Avoidable Mortality in Cumbria: An Overview

Report 1 of 4

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Acknowledgements

Key Messages

Avoidable Deaths from All Causes

- Deaths from potentially avoidable causes account for approximately 24% of all deaths registered in Cumbria.
- In Cumbria, avoidable mortality rates fell significantly by 13.1% from 263.9 to 229.2 deaths per 100,000 population between 2008 and 2012.
- On average, deaths due to avoidable causes account for 17,689 potential years of life lost each year in Cumbria.
- In 2011, the Cumbria avoidable mortality rate was signficantly higher compared to England (242.7 and 224.7 per 100,000 population respectively).

Avoidable Deaths by Specific Cause

- Avoidable deaths from neoplasms contribute to the highest number of potential years of life lost in Cumbria, followed by cardiovascular diseases and injuries.
- The highest rate of avoidable death in Cumbria in 2012 was for neoplasms at 78.3 deaths per 100,000 population.
- In 2011 the rate of avoidable mortality due to injuries in Cumbria was significantly higher compared to England, 40.3 and 32.2 deaths per 100,000 population respectively.
- Avoidable deaths from injuries in Cumbria accounted for 15% of all avoidable deaths in Cumbria between 2008 and 2012, however these deaths accounted for 20.6% of totalpotential years of life lost.
- The 2012 rate of avoidable mortality from cardiovascular diseases in Cumbria was signficantly lower than the 2008 rate.

Avoidable death and local authority

- Trend data showed no significant change in the rate of avoidable mortality from all cause at a local authority level between 2008 and 2012.
- The 2012 rate of avoidable mortality in Allerdale, Barrow-in-Furness and Copeland was signficantly higher than the Eden and South Lakeland rates.
- Barrow-in-Furness had the highest rate of mortality for all causes of avoidable death and for five of the seven avoidable group causes (drug use disorders, respiratory diseases, cardiovascular diseases, neoplasms, and 'other' causes).

Avoidable Death by Sex

- The leading cause of male avoidable death in Cumbria in 2012 was cardiovascular diseases at 78.7 deaths per 100,000 males.
- The leading cause of female avoidable death in Cumbria in 2010 was neoplasms for females at 78.5 deaths per 100,000 females.

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- The male avoidable death rate in 2012 at 272.7 deaths per 100,000 males was 1.5 times higher than the female rate of 187.3 deaths per 100,000 females; this was a difference of 85.4 deaths per 100,000 population.
- Males consistently had a higher rate of avoidable death compared to females in Cumbria between 2008 and 2012.
- Trend data show no significant change of avoidable mortality by sex in Cumbria between 2008 and 2012.
- In 2012 males had a significantly higher rate of avoidable mortality from injuries compared to females (58.3 per 100,000 males and 25.8 per 100,000 females).
- Males consistently had a higher rate of avoidable death from injuries compared to females between 2008 and 2012.
- The male rate of avoidable death from cardiovascular disease was signficantly higher than females across all Cumbria local authorities.
- Males from Barrow-in-Furness had the highest rate of avoidable mortality in Cumbria for drug use disorders, respiratory diseases, cardiovascular diseases, neoplasms, infections and 'other' causes.

Avoidable Death by Deprivation and Rural/Urban Area

- There was a clear association with avoidable mortality from all causes and deprivation in Cumbria.
- The rate of avoidable mortality from all causes in quintile 1 (most deprived areas) was 2.9 times higher compared to quintile 5 (least deprived), this was a significant difference.
- For the majority of avoidable group causes the rate of avoidable death in quintile 1 (most deprived areas) was significantly higher compared to quintile 5 (least deprived areas).
- Urban areas of Cumbria had a significantly higher rate of avoidable mortality compared to village, hamlet and isolated dwelling areas of Cumbria; 278.3 and 173.5 deaths per 100,000 population respectively.

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Amenable Mortality

A death is defined as amenable if in light of medical knowledge and technology at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided through good quality healthcare.

Avoidable Mortality

Avoidable mortality is defined as those causes of death which are deemed to be either amenable or preventable (see amenable mortality and preventable mortality definitions).

Confidence Interval

Confidence intervals are a measure of the statistical precision of an estimate and show the range of uncertainty around a value (e.g. directly age-standardised rate). Significance is assigned on the basis of non-overlapping confidence intervals, whilst there are more formalised and accurate methods of significance testing; the non-overlapping method is used as it is both simple and easily understood.

Deprivation Quintile

Deprivation quintiles divide areas into fifths according to the National Indices of Multiple Deprivation scores, and are used to analyse variation between deprived and affluent sections of the population. Quintile 1 refers to the most deprived 20% of areas nationally, while quintile 5 refers to the least deprived 20% of areas nationally.

Directly Standardised Rate

Direct standardisation gives an indication of the number of events that would occur in a standard population, if the population had the same age-specific rates of the local area. The standard population that is used within this report is the European standard population (version 2013). These rates are calculated per 100,000 and allow comparison across areas, sex and conditions.

European Standard Population

The European standard population is an artificial population structure (equating to 100,000) which is used to calculate age standardised rates. The European Standard Population used in this report is the 2013 revised version which takes into account the significant changes to the age distribution of populations across Europe since the 1976 version.

Index of Multiple Deprivation

The Index of Multiple Deprivation is a UK government study of deprived areas in UK local councils which covers seven aspects of deprivation: income, employment, health deprivation and disability, education skills and training, barriers to housing and services, crime, and living environment.

Lower Layer Super Output Area

Lower layer Super Output Areas (LSOAs) refer to geographical areas that are designed specifically for statistical purposes. LSOAs have an average population of 1,600 and there are a total of 321 LSOAs within Cumbria.

Percentage

A percentage is a measure of a portion in relation to a whole, expressed in relation to how many of something there are per 100.

Premature Mortality

Premature mortality refers to all deaths under the age of 75 years.

Preventable Mortality

A death is defined as preventable if, in 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.

Public Health Mortality File (monthly)

The Office for National Statistics provides a monthly dataset on deaths to directors of public health. The monthly public health mortality file contains information about deaths within different health boundaries and provides details surrounding each death such as name of deceased, age, sex, postcode of residence and cause of death.

Rural and Urban Classification

The rural and urban definition is an official National Statistics introduced in 2004 and defines the rurality of census based geographies. The classifications consist of 'urban >10k', 'town and fringe', and 'village, hamlet and isolated dwelling' areas.

Statistical Significance

Within this report, a difference which is described as 'statistically significant' has been assessed using confidence intervals (see confidence interval definition). If the confidence interval around a rate overlaps with the interval around another, there is no significant difference between the two rates.

Potential Years of Life Lost

Potential years of life lost is a measure of the potential number of years lost when a person dies prematurely from any cause.

Abbreviations

AMIEHS – Avoidable Mortality Indicators for the Effectiveness of Health Systems
ICD – International Classification of Diseases
IMD – Index of Multiple Deprivation
LSOA – Lower layer Super Output Area
ONS – Office for National Statistics
PHMF – Public Health Mortality File
PYLL – Potential Years of Life Lost

Introduction

A fundamental goal of the health system is to improve population health and provide services which are responsive to the needs of the population. Strongly linked to these goals is the assessment of deaths that should not occur from certain causes – this is commonly termed avoidable mortality. The Office for National Statistics recognise that 'avoidable mortality is a major public health concern that can be used to monitor and assess the quality of healthcare and policies with regards to behavioural, environmental and clinical factors including smoking, obesity and immunisation, both geographically and over time' *(Office for National Statistics, 2012: p2).*

Policy Context

Following a recent study of premature mortality (deaths under age 75) across Europe, which identified England as comparing poorly against other European Countries *(Murray et al, 2013)*; the Secretary of State for Health released a call for action to reduce premature avoidable mortality in England *(Department of Health, 2013).* Around 20,000 lives a year would be saved if England's mortality rates were reduced to the level of the best in Europe and the Government's ambition is for England to become one of the most successful countries in Europe at preventing avoidable premature deaths. As a result, the call to action outlines an objective to make measurable progress towards this outcome by 2016 *(Department of Health, 2013)*.

Reducing premature mortality has also been reflected as a priority for the UK health system through the NHS outcomes framework for public health. Specifically, domain 1 of the outcomes framework relates to premature mortality and a number of the areas identified in the framework for improvement demonstrate some overlap with the focus of this report. The indicators which constitute domain 1 of the NHS outcomes framework for public health are:

- Potential Years of Life Lost (PYLL) from causes considered amenable to health care.
- Reducing premature mortality from the major causes of death – under-75 mortality from cardiovascular disease, respiratory disease, liver disease, and cancer.
- Reducing premature death in people with serious mental illness.
- Reducing deaths in babies and young children.
- Reducing premature death in people with learning disabilities.

(Department of Health, 2012)

Aims

The main aims of this report are:
- To explain the terminology of avoidable mortality and to outline the concept's evolution.
- To outline the limitations associated with the concept of avoidable mortality as an indicator for quality of care.
- To present an overview of avoidable mortality in Cumbria, through analysis and interpretation of data from 2008 to 2012. This will include analysis of the following: specific causes of avoidable mortality, by local authority of residence, sex, deprivation quintile, and rural/urban area classification.
- To support Cumbria County Council's selection of specific causes of avoidable mortality on which to focus further in-depth review and audit.

The Evolution of the Concept of Avoidable Mortality

The concept of avoidable mortality had its origin almost forty years ago in the work of the United States Working Group on Preventable and Manageable Diseases chaired by Dr David Rutstein. Primarily concerned with improving the quality of health care through an analysis of 'unnecessary, untimely deaths', the group proposed a list of 91 conditions, or 'sentinel health events' for which death should not occur given 'timely and effective' health care was provided *(Nolte & McKeel, 2004: p16)*.

Rutstein's initial list of 'sentinel health events' was based on the 8th edition of the International Classification of Disease (ICD) coding system and this list was revised in 1977 and 1980 to take into account further advances in medical care and also to reflect the changes made to ICD codes in the 9th revision *(Nolte & McKee, 2004: p19)*. The list of conditions produced by Rutstein et al have formed the basis for almost all subsequent studies on avoidable mortality *(Castelli & Nizalova, 2011)* and since then the concept and application of avoidable mortality has been reviewed and developed even further.

The term of 'avoidable mortality' owes its origin to *Charlton et al (1983)* who first applied the concept empirically at a population level in an analysis of regional variation in mortality across England and Wales. *Charlton et al (1983)* included 14 disease groups into the analysis and excluded conditions that were considered to be outside the scope of medication care, for example lung cancer *(Castelli & Nizalova, 2011)*.

As the concept of avoidable mortality began to spread through a series of studies, so too did the definitions with which it has been applied. For example, *Holland et al (1988)* first introduced a broadened definition to include 'preventable' causes of death and 'amenable' causes of death. They identified 17 disease groups and introduced age limits (5 to 64 years) for most of the conditions. Preventable and amenable causes of death were then also adopted for analysis and descriptive studies by *Westerling & Smedby (1992)*, *Simonato et al (1998)* and *Tobias & Jackson (2001)*.

It is clear from the literature that no universally agreed upon list of conditions for which mortality is considered avoidable has been determined. However, it has become generally agreed to include diseases such as tuberculosis, some malignant cancers such as breast cancer and skin cancer, chronic rheumatic heart disease, hypertensive disease, cerebrovascular disease, influenza and pneumonia, and maternal deaths *(Nolte & McKee, 2004)*.

The most recent definition used for presenting statistics on avoidable mortality in the UK is from the Office of National Statistics (ONS) following a consultation in 2011 *(Office for National Statistics, 2012)*. As per a number of previous studies on avoidable mortality, the ONS differentiate between preventable and amenable causes of death and apply age limits to certain conditions. The 2011 consultation was launched with a view to produce a definition that was clear, consistent and an up-to date measure to meet both the needs of government and the public. Following 20 responses from a number of organisations, the 2011 definition is now used by the ONS for compiling and presenting statistics on avoidable mortality, more detail of which is outlined in the following chapter.

Current UK Definition of Avoidable Mortality

As previously noted, the most recent definition used for presenting statistics on avoidable mortality in the UK is from the ONS, this definition outlines and differentiates between preventable and amenable causes of death, which together represent avoidable mortality. This definition is utilised throughout this report:

> A death is defined as **amenable** if, 'in light of medical knowledge and technology at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided through good quality healthcare' *(Office for National Statistics, 2012:p3).*

> A death is defined as **preventable** if, 'in 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' *(Office for National Statistics, 2012:p3).*

Table 1 lists the causes of avoidable death are outlined by the ONS, along with their corresponding ICD-10 codes and age groupings.

Table 1: List of avoidable death causes and groups[1]

Condition group and cause	ICD-10 codes	Age	Amenable	Preventable
Infections				
Tuberculosis	A15-A19, B90	0-74	•	•
Selected invasive bacterial and protozoal infections	A38-A41, A46, A48.1, B50-B54, G00, G03, J02, L03	0-74	•	
Hepatitis C	B17.1, B18.2	0-74	•	•
HIV/AIDS	B20-B24	All	•	•
Neoplasms				
Malignant neoplasm of lip, oral cavity and pharynx	C00-C14	0-74		•
Malignant neoplasm of oesophagus	C15	0-74		•
Malignant neoplasm of stomach	C16	0-74		•
Malignant neoplasm of colon and rectum	C18-C21	0-74	•	•
Malignant neoplasm of liver	C22	0-74		•
Malignant neoplasm of trachea, bronchus and lung	C33-C34	0-74		•
Malignant neoplasm of skin	C43	0-74	•	•
Mesothelioma	C45	0-74		•
Malignant neoplasm of breast	C50	0-74	•	•

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[1]Office for National Statistics, 2012

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Condition group and cause	ICD-10 codes	Age	Amenable	Preventable
Malignant neoplasm of cervix uteri	C53	0-74	•	•
Malignant neoplasm of bladder	C67	0-74	•	
Malignant neoplasm of thyroid gland	C73	0-74	•	
Hodgkin's disease	C81	0-74	•	
Leukaemia	C91, C92.0	0-44	•	
Benign neoplasms	D10-D36	0-74	•	
Nutritional, endocrine and metabolic				
Diabetes mellitus	E10-E14	0-49	•	•
Drug use disorders				
Alcohol related diseases, excluding external causes	F10, G31.2, G62.1, I42.6, K29.2, K70, K73, K74 (excl. K74.3 - K74.5), K86.0	0-74		•
Illicit drug use disorders	F11-F16, F18-F19	0-74		•
Neurological disorders				
Epilepsy and status epilepticus	G40-G41	0-74	•	
Cardiovascular diseases				
Rheumatic and other valvular heart disease	I01-I09	0-74	•	
Hypertensive diseases	I10-I15	0-74	•	
Ischaemic heart disease	I20-I25	0-74	•	•
DVT with pulmonary embolism	I26, I80.1-I80.3, I80.9, I82.9	0-74		•
Cerebrovascular diseases	I60-I69	0-74	•	
Aortic aneurysm and dissection	I71	0-74		•
Respiratory disease				
Influenza (including swine flu)	J09-J11	0-74	•	•
Pneumonia	J12-J18	0-74	•	
Chronic obstructive pulmonary disorder	J40-J44	0-74		•
Asthma	J45-J46	0-74	•	
Digestive disorders				
Gastric and duodenal ulcer	K25-K28	0-74	•	
Acute abdomen, appendicitis, intestinal obstruction, cholecystitis/lithiasis, pancreatitis, hernia	K35-K38, K40-K46, K80-K83, K85, K86.1-K86.9, K91.5	0-74	•	
Genitourinary disorders				
Nephritis and nephrosis	N00-N07, N17-N19, N25-N27	0-74	•	

Condition group and cause	ICD-10 codes	Age	Amenable	Preventable
Obstructive uropathy and prostatic hyperplasia	N13, N20-N21, N35, N40, N99.1	0-74	•	
Maternal and infant				
Complications of perinatal period	P00-P96, A33	All	•	
Congenital malformations, deformations and chromosomal anomalies	Q00-Q99	0-74	•	
Unintentional injuries				
Transport accidents	V01-V99	All		•
Accidental injury	W00-X59	All		•
Intentional injuries				
Suicide and self-inflicted injuries	X60-X84, Y10-Y34	All		•
Homicide/assault	X85-Y09, U50.9	All		•
Misadventures to patients during surgical and medical care	Y60-Y69, Y83-Y84	All	•	•

Limitations of the Concept of Avoidable Mortality

Despite avoidable mortality often being used as an indicator on the measurement of health system performance, specifically around the quality of care delivered by the health system, it is important to recognise that the concept of avoidable mortality is not without its limitations and that these need to be considered and understood when analysing potentially avoidable deaths.

Studies of avoidable mortality carried out in the European Union *(AMIEHS, 2011)* and in Scotland *(Grant et al, 2006)* have made suggestions that changes in avoidable death rates are often not linked to healthcare innovation. For example, *Grant et al (2006)* undertook analysis to explore the effects of deprivation on amenable mortality which showed that amenable mortality rates in Scotland were strongly correlated with deprivation.   In addition, the *AMIEHS (2011)* aimed to determine whether the introduction of innovations was related to a decline in certain causes of amenable mortality. They considered a total of 18 innovations that were mainly related to malignant neoplasms and causes related to cardiovascular diseases, and results found few associations between the innovations on changes in amenable mortality.

Kossarova et al *(2009)* and the *Office for National Statistics (2012)* highlight that analysis of avoidable mortality does not take into account changes of disease incidence throughout a certain period. This therefore means that if there was a sudden increase in the incidence of a particular condition, then a subsequent increase in mortality for this condition might be mistakenly interpreted as a decrease in the quality of healthcare provided. The ONS therefore recommend that great care should be taken if avoidable mortality statistics are used to monitor the performance of healthcare systems or policy across years.

The AMIEHS (2011) project identified a substantial time lag between the introduction of a public health policy or improved healthcare service with a corresponding reduction in avoidable mortality.

They found that the average time lag was 7 years; this therefore means that statistics on avoidable mortality are unlikely to provide an immediate measure of the success of medical advances.

While the ONS have listed particular conditions as avoidable, it should be noted that this does not mean that every death caused by this condition could be prevented. This therefore highlights the need to consider the precise nature of each 'avoidable' death, such as the age of the person dying, the extent of disease progression at diagnosis, or the existence of other medical conditions; these factors can potentially be explored through an in depth audit using patient files from primary and secondary health care services.

Finally, there are also other considerations to take into account when analysing trends of avoidable mortality. For example, *Kossarova et al (2009)* note that factors such as behavioural changes and environmental risk factors may have an impact on the incidence of certain diseases, and in turn could have an impact on the rates of mortality. *Castelli & Nizalova (2011)* also made reference to external risk factors such as education attainment, housing, environmental and economic factors and their interrelationship with health behaviours, health of the population and provision of healthcare. *Castelli & Nizalova (2011)* formed a model to outline the connections of these health production processes and its relation to avoidable death, this is outlined in figure 1 and it should be intended that for further in-depth audit into avoidable death in Cumbria, that these factors are considered.
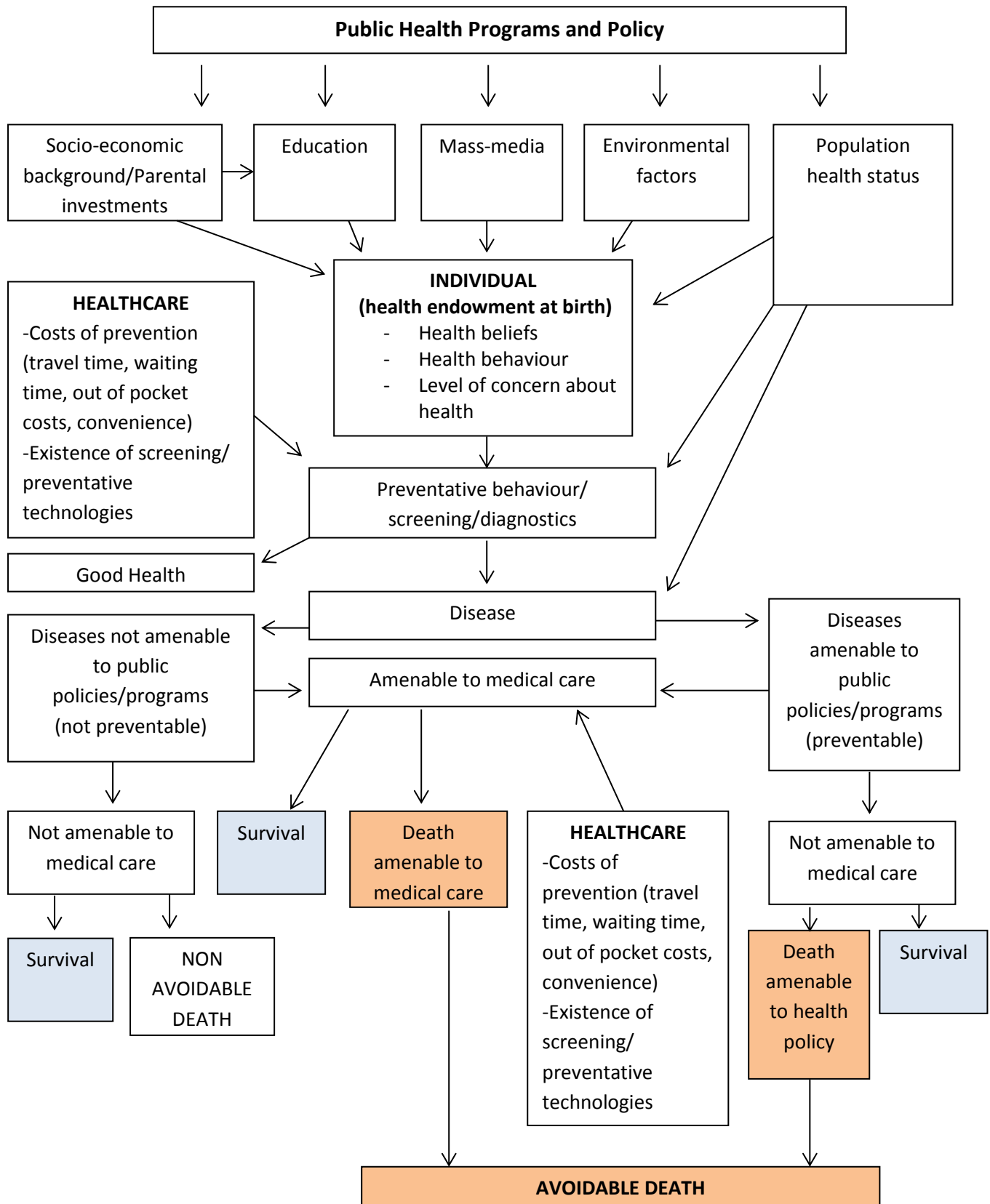
Figure 1: Individual, population and healthcare factors influencing the incidence of avoidable mortality[2]

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[2]Castelli & Nizalova (2011)

ICD-10 v2010 Coding Changes

In January 2011, the ONS introduced a new version of ICD-10 (version 2010), which replaced the version introduced in 2001 (version 2001.2). The main changes made to the ICD-10 version 2010 are amendments to the rules that govern which cause of death is selected from the death certificate as the underlying cause of death.

To understand the impact of the introduction of the ICD-10 v2010 on mortality statistics, the ONS carried out a bridge coding study in which a sample of deaths that had been previously coded using v2001.2 were then independently recorded using the ICD-10 v2010. In this bridging code study, a sample of deaths were used from 2009 whereby around 11% of deaths were bridge coded, equating to just over 55,000 records. Comparability ratios, along with confidence intervals were calculated using standard methods. Comparability ratios refer to the ratio of the number of deaths coded to a cause in ICD-10 v2001.2 to the number coded to the equivalent cause in ICD-10 v2010, and these ratios reflect the net effect of the change. For example if the ratio for a certain cause of death is 1, then the number of deaths coded to that specific cause is the same in both versions. Or if a ratio is 0.5, then half as many deaths have been coded to a specific cause in ICD-10 v2010 compared to ICD-10 v2001 *(Office for National Statistics, 2011a).*

Despite these changes to the ICD-10 coding system, the ONS have stated that when considering avoidable mortality, many of the changes affected by the ICD revisions are not included in the definition of avoidable mortality and that in the majority of cases, where conditions are affected, deaths previously coded to one condition are now coded to another that is still included in the overall definition *(Office for National Statistics, 2013a).* Therefore, as the coding changes will have had little impact on the avoidable mortality figures for 2011 and 2012, the data provided in this report have not been adjusted following the ONS bridge coding study. This also ensures consistency and comparability with the latest ONS statistical release on avoidable mortality figures.

Methodology

Data Sources

Avoidable deaths data for Cumbria were obtained from the monthly public health mortality file (PHMF). In England and Wales deaths should be registered within five days of the death occurring, the PHMF is therefore derived from the information provided when a death is certified and registered. There are some circumstances which result in the registration of deaths being delayed, such as those considered unexpected, accidental or suspicious. These deaths are referred to a coroner who may request a post mortem or carry out an inquest to determine the cause of death. Under these situations the time taken to investigate the circumstances surrounding a death can often lead to a registration delay, these are commonly only a few days but can extend into years *(Office for National Statistics, 2011b).* Because the monthly PHMF is not a cleansed and revised version of death statistics, there can often be discrepancies with the official ONS mortality statistics release, and this is mainly due to the lengthy coroner inquests.

The data extract from the PHMF (provided by Cumbria County Council) was based on deaths occurring between 01-01-2007 and 31-12-2012, however in order to follow standard national

practice the deaths were then filtered to only include deaths registered between 01-01-2008 to 31-12-2012, thus meaning that the data for Cumbria presented in this report relates to deaths registered over the five year period from 2008 to 2012. In order to select the deaths that were avoidable, queries were created using MS Access based on the ONS ICD-10 codes and corresponding age groups as defined by the ONS (outlined in table 1).

Deaths of non-residents of Cumbria were excluded from the analysis; these were determined by removing records with a non-Cumbria related ward code. The ward codes for Cumbria begin with: UB (Allerdale), UC (Barrow-in-Furness), UD (Carlisle), UE (Copeland), UF (Eden) and UG (South Lakeland). These ward codes were also utilised for analysis at a local authority level.

The monthly PHMF also provides the sex of the deceased, where 1 refers to males and 2 refers to females; these codes were used for analysis of avoidable mortality by sex.

The data presented in the report for England were obtained from the Office for National Statistics website and werepublished on 22nd May 2013 *(Office for National Statistics, 2013)*. The number of avoidable deaths was available by five year age band, sex, and specific avoidable condition registered between 2001 and 2011 and this report used the data from 2008 to 2011. The directly age-standardised rates in the report differ to the ONS published rates and this is due to a more recent European standard population being utilised for this analysis.

