1b Life expectancy at 75: i Males ii Females
Indicator Reference: I00655

Indicator Quality Statement

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Introduction

Context for the quality statement.

This data quality report accompanies the National Statistics release of new data points for NHS Outcomes Framework (NHS OF) indicator 1b, Life expectancy at 75.

This indicator forms part of the NHS Outcomes Framework, which is designed to provide national level accountability for the outcomes the NHS delivers, and act as a catalyst for driving transparency, quality improvement and outcome measurement throughout the NHS.

The NHS Outcomes Framework sets out the national outcome goals that the Secretary of State will use to monitor the progress of NHS England. It does not set out how these outcomes should be delivered, it is for NHS England to determine how best to deliver improvements by working with Clinical Commissioning Groups (CCGs) to make use of the tools at their disposal.

This indicator has been assured through the Indicator and Methodology Assurance Service (IMAS), which is managed by NHS Digital. Under the regulations within the Health and Social Care Act, a national database of quality assured indicators was established and this contains details of all indicators which have been approved under the assurance process. Further details about the IMAS can be found in the ‘Accuracy and Reliability’ section.

Related Links

The NHS Digital website: www.digital.nhs.uk

The Indicator Portal: https://indicators.hscic.gov.uk

For summary dashboard and other useful links please use the link above and select “NHS Outcomes Framework (NHS OF) summary dashboard and useful links” from the left hand side menu.

Relevance

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

Background

The NHS Outcomes Framework indicators were developed by the Department of Health in 2010 to provide national level accountability for the outcomes that the NHS deliver. Each year the Department decide which indicators will be included in the framework based on consultation with internal and external stakeholders. Data for the indicators come from a wide range of sources which become available at different times of the year. NHS Digital publish indicator data on a quarterly basis, each release includes the indicators for which new data have recently become available.
Details about the types of people who use the NHS OF indicators can be found in our Users and Uses Statement on the NHS OF home page at the following link: http://digital.nhs.uk/nhsop

**Purpose of this indicator**

This indicator is an overarching indicator in domain 1 of the framework. The overarching indicators in domain 1 allow the Secretary of State to review how successful the NHS has been in preventing people from dying prematurely, and in particular, preventing deaths from causes considered ‘amenable’ to healthcare. ‘Amenable’ in this context relates to premature deaths that should not occur in most cases in the presence of timely and effective healthcare.

While a limited number of conditions for those aged 75 and over are included in the definition of “amenable” used in other domain 1 indicators, these indicators focus on those aged under 75 for the most part. This is largely because of the difficulty of ascribing cause of death in 75+ age groups where there are often multiple morbidities. However many deaths at ages 75 and over could be considered premature. In order to address concerns that the framework neglects premature or avoidable deaths in older people, this indicator, life expectancy at 75, is a companion indicator to amenable mortality.

NHS England state that “There are significant inequalities across the country in life expectancy”¹ and this indicator will be key in measuring efforts to combat this.

**Interpretation of this indicator**

The life expectancy figures estimate 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. Figures are based on their year of birth, current age (in this case at age 75) and other demographic factors including their gender. Life expectancies are calculated using life tables which show, for each age, what the probability is that a person will die before his or her next birthday.

Expectations of life can be calculated in two ways: ‘period life expectancy’ or ‘cohort life expectancy’.

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.

¹https://www.england.nhs.uk/resources/resources-for-ccgs/out-frwrk/dom-1/
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 on².

The life expectancies used in this indicator relate to remaining years of life regardless of general health or disability status. Healthy life expectancy refers to the number of years someone can expect to live in “good” health. Disability-free life expectancy refers to the number of years someone can expect to live disability free. Both health and disability-free life expectancies are published by the Office for National Statistics³ (ONS) but are not included in NHS OF.

