

### Arsyllfa lechyd Cyhoeddus Cymru Public Health Wales Observatory

# A descriptive analysis of health in the vicinity of the Hanson Cement Plant



# February 2011



Authors: Rhys Gibbon, Dr Ciaran Humphreys, Claire Jones, Nathan Lester, Margaret Webber

**Acknowledgements:** Anna Childs, Hugo Cosh, Andrea Gartner, Jo Menzies, Bethan Patterson, Isabel Puscas, Dr John Steward, Dr Ceri White

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## **1** Summary

This report forms part of the investigation into public health concerns associated with the Hanson Cement Plant in Padeswood, Flintshire. It uses sources of routinely collected data to describe the health of the local community.

This analysis does not, and cannot, link people's health to the presence of the cement plant. It is designed simply to provide background information.

The indicators chosen have, where possible, been guided by the questions and concerns which were raised by the local community and documented by the investigation response team. The indicators cover a range of topics including births and deaths, occurrences of cancer and hospital admissions.

In order to respond effectively to community concerns, it was important to identify a geography that would satisfy two essential criteria:

- To be small enough to identify in detail the communities in the vicinity of the plant; and
- To contain areas that are large enough to include adequate numbers of health events to allow a reliable analysis of data to be performed.

Middle Super Output Areas (MSOA) were judged to be the most suitable compromise between these two requirements. There are 413 MSOAs in Wales with an average population of about 7,000 people.

The focus of the analysis has been the seven MSOAs immediately surrounding the cement plant. To provide context, figures for Flintshire, North Wales and Wales are included.

A large range of factors are known to affect health, both positively and negatively. These factors include the age, sex and genetic makeup of individuals, as well as lifestyle choices such as smoking, diet and exercise. Wider factors such as community networks, living and working conditions, healthcare services, and general socio-economic and environmental conditions also influence health.

All of these factors have been shown to interact with each other, producing different patterns of health across different communities.

When looking at differences in health status within North Wales it is important to remember that health is influenced by all of these factors, but that many are difficult to measure. Agestandardised rates have been used, these allow comparisons to be made by taking account of the different age structures in different areas.

Measures of statistical difference have also been applied to the indicators. Statistical significance refers to how likely it is that the difference between two values (in this case the national and local value) might be due to chance. Statistical significance is not the same as public health importance. A 'statistically significant' result means that it is unlikely that the local value would be different from the national value, due to chance alone. Statistical significance is a guide only. For example, even if two areas had the same 'underlying rate' it would be expected that one in forty results would be statistically significantly higher and one in forty would be statistically significantly lower. Classifying such results as statistically

significantly higher or lower is called a type I error.<sup>1</sup> Similarly, where `underlying rates' are different they may be classed as not statistically significantly different, this is called a type II error.<sup>1</sup>

Table 1 identifies how certain health indicators in each of the seven MSOAs surrounding the Hanson Cement Plant compare to the Wales rate. There are three comparisons to the Wales rate outlined in the table. These are:

- Statistically significantly lower than Wales the rate is lower than the Wales rate
- Statistically no different to Wales the rate may be higher or lower than the Wales rate, but this difference might be down to chance.
- Statistically significantly higher than Wales the rate is higher than the Wales rate

For the majority of indicators examined, health, or the surrogate used, e.g. emergency hospital admissions, was as good as or better than the Wales average in the areas surrounding the plant.

The factors that contribute to levels of health in an area are numerous and complex. The relatively low levels of deprivation are likely to contribute to the levels of health seen in the area.

Table 1	Indicators	by	statistical	significance
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	Number of MSOAs in the vicinity of the cement plant		
Indicator	Statistically significantly lower than Wales	Statistically no difference to Wales	Statistically significantly higher than Wales
All cause mortality	4	3	0
All cause mortality under 75 years	4	3	0
Low birth weight	1	6	0
Circulatory mortality	3	4	0
Circulatory mortality under 75 years	1	6	0
Coronary heart disease mortality	2	5	0
Hospital admissions aged under 75 years	6	1	0
Emergency hospital admissions under 75 years	5	2	0
Elective hospital admissions under 75 years	7	0	0
All cancer incidence	0	6	1
All cancer mortality	2	5	0
Lung cancer incidence	0	7	0
Lung cancer mortality	1	6	0
Prostate cancer incidence	0	7	0
Breast cancer incidence	0	7	0
Emergency admissions for respiratory disease under 75 years	6	1	0
Respiratory mortality	0	7	0
Emergency admissions for chronic obstructive pulmonary disease (COPD) under 75 years	4	3	0
COPD mortality	2	5	0
Emergency admissions for asthma under 75 years	5	2	0
Emergency admissions for respiratory infections under 75 years	3	4	0

## 2 Introduction

Mrs Edwina Hart AM MBE, Minister for Health and Social Services, requested Public Health Wales to work with other interested agencies and the local community to gain a better understanding of the health concerns associated with the Hanson Cement Plant (formerly Castle Cement Ltd) in Padeswood, Flintshire. A response team has been established to investigate health concerns raised by local community leaders over the Hanson Cement Plant in Padeswood, Flintshire.

This report forms one part of the response in relation to the health concerns raised. The report has been prepared by the Public Health Wales Observatory. It is a small team within Public Health Wales, with staff skilled in public health data analysis, evidence finding and knowledge management.

Public Health Wales is part of the NHS and provides professional independent public health advice and services to protect and improve the health and wellbeing of the population of Wales.

## 3 Background

Operations at the cement works in Padeswood commenced in 1948, initially with kiln 1 and 2, and in 1967 kiln 3 was built. These kilns were decommissioned in 2005 when kiln 4 was commissioned. Separate work is ongoing to characterise the emissions that may be released from the plant, the potential routes of exposure and, where relevant, populations that may be exposed (source, pathway and receptor). The main mechanism for human exposure to pollution from the plant, other than occupational exposure, is likely to be airborne. Generally, prevailing wind is from the North West but sometimes from the South West depending on meteorological conditions.

Concerns relating to health include:

- Are emissions harmful to health?
- Does the population suffer more ill health than a comparable population?
- Is the age profile of ill health different in nearby communities i.e. do people become ill at a younger age, is infant mortality/morbidity increased?
- Do the communities suffer from more cancer than other comparable communities, and are there any clusters of cancer in nearby communities?
- Are there general increased levels of respiratory disease, includes asthma and chest problems?
- Are there increases in other acute health problems in nearby communities e.g. respiratory, coughs, dry throats, skin rashes?

Other concerns raised relate to emissions and their monitoring, processes undertaken at the plant and regulation. There is also concern about occupational health. This does not form a

core part of this investigation but has been passed to the Health and Safety Executive for further investigation, and to report back to the community.