Statistical Calculations

Directly age-standardised rates for Cumbria were calculated using the number of potentially avoidable deaths registered in each year as the numerator and the mid-year population estimates from the ONS (published 30 April 2013) as the denominator. These rates were calculated for all avoidable deaths, for specific conditions (infections, neoplasms, drug use disorders, cardiovascular diseases, respiratory diseases, injuries, and other), by sex, and by local authority. Although age limits were set for some cause groups, the rates were calculated using persons of all ages as the denominator. This method was adopted to replicate the ONS methodology, whose rationale is that the entire population is at risk of mortality due to causes considered to be avoidable at an aggregate level and also to allow data by cause group to be presented on a comparable basis *(Office for National Statistics, 2013b).*

To calculate the directly age standardised rates, the PHMF data were inserted into a pivot table using MS Excel and grouped into five year age bands from 0 to 84 and 85+. The ICD-10 codes were then grouped accordingly to the ONS definitions (table 1) to enable the correct age groupings to be assigned to each cause of avoidable death. Using the aggregated data, the numbers of deaths for specific age groups were placed into a directly age-standardisation tool *(Association of Public Health Observatories, 2008)*. Also placed into the directly age standardisation tool were the mid-year population estimates by five year age band that related to the same year as the deaths. The directly age-standardised rate was then calculated automatically in the tool by firstly dividing the number of deaths by the local population, then the rate of events that would occur in the standard population was calculated by multiplying the five year age specific rates to the age structure of the standard population (in this case the European standard population 2013). These were then summed and divided by the total European standard population to get a single standardised rate. The directly

age-standardised rates for England were calculated in the same way using ONS data by five year age band, mid year population estimates and the 2013 European standard population.

The directly-age standardisation tool used also calculated the 95% confidence intervals using Byar's approximation. Confidence intervals determine statistical precision and illustrate the range of uncertainty around a particular value, in the case of this report, the rate of avoidable death. Statistical significance is assigned on the basis on non-overlapping confidence intervals and throughout this report statistically significant differences are referred to as being significant.

Deprivation Analysis

The English Indices of Multiple Deprivation 2010 uses 38 separate indicators that cover seven domains (income, employment, health and disability, education skills and training, barriers to housing and other services, crime, and living environment) which can be combined, using appropriate weights, to calculate the Index of Multiple Deprivation (IMD 2010). This is an overall measure of multiple deprivation experienced by people living in an area and is calculated for every Lower layer Super Output Area (LSOA) in England. The IMD 2010 scores can then be used to rank every LSOA in England according to their relative level of deprivation *(Communities and Local Government, 2011).* When ranked, the LSOAs can be divided into fifths (referred to in this report as deprivation quintiles). The higher the IMD score the more deprived the LSOA is, thus meaning that the fifth of LSOAs with the lowest IMD scores constitute quintile 1. Conversely the lower the IMD score the less deprived the LSOA is, thus meaning that the fifth of LSOAs with the highest IMD scores constitute quintile 5.

As the monthly public health mortality file does not provide LSOA of residence, the post code was used to determine this. A postcode to LSOA look up table was provided by Cumbria County Council, and for each avoidable death a VLookUp in Microsoft Excel was performed to match a LSOA code to the postcode. Once each LSOA code was established it was then possible to link these to an IMD look up table which outlined the national quintile each LSOA in Cumbria related to. Avoidable deaths by deprivation quintile and five year age band could then be determined and directly age-standardised rates calculated.

Rural and Urban Area Analysis

The rural and urban classification is an official National Statistic introduced in 2004 and defines the rurality of very small census based geographies. Urban >10k areas refer to urban settlements with a population greater than 10,000; town and fringe areas refer to small towns and fringe areas that are located within the rural domain; and village, hamlet and isolated dwelling areas are also within the rural domain *(Office for National Statistics, 2004).*

The ONS provide urban and rural classifications for each LSOA in England, and these classifications were linked to the avoidable mortality dataset via the VLookUp formula within Microsoft Excel. The population structure for each rural and urban classification was also determined by linking classifications via VLookUp to the ONS mid-year population figures for LSOAs and then grouped accordingly. Avoidable deaths by rural and urban classification and five year age band could then be determined and directly age-standardised rates calculated.

Potential Years of Life Lost Analysis

Potential years of life lost (PYLL) is a measure of the potential number of years lost when a person dies prematurely (under age 75) from a particular cause. Deaths from persons aged 75 or over were not included in the calculation. PYLL is calculated by subtracting the age at which death occurred for each individual from 75, for example a person who died at age 20 would contribute 55 PYLL. Each individuals PYLL was then summed by group cause to give a total PYLL.

Potential Years of Life Lost Analysis

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Mortality from all Avoidable Causes in Cumbria Compared to England

Over the five year period 2008 - 2012, on average 24% of all deaths of Cumbrian residents were potentially avoidable and a total of 88,446 PYLL, an average of 17,689 PYLL per year.

The number of deaths from avoidable causes in Cumbria decreased from 1,352 to 1,230 between 2008 and 2010. The number then increased to 1,293 in 2011 and decreased in 2012 to 1,239 (table 2).

Table 2: Number of avoidable deaths in Cumbria by group cause and year (2008 – 2012)[3]

Condition Group	2008	2009	2010	2011	2012	Total
Infections	13	17	15	17	18	80
Neoplasms	474	433	417	466	432	2,222
Nutritional, Endocrine and Metabolic	*	*	5	*	5	20
Drug Use Disorders	68	56	63	58	65	310
Neurological Disorders	9	9	*	*	8	36
Cardiovascular Diseases	420	418	404	357	334	1,933
Respiratory Diseases	120	131	102	139	120	612
Digestive Disorders	29	15	12	15	21	92
Genitourinary Disorders	9	*	9	6	*	33
Maternal and Infant	29	21	17	18	19	104
Unintentional Injuries	137	108	128	140	141	654
Intentional Injuries	41	59	54	67	72	293
All Avoidable Causes	**1,352**	**1,275**	**1,230**	**1,293**	**1,239**	**6,389**

The most recent data for 2012 reveals that the directly age-standardised rate of mortality from all causes of avoidable death in Cumbria was 229.2 per 100,000 population. Trend data reveals that the rate of avoidable mortality in Cumbria decreased significantly by 13.1% (or 34.7 deaths per 100,000 population) between 2008 and 2012. Figure 2 illustrates the trend of avoidable mortality directly age-standardised rates over the five years in Cumbria compared to England.

Comparable rates against England at the time of writing were only available for 2011 and previous years. In 2011, Cumbria had a significantly higher rate of mortality compared with the national rate (242.7 and 224.7 per 100,000 population respectively). Avoidable mortality in England has decreased year on year since 2008, whereas the rate in Cumbria fluctuated marginally between 2010 and 2012.

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[3]Monthly Public Health Mortality File
*data are supressed due to small numbers
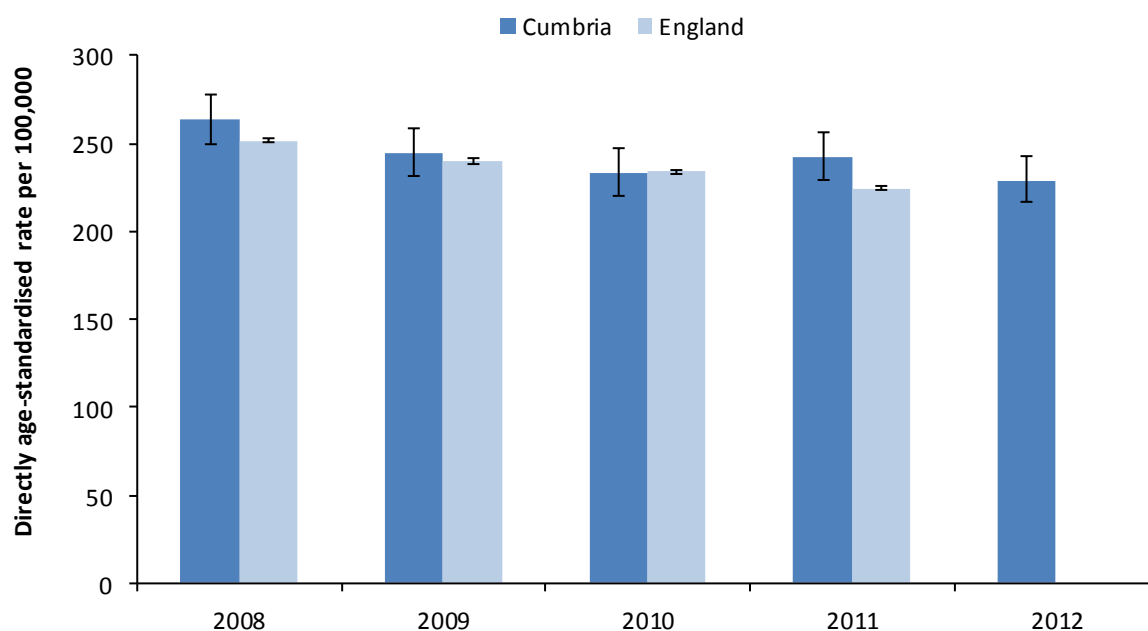
Figure 2: Trend of directly age-standardised rate (per 100,000 population, all ages) of mortality from all avoidable causes, Cumbria and England, 2008 – 2012. [4]

Avoidable Mortality in Cumbria by Local Authority

Data analysis by local authority reveals some significant differences in the rate of avoidable mortality across Cumbria. Barrow-in-Furness had the highest rate of avoidable mortality in 2012 at 270.0 deaths per 100,000 population; this rate was significantly higher compared to the rate in Eden and South Lakeland (177.1 and 185.9 per 100,000 respectively). Copeland also had a statistically significantly higher rate of avoidable mortality than Eden and South Lakeland, at 266.3 deaths per 100,000 population. The rate in Allerdale, at 244.7 deaths per 100,000 was also significantly higher than Eden and South Lakeland (figure 3).

Despite Barrow-in-Furness and Copeland having the two highest rates of avoidable mortality in Cumbria, they were not significantly higher than the Cumbria average of 229.2 deaths per 100,000 population. Eden and South Lakeland local authorities both had a significantly lower rate of avoidable mortality compared to the Cumbria rate, and South Lakeland's rate was significantly lower compared to Carlisle (figure 3).

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[4]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

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Figure 3: Directly age-standardised rate (per 100,000 population, all ages) of mortality from all avoidable causes in Cumbria by local authority, 2012[5]

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[5]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and European Standard Population (2013 version)

Trend of Avoidable Mortality in Cumbria by Local Authority

In all Cumbria local authorities, the 2012 rate of death from all avoidable causes was lower than the rate for 2008, although not significantly lower. The trend pattern was similar for all local authorities in that the rates have on the whole followed a downward trend; however there have been no significant year-on-year changes (figure 4).

Figure 4: Trend of directly age-standardised rate (per 100,000, all ages) of mortality from all avoidable causes in Cumbria by local authority, 2008 - 2012[6]

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[6]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and European Standard Population (2013 version).

Trend of Avoidable Mortality in Cumbria by Sex

Between 2008 and 2012, males in Cumbria have consistently had a significantly higher rate of avoidable mortality compared to females. The data reveal a decreasing trend pattern for both sexes overall during the five year period, although there were no significant year-on-year changes (figure 5). The male rate in 2012 at 272.7 deaths per 100,000 males was 1.5 times higher than the female rate of 187.3 deaths per 100,000 females; this was a difference of 85.4 deaths per 100,000.

Figure 5: Trend of directly age-standardised rate (per 100,000, all ages) of mortality from all avoidable causes in Cumbria by sex, 2008 - 2012[7]

Avoidable Mortality in Cumbria Compared to England by Sex

Nationally, males have also consistently had a significantly higher rate of avoidable mortality than females over the four year period between 2008 and 2011. The most recent rates for 2011 reveal that the national male rate was 0.8 times higher compared to females (282.0 per 100,000 males and 171.0 per 100,000 females respectively).

Figure 6 illustrates that between 2008 and 2011, the male avoidable mortality rates in Cumbria have been similar to that of the national rate with no significant differences. The female avoidable mortality rates in Cumbria have also been also similar to the national rate over the four year period (figure 7); however in 2011 the rate of female avoidable mortality in Cumbria was significantly higher than the national rate (193.8 per 100,000 females and 171.0 per 100,000 females respectively).

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[7]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and European Standard Population (2013 version).
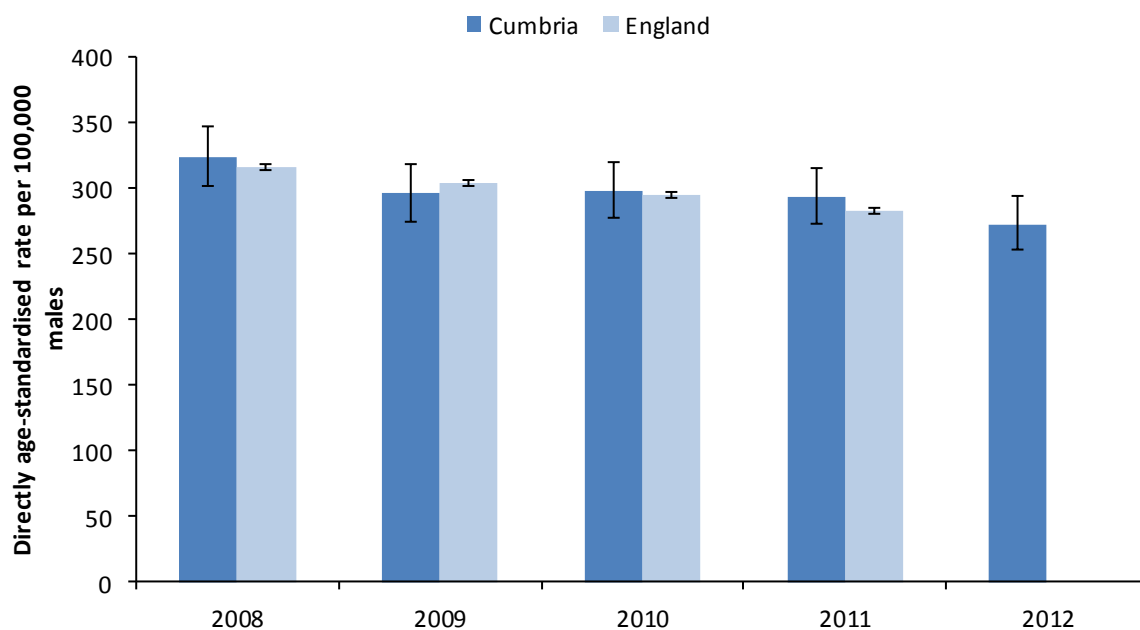
Figure 6: Male trend of directly age-standardised rate (per 100,000, all ages) of mortality from all avoidable causes in Cumbria and England, 2008 - 2012[8]
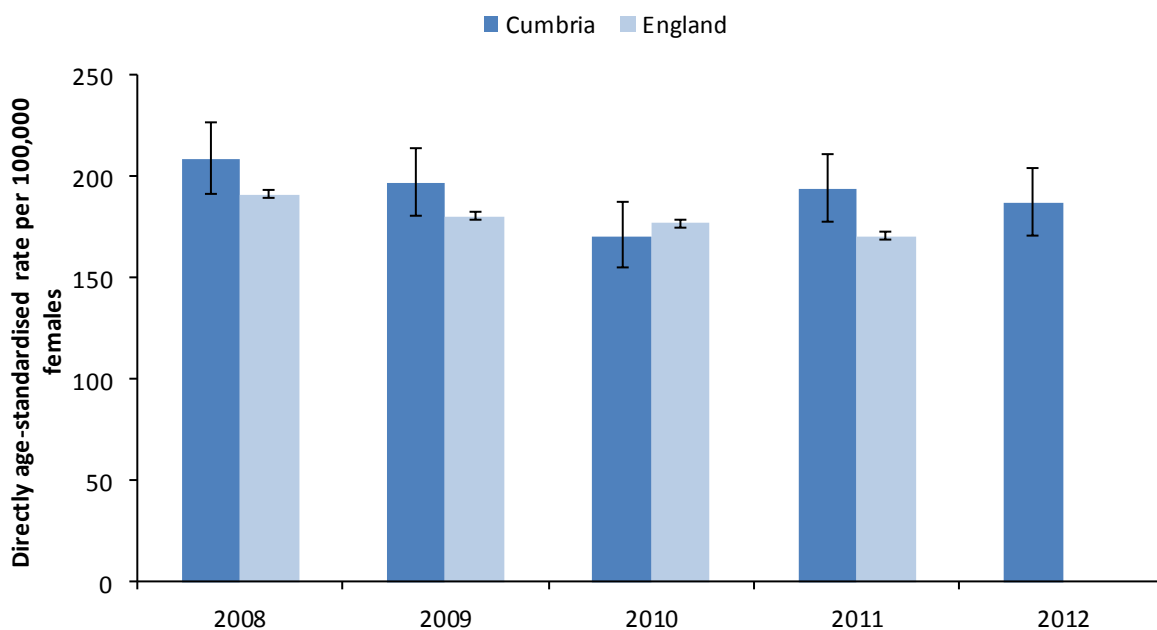
Figure 7: Female trend of directly age-standardised rate (per 100,000, all ages) of mortality from all avoidable causes in Cumbria and England, 2008 - 2012[9]

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[8]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

[9]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

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Avoidable Mortality in Cumbria by Local Authority and Sex

Analysis of avoidable mortality in Cumbria by sex and local authority shows that Barrow-in-Furness had the highest male rate of avoidable death in the county at 339.6 deaths per 100,000 males; this was also significantly higher than the Eden and South Lakeland rates of 215.8 and 209.4 male deaths per 100,000 males respectively (figure 8).

Carlisle had the highest female rate of avoidable mortality in Cumbria at 209.2 deaths per 100,000 females, whilst Eden had the lowest rate with 140.2 female deaths per 100,000 females. There were no significant differences in female avoidable mortality between Cumbria local authorities (figure 8).
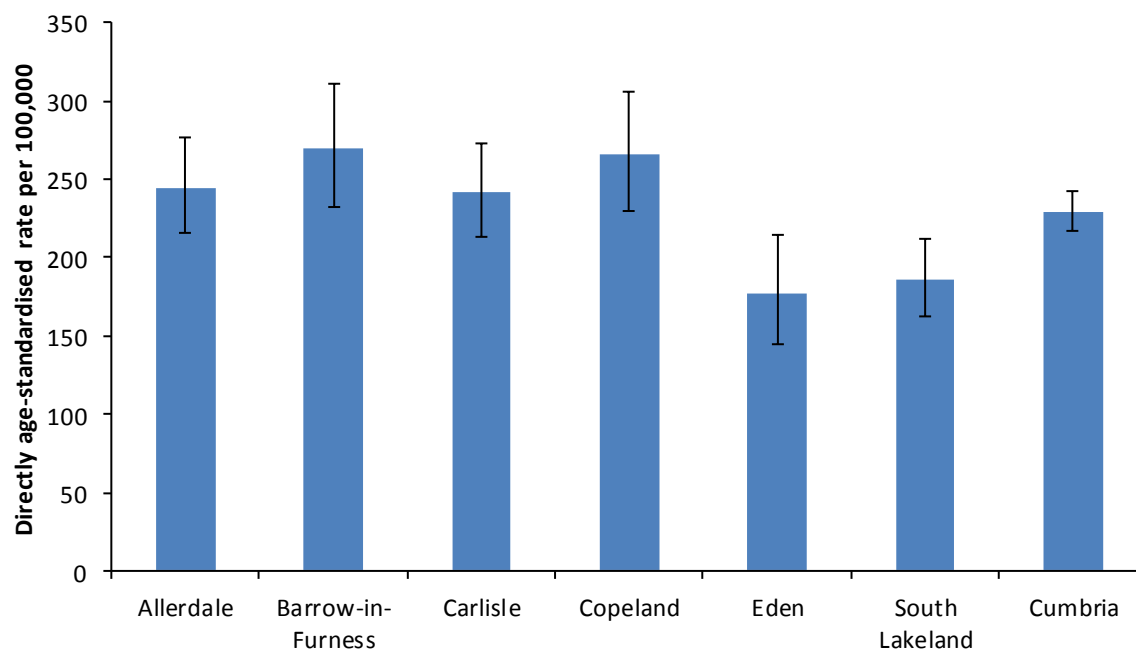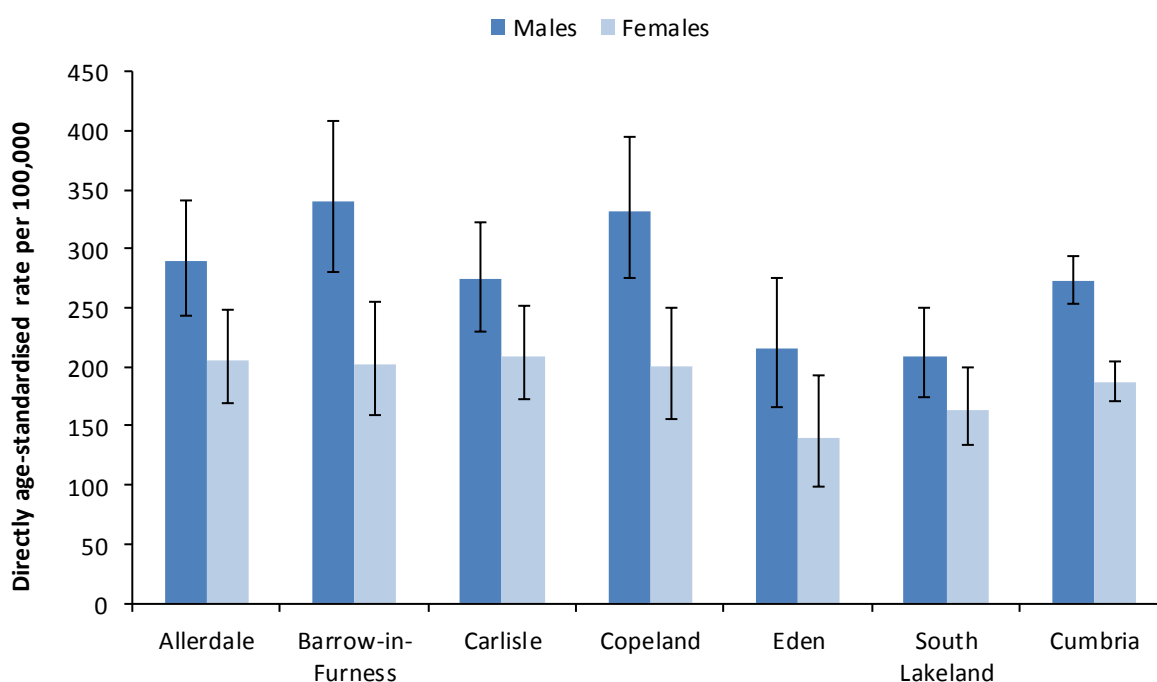

Figure 8: Directly age-standardised rate (per 100,000, all ages) of mortality from all avoidable causes in Cumbria by local authority and sex, 2012[10]

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[10]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

Avoidable Mortality in Cumbria by Deprivation

Figure 9 shows the rate of avoidable mortality in Cumbria according to national deprivation quintile and relates to deaths registered between 2010 and 2012 to give a three year average. Quintile 1 refers to the most deprived national fifth of areas, whilst quintile 5 refers to the least deprived national fifth of areas. Analysis reveals that in Cumbria there was a strong association between avoidable mortality and deprivation with significant differences. The avoidable mortality rate for areas of Cumbria in quintile 1 was 2.9 times higher compared to quintile 5 (436.6 and 148.9 deaths per 100,000 population respectively).

Figure 9: Directly age-standardised rate (per 100,000, all ages) of mortality from all avoidable causes in Cumbria by national deprivation quintile, 2010-12 average[11]

Rural and Urban Variation of Avoidable Mortality in Cumbria

Figure 10 shows the avoidable mortality rate in Cumbria according to ONS rural and urban area classifications and relates to deaths registered between 2010 and 2012 to show a three year average. The rate of avoidable death in urban areas of Cumbria was highest at 278.3 deaths per 100,000 population; this was 1.6 times higher than the rate in village, hamlet and isolated dwelling areas (173.5 deaths per 100,000 population). The rates of avoidable death in both Urban and Town and Fringe areas of Cumbria were significantly higher compared to village, hamlet and isolated dwelling areas.

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[11]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and 2010 Index of Multiple Deprivation (Communities and Local Government).

