Cardiovascular disease indicators

Technical Guide
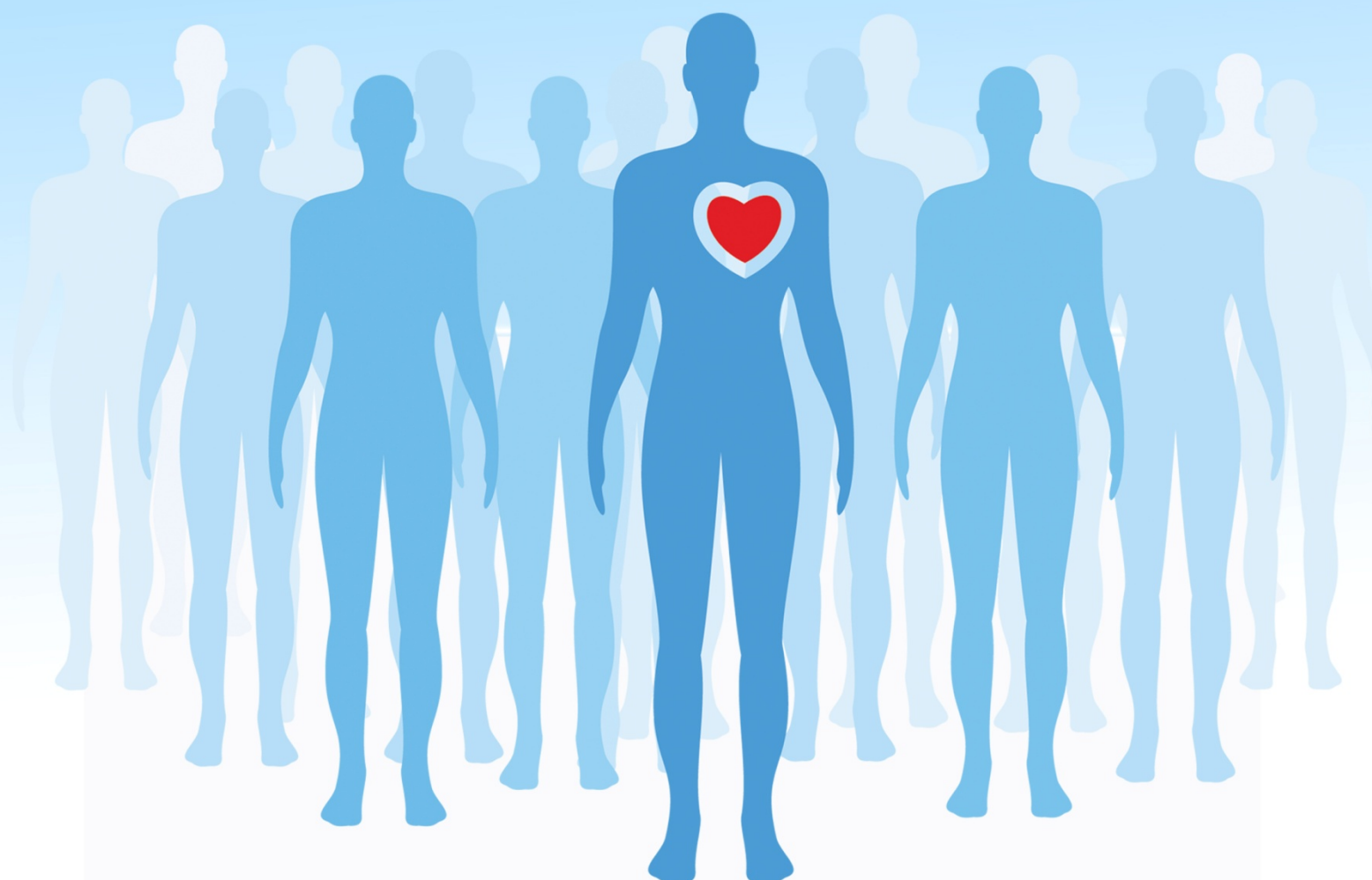
August 2013

Contents

1.   Introduction

This technical guide describes the eleven cardiovascular disease indicators. It accompanies the release of an interactive data file with tables and charts as well as PowerPoint slides with a summary of charts. The technical guide gives details of the definitions, data sources and terms used as well as notes on interpretation.

These are available on the cardiovascular disease web resource:
www.publichealthwalesobservatory.wales.nhs.uk/cardiovascular

Acknowledgements

Project team: Jo Arthur, Ioan Francis, Andrea Gartner (project manager), Dee Hickey

Project board: Dr Ciaran Humphreys, Nathan Lester, Dinah Roberts, Dr Michael Thomas

Thanks to the following for their help and support:
Allan Baker (Public Health England), Susan Belfourd, Andrew Graham (NWIS), Andrew Hughes (Public Health England), Leon May, Isabel Puscas, Cath Roberts (WG)

2.   Using the interactive data file

The 'interactive LA' and 'interactive HB' tabs in the interactive data file allow the user to choose the sex and year (where applicable) for each indicator by selecting the desired criteria from the selection boxes. This automatically updates the table and chart.

Figure 1 shows the interactive data file with the indicator, sex and time period selectable menus on the left hand side.

