GIG CYMRU NHS WALES
Arsyllfa Iechyd Cyhoeddus Cymru
Public Health Wales Observatory

Measuring inequalities 2016

Technical guide

This document is part of the *Measuring Inequalities 2016* publication, which also includes:

- a detailed Wales report

- seven health board summary documents

- interactive data files showing the main indicators

These are available from www.publichealthwalesobservatory.wales.nhs.uk/inequalities

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Contents

1 Introduction

This guide describes the methods, indicators, data sources and terms used in the publication *Measuring inequalities 2016: Trends in mortality and life expectancy in Wales*. It also provides definitions, notes for interpretation, and details of where to find further information. It is intended that this guide is used in conjunction with the Wales report and the interactive data files available at www.publichealthwalesobservatory.wales.nhs.uk/inequalities

How to use this document:

- Section 2 describes the national and local deprivation fifths used within the publication
- Sections 3 and 4 provide notes for interpretation in relation to the mortality and life expectancy indicators used within the publication and the methods used to measure the inequality gaps
- Sections 5 and 6 contain a list of the indicators included in the publication and their data sources
- Section 7 is the Glossary, which contains a list of abbreviations and definitions for terms used within the publication and this guide

It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via the link above.

For further details, or to provide feedback on any aspect of the publication, please contact us on publichealthwalesobservatory@wales.nhs.uk

2 Understanding local and national deprivation fifths

The analysis presented in the Wales report and online data files examine differences in health outcomes between those living in the most deprived and those living in the least deprived areas. A measure of deprivation for each individual would be the ideal. In the absence of suitable individual level socio-economic data, an area-based deprivation measure is used: the Welsh Index of Multiple Deprivation (WIMD) 2014. As with all area-based measures, it must be noted that not everyone living in a deprived area is necessarily living in deprived circumstances and, equally, some people living in an area classed as least deprived may experience deprivation. Mortality analyses use the residence at the time of death and the associated deprivation fifth which may not necessarily be the area or deprivation fifth where individuals have grown up or lived for most of their lives.

As WIMD data is not directly comparable between releases, the latest available release at the time (WIMD 2014) was used for all of the analyses. The trend in outcomes, therefore, does

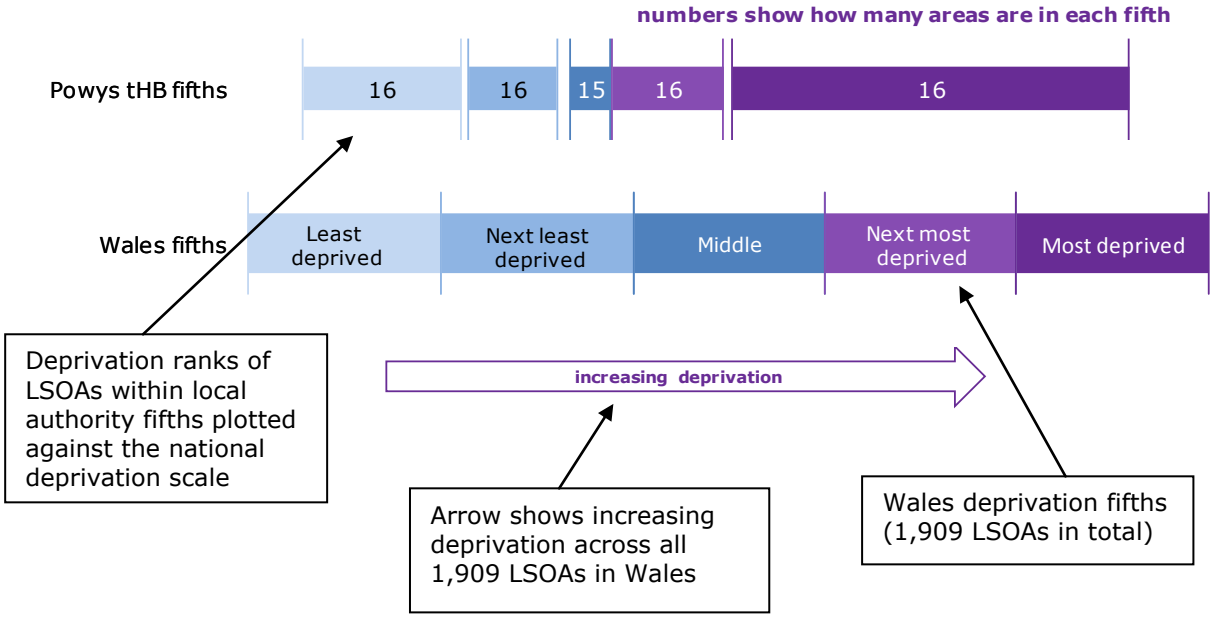
not take into account any potential change in deprivation level over time. This means that the analysis is covering the trend in time for fixed areas that have a fixed deprivation fifth.

For the Wales-level analysis, all Lower Super Output Areas (LSOAs) in Wales were grouped into fifths according to their published rank. These deprivation fifths are commonly used. For the health board and local authority level analysis, however, specific deprivation fifths within each area have been produced, as some areas do not have sufficient numbers of LSOAs in each national fifth. For example, Blaenau Gwent has no LSOAs that are nationally classed as least deprived (see charts overleaf). This approach is consistent with those used elsewhere in the UK, including in the development of Fair Society Healthy Lives (Marmot) indicators[1] at a local level in England.

Local deprivation fifths for each local authority or health board have been produced by ranking all LSOAs *within* the area and grouping them into fifths, based on the WIMD. These fifths were produced using Stata, a statistical software package. Each local authority and health board therefore has its own local fifths depending on the deprivation distribution *within* that area. In areas with a greater range of deprivation levels, the inequality gap is inevitably larger than in areas where there is less diversity. Comparisons, therefore, often illustrate the difference in the range of deprivation between areas, rather than how outcomes relate to particular levels of deprivation for those areas.

To help to understand the range of deprivation within each area, the chart below has been produced for all health boards and local authorities (see online interactive data file).

Range of deprivation within health board fifths on a scale relative to Wales fifths
Produced by Public Health Wales Observatory, using WIMD 2014 (WG)

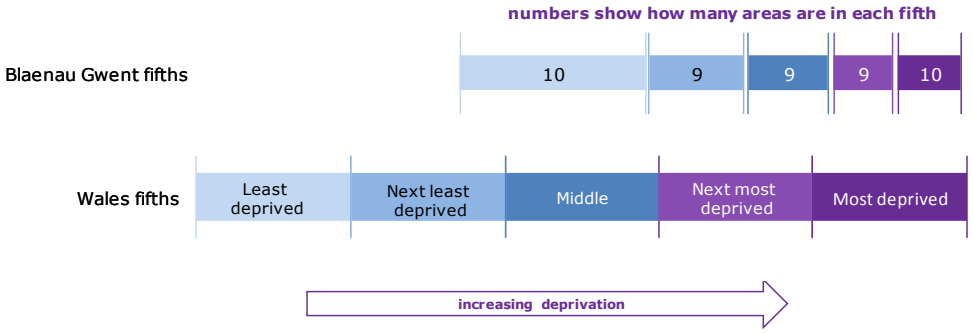


Examples of some of the local authority deprivation charts are shown overleaf. These have been selected to highlight the different ranges of deprivation within local authority fifths on a scale relative to Wales fifths. The text accompanying the charts describes how the range of deprivation within the local authority may influence the results of the analysis in terms of the inequality gap in health outcomes.