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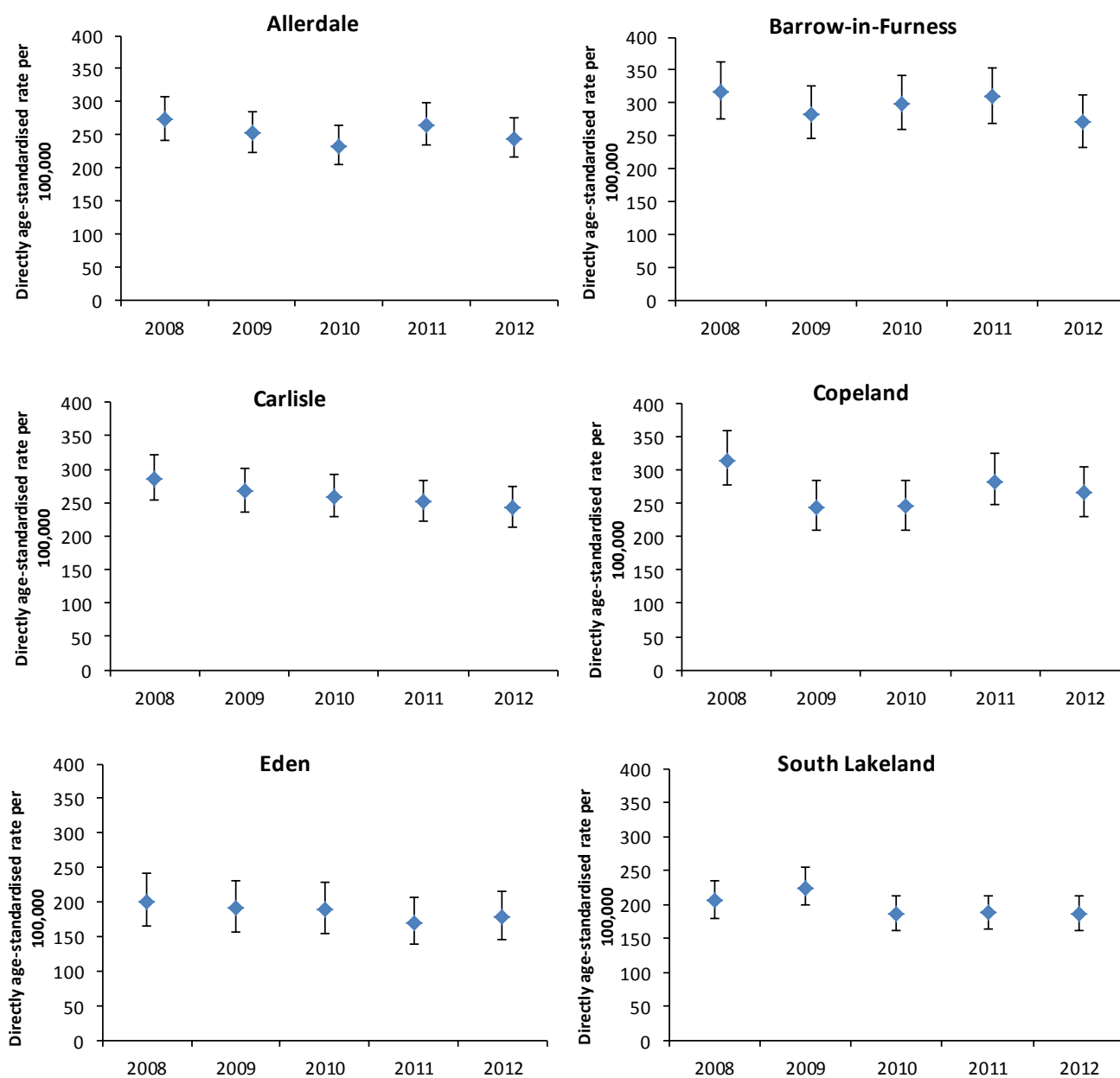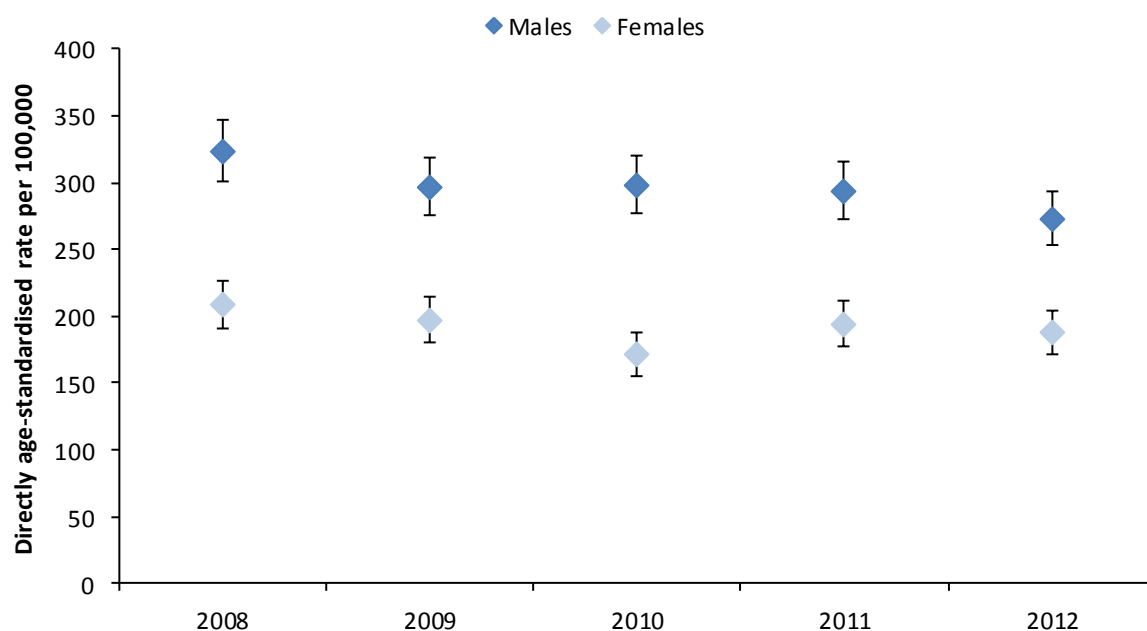**Figure 10: Directly age-standardised rate (per 100,000, all ages) of mortality from all avoidable causes in Cumbria by ONS rural and urban area classification, 2010-12 average[12]**

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[12]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and ONS rural and urban area classification.

Avoidable Mortality from Drug Use Disorders in Cumbria Compared to England

The data in this section refers to avoidable deaths from drug use disorders and includes alcohol related deaths (excluding external causes) and illicit drug use disorders (refer to table 1 for corresponding ICD-10 codes and age groups).

Between 2008 and 2012, 310 residents of Cumbria died as a result of avoidable drug use disorders, an average of 62 per year. Over this period, the number of avoidable deaths from drug use disorders accounted for 5% of all avoidable deaths in Cumbria and was responsible for 6,666 PYLL (this relates to an average of 1,333 PYLL per year and accounts for 7.5% of all PYLL due to avoidable mortality).

National data from the four year period 2008 – 2011 shows that the directly standardised rate of avoidable mortality from drug use disorders decreased significantly by 16% from 13.9 to 11.7 per 100,000 population (figure 11). Compared to national figures, Cumbria has consistently had a lower rate of avoidable mortality from drug use disorders, although not significantly lower and the rate fluctuated between 2008 and 2012.

Figure 11: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from drug use disorders in Cumbria and England, 2008 - 2012[13]

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[13]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

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Avoidable Mortality from Drug Use Disorders in Cumbria by Local Authority

Due to smaller numbers, local authority level rates of avoidable mortality from drug use disorders were calculated by combining three years of data to illustrate a three year average (2010 – 2012).

Within Cumbria, Barrow-in-Furness had the highest rate of avoidable death from drug use disorders at 22.6 per 100,000 population (this equates to an average of 16 deaths per year). Furthermore, the rate in Barrow-in-Furness was significantly higher than the Cumbria 2010-12 average and Allerdale, Eden and South Lakeland local authorities (figure 12).

Figure 12: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from drug use disorders in Cumbria by local authority, 2010-12 average[14]

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[14]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

Avoidable Mortality from Drug Use Disordersin Cumbria by Sex

Almost two thirds (65%) of avoidable deaths due to drug use disorders in Cumbria between 2008 and 2012 were among males. The most recent male avoidable mortality rate (2012) from drug use disorders was 15.5 deaths per 100,000 males, this compares to a female rate of 9.1 deaths per 100,000 females, however the difference was not significant. Trend data shows that both male and female avoidable death rates from drug use disorders have not significantly changed between 2008 and 2012 (figure 13).

Figure 13: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from drug use disorders in Cumbria by sex, 2008 - 2012[15]

Avoidable Mortality from Drug Use Disorders in Cumbria by Local Authority and Sex

Figure 12 presents the rate of avoidable mortality from drug use disorders by sex and local authority and combines 2010 – 2012 data due to smaller numbers to give a three year average. As illustrated, the male and female disparity of avoidable drug use deaths was evident across most of the county, with the exception of South Lakeland where females had a higher rate compared to males (8.6 and 7.6 per 100,000 respectively, not significant). In Copeland males had a significantly higher rate of avoidable mortality from drug use disorders compared to females (21.1 and 5.1 per 100,000 respectively). Barrow-in-Furness had the highest rate of avoidable mortality from drug use disorders for both males and females; 21.4 male deaths per 100,000 males and 9.7 female deaths per 100,000 females (figure 14).

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[15]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

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Figure 14: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from drug use disorders in Cumbria by local authority and sex, 2010-12 average[16]

Avoidable Mortality from Drug Use Disorders in Cumbria by Deprivation

Analysis of avoidable death from drug use disorders by residential deprivation demonstrates that the 2010-12 rate was significantly higher in the areas of Cumbria which are classified as being in the country's most deprived quintile (quintile 1) compared to the areas of Cumbria that are classified as being in the country's least deprived quintile (quintile 5). The rate in quintile 1 was 2.7 times higher than quintile 5, this related to 22.4 and 8.2 deaths per 100,000 population respectively (figure 15).

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[16]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
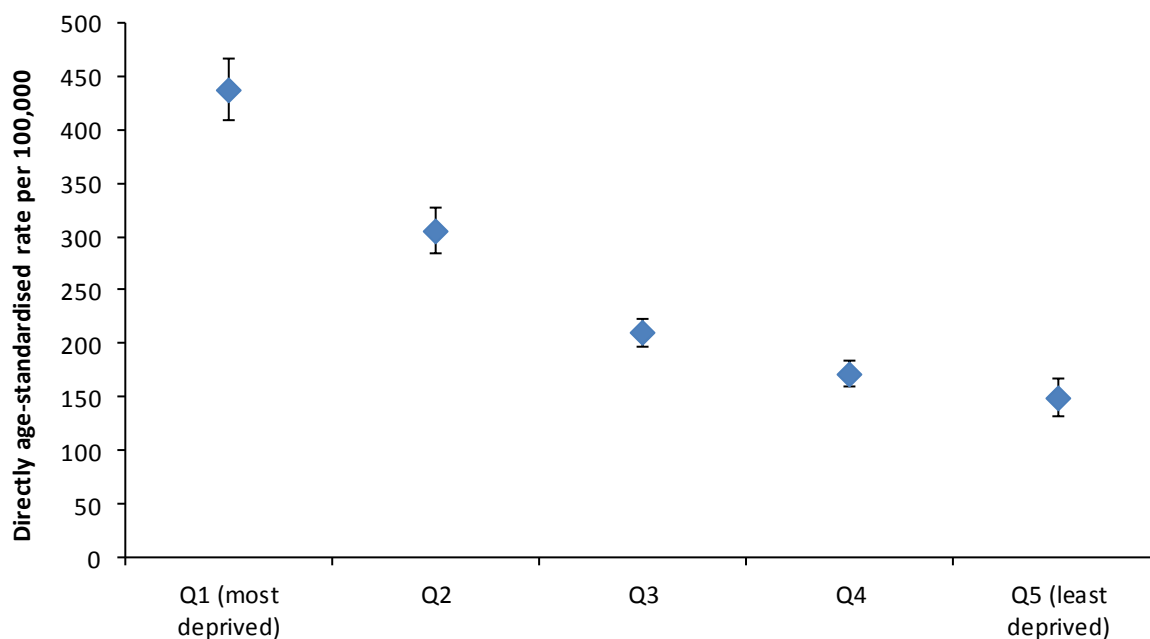
Figure 15: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from drug use disorders in Cumbria by national deprivation quintile, 2010-12 average[17]

Avoidable Mortality from Drug Use Disorders in Cumbria by Rural and Urban Variation

Figure 16 shows the rate of avoidable mortality from drug use disorders in Cumbria according to ONS rural and urban area classifications and relates to deaths between 2010 and 2012 to show a three year average.

The rate of avoidable death from drug use disorders in urban areas of Cumbria was highest at 14.2 deaths per 100,000 population; however there were no significant differences between urban, town and fringe, and village, hamlet and isolated dwelling areas.

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[17]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and 2010 Index of Multiple Deprivation (Communities and Local Government).
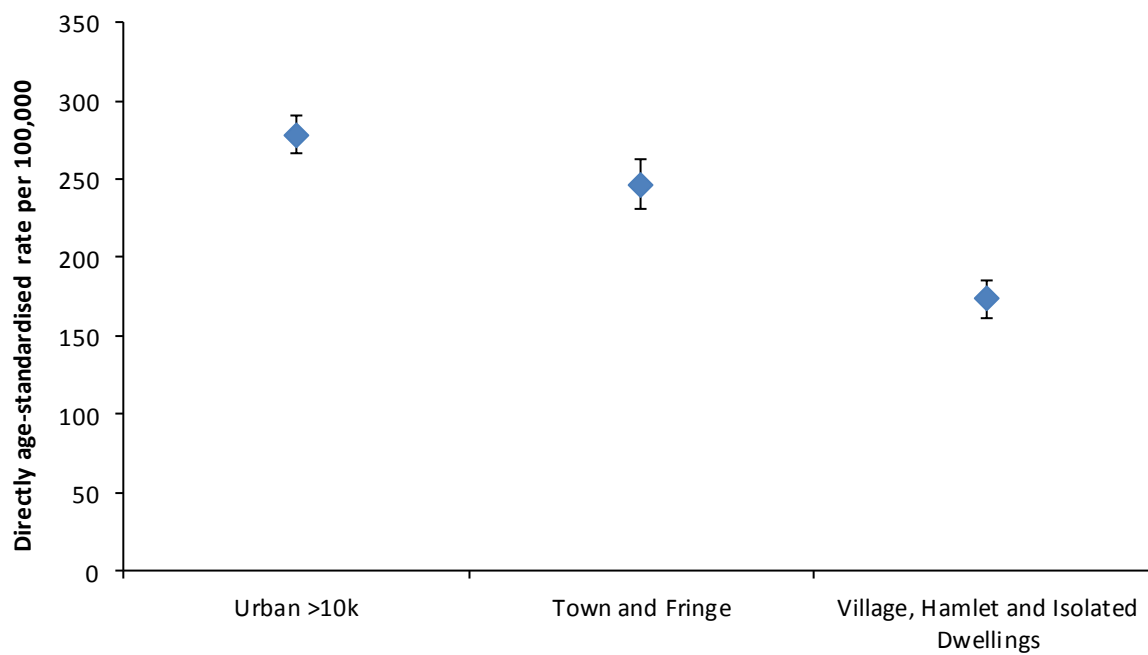
August 1, 2013
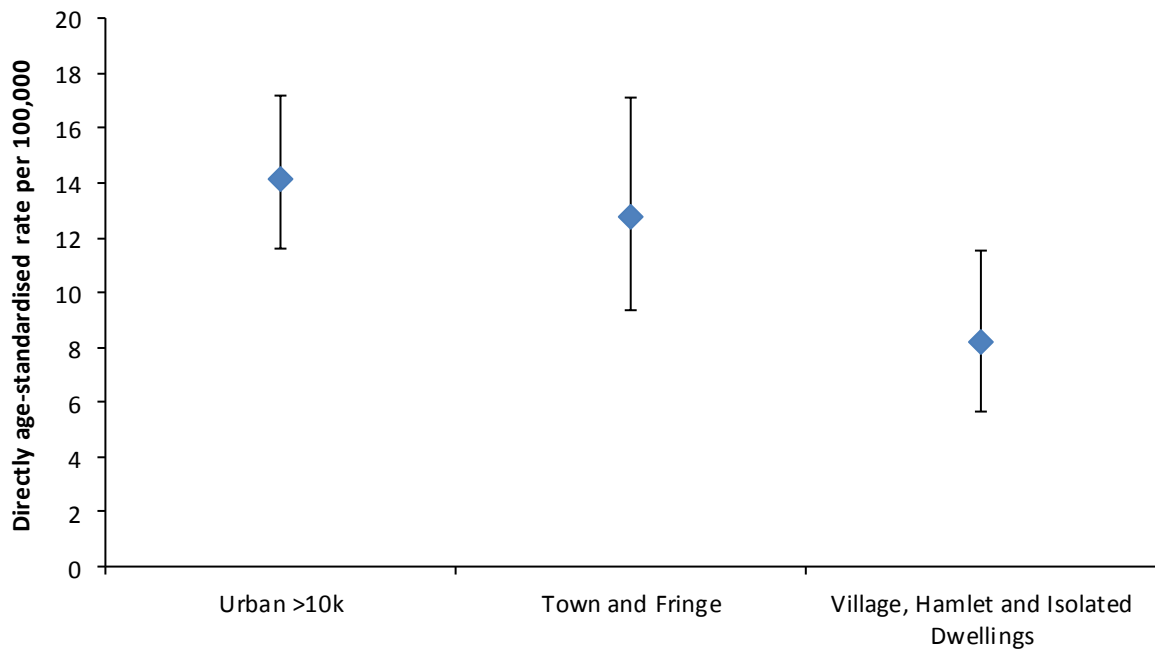
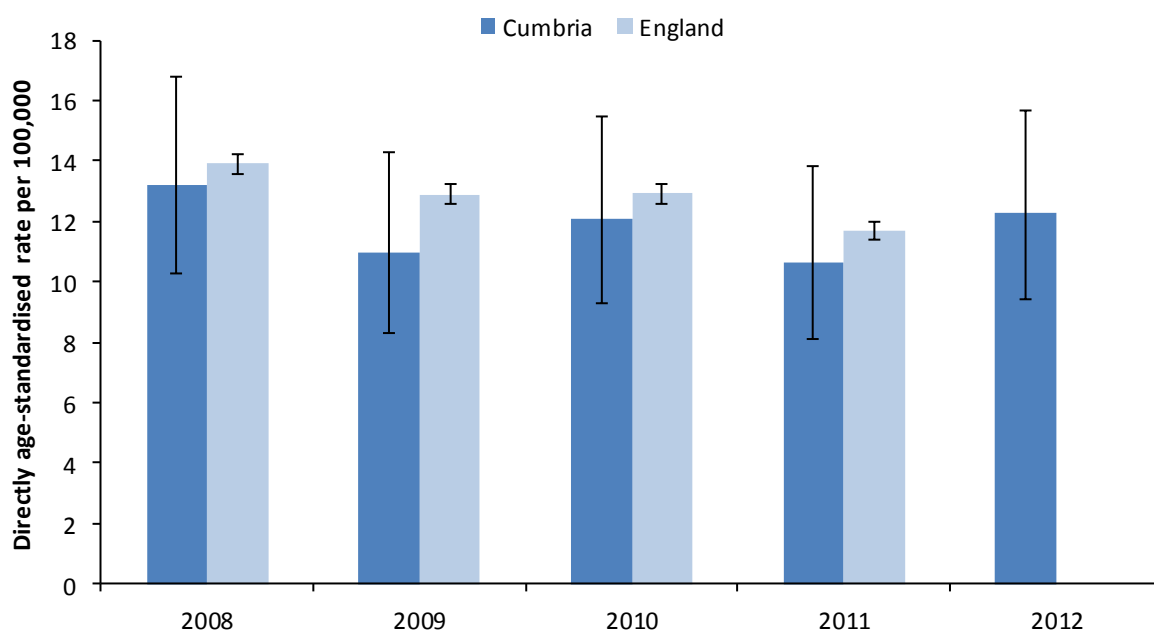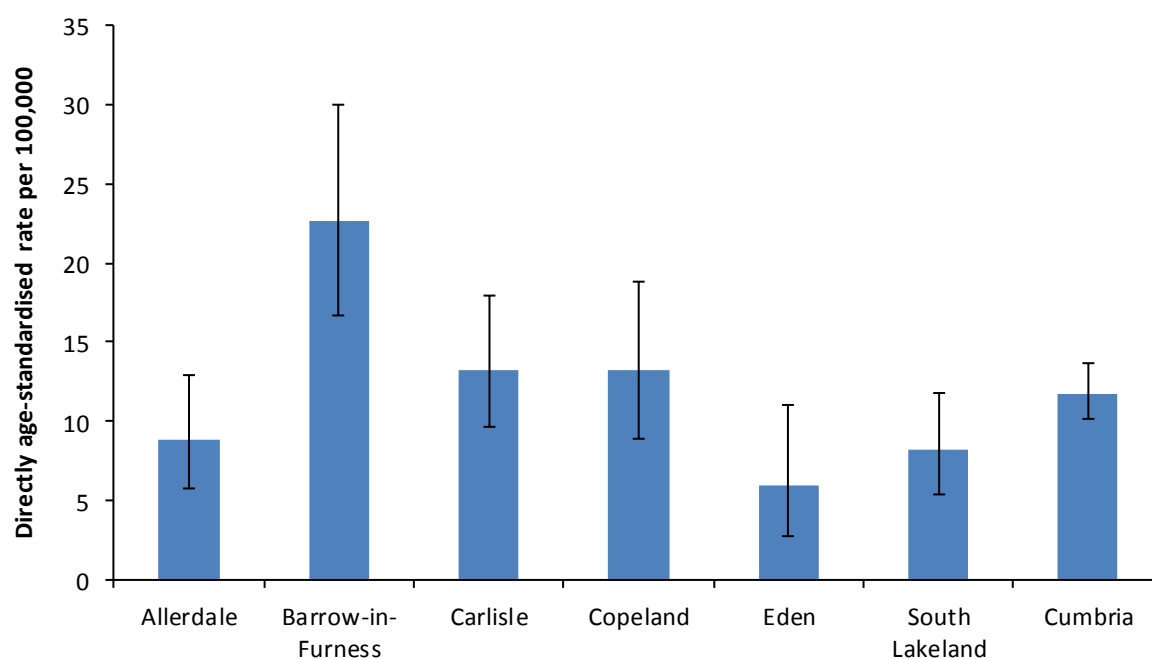**Figure 16: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from drug use disorders in Cumbria by ONS rural and urban classification, 2010-12 average[18]**

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[18]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and ONS rural and urban area classification.

Underlying Causes of Avoidable Drug Use Death in Cumbria

In this section, avoidable deaths from drug use disorders in Cumbria registered between 2008 and 2012 are examined in more detail to illustrate the specific underlying causes of drug use death (table 3).   Over the five year period, alcohol related diseases accounted for 92.3% of all avoidable drug use deaths in Cumbria. The most common cause of drug use death was alcohol liver disease, accounting for 64.8% of all drug use deaths, and a further 17.1% were due to fibrosis and cirrhosis of the liver.   Deaths due to illicit drug use disorders accounted for 7.7% of all avoidable drug use deaths.

Table 3: Proportion of avoidable deaths from drug use disorders in Cumbria by underlying cause of death, 2008 - 2012[19]

Underlying cause of avoidable drug use disorder death	%
Alcohol related diseases (excluding external causes)	
Alcoholic liver disease	64.8%
Fibrosis and cirrhosis of liver	17.1%
Mental and behavioural disorders due to use of alcohol	8.1%
Other diseases of pancreas	1.0%
Alcoholic cardiomyopathy	1.0%
Degeneration of nervous system due to alcohol	0.3%
Alcoholic polyneuropathy	0.0%
Alcoholic gastritis	0.0%
Chronic hepatitis, not elsewhere classified	0.0%
Alcohol related diseases total	**92.3%**
Illicit drug use disorders	
Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances	3.9%
Mental and behavioural disorders due to use of opioids	3.5%
Mental and behavioural disorders due to use of other stimulants, including caffeine	0.3%
Mental and behavioural disorders due to use of cannabinoids	0.0%
Mental and behavioural disorders due to use of sedatives or hypnotics	0.0%
Mental and behavioural disorders due to use of cocaine	0.0%
Mental and behavioural disorders due to use of hallucinogens	0.0%
Mental and behavioural disorders due to use of volatile solvents	0.0%
Illicit drug use disorders total	**7.7%**

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[19]Monthly Public Health Mortality File.

Avoidable Mortality from Injuries in Cumbria Compared to England

The data in this section refers to avoidable deaths from unintentional and intentional injuries. Avoidable unintentional injuries include transport accidents and accidental injury, while avoidable intentional injuries comprise of suicide and self-inflicted injuries, homicide/assault, and misadventures to patients during surgical and medical care (refer to table 1 for corresponding ICD-10 codes and age groups).

Between 2008 and 2012, 947 residents of Cumbria died as a result of injuries; this was an average of 189 per year. Over this period, avoidable deaths due to injuries accounted for 15% of all avoidable deaths in Cumbria and were responsible for 18,233 PYLL (this relates to an average of 3,647 PYLL per year and accounts for 20.6% of all PYLL due to avoidable mortality).