Figure 1
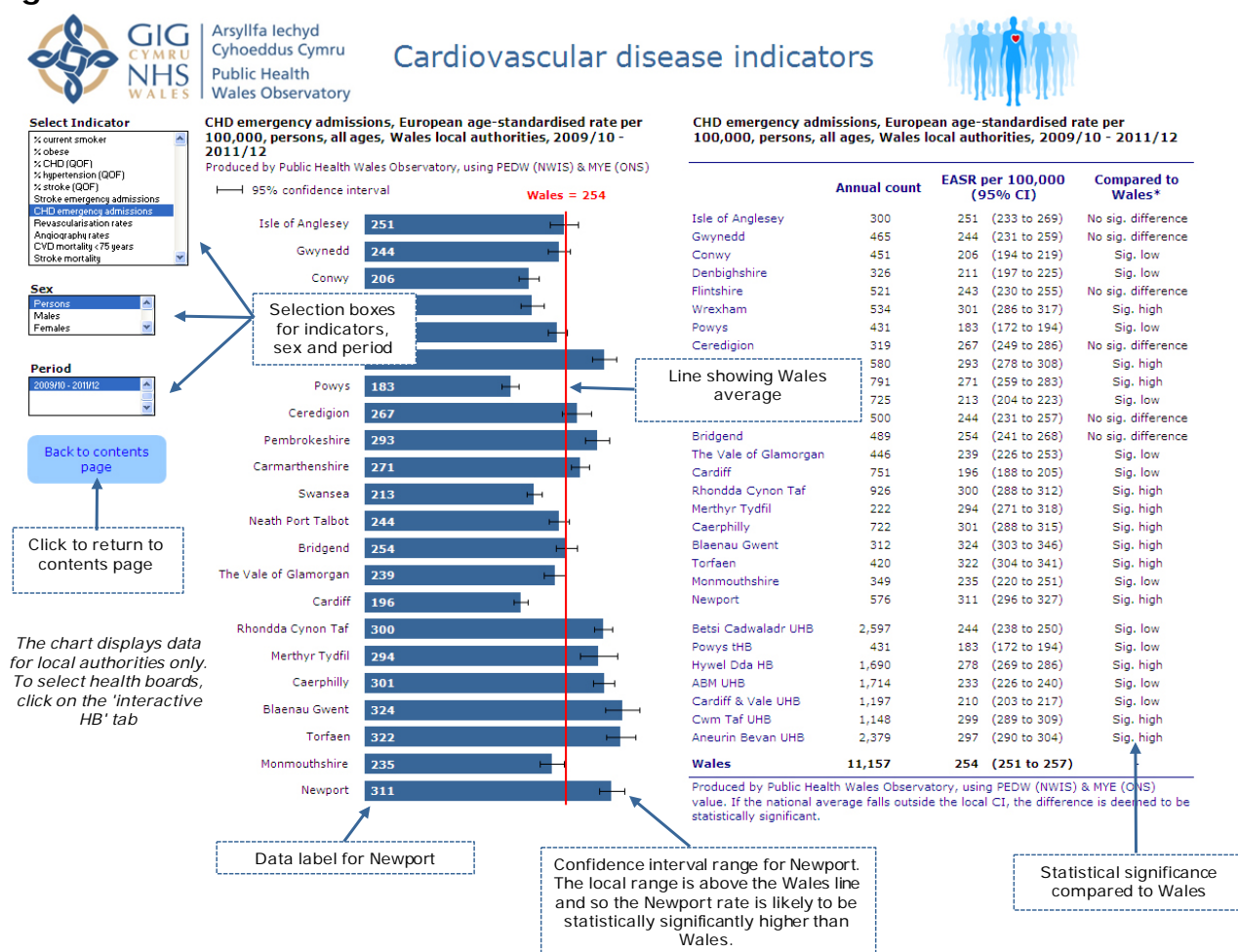
The interactive data file also contains information on how to copy and paste the tables and charts as pictures to allow for use within other documents.

3. Understanding the overview tables

The overview tables are used to provide a snapshot of the indicators at local authority, health board and all-Wales level, and allows the user to make comparisons between the different geographical areas and the Wales average. The indicators are split into the Welsh Health Survey and QOF indicators on one tab and mortality and admission indicators on another.

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Available indicators

Letter indicates sex (F=females)

Shades of blue represent statistical significance (see key for details)

CHD emergency admissions rate for Neath Port Talbot in females. Medium blue indicates that the rate is considered to be similar to Wales.

	Stroke emergency admissions			CHD emergency admissions		
	P	M	F	P	M	F
Isle of Anglesey	132	154	111	251	354	159
Gwynedd	113	129	97	244	349	147
Conwy	106	119	94	206	283	138
Denbighshire	105	123	89	211	298	132
Flintshire	94	105	83	243	343	149
Wrexham	90	101	79	301	413	195
Powys	80	78	80	183	262	111
Ceredigion	66	82	50	267	400	140
Pembrokeshire	90	110	73	293	420	179
Carmarthenshire	96	100	89	271	384	169
Swansea	83	99	67	213	305	132
Neath Port Talbot	87	108	66	244	333	167
Bridgend	91	101	81	254	372	149
The Vale of Glamorgan	94	116	74	239	324	166
Cardiff	78	99	59	196	282	119
Rhondda Cynon Taf	112	139	87	300	421	189
Merthyr Tydfil	108	129	85	294	420	179
Caerphilly	79	97	61	301	408	208
Blaenau Gwent	97	108	86	324	459	194
Torfaen	70	78	63	322	441	214
Monmouthshire	56	61	51	235	346	132
Newport	74	89	61	311	443	188
Betsi Cadwaladr UHB	105	119	91	244	342	154
Powys tHB	80	78	80	183	262	111
Hywel Dda HB	88	100	76	278	399	167
ABM UHB	86	102	71	233	331	147
Cardiff & Vale UHB	83	105	64	210	296	134
Cwm Taf UHB	111	137	86	299	421	187
Aneurin Bevan UHB	75	86	63	297	415	189
Wales	90	105	76	254	359	159