## 4 Aim of this report

This report aims to describe the health of the people living in the vicinity of the cement plant, with particular reference to the initial health concerns expressed to the response team. The report is intended to be descriptive, using information that is routinely available within NHS Wales. It seeks to place the health of the local population into context, including in the context of health across North Wales and Wales as a whole, in a way that can be understood by local community leaders.

This is not an in-depth study. Rather, it forms a part of the first phase of investigations around the possible impact of the cement plant on the health of local communities. The report does not, and cannot, examine cause and effect in relation to the cement plant and health.

This report provides information in relation to specific concerns raised about:

- The general health or ill health of the population
- Levels of cancer in the population
- Levels of respiratory disease in the population

Concern has particularly been raised about illness or death at a younger age. For this reason, where numbers allow, analysis has focused on those aged 75 or under.

This report does not attempt to describe potential pockets or clusters of cancer, as this work will be supported by the Welsh Cancer Intelligence and Surveillance Unit, also a part of Public Health Wales.

Information on infant mortality and morbidity are not considered as part of this report. Infant deaths are now very rare across Wales, with about 150 deaths per year. For this reason, infant mortality is not suited to the local analysis that we have undertaken for this report. Analyses of infant morbidity (illness) are not included in this report, as there is a need to further understand what aspects of infant morbidity are of concern.

## 5 Understanding the data

This report examines health indicators at a local level using MSOAs (see section 5.3). This is a statistical geography produced by the Office for National Statistics (ONS). The MSOAs in the vicinity of the cement plant are put in a North Wales context. Betsi Cadwaladr University Health Board has a statutory responsibility for the health of the residents of North Wales.

The information is presented in the form of maps, tables and charts with accompanying commentary. This section is designed to aid understanding of health data, the geographies used, how to interpret the data and the way in which the analysis has been presented.

#### 5.1 Factors that affect health

Health is affected, positively and negatively, by a large range of factors. These include age, sex and genetic (or inherited) makeup of an individual and lifestyle factors such as smoking, diet and exercise. They also include wider factors such as community networks, living and working conditions, including healthcare services, and general socio-economic and environmental conditions (Figure 1). These factors all interact to produce different patterns of health across different communities.

The Welsh Index of Multiple Deprivation  $(WIMD)^2$  comprises a number of the factors that influence health within the population of an area. Higher levels of deprivation are often associated with poorer health outcomes.



#### Figure 1. The Dahlgren and Whitehead schema of factors that influence health

Source: Dahlgren G, Whitehead M. *Policies and strategies to promote social equity in health.* Stockholm: Institute for Future Studies; 2007.<sup>3</sup>

### 5.2 Health information

Often we want to know about new cases of disease (incidence) or the amount of disease in a population (prevalence) at a local level. However, unless there is a managed population based register established for this purpose, this information is not routinely available.

Key routine sources of health data that help give an idea of the underlying burden of disease include:

#### Death registrations

These are routinely collected at a national level.

- Deaths are attributed to the 'underlying cause of death'. For example if someone dies from pneumonia caused by lung cancer, the death will be classed as due to cancer, not infection.
- They capture the extreme end of disease or illness, i.e. death.

#### **Routine surveys**

Specific surveys, such as the Welsh Health Survey are very useful sources of data, but do not provide information at a sufficient local level for this report. The Census is available at a local level but has few questions relating directly to health.

#### Health service data

Health service data is not designed primarily for public health purposes and so this use of the data is sometimes called 'secondary use'. Data from general practice are not routinely available on a residence basis and have not been included in this report. It includes data on admissions to hospital. There are a number of factors to be considered when using hospital admission data:

- The data represents the use of services, rather than just the underlying amount of disease. It is influenced by whether people approach services (demand) and the make up and response of those services (supply).
- Only those with a condition severe enough to warrant admission are included in the dataset
- The main condition for which an individual was admitted is included in these analyses, e.g. if an individual with lung cancer is admitted with a pneumonia the admission is likely to be classed as respiratory infection, not cancer.
- Some individuals may be admitted multiple times.
- There may be inconsistencies in how data are recorded in different healthcare facilities.

#### Population based registers

These use many sources such as death registrations and health service data to identify all cases of a disease. Data is checked to ensure it is of high quality. There is a high quality population based register for cancers in Wales. Nonetheless, even these sources are subject to some of the problems of their underlying sources, and variation in cancer rates can reflect variation in diagnosis and data recording.

Detail on the specific data sources used in this analysis is given in section 5.4.

## 5.3 Geography

#### 5.3.1 Choice of geography

In order to describe health outcomes in the vicinity of the cement plant it is, of course, necessary to define a suitable geography for reporting. There are two main types of geography that can be used for the analysis of health information at sub-local authority level. These are administrative and statistical geographies. Statistical geographies are relatively new. They have been created by the ONS in consultation with local government. Table 2 provides summary information about these geographies within Flintshire.

Area	Туре	Number within Flintshire	Average population
Output area	Statistical	496	300
Lower super output area	Statistical	92	1,641
Electoral division (ward)	Administrative	57	2,641
Middle super output area	Statistical	20	7,527
Upper super output area	Statistical	5	30,193

#### Table 2 Statistical and administrative geographies within Flintshire

When undertaking analysis such as this, there are two key requirements. The first is that the areas chosen are small enough to be able to provide the fine detail required. The second is that the data to be analysed are robust and that the results can therefore be relied upon. Unfortunately, these two requirements tend to conflict with one another. The finer the detail, the less robust the data tend to be. This is because the smaller the area, the lower the number of events (for example, deaths or admissions to hospital). When the number of events is low there tends to be a lot of variation from year to year which happens on a purely random basis. This serves to hide the 'true' underlying picture.

Therefore, the geography selected for small area analysis of health tends to be a compromise between these two competing requirements. For this piece of work MSOAs have been judged to be the best compromise. MSOAs allow us to show a good range of data in reasonably fine detail.

Unfortunately MSOAs are not perfect. In particular, they are not familiar to the public, and their names lack local meaning. In contrast, electoral divisions (wards) are the areas to which local councillors are elected and they have meaningful names. For this analysis, we consider wards less suitable. This is because, as shown in table 2, ward populations are roughly a third of the size of MSOAs. By using MSOAs, we are able to show more indicators of health in the knowledge that our analysis is robust.

All indicators in this report are shown at MSOA level with the exception of the WIMD which is only available at lower super output area.

#### 5.3.2 Middle super output areas in Flintshire

Figure 2 shows the MSOAs and the electoral divisions (wards) in Flintshire. The cement plant lies within MSOA 017. The nearby town of Buckley straddles MSOAs 012, 013, 014 and 017.

The smaller settlements of Penymynydd and Pen-y-ffordd are within MSOA 018. These areas are covered by the wards of Buckley Mountain, New Brighton, Argoed, Buckley Bistre West, Buckley Bistre East, Buckley Pentrobin and Penyffordd. Other wards include Hope, Caergwrle and Llanfynydd sitting within MSOA 020 whilst Treuddyn, Leeswood, Gwernymynydd and Gwernaffordd are within MSOA 019.