Data from the four year period 2008 - 2011 show that nationally the directly standardised rate of avoidable mortality from injures has changed very little (figure 17). The national rate decreased by 5.7% from 34.2 to 32.2 per 100,000 population between 2008 and 2011.   Since 2009 the rate of avoidable mortality from injuries in Cumbria has increased year on year (though not significantly). Notably, the 2011 Cumbria rate of 40.3 deaths per 100,000 population was significantly higher than the national rate of 32.2 deaths per 100,000 population.
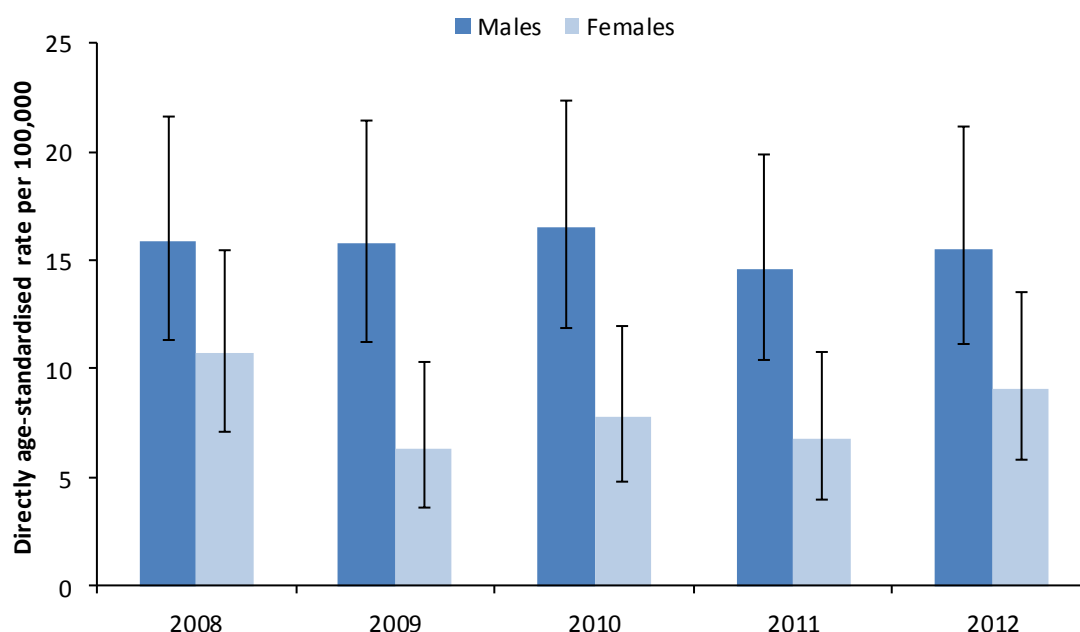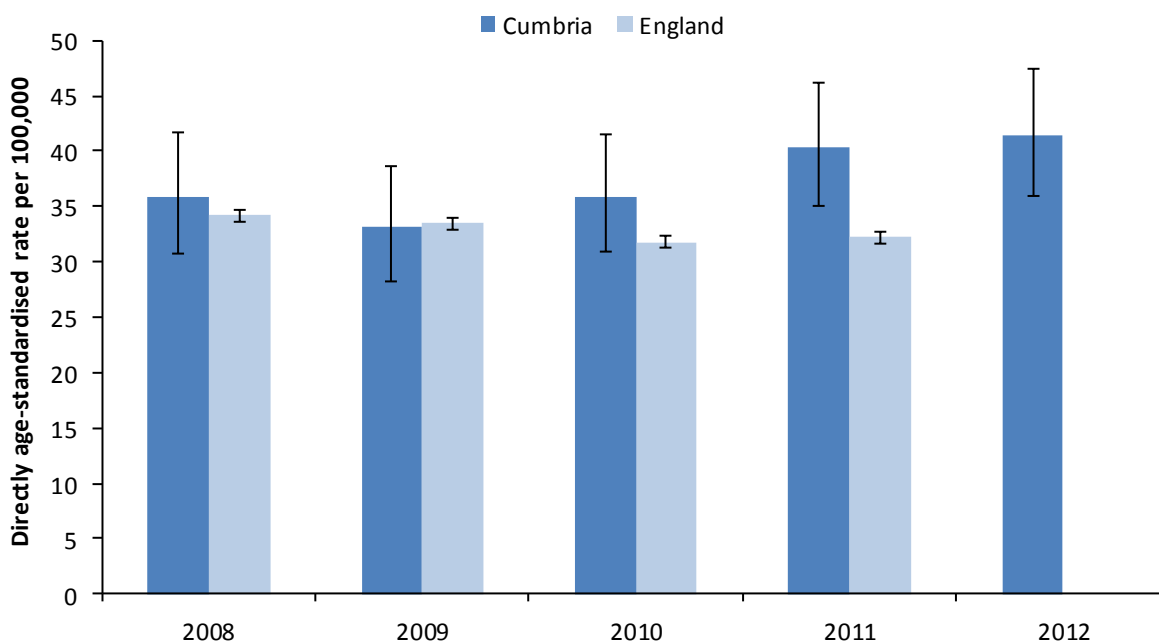

Figure 17: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from injuries in Cumbria and England, 2008 - 2012[20]

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[20]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.
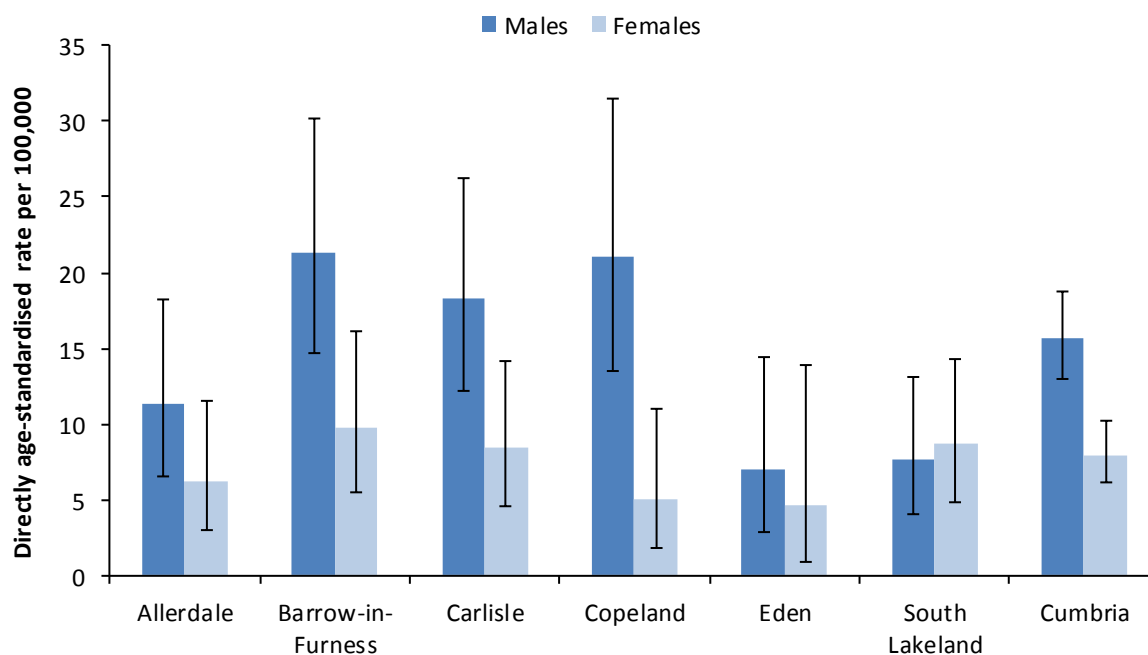
Avoidable Mortality from Injuries in Cumbria by Local Authority

Due to smaller numbers, locality level rates of avoidable mortality from injuries were calculated by combining three years of data to illustrate a three year average (2010 – 2012).

Within Cumbria, Copeland had the highest rate of avoidable death from injuries at 48.4 deaths per 100,000 population (this equates to an average of 33 deaths per year). Furthermore, the rate of avoidable death from injuries in Copeland was significantly higher compared to Eden where the rate was 28.8 deaths per 100,000 population (figure 18).
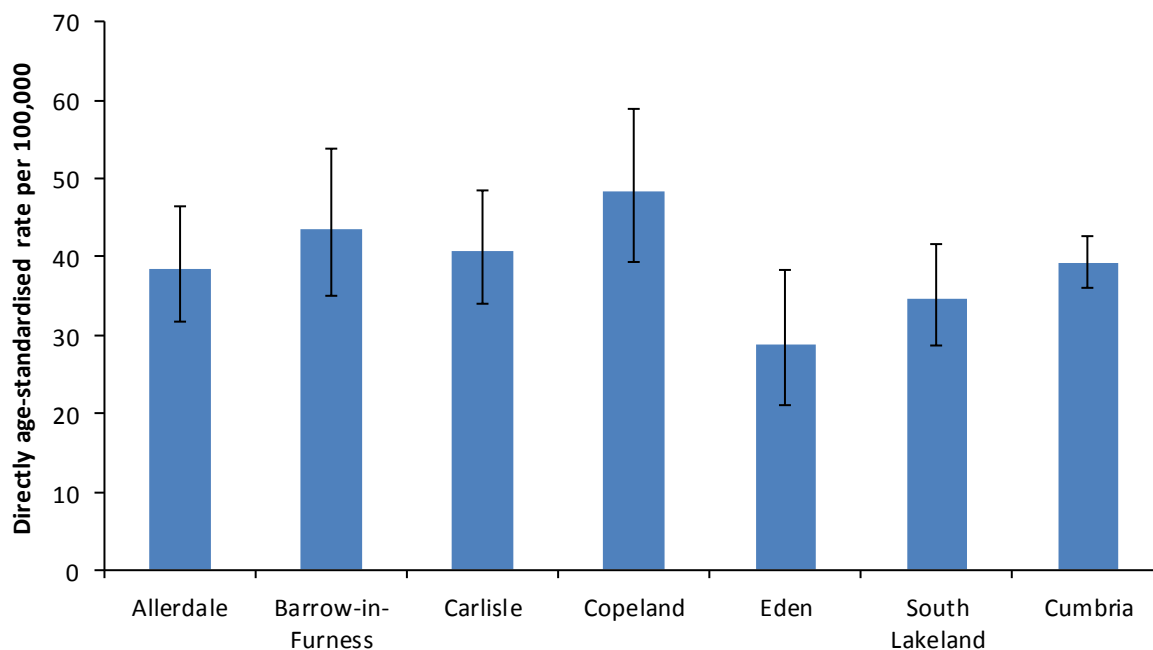
Figure 18: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from injuries in Cumbria by local authority, 2010-12 average[21]

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[21]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
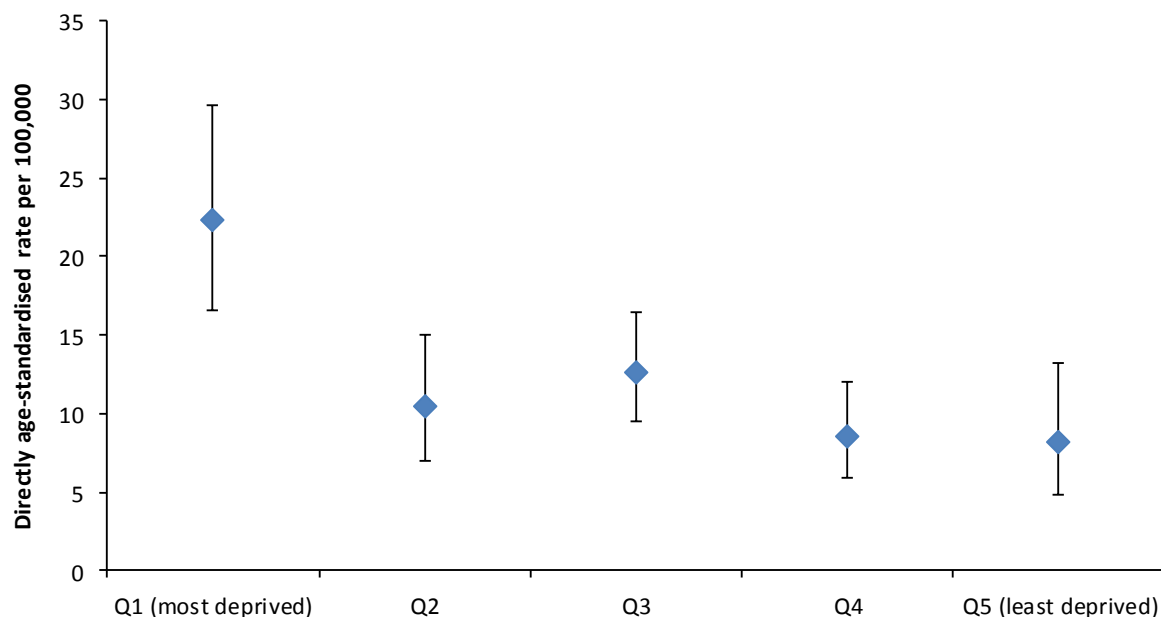
Avoidable Mortality from Injuries in Cumbria by Sex

Almost two thirds (63%) of avoidable deaths due to injuries in Cumbria between 2008 and 2012 were among males. The most recent male avoidable mortality rate (2012) from injuries was 58.2 per 100,000 males and this was significantly higher than the female rate of 25.8 deaths per 100,000 females (figure 19). Over the five year period males in Cumbria had a consistently significantly higher rate of avoidable mortality from injuries compared to females. Trend data shows an increasing male trend of avoidable death from injuries, however this was not a significant increase.
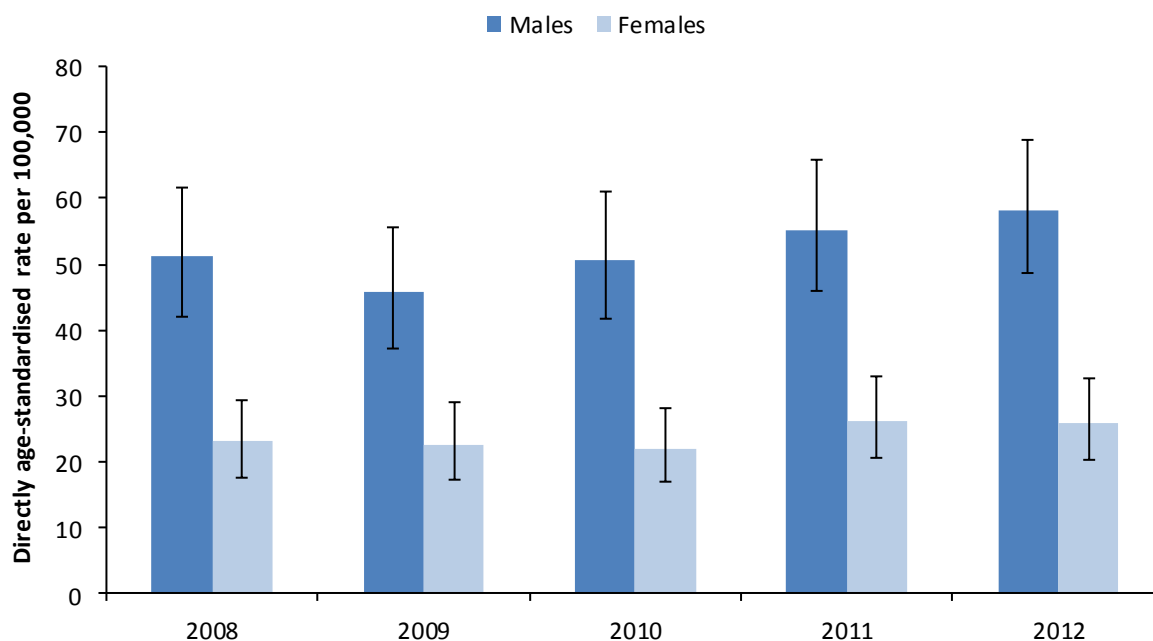
Figure 19: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from injuries in Cumbria by sex, 2008 - 2012[22]

Avoidable Mortality from Injuries in Cumbria by Local Authority and Sex

Figure 20 presents the rate of avoidable mortality from injuries in Cumbria by sex and local authority and combines 2010 – 2012 data due to smaller numbers to give a three year average.

As illustrated the male and female disparity of avoidable death from injuries was evident across the whole county of Cumbria, and with the exception of Eden local authority, males had a significantly higher rate of avoidable death from injuries compared to females in all local authorities (figure 20).

Copeland had the highest rate of avoidable mortality from injuries for both males and females; 67.8 male deaths per 100,000 males and 29.6 female deaths per 100,000 females.

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[22]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

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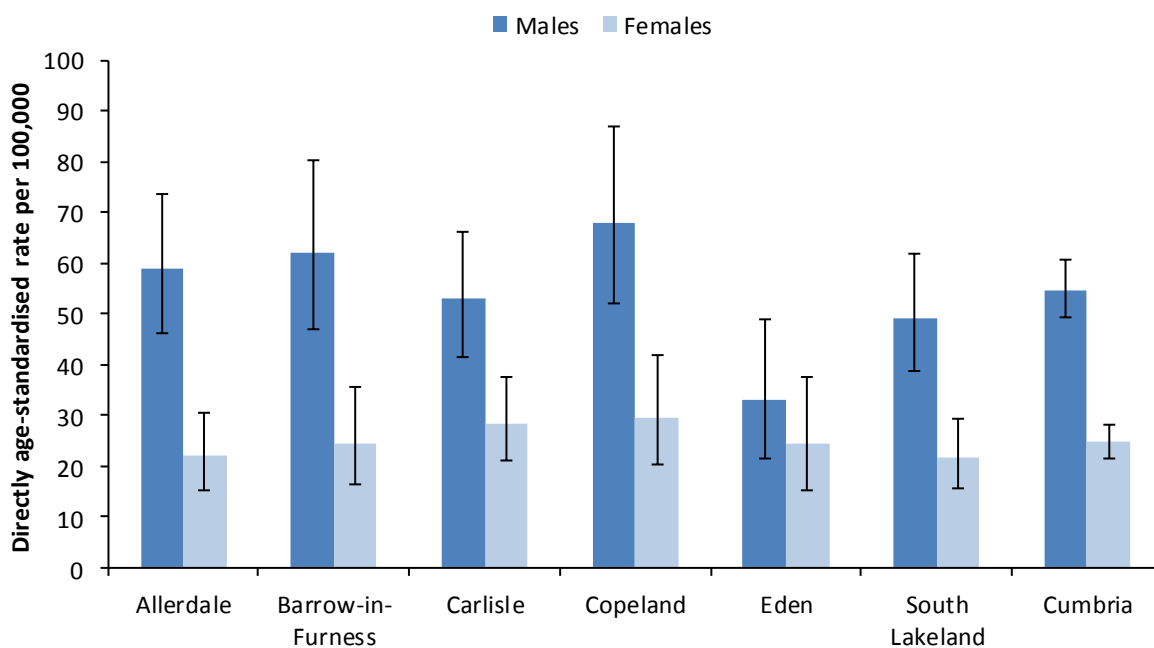
Figure 20: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from injuries in Cumbria by local authority and sex, 2010-12 average[23]

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[23]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

Avoidable Mortality from Injuries in Cumbria by Deprivation

Analysis of avoidable death from injuries by residential deprivation demonstrates that the 2010-12 rate was significantly higher in the areas of Cumbria which are classified as being in the country's most deprived quintile (quintile 1) compared to the rest of Cumbria (figure 21). The rate of avoidable mortality from injuries in quintile 1 was 2.6 times higher than the rate for the areas of Cumbria that are classified as being in the country's least deprived quintile (quintile 5), this related to 65.9 and 25.4 deaths per 100,000 respectively.
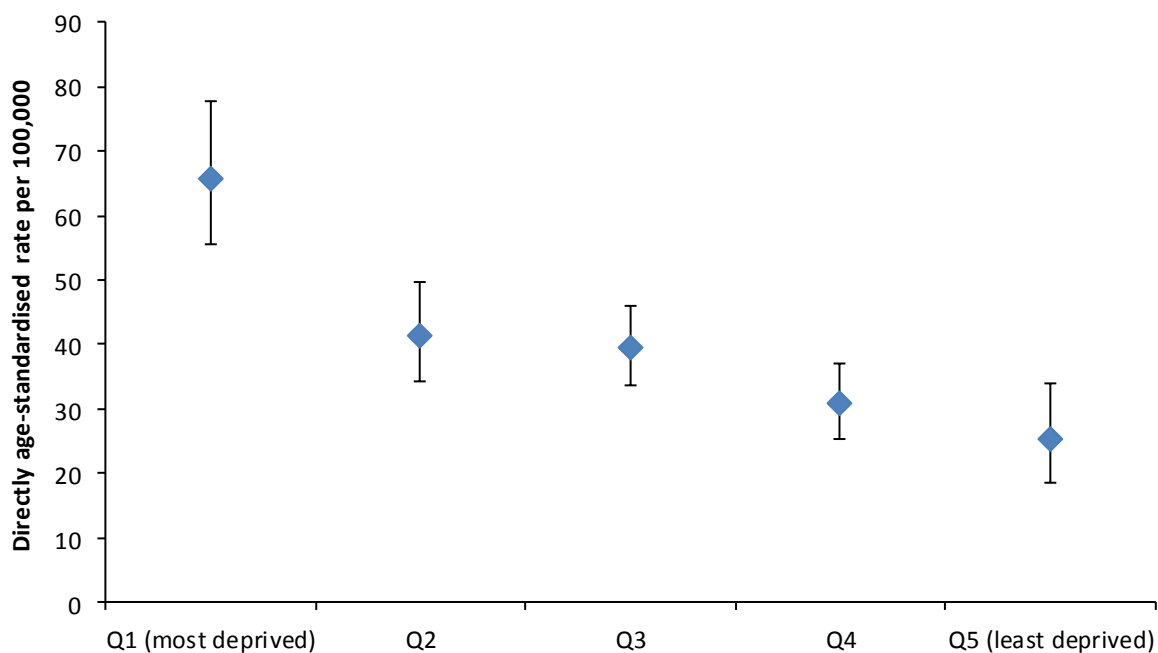
Figure 21: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from injuries in Cumbria by national deprivation quintile, 2010-12 average[24]

Avoidable Mortality from Injuries in Cumbria by Rural and Urban Variation

Figure 22 shows the rate of avoidable mortality from injuries in Cumbria according to ONS rural and urban area classifications and relates to deaths between 2010 and 2012 to show a three year average.

The rate of avoidable mortality from injuries in town and fringe ares of Cumbria was highest at 42.3 deaths per 100,000, this was closely followed by the rate in urban >10k areas at 41.7 deaths per 100,000. The rate in village, hamlet and isolated dwelling areas was 34.2 per 100,000; however there were no significant differences between the areas.

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[24]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and 2010 Index of Multiple Deprivation (Communities and Local Government).
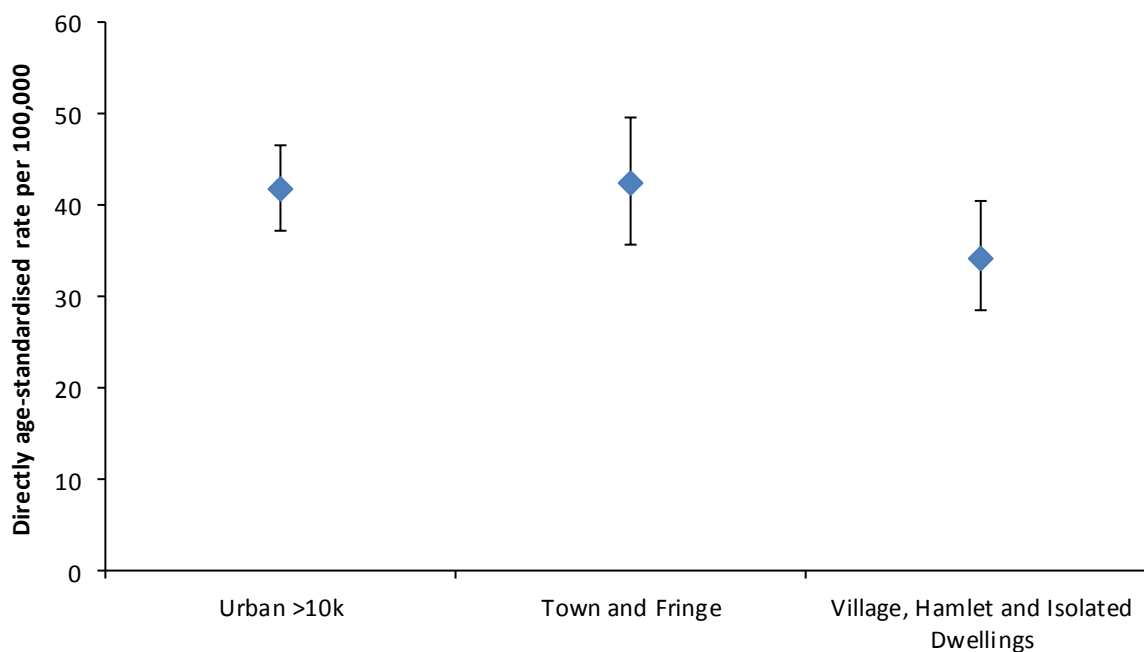
Figure 22: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from injuries in Cumbria by ONS rural and urban classification, 2010-12 average[25]

Underlying Causes of Avoidable Injury Deaths in Cumbria

In this section, avoidable deaths from injuries in Cumbria registered between 2008 and 2012 were examined in more detail to illustrate a break down of the specific underlying causes of death from injuries (table 4). Over the five year period, 69.1% of deaths from avoidable injuries were due to unintentional injuries, and 30.9% due to intentional injuries.

Accidental injuries, such as falls and accidental poisonings accounted for over half of all deaths from injuries (54.7%), while suicide and self-inflicted injuries accounted for a quarter of all deaths from injuries (25.4%).

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[25]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and ONS rural and urban area classification.

Table 4: Proportion of avoidable deaths from injuries in Cumbria by underlying cause of death, 2008-2012[26]

Underlying cause of avoidable death in injuries	%
Transport Accidents	
Car occupant injured in transport accident	7.0%
Motorcycle rider injured in transport accident	2.2%
Pedestrian injured in transport accident	2.1%
Pedal cyclist injured in transport accident	1.5%
Other land transport accident	1.0%
Bus occupant injured in transport accident	0.2%
Occupant of heavy transport vehicle injured in transport accident	0.1%
Occupant of pick-up truck or van injured in transport accident	0.1%
Air and space transport accidents	0.1%
Water transport accidents	0.1%
Occupant of three-wheeled motor vehicle injured in transport accident	0.0%
Other and unspecified transport accidents	0.0%
Transport accidents total	**14.4%**
Accidental Injury	
Falls	19.1%
Accidental exposure to other and unspecified factors	14.4%
Accidental poisoning by and exposure to noxious substances	8.8%
Other accidental threats to breathing	6.1%
Accidental drowning and submersion	2.2%
Exposure to smoke, fire and flames	2.0%
Exposure to inanimate mechanical forces	1.3%
Exposure to animate mechanical forces	0.4%
Exposure to forces of nature	0.3%
Overexertion, travel and privation	0.1%
Contact with heat and hot substances	0.0%
Exposure to electric current, radiation and extreme ambient air temperature and pressure	0.0%
Contact with venomous animals and plants	0.0%
Accidental injury total	**54.7%**
Total unintentional injuries	**69.1%**
Suicide and self-inflicted injuries	
Intentional self-harm	21.9%
Event of undetermined intent	3.6%
Total suicide and self-inflicted injuries	**25.4%**
Assault/homicide	**3.3%**
Misadventures to patients during surgical and medical care	**2.2%**
Total intentional injuries	**30.9%**

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[26]Monthly Public Health Mortality File

Avoidable Mortality from Respiratory Diseases in Cumbria Compared to England

The data in this section refers to avoidable deaths from respiratory disease and includes influenza (including swine flu), pneumonia, chronic obstructive pulmonary disorder, and asthma (refer to table 1 for corresponding ICD-10 codes and age groups).

Between 2008 and 2012, 612 residents of Cumbria died as a result of respiratory disease, an average of 122 per year. Over this period, the number of avoidable deaths from respiratory diseases accounted for 10% of all avoidable deaths in Cumbria and was responsible for 6,175 PYLL (this relates to an average of 1,235 PYLL per year and accounts for 7.0% of all PYLL due to avoidable mortality).

Data from the four year period 2008 - 2011 show that nationally the directly standardised rate of avoidable mortality from respiratory disease decreased by 7.8% from 25.6 to 23.6 deaths per 100,000 population. By comparison, the trend in Cumbria has fluctuated year on year, however these changes have not been significantly different, nor were they significantly different to the national rates. The most recent rate (2012) of avoidable death from respiratory diseases in Cumbria was 21.8 deaths per 100,000 population (figure 23).

Figure 23: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from respiratory diseases in Cumbria and England, 2008 - 2012[27]

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[27]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

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Avoidable Mortality from Respiratory Diseases in Cumbria by Local Authority

Due to smaller numbers, locality level rates of avoidable mortality from respiratory diseases were calculated by combining three years of data to illustrate a three year average (2010 – 2012).

Within Cumbria, Barrow-in-Furness and Carlisle local authorities had the highest rates of avoidable death from respiratory diseases at 26.8 and 26.7 deaths per 100,000 population respectively. Across Cumbria there were no significant differences between the rates of avoidable mortality from respiratory diseases (figure 24).

Figure 24: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from respiratory diseases in Cumbria by local authority, 2010-12 average[28]

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[28]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

Avoidable Mortality from Respiratory Diseases in Cumbria by Sex

The proportion of avoidable death from respiratory diseases in Cumbria by sex between 2008 and 2012 were equal with male deaths accounting for 50% and female deaths accounting for 50%.

The most recent male avoidable mortality rate (2012) from respiratory diseases was 25.9 deaths per 100,000 males, compared to a female rate of 17.6 deaths per 100,000 females. Trend data shows that both the male and female rates of avoidable death from respiratory disease have fluctuated, with no significant changes over the five year period 2008 - 2012 (figure 25).