Wales average

M/F/P = Males/females/persons

Statistically significantly worse than Wales
Not statistically significantly different
Statistically significantly better than Wales

Key to indicate sex

Key of colour coding to indicate statistical significance

In the overview tables, pale blue and dark blue values represent results that are statistically significantly better and worse respectively, compared to Wales. Medium blue represents results that are not statistically significantly different to Wales.

A statistically significant finding suggests that the difference between two values is unlikely to be due to chance. In this publication, statistical significance is evaluated by the comparison of the 95% confidence intervals of the local values with the Wales average. If the local confidence interval does not include the Wales average, then the local value is considered to be statistically significantly different. Deeming a local value as statistically significant suggests that there is only 5% chance of it being so different to the Wales average due to natural variation alone.

It is important to note that whilst an indicator may show a light blue (statistically significantly lower) value, this means only that the result is significantly different to Wales, not that public health action is unnecessary. Statistical significance is not the same as public health importance.

It is possible for two areas to have the same rate for an indicator whilst displaying a different significance result. This is because the confidence interval ranges vary; they are narrower for some areas and wider for others. Therefore, for one population, the Wales average may be within the local range, while falling outside the local range for another population with the same rate.

4.   Indicators

4.1   *Adults who smoke*

What is being measured?	**The proportion of adults who reported being a current smoker (smoking daily or occasionally)**
How is this indicator defined?	This indicator shows the proportion (or percentage) of people who reported smoking daily or occasionally (current smokers). The results have been age-standardised. • The survey asked adults whether they smoked (daily or occasionally), used to smoke (daily or occasionally) or had never smoked.
Where does the data actually come from?	Welsh Health Survey (Welsh Government)
Who does it measure?	Adults (aged 16 and over)
When does it measure it?	2010-11
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities
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?	• Smoking status is self-reported and therefore may be subject to respondent bias[1] i.e. smokers may underestimate the amount they smoke. • WHS data are weighted to adjust for non-response to the survey. • For further details see the Welsh Health Survey data source section 5.1.
References	1. Wilson A, Manku-Scott T, Shepherd D and Jones B. A comparison of individual and population smoking data from a postal survey and general practice records. *Br J Gen Pract.* 2000; 50(455):465-468. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1313724/ [Accessed 12th Aug 2013]

4.2   Adults who are obese

What is being measured?	The proportion of adults who are obese based on self-reported height and weight measurements
How is this indicator defined?	This indicator reports the proportion (or percentage) of the resident adult population who are obese. The results have been age-standardised. The survey asked adults to report their height and their weight in order for Body Mass Index (BMI) to be calculated. Obese is defined as a BMI of 30 and above. Body Mass Index (BMI) is calculated as weight in kilograms (kg) divided by the height squared (m^2). Pregnant women and respondents providing invalid measurements were excluded.
Where does the data actually come from?	Welsh Health Survey, Welsh Government
Who does it measure?	Adults (aged 16 and over)
When does it measure it?	2010-11
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities
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?	- Height and weight of respondents are self-reported, and there is evidence to show that some people tend to under report weight and/or over report height resulting in an under-estimation of the prevalence of obesity[1]. - BMI does not distinguish between mass due to body fat and mass due to muscular physique, nor does it take account of the distribution of fat. - Ethnicity may affect BMI. - For further details see the Welsh Health Survey data source section 5.1.
References	1. Gorber SC et al. A comparison of direct vs. self-report measures for assessing height, weight and body mass index: a systematic review. *Obesity reviews* 2007; 8:307-326. Available at: http://www3.interscience.wiley.com/journal/117981349/abstract?CRETRY=1&SRETRY=0 [Accessed 12th Aug 2013]