In the analysis section we show a small map of MSOAs and wards to help the reader to relate the data we are showing to ward geography. A guide to the maps included in the report may be found in section 5.7.



Figure 2 MSOA and electoral division geography in Flintshire.

#### 5.3.3 Choice of middle super output areas highlighted

In this analysis we highlighted MSOAs in the vicinity of the Hanson Cement Plant, MSOA Flintshire 017, which includes the cement plant, and the five MSOAs adjacent to this MSOA (Flintshire 012, 013, 014, 018 and 019).

These MSOAs coincide with the MSOAs considered to be most relevant following examination of environmental and complaints data which has been undertaken separately during the initial part of this investigation.

An additional MSOA, Flintshire 020, has been highlighted. This was at the specific request of Hope Community Council. These seven MSOAs are shown in figure 4.



Figure 3 Middle super output areas in Flintshire



Figure 4 Middle super output areas in the vicinity of Hanson Cement Plant

## 5.4 Sources of information

This report has used the following data sources to describe births, deaths, cancer incidence and hospital admissions.

#### Table 3 Data sources

Births	Births data come from the Annual District Births Extract (ADBE). The data is provided by the Office for National Statistics (ONS) and includes information on date of birth, mother's address and birth weight of baby.
Deaths	Deaths data used to calculate mortality rates come from the Annual District Deaths Extract (ADDE), which is provided by ONS. The data is based on the underlying cause from the medical certificate of cause of death. This is the disease or injury that began the chain of events directly leading to a person's death.
Cancer incidence	Cancer incidence is another way of saying new cases of cancer. All new cases are registered with the Welsh Cancer Intelligence and Surveillance Unit which is part of Public Health Wales.
Hospital admissions	Hospital admissions data come from the Patient Episode Database for Wales (PEDW). PEDW includes records of all stays in hospitals where at least one overnight stay is required (inpatients) or where a bed is required for a period during the day only (day cases). Hospital admissions for people living in Wales who are treated in other parts of the UK are included in the figures. Attendances at A&E departments and outpatient departments are not included in these figures.
Mid-year population estimates	The rates in this report have been calculated using mid-year population estimates (MYE) produced by ONS. These are annual estimates of the resident population based on the Census and take into account population changes due to births, deaths and migration.

### 5.5 Choice of indicators

The indicators chosen reflect the concerns raised by the community, with specific reference to general health, cancer and respiratory disease. As there were particular concerns about ill-health developing at a younger age, for those indicators where there was sufficient data, rates were calculated for those aged under 75. Under 75 is commonly used as a threshold for analyses of premature mortality. The WIMD<sup>2</sup> is shown to provide contextual information for the health indicators.

Health indicators are in three broad groups:

- General health: nine indicators covering deaths from all causes and circulatory and coronary heart disease (a major cause of death not included among cancer and respiratory indicators), low birth weight, and hospital admissions.
- Cancer: six indicators covering new diagnoses and deaths from all cancer and the more common cancers to be diagnosed and cause death.

• Respiratory illness: six indicators covering deaths and emergency hospital admissions due to respiratory disease including chronic obstructive pulmonary disease and asthma.

In some cases an illness is included in one type of indicator but not another due to the relative frequency of events, e.g. emergency hospital admissions for asthma are included, but deaths due to asthma are very rare and are not included.

## 5.6 Statistical methods

#### 5.6.1 Rates

All of the indicators in this report are presented as rates per unit of population. A rate is a way of measuring how often something happens in a particular place and over a particular period of time. A crude rate divides the number of events (e.g. deaths in an area in a year) by the population (e.g. estimated number of residents of the area at the mid point of the year).

Rates are designed to help us to make comparisons. However, comparing crude rates does not always compare like with like. Age is a particularly influential factor in determining whether someone will become ill or die. We also know that different areas have a different make-up in terms of the age of their population. This is referred to as the population age-structure. In order to be able to account for this and therefore make genuine comparisons across areas agestandardised rates are produced. In this report we use European age-standardised rates (EASR) to compare MSOAs across the North Wales area.

The **European age standardised rate** is the rate you would get if the population had the same age-structure as a theoretical standard European population. In order to calculate this we apply the rates which occur in each five year age band to the standard European population structure. In applying this widely-used method we can be confident that the rates take into account the different population age structures across MSOAs.

#### 5.6.2 Confidence intervals

By themselves, rates may not tell us all we need to know about whether there is a problem which may require action in a particular area. This is because rates tend to vary between areas and within areas over time due to random (or chance) factors. When rates are measuring something that is rare, the influence of these random factors is proportionally greater. In producing this report we have focused on indicators where at MSOA level there are at least 20 'events', for example deaths, over the period covered.

**Confidence intervals** give an indication of the range of variation expected in the rate due to chance (random variation). In this report we use 95% confidence intervals. This represents a range of values that we can be 95% confident contains the 'true' underlying rate.

The size of the confidence interval is dependent on the number of events occurring and the size of the population from which the events came. Generally speaking, rates based on small numbers of events and small populations are likely to have wider confidence intervals. Conversely, rates based on large populations are likely to have narrower confidence intervals. For example, the confidence limits for all deaths are narrower relative to the rate than deaths due to lung cancer only (Figure 5).

#### All cause deaths, Flintshire 001 MSOA

All lung cancer deaths, Flintshire 001 MSOA



**Figure 5 Width of confidence intervals** 

#### 5.6.3 Statistical significance

Statistical significance is calculated using the method as described by Breslow & Day<sup>4</sup>, whilst confidence intervals are used for Poisson parameters as described by Dobson *et al*<sup>5</sup>.

Linked to confidence intervals is the concept of statistical significance. As well as showing rates for each MSOA, the maps in this report also label MSOAs that have rates which are statistically significantly higher than the average for Wales.

A difference is called statistically significant if it is unlikely to have occurred by chance. If two areas have the same underlying rate one in 20 comparisons would be expected to have a statistically significantly different rate due to chance alone. We examined whether the MSOA rate is statistically significantly higher than the overall Wales rate.

Statistical tests are designed to rule out type I errors with greater certainty than type II errors. In considering statistical significance the following should be borne in mind:

#### Type I error

A type I error occurs when a result is classified as statistically significantly different when it should not be (thus falsely rejecting the null hypothesis). In every analysis of twenty cases where the 'underlying rate' is the same, one is expected to be statistically significant (i.e. one in forty would be statistically significantly higher, and one in forty statistically significantly lower). The more tests that are undertaken the higher the risk of type I errors.<sup>1</sup>

#### Type II error

A type II error occurs when a result is classified as statistically not significantly different when it should not be (thus an error in failing to reject the null hypothesis when it's false). Even if a result is not statistically significantly different it does not mean that the underlying rates are the same.<sup>1</sup>

Statistical tests are designed to rule out type I errors with greater certainty than type II errors.