Figure 25: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from respiratory diseases in Cumbria by sex, 2008 - 2012[29]

Avoidable Mortality from Respiratory Diseases in Cumbria by Local Authority and Sex

Figure 26 presents rates of avoidable mortality from respiratory diseases in Cumbria by local authority and sex which combines 2010 – 2012 data due to smaller numbers to give a three year average.

With the exception of Carlisle local authority, males had a higher rate of avoidable death from respiratory disease compared to females across the county; however there were no significant differences between male and female rates in each local authority.

Barrow-in-Furness had the highest rate of male avoidable mortality from respiratory diseases at 32.6 deaths per 100,000 males, and Carlisle had the highest female rate at 26.9 per 100,000 females.

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[29]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
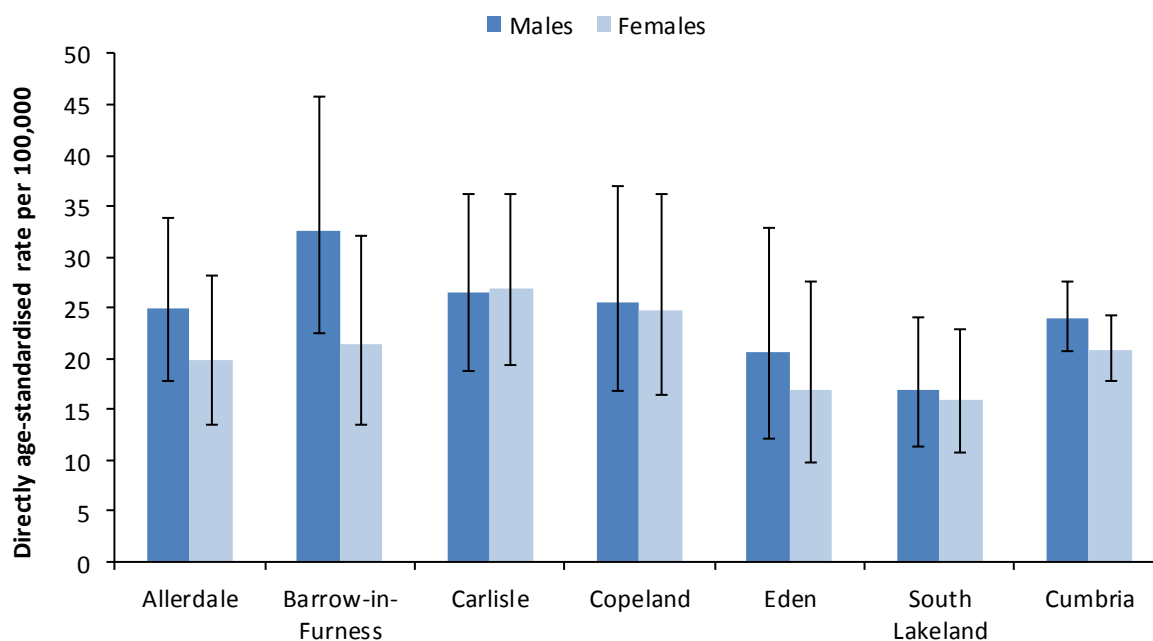
Figure 26: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from respiratory diseases in Cumbria by local authority and sex, 2010-12 average[30]

Avoidable Mortality from Respiratory Diseases in Cumbria by Deprivation

Analysis of avoidable deaths from respiratory diseases by residential deprivation demonstrates that the 2010-12 rate was significantly higher in the areas of Cumbria which are classified as being in the country's most deprived quintile (quintile 1) compared to areas which are less deprived (quintiles, 3, 4 and 5). The rate in quintile 1 was 2.8 times higher than quintile 5, this related to 41.3 and 14.7 deaths per 100,000 population (figure 27).

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[30]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
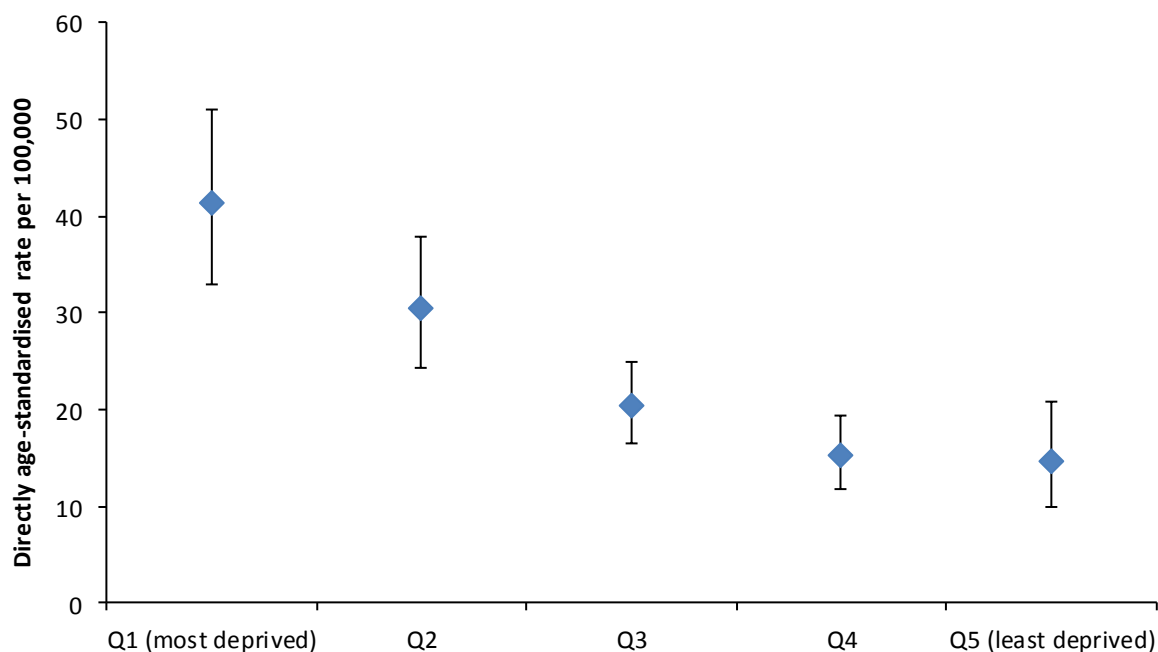
Figure 27: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from respiratory diseases in Cumbria by national deprivation quintile, 2010-12 average[31]

Avoidable Mortality from Respiratory Diseases in Cumbria by Rural and Urban Variation

Figure 28 shows the rate of avoidable mortality from respiratory diseases in Cumbria according to ONS rural and urban area classifications and relates to deaths registered between 2010 and 2012 to show a three year average.

The rate of avoidable mortality from respiratory diseases in urban areas of Cumbria was highest at 27.6 per 100,000 population and this was significantly higher than the rate in village, hamlet and isolated dwelling areas which was 15.4 deaths per 100,000 population. The rate in town and fringe areas of Cumbria was 23.4 deaths per 100,000 population.

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[31]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and 2010 Index of Multiple Deprivation (Communities and Local Government).
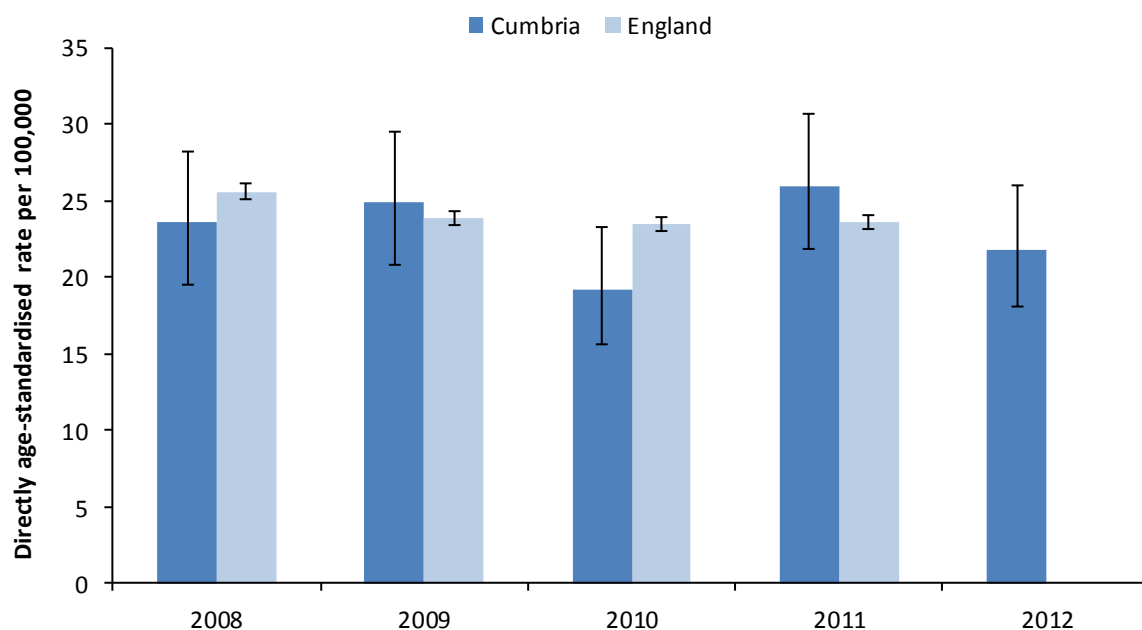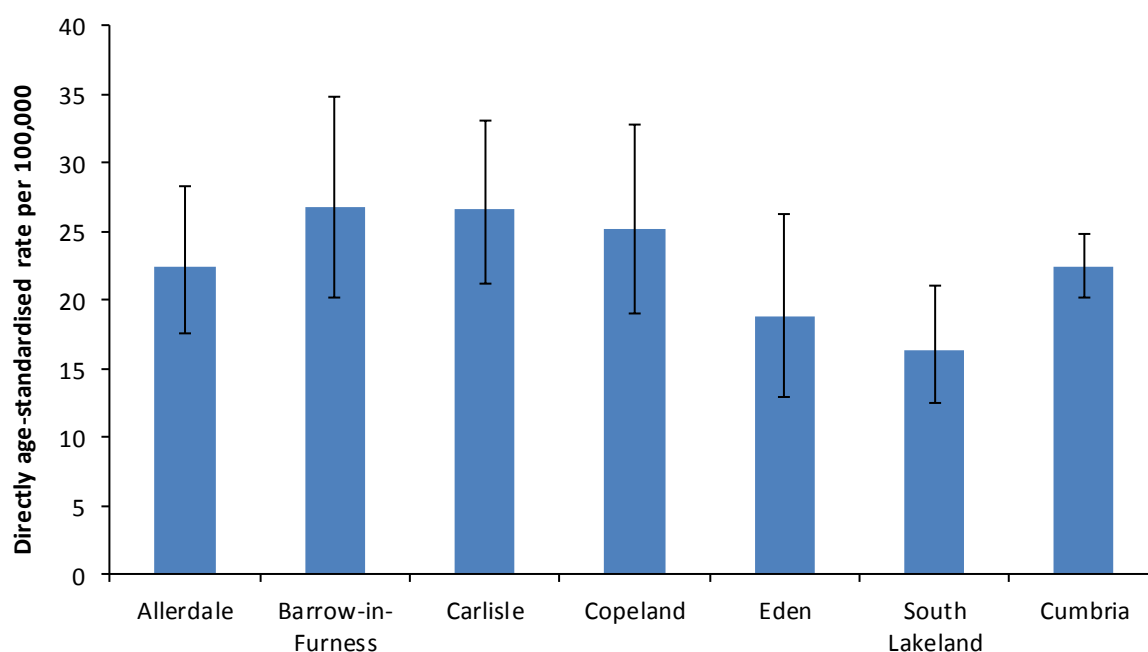
Figure 28: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from respiratory diseases in Cumbria by ONS rural and urban classification, 2010-12 average[32]

Underlying Causes of Avoidable Respiratory Disease Death in Cumbria

In this section, avoidable deaths from respiratory diseases in Cumbria registered between 2008 and 2012 are examined in more detail to illustrate the specific underlying causes of respiratory disease death (table 5). Over the five year period, deaths from chronic obstructive pulmonary disease (COPD) accounted for 68% of all avoidable deaths from respiratory diseases, and deaths from pneumonia accounted for over a quarter at 26.8%.

Table 5: Proportion of avoidable deaths from respiratory diseases in Cumbria by underlying cause of death, 2008 - 2012[33]

Underlying cause of avoidable respiratory disease	%
Chronic obstructive pulmonary disease (COPD)	
Other COPD	64.9%
Emphysema	2.8%
Bronchitis	0.3%
Total COPD	**68.0%**
Pneumonia	**26.8%**
Asthma	**4.2%**
Influenza	**1.0%**

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[32]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and ONS rural and urban area classification.
[33]Public Health Mortality File.

Avoidable Mortality from Cardiovascular Diseases in Cumbria Compared to England

The data in this section refers to avoidable deaths from cardiovascular diseases and this includes rheumatic and other valvular heart disease, hypertensive diseases, ischaemic heart disease, deep vein thrombosis (DVT) with pulmonary embolism, cerebrovascular diseases, and aortic aneurysm and dissection (refer to table 1 for corresponding ICD-10 codes and age groups).

Between 2008 and 2012, 1,933 residents of Cumbria died as a result of avoidable cardiovascular diseases; this was an average of 387 per year. Over this period, the number of avoidable deaths from cardiovascular disease accounted for 30% of all avoidable deaths in Cumbria and was responsible for 21,412 PYLL (this relates to an average of 4,282 PYLL per year and accounts for 24.3% of all PYLL due to all avoidable mortality).

Data from the four year period 2008 - 2011 show that the national rate of avoidable mortality from cardiovascular diseases decreased by 19% from 79.4 to 64.0 deaths per 100,000 population. Cumbria by comparison has consistently had a higher rate of avoidable mortality from cardiovascular diseases, although not significantly higher. Between 2008 and 2012 the rate in Cumbria significantly decreased from 81.9 deaths per 100,000 to 61.2 deaths per 100,000 (figure 29).
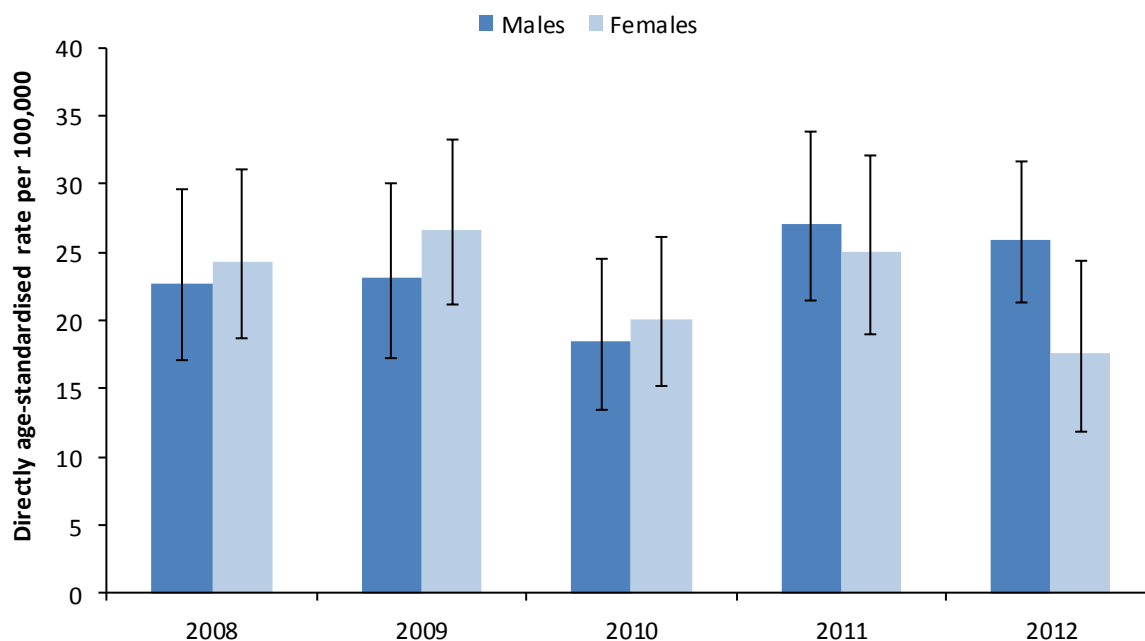

Figure 29: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from cardiovascular diseases in Cumbria, 2008 - 2012[34]

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[34] Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

Aviodable Mortality from Cardiovascular Diseases in Cumbria by Local Authority

Due to smaller numbers, local authority level rates of avoidable mortality from cardiovascular diseases were calculated by combining three years of data to illustrate a three year average (2010 – 2012).

Within Cumbria, Barrow-in-Furness had the highest rate of avoidable death from cardiovascular disease at 84.9 deaths per 100,000 population (this equates to an average of 60 deaths per year). The rate in Barrow-in-Furness was also significantly higher than the Cumbria 2010-12 average and the rates in Eden and South Lakeland local authorities (52.7 and 50.4 deaths per 100,000 population respectively). The South Lakeland rate was also significantly lower than the Cumbria 2010—12 average (figure 30).
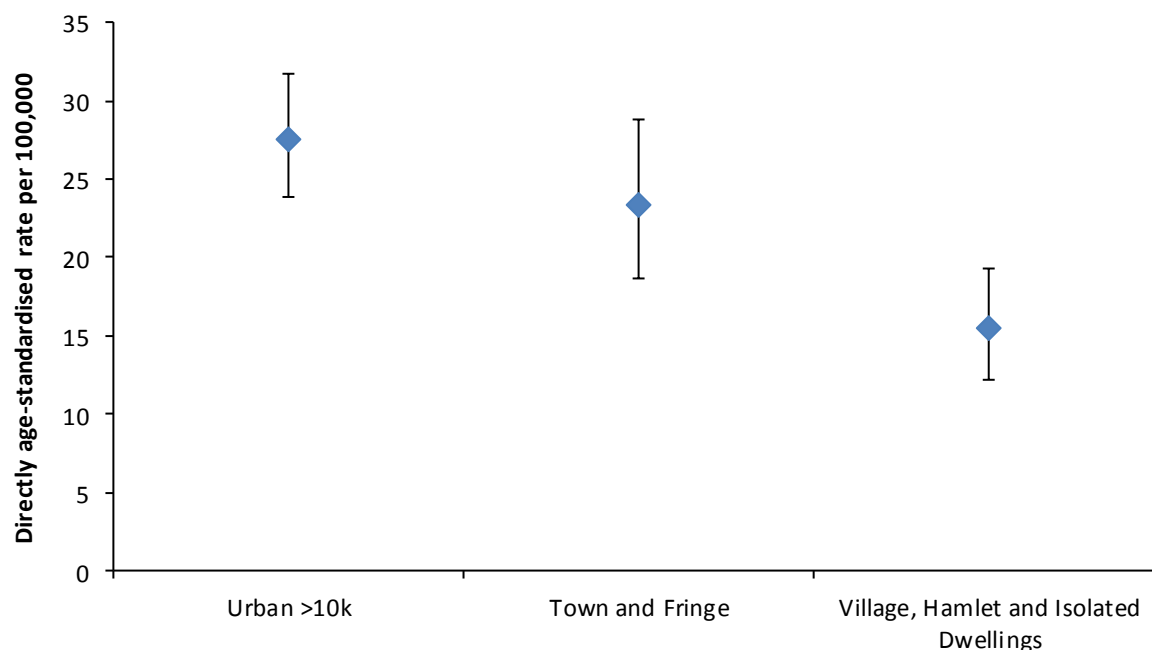

Figure 30: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from cardiovascular disease in Cumbria by Local Authority, 2010 - 2012 average[35]

Avoidable Mortality from Cardiovascular Diseases in Cumbria by Sex

Two thirds (66%) of avoidable deaths from cardiovascular diseases in Cumbria registered between 2008 and 2012 were among males. The most recent male avoidable mortality rate (2012) from cardiovascular diseases was 78.7 deaths per 100,000 males and was significantly higher than the female rate of 43.9 deaths per 100,000 females. Trend data show that both the male and female avoidable death rates from cardiovascular disease are following a decreasing trend and the 2012 male rate was significantly lower than the 2010 rate (figure 31).
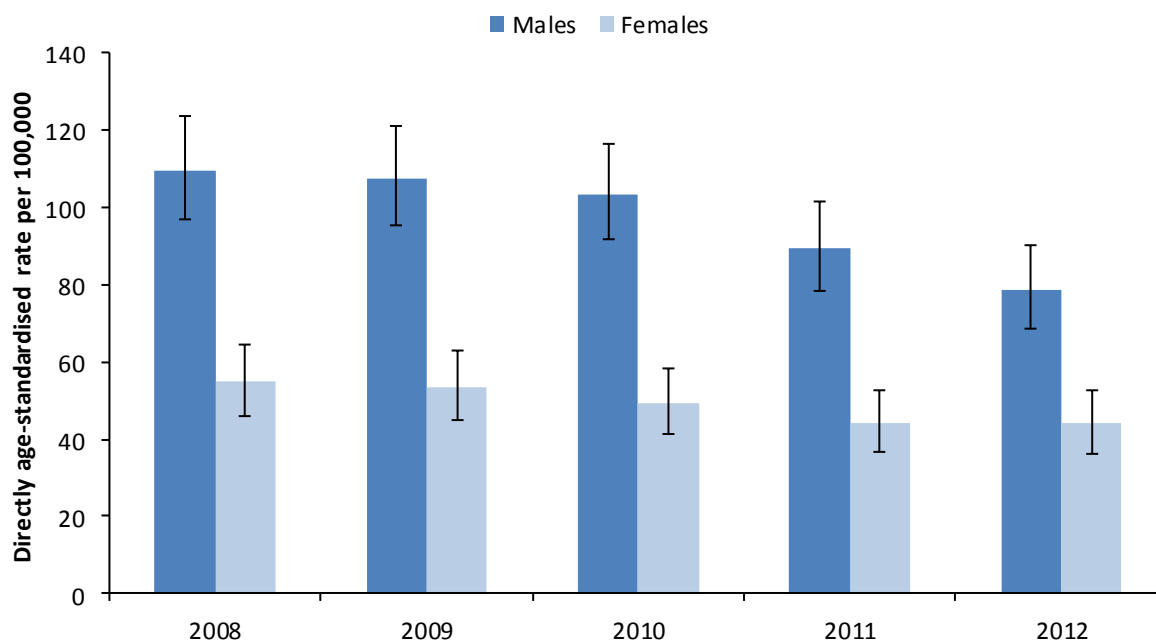
Figure 31: Trend of directly standardised rate (per 100,000, all ages) of avoidable mortality from cardiovascular diseases in Cumbria by sex, 2008 - 2012[36]

Avoidable Mortality from Cardiovascular Diseases in Cumbria by Local Authority and Sex

Figure 32 presents the rates of avoidable mortality from cardiovascular diseases by local authority and sex which combine 2010 – 2012 data due to smaller numbers to give a three year average.

As illustrated the male and female disparity of avoidable cardiovascular disease death was evident across the county, and each local authority had a significantly higher rate of male death compared to females. The male rate in South Lakeland local authority was significantly lower than the 2010-12 Cumbria average (62.3 and 90.7 male deaths per 100,000 males respectively).

Barrow-in-Furness had the highest rate of avoidable mortality from cardiovascular diseases for both males and females; 111.0 male deaths per 100,000 males and 59.5 female deaths per 100,000 females (figure 32).

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[36]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
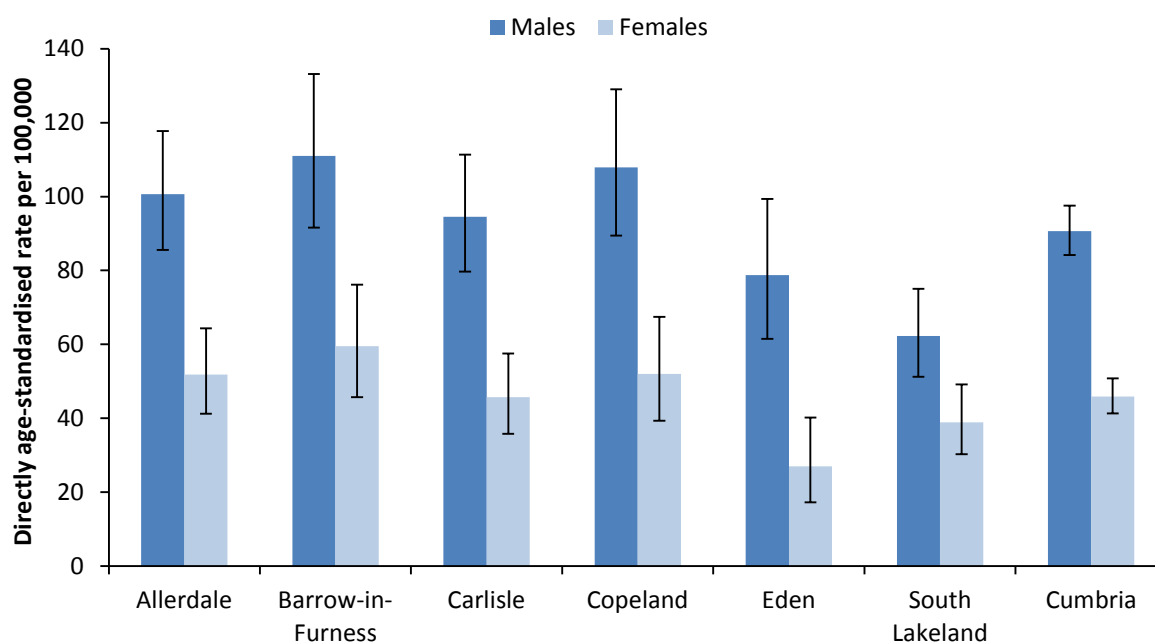
Figure 32: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from cardiovascular disease in Cumbria by local authority and sex, 2010-12 average [37]

Avoidable Mortality from Cardiovascular Disease in Cumbria by and Deprivation

Analysis of avoidable deaths from cardiovascular diseases by residential deprivation demonstrates that the rate was significantly higher in the areas of Cumbria which are classified as being in the country's most deprived quintile (quintile 1) compared to all other areas of Cumbria. The rate in quintile 1 was 3.4 times higher than the areas of Cumbria classified as being in the country's least deprived quintile (quintile 5), this related to 137.1 and 40.3 deaths per 100,000 population respectively (figure 33).