4.3 *Patients with CHD, hypertension or stroke (QOF)*

What is being measured?	**Proportion of patients with coronary heart disease (CHD), hypertension or stroke on GP registers in Wales**
How is this indicator defined?	This indicator reports the crude proportion and the age-standardised proportion of patients with coronary heart disease (CHD), hypertension or stroke recorded on QOF GP registers in Wales.
Where does the data actually come from?	Quality and Outcomes Framework, Audit +: NHS Wales Informatics Service (NWIS)
Who does it measure?	Males, females and persons registered with GP practices in Wales. It does not measure the resident population of a geographical area.
When does it measure it?	Data extracted on 29th February 2012
What geographical area does it cover?	Wales, local authorities and health boards (based on location of the GP practice not the patients)
How is it calculated?	- For each of the conditions (CHD, hypertension and stroke), the counts of patients with the condition were extracted by age band along with the total list sizes from Audit + (NWIS). - Crude percentages were calculated for each of the conditions by measuring the total cases as a proportion of the total list size multiplied by 100. - Age-standardised percentages were calculated by applying the age-specific percentages for each condition to the standard population used, in this instance the standard European population. - Results are presented as age-standardised proportions with 95% confidence intervals (intervals are calculated using a method proposed by Dobson et al (1991)).[1]
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 age-standardised percentage can be used to compare between local authorities, health boards and Wales as these are adjusted to take into account the different age structures. Areas with older populations are expected to have higher percentages of people with conditions related to old age and so higher crude rates. - These percentages are likely to be underestimates of the "true" prevalence of conditions. The figures only report on diagnosed cases of the conditions and there will be a certain number of undiagnosed cases, for example of hypertension, within the populations. Also, cases can be excluded from the register as exceptions by the practice. The age-standardised percentage for Wales for hypertension, for example, is 11% for Wales from QOF (16% crude percentage). The corresponding percentage of respondents from the Welsh Health Survey is much higher at 20%. There are differences in how the data is gathered, the methodology including also different standard populations and so these are not comparable. - A higher number of patients on the disease registers may

	reflect greater efforts on behalf of GPs to identify patients with the chronic condition.
	• The data on the conditions was collected in line with 2009/10 guidance: http://www.nhsemployers.org/aboutus/publications/documents/qof_guidance_2009_final.pdf
	• Further information on definitions and any caveats for these conditions are found within the document:
	• CHD – starting on page 26
	• Hypertension – starting on page 47
	• Stroke – starting on page 42
	• There are known issues that affect the accuracy and completeness of Audit+ data. One issue is the fact that a small number of practices do not submit data to Audit +.
	• For further information about the Quality and Outcomes Framework, Audit +, see section 5.2 of this technical guide.
References	1. Dobson A.J. et al (1991) Confidence intervals for weighted sums of Poisson parameters. Stat Med 10(3):457-462.

4.4 Stroke emergency admissions

What is being measured?	**Rate of emergency admissions from stroke in males, females and persons living in Wales**
How is this indicator defined?	Emergency admissions (per 100,000 resident population) from Stroke, all ages (ICD-10 codes I61, I63, I64)
Where does the data actually come from?	• Numerator: Patient Episode Database for Wales (PEDW), NHS Wales Informatics Service (NWIS) • Denominator: Mid-year population estimates (MYE), Office for National Statistics (ONS)
Who does it measure?	Welsh residents: Males, females, persons
When does it measure it?	2009/10-2011/12 financial years
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities
How is it calculated?	• Admitting episodes were extracted where the primary diagnosis was stroke (ICD-10 codes I61, I63, I64). Only emergency admissions were counted (admission method between 21 and 29) which includes emergency transfers. This includes inpatient and day case episodes (although there were no day cases for Wales) and matches the definition of the indicator included in the cardiovascular disease profiles for England[2]. • Episodes with an invalid age or LA code of residence were excluded from the analysis. • Results are presented as European age-standardised rates (EASR) per 100,000 population with 95% confidence intervals (intervals are calculated using a method proposed by Dobson et al (1991)).[1]
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?	• Individual patients can be counted multiple times under the method employed. • The 95% confidence intervals are indications of the natural variation that would be expected around a rate. For further information about the Patient Episode Database for Wales, see section 5.3 of this technical guide.
References	1. Dobson A.J. et al (1991) Confidence intervals for weighted sums of Poisson parameters. Stat Med 10(3):457-462. 2. Public Health England (2012) Cardiovascular Disease Profiles. Available on http://www.sepho.org.uk/CVDprofiles.aspx [Accessed 12th August 2013]

4.5 *CHD emergency admissions*

What is being measured?	**Rate of emergency admissions from CHD in males, females and persons living in Wales**
How is this indicator defined?	Emergency admissions (per 100,000 resident population) from coronary heart disease (CHD) (ICD-10 codes I20-I25) ; all ages
Where does the data actually come from?	• Numerator: Patient Episode Database for Wales (PEDW), NHS Wales Informatics Service (NWIS) • Denominator: Mid-year population estimates (MYE), Office for National Statistics (ONS)
Who does it measure?	Males, females, persons
When does it measure it?	2009/10-2011/12 financial years
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities
How is it calculated?	• Admitting episodes were extracted where the primary diagnosis was CHD (ICD-10 codes I20-I25). Only emergency admissions were counted (admission method between 21 and 29) which includes emergency transfers. This includes inpatient and day case episodes (although there were no day cases for Wales) and matches the definition of the indicator included in the cardiovascular disease profiles for England[2]. • Episodes with an invalid LA code of residence or age were excluded from the analysis. • Results are presented as European age-standardised rates (EASR) per 100,000 populations with 95% confidence intervals (intervals are calculated using a method proposed by Dobson et al (1991)).[1]
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?	• Individual patients can be counted multiple times under the method employed. • The 95% confidence intervals are indications of the natural variation that would be expected around a rate. For further information about the Patient Episode Database for Wales, see section 5.3 of this technical guide.
References	1.Dobson A.J. et al (1991) Confidence intervals for weighted sums of Poisson parameters. Stat Med 10(3):457-462. 2. Public Health England (2012) Cardiovascular Disease Profiles. Available on http://www.sepho.org.uk/CVDprofiles.aspx [Accessed 12th August 2013]