#### Public health importance

A difference in rate that is statistically significant does not always reflect significance in the wider sense, i.e. important or problematic.

The position of the confidence interval in relation to the all Wales rate is closely related to its statistical significance compared with Wales (Figure 6).



Figure 6 Confidence intervals and statistical significance relative to Wales in all cause mortality, Flintshire

## 5.7 Reading the charts and maps

#### 5.7.1 Interpreting maps

Maps show the MSOAs and Local Authority (LA) boundaries within North Wales (Betsi Cadwaladr University Health Board).

The maps show data by fifths of equal ranges within the health board. This is achieved by taking the range of health board data between the lowest and highest at MSOA level and splitting it into five equally-sized sections (fifths).

Maps are created by shading each MSOA according to which fifth it fell into. This method aims to put areas with similar values within the same fifth; however, where there is little variation across the health board, the groups may be quite similar and the use of dark and light colours could make the variation seem greater than it really is. For this reason it is useful to look at what the rates in each fifth are, rather than simply which fifth an area is in.

Maps may also contain numbered labels which highlight areas where the rate or proportion is statistically significantly higher than the Wales average. Details of these areas are shown in the table alongside each map. By producing maps including the health board fifths and statistical significance compared with Wales, both the local and national perspective is shown. This section does not show the areas that are statistically significantly lower than the Wales average, however, a summary of the statistical significance in relation to each of the indicators in each of the seven highlighted MSOAs is included in Appendix A.

An example map, annotated to aid interpretation, is shown on page 22.



#### 5.7.2 Interpreting the charts

Charts have been included to complement the maps. MSOA data has been ranked in order to show the range of values within Flintshire. The circular turquoise markers show the values of the MSOAs surrounding the Hanson Cement Plant.

An example chart, annotated to aid interpretation is shown below.



## 6 Analysis

## 6.1 Welsh Index of Multiple Deprivation



#### Definition

The WIMD 2008 is produced at a small area level called lower super output area (LSOA), and is derived from a broad range of factors including income, employment, health, education, skills and training, community safety, housing, physical environment and access to services. It is a geographically based deprivation measure which can be used to show inequalities in health and suggest areas likely to most need measures to improve health and manage ill-health <sup>6</sup>

For this indicator the distribution of deprivation across LSOAs of Wales was divided into five groups, known as fifths. The choice of number of groups was arbitrary but made on the expectation that the five groups, however defined, are sufficiently large to avoid small number problems and are sufficiently small to provide discrimination between two extremes. The cutpoints were defined so that each fifth has an equal number of lower super output areas.

#### About deprivation

There are strong links between deprivation and poor health. Education, employment and income affect opportunities for health and health choices. For example, people living in the most deprived areas are more likely than people living in the least deprived areas, to smoke, drink above recommended daily levels of alcohol, and less likely to eat five or more fruit and vegetables a day or meet recommended levels of physical activity.

#### Pattern of deprivation

North Wales shows relatively less deprivation than Wales as a whole, with 49 (13%) of LSOAs falling within the most deprived fifth. Nevertheless, some of the most deprived areas in Wales are found in the coastal areas of Rhyl. The lower super output areas surrounding the Hanson Cement Plant fall mainly into the least deprived (63%) and next least deprived (16%) of Wales' fifth.



#### All cause mortality, all ages

#### MSOAs significantly higher than overall EASR for Wales

EASR	annual avg	MSOA name	label	EASR	annual avg	MSOA name	label
755	82	Flintshire 004	9	1016	72	Wrexham 004	18
750	86	Wrexham 015	8	941	192	Denbighshire 004	17
750	102	Wrexham 017	7	887	75	Wrexham 010	16
748	108	Isle of Anglesey 003	6	814	125	Flintshire 003	15
738	83	Wrexham 006	5	813	87	Wrexham 012	14
736	46	Denbighshire 006	4	806	102	Flintshire 009	13
715	65	Flintshire 005	3	789	126	Conwy 005	12
715	156	Conwy 001	2	778	93	Conwy 007	11
710	76	Gwynedd 003	1	778	61	Flintshire 007	10

	Flintsh	ire		
	003		814	⊢∙⊣
	009		806	⊢•
	007		778	<b>⊢</b> ∙−−-
	004	-	755	<b>⊢</b> ∙−−-
	005	7	15	
	011	68	33 I	
	001	65	6 H	<mark>- ₽</mark>
MSOA EASR with 95%	020	65	4 ⊢	
confidence interval	017	635	5 –	<b>-</b>
Local Authority	<b>5</b> 002	632	<u>2</u> ⊢	P
	<b>S</b> 014	603	H	41
Health Board (EASR = 617)	006	581	<b>⊢</b> •	-1
MSOAc currounding the Hanson	008	580	<b></b> ₽	
Cement Plant	012	556	⊢_	F Contraction of the second seco
	016	549	_●_	
	019	538	<b>⊢_</b> –∣	
	010	524	<b>⊢_●</b>	
	015	521	⊢•–1	Eliptobiro
	013	456	H-H	= Filntshire $=$ EASP $=$ 620
	018	448	<b></b>	= LASR = 020 -
	,	EASR pe	r 100,000	

#### Definition

The rate of deaths per 100,000 population. This has been standardised to take account of age structure.

#### About all-cause mortality

Mortality rates, adjusted for age, reflect the underlying health of the population. They do not reflect poor health which impinges on quality of life without shortening life. Although healthcare services have an influence on mortality rates the overall rate is likely to be related to a wide range of determinants of health.

#### Pattern of all-cause mortality

The death rates for Wales and North Wales are 635 and 617 per 100,000 respectively. MSOA rates in North Wales range between 427 and 1016 per 100,000 population. The rates across the areas surrounding the Hanson Cement Plant are broadly similar to elsewhere in Wales. The areas MSOA 014, 017 and 020 are similar to the Wales rate. Other MSOAs are lower, with MSOAs 018 and 013 being the lowest in Flintshire.



#### All-cause mortality, aged under 75 years

label	MSOA name	annual avg	EASR	label	MSOA name	annual avg	EASR
15	Denbighshire 004	62	584	7	Conwy 001	46	445
14	Wrexham 010	32	530	6	Isle of Anglesey 003	48	444
13	Flintshire 009	42	474	5	Conwy 007	30	444
12	Wrexham 004	27	470	4	Wrexham 015	29	441
11	Flintshire 007	29	463	3	Denbighshire 006	21	415
10	Wrexham 012	35	461	2	Wrexham 006	32	408
9	Flintshire 003	52	451	1	Conwy 005	44	384
8	Flintshire 004	29	446				



EASR per 100,000

#### Definition

The rate of deaths per 100,000 population aged under 75 years. This has been standardised to take account of age structure.

