
The directly age-standardised rate is the rate of events that would occur in a standard population if that population were to experience the age-specific rates of the subject population. Explicitly:

\[
DSR = \frac{\sum_i w_i r_i}{\sum_i w_i} \times 100,000
\]

(expressed per 100,000 population)
where:

- $w_i$ is the number, or proportion, of individuals in the standard population in age group $i$;
- $r_i$ is the crude age-specific rate in the subject population in age group $i$, given by:

$$r_i = \frac{O_i}{n_i}$$

where:

- $O_i$ is the observed number of events in the subject population in age group $i$;
- $n_i$ is the number of individuals in the subject population in age group $i$.

The standard population used for the direct method is the 2013 European Standard Population. The age groups used are: 0-4, 5-9,…, 70-74 (for this indicator ages 75 and above are irrelevant). The 2013 European Standard Population is detailed in appendix 3.

The same standard population is used for males, females and persons. This means that rates can be compared across gender but also that rates for persons are standardised for age only, and not for sex.

Age group indicator values are crude rates and not directly standardised. Direct standardisation to the 2013 European Standard Population is not possible at this level.

Confidence Intervals for Directly Standardised Rates (DSRs)

95% confidence intervals are calculated using Dobson's\(^8\) and Byar's\(^9\) methods. Byar’s method is recommended for larger counts whereas for smaller numerators (less than 389) a more exact method based on the Poisson distribution (Dobson’s method) is used:

$$DSR_{lower} = \frac{DSR}{100,000} + \sqrt{\frac{Var(DSR)}{Var(O)}}(O_{lower} - O)$$

$$DSR_{upper} = \frac{DSR}{100,000} + \sqrt{\frac{Var(DSR)}{Var(O)}}(O_{upper} - O)$$

where:


\( O \) is the total number of observed deaths in the subject population

\[
Var(DSR) = \frac{\sum_i w_i^2 O_i}{(\sum_i w_i)^2}
\]

\[
Var(O) = \sum_i O_i
\]

\( O_{lower} \) and \( O_{upper} \) are the lower and upper confidence limits for the observed number of events;

When \( O < 389 \) then,

\[
O_{lower} = \frac{\chi^2_{lower}}{2}
\]

\[
O_{upper} = \frac{\chi^2_{upper}}{2}
\]

where:

\( \chi^2_{lower} \) is the 97.5\(^{th}\) percentile value from the \( \chi^2 \) distribution with \( 2O \) degrees of freedom;

\( \chi^2_{upper} \) is the 2.5\(^{th}\) percentile value from the \( \chi^2 \) distribution with \( 2O+2 \) degrees of freedom.

When \( O >= 389 \) then,

\[
O_{lower} = O \left( 1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}} \right)^3
\]

\[
O_{upper} = (O + 1) \left( 1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}} \right)^3
\]

where:

\( z \) is the 97.5\(^{th}\) percentile value from the Standard Normal distribution.

**Confidence Intervals for Crude Rates**

Where the indicator values are broken down by age and gender direct standardisation is not possible and crude rates are calculated instead. Although still based on the Dobson’s and Byar’s method, in these cases 95\% confidence intervals are calculated using a different methodology:

\[
r_{lower} = \frac{O_{lower}}{n}
\]

\[
r_{upper} = \frac{O_{upper}}{n}
\]

where:
\( r \) is the crude rate and \( r_{\text{lower}} \) and \( r_{\text{upper}} \) are the lower and upper confidence limits for the crude rate;

\( O \) is the total number of observed deaths in the subject population and \( O_{\text{lower}} \) and \( O_{\text{upper}} \) are the lower and upper confidence limits for the total number of observed deaths;

\( n \) is the number of individuals in the subject population.

The confidence intervals for the total number of observed deaths are given by the following formulas.

When \( O < 389 \) then,

\[
O_{\text{lower}} = \frac{\chi^2_{\text{lower}}}{2}
\]

\[
O_{\text{upper}} = \frac{\chi^2_{\text{upper}}}{2}
\]

where:

\( \chi^2_{\text{lower}} \) is the 97.5\(^{th} \) percentile value from the \( \chi^2 \) distribution with 2\( O \) degrees of freedom;

\( \chi^2_{\text{upper}} \) is the 2.5\(^{th} \) percentile value from the \( \chi^2 \) distribution with 2\( O + 2 \) degrees of freedom.

When \( O \geq 389 \) then,

\[
O_{\text{lower}} = O \left( 1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}} \right)^3
\]

\[
O_{\text{upper}} = (O + 1) \left( 1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}} \right)^3
\]

where:

\( z \) is the 97.5\(^{th} \) percentile value from the Standard Normal distribution.

**Deprivation breakdown**

The deprivation breakdowns for this indicator have all been derived using the 2015 Index of Multiple Deprivation (IMD) scores which are based on 2011 lower super output area (LSOA) boundaries. These data are published by the Ministry of Housing, Communities & Local Government (MHCLG) department, the latest publication can be found here: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

To create the deprivation breakdowns, both numerator and denominator data need to be available at LSOA level.

Between 2009 and 2011, the numerator (mortality) data were sourced directly from ONS and a postcode of residence was included but LSOA of residence was not. For these data, NHS Digital used a reference table from ONS’s open geography portal to derive the LSOA from...
the postcode. From 2012 onwards, the numerator data were sourced from the NHS Digital PCMD, from which the LSOA of residence is already included.

For the denominator (population) values, data for all years are sourced from ONS at LSOA level.

Once all numerator and denominator data have LSOAs allocated, NHS Digital then uses the IMD data published by MHCLG to derive the deprivation deciles from the LSOAs.

Presentation

Breakdowns

Time periods
Annual data from 2003

Demographic
Age: 5-year age bands from age 0 to 74 for males, females and all persons (by calendar year)
Gender: Male, female and all persons for England and region from 2003
Deprivation: Deciles from ‘1- Most deprived’ to ‘10 – Least deprived’ for males, females and all persons (by calendar year from 2009)

Geographic
England: Male, female and all persons from 2003
Region: Male and female by 5-year age bands from 2003

Disclosure control
No disclosure control is currently applied to these data, the lowest geography presented is region level and therefore counts are sufficiently large.

Excel and CSV output

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1.3 Under 75 mortality rate from liver disease

Indicator assurance

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</table>

Overview

Indicator title
1.3 Under 75 mortality rate from liver disease

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature mortality from the major causes of death

Outcome sought
Reduced premature mortality from liver disease.

Detailed Descriptor

Plain English description
A measure of the likelihood of dying of liver disease under the age of 75, which allows for comparisons between populations with different age profiles and over time.

Technical description
Directly standardised mortality rate from liver disease for people aged under 75

Alignment with other Outcomes Frameworks
Shared with Public Health Outcomes Framework Indicator 4.06i

Data sources

Denominator
Mid-year population estimates of the relevant age group and gender based on the 2011 Census – National Statistics
Published annually (calendar years) by the Office for National Statistics (ONS).
Usually available in June following year-end.
NHS Outcomes Framework: 1.3 - Under 75 mortality rate from liver disease

Numerator
Primary care mortality database (PCMD) - Managed by NHS Digital
Bespoke extract taken annually, usually in September each year

Standard population
2013 European Standard Population, see appendix 3.

Construction

Introduction
The method used for this indicator is direct standardisation.
The mortality rates are directly standardised to the 2013 European Standard Population to allow international comparison.