- **Likely to show a narrower inequality gap than Wales:**

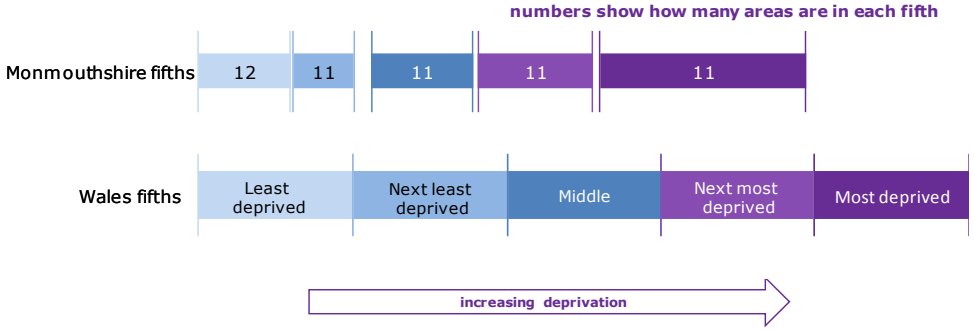
Blaenau Gwent:

LSOAs are concentrated towards the more deprived end of the national deprivation scale



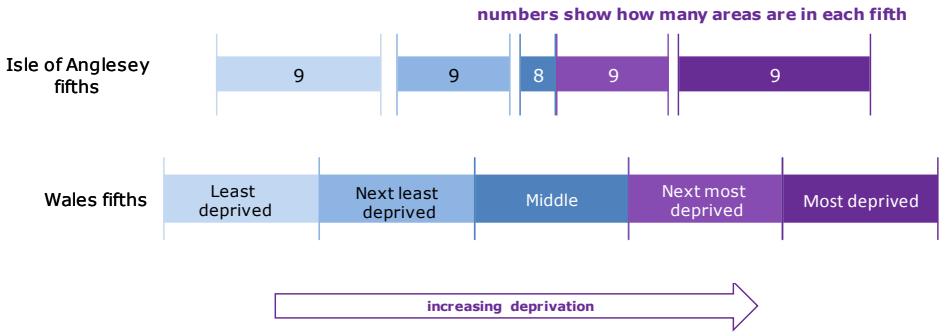
Monmouthshire:

LSOAs are concentrated towards the least deprived end of the national deprivation scale



The Isle of Anglesey:

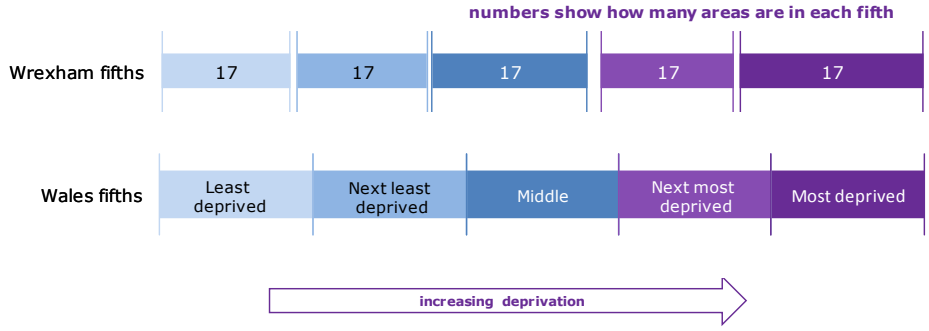
LSOAs are concentrated towards the middle of the national deprivation scale (the least and most deprived local authority fifths do not contain the extreme ends of the deprivation scale)



- **May show a similar inequality gap to Wales:**

Wrexham:

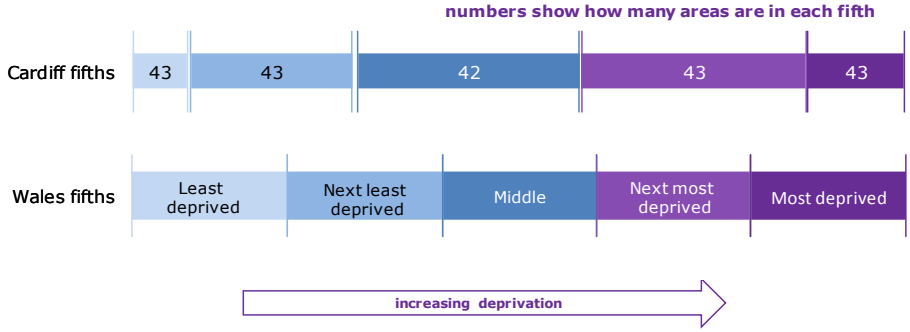
LSOAs cover the whole range of the national deprivation scale



- **Likely to show a wider inequality gap than Wales:**

Cardiff:

LSOAs cover the whole range of the national deprivation scale, but particularly the extreme ends



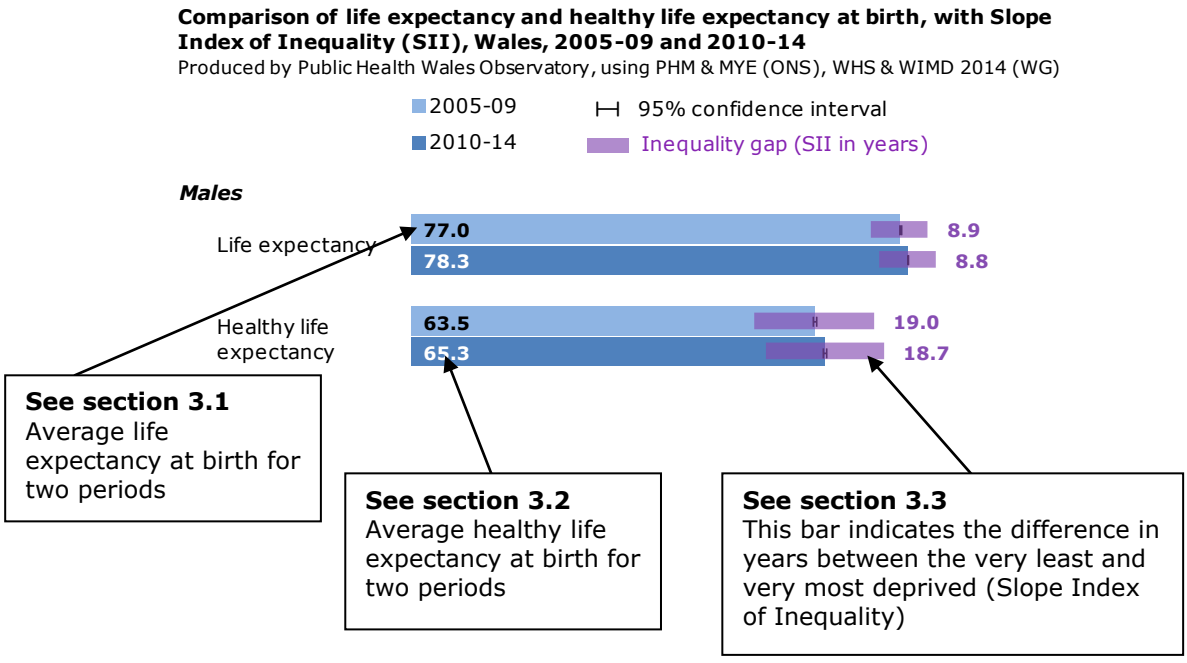
Reference
1. Marmot Review Team. *Fair society, healthy lives: strategic review of health inequalities in England post-2010. The Marmot review*. London: TSO; 2010. Available at: http://www.instituteofhealthequity.org/projects/fair-society-healthy-lives-the-marmot-review [Accessed 24th June 2016].

3 Life expectancy at birth

The *Measuring inequalities 2016* publication includes life expectancy and healthy life expectancy at birth for Wales and the local level, and by fifths of deprivation.

Both types of life expectancy have been calculated for two time periods, 2005-09 and 2010-14, for males and females separately at Wales, health board and local authority level. They have also been produced by fifths of deprivation within each area, which has been used in the calculation of the Slope Index of Inequality (see section 3.3).

Both types of life expectancy for each area and time period are displayed in the respective Wales and health board documents in the format of the chart below.



Sections 3.1 to 3.3 explain how to interpret the measures, and the details of the method of their calculation, data sources and caveats for each indicator are included in Section 5. The data for the estimates, including those for health boards, are also published in the interactive data files available at www.publichealthwalesobservatory.wales.nhs.uk/inequalities.