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[37]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013, and the European Standard Population (2013 version).
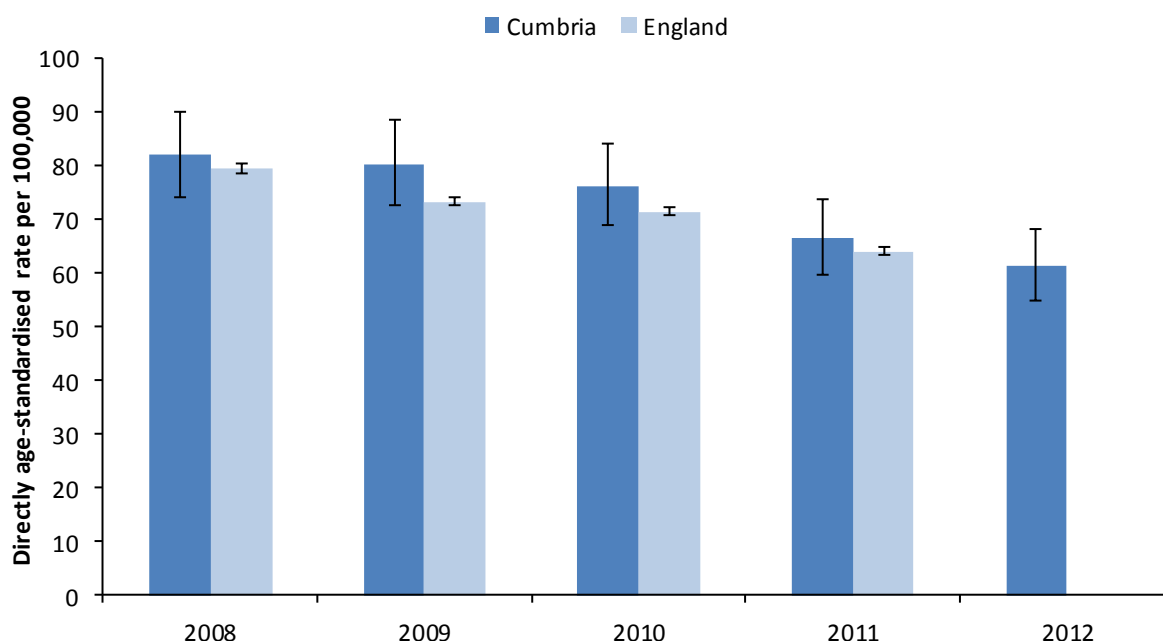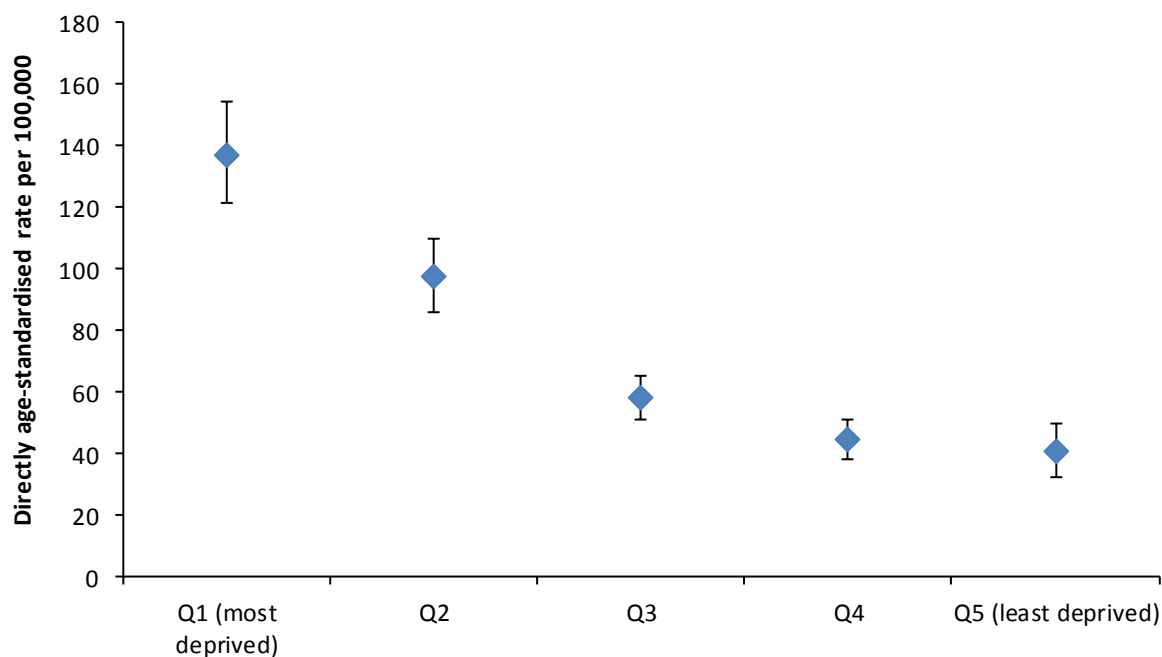
Figure 33: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from cardiovascular disease in Cumbria by national deprivation quintile, 2010-12 average[38]

Avoidable Mortality from Cardiovascular Diseases in Cumbria by Rural and Urban Variation

Figure 34 shows the rate of avoidable mortality from cardiovascular diseases in Cumbria according to ONS rural and urban classifications and relates to deaths between 2010 and 2012 to show a three year average.

The rate of avoidable death from cardiovascular disease in urban areas of Cumbria at 81.9 deaths per 100,000 population was significantly higher compared to both town and fringe areas of Cumbria and village, hamlet and isolated dwelling areas of Cumbria (74.6 and 45.2 deaths per 100,000 respectively).

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[38]Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and 2010 Index of Multiple Deprivation (Communities and Local Government).
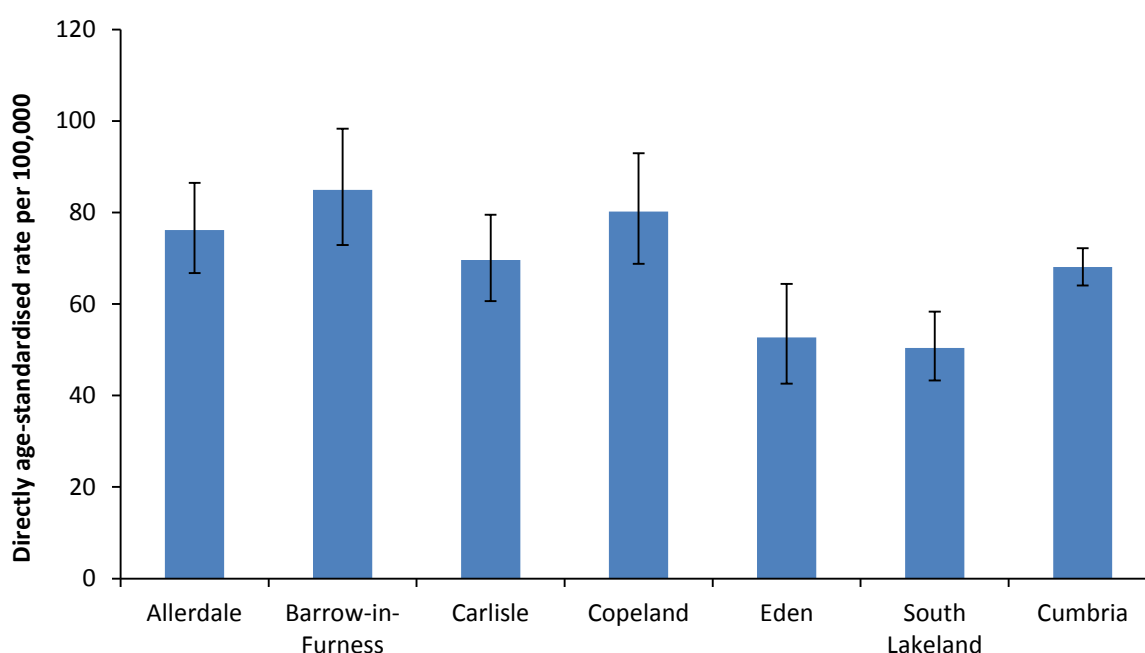
Figure 34: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from cardiovascular diseases in Cumbria by ONS rural and urban classification, 2010-12 average[39]

Underlying Causes of Avoidable Cardiovascular Disease Death in Cumbria

In this section, avoidable deaths from cardiovascular diseases in Cumbria registered between 2008 and 2012 are examined in more detail to illustrate the specific underlying causes of cardiovascular disease (table 6). Over the five year period, deaths from ischaemic heart disease accounted for 64.4% of all avoidable deaths from cardiovascular disease, and deaths from cerebrovascular disease accounted for 22% of avoidable deaths.

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[39]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and ONS rural and urban area classification.

Table 6: Proportion of avoidable deaths from cardiovascular diseases in Cumbria by underlying cause of death, 2008 - 2012[40]

Underlying cause of avoidable cardiovascular disease	%
Rheumatic and other valvular heart disease	
Chronic rheumatic heart diseases	0.5%
Rheumatic and other valvular heart diseases	0.5%
Rheumatic fever with heart involvement	0.0%
Rheumatic chorea	0.0%
Total Rheumatic and other valvular heart diseases	**0.9%**
Hypertensive diseases	**1.5%**
Ischaemic heart disease	**64.4%**
DVT with pulmonary embolism	
Pulmonary embolism	4.2%
Phlebitis and thrombophlebitis of other deep vessels of lower extremities	2.1%
Phlebitis and thrombophlebitis of lower extremities, unspecified	0.1%
Phlebitis and thrombophlebitis of femoral vein	0.1%
Phlebitis and thrombophlebitis of unspecified site	0.0%
Embolism and thrombosis of unspecified vein	0.0%
Total DVT with pulmonary embolism	**6.5%**
Cerebrovascular diseases	**22.0%**
Aortic aneurysm and dissection	**5.2%**

[40]Monthly Public Health Mortality File

Avoidable Mortality from Neoplasms in Cumbria Compared to England

The data in this section refers to avoidable deaths from neoplasms and includes neoplasms of lip oral cavity and pharynx, oesophagus, stomach, colon and rectum, liver, trachea bronchus and lung, melanoma of skin, mesothelioma, and neoplasm of breast, cervix uteri, bladder, thyroid gland, Hodgkin's disease, leukaemia and benign neoplasms (refer to table 1 for corresponding ICD-10 codes and age groups).

Between 2008 and 2012, 2,222 residents of Cumbria died as a result of avoidable neoplasms, an average of 444 per year. Over this period, the number of avoidable deaths from neoplasms accounted for 35% of all avoidable deaths in Cumbria and was responsible for 25,628 PYLL (this relates to an average of 5,126 PYLL per year and accounts for 29.0% of all PYLL due to avoidable mortality).

Data from the four year period 2008 - 2011 show that the national directly age-standardised rate of avoidable mortality from neoplasms decreased by 4.6% from 85.7 to 81.7 deaths per 100,000 population. Overall, avoidable mortality from neoplasms in Cumbria decreased by 14.2% from 91.2 to 78.3 deaths per 100,000 population, however this was not a significant decrease. The difference in rates between Cumbria and England were also not significantly different (figure 35).

Figure 35: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from neoplasms in Cumbria and England, 2008 - 2012[41]

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[41]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

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Avoidable Mortality from Neoplasms in Cumbria by Local Authority

Due to smaller numbers, local authority level rates of avoidable mortality from neoplasms were calculated by combining three years of data to illustrate a three year average (2010 - 2012).

Within Cumbria, Barrow-in-Furness had the highest rate of avoidable mortality from neoplasms at 97.9 deaths per 100,000 population (this equates to an average of 69 deaths per year). The rates in Allerdale, Barrow-in-Furness, Carlisle and Copeland were significantly higher compared to the rates in Eden and South Lakeland local authorities. Eden and South Lakeland had a significantly lower rate compared to the Cumbria average (figure 36).
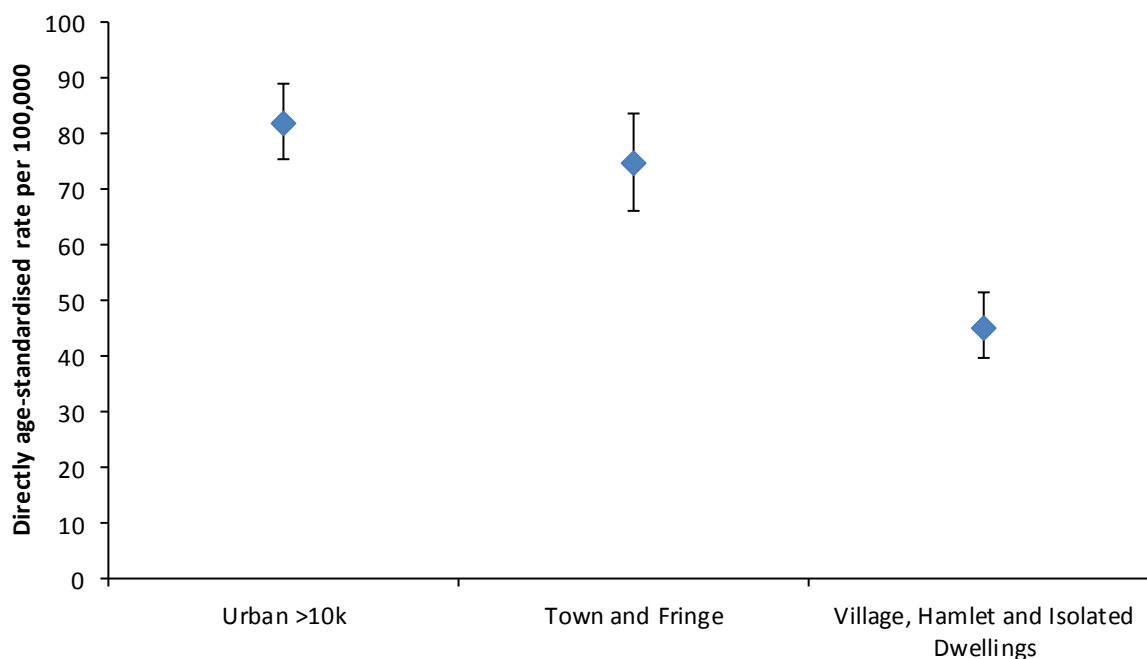

Figure 36: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from neoplasms in Cumbria by local authority, 2010-12 average[42]

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[42]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

Avoidable Mortality from Neoplasms in Cumbria by Sex

Just over half (54%) of avoidable deaths from neoplasms in Cumbria between 2008 and 2012 were among males. The most recent male avoidable mortality rate (2012) from neoplasms was 78.1 deaths per 100,000 males, this was similar to the female rate of 78.5 deaths per 100,000 females and there was no significant difference. Trend data show that there have been no significant changes to the rate of avoidable mortality from neoplasms for both males and females between 2008 and 2012 (figure 37).

Figure 37: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from neoplasms in Cumbria by sex, 2008 - 2012[43]

Avoidable Mortality from Neoplasms in Cumbria by Local Authority and Sex

Figure 38 presents rates of avoidable mortality from neoplasms by local authority and sex which combines 2010 – 2012 data due to smaller numbers to give a three year average.

There were disparities between the male and female rates of avoidable mortality from neoplasms across the county, and the 2010-12 average for Cumbria shows a significantly higher male rate compared to females (88.7 male deaths per 100,000 males and 74.0 female deaths per 100,000 females). The male rate in South Lakeland at 69.7 deaths per 100,000 males was significantly lower compared to Allerdale, Barrow-in-Furness, Carlisle and the Cumbria average. There were no significant differences between the female rates.

Barrow-in-Furness had the highest rate of avoidable mortality from neoplasms for both male and females; 108.2 male deaths per 100,000 males, and 87.8 female deaths per 100,000 females (figure 38).

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[43]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
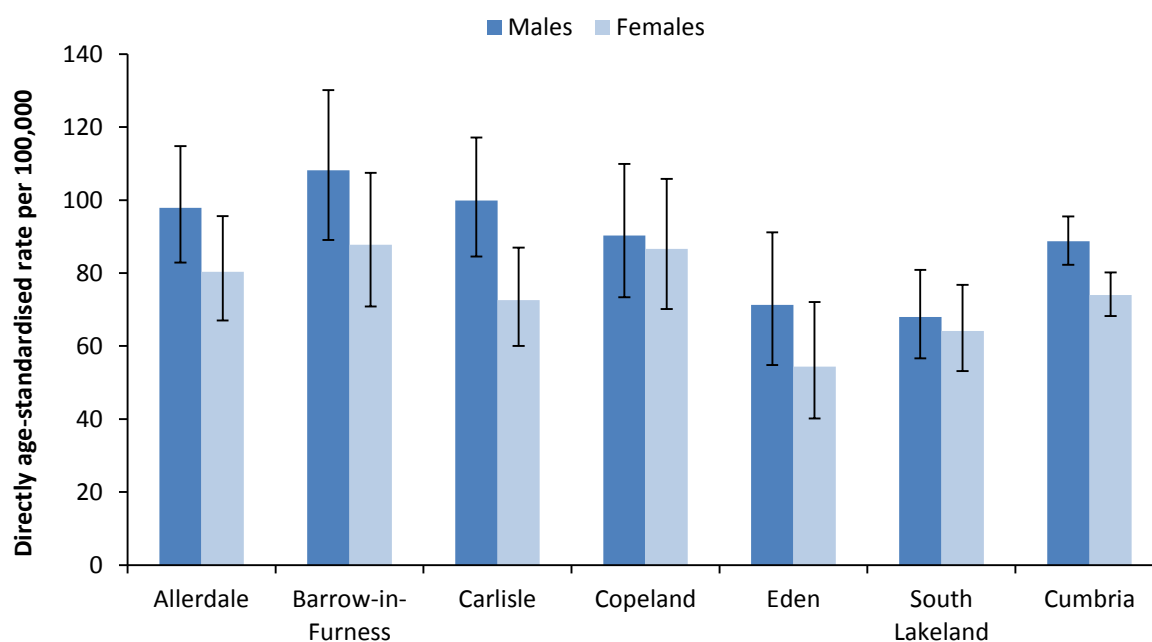
Figure 38: Directly age-standardised rate (per 100,000, all persons) of avoidable mortality from neoplasms in Cumbria by sex, 2010-12 average[44]

Avoidable Mortality from Neoplasms in Cumbria by Deprivation

Analysis of avoidable deaths from neoplasms by residential deprivation demonstrates that the rate was significantly higher in the areas of Cumbria which are classified as being in the country's most deprived quintile (quintile 1) compared to all other areas of Cumbria. The rate in quintile 1 was 2.7 times higher than the areas of Cumbria classified as being in the country's least deprived quintile (quintile 5), this related to 147.6 and 54.6 deaths per 100,000 person respectively (figure 39).

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[44]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

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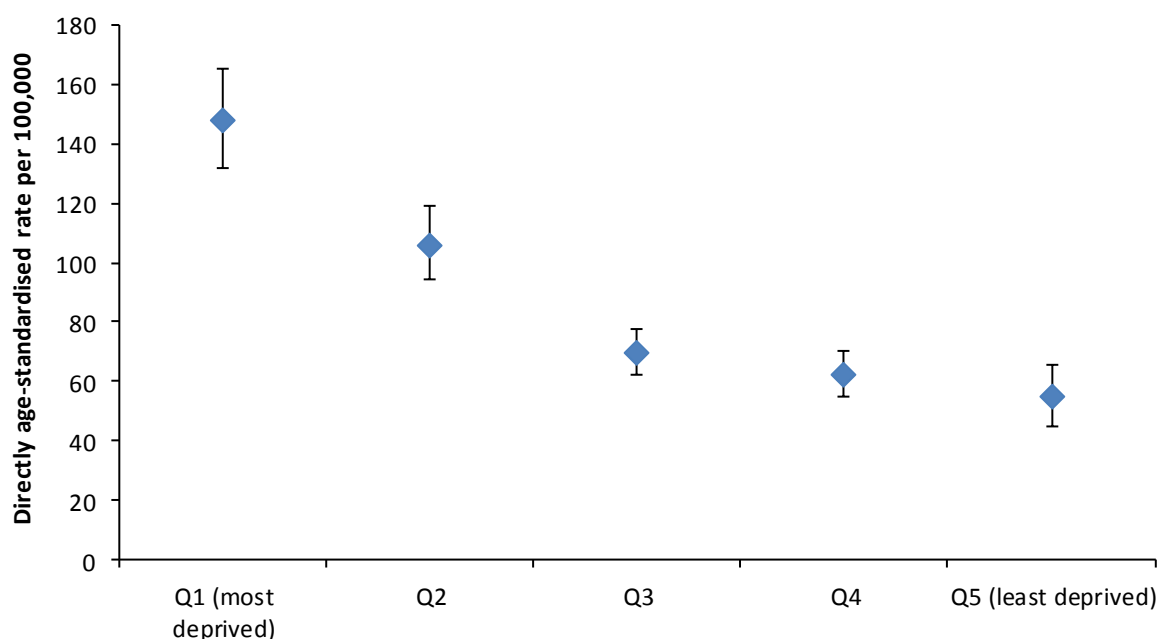
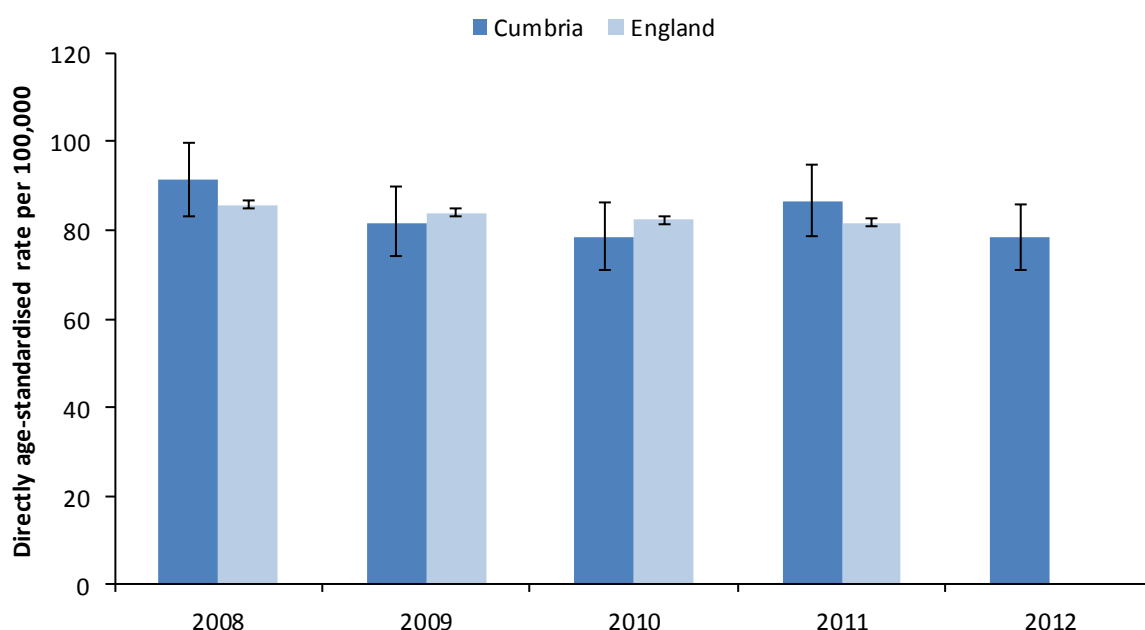**Figure 39: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from neoplasms in Cumbria by national deprivation quintile, 2010-12 average[45]**

Avoidable Mortality from Neoplasms in Cumbria by Rural and Urban Variation

Figure 40 shows the rate of avoidable mortality from neoplasms in Cumbria according to ONS rural and urban area classifications and relates to deaths registered between 2010 and 2012 to show a three year average.

The rate of avoidable death from neoplasms in urban areas of Cumbria at 97.8 deaths per 100,000 population was significantly higher compared to village, hamlet and isolated dwelling areas of Cumbria (60.3 deaths per 100,000 population).

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[45]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and 2010 Index of Multiple Deprivation (Communities and Local Government).
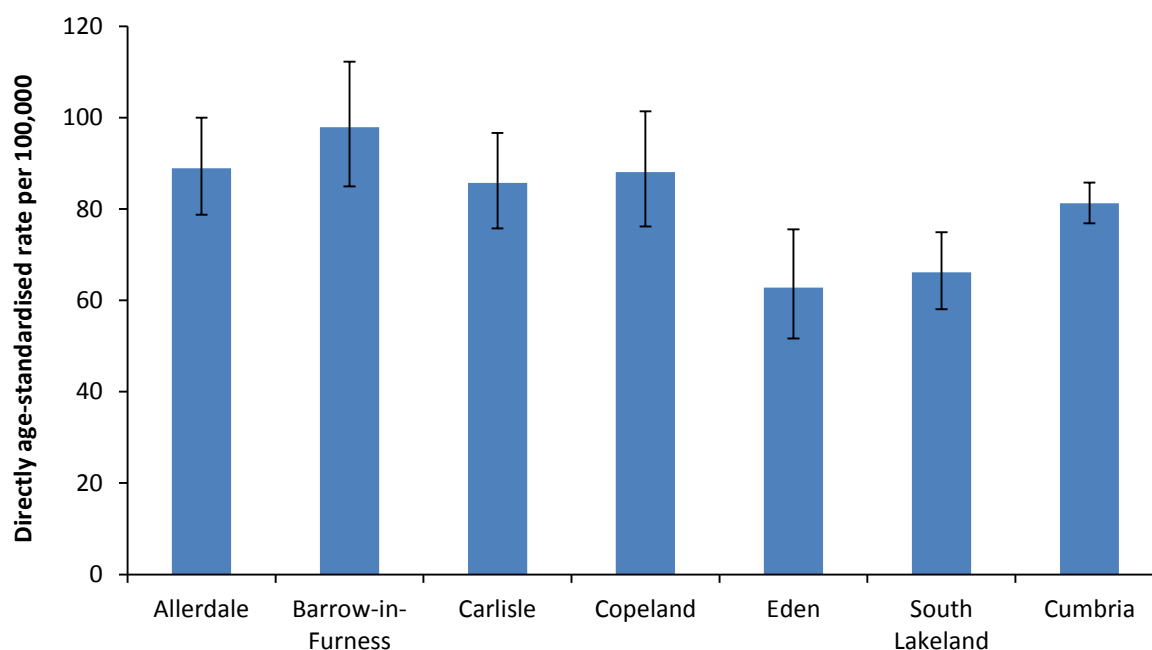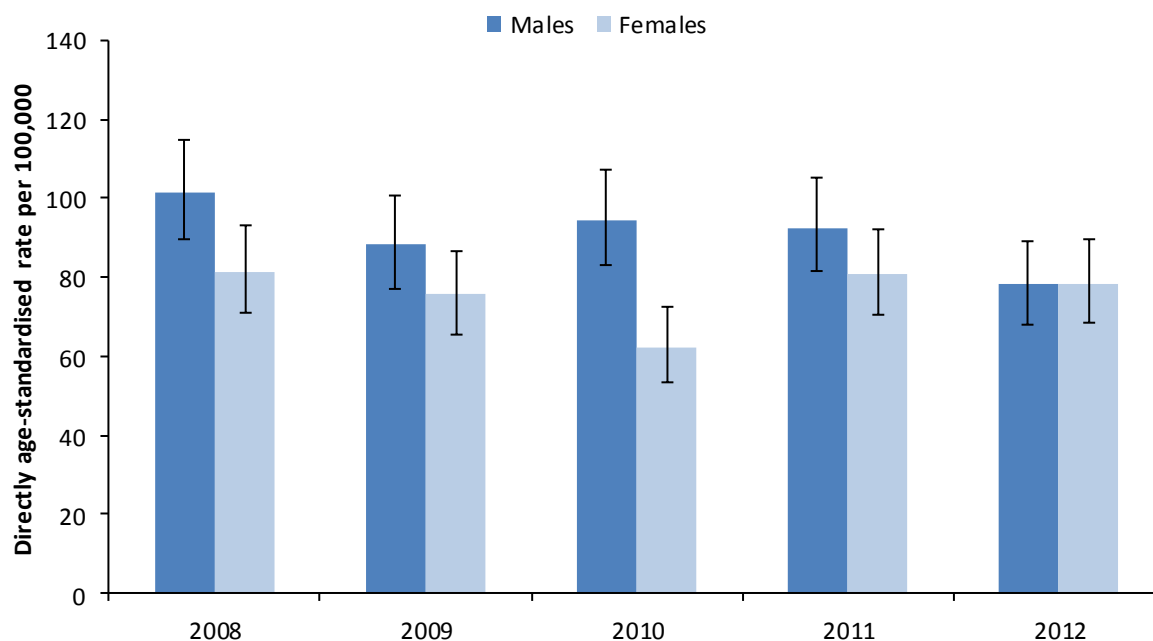
Figure 40: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from neoplasms in Cumbria by ONS rural and urban classifications, 2010-12 average[46]

Underlying Cause of Avoidable Death from Neoplasms in Cumbria

In this section, avoidable deaths from neoplasms in Cumbria registered between 2008 and 2012 are examined in more detail to illustrate a break down of the specific underlying causes of death (table 7). Over the five year period, 38.7% of avoidable deaths from neoplasms were due to malignant neoplasms of trachea, bronchus and lung. This was then followed by malignant neoplasms of colon and rectum at 15.1% and malignant neoplasm of breast at 14.2%.