Data fields
The data fields and filters used within the ONS mortality data are as follows:

- CALCULATED_AGE_UNIT
- CALCULATED_AGE
- SEX
- DATE_OF_REGISTRATION
- LSOA_OF_RESIDENCE_CODE
- UNDERLYING_CAUSE_OF_DEATH

Data Filters

1. Field Name: CALCULATED_AGE_UNIT
   Conditions: When CALCULATED_AGE_UNIT equals 2, 3 or 4 recode age to zero years
   Rationale: The calculated age unit is used to specify whether the CALCULATED_AGE field refers to years (1), months (2), weeks (3) or days (4) of life.

2. Field Name: CALCULATED_AGE
   Conditions: Is between (inclusive): 0 and 74
   Rationale: Combined with the recoded zero ages from CALCULATED_AGE_UNIT selects only those aged under 75 years at the time of death

3. Field Name: DATE_OF_REGISTRATION
Conditions: Is between 1 January and 31 December of the respective calendar year inclusive.
Rationale: Selects only those deaths registered during the relevant calendar year.

4. Field Name: **SEX**
   Conditions: Is equal to 1 or 2
   Rationale: A valid sex field is required when directly standardising by age and sex.

5. Field Name: **LSOA_OF_RESIDENCE_CODE**
   Conditions: Is equal to a valid English Lower Super Output Area (LSOA).
   Rationale: This restricts data to patients resident in England. A valid English LSOA starts with the letter ‘E’.

6. Field Name: **UNDERLYING_CAUSE_OF_DEATH**
   Conditions: ICD-10 codes K70-K77, B15-B19, C22, I81, I85, T86.4
   Rationale: Selects those whose underlying cause of death was coded on the death certificate as liver disease.

**Calculation**

**Denominator**

2011 Census-based ONS mid-year population estimates for all calendar years.

**Numerator**

Number of deaths for which liver disease is given as the underlying cause of death (ICD-10 K70-K77, B15-B19, C22, I81, I85, T86.4), registered in the respective calendar year(s). The data are based on the original causes of death recorded on the death certificate rather than the final amended causes.

**Direct Standardisation**

The directly age-standardised rate is the rate of events that would occur in a standard population if that population were to experience the age-specific rates of the subject population. Explicitly:

\[
DSR = \frac{\sum w_i r_i}{\sum w_i} \times 100,000
\]

(expressed per 100,000 population)

where:
\( wi \) is the number, or proportion, of individuals in the standard population in age group \( i \);
\( ri \) is the crude age-specific rate in the subject population in age group \( i \), given by:

\[
ri = \frac{O_i}{n_i}
\]

where:

- \( O_i \) is the observed number of events in the subject population in age group \( i \);
- \( n_i \) is the number of individuals in the subject population in age group \( i \).

The standard population used for the direct method is the European Standard Population. The age groups used are: 0-4, 5-9, ..., 70-74 (for this indicator ages 75 and above are irrelevant). The 2013 European Standard Population is detailed in appendix 3.

The same standard population is used for males, females and persons. This means that rates can be compared across gender but also that rates for persons are standardised for age only, and not for sex.

Age group indicator values are crude rates and not directly standardised. Direct standardisation to the 2013 European Standard Population is not possible at this level.

Confidence Intervals for Directly Standardised Rates (DSRs)

95% confidence intervals are calculated using Dobson's\(^{10}\) and Byar's\(^{11}\) methods. Byar's method is recommended for larger counts whereas for smaller numerators (less than 389) a more exact method based on the Poisson distribution (Dobson's method) is used:

\[
DSR_{lower} = \frac{DSR}{100,000} + \sqrt{\frac{Var(DSR)}{Var(O)}} (O_{lower} - O)
\]

\[
DSR_{upper} = \frac{DSR}{100,000} + \sqrt{\frac{Var(DSR)}{Var(O)}} (O_{upper} - O)
\]

where:

- \( O \) is the total number of observed deaths in the subject population


\[ Var(DSR) = \frac{\sum_i w_i^2 O_i}{(\sum_i w_i)^2} \]

\[ Var(O) = \sum_i O_i \]

\( O_{\text{lower}} \) and \( O_{\text{upper}} \) are the lower and upper confidence limits for the observed number of events;

When \( O < 389 \) then,

\[ O_{\text{lower}} = \frac{\chi^2_{\text{lower}}}{2} \]
\[ O_{\text{upper}} = \frac{\chi^2_{\text{upper}}}{2} \]

where:

\( \chi^2_{\text{lower}} \) is the 97.5\(^{\text{th}}\) percentile value from the \( \chi^2 \) distribution with 2\( O \) degrees of freedom;
\( \chi^2_{\text{upper}} \) is the 2.5\(^{\text{th}}\) percentile value from the \( \chi^2 \) distribution with 2\( O + 2 \) degrees of freedom.

When \( O \geq 389 \) then,

\[ O_{\text{lower}} = O \left(1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}}\right)^3 \]
\[ O_{\text{upper}} = (O + 1) \left(1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}}\right)^3 \]

where:

\( z \) is the 97.5\(^{\text{th}}\) percentile value from the Standard Normal distribution.

**Confidence Intervals for Crude Rates**

Where the indicator values are broken down by age and gender direct standardisation is not possible and crude rates are calculated instead. Although still based on the Dobson’s and Byar’s method, in these cases 95% confidence intervals are calculated using a different methodology:

\[ n_{\text{lower}} = \frac{O_{\text{lower}}}{n} \]
\[ n_{\text{upper}} = \frac{O_{\text{upper}}}{n} \]

where:
\( r \) is the crude rate and \( r_{\text{lower}} \) and \( r_{\text{upper}} \) are the lower and upper confidence limits for the crude rate;

\( O \) is the total number of observed deaths in the subject population and \( O_{\text{lower}} \) and \( O_{\text{upper}} \) are the lower and upper confidence limits for the total number of observed deaths;

\( n \) is the number of individuals in the subject population.

The confidence intervals for the total number of observed deaths are given by the following formulas.

When \( O < 389 \) then,

\[
O_{\text{lower}} = \frac{\chi^2_{\text{lower}}}{2}
\]

\[
O_{\text{upper}} = \frac{\chi^2_{\text{upper}}}{2}
\]

where:

\( \chi^2_{\text{lower}} \) is the 97.5\(^{\text{th}} \) percentile value from the \( \chi^2 \) distribution with \( 2O \) degrees of freedom;

\( \chi^2_{\text{upper}} \) is the 2.5\(^{\text{th}} \) percentile value from the \( \chi^2 \) distribution with \( 2O + 2 \) degrees of freedom.

When \( O \geq 389 \) then,

\[
O_{\text{lower}} = O \left( 1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}} \right)^3
\]

\[
O_{\text{upper}} = (O + 1) \left( 1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{(O + 1)}} \right)^3
\]

where:

\( z \) is the 97.5\(^{\text{th}} \) percentile value from the Standard Normal distribution.

**Deprivation breakdown**

The deprivation breakdowns for this indicator have all been derived using the 2015 Index of Multiple Deprivation (IMD) scores which are based on 2011 lower super output area (LSOA) boundaries. These data are published by the Ministry of Housing, Communities & Local Government (MHCLG) department, the latest publication can be found here: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

To create the deprivation breakdowns, both numerator and denominator data need to be available at LSOA level.

Between 2009 and 2011, the numerator (mortality) data were sourced directly from ONS and a postcode of residence was included but LSOA of residence was not. For these data, NHS Digital used a reference table from ONS’s open geography portal to derive the LSOA from
the postcode. From 2012 onwards, the numerator data were sourced from the NHS Digital PCMD, from which the LSOA of residence is already included.