#### About all-cause mortality, under 75 years

Death occurring under 75 years of age is often used as a proxy for premature death. In other respects this indicator is similar to the all age all cause mortality rate.

#### Pattern of all-cause mortality, under 75 years

The pattern is very similar to the all age mortality indicator. The under 75 mortality rates for Wales and North Wales are 331 and 320 per 100,000 respectively. MSOA rates in North Wales range between 201 and 584 per 100,000 population. The rates across the areas surrounding the Hanson Cement Plant are broadly lower than the Wales average, especially MSOA 013, 018, 019 and 014. MSOA 017 is similar to the Wales rate.

6.4 Percent low birth weight



#### Low Birth Weight (% of live births)

#### MSOAs significantly higher than overall % for Wales

label	MSOA name	annual avg	% low birth weight
6	Denbighshire 006	7	8.2
5	Flintshire 007	6	8.1
4	Wrexham 010	9	7.5
3	Gwynedd 006	8	7.5
2	Flintshire 009	9	7.4
1	Denbighshire 004	9	7.4



% low birth weight

#### Definition

The proportion of singleton live births where the baby weighs less than 2,500 grams at birth.

#### About low birth weight

Low birth weight can reflect the general health of the mother and is associated with socioeconomic background, education and employment. It is also associated with smoking and alcohol consumption during pregnancy; poor nutrition; teenage pregnancy and ethnic origin. Low birth weight has been linked with poorer health outcomes in later life.

#### Pattern of low birth weight

Typically, 5.8% of singleton live born babies in Wales have a low birth weight. This ranges from 2.9% to 8.2% among North Wales MSOAs. The percentages of low birth weight across the areas surrounding the Hanson Cement Plant are broadly similar to elsewhere in Wales. One area, MSOA 019, has the lowest proportion of babies born with a low birth weight in Flintshire at 3.7%, substantially lower than the Wales percentage.



#### Circulatory mortality, all ages

1SOAs significantly higher than overall EASR for Wales								
label	MSOA name	annual avg	EASR					
12	Wrexham 004	27	378					
11	Denbighshire 004	74	333					
10	Flintshire 005	27	285					
9	Flintshire 004	34	281					
8	Wrexham 012	33	278					
7	Conwy 005	46	278					
6	Flintshire 003	45	278					
5	Wrexham 017	39	266					
4	Conwy 007	37	262					
3	Gwynedd 009	31	259					
2	Flintshire 009	36	255					
1	Isle of Anglesey 003	38	252					





#### Definition

The rate of circulatory disease deaths per 100,000 population. This has been standardised to take account of age structure.

#### About circulatory mortality

Circulatory disease includes coronary heart disease, stroke and a range of other conditions such as pulmonary embolism. Risk factors include high blood pressure, high cholesterol, smoking, unhealthy diet, inactivity, diabetes, age and genetic factors. It is also associated with deprivation and may also be influenced by patterns of care.

#### Pattern of circulatory mortality

The circulatory mortality rates for Wales and North Wales are 214 and 210 per 100,000 respectively. MSOA rates in North Wales range between 136 and 378 per 100,000 population. The rates across the areas surrounding the Hanson Cement Plant are broadly similar to Wales. MSOAs 013, 012 and 018 are lower than the Wales rate. The remaining four areas are similar to the Wales rate.



#### Circulatory mortality aged under 75 years

MSOAs significantly higher than overall EASR for Wales		
label	MSOA name	annual avg EASR
6	Denbighshire 004	21 183.2
5	Wrexham 004	10 171.3
4	Flintshire 004	10 137.4
3	Isle of Anglesey 003	14 127.6
2	Flintshire 003	15 126.7
1	Wrexham 012	9 123.9



EASR per 100,000

#### Definition

The rate of circulatory deaths per 100,000 population aged under 75 years. This has been standardised to take account of age structure.

#### About circulatory mortality, under 75

This indicator is similar to the all age circulatory mortality indicator, except it only includes individuals aged under 75 years. Under 75 mortality is often used to represent premature mortality.

#### Pattern of circulatory mortality, under 75

The pattern of under 75 circulatory mortality is quite similar to the all-age pattern. Rates for Wales and North Wales are 90 and 82 per 100,000 respectively. MSOA rates in North Wales range between 46 and 184 per 100,000 population. The rates across the areas surrounding the Hanson Cement Plant are broadly similar to elsewhere in Wales. All of these areas are lower than the Wales rate.


## Coronary heart disease mortality, all ages

1SOAs sign	ificantly higher than ov	erall EASR for	Wales
label	MSOA name	annual avg	EASR
8	Wrexham 004	16	225.8
7	Denbighshire 004	36	176.1
6	Flintshire 004	19	171.8
5	Wrexham 017	24	169.9
4	Flintshire 003	24	151.8
3	Conwy 005	23	150.9
2	Wrexham 012	17	147.5
1	Flintshire 005	13	144.0



#### EASR per 100,000

## Definition

N

The rate of coronary heart disease (CHD) deaths per 100,000 population. This has been standardised to take account of age structure.

## About coronary heart disease mortality

Coronary heart disease is a disease of the blood vessels supplying the heart muscle and considered, is a largely preventable cause of ill health and premature death. Major risk factors for CHD include high blood pressure, high cholesterol, tobacco, unhealthy diet, physical inactivity and diabetes. It is associated with deprivation. It may also be influenced by patterns of care.

## Pattern of coronary heart disease mortality

The chart shows the rate for Wales and North Wales as 108 and 106 respectively. MSOA rates in North Wales range between 59 and 226 per 100,000 population. The rates across the areas surrounding the Hanson Cement Plant are broadly similar to elsewhere in Wales. MSOAs 012, 013, 014 and 018 are lower than the Wales rate. MSOAs 017, 019 and 020 are higher than the Wales rate but this is not beyond what might be expected due to chance alone, i.e. it is not statistically significant.





## All hospital admissions aged under 75 years

MSOAs	1SOAs significantly higher than overall EASR for Wales								
label	MSOA name	annual avg	EASR	label	MSOA name	annual avg	EASR		
20	Denbighshire 004	1519	180.8	10	Conwy 013	1102	154.1		
19	Gwynedd 006	1332	171.9	9	Gwynedd 002	1067	153.5		
18	Denbighshire 006	844	169.0	8	Conwy 007	864	152.9		
17	Isle of Anglesey 003	1580	165.8	7	Conwy 001	1190	152.7		
16	Wrexham 010	1041	159.9	6	Flintshire 004	892	152.1		
15	Gwynedd 005	1008	157.6	5	Denbighshire 011	743	151.9		
14	Conwy 005	1260	157.4	4	Conwy 010	1428	151.6		
13	Isle of Anglesey 001	1266	154.9	3	Denbighshire 007	741	149.8		
12	Conwy 002	950	154.6	2	Isle of Anglesey 009	1081	149.2		
11	Isle of Anglesey 006	938	154.3	1	Flintshire 009	1276	149.0		



#### Flintshire

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	018	115	H		FASR = 129
	020	112	H		ENSIX = 125
		EASR per 1,0	00		

## Definition

The rate per 1,000 population aged under 75 years admitted to hospital during 2008 on a planned or emergency basis. This has been standardised to take account of age structure. Day case as well as inpatient admissions are included.