**Slope and Relative Index of Inequality**

The summary inequality measures (Slope and Relative Index of Inequality) show whether inequality is growing or diminishing, and what the change is relative to the indicator average. The inequality measures, in part, reflect the extent of inequality in the underlying population, i.e. if inequality was reduced more generally we would expect the inequality measure in the context of this indicator to reduce.

**Improving this indicator**

A number of factors can contribute towards improvements or deterioration in this indicator. The relative contributions of healthcare, prevention activity and other external factors are difficult to disentangle. The activities than can contribute are discussed below.

**Healthcare contribution**

The NHS contributes to improvements in this indicator through prompt diagnosis and effective management of conditions and treatments. The NHS contribution also includes encouraging healthy behaviours and uptake of screening and vaccination.

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²https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/methodologies/periodandcohortlifeexpectancyexplained

options. For those aged 65 and over these include free seasonal flu and pneumonia vaccinations and for those aged 70 to 79, shingles vaccinations\(^4\).

### Public health and social care contribution

Prevention, early identification and management of risk factors including cholesterol, blood pressure, diabetes, chronic kidney disease and transient ischemic attack interventions can affect this indicator. Smoking, lack of physical activity, diet, salt and alcohol consumption, obesity, vaccination rates and the quality of care people receive will also have an influence.

ONS statistics show that in 2011 more than a quarter of a million (291,000) people aged 65 and over were living in care homes in England and Wales. This represents 3.2 per cent of the overall over 65 population and 82.5 per cent of the total care home population\(^5\). This makes social care a likely contributor to the direction of this indicator. Well run social care and hospitals working in conjunction to avoid inappropriate care, such as patients remaining in hospital when social care capacity is stretched, will be important in increasing life expectancy for those aged 75.

### Other contributions

The predominant external driver of outcomes in domain 1 is the incidence of disease, and incidence is greatly affected by demographic and cohort effects. For this reason, it is important to consider the impact of factors external to healthcare, public health and social care organisations when reviewing the progress of these indicators.

The World Health Organisation state that:

*Many factors combine together to affect the health of individuals and communities. Whether people are healthy or not, is determined by their circumstances and environment. To a large extent, factors such as where we live, the state of our environment, genetics, our income and education level, and our relationships with friends and family all have considerable impacts on health.*

Specific factors, which could have an impact on life expectancy for those aged 75 recently include the level of influenza circulating in the population and economic recession\(^6\).

The NHS has a responsibility to work with public health and social care services to improve outcomes for current cohorts by improving health behaviours, but it must be recognised that the full benefit of many such interventions will not be apparent in life expectancy data for many years or even decades.

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Accuracy and Reliability

How well the information is recorded and transmitted, and, where applicable, the proximity between an estimate and the unknown true value.

Source data

Two data sources are used for this indicator. The three-year average life expectancies at national level and for the region and local authority breakdowns in this indicator come directly from the ONS publication “Health state life expectancy - All ages, UK”7. This data can be modified in the published pivot table to provide data for general life expectancy, for England, at age 75.

The three-year average life expectancies for the deprivation breakdown are provided in a bespoke file fully calculated by ONS and are derived from “Health state life expectancy - All ages, UK”7. The deprivation scores are calculated using the 2015 Index of Multiple Deprivation (IMD) scores for England which are based on the Lower Super Output Area (LSOA) boundaries created in 2011. These data are produced by the Department for Communities and Local Government (DCLG)8.

The one-year life expectancies in this indicator, which are available at national level only, are sourced directly from the ONS publication “Expectation of Life, Principal Projection, England”9.

Data Processing

Details about the accuracy and reliability of these data are included below, together with the quality checks that take place to ensure the data are robust.

ONS processes10

The three-year life expectancy calculations use abridged life tables (based on five-year age groups) rather than complete ones (based on single year of age). This is because the single year of age tables involves small numbers of deaths in younger ages in smaller local authorities, which can make the estimates at lower levels unstable. Life expectancy figures are calculated as three-year rolling averages to provide large enough numbers to ensure that the results are sufficiently robust at all geographical levels. However, figures are not calculated for the City of London or the Isles of Scilly because the numbers of deaths are too small to produce statistically robust estimates.