4.6   *Revascularisation rates*

What is being measured?	**Rate of revascularisation procedures in males, females and persons living in Wales**
How is this indicator defined?	• The number of revascularisation procedures expressed as a rate per 100,000 persons.
Where does the data actually come from?	• Numerator: Patient Episode Database for Wales (PEDW), NHS Wales Informatics Service (NWIS) • Denominator: Mid-year population estimates (MYE), Office for National Statistics (ONS)
Who does it measure?	Males, females, persons
When does it measure it?	2009/10-2011/12 financial years
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities
How is it calculated?	• All episodes (inpatient and day cases) were extracted where there was any mention of OPCS4 codes K40-K46 (Coronary Artery Bypass Graft), (K49-K50, K75) (Angioplasty). This definition matches the definition of the indicator included in the cardiovascular disease profiles for England[2]. • Episodes with an invalid LA code of residence or age were excluded from the analysis. • Results are presented as European age-standardised rates (EASR) per 100,000 population with 95% confidence intervals (confidence intervals are calculated using a method proposed by Dobson et al (1991)).[1]
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?	• Individual patients can be counted multiple times under the method employed. • The 95% confidence intervals are indications of the natural variation that would be expected around a rate. • For further information about the Patient Episode Database for Wales, see section 5.3 of this technical guide.
References	1. Dobson A.J. et al (1991) Confidence intervals for weighted sums of Poisson parameters. Stat Med 10(3):457-462. 2. Public Health England (2012) Cardiovascular Disease Profiles. Available on http://www.sepho.org.uk/CVDprofiles.aspx [Accessed 12th August 2013]

4.7   Angiography rates

What is being measured?	**Rates of angiography procedures in males, females and persons living in Wales**
How is this indicator defined?	• The number of angiography procedures expressed as a rate per 100,000 persons.
Where does the data actually come from?	• Numerator: Patient Episode Database for Wales (PEDW), NHS Wales Informatics Service (NWIS) • Denominator: Mid-year population estimates (MYE), Office for National Statistics (ONS)
Who does it measure?	Males, females, persons
When does it measure it?	2009/10-2011/12 financial years
What geographical area does it cover?	Wales, Welsh health boards, Welsh local authorities
How is it calculated?	• All episodes (inpatient and day cases) were extracted where there was any mention of OPCS4 codes K63 (Contrast Radiology of heart), K65 (Catheterisation of heart), U10.2 (Cardiac computed tomography angiography) and U10.5 (Radionuclide angiocardiography).This definition matches the indicator used in the cardiovascular disease profiles for England[2]. • Episodes with an invalid LA code of residence or age were excluded from the analysis. • Results are presented as European age-standardised rates(EASR) per 100,000 population with 95% confidence intervals (intervals are calculated using a method proposed by Dobson et al (1991)).[1]
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?	• Individual patients can be counted multiple times under the method employed. • The 95% confidence intervals are indications of the natural variation that would be expected around a rate. • For further information about the Patient Episode Database for Wales, see section 5.3 of this technical guide.
References	1. Dobson A.J. et al (1991) Confidence intervals for weighted sums of Poisson parameters. Stat Med 10(3):457-462. 2. Public Health England (2012) Cardiovascular Disease Profiles. Available on http://www.sepho.org.uk/CVDprofiles.aspx [Accessed 12th August 2013]

4.8 *Cardiovascular disease mortality <75*

What is being measured?	Mortality rates from cardiovascular disease aged under 75
How is this indicator defined?	The European age-standardised mortality rate per 100,000 from cardiovascular disease (ICD-10 codes I00-I99 for circulatory disease), adjusted for ICD-10 coding change in 2011.
Where does the data actually come from?	• Numerator: Annual District Deaths Extract (ADDE): Office for National Statistics (ONS) • Denominator: Mid-year population estimates (MYE), Office for National Statistics (ONS) • Welsh Index of Multiple Deprivation (WIMD 2011), Welsh Government • Comparability ratios for ICD-10 coding change: Public Health England
Who does it measure?	• Males, females, persons aged under 75 years
When does it measure it?	• 2009-2011
What geographical area does it cover?	• Wales, Welsh health boards, Welsh local authorities
How is it calculated?	• Counts of deaths registered between 2009 and 2011 were extracted from the ADDE (ONS), for those under 75 years where the underlying cause of death matched ICD 10 I00 to I99 codes. This definition matches the indicator used in the cardiovascular disease profiles for England[2]. • There has been an ICD-10 coding change for deaths from 2011 onwards with a 5% reduction in circulatory diseases overall. Comparability ratios supplied by Public Health England were used to adjust the number of deaths for rate calculation. The count shown in the interactive data file is the actual count that has not been adjusted. • Results are presented as European age-standardised rates (EASR) per 100,000 populations with 95% confidence intervals (intervals are calculated using a method proposed by Dobson et al (1991)).[1]
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?	• Mortality rates are adjusted for ICD-10 coding change and will therefore not match rates from other sources without adjustment. • Mortality counts are derived from an annual mortality extract supplied by ONS and are based on the original underlying cause of death for which there is nearly 100% coverage on the mortality register. There is the potential for the underlying cause of death to be incorrectly attributed on the death certificate and, therefore, the cause of death misclassified. • The registration of death is mandatory in the UK, so the dataset should be a near complete record of mortality. However, the assigning of cause of death on the medical certificate is known to vary, for example between areas. *(Further notes on the ADDE are given in section 5.4)*