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[46]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and ONS rural and urban area classification.

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Table 7: Proportion of avoidable deaths from neoplasms in Cumbria by underlying cause of death, 2008 - 2012[47]

Underlying cause of avoidable death from neoplasms	%
Malignant neoplasm of trachea, bronchus and lung	38.7%
Malignant neoplasm of colon and rectum	15.1%
Malignant neoplasm of breast	14.2%
Malignant neoplasm of oesophagus	9.5%
Malignant neoplasm of stomach	4.3%
Malignant neoplasm of liver	4.2%
Mesothelioma	3.3%
Malignant melanoma of skin	3.2%
Malignant neoplasm of bladder	3.1%
Malignant neoplasm of lip, oral cavity and pharynx	2.6%
Malignant neoplasm of cervix uteri	0.6%
Leukaemia	0.4%
Benign neoplasms	0.4%
Hodgkin's disease	0.3%
Malignant neoplasm of thyroid gland	0.2%

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[47]Monthly Pubic Health Mortality File.

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Avoidable Mortality from Infections in Cumbria Compared to England

The data in this section refers to avoidable deaths from infections which include tuberculosis, selected invasive bacteria and protozoal infections, hepatitis C and HIV/AIDS (refer to table 1 for corresponding ICD-10 codes and age groups).

Between 2008 and 2012, 80 residents of Cumbria died as a result of infections, an average of 16 deaths per year. Over this period, the number of avoidable deaths from infections accounted for 1% of all avoidable deaths in Cumbria and was responsible for 1,425 PYLL (this relates to an average of 285 PYLL per year and accounts for 1.6% of all PYLL due to avoidable mortality).

Data from the four year period 2008 – 2011 show that the national directly age-standardised rate of avoidable mortality from infections decreased by 63% from 3.3 to 1.2 deaths per 100,000 population. Overall, between 2008 and 2012 avoidable mortality from infections in Cumbria has increased, however not significantly. Apart from in 2011, the difference in rates between Cumbria and England were also not significantly different (figure 41).

Figure 41: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from infections in Cumbria and England 2008 - 2012[48]

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[48]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

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Avoidable Mortality from Infections in Cumbria by Local Authority

Due to smaller numbers, local authority level rates of avoidable mortality from infections were calculated by combining three years of data to illustrate a three year average (2010 - 2012).

Within Cumbria, Carlisle had the highest rate of avoidable mortality from infections at 4.0 deaths per 100,000 population (this equates to an average of 4 deaths per year). There were no significant differences in the rate of avoidable mortality from infections between the local authorities in Cumbria (figure 42).

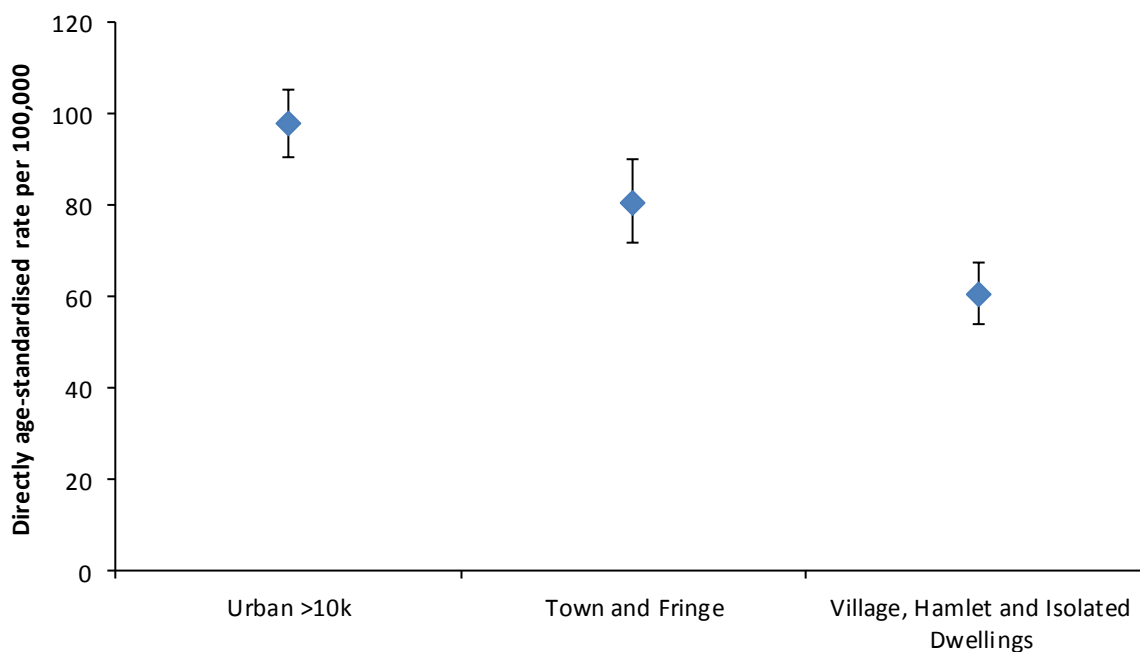**Figure 42: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from infections in Cumbria by local authority, 2010-12 average[49]**

Avoidable Mortality from Infections in Cumbria by Sex

In Cumbria, 60% of avoidable deaths from infections between 2008 and 2012 were among males. The most recent male avoidable mortality rate (2012) from infections was 3.8 deaths per 100,000 males, compared with a female rate of 3.0 deaths per 100,000 females, the difference was not significant. Trend data show that both male and female avoidable death rates from infections fluctuated slightly over the five year period, with no significant changes (figure 43).

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[49]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
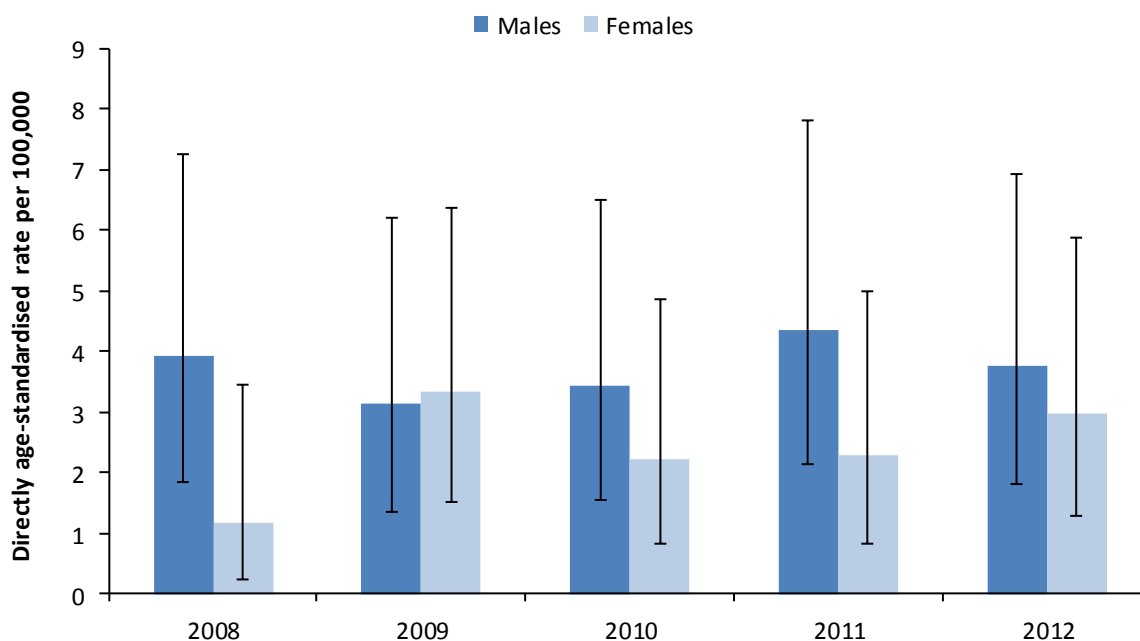
Figure 43: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from infections in Cumbria by sex, 2008-2012[50]

Avoidable Mortality from Infections in Cumbria by Local Authority and Sex

Figure 44 presents the rate of avoidable mortality from infections by sex and local authority which combine 2010 – 2012 data due to smaller numbers to give a three year average.

As illustrated, the male and female rates of avoidable mortality from infections by local authority varied across the county; however there were no significant differences. Barrow-in-Furness had the highest male rate at 5.8 deaths per 100,000 males, and Carlisle had the highest female rate at 4.8 deaths per 100,000 females (figure 44).

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[50]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

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Figure 44: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from infections in Cumbria by sex and local authority, 2010-12 average[51]

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[51]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

Avoidable Mortality from Infections in Cumbria by Deprivation

Analysis of avoidable deaths from infections by residential deprivation demonstrates that there was no association between the rate of avoidable mortality from infections and deprivation in Cumbria in 2010-12 (figure 45).
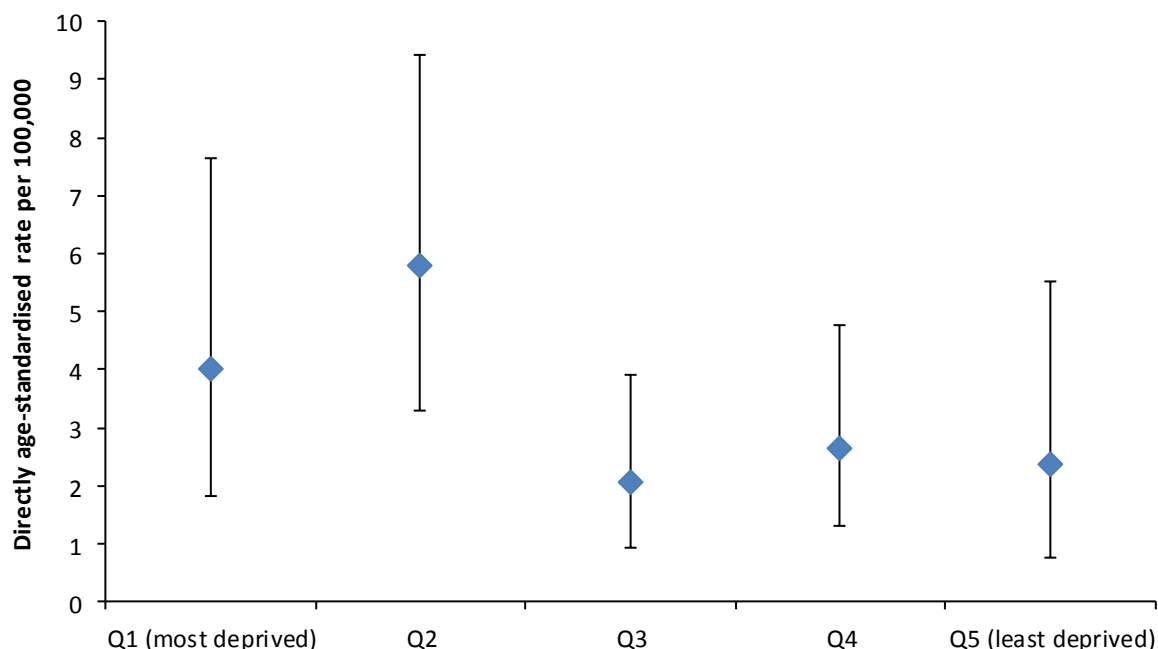
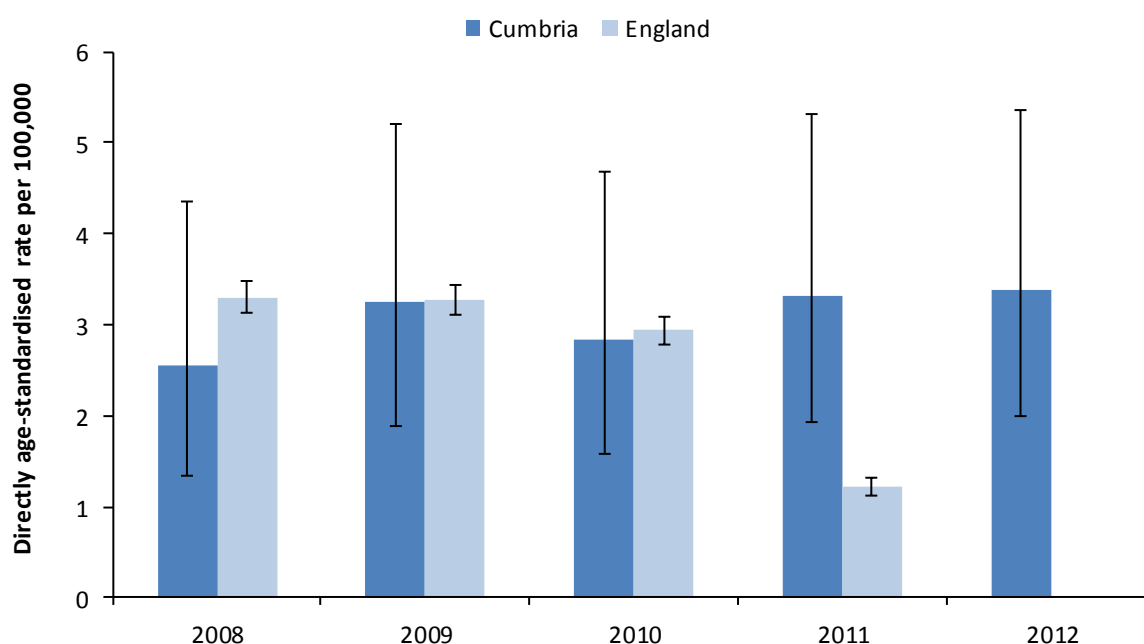**Figure 45: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from infections in Cumbria by national deprivation quintile, 2010-12 average[52]**

Avoidable Mortality from Infections in Cumbria by Rural and Urban Variation

Figure 46 shows the rate of avoidable mortality from infections in Cumbria according to ONS rural and urban area classifications and relates to deaths registered between 2010 and 2012 to show a three year average.

The rate of avoidable death from injuries in urban areas of Cumbria was highest at 4.3 deaths per 100,000 population; however there were no significant differences between the area classifications.

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[52]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and 2010 Index of Multiple Deprivation (Communities and Local Government).
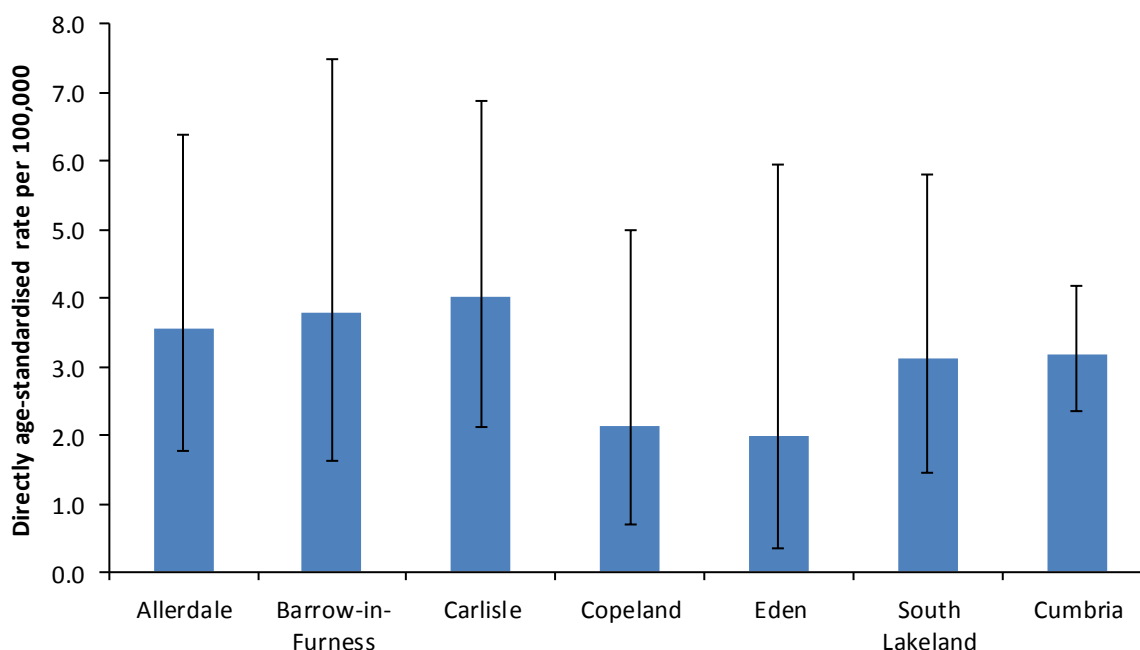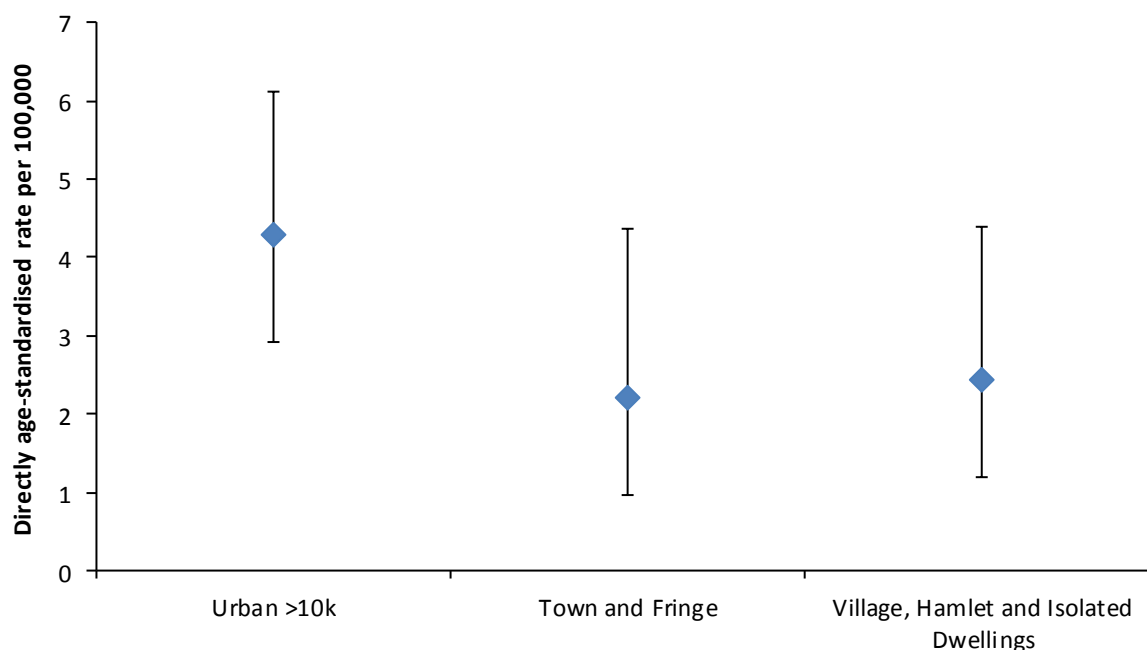
Figure 46: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from infections in Cumbria by ONS rural and urban area classifications, 2010-12 average[53]

Underlying Cause of Avoidable Death from Infections in Cumbria

In this section, avoidable deaths from infections in Cumbria registered between 2008 and 2012 are examined in more detail to illustrate a break down of the specific cause of death (table 8). Over the five year period, 78.8% of avoidable deaths from infections were due to selected invasive bacterial and protozoal infections. Deaths from Hepatitis C and HIV/AIDS accounted for 8.8% and 7.5% of avoidable deaths from infections respectively, while 5% were due to tuberculosis.

Table 8: Proportion of avoidable deaths from infections in Cumbria by underlying cause of death, 2008 - 2012[54]

Underlying cause of avoidable infections	%
Selected invasive bacterial and protozoal infections	78.8%
Hepatitis C	8.8%
HIV/AIDS	7.5%
Tuberculosis	5.0%

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[53]Monthly Public Health Mortality file, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and ONS rural and urban area classification.
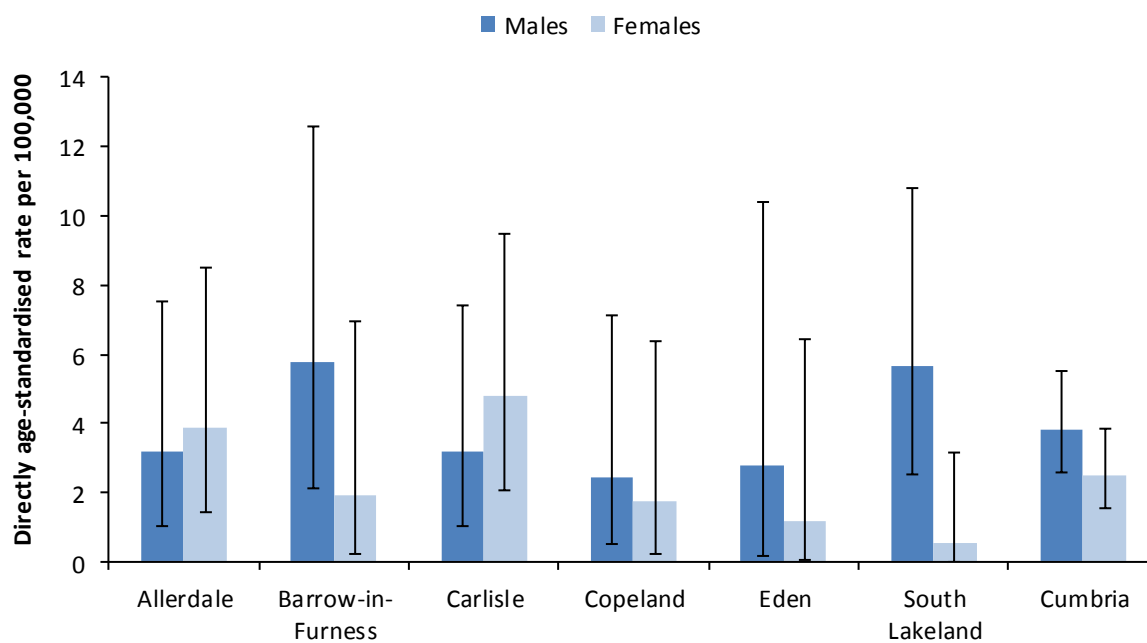[54]Monthly Public Health Mortality File.

Avoidable Mortality from Other Causes in Cumbria Compared to England

The data in this section refers to avoidable deaths from 'other' causes which include diabetes mellitus, epilepsy and status epilepticus, digestive disorders, genitourinary disorders, and maternal and infant related causes (refer to table 1 for corresponding ICD-10 codes and age groups).

Between 2008 and 2012, 285 residents of Cumbria died as a result of 'other' avoidable causes; this is an average of 57 per year. Over this period, the number of avoidable deaths from other causes accounted for 4% of all avoidable deaths in Cumbria and was responsible for 8,907 PYLL (this relates to an average of 1,781 PYLL per year and accounts for 10.1% of all PYLL due to avoidable mortality).

Data from the four year period 2008 - 2011 show that the national directly age-standardised rate of avoidable mortality from 'other' causes decreased by 7.1% from 9.6 to 8.9 deaths per 100,000 population. Overall, between 2008 and 2012 the rate of avoidable mortality from 'other' causes in Cumbria has decreased, however not significantly. Apart from in 2008, the difference in rates between Cumbria and England were also not significantly different (figure 47).
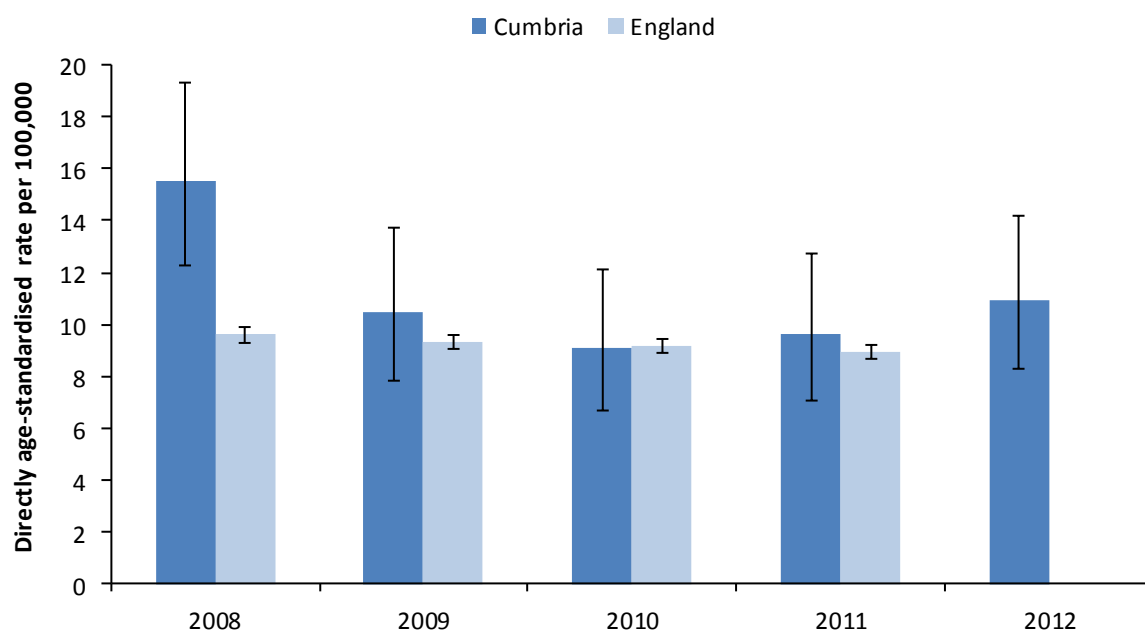
Figure 47: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from 'other' causes in Cumbria and England 2008 - 2012[55]

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[55]Monthly Public Health Mortality File, ONS avoidable mortality statistics (published 22 May 2013), ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version). England 2012 data were not available at the time of writing.