The one-year life expectancy calculations use complete life tables based on single year of age. The estimates for the one-year indicator values have a high level of precision and therefore confidence intervals are not deemed to be necessary.

Before the annual release, life expectancy figures for local and unitary authorities are

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7 https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/datasets/healthstatelifeexpectancyallagesuk
9 http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/datasets/expectationoflifeprincipalprojectionengland
10 https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/qmis/healthstatelifeexpectanciesukqmi
calculated as part of the process for quality assuring mid-year population estimates for England and Wales. The analyses highlight potential outliers in the distribution of new life expectancy estimates and compare results with those calculated for the previous period.

Separate tables are constructed for males and females as there are large, well-known variations between genders.

It is important to consider that anomalies in the data or methodological issues can cause minor fluctuations in any data set. The calculation of life expectancy involves the use of death registration data and mid-year population estimates and is therefore dependent on the accuracy of both of these datasets.

Counts of deaths are subject to natural variability, which means that different counts can occur even under the same circumstances. The population figures are also subject to uncertainty since they are derived from birth and death counts and survey data. More details about the accuracy of these data are provided in the following sections.

Since both of these data sources are subject to uncertainty, the calculated life expectancies are considered to be estimates. The data files therefore include 95 per cent confidence intervals to quantify the precision of the estimated life expectancies. The intervals show the range of values which we would expect the true value to lie in 95 per cent of the time. A narrower confidence interval shows that the estimated indicator value is a more precise estimate of the true indicator value.

**Death registrations**

Death registration data are published regularly by ONS and have been designated as National Statistics. The data therefore comply with the Code of Practice for Official Statistics and are considered to be of good quality.

The Births and Deaths Registration Act (1836) made it a legal requirement for all deaths to be registered from 1 July 1837. ONS collect mortality statistics once deaths are registered and counts are presented as deaths that were registered within the year rather than deaths that occurred within the year. This means that some deaths in the yearly counts will have occurred in the previous reference period to what is being reported but this only relates to around 4.5 per cent of records.

A relative of the deceased will usually present the death certificate to a registrar and give additional information about the deceased in order to officially register the death. Information supplied by the relative is generally believed to be correct since knowingly supplying false information may render them liable to prosecution for perjury. We would expect the volume of false information to be minimal and therefore believe the data is still suitable for use in this indicator.

When data are entered into the registration system, there are validation checks to help ensure the details entered are correct. The registrar has a duty to carry out a variety of checks on the data such as the death being in their area and that the relative is qualified to give information. They will also ask the relative of the deceased to check that the information entered is correct, before the registration is submitted.

Details of deaths are sent electronically to ONS from registry offices. Automated validation checks are carried out on each file and diagnostic reports produced to highlight any anomalies, resulting in weekly contacts with the identified registrars to
resolve any problems.

**Mid-year population estimates**¹¹

The mid-year estimates used to calculate the indicator values refer to the estimated population of England on 30 June of the reference year and are published annually. These data are National Statistics and therefore comply with the Code of Practice for Official Statistics and are considered to be of good quality.

The estimates relate to the usually resident population. They account for long-term international migrants (people who change their country of usual residence for a period of 12 months or more) but do not account for short-term migrants (people who come to or leave the country for a period of less than 12 months). This approach is consistent with the standard UN definition for population estimates.

Population estimates are produced using a well-established demographic approach called the cohort component method. This involves combining information from a number of data sources including the previous census, survey data and administrative registers. The data sources used are the best that are available on a nationally consistent basis down to local authority level, but the estimates are subject to the coverage and error associated with these sources. Information from administrative registers such as the numbers of births and deaths are considered to be very reliable.