3.1 How to interpret life expectancy at birth

Life expectancy at birth represents an estimate of the average number of years a newborn baby could expect to live, if the then current mortality rates for the area applied throughout their lives. Mortality rates, however, are likely to change during their life and many people may also move elsewhere for at least part of their lives. Life expectancy is therefore a comparative population measure of mortality of those living in the area rather than an exact prediction of individual life expectancy for a newborn. The details of the method of calculation, data sources and caveats can be found in Section 5.1.

Life expectancy estimates are directly comparable between areas, time periods and sexes. 95 per cent confidence intervals have been produced which describe the degree of uncertainty around the estimates. These intervals can be used to ascertain the statistical significance of a difference between two estimates. If, for example, the confidence intervals between the life expectancy estimate in the earlier period and the estimate in the later period overlap, then the difference between the two is not statistically significant.

3.2 How to interpret healthy life expectancy at birth

Healthy life expectancy (HLE) at birth is an estimate of the average number of years newborn babies could expect to live in good health, if the then current mortality rates and prevalence of good health applied throughout their lives. Mortality rates and prevalence of good health are, however, likely to change during their life and HLE is therefore a comparative population measure of mortality and good health rather than an exact prediction of individual HLE. The details of the method of calculation, data sources and caveats can be found in Section 5.2.

Healthy life expectancy estimates are comparable between areas, time periods and sexes. Also included were 95 per cent confidence intervals, which describe the degree of uncertainty around the estimates. These reflect the size of the population and also the certainty of the survey data for good health. An area with a large population and a large sample size will have relatively narrow confidence intervals, whilst areas with a small population and a small sample size will have large confidence intervals. These intervals can be used to ascertain the statistical significance of a difference between two estimates. If, for example, the confidence intervals between the healthy life expectancy estimate in the earlier period and the estimate in the later period do not overlap, then the difference between the two is statistically significant. The interpretation of results in areas with small populations and sample sizes and resulting large confidence intervals is generally more difficult.

The HLE estimates are very sensitive to variation in health status data, particularly in the older age groups, where there are fewer survey responses. Welsh Health Survey data is self-reported and subject to the individual's own perception of health.

3.3 How to interpret the Slope Index of Inequality (SII)

The Slope Index of Inequality (SII) is a single statistic that summarises the extent of health inequalities within an area. It is an estimate of the gap in years of life expectancy and HLE between the least and most deprived, whilst taking the entire deprivation distribution into account. The SII is a widely used indicator of health inequalities and the SII in life expectancy at birth is the measure of inequality recommended by the Association of Public Health Observatories[1]. It has also been included in the Marmot indicator set produced following the Marmot review[2].

A regression analysis was run to produce a line of best fit across all deprivation fifths, weighted by the population share in each fifth. The gradient of the line is the SII and nominally represents the gap between the most and least deprived individuals[1]. For ease of interpretation and to avoid giving the impression that individual-level data had been used, the SII in the *Measuring inequalities 2016* publication has generally been described as the difference between the most and least deprived. The overview of the method of calculation, data sources and caveats can be found in Section 5.3 for the SII in life expectancy, and in Section 5.4 for the SII in healthy life expectancy.

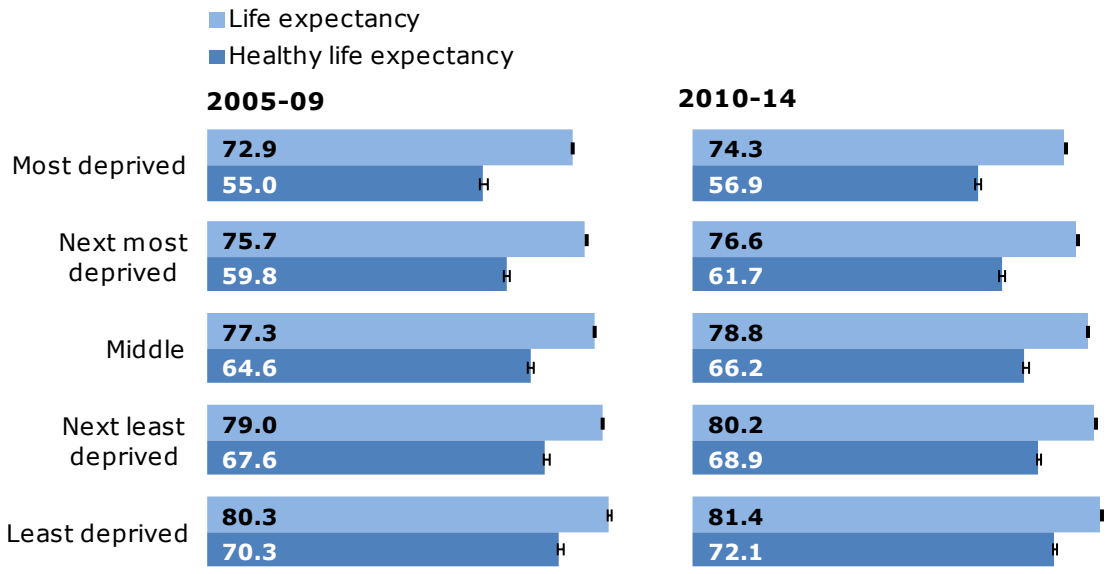
The SII gives an estimate of inequality within areas and is broadly comparable between areas. Comparisons, however, often illustrate the difference in the range of deprivation between areas. Areas with a greater range of deprivation levels will have a greater range of life expectancy estimates and therefore a greater SII. The inequality gaps in these areas tend to be larger than in areas where there is less diversity in deprivation. Further details on local deprivation fifths can be found in Section 2.

To give an indication of the uncertainty of the SII estimate, 95 per cent confidence intervals were calculated. These confidence intervals are influenced by the linearity of life expectancy estimates across the fifths. The statistical method of calculating the SII assumes a linear relationship, i.e. where a diagonal straight line could roughly be drawn across the values by increasing deprivation fifth.

The chart below shows an example of the distribution of both life expectancy and healthy life expectancy by fifths for males in Wales, and a relatively linear relationship.

Life expectancy and healthy life expectancy at birth by deprivation fifth, males, Wales, 2005-09 and 2010-14

Produced by Public Health Wales Observatory, using PHM & MYE (ONS), WHS & WIMD 2014



The calculation of the SII includes weighting by population share, but for ease of interpretation the distribution is shown simply by fifths. The effect is minimal and unlikely to affect the overall interpretation of the chart. When there is an approximately linear pattern the confidence interval is relatively narrow. In some instances, the visual inspection of the estimates by deprivation fifth showed that the distribution was not linear, and the resulting confidence interval is very wide, and in some cases even includes zero. For these cases, it is likely that the relationship between life expectancy and deprivation will not be described very well by the SII and extreme caution should be taken when interpreting the SII and comparing changes between the two periods. For any detailed analysis of these cases, it may be

advisable to use a straight subtraction between the life expectancy estimate in the most and least deprived fifths rather than the SII.