## About all hospital admissions, under 75 years

A higher rate of admissions is suggestive of a higher level of illness requiring hospital care having taken into account the population age structure<sup>5</sup>. The rate also reflects the behaviour of people in seeking healthcare and the way in which health services are provided to the community.

## Pattern of all hospital admissions, under 75 years

The hospital admission rate for under 75 year olds in North Wales is 134 per 1,000 population, just below the average for Wales of 139. MSOA rates in North Wales range from 93 to 181 per 1,000 population. Two MSOAs in Flintshire, MSOA 004 and MSOA 009, have hospital admission rate for MSOA 017 is similar to that of Wales. The rates for the other MSOAs surrounding the Hanson Cement Plant are lower than the average for Wales.

## Northop Aston Ewloe Buckley New BrightonMountain Buckley Hawarden Gwernaffield Buckley Bistre Buckley Argoed West Bistre Penvffordd East Leeswood Higher Kinnerton Gwernymynydd Hope Caergwrle Treuddyn Llanfynydd 18 17 10 P Emergency admissions, 2008, persons aged under 75 years MSOA, European age-standardised rate per 1,000; source: PEDW/ONS 91.0 to 103.8 (1) 78.4 to 91.0 (8) ) 65.8 to 78.4 (29) 53.2 to 65.8 (42) 40.6 to 53.2 (16) MSOA boundary Local authority boundary © Crown Copyright Licence Number 100022432 Produced by Public Health Wales Observatory MSOAs surrounding Hanson Cement Plant

## Emergency hospital admissions aged under 75 years

MSOAs signi	ificantly higher than ov	verall EASR for	r Wales				
label	MSOA name	annual avg	EASR	label	MSOA name a	nnual avg	EASR
18	Denbighshire 004	860	103.8	9	Conwy 007	429	77.2
17	Denbighshire 006	458	90.4	8	Flintshire 004	458	77.2
16	Gwynedd 006	684	89.4	7	Denbighshire 011	371	76.5
15	Wrexham 010	593	88.9	6	Gwynedd 005	470	75.8
14	Gwynedd 001	437	81.7	5	Conwy 010	682	75.5
13	Isle of Anglesey 003	751	78.9	4	Denbighshire 005	413	75.2
12	Conwy 005	615	78.8	3	Flintshire 009	616	73.4
11	Conwy 013	540	78.6	2	Flintshire 011	354	73.3
10	Gwynedd 002	544	78.5	1	Conwy 001	522	71.6

MSOA EASR with 95% confidence interval
Local Authority
———Health Board (EASR = 64)
— MSOAs surrounding the Hanson Cement Plant

#### Flintshire



## Definition

The rate per 1,000 population aged under 75 years admitted to hospital during 2008 for all causes on an emergency or unplanned basis. This has been standardised to take account of age structure.

## About emergency hospital admissions, under 75 years

A higher rate is suggestive of a higher level of morbidity requiring unplanned hospital care. This may, in turn, indicate inadequate preventative care on the part of health services and or individuals.<sup>7</sup> The rate also reflects the behaviour of people in seeking healthcare and the way in which health services are provided in both primary and secondary care, for example 'thresholds' for emergency admission may vary.

## Pattern of emergency hospital admissions, under 75 years

The North Wales rate of emergency admissions under 75 years of age is similar to the overall Wales rate. The rate for Flintshire is just below the regional rate at 61 per 1,000. MSOA rates in North Wales range between 41 and 104 per 1,000 population. In Flintshire, MSOA 004, MSOA 009 and MSOA 011 have emergency hospital admission rates statistically significantly higher than the average for Wales. The rates across the areas surrounding the Hanson Cement Plant are lower in MSOAs 012, 013, 018, 019 and 020 whilst MSOA 014 and 017 are not statistically significantly different from the average for Wales.



## Elective hospital admissions aged under 75 years

MSOAs signifi	icantly higher than ov	erall EASR for	Wales
label	MSOA name	annual avg	EASR
9	Conwy 002	586	88.2
8	Gwynedd 006	698	87.1
7	Isle of Anglesey 001	770	86.0
6	Isle of Anglesey 003	831	85.2
5	Conwy 001	711	82.8
4	Conwy 013	636	82.7
3	Gwynedd 005	553	81.3
2	Isle of Anglesey 006	521	81.1
1	Gwynedd 007	488	80.9

	Flintshire	e		
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	009	75		
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	004	72	⊢₽	
	016	71	<mark>⊦</mark> ∙-⊣	
_ MSOA EASR with 95%	003	70	h <mark>∎</mark> ∎- <mark>i</mark> l	
confidence interval	008	69	<b>⊢⊎<mark>₽−</mark>┥</b>	
Local Authority	013	67	F <b>_</b> H	
	002	67	⊢- <mark>-</mark>	
wales (EASR = 74)	<b>ð</b> 012	67	⊢ <mark>-</mark>	
—Health Board (EASR = 69)	<b>S</b> 010	66	┝╼┹╼┤	
<ul> <li>MSOAs surrounding the Hanson</li> </ul>	006	66	<b>⊢</b> ₽ <mark>-</mark>	
Cement Plant	007	66	⊢⊷∔┥	
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	005	62	⊢∙−	FASR = 68
	001	59	⊢∙⊷⊣	

#### EASR per 1,000

## Definition

The rate per 1,000 population aged under 75 years admitted to hospital during 2008 for all causes on an elective basis. This has been standardised to take account of age structure.

## About elective hospital admissions, under 75 years

A higher rate is indicative of a higher level of morbidity requiring planned admitted hospital care. Much of planned healthcare does not require hospital admission and so is not reflected in this figure. The rate also reflects the behaviour of people in seeking healthcare and the way in which health services are provided to the community.

## Pattern of elective hospital admissions, under 75 years

The elective hospital admission rate for under 75 year olds in North Wales is 69 per 1,000 population, which is lower than the average of 74 per 1,000 population for Wales. MSOA rates in North Wales range between 48 and 88 per 1,000 population. The elective hospital admission rates for under 75 year olds across the areas surrounding the Hanson Cement Plant are lower than the average for Wales.