For the denominator (population) values, data for all years are sourced from ONS at LSOA level.

Once all numerator and denominator data have LSOAs allocated, NHS Digital then uses the IMD data published by MHCLG to derive the deprivation deciles from the LSOAs.

**Presentation**

**Breakdowns**

**Time periods**

Annual data from 2003

**Demographic**

**Age:** 5-year age bands from age 0 to 74 for males, females and all persons (by calendar year)

**Gender:** Male, female and all persons for England and region from 2003

**Deprivation:** Deciles from ‘1 - Most deprived’ to ‘10 – Least deprived’ for males, females and all persons (by calendar year from 2009)

**Geographic**

**England:** Male, female and all persons from 2003

5-year age bands from 2003

**Region:** Male, female and all persons from 2003

**Disclosure control**

No disclosure control is currently applied to these data, the lowest geography presented is region level and therefore counts are sufficiently large.
### Excel and CSV output

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1.4 Under 75 mortality rate from cancer

Indicator assurance

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Overview

**Indicator title**
1.4 Under 75 mortality rate from cancer

**Indicator family name**
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature mortality from the major causes of death

**Outcome sought**
Reduced premature mortality from cancer.

**Detailed Descriptor**

**Plain English description**
A measure of the likelihood of dying of cancer under the age of 75, which allows for comparisons between populations with different age profiles and over time.

**Technical description**
Directly standardised mortality rate from cancer for people aged under 75.

**Alignment with other Outcomes Frameworks**
Shared with Public Health Outcomes Framework Indicator 4.05i.
Data sources

**Denominator**
Mid-year population estimates of the relevant age group and gender based on the 2011 Census – National Statistics
Published annually (calendar years) by the Office for National Statistics (ONS).
Usually available in June following year-end.

**Numerator**
Primary care mortality database (PCMD) - Managed by NHS Digital
Bespoke extract taken annually, usually in September each year

**Standard population**
2013 European Standard Population, see appendix 3.

Construction

**Introduction**
The method used for this indicator is direct standardisation.
The mortality rates are directly standardised to the 2013 European Standard Population to allow international comparison.

**Data fields**
The data fields and filters used within the ONS mortality data are as follows:

- CALCULATED_AGE_UNIT
- CALCULATED_AGE
- SEX
- DATE_OF_REGISTRATION
- LSOA_OF_RESIDENCE_CODE
- UNDERLYING_CAUSE_OF_DEATH

**Data Filters**

1. Field Name: **CALCULATED_AGE_UNIT**
   Conditions: When CALCULATED_AGE_UNIT equals 2, 3 or 4 recode age to zero years
   Rationale: The calculated age unit is used to specify whether the CALCULATED_AGE field refers to years (1), months (2),
weeks (3) or days (4) of life.

2. Field Name: **CALCULATED_AGE**
   Conditions: Is between (inclusive): 0 and 74
   Rationale: Combined with the recoded zero ages from CALCULATED_AGE_UNIT selects only those aged under 75 years at the time of death

3. Field Name: **DATE_OF_REGISTRATION**
   Conditions: Is between 1 January and 31 December of the respective calendar year inclusive.
   Rationale: Selects only those deaths registered during the relevant calendar year.

4. Field Name: **SEX**
   Conditions: Is equal to 1 or 2
   Rationale: A valid sex field is required when directly standardising by age and sex.

5. Field Name: **LSOA_OF_RESIDENCE_CODE**
   Conditions: Is equal to a valid English Lower Super Output Area (LSOA).
   Rationale: This restricts data to patients resident in England. A valid English LSOA starts with the letter ‘E’.

6. Field Name: **UNDERLYING_CAUSE_OF_DEATH**
   Conditions: ICD-10 codes C00-C97
   Rationale: Selects those whose underlying cause of death was coded on the death certificate as cancer.

**Calculation**

**Denominator**

2011 Census-based mid-year population estimates for all calendar years.

**Numerator**

Number of deaths for which cancer is given as the underlying cause of death (ICD-10 C00-C97), registered in the respective calendar year(s). The data are based on the original causes of death recorded on the death certificate rather than the final amended causes.
Direct Standardisation

The directly age-standardised rate is the rate of events that would occur in a standard population if that population were to experience the age-specific rates of the subject population. Explicitly:

\[
DSR = \frac{\sum w_i r_i}{\sum w_i} \times 100,000
\]

(expressed per 100,000 population)

where:

- \(w_i\) is the number, or proportion, of individuals in the standard population in age group \(i\).
- \(r_i\) is the crude age-specific rate in the subject population in age group \(i\), given by:

\[
r_i = \frac{O_i}{n_i}
\]

where:

- \(O_i\) is the observed number of events in the subject population in age group \(i\).
- \(n_i\) is the number of individuals in the subject population in age group \(i\).

The standard population used for the direct method is the European Standard Population. The age groups used are: 0-4, 5-9,…, 70-74 (for this indicator ages 75 and above are not needed). The 2013 European Standard Population is detailed appendix 3.

The same standard population is used for males, females and persons. This means that rates can be compared across gender but also that rates for persons are standardised for age only, and not for sex.

Age group indicator values are crude rates and not directly standardised. Direct standardisation to the European Standard Population is not possible at this level.

Confidence Intervals for Directly Standardised Rates (DSRs)

95% confidence intervals are calculated using Dobson’s\(^{12}\) and Byar’s\(^{13}\) methods. Byar’s method is recommended for larger counts whereas for smaller numerators (less than 389) a more exact method based on the Poisson distribution (Dobson’s method) is used:

\[
DSR_{\text{lower}} = \frac{DSR}{100,000} + \frac{Var(DSR)}{Var(O)} (O_{\text{lower}} - O)
\]

\[
DSR_{\text{upper}} = \frac{DSR}{100,000} + \frac{Var(DSR)}{Var(O)} (O_{\text{upper}} - O)
\]


where:

$O$ is the total number of observed deaths in the subject population

$$V_r(DSR) = \frac{\sum_i w_i^2 O_i}{(\sum_i w_i)^2}$$

$$V_r(O) = \sum_i O_i$$

$O_{lower}$ and $O_{upper}$ are the lower and upper confidence limits for the observed number of events;

When $O < 389$ then,

$$O_{lower} = \frac{\chi^2_{lower}}{2}$$

$$O_{upper} = \frac{\chi^2_{upper}}{2}$$

where:

$\chi^2_{lower}$ is the 97.5th percentile value from the $\chi^2$ distribution with $2O$ degrees of freedom;

$\chi^2_{upper}$ is the 2.5th percentile value from the $\chi^2$ distribution with $2O+2$ degrees of freedom.

When $O \geq 389$ then,

$$O_{lower} = O \left(1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}} \right)^3$$

$$O_{upper} = (O + 1) \left(1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}} \right)^3$$

where:

$z$ is the 97.5th percentile value from the Standard Normal distribution.

**Confidence Intervals for Crude Rates**

Where the indicator values are broken down by age and gender direct standardisation is not possible and crude rates are calculated instead. Although still based on the Dobson’s and Byar’s method, in these cases 95% confidence intervals are calculated using a different methodology:

$$r_{lower} = \frac{O_{lower}}{n}$$

$$r_{upper} = \frac{O_{upper}}{n}$$
where:

$r$ is the crude rate and $r_{lower}$ and $r_{upper}$ are the lower and upper confidence limits for the crude rate;

$O$ is the total number of observed deaths in the subject population and $O_{lower}$ and $O_{upper}$ are the lower and upper confidence limits for the total number of observed deaths;

$n$ is the number of individuals in the subject population.