References

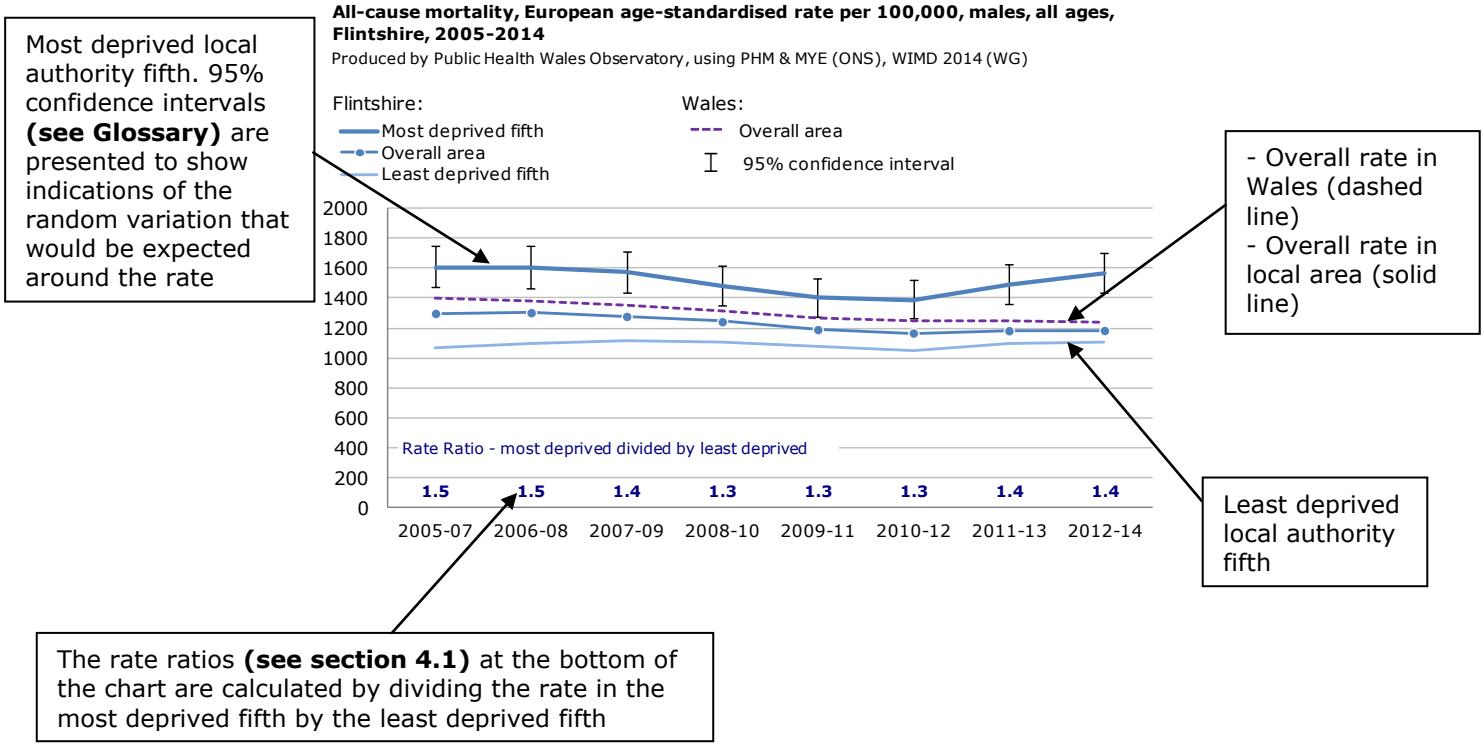
1. Baker A et al. *Health Inequality Indicators for Local Authorities. Guide to Interpretation.* APHO; 2011. Available at: http://www.apho.org.uk/resource/view.aspx?RID=96930 [Accessed 23rd Nov 2015].
2. London Health Observatory (LHO). *Marmot Indicators for Local Authorities in England.* LHO; 2011. Available at: www.lho.org.uk/LHO_Topics/national_lead_areas/marmot/marmotindicators.aspx [Accessed 9th Oct 2015].

4 Mortality

The *Measuring inequalities 2016* publication measures inequality gaps in preventable mortality rates (section 5.7) and deaths from all causes (section 5.8).

For each of the indicators, three-year rolling average mortality rates from 2005-07 to 2012-14 have been calculated for males and females using the European age-standardised rate (EASR) per 100,000 population (see Glossary for definition of EASR). Mortality rates are presented for the most and least deprived fifths within the chosen geographical area (Wales, health boards or local authorities) alongside the overall rates for the geographical area. In this publication, EASRs have been calculated using the 2013 European Standard Population which means that rates for overlapping years will not be comparable to the Measuring inequalities 2011 publication.

The diagram below provides guidance on interpreting charts showing mortality rates for the most and least deprived local area fifths compared to the overall Wales and local area rate. Confidence intervals are shown for the most deprived fifth within the local area (confidence intervals for the other rates are available via the online data files). The rate ratios (described in section 4.1) appear at the bottom of the chart.



4.1 How to interpret the rate ratio

The rate ratio used in the *Measuring inequalities 2016* publication is the mortality rate in the most deprived fifth divided by the rate in the least deprived fifth. A rate ratio of two, for example, means that the mortality rate in the most deprived fifth is twice as high as in the least deprived fifth. The rate ratio is a measure of relative inequality that can be compared between causes of death and over time and is independent of the scale. 95 per cent confidence intervals are provided for the rate ratios in the data files published online. These intervals can be used to estimate the statistical significance of a difference between two rate ratios. If, for example, the confidence intervals between two rate ratios do not overlap, then the difference between the two is statistically significant. Changes in the rate ratio over time at the local level are often not statistically significant as the confidence intervals overlap. An absolute measure of inequality, calculated as the difference in rate between the most and least deprived, is also included in the online data files.

5 Indicators

5.1 Life expectancy at birth

What is being measured?	**Life expectancy at birth**
How is this indicator defined?	An estimate of the average number of years newborn babies could expect to live, assuming that current mortality rates for the area in which they were born applied throughout their lives.
Where does the data actually come from?	• Public Health Mortality (PHM): Office for National Statistics (ONS) • Mid-year population estimates by LSOA and single year of age (unrounded): ONS • Welsh Index of Multiple Deprivation (WIMD) 2014: Welsh Government
Who does it measure?	Males, females
When does it measure it?	2005-09, 2010-14
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities, including by fifths of deprivation
How is it calculated?	• Life expectancy was calculated using the preferred method of the Office for National Statistics for calculating life expectancy at birth for small areas, as described by Eayres & Williams[1] and Toson & Baker[2]. • This method has been shown to be sufficiently reliable for populations larger than 5000. • It utilises population estimates and mortality data to calculate a life table, from which the probability of surviving each 5-year age group, given that the previous age group has been survived, is calculated. It estimates the average number of years of life expected for any particular age. In this report only the average number of years of life expected from birth is presented. • The results are reported with 95 per cent confidence intervals.
How accurate and complete will the data be for this indicator? Are there any problems, notes for interpretation or warnings with the data in relation to this indicator?	• As all life expectancy calculations are based on current mortality rates, which have been improving for decades, average life expectancy will change over the course of a lifetime irrespective of other factors. These should therefore be considered as comparative population measures of mortality during a period of time rather than as predictions of actual individual life expectancy. • The registration of death is mandatory in the UK, so the dataset should be a near complete record of mortality *(further notes on the interpretation of PHM are given in section 6.1).* • Data are aggregated from LSOA level to the local authority,

	health board or national level. This means records without a valid LSOA are excluded from the analysis and figures from this analysis may not match exactly to other data sources where data are aggregated at a higher level. • At the time of analysis, 2014 population data was unavailable. For this reason, 2013 mid-year estimates have been used as a proxy for 2014. • The 95 per cent confidence intervals are indications of the random variation that would be expected around a rate. These must be considered when assessing or interpreting a rate. The 95 per cent confidence interval represents a range which has a 95 per cent probability of including the underlying population rate. The range of the confidence interval is dependent on the size of the population from which the events came. Rates based on small populations are likely to have wider confidence intervals and rates based on large populations are likely to have narrower confidence intervals. • WIMD fifths have been calculated for Wales, health boards and local authorities independently of each other (see section 2 for details). Care should be taken when comparing the different geographies. • It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities
References	1. Eayres D.P. & Williams E.S., Evaluation of methodologies for small area life expectancy estimation, *J Epidemiol Community Health.* 2004;58:243-249. 2. Toson B. & Baker A*. Life expectancy at birth: methodological options for small populations. National Statistics Methodological series no. 33*. ONS: 2003. Available at: http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/guide-method/method-quality/specific/gss-methodology-series/index.html [Accessed 27th June 2016].