## All cancer incidence, all ages

MSOAs significantly higher than overall EASR for Wales								
label	MSOA name	annual avg	EASR	label	MSOA name ann	ual avg	EASR	
14	Denbighshire 006	30	522.0	7	Wrexham 013	34	485.5	
13	Wrexham 010	37	507.9	6	Isle of Anglesey 006	44	481.0	
12	Wrexham 017	60	501.7	5	Flintshire 016	69	478.9	
11	Flintshire 020	42	496.6	4	Isle of Anglesey 007	45	478.0	
10	Denbighshire 011	34	491.2	3	Denbighshire 009	46	474.6	
9	Gwynedd 016	54	490.4	2	Isle of Anglesey 002	57	472.5	
8	Denbighshire 004	75	488.3	1	Gwynedd 012	60	468.2	





## Definition

The rate of newly diagnosed cases of any cancer (malignant neoplasm) per 100,000 population. Skin cancer, other than melanoma, is excluded. This is standard practice, as they are not easy to reliably record. This has been standardised to take account of age structure.

## About cancer incidence

Cancer is common with approximately 18,000 cases diagnosed each year in Wales. About one in three people develop cancer in their lifetime. A large number of factors impact on the chance of getting cancer including tobacco smoke, dietary factors, obesity and exercise, infectious agents and occupation. Evidence suggests that air, water and soil pollution contribute to approximately 1% of global cancers.<sup>8</sup> This is a useful summary measure but relatively non specific, due to the variety of risk factors that may be reflected.

## Pattern of cancer incidence

Incidence of cancer in North Wales ranges from 342 to 523 per 100,000 population. The overall incidence in North Wales (424) is slightly higher than that in Wales as a whole (413). Most of the MSOA rates in the vicinity of the Hanson Cement Plant are similar to the North Wales average. MSOA 012 is higher than the Wales average, but this is not statistically significant (i.e. not beyond what one might expect due to chance alone). MSOA 020 is, however, statistically significantly higher than the Wales average, with a rate of 497 per 100,000 population.



## All cancer mortality, all ages

MSOAs	significantly higher than	overall EASR for	Wales
label	MSOA name	annual avg	EASR
10	Wrexham 010	21	272
9	Flintshire 007	20	262
8	Wrexham 012	24	257
7	Flintshire 003	36	257
6	Denbighshire 006	15	247
5	Wrexham 015	22	242
4	Flintshire 009	28	237
3	Denbighshire 004	42	234
2	Wrexham 006	24	232
1	Flintshire 004	24	229



## Definition

The rate of cancer deaths per 100,000 population. This analysis excludes non-melanotic skin cancers, as with incidence. This has been standardised to take account of age structure.

## About cancer mortality

Cancer mortality reflects the underlying burden of disease and is influenced by detection and treatment of cancers. Some cancers will have higher mortality rates than some cancers. Risks affecting cancers are discussed under the 'all cancer incidence' indicator.

## Pattern of cancer mortality

The cancer mortality rates for Wales and North Wales are 186 and 187 per 100,000 respectively. MSOA rates in North Wales range between 124 and 272 per 100,000 population. The rates across the areas surrounding the Hanson Cement Plant are broadly similar to elsewhere in Wales. Apart from MSOA 013 and 019 which are lower, the MSOAs surrounding the cement plant are not statistically significantly different from the Wales rate.



## Lung cancer incidence, all ages

MSOAs s	significantly hig	her than	overall EAS	R for Wales	;		
label MSOA name	e annual avg	EASR	lab	el MSOA na	ame annu	ual avg	EASR
17 Denbighshire 00	5 5	100.4		8 Gwynedd	009	7	77.7
16 Flintshire 00	7 6	98.7		7 Wrexham	006	6	73.4
15 Wrexham 01	0 6	90.3		6 Flintshire	008	5	73.4
14 Wrexham 01	5 7	87.5		5 Wrexham	005	5	72.6
13 Denbighshire 004	4 12	85.9		4 Conwy	005	9	71.9
12 Flintshire 00	3 10	84.7		3 Gwynedd	002	6	70.7
11 Wrexham 01	2 7	81.0		2 Conwy	010	13	68.4
10 Wrexham 01	7 9	80.9		1 Flintshire	009	7	68.1
9 Denbighshire 01	1 5	80.4					
		Fli	ntshire				
			007	99		•	
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MSOA EASR with 95%			004	63 H	• 1		
confidence interval			020	63 H			
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Health Board (EASR = 52)		٩S	015	51			
MSOAs surrounding the Hans	son	-	012	51 H			
Cement Plant			018	50			
			016	49  • <mark>-</mark> +	—		
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			010 37	<b>ب</b> ۲		EASR =	55 —
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EASR per 100,000

## Definition

The rate of newly diagnosed cases of lung cancer per 100,000 population. This has been standardised to take account of age structure. For this indicator, 2001-08 data have been chosen to ensure the analysis is robust.

## About lung cancer incidence

Lung cancer is the second most common newly diagnosed cancer in men after prostate cancer, and the third most common in women after breast and bowel. It accounts for approximately 13% of all malignancies excluding non melanoma skin cancer. Approximately 90% of lung cancer is thought to be due to tobacco.<sup>8</sup> Other factors associated with lung cancer include ionising radiation and occupational agents such as asbestos and combustion fumes.

## Pattern of lung cancer incidence

In Wales, the rate was 51 per 100,000 population and ranges from 25 to 100 per 100,000 in North Wales. In Flintshire, the rate ranges between 34 and 99 per 100,000 population. Four MSOAs in Flintshire have rates statistically significantly higher than the Wales rate. None of these are among the middle super output areas in the vicinity of Hanson Cement Plant. MSOA 013 has the lowest lung cancer incidence in Flintshire.



## Lung cancer mortality, all ages

MSOAs significantly higher than overall EASR for Wales									
label	MSOA name	annual avg	EASR	label	MSOA name	annual avg	EASR		
16	Flintshire 007	5	81.8	8	Conwy 005	7	63.7		
15	Wrexham 010	4	76.2	7	Denbighshire 011	4	63.7		
14	Wrexham 015	5	71.7	6	Gwynedd 009	5	62.1		
13	Denbighshire 006	3	71.1	5	Wrexham 009	4	60.6		
12	Wrexham 012	5	70.2	4	Denbighshire 004	8	59.5		
11	Wrexham 004	3	69.3	3	Denbighshire 005	4	59.0		
10	Flintshire 003	7	63.9	2	Flintshire 009	5	57.0		
9	Wrexham 017	7	63.9	1	Isle of Anglesey 003	6	56.3		



EASR per 100,000

## Definition

The rate of lung cancer deaths per 100,000 population. This has been standardised to take account of age structure. For this indicator, 2001-08 data have been chosen to ensure sufficient numbers.

## About lung cancer mortality

Lung cancer has a high mortality rate. For details of factors relating to lung cancer, see lung incidence.

## Pattern of lung cancer mortality

The pattern of lung cancer mortality is very similar to that seen in lung cancer incidence. The mortality rate for Wales and North Wales is 41 and 42 respectively, the North Wales line is hidden behind the Wales value. MSOA rates in North Wales range between 20 and 82 per 100,000 population. MSOA 013 has the lowest rate in Flintshire, its upper confidence interval not overlapping with the Wales rate.