Estimates of international migration are obtained from the International Passenger Survey (IPS). Although national figures have relatively small levels of uncertainty, at local levels the sample counts in the IPS are small. The ONS combine data across years and distribute figures using other administrative data sources in order to compensate for this. The ONS state that the impact of uncertainty associated with net migration flows is only small as a percentage of the local authority mid-year estimates.

One source of potential inaccuracy in the estimates is the use of sample surveys in the derivation of the census and international migration estimates. The sampling error from those sources allows the derivation of an estimated confidence interval of +/-0.2 per cent. This means that if the surveys were repeated many times, with a new sample selected each time, we would expect the true value to be within +/-0.2 per cent of the estimated value 95 per cent of the time.

ONS has undertaken a substantial and long-term programme of work to improve the population and migration statistics that it produces. The scope for improving migration and population statistics was addressed in the conclusions and recommendations of the National Statistician’s Task Force on Migration Statistics. The Task Force report was published in December 2006 and made recommendations for improvements between 2008 and 2012. These recommendations were taken forward as part of the Migration Statistics Improvement Programme (MSIP)¹² of work in conjunction with other Government departments.

Population estimates are subject to revisions; they are revised once new census data

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become available and if errors are discovered in the data.

For much of the time series presented here, those aged 75 were born around the world wars, where there was a particularly rapid change in the birth rate. This may make the population estimates suboptimal. The effect of the world wars will have significant impact on age specific mortality rates, but the impact on life expectancy (which is calculated from multiple age-specific mortality rates) is likely to be small.

**Clinical Indicators team processes**

The NHS Digital clinical indicators (CI) team re-format published ONS data for the three-year life expectancies at national, regional and local authority level and for the one-year life expectancies at national level. Three-year deprivation data are provided in a bespoke file fully calculated by ONS but also require re-formatting by the CI team into the NHS OF template.

Two analysts create the NHS OF templates independently and then compare the outputs to check for any processing errors. Checks are made to ensure consistency with previous years’ data and any unusual patterns are discussed with ONS.

**IMAS team processes**

This indicator has been assured by the Indicator and Methodology Assurance Service (IMAS), which is managed by NHS Digital. This is a service provided for Health and Social Care, which assesses factors such as the statistical methodology, the purpose of the indicator and the quality of the data source for the purpose of a given indicator.

The IMAS assessment criteria have been improved over time to become more robust and now require significant detail on areas such as the quality of source data. The assessment provides users with assurance of the suitability of the indicator and its data source. If significant issues are found, the indicator would not meet the IMAS assessment criteria and the issues would need to be investigated. If we were unable to resolve significant issues, the indicator would not be published.

Once indicators have been assured and published, they are reviewed every few years to ensure their continued accuracy and suitability.

Further details of the IMAS can be found here: http://digital.nhs.uk/article/1674/Indicator-Assurance-Service

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**Timeliness and Punctuality**

**Timeliness** refers to the time gap between publication and the reference period.  
**Punctuality** refers to the gap between planned and actual publication dates.

ONS usually publish "Health state life expectancy - All ages, UK" in November following the release of annual death registrations data and mid-year population estimates for the previous year (usually by the end of August). Deprivation level data is sent to NHS Digital shortly after this.
"Expectation of Life, Principal Projection, England" is published biennially by ONS. Publications are usually in December following the latest year covered; for example the 2014-based tables were published in December 2015.

The clinical indicators team usually update the indicator in the following February which equates to approximately 14 months after the end of the reference period.

The date of NHS Digital publications are pre-announced and there is no gap between the planned and actual publication date.

**Accessibility and Clarity**

**Accessibility** is the ease with which users are able to access the data, also reflecting the format in which the data are available and the availability of supporting information.

**Clarity** refers to the quality and sufficiency of the metadata, illustrations and accompanying advice.

There are four main locations where members of the public can access resources and information related to the NHS Outcomes Framework (NHS OF). These are listed below together with a link to their location and information about what resources are available from each.