	• The 95% 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% confidence interval represents a range which has a 95% 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.
References	1. Dobson A.J. et al (1991) Confidence intervals for weighted sums of Poisson parameters. Stat Med 10(3):457-462. 2. Public Health England (2012) Cardiovascular Disease Profiles. Available on http://www.sepho.org.uk/CVDprofiles.aspx [Accessed 12th August 2013]

4.9   Stroke mortality

What is being measured?	Mortality rates from stroke
How is this indicator defined?	The European age-standardised mortality rate per 100,000 from stroke (all cerebrovascular diseases - ICD-10 codes I60-I69)
Where does the data actually come from?	• Numerator: Annual District Deaths Extract (ADDE): Office for National Statistics (ONS) • Denominator: Mid-year population estimates (MYE), Office for National Statistics (ONS) • Welsh Index of Multiple Deprivation (WIMD 2011), Welsh Government • Comparability ratios for ICD-10 coding change: Public Health England
Who does it measure?	• Males, females, persons
When does it measure it?	• 2009-2011
What geographical area does it cover?	• Wales, Welsh health boards, Welsh local authorities
How is it calculated?	• Counts of deaths registered between 2009 and 2011 were extracted from the ADDE (ONS), where the underlying cause of death corresponds to ICD-10 codes I60-I69. This definition matches the indicator used in the cardiovascular disease profiles for England[2]. • There has been an ICD-10 coding change for deaths from 2011 onwards with a 5% reduction in circulatory disease overall. Comparability ratios supplied by Public Health England were used to adjust the number of deaths for rate calculation. The count shown in the interactive data file is the actual count that has not been adjusted. • Results are presented as European age-standardised rates (EASR) per 100,000 populations with 95% confidence intervals (intervals are calculated using a method proposed by Dobson et al (1991)).[1]
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?	• Mortality rates are adjusted for ICD-10 coding change and may therefore not match rates from other sources without adjustment. • Mortality counts are derived from an annual mortality extract supplied by ONS and are based on the original underlying cause of death for which there is nearly 100% coverage on the mortality register. There is the potential for the underlying cause of death to be incorrectly attributed on the death certificate and, therefore, the cause of death misclassified. • The registration of death is mandatory in the UK, so the dataset should be a near complete record of mortality. However, the assigning of cause of death on the medical certificate is known to vary, for example between areas. *(Further notes on the ADDE are given in section 5.4)* • The 95% 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% confidence interval represents a range which has a 95% 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.
References	1. Dobson A.J. et al (1991) Confidence intervals for weighted sums of Poisson parameters. Stat Med 10(3):457-462. 2. Public Health England (2012) Cardiovascular Disease Profiles. Available on http://www.sepho.org.uk/CVDprofiles.aspx [Accessed 12th August 2013]

5. Data sources

5.1 *Welsh Health Survey*

How is the data collected?	• The Welsh Health Survey provides information about the health of the population of Wales, their use of health services and health-related lifestyle. • The survey collects information at the household-level through a short interview, and on individuals through a self-completion questionnaire. • It is based on a representative sample of people living in private households in Wales, selected using a random sample from the Post Office's Postcode Address File (with appropriate stratification at unitary authority level)[1] which covers more than 99% of private households in Wales. • At each household, all adults and maximum of two children are eligible for inclusion in the survey. • A sample of around 15,000 adults and 3,000 children is aimed for each year, to include a minimum of 600 adults from each local authority.
How accurate or complete will the data be?	• The Welsh Health Survey was designed to be representative of the general adult population and is the most regular comprehensive survey of lifestyle data at the local authority level across Wales. • In 2010-2011, self-completion questionnaires were obtained for 83% of adults in participating households and interviews were obtained with 79% of eligible households in the sample[2]. • A small proportion of the population are not covered by the survey, for example those living in institutions such as nursing homes.
Are there any notes for interpretation	• The results in this report are based on individual self-completed questionnaires which reflect people's own understanding of their health and health-related behaviours.

/warnings /problems associated with the data?	• The results are weighted to ensure that the age and sex distribution of respondents matches Wales. • The results are age-standardised to adjust for the differences in age structure between populations and to allow comparisons to be made between local authorities and health boards.
Potential for errors due to type of measurement, or bias and confounding	• Results are prone to respondent bias i.e. people may adjust their answers to give a more favourable response. • Results are subject to sampling error as the survey is based on a sample of households rather than the entire population of Wales.
Who manages the data?	The survey is carried out by the National Centre for Social Research (NatCen) on behalf of the Welsh Government.
Where can you get hold of the data?	1. Welsh Health Survey results are available at: http://wales.gov.uk/topics/statistics/headlines/health2012/1209191/?lang=en [Accessed 12th Aug 2013]
References	2. Welsh Assembly Government. *Welsh Health Survey 2010 + 2011 Local Authority / Health Board Results.* SB 86/2012. Cardiff: WAG; 2011. Available at: http://wales.gov.uk/docs/statistics/2012/120919sb862012en.pdf [Accessed 12th Aug 2013]