5.2 Healthy life expectancy at birth

What is being measured?	Healthy Life Expectancy (HLE) at birth
How is this indicator defined?	An estimate of the average number of years that newborn babies could expect to live in good health, assuming that current mortality rates and levels of good health for the area in which they were born applied throughout their lives.
Where does the data actually come from?	• Public Health Mortality (PHM): Office for National Statistics (ONS) • Mid-year population estimates by LSOA and single year of age (unrounded): ONS • Welsh Health Survey: Welsh Government (WG) • Welsh Index of Multiple Deprivation (WIMD) 2014: (WG)
Who does it measure?	Males, females
When does it measure it?	2005-09, 2010-14
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities, including by fifths of deprivation
How is it calculated?	• Healthy life expectancy was calculated using the Sullivan method which is the preferred method of the Office for National Statistics for calculating healthy life expectancy at birth[1,2]. • Its calculation involved combining health status data from the Welsh Health Survey with the mortality and population data used for life expectancy. It was produced for each area and for each fifth of deprivation. • The health states were based on the Welsh Health Survey questions asking those aged 16 and over "In general would you say your health is? Excellent, Very Good, Good, Fair, Poor" and asking a parent or guardian "How is the child's health in general? Very good, good, fair, bad, very bad". 'Healthy' was judged to be a response of excellent, very good or good for adults and very good or good for children. • The survey data for children at the Wales level (and by fifths) was used as a proxy for the calculation of HLE at Local Authority level, as the sample size was not sufficiently large to break down by local authority or health board level and fifths. As a result 15 year olds have been excluded from the analysis to avoid having a mix of Wales level and small area responses in the 15-19 prevalence calculations. • The results are reported with 95 per cent confidence intervals. • The percentage of life expectancy lived in good health was calculated by dividing the healthy life expectancy by the life expectancy. Confidence intervals for the percentage of life expectancy in good health were calculated using the lower and upper confidence intervals of the healthy life expectancy figure divided by the estimated life expectancy.

How accurate and complete will the data be for this indicator? Are there any problems, notes for interpretation or warnings with the data in relation to this indicator?	• As all life expectancy calculations are based on current mortality rates, which have been improving for decades, average healthy life expectancy will change over the course of a lifetime irrespective of other factors. These should therefore be considered as comparative population measures of mortality and health status during a period of time rather than as predictions of actual individual healthy life expectancy. • The 95 per cent confidence interval is an indication of the extent of random variation that could reasonably be expected and must be considered during assessment and interpretation of any estimate. A narrow interval is suggestive of the estimate being closer to the real unknown value. The width of a confidence interval is partly dependent on the size of the population from which the events came and also on the sample size of the WHS data per area. Estimates based on small populations and small WHS sample sizes are likely to have wider confidence intervals, and estimates based on large populations and larger sample sizes are likely to have narrower confidence intervals. • The Welsh Health Survey data is self-reported and may be affected by individuals' perception of their own health. • In a few isolated instances there were no survey respondents in the 85+ age group in a particular fifth within an area. When this occurred the results for the 80-84 age group were used as a substitute. • A very small number of records in the Welsh Health Survey were found to have LSOAs which did not match their local authority. These records were removed from all of the HLE calculations. • The survey data for children at the Wales level (and by fifths) was used as a proxy for the calculation of HLE at Local Authority level, as the sample size was not sufficiently large to break down by local authority or health board level and fifths. This is unlikely to have a great effect on the HLE estimates. • The Sullivan method includes an adjustment for people living in communal establishments. As there were no reliable and timely data available, this adjustment was not made in this analysis. • It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities • *Additional issues relating to mortality data, population data, and WIMD fifths that are common to all types of life expectancy indicators are highlighted in the life expectancy indicator (5.1). Further notes on the interpretation of PHM are given in section 6.1 and notes on the Welsh Health Survey are given in section 6.4.*

References	1. Jagger, C. *Health Expectancy Calculation by the Sullivan Method: A Practical Guide.* NUPRI Research Paper Series No 68. 1999. Toyko. 2. ONS. *Health expectancies at birth and at age 65, United Kingdom, 2009–11*. 2014. Available at: [Accessed 6th Oct 2015].

5.3 SII in life expectancy at birth

What is being measured?	**The Slope Index of Inequality (SII) in life expectancy at birth**
How is this indicator defined?	• A measure of the absolute difference in years of life expectancy at birth between the least and most deprived, whilst taking into account the distribution across all deprivation fifths. • Results are reported as the slope of the regression line across all fifths within an area.
Where does the data actually come from?	See 5.1 for life expectancy at birth; proportion of population share for weighting from MYE (ONS), WIMD 2014 (WG)
Who does it measure?	Males, females
When does it measure it?	2005-09, 2010-14
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities
How is it calculated?	• The SII was calculated following the methods published by Low & Low[1]. This used ordinary least squares regression in Stata, a statistical software package, where the independent variable was life expectancy, the dependent variable is the population mid-point of the deprivation fifth and the analytical weight was the square root of the fifths population. • This means then that for each local authority a regression model was run to produce a line of best fit across all deprivation fifths, the gradient of which was the SII. A 95 per cent confidence interval for the slope was produced at the same time. No autocorrelation adjustment was made as previous studies had shown this to have little impact on the estimation of the SII[1]. • This statistical approach assumes that data exhibit a linear relationship, i.e. a diagonal straight line could roughly be drawn across the values by increasing deprivation fifth. The calculation is consistent with that of the Marmot indicator for England [2] on "inequality in life expectancy at birth" although it is based on deprivation tenths not fifths and on a different deprivation index, which only covers England. The local estimates for England and Wales may be roughly comparable but the figure for England as a whole is not calculated specifically but is the median of the local figures.

How accurate and complete will the data be for this indicator? Are there any problems, notes for interpretation or warnings with the data in relation to this indicator?	• SII in life expectancy based on estimates of life expectancy at birth by fifths (see 5.1 for details) • The 95 per cent confidence interval of the SII reflects how well the regression line fits the HLE estimates across fifths. To aid interpretation of the confidence interval, the charts showing life expectancy and healthy life expectancy by deprivation fifth should be examined for linearity of distribution. • WIMD fifths have been calculated for Wales, health boards and local authorities independently of each other (see section 2 for details). • The interpretation of the SII is described in section 3.3. • It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities
References	1. Low A. & Low A. Measuring the gap: quantifying and comparing local health inequalities. *J Public Health*. 2004;26(4):388-395. 2. London Health Observatory. *Marmot Indicators for Local Authorities in England.* LHO; 2012. Available at: http://www.lho.org.uk/LHO_TOPICS/NATIONAL_LEAD_AREAS/MARMOT/MARMOTINDICATORS.ASPX [Accessed 27th June 2016].

5.4 SII in healthy life expectancy at birth

What is being measured?	The Slope Index of Inequality (SII) in healthy life expectancy at birth
How is this indicator defined?	• A measure of the absolute difference in healthy life expectancy at birth between the least and most deprived, whilst taking into account the distribution across all deprivation fifths. • Results are reported as the slope of the regression line across the estimates of all fifths within an area.
Where does the data actually come from?	See Section 5.2 for healthy life expectancy at birth, proportion of population share for weighting from MYE(ONS), WIMD 2014 (WG)
Who does it measure?	Males, females
When does it measure it?	2005-09, 2010-14
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities
How is it calculated?	• The SII was calculated following the methods published by Low & Low[1]. This used ordinary least squares regression in Stata where the independent variable is healthy or disability-free life expectancy, the dependent variable was the population mid-point of the deprivation fifth and the analytical weight was the square root of the fifths population. • This means then that for each local authority a regression model was run to produce a line of best fit across all deprivation fifths, the gradient of which was the SII. A 95 per cent confidence interval for the slope was produced at the same time. No autocorrelation adjustment was made as previous studies had shown this to have little impact on the estimation of the SII[1]. • This statistical approach is appropriate for data which exhibit a linear relationship, i.e. a diagonal straight line could roughly be drawn across the values by increasing deprivation fifth.
How accurate and complete will the data be for this indicator? Are there any problems, notes for interpretation or warnings with the data in relation to this indicator?	• SII in healthy life expectancy is based on estimates of HLE by fifths and details of their calculation and caveats are listed in Section 5.2 • The 95 per cent confidence interval of the SII reflects how well the regression line fits the HLE estimates across fifths. To aid interpretation of the confidence interval, the charts showing life expectancy and healthy life expectancy by deprivation fifth should be examined for linearity of distribution. • Local WIMD fifths have been calculated for Wales, health boards and local authorities independently of each other (see section 2 for details). • The interpretation of the SII is described in Section 3.3.