The confidence intervals for the total number of observed deaths are given by the following formulas.

When $O < 389$ then,

$$O_{lower} = \frac{\chi^2_{lower}}{2}$$

$$O_{upper} = \frac{\chi^2_{upper}}{2}$$

where:

$\chi^2_{lower}$ is the 97.5th percentile value from the $\chi^2$ distribution with $2O$ degrees of freedom;

$\chi^2_{upper}$ is the 2.5th percentile value from the $\chi^2$ distribution with $2O+2$ degrees of freedom.

When $O \geq 389$ then,

$$O_{lower} = O \left(1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}}\right)^3$$

$$O_{upper} = (O + 1) \left(1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}}\right)^3$$

where:

$z$ is the 97.5th percentile value from the Standard Normal distribution.

**Deprivation breakdown**

The deprivation breakdowns for this indicator have all been derived using the 2015 Index of Multiple Deprivation (IMD) scores which are based on 2011 lower super output area (LSOA) boundaries. These data are published by the Ministry of Housing, Communities & Local Government (MHCLG) department, the latest publication can be found here:


To create the deprivation breakdowns, both numerator and denominator data need to be available at LSOA level.

Between 2009 and 2011, the numerator (mortality) data were sourced directly from ONS and a postcode of residence was included but LSOA of residence was not. For these data, NHS
Digital used a reference table from ONS’s open geography portal to derive the LSOA from the postcode. From 2012 onwards, the numerator data were sourced from the NHS Digital PCMD, from which the LSOA of residence is already included.

For the denominator (population) values, data for all years are sourced from ONS at LSOA level.

Once all numerator and denominator data have LSOAs allocated, NHS Digital then uses the IMD data published by MHCLG to derive the deprivation deciles from the LSOAs.

**Presentation**

**Breakdowns**

**Time periods**

Annual data from 2003

**Demographic**

Age: 5-year age bands from age 0 to 74 for males, females and all persons (by calendar year)

Gender: Male, female and all persons for England and region from 2003

Deprivation: Deciles from ‘1- Most deprived’ to ’10 – Least deprived’ for males, females and all persons (by calendar year from 2009)

**Geographic**

England: Male, female and all persons from 2003

Male and female by 5-year age bands from 2003

Region: Male, female and all persons from 2003

**Disclosure control**

No disclosure control is currently applied to these data, the lowest geography presented is region level and therefore counts are sufficiently large.
## Excel and CSV output

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<th>Output</th>
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</thead>
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<td>Calendar year</td>
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<td>Period of coverage</td>
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<td>Breakdown</td>
<td>England, region, deprivation decile</td>
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1.4.i One-year survival from all cancers

Indicator assurance

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Overview

Indicator title
1.4.i One-year survival from all cancers

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature mortality from the major causes of death

Outcome sought
Reducing premature mortality for all cancers.

Detailed Descriptor
Plain English description
A measure of the number of adults diagnosed with any type of cancer in a year who are still alive one year after diagnosis.

Technical description
One-year net survival for adults (15-99 years) suffering from any type of cancer.

Data sources
Index of cancer survival for Clinical Commissioning Groups in England – National Statistics
Published annually (calendar years) by the Office for National Statistics (ONS).
Released between December and February following the end of the reporting year.
The latest ONS data, publication and methodology can be found here:
Introduction

Data for this indicator are from the cancer survival statistical bulletin which is published annually by ONS. One-year age-standardised net survival data for all cancers are used for the national indicator 1.4.i.

Net survival is an estimate of the probability of survival from the cancer alone. It is defined as the ratio of the observed survival and the survival that would have been expected if the cancer patients had experienced the same background mortality by age and sex as the general population. It can be interpreted as the survival of cancer patients after taking into account the background mortality that the patients would have experienced if they had not had cancer.

Net survival varies with age, sex and type of cancer and all of these factors can vary with time and between geographical areas, so the estimates are age, sex and cancer standardised to facilitate comparison.

Data filters

The number of patients aged 15 to 99 diagnosed with any type of cancer in a year who are still alive one year after diagnosis. Cancer is defined as a first, primary, invasive malignancy with two exclusions:

- Non-melanoma skin cancer (ICD-10 C44)
- Cancer of the prostate (C61)

Calculation

The methodology used to calculate one-year survival is the ‘classical’ or ‘cohort’ approach. All patients diagnosed in the diagnosis period are followed up one year later.

The indicator values are sourced from ONS fully calculated. The net survival is calculated from patients diagnosed over a period of time and followed up to a given date after this period.

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Presentation

Breakdowns

Time periods

Annual data for follow ups from 1997 onwards
Demographic
Age: Age-sex and cancer standardised data at England level for all ages (15-99) and age bands 55-64 and 75-99

Geographic
England: Age-sex and cancer standardised data

Excel and CSV output

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1.4.ii Five-year survival from all cancers

Indicator assurance

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Overview

Indicator title
1.4.ii Five-year survival from all cancers

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature mortality from the major causes of death

Outcome sought
Reducing premature mortality for all cancers.

Detailed Descriptor

Plain English description
A measure of the number of adults diagnosed with any type of cancer in a year who are still alive five years after diagnosis.

Technical description
Five-year net survival for adults (15-99 years) suffering from any type of cancer.

Data sources

Index of cancer survival for Clinical Commissioning Groups in England – National Statistics
Published annually (calendar years) by the Office for National Statistics (ONS).
Released between December and February following the end of the reporting year.
The latest ONS data, publication and methodology can be found here:
Construction

Introduction
Data for this indicator are from the cancer survival index statistical bulletin published annually by ONS. Five-year age-standardised net survival data for all cancers are used for the national indicator 1.4.ii.

Net survival is an estimate of the probability of survival from the cancer alone. It is defined as the ratio of the observed survival and the survival that would have been expected if the cancer patients had experienced the same background mortality by age and sex as the general population. It can be interpreted as the survival of cancer patients after taking into account the background mortality that the patients would have experienced if they had not had cancer.

Net survival varies with age, sex and type of cancer and all of these factors can vary with time and between geographical areas, so the estimates are age, sex and cancer standardised to facilitate comparison.

Data filters
The number of patients aged 15 to 99 diagnosed with any type of cancer in a year who are still alive five years after diagnosis. Cancer is defined as a first, primary, invasive malignancy with two exclusions:

Non-melanoma skin cancer (ICD-10 C44)
Cancer of the prostate (C61)

Calculation
The methodology used to calculate five-year survival is the ‘classical’ or ‘cohort’ approach. All patients diagnosed in the diagnosis period are followed up five years later.

The indicator values are sourced from ONS fully calculated. The net survival is calculated from patients diagnosed over a period of time and followed up to a given date after this period.

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Presentation

Breakdowns

Time periods
Annual data for follow ups from 2001 onwards

Demographic
Age: Age-sex and cancer standardised data at England level for all ages (15-99) and age bands 55-64 and 75-99
Geographic
England: Age-sex and cancer standardised data

Excel and CSV output

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1.4.iii One-year survival from breast, lung and colorectal cancer

Indicator assurance

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Overview

Indicator title
1.4.iii One-year survival from breast, lung and colorectal cancer

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature mortality from the major causes of death

Outcome sought
Reducing premature mortality for breast, lung and colorectal cancer.