5.2   *Quality Outcomes Framework (QOF) – via Audit+*

How are the data collected?	• Quality and Outcomes Framework (QOF) is part of the General Medical Services contracts for general practices, introduced on 1 April 2004. The QOF provides financial rewards to general practices for the provision of high quality care. • QOF data is used to report routinely collected general medical practice information for Wales. • Audit+ is the centrally funded analysis tool which is available to GP practices in Wales. Audit+ provides practices with a number of tools that allow them to manage their patient registers as defined in an audit specification. These tools allow the practices to browse patients and easily identify those that require attention, to graphically view any patient treatment and outcome targets that may have been set for a specified audit, along with other internal uses. The extracted data is locally analysed at each practice and then the aggregated results of those analyses are sent to a central NHS Wales repository and presented in the web based system AuditWeb[1].
How accurate or complete will the data be?	• Audit + is non-mandatory which enables a GP practice to choose whether or not to use this analysis tool. • Audit + is installed in excess of 95% of GP practices on a voluntary basis. Data is extracted weekly, however the general return rate is around 90%, therefore data completeness may vary depending on which practices have submitted at the time of extraction. • The data is provided at aggregated level rather than patient level which means it is not possible to identify those who appear on more than one register. • QOF data is primarily used to monitor GP practice performance against their contract; secondary use of data should be interpreted with caution. • QOF prevalence represents prevalence of the diagnosed condition as captured by GP information systems and the QOF algorithms. • Guidance on this can be found at: http://www.wales.nhs.uk/sites3/page.cfm?orgid=480&pid=6063 • The data was captured in line with 2009/10 guidance: http://www.nhsemployers.org/aboutus/publications/documents/qof_guidance_2009_final.pdf • Some conditions are not overtly apparent to the patient or clinician and there may be some clinical uncertainties in specifically diagnosing these types of condition e.g. Hypertension. • In addition it is important to understand the environment and constraints under which the data was captured. • The QOF data recording specifications are consistent and practices must comply in order to receive remuneration under the GMS contract requirements. • Practices do vary to some extent in their coding and recording, and their data reflects the priorities, needs, specialisms, capacity, skills of the whole practice, the nature of the balance of services between primary and secondary care and the

	communication of information relating to the care of patients.
	• The comparative analysis of local authority or health board level QOF achievement may also be inappropriate without taking account of the underlying social and demographic characteristics of the populations concerned. The delivery of services will be related, for example, to population age/sex, ethnicity or deprivation characteristics that are not included in the QOF data collection processes.
	• The data was extracted on the 29th February 2012.
Who manages the data?	The data is managed by the Primary Care Informatics program within NHS Wales Informatics Service (NWIS).
Where can you get hold of the data?	• Audit+ data can only be obtained by request to NWIS: http://www.wales.nhs.uk/sitesplus/956/home
	• The number of patients on QOF registers is available by GP practice on the Welsh Government web pages: Welsh Government	General Medical Services Contract: Quality and Outcomes Framework Statistics, 2011-12
References	1. Welsh Government. General Medical Services Contract: Quality and Outcomes Framework Statistics for Wales, 2011-12. Cardiff: WG; 2012. Available at: http://wales.gov.uk/docs/statistics/2012/120927sdr1642012en.pdf [Accessed 20th June 2013]

5.3 *Patient Episode Database for Wales (PEDW)*

How is the data collected?	• The Patient Episode Database for Wales (PEDW) is managed by the NHS Wales Informatics Service (NWIS) and comprises records of all episodes of inpatient and day case activity in NHS Wales hospitals. Hospital activity for Welsh residents treated in other UK nations (primarily England) is also included. • The data is collected and coded at each hospital. The records are then electronically transferred to NWIS, where they are validated and merged into the main database.
How accurate or complete will the data be?	• Outpatient activity is not included in this dataset
Are there any notes for interpretation /warnings /problems associated with the data?	• PEDW was created primarily to track hospital activity from the point of view of payments for services, rather than for epidemiological analysis. • The use of PEDW in public health analysis can be complex. For example, there are a number of different 'currencies' that can be counted such as episodes, admissions, discharges and patients, and there are benefits and limitations associated with analysis based on each of these.
Potential for errors due to type of measurement, or bias and confounding	• Coding practices vary from hospital to hospital, particularly in recording secondary diagnoses. This makes regional variations more difficult to interpret.
Who manages the data?	NHS Wales Informatics Service (NWIS)
Where can you get hold of the data?	• Annual PEDW data tables are published here: http://www.infoandstats.wales.nhs.uk/page.cfm?pid=41010&orgid=869 [Accessed 12th August 2013] Contact details for the NHS Wales Informatics Service can be found on their website: http://www.wales.nhs.uk/sitesplus/956/home [Accessed 12th August 2013]

5.4 *Annual District Deaths Extract (ADDE)*

How are the data collected?	- The Annual District Deaths Extract (ADDE) is a dataset containing the details of all deaths registered for residents of Wales. - The information presented in the cardiovascular disease indicator set relate to deaths registered between 2009 and 2011. - 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. Data is based on the underlying cause of death e.g. if an individual dies from pneumonia but has been made vulnerable to that disease by end-stage cancer, then cancer (rather than pneumonia) is recorded as the underlying cause of death[1].
How accurate or complete will the data be?	It is a legal requirement to register a death and so the ADDE provides a reliable and complete data source.
Are there any notes for interpretation /warnings /problems associated with the data?	- 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 there was no doctor in attendance during the deceased's last illness. There will be a long 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 will inevitably be variations in the quality of medical certificates of cause of death (ONS website). - The cause of death is easier to define in younger people. Older people are far more likely to have many underlying health conditions, making it more difficult to determine the underlying cause of death[1].
Potential for errors due to type of measurement, or bias and confounding	n/a
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: http://www.statistics.gov.uk/hub/health-social-care/health-of-the-population/causes-of-death/index.html [Accessed 12th August 2013] - The Welsh Assembly Government website: https://statswales.wales.gov.uk/Catalogue/ [Accessed 12th May 2012].