	• It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities
References	1. Low A. & Low A. Measuring the gap: quantifying and comparing local health inequalities. *J Public Health*. 2004;26(4):388-395.

5.5 Good health

What is being measured?	**The percentage of people who reported good health**
How is this indicator defined?	The percentage of survey respondents, either from the Welsh Health Survey or 2011 Census, who reported good or very good health on the 'health status' question.
Where does the data actually come from?	• Good health pyramids – Welsh Health Survey (WG) • Good health maps – Census data table LC3302EW (ONS)
Who does it measure?	Males, females
When does it measure it?	• Good health pyramids – 2010-14 • Good health maps – 2011
What geographical area does it cover?	• Good health pyramids – Wales by most and least deprived fifth • Good health maps – Wales at Lower Super Output Area level
How is it calculated?	• The good health pyramids were created by calculating the percentage of survey respondents who reported good health or better, by age group and deprivation fifth. • The figures are based on the Welsh Health Survey questions asking those aged 16 and over "In general would you say your health is? Excellent, Very Good, Good, Fair, Poor" and asking a parent or guardian "How is the child's health in general? Very good, good, fair, bad, very bad". 'Healthy' was judged to be a response of excellent, very good or good for adults and very good or good for children. • The results are reported with 95 per cent confidence intervals. • The good health maps were based on the Census 2011 question "How is your health in general? Very good, Good, Fair, Bad, Very bad". • Results for the good health maps are presented as a European age-standardised percentage using aggregated weightings from the 2013 European standard population. If an LSOA had no population in a specific age category, the national prevalence was used.
How accurate and complete will the	• The 95 per cent confidence interval is an indication of the extent of random variation that could reasonably be expected

data be for this indicator? Are there any problems, notes for interpretation or warnings with the data in relation to this indicator?	and must be considered during assessment and interpretation of any estimate. A narrow interval is suggestive of the estimate being closer to the real unknown value. Estimates based on small WHS or Census sample sizes are likely to have wider confidence intervals, and estimates based on larger sample sizes are likely to have narrower confidence intervals. • The Welsh Health Survey and Census data are self-reported and therefore may be affected by an individual's perception of their own health. • It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities

5.6 The effect of cause specific mortality rates on life expectancy

What is being measured?	**This measure gives an indication as to how life expectancy in the most deprived fifth of a given area would change if rates of certain causes of death were the same as in the least deprived fifth.**
How is this indicator defined?	It is an estimate of the increase or decrease in life expectancy at birth if the most deprived fifth within the area experienced the same cause-specific mortality rate as the least deprived fifth.
Where does the data actually come from?	• Public Health Mortality (PHM): Office for National Statistics (ONS) • Population mid-year estimates by LSOA and single year of age (unrounded): ONS • Welsh Index of Multiple Deprivation (WIMD) 2014: Welsh Government
Who does it measure?	Males, females
When does it measure it?	2012-14
What geographical area does it cover?	Wales, Welsh health boards and Welsh local authorities
How is it calculated?	• The age and sex specific number of deaths that would occur in a study area if it experienced the same mortality rate (for different causes of death) as a comparison area were calculated using the formula below. $\text{Adjusted deaths} = [\text{Deaths from all causes in the most deprived fifth}] - [\text{Deaths from the specific cause in the most deprived fifth}] + [\text{Death rate from the specific cause in the least deprived fifth} \times \text{Population in the base area}]$

<table>
<tr><td></td><td>

The adjusted number of deaths was used to calculate age and sex specific mortality rates, which were used to calculate the life expectancy if the study area had the same mortality rate for that cause as a comparator area.
The difference between the adjusted and actual life expectancy is calculated. A positive figure means life expectancy years would be gained if the most deprived fifth had the same age and cause specific mortality rates as the least deprived fifth, a negative figure indicates life expectancy years would be lost.

</td></tr>
<tr><td>Cause groups</td><td>
The underlying cause of death groups are described below:
<table>
<tr><th>Broad cause</th><th>ICD-10 codes</th></tr>
<tr><td>Circulatory diseases</td><td>I00-I99</td></tr>
<tr><td>Cancer</td><td>C00-C97</td></tr>
<tr><td>Respiratory diseases</td><td>J00-J99</td></tr>
<tr><td>Digestive diseases</td><td>K00-K93</td></tr>
<tr><td>External causes</td><td>V00-Y98, U50</td></tr>
<tr><td>Mental and behavioural disorders</td><td>F00-F99 and G30*</td></tr>
<tr><td>Other</td><td>All remaining ICD-10 codes</td></tr>
<tr><td>Deaths under 28 days</td><td>ICD-10 code not assigned</td></tr>
</table>
* G30 – Alzheimer’s disease with early onset has been included in mental and behavioural disorders so that all dementia codes are together
</td></tr>
<tr><td>How accurate and complete will the data be for this indicator? Are there any problems, notes for interpretation or warnings with the data in relation to this indicator?</td><td>

There have been two recent revisions to the manner in which the text about causes of death on death certificates are translated by the Office for National Statistics into International Classification of Diseases codes. These changes mean that unrevised data are not comparable across years. The main change relates to the rules that govern which cause of death detailed on the death certificate is selected as the underlying cause. In general, the impact of these changes can be quantified and the data can be adjusted through the use of ‘comparability ratios’ which are used to adjust the number of deaths and to calculate adjusted mortality rates.
Comparability ratios have been used to adjust the number of deaths to account for coding changes between 2010 and 2011 and between 2013 and 2014. For more details on compatibility ratios see Public Health England (PHE) guidance available at: www.apho.org.uk/resource/item.aspx?RID=126646
Life expectancies are calculated using the same method described in section 5.1 and therefore this indicator is subject to the same limitations.

</td></tr>
</table>

	• At the time of analysis, 2014 population data was unavailable. For this reason, 2013 mid-year estimates have been used as a proxy for 2014. • This indicator does not attempt to quantify the contribution of the different causes of death to the overall gap in life expectancy between two areas. It is rather an indication of what the life expectancy would be if one area had the same mortality rate for a specific cause as a comparator area. • The years of life lost or gained for each cause of death is an independent measure of the expected change in life expectancy if the most deprived areas experienced the mortality rate of the least deprived areas for a particular cause of death. The difference in life expectancy between two areas is not equivalent to sum of the years of life lost for each cause group. • Where the figures shown are negative, this means that mortality rates for the particular cause of death are higher in the least deprived than in the most deprived areas. This could happen in the case of the 'mental' category for example, which includes deaths with an underlying cause of dementia. Such deaths may be more common in the least deprived areas than in the most deprived, because people are likely to live longer in those areas, and dementia becomes more prevalent as age increases. Such a pattern may also exist for other causes of death, but the effect may not be visible in the outputs due to being grouped with other similar diseases; for example, prostate cancer and female breast cancer, which are known generally to be more common in the least deprived than the most deprived areas, are grouped in 'all cancers' with other types of cancer (e.g. lung) which are known to be more common in the most deprived areas. • It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities
References	3. Eayres D.P. & Williams E.S., Evaluation of methodologies for small area life expectancy estimation, *J Epidemiol Community Health.* 2004;58:243-249. 4. Toson B. & *Baker A. Life expectancy at birth: methodological options for small populations. National Statistics Methodological series no. 33*. ONS: 2003. Available at: www.ons.gov.uk/ons/guide-method/method-quality/specific/gss-methodology-series/gss-methodology-series--33--life-expectancy-at-birth--methodological-options-for-small-populations.pdf [Accessed 6th Oct 2015].