Detailed Descriptor
Plain English description
A measure of the number of adults diagnosed with breast, lung and colorectal cancer in a year who are still alive one year after diagnosis.

Technical description
One-year net survival for adults (15-99 years) suffering from breast, lung or colorectal cancer.

Data sources
Published annually (calendar years) by the Office for National Statistics (ONS).
Available December following year-end.
Construction

Introduction

Data for this indicator are from the cancer survival index statistical bulletin published for the first time in December 2013 by the ONS. One-year age-standardised net survival data for breast, lung and colorectal cancer are used for the national indicator 1.4.iii.

One-year survival is a measure of the number of patients diagnosed with cancer in a year who are still alive one year after diagnosis.

Net survival is an estimate of the probability of survival from the cancer alone. It is defined as the ratio of the observed survival and the survival that would have been expected if the cancer patients had experienced the same background mortality by age and sex as the general population. It can be interpreted as the survival of cancer patients after taking into account the background mortality that the patients would have experienced if they had not had cancer. Net survival varies with age, sex and type of cancer and all of these factors can vary with time and between geographical areas, so the estimates are age, sex and cancer standardised to facilitate comparison.

Data filters

The number of patients aged 15 to 99 diagnosed with breast, lung or colorectal cancer in a year who are still alive one year after diagnosis. Breast, lung and colorectal cancer are defined in terms of ICD-10 codes: C18-C20, C21.8 (colorectal), C50 (breast) or C33-C34 (lung).

Calculation

The methodology used to calculate one-year survival is the ‘classical’ or ‘cohort’ approach. All patients diagnosed in the diagnosis period are followed up one year later.

The value from the ONS is sourced fully calculated. The net survival is calculated from patients diagnosed over a period of time and followed up to a given date after this period.

Further details of the methodology used can be found in the following publication:


A time series for one-year survival figures for breast, lung and colorectal cancer individually (previous NHS Outcomes Framework indicators 1.4.i, 1.4.iii and 1.4.v) is still published and can be found on the indicator portal (https://indicators.hscic.gov.uk).

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Presentation

Breakdowns

Time periods
Annual data from 1996-2011 and followed up to 1997-2012

Demographic
Age: Age-sex and cancer standardised data at England level for all ages (15-99) and age bands 55-64 and 75-99

Geographic
England: Age-sex and cancer standardised data from 1996-2011 and followed up to 1997-2012

Excel and CSV output

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1.4.iv Five-year survival from breast, lung and colorectal cancer

Indicator assurance

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Overview

Indicator title
1.4.iv Five-year survival from breast, lung and colorectal cancer

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature mortality from the major causes of death

Outcome sought
Reducing premature mortality from breast, lung and colorectal cancer.

Detailed Descriptor
Plain English description
A measure of the number of adults diagnosed with breast, lung or colorectal cancer in a year who are still alive five years after diagnosis.

Technical description
Five-year net survival for adults (15-99 years) suffering from breast, lung or colorectal cancer.

Data sources
Published annually (calendar years) by the Office for National Statistics (ONS).
Available December following year-end.
Construction

Introduction

Data for this indicator are from the cancer survival index statistical bulletin published for the first time in December 2013 by the ONS. Five-year age-standardised net survival data for breast, lung and colorectal cancer are used for the national indicator 1.4.iv.

Five-year survival is a measure of the number of patients diagnosed with cancer in a year who are still alive five years after diagnosis.

Net survival is an estimate of the probability of survival from the cancer alone. It is defined as the ratio of the observed survival and the survival that would have been expected if the cancer patients had experienced the same background mortality by age and sex as the general population. It can be interpreted as the survival of cancer patients after taking into account the background mortality that the patients would have experienced if they had not had cancer. Net survival varies with age, sex and type of cancer and the all of these factors can vary with time and between geographical areas, so the estimates are age, sex and cancer standardised to facilitate comparison.

Data filters

The number of patients aged 15 to 99 diagnosed with breast, lung or colorectal cancer in a year who are still alive five years after diagnosis. Breast, lung and colorectal cancer are defined in terms of ICD-10 codes: C18-C20, C21.8 (colorectal), C50 (breast) or C33-C34 (lung).

Calculation

The methodology used to calculate five-year survival is the ‘classical’ or ‘cohort’ approach. All patients diagnosed in the diagnosis period are followed up five years later.

The value from the ONS is sourced fully calculated. The net survival is calculated from patients diagnosed over a period of time and followed up to a given date after this period.

Further details of the methodology used can be found in the following publication:


A time series for five-year survival figures for breast, lung and colorectal cancer individually (previous NHS Outcomes Framework indicators 1.4.ii, 1.4.iv and 1.4.vi) is still published and can be found on the indicator portal (https://indicators.hscic.gov.uk).

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**Presentation**

**Breakdowns**

**Time periods**
Annual data from 1996-2007 and followed up 2001-2012

**Demographic**
Age: Age-sex and cancer standardised data at England level for all ages (15-99) and age bands 55-64 and 75-99

**Geographic**

**Excel and CSV output**

<table>
<thead>
<tr>
<th>Column name</th>
<th>Output</th>
</tr>
</thead>
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<tr>
<td>Year of diagnosis</td>
<td>Year of diagnosis</td>
</tr>
<tr>
<td>Period of coverage</td>
<td>Diagnosis- and follow-up period</td>
</tr>
<tr>
<td>Breakdown</td>
<td>National, age</td>
</tr>
<tr>
<td>Age</td>
<td>Age range</td>
</tr>
<tr>
<td>Indicator value</td>
<td>Five-year age-standardised net survival (%)</td>
</tr>
<tr>
<td>Precision</td>
<td>The inverse of the variance of the survival index</td>
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1.5.i Excess under 75 mortality rate in adults with serious mental illness (formerly indicator 1.5)

Indicator assurance

<table>
<thead>
<tr>
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<th>Date</th>
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</thead>
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</table>

Overview

Indicator title
1.5.i Excess under 75 mortality rate in adults with serious mental illness

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing premature death in people with serious mental illness

Outcome sought
Reduced premature mortality in adults with serious mental illness.

Detailed Descriptor
Plain English description
A measure of the extent to which adults with a serious mental illness die younger than adults in the general population.

Technical description
The ratio (expressed as a percentage) of the observed number of deaths in adults in contact with secondary mental health services to the expected number of deaths in that population based on age and gender-specific mortality rates in the general population in England.

Alignment with other Outcomes Frameworks
Shared with Public Health Outcomes Framework Indicator 4.09i
Data sources

Denominator mental health mortality rate
Mental health data linked over years and to the Primary Care Mortality Database (PCMD). Linkage carried out by NHS Digital annually.

Denominator general population mortality rate
Mid-year population estimates of the relevant age group and gender (based on the 2011 Census) – National Statistics
Published annually (calendar years) by the Office for National Statistics (ONS).

Numerator mental health mortality rate
Mental health data linked over years and to the Primary Care Mortality Database (PCMD). Linkage carried out by NHS Digital annually.

Numerator general population mortality rate
Primary care mortality database (PCMD) - Managed by NHS Digital.
Bespoke extract taken annually, usually in September each year.

Construction

Introduction
The indicator value is the indirectly standardised ratio (expressed as a percentage) of the observed number of deaths of adults in contact with secondary mental health services to the expected number of deaths in that population based on age- and sex-specific mortality rates in the general population.