1. **NHS Outcomes Framework Home Page**
   [http://digital.nhs.uk/nhsof](http://digital.nhs.uk/nhsof)
   - Background to the framework
   - Information about the domains included in the framework
   - Users and uses statement
   - User feedback survey report

2. **Quarterly Publication Web Pages**
   Click here to view NHS OF publications
   - Commentary on the indicators that were updated in that release
   - A dashboard giving all of the indicator values at that point in time
   - Excel and CSV format data files, data quality statements and indicator specifications for each indicator updated in that release

3. **Indicator Portal**
   [https://indicators.hscic.gov.uk](https://indicators.hscic.gov.uk)
   - The latest information and data for all NHS OF indicators
   - A dashboard giving all of the latest indicator values
Coherence and Comparability

Coherence is the degree to which data that are derived from different sources or methods, but refer to the same topic, are similar.

Comparability is the degree to which data can be compared over time and domain.

Regional and local authority level comparisons
Life expectancy is an indicator of mortality which takes into account differences in the age structures of populations. Results for regions and local authorities can therefore be meaningfully compared.

Year on year comparisons
All three-year life expectancy data from 2001-03 onwards were calculated using the same method and are therefore comparable. Indicator data prior to this use a slightly different methodology and should not be compared, therefore the three-year data prior to 2001-03 has been removed from the data file. Please see the “ONS methodology change – February 2017” section below for more information.

European comparisons
The one-year data at national level in this indicator are more appropriate for comparison with other European countries as these are also calculated using single year of age which is consistent with Eurostat methodology. The three-year indicator data are based on combined age groups which is inconsistent with the Eurostat methodology.
Updated deprivation data - February 2016

Deprivation breakdown data for all years was revised by ONS using the 2015 Index of Multiple Deprivation (IMD) scores and published by NHS Digital in February 2016. The deprivation breakdowns were previously calculated using the adjusted IMD2010 scores. Since all years have been revised using the same IMD scores, the time series is fully comparable.

ONS methodology change – February 2017

ONS have changed the age groups used in life expectancy calculations and have published revised results for all three-year breakdowns from 2001-03 onwards. These figures were included in the NHS OF indicator data file in February 2017.

The methodology change relates to the oldest age group. The 85 and over group used in calculations has been replaced by an 85 to 89 group and a 90 and over group. This brought the age groups in line with the mid-year population estimates.

The change has affected life expectancies at all ages because the figures are based on the probabilities of individuals passing through each of the age groups. This change in methodology increased the accuracy of the estimates and tended to reduce life expectancies very slightly.

There is more information about the scale of change for the indicator values (life expectancy at age 75) in the February 2017 NHS OF commentary document and ONS have produced information about the scale of change for all age’s life expectancy at the link in this footnote.

Population column change - May 2017

A population column was introduced into the data file in November 2017. This column originally showed the general population for each respective category for adults aged between 75 and 79, but this age group was used in error. It is more appropriate to show the population for all adults aged 75 and over because the life expectancy indicator value is essentially a summary of the mortality rates for the 75 and over age group. The population column has now been updated to reflect this.

This issue also affects the calculation of the slope index of inequality (SII) and relative index of inequality (RII) values. These values were previously calculated using the 75-79 population which was used in error. The SII and RII values have now been recalculated using the 75 and over populations.

Further details about the extent and scope of these changes are included in the NHS Outcomes Framework May 2017 Commentary Report:

http://content.digital.nhs.uk/searchcatalogue?q=nhs+outcomes+framework&area=&size=10&sort=Relevance

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13 https://digital.nhs.uk/searchcatalogue?q=nhs+outcomes+framework&area=&size=10&sort=Relevance
14 https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/methodologies/methodchangestolifeandhealthstateexpectancies#results
Slope index confidence interval change - May 2017

The confidence intervals for the slope index of inequality (SII) and relative index of inequality (RII) values were updated in May 2017 using a new methodology. The previous method produces relatively wide confidence intervals because it overestimates the random variability in the deprivation decile estimates used in the calculation.