Other Avoidable Causes of Mortality in Cumbria by Local Authority

Due to smaller numbers, local authority level rates of avoidable death from 'other' causes were calculated by combining three years of data to illustrate a three year average (2010 - 2012).

Within Cumbria, Barrow-in-Furness had the highest rate of avoidable mortality from 'other' causes at 13.8 deaths per 100,000 population (this equates to an average of 9 deaths per year). There were no significant differences in the rate of avoidable mortality from 'other' causes between the local authorities in Cumbria (figure 48).

Figure 48: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from 'other' causes in Cumbria by local authority, 2010-12 average[56]

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[56]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).

Other Avoidable Causes of Mortality in Cumbria by Sex

Over half (58%) of avoidable deaths from 'other' causes in Cumbria between 2008 and 2012 were among males. The most recent male avoidable mortality rate (2012) from 'other' causes was 12.4 deaths per 100,000 males, this compared to a female rate of 9.4 deaths per 100,000 females; there was no significant difference between males and females. Trend data show that there have been no significant changes to the rate of avoidable mortality from 'other' causes for both males and females between 2008 and 2012 (figure 49).

Figure 49: Trend of directly age-standardised rate (per 100,000, all ages) of avoidable mortality from 'other' causes in Cumbria by sex, 2008 - 2012[57]

Other Avoidable Causes of Mortality in Cumbria by Local Authority and Sex

Figure 50 presents the rates of avoidable mortality from 'other' causes by local authority and sex which combines 2010 – 2012 data due to smaller numbers to give a three year average.

With the exception of South Lakeland, all local authorities in Cumbria had a higher rate of male avoidable mortality from 'other' causes compared to females. However, the rates by sex and local authority did not reveal any significant differences.

Barrow-in-Furness had the highest male rate of avoidable mortality from 'other' causes at 17.8 deaths per 100,000 males, while South Lakeland had the highest female rate at 10.5 deaths per 100,000 females (figure 50).

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[57]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
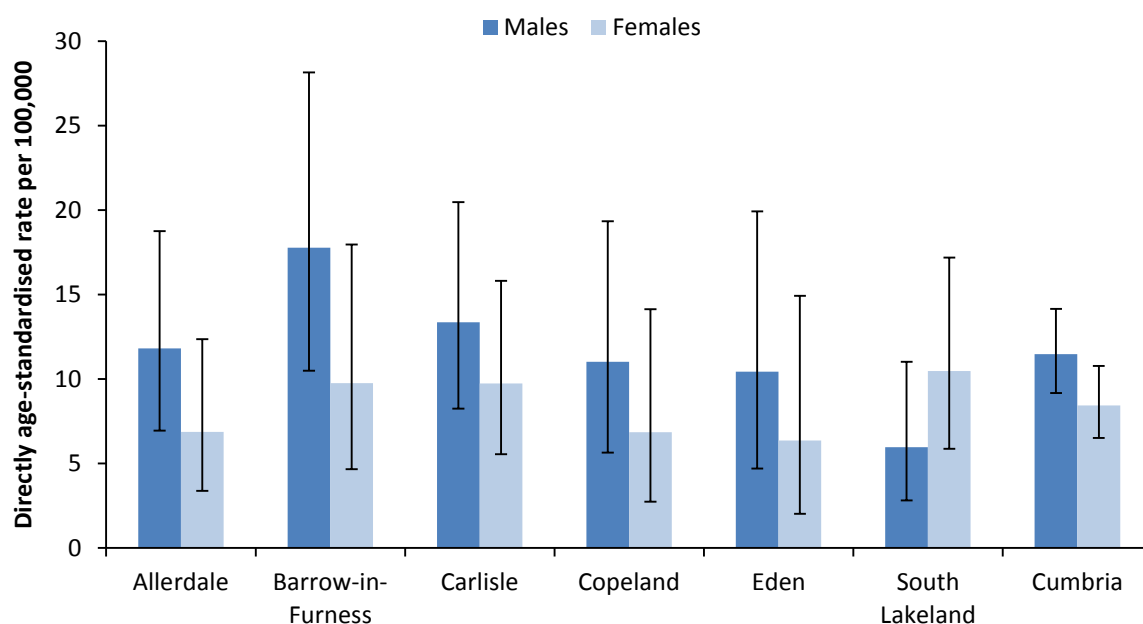
Figure 50: Directly age-standardised rate (per 100,000, all persons) of avoidable mortality from 'other' causes in Cumbria by sex, 2010-12 average[58]

Other Avoidable Causes of Mortality in Cumbria by Deprivation

Analysis of avoidable deaths from 'other' causes by residential deprivation demonstrates that the rate was significantly higher in the areas of Cumbria which are classified as being in the country's most deprived quintile (quintile 1) compared to some other areas of Cumbria (quintile 3, 4 and 5). The rate in quintile 1 was 5.4 times higher than the areas of Cumbria classified as being in the country's least deprived quintile (quintile 5), this related to 18.3 and 3.4 deaths per 100,000 person respectively (figure 51).

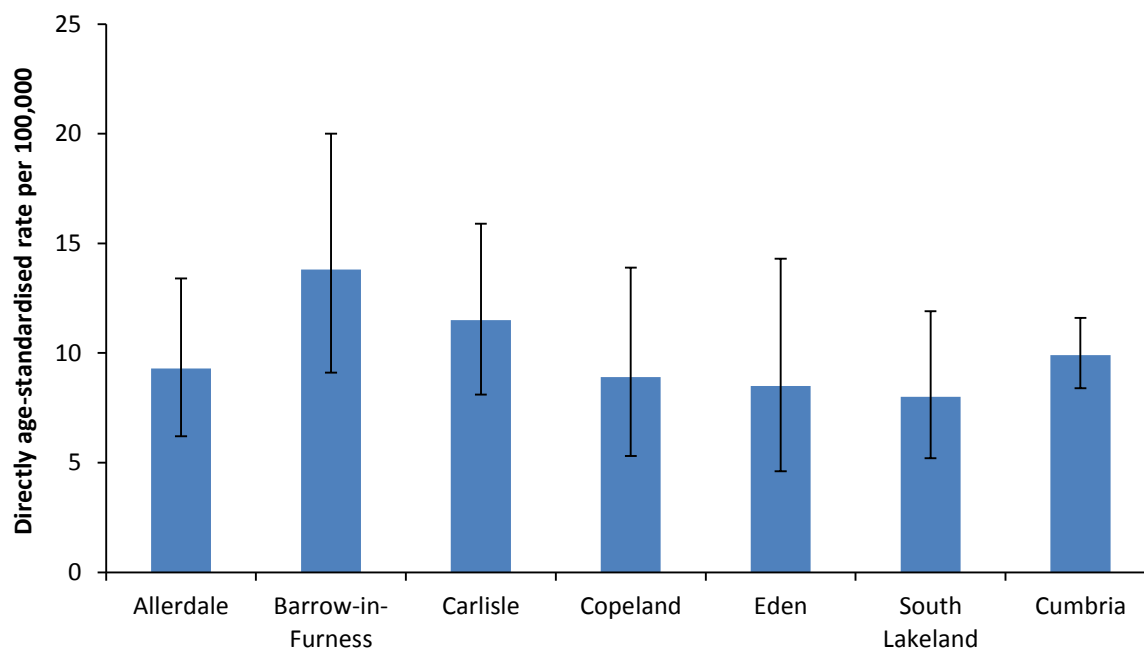[58]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
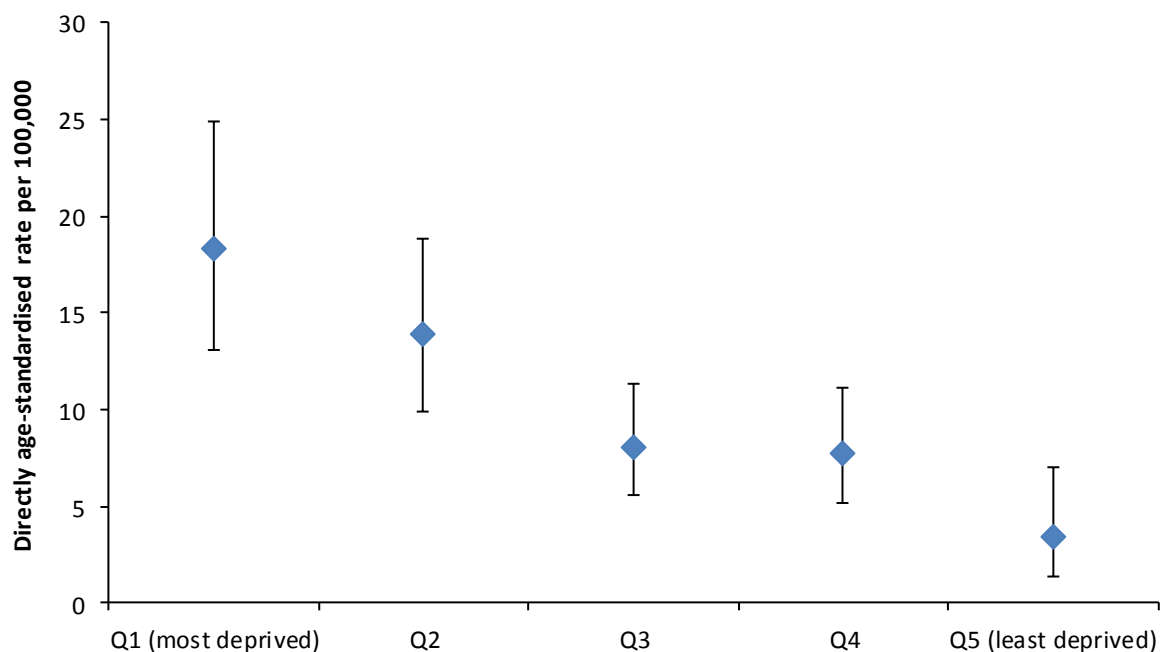
Figure 51: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from 'other' causes in Cumbria by national deprivation quintile, 2010-12 average[59]

Other Avoidable Causes of Mortality in Cumbria by Rural and Urban Variation

Figure 52 shows the rate of avoidable mortality from 'other' causes in Cumbria according to ONS rural and urban area classifications and relates to deaths registered between 2010 and 2012 to show a three year average.

The rate of avoidable death from 'other' causes in town and fringe areas of Cumbria at 11.0 deaths per 100,000 population was highest; however there were no significant differences between the area classifications.

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[59]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and 2010 Index of Multiple Deprivation (Communities and Local Government).
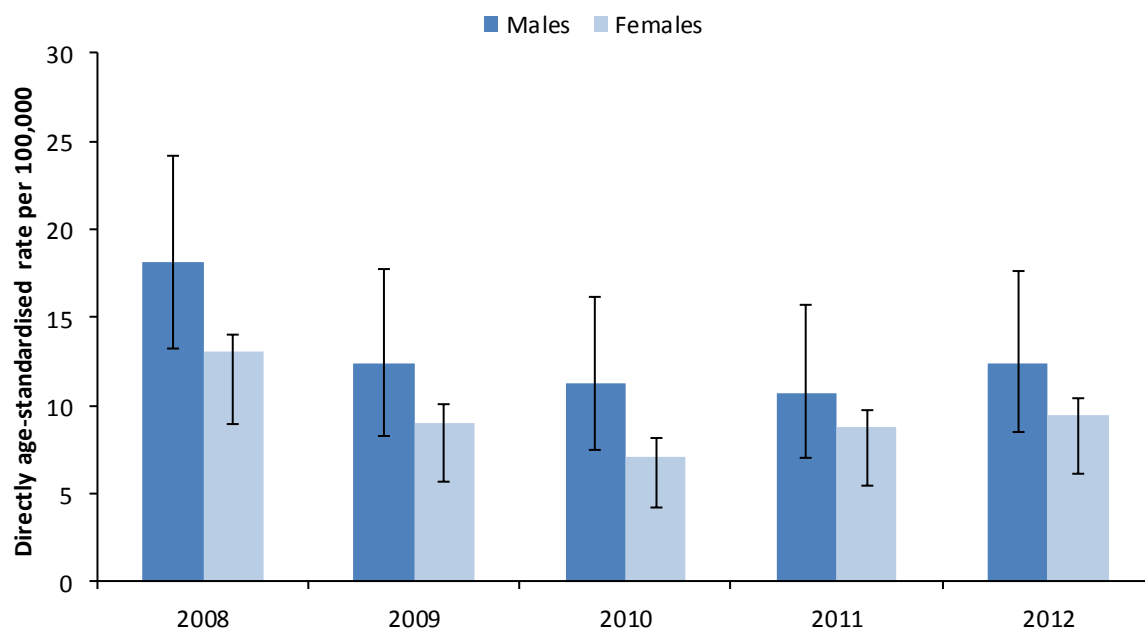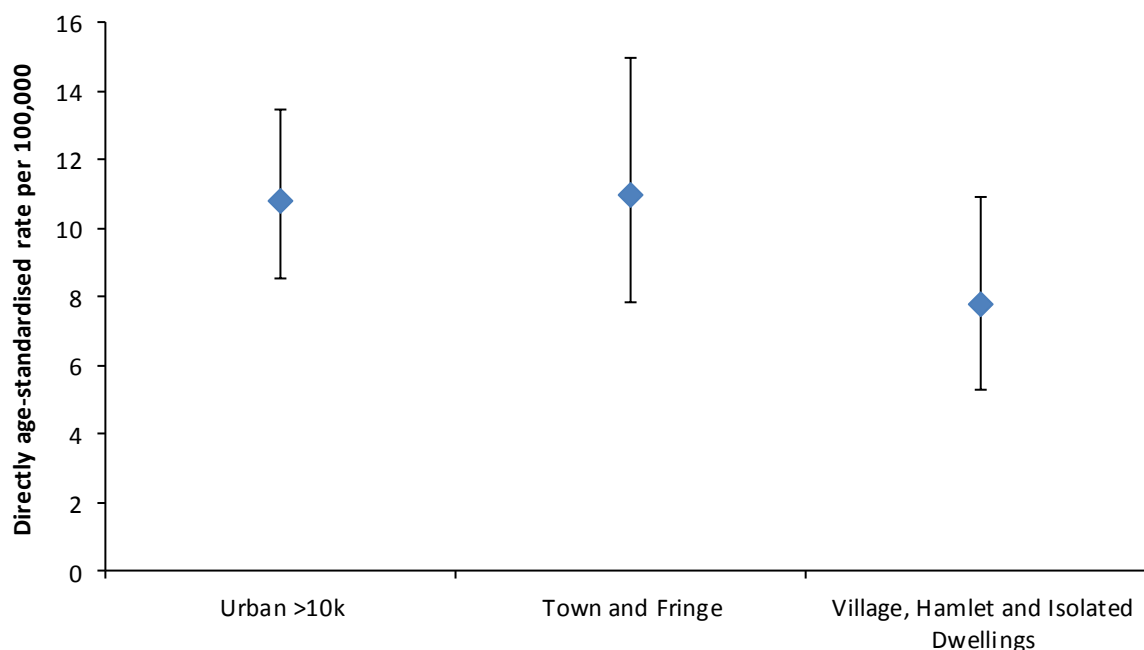
Figure 52: Directly age-standardised rate (per 100,000, all ages) of avoidable mortality from 'other' causes in Cumbria by ONS rural and urban classifications, 2010-12 average[60]

Underlying Causes of Avoidable Mortality from Other Causes in Cumbria

In this section, avoidable deaths from 'other' causes in Cumbria registered between 2008 and 2012 are examined in more detail to illustrate a break down of the specific underlying causes of death (table 9). Over the five year period, 36.5% of avoidable deaths from 'other' causes were related to maternal and infant deaths, this was then followed by deaths from digestive diseases at 32.3%.

Table 9: Proportion of avoidable deaths from 'other causes' in Cumbria by underlying cause of death, 2008 - 2012[61]

Underlying cause avoidable death from 'other' causes	%
Complications of perinatal period	20.4%
Congenital malformations, deformations, and chromosomal anomalies	16.1%
Maternal and infant total	**36.5%**
Gastric and duodenal ulcer	16.1%
Acute abdomen, appendicitis, intestinal obstruction, cholecystitis/lithiasis, pancreatitis, hernia	16.1%
Digestive disease total	**32.3%**
Nephritis and nephrosis	9.5%
Obstructive uropathy and prostatic hyperplasia	2.1%
Genitourinary disorders total	**11.6%**
Neurological and status epilepticus	**12.6%**
Nutritional, endocrine and metabolic	**7.0%**

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[60]Monthly Public Health Mortality File, ONS 2011 mid year population estimates (published 30 April 2013), the European Standard Population (2013 version), and ONS rural and urban area classification.
[61]Monthly Public Health Mortality File.

Main Findings

This report has found that in Cumbria there was a significant decrease in the rate of avoidable mortality between 2008 and 2012 from 263.9 to 229.2 deaths per 100,000 population (a decrease of 13.1% or 34.7 deaths per 100,000 population). However, Cumbria had a significantly higher rate of avoidable mortality compared to England in 2011, the Cumbria rate was 242.7 deaths per 100,000 population compared to the national rate of 224.7 per 100,000 population. Significantly higher rates of avoidable mortality in Cumbria compared to England in 2011 were also evident for injuries and infections. For all other specific group causes there were no significant differences between the Cumbria and England avoidable mortality rates.

Females in Cumbria had a significantly higher rate of avoidable mortality in 2011 compared to females in England, whilst the male rate showed no significant difference.

The summary table of avoidable mortality rates in Cumbria (table 10), show that in 2012 neoplasms had the highest avoidable death rate and although the rate declined between 2008 and 2012, this was not a significant decrease. The only specific group cause of avoidable mortality to have a significant decrease between 2008 and 2012 was cardiovascular diseases. There were no significant increases of the rate of avoidable mortality in Cumbria for any of the specific group causes.

Deaths from injuries in Cumbria accounted for 15% of all avoidable deaths in Cumbria between 2008 and 2012, however these deaths accounted for 20.6% of total PYLL.   The data show an increasing trend of avoidable death from injuries between 2009 and 2012, although not significant. Overall, between 2008 and 2012 accidental injuries (such as falls) accounted for over half of avoidable deaths from injuries, and suicide and self-inflicted injuries accounted for over a quarter.

Local Authority Inequalities

Trend analysis revealed no significant increase or decrease in the rate of avoidable mortality from all causes at a local authority level in Cumbria between 2008 and 2012. However the analysis did reveal some significant intra county differences in 2012. For example, the avoidable mortality rates for all causes in Allerdale, Barrow-in-Furness and Copeland were signficantly higher compared to Eden and South Lakeland local authorities. South Lakeland had a significantly lower rate than Carlisle, in addition to a significantly lower rate than the Cumbria average along with Eden local authority.

Barrow-in-Furness had the highest rate of mortality for all causes of avoidable death and also for five out of the seven group causes (drug use disorders, respiratory diseases, cardiovascular diseases, neoplasms, and 'other' causes).   For the majority of these causes, the rate in Barrow-in-Furness was significantly higher compared to the rates in Eden and South Lakeland local authorities, and for drug use disorders and cardiovascular diseases the rate in Barrow-in-Furness was significantly higher than the Cumbria average.

Table 10: Directly age standardised rates (per 100,000, all ages) with 95 per cent confidence intervals for causes of avoidable death in Cumbria, 2008-2012[62]

Condition Group	Year	Rate per 100,000 population	Lower confidence limit	Upper confidence limit	Number of deaths	PYLL
All Avoidable Causes	2008	263.9	249.9	278.4	1,352	19,556
	2009	244.6	231.3	258.5	1,275	17,617
	2010	233.5	220.5	246.9	1,230	16,801
	2011	242.7	229.6	256.4	1,293	17,782
	2012	229.2	216.6	242.4	1,239	16,690
Infections	2008	2.5	1.3	4.4	13	229
	2009	3.2	1.9	5.2	17	245
	2010	2.8	1.6	4.7	15	185
	2011	3.3	1.9	5.3	17	362
	2012	3.4	2.0	5.4	18	404
Neoplasms	2008	91.2	83.2	99.8	474	5,596
	2009	81.6	74.1	89.7	433	4,965
	2010	78.2	70.9	86.1	417	4,854
	2011	86.4	78.7	94.6	466	5,477
	2012	78.3	71.0	86.0	432	4,736
Drug Use Disorders	2008	13.2	10.2	16.8	68	1,490
	2009	11.0	8.3	14.3	56	1,330
	2010	12.1	9.3	15.5	63	1,497
	2011	10.7	8.1	13.8	58	1,164
	2012	12.3	9.4	15.7	65	1,185
Cardiovascular Diseases	2008	81.9	74.2	90.1	420	4,786
	2009	80.3	72.7	88.4	418	4,654
	2010	76.1	68.8	83.9	404	4,589
	2011	66.5	59.7	73.8	357	3,850
	2012	61.2	54.8	68.2	334	3,533
Respiratory Diseases	2008	23.6	19.6	28.3	120	1,210
	2009	24.9	20.8	29.6	131	1,404
	2010	19.2	15.6	23.3	102	1,051
	2011	26.0	21.8	30.7	139	1,419
	2012	21.8	18.0	26.0	120	1,091
Injuries	2008	35.9	30.8	41.7	178	3,547
	2009	33.1	28.3	38.6	167	3,113
	2010	35.9	30.9	41.6	182	3,469
	2011	40.3	35.0	46.3	207	3,934
	2012	41.4	36.0	47.4	213	4,170
Others[63]	2008	15.5	12.3	19.4	79	2,698
	2009	10.5	7.8	13.7	53	1,906
	2010	9.1	6.7	12.1	47	1,156
	2011	9.6	7.1	12.7	49	1,576
	2012	10.9	8.3	14.2	57	1,571

[62]Monthly Public Health Mortality File, ONS mid year population estimates (published 30 April 2013), and the European Standard Population (2013 version).
[63]'Other' causes of avoidable death include: Nutritional, endocrine and metabolic, Neurological disorders, Digestive disorders, Genitourinary disorders, and Maternal and infant.

Sex Inequality

The data reveal that males in Cumbria consistently had a significantly higher rate of avoidable mortality compared to females between 2008 and 2012. The male rate in 2012 at 272.7 deaths per 100,000 males was 1.5 times higher than the female rate of 187.3 deaths per 100,000 females; a difference of 85.4 deaths per 100,000 population.

Trend data by sex do not reveal any significant changes of avoidable mortality rates for both males and females in Cumbria between 2008 and 2012.

With the exception of avoidable deaths from neoplasms, males had a higher mortality rate for all specific group causes of avoidable mortality in 2012 compared to females; however the only significant difference was for deaths due to avoidable injuries. The male rate of avoidable death from injuries was 58.3 male deaths per 100,000 males compared to 25.8 female deaths per 100,000 females. Males consistently had a higher rate of avoidable death from injuries compared to females between 2008 and 2012.

Avoidable mortality by sex and local authority reveal that males in Barrow-in-Furness had the highest rate of avoidable death for six of the seven specific group causes (drug use disorders, respiratory diseases, cardiovascular diseases, neoplasms, infections and 'other' causes).   Females from Barrow-in-Furness had the highest rate for three of the seven group causes (drug use disorders, cardiovascular diseases, and neoplasms).   Copeland had the highest male and female rate for injuries.

Deprivation Inequalities

A number of studies on avoidable mortality have found an association with avoidable mortality and low socioeconomic status. For example, a study in Canada conducted by *Wood et al (1999)* found that for every amenable cause of death, the mortality rate was higher among the lower social classes and this was regardless of whether education, occupational class, or income was used as a socioeconomic indicator. More recently *Dahl, Hofoss & Elstat (2007)* compared avoidable and non-avoidable deaths of the Norwegian population aged 25-67 by two socioeconomic factors (education and housing). Their analysis revealed that education formed a clear gradient in overall mortality but an even steeper gradient in avoidable mortality.

In the UK, a review carried out by *Marmot (2010)* demonstrated a social gradient in health, and concludes that the more socially deprived people are, the higher the chance of avoidable premature mortality. The *Marmot (2010)* report utilised analysis based on the IMD, which was also used in this report for the analysis of avoidable morality in Cumbria. The analysis revealed that for avoidable death from all causes, there was a clear gradient in the avoidable death rate and deprivation quintile with a significant difference between areas in Cumbria that are in the most deprived fifth of areas nationally (quintile 1) and the least deprived fifth of areas nationally (quintile 5).

The association of avoidable mortality and deprivation in Cumbria was also apparent across the majority of avoidable death groups: drug use disorders, injuries, respiratory diseases, cardiovascular diseases, neoplasms, and 'other'. For each of these group causes of avoidable mortality in Cumbria, the rate in quintile 1 was significantly higher compared to quintile 5. For 'other' causes of avoidable

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death, the death rate in quintile 1 was 5.4 times higher compared to quintile 5 and for cardiovascular diseases the rate was 3.4 times higher in quintile 1 than quintile 5. For the remaining avoidable group causes the rate in quintile 1 was between 2.6 and 2.9 times higher than in quintile 5.

Rural and Urban Inequalities

The analysis shows that urban areas of Cumbria had the highest rate of avoidable mortality from all causes in Cumbria, and this was also significantly higher than village, hamlet and isolated dwelling areas of Cumbria. Furthermore, the avoidable death rates in urban areas for respiratory diseases, cardiovascular diseases and neoplasms were significantly higher compared to village, hamlet and isolated dwelling areas. There were no significant differences between areas for drug use disorders, injuries, infections, and 'other' avoidable causes'.

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