5.7 Preventable mortality

What is being measured?	**Rates of death from causes deemed to be 'preventable'.**
How is this indicator defined?	As defined by the Office for National Statistics (ONS), a death is preventable if, in the light of understanding of the determinants of health at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided by public health interventions in the broadest sense. The indicator presents the Preventable mortality rate (per 100,000 population).
Where does the data actually come from?	• Public Health Mortality (PHM): Office for National Statistics (ONS) • Mid-year population estimates by LSOA and single year of age (unrounded): ONS • Welsh Index of Multiple Deprivation (WIMD) 2014: Welsh Government
Who does it measure?	Males and females; all ages (note: preventable mortality definition includes age-limits for some causes of death)
When does it measure it?	2005-07 to 2012-14 (three year rolling averages)
What geographical area does it cover?	Wales and most/least deprived deprivation fifths
How is it calculated?	• Counts of registered deaths classed as preventable between 2005 and 2014 were extracted from ONS mortality files. Causes of mortality which are classed as preventable are available at: http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/about-ons/get-involved/consultations/archived-consultations/2011/definitions-of-avoidable-mortality/index.html Age limits have been applied to the majority of causes included in the list of preventable mortality. • Mortality rates were calculated and the results standardised to LSOA mid-year population estimates 2005-2014 to adjust for the effect of age in comparisons between areas. • Results are presented as European age-standardised rates (EASR) per 100,000 population and 95 per cent confidence intervals are shown for the most deprived fifth.
How accurate and complete will the data be for this indicator? Are there any problems, notes for interpretation or warnings with the data in relation to this indicator?	• The registration of death is mandatory in the UK, so the dataset should be a near complete record of mortality. • The 95 per cent confidence intervals are indications of the random variation that would be expected around a rate. These must be considered when assessing or interpreting a rate. The 95 per cent confidence interval represents a range which has a 95 per cent probability of including the underlying population rate. The range of the confidence interval is dependent on the size of the population from which the events came. Rates

	based on small populations are likely to have wider confidence intervals and rates based on large populations are likely to have narrower confidence intervals. • Data are aggregated from LSOA level to the national level. This means records without a valid LSOA are excluded from the analysis and figures from this analysis may not match exactly to other data sources where data are aggregated at a higher level. • WIMD fifths were created by considering the relative deprivation of all 1909 LSOA's in Wales, then inserting four cut-points to create five groups of increasing deprivation (see section 2 for details). • It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities

5.8 All cause mortality

What is being measured?	**Rates of death from all causes, circulatory disease, respiratory disease, and cancer**
How is this indicator defined?	Mortality (per 100,000 population) from: • All causes; all ages • All causes; under 75s
Where does the data actually come from?	• Public Health Mortality (PHM): Office for National Statistics (ONS) • Mid-year population estimates by LSOA and single year of age (unrounded): ONS • Welsh Index of Multiple Deprivation (WIMD) 2014: Welsh Government
Who does it measure?	Males, females; all ages and under 75s
When does it measure it?	2005-07 to 2012-14 (three year rolling averages)
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities, including least and most deprived fifths of deprivation. All age mortality is only available at Wales and health board level.
How is it calculated?	• Counts of deaths registered between 2005 and 2014 were extracted from ONS mortality files, for all causes (all ages and under 75) • Mortality rates were calculated and the results standardised to LSOA mid-year population estimates 2005-2014 to adjust for the effect of age in comparisons between areas. • Results are presented as European age-standardised rates (EASR) per 100,000 population and 95 per cent confidence

	intervals are shown for the most deprived fifth.
How accurate and complete will the data be for this indicator? Are there any problems, notes for interpretation or warnings with the data in relation to this indicator?	• The registration of death is mandatory in the UK, so the dataset should be a near complete record of mortality. • The 95 per cent confidence intervals are indications of the random variation that would be expected around a rate. These must be considered when assessing or interpreting a rate. The confidence interval represents a range which has a 95 per cent probability of including the underlying population rate. The range of the confidence interval is dependent on the size of the population from which the events came. Rates based on small populations are likely to have wider confidence intervals and rates based on large populations are likely to have narrower confidence intervals. • Data are aggregated from LSOA level to local authority, health board or national level. This means records without a valid LSOA are excluded from the analysis and figures from this analysis may not match exactly to other data sources where data are aggregated at a higher level. • WIMD fifths have been calculated for Wales, health boards and local authorities independently of each other. For further information, please see section 2 of the technical guide. • It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities

6 Data sources

6.1 Public Health Mortality

What the data tells you?	• Public Health Mortality (PHM) is a dataset containing each individual death of a resident that is registered in the particular year. • The information presented in the *Measuring inequalities 2016* publication relates to deaths registered between 2005 and 2014.
How are the data collected?	• Individual records for death registrations are sent on a weekly basis from the Registrars' offices across England and Wales to the Office for National Statistics (ONS). The ONS collates and validates the data. The data are based on the underlying cause of death e.g. if an individual dies from pneumonia but had been made vulnerable to that disease by end-stage cancer, then cancer (rather than pneumonia) is recorded as the underlying cause of death.
How accurate and complete will the data be? Are there any problems, notes for interpretation or warnings with the data?	• It is a legal requirement to register a death and so PHM provides a reliable and complete data source. • Cause of death is based on the medical certificate of cause of death. This is completed by the certifying doctor for about three quarters of deaths and by a coroner for the remainder. Most of the deaths certified by a coroner do not involve an inquest or any suspicion of violence, but are referred to the coroner because they were sudden and unexpected, or because there was no doctor in attendance during the deceased's last illness. There will be a longer delay in registering a small number of deaths for which a coroner's ruling is required e.g. suicide, homicide, undetermined intent. • It is important to note that with many thousands of doctors writing certificates, the differences in their training, habits and knowledge mean that there would inevitably be variations in the quality of medical certificates of cause of death[1]. • The cause of death is easier to define in younger people. Older people are more likely to have many underlying health conditions, making it more difficult to determine the underlying cause of death[2].
Who manages the data?	Office for National Statistics (ONS)
Where can you get hold of the data?	Summary data are available from: • The Office for National Statistics website: • The Welsh Government website: www.statswales.wales.gov.uk/ReportFolders/reportFolders.aspx

References	1. Office for National Statistics. *Mortality Statistics: Deaths registered in England and Wales (Series DR), 2010*. Newport: ONS 2011. Available at: http://www.ons.gov.uk/ons/dcp171778_381807.pdf [Accessed 23rd Oct 2015]. 2. Gorina Y, Lentzner H. Multiple Causes of Death in Old Age. *Aging Trends* 2008; 9:1-9. Available at: www.cdc.gov/nchs/data/ahcd/agingtrends/09causes.pdf [Accessed 23rd Oct 2015].

6.2 Mid-year population estimates

What the data tells you?	Mid-year population estimates (as at 30 June each year) provide an estimate of the resident population of an area.
How are the data collected?	Population estimates are based on births, deaths and an estimate of migration since the last census. They are produced using a well established demographic approach called the cohort component method by the Office for National Statistics (ONS). In simple terms, population estimates are calculated by: • Taking the previous years' population estimate • Taking out special population groups • Ageing every person on one year • Adding births and subtracting deaths • Allowing for inward and outward migration • Adding back in the special population groups.
How accurate and complete will the data be? Are there any problems, notes for interpretation or warnings with the data?	• The estimated resident population of an area includes all people who usually live there, whatever their nationality[1]. • Members of the armed forces stationed in the UK are included[1]. • UK forces stationed outside the UK are excluded[1]. • Students are taken to be resident at their term time address[1]. • The estimates include long term international migrants (defined as somebody who changes his or her country of usual residence for a period of at least one year)[1]. • The estimates do not include short term migrants (people who come to or leave the UK for less than a year)[1]. • The census and therefore mid-year population estimates are thought to underestimate the population in some areas e.g. areas of multi-occupancy housing. • It has recently come to light that the population aged 85+ has been underestimated in some areas by the Office for National Statistics population estimates. In most parts of Wales, the impact of this issue on *Measuring inequalities 2016* will be very small; further details are provided in a brief paper available via www.publichealthwalesobservatory.wales.nhs.uk/inequalities • Full guidance on the methodology used by ONS to calculate population estimates can be accessed at: www.ons.gov.uk/ons/guide-method/method-quality/specific/population-and-migration/pop-ests/index.html

Who manages the data?	Office for National Statistics (ONS)
Where can you get hold of the data?	Office for National Statistics website available at: http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates
References	1. Office for National Statistics. *Methods guide for mid-2014 Population Estimates* [Online]. 2011. Available at: http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/guide-method/method-quality/specific/population-and-migration/pop-ests/population-estimates-for-las/index.html [Accessed 23rd Oct 2015].