The excess variability is generated because the relationship between life expectancy and deprivation deciles is only approximately linear. The linear regression used to calculate the SII creates residual values between the regression line and the deprivation decile estimates, all of which is treated as random variation in the calculation of the confidence intervals. However, not all of a residual value is generated by random variation, they also reflect the degree of non-linearity in the life expectancy and deprivation decile relationship. Ideally, this part of the residuals should not be incorporated into the calculation of the confidence intervals and only the true variability of the data should be measured.

Therefore, a new simulation method was developed by Public Health England (PHE) as a solution to this. The new method has been used to revise the SII and RII confidence intervals in the indicator data file and this has resulted in narrower confidence intervals.

The full methodology for the simulation confidence intervals is described in the Domain 1 Specification on the Indicator Portal.

Further details about the extent and scope of this change are included in the NHS Outcomes Framework May 2017 Commentary Report:

http://content.digital.nhs.uk/searchcatalogue?q=nhs+outcomes+framework&area=&size=10&sort=Relevance

Coherence

Compendium of Population Health indicators

The Compendium of Population Health indicators are also produced by the Clinical Indicators team in NHS Digital. The Compendium provides a comprehensive overview of population health at a national, regional and local level. The Compendium has two indicators for life expectancy:

- Life expectancy: number and rank at birth, 3-year average trend MF
- Life expectancy: number and rank at age 65, 3-year average trend MF

These indicators use the same methodology as those in NHSOF.

Public Health Outcomes Framework (PHOF) indicators

The PHOF sets out a vision for public health and desired outcomes. It includes indicators that will help people to understand how well public health is being improved
and protected.

PHOF has the same two indicators as Compendium and these use the same methodology as those in Compendium and NHSOF. PHOF also has slope index of inequality indicators based on life expectancy at birth and the slope index methodology is the same as the one used in NHS OF.

Trade-offs between Output Quality Components

Trade-offs are the extent to which different aspects of quality are balanced against each other.

Period life expectancies such as those used in this indicator take no account of future changes in mortality and as such should not be regarded as the number of remaining years a person can expect to live for.

They also make an assumption that a person will experience area specific mortality rates for the rest of their life which again is impractical as persons may have moved in the past and may move in future.

The estimates are intended as an indicator of general health and avoidable mortality for those aged 75 rather than an exact calculation of remaining years of life.

The use of combined age groups in the calculation of three-year life expectancies is necessary, as numbers may be too small for robust estimates at local area level. This method however is not as accurate as using single year of age, which are used in the one-year national calculation.

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.

Assessment of User Needs and Perceptions

The processes for finding out about users and uses, and their views on the statistical products.

Comments about the NHS Outcomes Framework data or publications can be made through various media:

- ‘Have your say’ on the NHS OF section of the NHS Digital website:
  http://digital.nhs.uk/haveyoursay

- NHS Digital general enquiries team
  Email: enquiries@nhsdigital.nhs.uk
For more details on how we assess and respond to user needs, please see our Users and Uses Statement on the NHS OF home page: http://digital.nhs.uk/nhsouf

In 2015, we ran a survey to understand more about user needs. A report about the survey can also be found on the NHS OF home page: http://digital.nhs.uk/nhsouf

**Performance, Cost and Respondent Burden**

**The effectiveness, efficiency and economy of the statistical output.**
This indicator makes use of existing data sources.

**Confidentiality, Transparency and Security**

**The procedures and policy used to ensure sound confidentiality, security and transparent practices.**

The NHS Outcomes Framework publication is subject to a standard NHS Digital risk assessment prior to issue. Disclosure control is implemented where judged necessary.

A detailed specification document describing the methodology used to calculate this indicator is available on the Indicator Portal: https://indicators.hscic.gov.uk

The Code of Practice for Official Statistics is followed regarding security and release of information prior to publication.