Calculation of the mental health mortality rate
The mental health mortality rate is directly standardised by age and sex to the England population. The England populations used are the ONS mid-year population estimates. For all financial years the mid-year population estimates based on the 2011 Census are used.

The mental health population is defined as anyone who has been in contact with the secondary mental health services in the current financial year or in either of the two previous financial years who is alive at the beginning of the current financial year.

Denominator – mental health mortality rate
Denominator Filters:

1. Field Name pcmd_age_in_indicator_year
NHS Outcomes Framework: 1.5.i - Excess under 75 mortality rate in adults with serious mental illness

Conditions: Between 18 and 74 inclusive
Rationale: Derived age field to allow for the fact some people's latest contact could have been up to two years ago when dealing with a particular indicator year. This indicator is concerned with people aged 18 to 74 years inclusive.

2. Field Name: INDICATOR_YEAR
   Conditions: Relevant financial year, e.g. ‘2014/15’
   Rationale: Derived field to indicate which indicator year (e.g. 2013/14, 2014/15) the record was for.

3. Field Name: DATE_OF_REGISTRATION (date of death registration from PCMD data)
   Conditions: Is not before the relevant financial year, or is null.
   Rationale: This ensures that only people who were alive at some point in the indicator year were included in the population data.

Numerator – mental health mortality rate
All deaths from any cause for ages 18-74 at time of death are included in the numerator for the mental health mortality rate. The data are based on the registered date of death.

Numerator Filters:
1. Field Name: DATE_OF_REGISTRATION
   Conditions: Within the relevant financial year.
   Rationale: For the indicator for the relevant financial year only deaths registered during the year are included in the numerator. This field is from the PCMD data.

2. Field Name: pcmd_age_in_indicator_year
   Conditions: Between 18 and 74 inclusive
   Rationale: Derived age field to allow for the fact some people’s latest contact could have been up to two years ago when dealing with a particular indicator year. This indicator is concerned with people aged 18 to 74 years inclusive.

3. Field Name: INDICATOR_YEAR
   Conditions: Relevant financial year, e.g. ‘2014/15’
Rationale

Derived field to indicate which indicator year (e.g. 2013/14, 2014/15) the record was for.

Direct Standardisation – mental health mortality rate

The directly age and sex standardised rate is the rate of events that would occur in a standard population if that population were to experience the age and sex specific rates of the subject population. Explicitly:

\[
DSR = \frac{\sum_i w_i r_i}{\sum_i w_i} \times 100,000
\]

(expressed per 100,000 population)

where:

- \( w_i \) is the number, or proportion, of individuals in the standard population in age and sex group \( i \);
- \( r_i \) is the crude age and sex specific rate in the subject population in group \( i \), given by:

\[
r_i = \frac{O_i}{n_i}
\]

where:

- \( O_i \) is the observed number of events in the subject population in age and sex group \( i \);
- \( n_i \) is the number of individuals in the subject population in age and sex group \( i \).

The standard population used is the ONS mid-year population estimate for England. The age groups used are detailed in appendix 4.

Please note that for the local authority level breakdowns, the general population of the local authority is used as the standard population. This is so that the mental health mortality rates are comparable to the general population mortality rates for each local authority. However, this means that the mental health mortality rates at local authority level cannot be compared to each other.

Confidence Intervals – mental health mortality rate

95% confidence intervals are calculated using Dobson's\(^\text{14}\) and Byar's\(^\text{15}\) methods. Byar’s method is recommended for larger counts and the exact method based on the Poisson distribution for small counts; where Byar’s method is not quite as accurate. As follows:


\[ DSRLower = DSR + \frac{\text{Var}(DSR)}{\text{Var}(O)} (O_{\text{lower}} - O) \]
\[ DSRunner = DSR + \frac{\text{Var}(DSR)}{\text{Var}(O)} (O_{\text{upper}} - O) \]

where:

\( O \) is the number of observed events in the subject population

\[ \text{Var}(DSR) = \sum_{i} \frac{w_{i}^{2}O_{i}}{n_{i}^{2}} \left( \sum_{i} w_{i} \right)^{2} \]

\[ \text{Var}(O) = \sum_{i} O_{i} \]

\( O_{\text{lower}} \) and \( O_{\text{upper}} \) are the lower and upper confidence limits for the observed number of events;

When \( O < 389 \) then,

\[ O_{\text{lower}} = \frac{\chi_{\text{lower}}^{2}}{2} \]
\[ O_{\text{upper}} = \frac{\chi_{\text{upper}}^{2}}{2} \]

where:

\( \chi_{\text{lower}}^{2} \) is the 97.5\(^{th}\) percentile value from the \( \chi^{2} \) distribution with \( 2O \) degrees of freedom; \n\( \chi_{\text{upper}}^{2} \) is the 2.5\(^{th}\) percentile value from the \( \chi^{2} \) distribution with \( 2O + 2 \) degrees of freedom.

When \( O \geq 389 \) then,

\[ O_{\text{lower}} = O \left( 1 - \frac{1}{9O} - \frac{z}{3\sqrt{O}} \right)^{3} \]
\[ O_{\text{upper}} = (O + 1) \left( 1 - \frac{1}{9(O + 1)} + \frac{z}{3\sqrt{O + 1}} \right)^{3} \]

where:

\( z \) is the 97.5\(^{th}\) percentile value from the Standard Normal distribution.
Calculation of the general population mortality rate
The general population mortality rate is a simple crude rate for England for people aged 18 to 74.

Denominator – general population mortality rate
The general population is derived from the ONS mid-year population estimates based on the 2011 Census for ages 18 to 74.

Numerator – general population mortality rate
All deaths from any cause for ages 18-74 at time of death are included in the numerator for the general population mortality rate. The data are based on the registered date of death.

Calculation of the Standardised Mortality Ratio (indicator value)
The Standardised Mortality Ratio (SMR) expressed as a percentage represents the indicator value. It is an indirectly standardised ratio.

The SMR is calculated, by using the general population age and sex mortality rates to get expected deaths in the mental health population, and then compare the observed deaths with the expected deaths. The age groups used are 18-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69 and 70-74.

The SMR expressed as a percentage is calculated as:

\[ SMR = \frac{O}{E} \times 100 = \sum \frac{O_i}{E_i} \times 100 = \sum \frac{O_i}{n_i \lambda_i} \times 100 \]

where:

- \(O_i\) is the observed number of events in the mental health population in age and sex group \(i\);
- \(E_i\) is the expected number of events in the mental health population in age and sex group \(i\);
- \(n_i\) is the number of individuals in the mental health population in age and sex group \(i\);
- \(\lambda_i\) is the crude age and sex-specific rate in the general population in age and sex group \(i\).

Confidence Intervals of Indirectly Standardised Ratios
When calculating 95% confidence intervals for indirectly standardised ratios, it is assumed that the standard rates come from a population sufficiently large as to assume their sampling variance is negligible, and that the observed number of events \(O\) follows a Poisson distribution. Where the number of observed events is less than 500, the exact upper and lower limits for \(O\) are found from a look-up table and used to calculate the respective limits of
the ratio. Where the number of observed events is 500 or more, confidence intervals are calculated using the method described by Goldblatt and Jones\textsuperscript{16,17} The lower and upper confidence limits for the SMR are denoted by SMR\textsubscript{LL} and SMR\textsubscript{UL}

For $O < 500$:

$$SMR\textsubscript{LL} = \frac{O\textsubscript{LL}}{E} \times 100 \quad SMR\textsubscript{UL} = \frac{O\textsubscript{UL}}{E} \times 100$$

where:

$O\textsubscript{LL}/U\textsubscript{LL}$ are the exact lower and upper 95% confidence limits from a Poisson distribution table for the total number of observed events $O$ in the subject population.