6.3 Welsh Index of Multiple Deprivation

What the data tells you?	• The Welsh Index of Multiple Deprivation (WIMD) 2014 is a measure of multiple deprivation at small area level. The fifth edition of the Welsh Index of Multiple Deprivation was released in August 2014 and replaced WIMD 2011. WIMD is made up of eight separate domains of deprivation: income; employment; health; education; housing; access to services; environment; and community safety. • WIMD is used to give an overall deprivation rank for each of the 1,909 lower super output areas (LSOA) in Wales and to give ranks for the separate deprivation domains for each of the LSOAs.
How are the data collected?	• Deprivation ranks are calculated for each LSOA in Wales. One area has a higher deprivation rank than another if the proportion of people living there that are classed as deprived is higher. The most deprived area is ranked as one and the least deprived area is ranked as 1,909. • Each of the eight domains are based on a range of different indicators. The domain indices are weighted and combined into an overall index of multiple deprivation. The weighting is the adjustment of the contribution of the domain indices make to the overall index when they are combined. Income and employment are classed as the most important indicators and are given the biggest weighting in the overall index. • To obtain deprivation fifths geographical areas are ranked from highest to lowest by the deprivation rank and then split into five equal bands, ranging from least deprived to most deprived fifth.
How accurate and complete will the data be? Are there any problems, notes for interpretation or warnings with the data?	• The WIMD provides a deprivation rank for each of the 1,909 LSOAs in Wales. • Not everyone living in a deprived area is deprived and not all deprived people live in deprived areas. An area itself is not deprived, it is the circumstances and lifestyle of people who are living there that affects its deprivation ranks. • The WIMD cannot tell you how much more deprived one LSOA is than another. If one area is ranked as the 100th most deprived and another area as the 300th most deprived, you cannot say that one area is three times more deprived than the other. • Deprivation ranks cannot be compared with scores from a

	previous index. • The WIMD ranks cannot be compared with those from deprivation indices of other UK countries. • There are no official Health Board and Local Authority fifths. • WIMD is an ecological measure whereas individuals within an area (LSOA in this instance) may vary. • The overall WIMD index includes a health measure and so it can be argued that assessing health experiences against WIMD can have a circular effect. • Unlike measures of material deprivation some of the factors do not relate directly to material deprivation e.g. access to services. • It is important to note that low deprivation does not equate to affluence.
Who manages the data?	Welsh Government's Statistical Directorate and the Local Government Data Unit (Wales)
Where can you get hold of the data?	http://gov.wales/statistics-and-research/welsh-index-multiple-deprivation/?lang=en

6.4 Welsh Health Survey

What the data tells you?	• The Welsh Health Survey provides estimates of health status, health related lifestyle and health service use at national level, for population sub-groups (such as age, sex and socio-economic group), and for local authorities / health boards. • Five years of survey data were combined for each time period (2004/05-09 and 2010-14) for the healthy life expectancy analysis in the *Measuring inequalities 2016* publication.
How are the data collected?	• The Welsh Health Survey is based on a representative sample of adults (aged 16 and over) living in private households in Wales (plus some information for children living in those households). • Information is collected on households through a short interview and on individuals through a self-completion questionnaire.
How accurate and complete will the data be? Are there any problems, notes for interpretation or warnings with the data?	• The Welsh Health Survey is the most comprehensive survey into the health of the population at local authority level across Wales. • As the survey responses are self-reported, some of the results may be over- or under-estimates. • The Welsh Health Survey does not include adults living in institutional settings such as care homes or nursing homes. • Child survey data has only been available since 2007. Therefore 2007-09 child data have been used as a proxy for the 2004/05-09 period.
Who manages the data?	Welsh Government
Where can you get hold of the data?	Welsh Health Survey results are available at: http://gov.wales/statistics-and-research/welsh-health-survey/?lang=en

7 Glossary

7.1 Abbreviations

PHM	Public Health Mortality
CI	Confidence interval
EASR	European age-standardised rate
HLE	Healthy life expectancy
ICD-10	International Classification of Diseases 10th Revision
LE	Life expectancy
LSOA	Lower super output area
MYE	Mid-year population estimate
ONS	Office for National Statistics
PEDW	Patient Episode Database for Wales
SII	Slope Index of Inequality
UHB/THB	University/Teaching Health Board
WG	Welsh Government
WIMD	Welsh Index of Multiple Deprivation

7.2 Definitions

Age-standardised rate

- Age-standardisation allows comparison of rates across different populations while taking account of the different age structures of those populations. Failure to take account of differing age structures can be very misleading when comparing rates in different populations.

Confidence intervals (CIs)

- Confidence intervals are indications of the natural variation that would be expected around a rate and they should be considered when assessing or interpreting a rate. The size of the confidence interval is dependent on the number of events occurring and the size of the population from which the events came. Generally speaking, rates based on small numbers of events and small populations are likely to have wider confidence intervals. Conversely, rates based on large populations are likely to have narrower confidence intervals. In the *Measuring inequalities 2016* publication we use 95 per cent confidence intervals. This represents a range of values that we can be 95 per cent confident contains the 'true' underlying rate.

European age-standardised rate (EASR)

- The European age-standardised rate represents the overall rate you would get if the population had the same age-structure as a theoretical standard European population (direct age-standardisation). In order to calculate this we apply the rates which occur in each age band to the new (standard) population structure. The measure only allows for comparison between rates which have been standardised; it is not a proportion or risk of an event occurring and does not, of itself, involve a comparison with rates across Europe. See *age-standardised rate* for further details.

Fifths of deprivation

- Geographical areas are ranked from highest to lowest by deprivation score and then split into five bands of similar size, ranging from least deprived to most deprived fifth.

Health board

- Health boards are the NHS bodies in Wales responsible for the health of the population within their geographical area. This includes planning, designing, developing and securing the delivery of primary, community, in-hospital care services and specialised services. There are seven health boards in Wales, changed from 22 local health boards and seven NHS Trusts previously.

Healthy life expectancy (HLE) at birth

- Healthy life expectancy at birth is an estimate of the average number of years newborn babies could expect to live in good health, if the then current mortality rates and prevalence of good and very good health applied throughout their lives.

Life expectancy (LE) at birth

- Life expectancy at birth is an estimate of the average number of years newborn babies could expect to live if current age-specific mortality rates continue to apply.

Lower Super Output Area (LSOA)

- Defined geographical area based on Census output areas with an average of 1,600 persons per LSOA. There are 1,909 LSOAs in Wales, and the number of LSOAs can vary widely between health boards.

Mid-year estimates

- Annual ONS estimates of the resident population, based on the Census and taking into account population change (births, deaths and migration).

Rate ratio

- The rate ratio used in the *Measuring inequalities 2016* publication is the mortality rate in the most deprived fifth divided by the rate in the least deprived fifth (see section 3.1).

Respiratory diseases

- Diseases which occur in the upper and lower respiratory tract.

Slope Index of Inequality (SII)

- The Slope Index of Inequality is a single statistic that summarises the extent of health inequalities within an area. It is an estimate of the actual gap in life expectancy, healthy life expectancy or disability-free life expectancy between the least and most deprived areas, taking into account the life expectancies of the fifths in between (see section 2.4).

Statistical significance

- A result may be deemed statistically significant if it is considered unlikely to have occurred by chance alone. The basis for such judgements is a predetermined and arbitrary cut-off, usually taken as 5% or 0.05. In some circumstances this cut–off may be lowered to 1%, for example where there is a greater need for certainty over the safety of a drug or

procedure. Statistical significance must not be confused with clinical or other significance. A result may be clinically significant whilst not being statistically significant and vice versa.

Welsh Index of Multiple Deprivation (WIMD)

- WIMD is a measure of multiple deprivation at lower super output area level. A WIMD deprivation score is calculated using eight domains i.e. income, employment, health, education, access to services, housing, physical environment and community safety.