References	1 Rooney C, Smith S. Implementation of ICD-10 for mortality data in England and Wales from January 2001. *Health Statistics Quarterly* 2000; 8:41-69. Available at: http://www.ons.gov.uk/ons/rel/hsq/health-statistics-quarterly/no--8--winter-2000/implementation-of-icd-10-for-mortality-data-in-england-and-wales-from-january-2001.pdf [Accessed 12th August 2013]

5.5 Mid-year population estimates

How are the data collected?	Mid-year population estimates (as at 30 June each year) provide an estimate of the resident population of an area based on births, deaths and an estimate of migration since the last census.
How accurate or complete will the data be?	- The estimated resident population of an area includes all usual residents, whatever their nationality[1]. - Members of the UK and non-UK armed forces stationed in the UK are included[1]. - UK forces stationed outside the UK are excluded[1]. - Students are taken to be residents 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].
Are there any notes for interpretation /warnings /problems associated with the data?	The census and mid-year population estimates are thought to underestimate the population in some areas e.g. areas of multi-occupancy housing.
Potential for errors due to type of measurement, or bias and confounding	Mid-year population estimates are occasionally revised (e.g. following a census of population or a change in methodology). They also take into account boundary changes. Guidance on the methodology is available at: http://www.ons.gov.uk/ons/guide-method/method-quality/quality/quality-information/social-statistics/index.html
Who manages the data?	Office for National Statistics
Where can you get hold of the data?	Office for National Statistics website available at: http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-231847
References	1. Office for National Statistics. *Population estimates for UK, England and Wales, Scotland and Northern Ireland - current datasets* [Online]. 2012. Available at: http://www.ons.gov.uk/ons/publications/all-releases.html?definition=tcm:77-22371 [Accessed 3rd Aug 2012].

6.   Definitions

Age-standardised rate

- Age-standardisation allows for the comparison of rates between populations while taking account of the different age structures of those populations. In order to calculate this we apply the rates which occur in each age band to the standard population structure. Calculating age-standardised rates is particularly useful for health-related behavioural indicators where age has an important influence, and where it may be misleading to compare crude rates. For example, meeting physical activity guidelines may become less common with age and so populations with older age profiles may be observed to perform worse than populations with younger age profiles - age-standardisation adjusts for these differences.

Body Mass Index (BMI)

- BMI is a measurement of a person's weight, compared to their height. BMI is calculated as weight (in kilograms) divided by the height squared (in metres). Adults with a BMI of 25 or more are categorised as overweight and adults with a BMI of 30 or more are categorised as obese.

Cardiovascular disease (CVD)

- Cardiovascular disease is caused by disorders of the heart and blood vessels, and includes coronary heart disease (heart attacks), cerebrovascular disease (stroke), raised blood pressure (hypertension), peripheral artery disease, rheumatic heart disease, congenital heart disease and heart failure. CVD and circulatory disease is often used interchangeably but they are not exactly the same. CVD includes congenital heart disease but circulatory disease does not. Similarly circulatory disease includes the lymphatic system but this is not usually included in the broad definition of CVD. For the purposes of this work, where we say cardiovascular disease in relation to mortality and hospital admissions, we mean the ICD-10 chapter on circulatory disease (ICD-10 I00-I99) and have stated the ICD-10 codes.

Cerebrovascular disease

- Cerebrovascular diseases are conditions that develop as a result of problems with the blood vessels inside the brain.

Coronary heart disease (CHD)

- CHD occurs when the walls of the coronary arteries become narrowed by a gradual build-up of fatty material. The two main forms of CHD are angina and heart attack (also known as myocardial infarction).

Emergency admissions

- Unplanned admissions to a hospital. These include emergency transfers in our analysis.

European age-standardised rate

- The European age-standardised rate represents the overall rate you would expect if the population had the same age-structure as a theoretical standard European population. See age-standardised rate for further details.

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 and specialised services. There are seven health boards in Wales which came into being on 1 October 2009.

Mid-year estimates

- Annual estimates of the resident population as at 30 June each year, provided by ONS. The figures are based on the census and take into account population change due to births, deaths and migration.

Public Health Wales NHS Trust

- Public Health Wales was established as an NHS Trust on 1 October 2009. The Trust incorporates the functions and services previously provided by the National Public Health Service for Wales, the Wales Centre for Health, the Welsh Cancer Intelligence and Surveillance Unit and Screening Services Wales.

Quality and Outcomes Framework

- This data source relates to GP patient data. The Quality and Outcomes Framework (QOF) is a voluntary system of financial incentives. It is about rewarding contracts for good practice (and its associated workload) through participation in an annual quality improvement cycle.

Statistical significance

- A difference is called statistically significant if it is unlikely to have occurred by chance. In this publication, statistical significance is determined using the confidence intervals (CIs) of the local value. The national average is treated as an exact reference value and if it falls outside the local confidence interval range, the difference is considered to be statistically significant.