$E$ is the total expected number of events in the subject population.

For $O \geq 500$:

$$SMR\textsubscript{LL} = \frac{0.96 + O - 1.96\sqrt{(O + 0.11)}}{E} \times 100 \quad \text{for } O < 900$$

$$SMR\textsubscript{UL} = \frac{0.962 + O - 1.9602\sqrt{O}}{E} \times 100 \quad \text{for } O \geq 900$$

$$SMR\textsubscript{UL} = \frac{1.94 + O + 1.96\sqrt{O + 0.96}}{E} \times 100$$

**Presentation**

**Breakdowns**

**Time periods**


**Demographic**


**Age:**
5-year age bands from 18 years from 1/4/2008 to 31/3/2009; In contact with secondary mental health services; 1/4/2006 to 31/3/2009

**Geographic**


**Upper tier local authority:**
For all persons from 1/4/2009 to 31/3/2010; In contact with secondary mental health services; 1/4/2007 to 31/3/2010

**Other**

**Condition:** Cancer, cardiovascular disease, respiratory disease and liver disease from 1/4/2009 to 31/3/2010; In contact with secondary mental health services; 1/4/2007 to 31/3/2010

**Disclosure control**
This indicator is calculated using mental health and PCMD data and follows the rules of both datasets on the suppression of small numbers. Mental health data for upper tier local authorities are suppressed where the number of mental health deaths is between one and four (inclusive) and when both the number of mental health deaths is zero and the underlying resident population is less than 5,000. Additionally, the number of deaths in the general population is suppressed for values between zero and two (0,1,2) where the underlying resident population is less than 5,000. Secondary suppression is carried out where only one rate is suppressed for a certain breakdown and time period to prevent this number being calculated through differencing. Please see the ONS disclosure control rules for further information:

https://www.ons.gov.uk/methodology/methodologytopicsandstatisticalconcepts/disclosurecontrol/guidanceforbirthanddeathstatistics

Denominator figures for the general population mortality rate sourced from the relevant ONS mid-year population estimates are rounded to the nearest 100.
### Excel and CSV output

<table>
<thead>
<tr>
<th>Column name</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Year of data (financial year)</td>
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<tr>
<td>Period of coverage</td>
<td>01/04 to 31/03 of the respective financial year</td>
</tr>
<tr>
<td>Breakdown</td>
<td>England, age, gender, upper tier local authority, condition</td>
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<tr>
<td>Level</td>
<td>More detailed breakdown (e.g. LA code)</td>
</tr>
<tr>
<td>Level description</td>
<td>Description of level</td>
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<tr>
<td>Condition</td>
<td>Type of condition the data covers</td>
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<tr>
<td>General population mortality rate</td>
<td>As defined above</td>
</tr>
<tr>
<td>Mental health DSR</td>
<td>DSR as defined under ‘Direct standardisation’</td>
</tr>
<tr>
<td>Mental health lower CI</td>
<td>Lower confidence interval value (95%)</td>
</tr>
<tr>
<td>Mental health upper CI</td>
<td>Upper confidence interval value (95%)</td>
</tr>
<tr>
<td>Indicator value</td>
<td>Standardised mortality ratio</td>
</tr>
<tr>
<td>SMR lower CI</td>
<td>Lower confidence interval value (95%)</td>
</tr>
<tr>
<td>SMR upper CI</td>
<td>Upper confidence interval value (95%)</td>
</tr>
<tr>
<td>MH deaths (numerator MH mortality rate and SMR)</td>
<td>Number of deaths in the mental health population</td>
</tr>
<tr>
<td>Expected (denominator SMR)</td>
<td>Number of expected events</td>
</tr>
<tr>
<td>MH population (denominator MH mortality rate)</td>
<td>Number of people in the mental health population</td>
</tr>
<tr>
<td>General population deaths</td>
<td>Number of deaths in the general population</td>
</tr>
<tr>
<td>General population</td>
<td>Number of people in the general population</td>
</tr>
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</table>
1.6.i Infant mortality

Indicator assurance

<table>
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<tr>
<td>Methodology Review Group (MRG) recommended</td>
<td>April 2011</td>
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<td>Indicator Governance Board (IGB) assured</td>
<td>April 2011</td>
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Overview

Indicator title
1.6.i Infant mortality

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely
Improvement area – Reducing deaths in babies and young children

Outcome sought
Reduced infant mortality

Detailed Descriptor

Plain English description
The number of babies dying before the age of one for every 1,000 that were born alive.

Technical description
The number of deaths at ages under one year, per 1,000 live births.

Alignment with other Outcomes Frameworks
Shared with Public Health Outcomes Framework Indicator 4.01

Data sources
The national and regional data for England are published annually (calendar years) by the Office for National Statistics (ONS) in the Childhood Mortality publication (National Statistics), available approximately 14 months after the end of the reporting year. The latest data and publication can be found here:
The age of mother, local authority and deprivation data for England are not routinely published by ONS and are provided separately in a bespoke file.

**Construction**

**Introduction**
Data for this indicator is sourced from ONS.

**Data filters**
The England numbers excluding non-residents of England and Wales are selected for the national indicator.

**Calculation**
The raw data are sourced from ONS and the indicator rates are calculated by NHS Digital.

The rate is per thousand live births. The numerator is the number of deaths, aged under one year (infant deaths), occurring during the year. The denominator is the number of live births occurring during the year. A full definition of each can be found in the original ONS publications.

The indicator value is rounded to one decimal place.

Infant deaths at local authority, region, mother’s age and deprivation quintile level which make up this indicator’s numerator are sourced from a linked dataset which derives these characteristics from the birth record. The linked dataset is a live system which is continuously updated.

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**Presentation**

**Breakdowns**

**Time periods**
Annual data from 1999

**Demographic**

Gender: Male and female from 1/1/1999 to 31/12/1999 onwards

Age: Age bands of mother under 20, 20 to 24, 25 to 29, 30 to 34, 35 to 39 and 40 over from 1/1/1999 to 31/12/1999 onwards.
Deprivation: Deprivation quintiles from 1/1/1999 to 31/12/1999 onwards

**Geographic**

England: England level data from 1/1/1999 to 31/12/1999 onwards

Local authority: Local authority level data from 1/1/1999 to 31/12/1999 onwards

Region: Region level data from 1/1/1999 to 31/12/1999 onwards

**Disclosure control**

Values for Cornwall and Isles of Scilly and Hackney and City of London have been combined and no values are currently suppressed. This is in line with the ONS Childhood Mortality publication.

**Excel and CSV output**

<table>
<thead>
<tr>
<th>Column name</th>
<th>Output</th>
</tr>
</thead>
<tbody>
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<td>The year of coverage</td>
</tr>
<tr>
<td>Period of coverage</td>
<td>The exact dates of coverage</td>
</tr>
<tr>
<td>Breakdown</td>
<td>England, gender, age of mother, local authority, region, deprivation quintile</td>
</tr>
<tr>
<td>Level</td>
<td>The level of each breakdown</td>
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<tr>
<td>Level description</td>
<td>Description of each level</td>
</tr>
<tr>
<td>Indicator value</td>
<td>Infant mortality rate per 1,000 births</td>
</tr>
<tr>
<td>Live births</td>
<td>Number of live births in the time period</td>
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<tr>
<td>Infant deaths</td>
<td>Number of infant deaths in the time period</td>
</tr>
</tbody>
</table>
1.6.ii Five-year survival from all cancers in children (formerly indicator 1.6.iii)

Indicator assurance

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Overview

Indicator title
1.6.ii Five-year survival from all cancers in children

Indicator family name
NHS Outcomes Framework – Domain 1: Preventing people from dying prematurely Improvement area – Reducing deaths in babies and young children

Outcome sought
Reducing premature mortality from all cancers in children.

Detailed Descriptor

Plain English description
A measure of the percentage of children diagnosed with any type of cancer in a year who are still alive five years after diagnosis.

Technical description
Five-year overall survival for children (0-14 years) suffering from any type of cancer.

Data sources
Childhood cancer survival in England – Experimental Statistics
Published annually (calendar years) by the Office for National Statistics (ONS).
Available approximately 13 months following the end of the reporting year.
The latest ONS bulletin, source data and methodology can be found at the following link.
Construction

Introduction

Data for this indicator are from the cancer survival statistical bulletins published annually by the ONS. Five-year age-standardised overall survival data for all cancers in children are used for the national indicator 1.6.ii.

Five-year survival is a measure of the number of children diagnosed with cancer in a year who are still alive five years after diagnosis.

The five-year survival rate is the cumulative probability of all-cause (overall) survival up to five years after diagnosis using the actuarial method. This means that all deaths are included in the analysis, whatever the cause of death written on the death certificate. For the adult cancer indicators the net survival indicator is used to compensate for mortality from other causes, which may be considerable. For children, overall survival is considered a reliable estimator of cancer survival because, unlike in adults, death within five years of diagnosis is almost always due to the cancer.

Survival varies with age at diagnosis, and the age profile of patients can change over time. To enable comparison of overall survival for the age range 0–14 years over long periods of time, age-standardised estimates are calculated as a weighted sum of the age-specific survival estimates. For children, it is conventional to use equal weights for the three five-year age groups, 0–4, 5–9 and 10–14 years, by taking the simple arithmetic mean of the age-specific survival estimates.

Data filters

The number of children diagnosed with any type of cancer in a year who are still alive five years after diagnosis. Includes cancers defined as a malignant neoplasm (ICD-10 C00-C97) or a non-malignant CNS tumour (ICD-10 D32-D33, D35.2-D35.4, D42-D43 and D44.3-D44.5). Excludes code C44 - non-melanoma skin cancers.

Calculation

The methodology used to calculate five-year survival is the ‘complete’ approach. Only children diagnosed in the first year of the diagnosis period are followed up for five years; those diagnosed in later years contribute as many years of follow-up as available. This is a robust method, and allows five-year figures to be calculated timeously.

The values from the ONS are sourced fully calculated. Overall survival is calculated from patients diagnosed over a period of time and followed up to a given date after this period.
Presentation

Breakdowns

Time periods
Annual data for follow ups from 1995 onwards

Demographic
Age: Age-standardised rate at England level for ages 0-14 and age bands 0-4, 5-9 and 10-14

Geographic
England: Age-standardised rates

Excel and CSV output

<table>
<thead>
<tr>
<th>Column name</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of diagnosis</td>
<td>Year of diagnosis</td>
</tr>
<tr>
<td>Period of coverage</td>
<td>Diagnosis- and follow-up period</td>
</tr>
<tr>
<td>Breakdown</td>
<td>England or age</td>
</tr>
<tr>
<td>Age</td>
<td>Age range</td>
</tr>
<tr>
<td>Number of patients</td>
<td>The number of patients aged 0 to 14 with a diagnosis of cancer in the respective year</td>
</tr>
<tr>
<td>Indicator value</td>
<td>Five-year age-standardised net survival (%)</td>
</tr>
<tr>
<td>Lower CI</td>
<td>Lower confidence interval value (95%)</td>
</tr>
<tr>
<td>Upper CI</td>
<td>Upper confidence interval value (95%)</td>
</tr>
</tbody>
</table>
## Domain 1 Appendices

### Appendix 1 – Causes considered amenable to healthcare used in the calculation of NHS Outcomes Framework indicators 1a.i and 1a.ii

<table>
<thead>
<tr>
<th>ICD–10 codes</th>
<th>Condition group and cause</th>
<th>Ages included</th>
<th>Used in indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infections</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A00 – A09</td>
<td>Intestinal infectious disease</td>
<td>0-14</td>
<td>Children’s indicator (1a.ii) only</td>
</tr>
<tr>
<td>A15–A19, B90</td>
<td>Tuberculosis</td>
<td>0-74</td>
<td>All</td>
</tr>
<tr>
<td>A35 – A36, A80</td>
<td>Other infections (diphtheria, other tetanus, acute poliomyelitis)</td>
<td>0-19</td>
<td>Children’s indicator (1a.ii) only</td>
</tr>
<tr>
<td>A37</td>
<td>Whooping cough</td>
<td>0-14</td>
<td>Children’s indicator (1a.ii) only</td>
</tr>
<tr>
<td>A38–A41, A46, A48.1, B50–B54, G00, G03, J02, L03</td>
<td>Selected invasive bacterial and protozoal infections</td>
<td>0-74</td>
<td>All</td>
</tr>
<tr>
<td>B05</td>
<td>Measles</td>
<td>1-14</td>
<td>Children’s indicator (1a.ii) only</td>
</tr>
<tr>
<td>B17.1, B18.2</td>
<td>Hepatitis C</td>
<td>0-74</td>
<td>All</td>
</tr>
<tr>
<td>B20-B24</td>
<td>HIV/AIDS</td>
<td>All ages</td>
<td>All</td>
</tr>
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<p>| <strong>Neoplasms</strong> |                           |               |                   |
| C18–C21      | Malignant neoplasm of colon and rectum | 0-74          | All               |
| C43          | Malignant melanoma of skin       | 0-74          | All               |
| C44          | Other malignant neoplasms of skin | 0-19          | Children’s indicator (1a.ii) only |
| C50          | Malignant neoplasm of breast     | 0-74          | All               |</p>
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**Digestive disorders**

| K25–K28     | Gastric and duodenal ulcer | 0-74          | All               |
| K35–K38, K40–K46, K80–K83, K85, K86.1–K86.9, K91.5 | Acute abdomen, appendicitis, intestinal obstruction, cholecystitis / lithiasis, pancreatitis, hernia | 0-74          | All               |

**Genitourinary disorders**

| N00–N07, N17–N19, N25–N27 | Nephritis and nephrosis | 0-74          | All               |
| N13, N20–N21, N35, N40, N99.1 | Obstructive uropathy & prostatic hyperplasia | 0-74          | All               |

**Maternal & infant**

| P00–P96, A33 | Complications of perinatal period | All ages | All |
| Q00–Q99 | Congenital malformations, deformations and chromosomal anomalies | 0-74 | All |
| O00 – O99 | Pregnancy, childbirth and the puerperium | 0-19 | Children’s indicator (1a.ii) only |

**Injuries**

| Y60–Y69, Y83–Y84 | Misadventures to patients during surgical and medical care | All ages | All |
Appendix 2a – ONS 2012 based estimates of life expectancy by age groups – Males


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Appendix 2b – ONS 2012 based estimates of life expectancy by age group – Females


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Appendix 4 – Age groups for use in the standardisation of the mental health rate for NHS Outcomes Framework indicator 1.5.i

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