## Prostate cancer incidences, all ages

<b>MSOAs signif</b>	icantly higher than ove	erall EASR for	Wales
label	MSOA name	annual avg	EASR
5	Flintshire 016	12	181.7
4	Denbighshire 005	7	179.8
3	Wrexham 016	7	175.6
2	Isle of Anglesey 002	10	162.0
1	Wrexham 008	11	160.4



## Definition

Rate of newly diagnosed cases of prostate cancer per 100,000 male population. This has been standardised to take account of the age structure.

## About prostate cancer incidence

Prostate cancer is the most common cancer in males, accounting for approximately a quarter of all male cancers excluding non melanoma skin cancer. Risk factors include age and ethnicity. Like breast cancer, its development is thought to be linked to hormonal factors. Variations in incidence are much greater than those in mortality. Incidence is affected by use of prostate specific antigens testing and biopsies obtained in the treatment of prostatic hypertrophy (a common condition in older men). It is more common in less deprived areas.

## Pattern of prostate cancer incidence

In Wales, the rate was 117 per 100,000 population and ranges from 69 to 182 per 100,000 in North Wales. In Flintshire, the EASR ranges between 86 and 182 per 100,000 population. One area, MSOA 016 has a statistically significantly higher rate than the Wales rate. However, this MSOA is not in the area surrounding the Hanson Cement Plant. One of the MSOAs in the vicinity of the plant, MSOA 012, has the second highest rate in Flintshire; however, this is not beyond what might be expected from chance alone. All other MSOAs in the vicinity of the plant have rates broadly similar to the Wales rate.



## Female breast cancer incidence, all ages

MSOAs signifi	cantly higher than ove	erall EASR for	Wales
label	MSOA name	annual avg	EASR
7	Wrexham 001	10	170.3
6	Wrexham 017	10	174.4
5	Isle of Anglesey 002	10	182.6
4	Conwy 001	13	184.9
3	Conwy 014	8	185.4
2	Denbighshire 016	9	190.4
1	Conwy 006	13	199.1

#### Flintshire



## Definition

The rate of newly diagnosed cases of female breast cancer per 100,000 female population. This has been standardised to take account of age structure.

## About female breast cancer incidence

Breast cancer is the most common cancer in females and accounts for approximately 30% of all female malignancies excluding non melanoma skin cancer. Women from higher socioeconomic groups have higher rates of breast cancer than those from lower socio-economic groups. Hormonal factors influence risk of breast cancer, such as early age of onset of ovulation, late age of menopause, not having been pregnant, and hormone replacement therapy. Alcohol and obesity may also contribute.

## Pattern of female breast cancer incidence

In Wales, the rate was 124 per 100,000 population and ranges from 71 to 200 per 100,000 in North Wales. In Flintshire, the EASR ranges between 107 and 171 per 100,000 population. No MSOA in Flintshire is statistically significantly different from the all Wales rate.

# 6.17 Rate of respiratory disease emergency hospital admissions, under 75 years



## Emergency hospital admissions for respiratory disease aged under 75 years

	MSOAs s	significantly	higher t	han ove	rall EASR for Wales		
label	MSOA name	annual avg	EASR	label	MSOA name	annual avg	EASR
16	Denbighshire 004	132	16.5	8	Flintshire 004	71	12.2
15	Denbighshire 006	74	14.3	7	Denbighshire 011	53	11.9
14	Gwynedd 002	91	13.9	6	Isle of Anglesey 008	55	11.6
13	Gwynedd 006	100	13.4	5	Isle of Anglesey 009	77	11.2
12	Wrexham 010	82	12.5	4	Denbighshire 005	57	11.1
11	Denbighshire 007	55	12.4	3	Gwynedd 001	50	11.0
10	Wrexham 017	97	12.3	2	Wrexham 011	64	10.9
9	Conwy 005	92	12.3	1	Isle of Anglesey 007	67	10.9



## Definition

The rate per 1,000 population aged under 75 years admitted to hospital between 2004-08, for respiratory disease on an emergency basis. This has been standardised to take account of age structure.

## About emergency hospital admissions for respiratory disease, under 75 years

A higher rate suggests a higher level of respiratory morbidity requiring unplanned hospital care. Respiratory admissions cover a wide range of conditions such as COPD, asthma, pneumonia and influenza. The emergency admission rate may be affected by behaviours of individuals as well as how services are provided to the community, in relation to both prevention, and treatment. Many respiratory conditions are caused by or aggravated by tobacco smoke.

## Pattern of emergency hospital admissions for respiratory disease, under 75 years

The emergency hospital admission rate for respiratory disease, under 75 year olds in North Wales is 9.3 per 1,000 population, which is lower than the average of 9.7 per 1,000 population for Wales. MSOA rates in North Wales range between 5 and 17 per 1,000 population. The rate in MSOA 017 is similar to the all Wales rate. Rates in other areas surrounding the Hanson Cement Plant are lower than the average for Wales.





MSOAs significantly	higher than o	verall EASR for	Wales
lahal	MCOA nome		EACD

label	MSOA name	annual avy	EASK
13	Wrexham 010	13	152.4
12	Wrexham 004	11	145.5
11	Denbighshire 004	33	126.3
10	Wrexham 012	14	123.7
9	Flintshire 003	19	117.0
8	Wrexham 017	17	114.2
7	Isle of Anglesey 003	17	112.0

label	MSOA name	annual avg	EASR
6	Wrexham 011	16	111.7
5	Wrexham 006	14	110.9
4	Flintshire 009	15	107.4
3	Wrexham 015	16	105.0
2	Wrexham 001	17	105.0
1	Conwy 005	18	96.8





## Definition

The rate of respiratory disease deaths per 100,000 population. This has been standardised to take account of age structure.

## About respiratory disease mortality

Respiratory diseases are a very common cause of ill health, hospitalisation and death and include COPD, asthma, influenza, pneumonia and other conditions. Many respiratory conditions are often caused by, or aggravated by, exposure to tobacco smoke.

## Pattern of respiratory disease mortality

The chart shows the rate for Wales and North Wales as 77 and 74 respectively. MSOA rates in North Wales range between 42 and 153 per 100,000 population. The rates across the areas surrounding the Hanson Cement Plant are broadly similar to elsewhere in Wales.

## Rate of chronic obstructive pulmonary disease emergency 6.19 hospital admissions, under 75 years Northop Aston Ewloe Buckley New BrightonMountain Buckley Hawarden Gwernaffield Buckley 11 Bistre Buckley West Bistre Argoed Penyffordd East Higher Kinnerton Leeswood Gwernymynydd Норе Caergwrle Treuddyn Llanfynydd 20 P Emergency COPD admissions, 2004-08, persons <75 years MSOA, European age-standardised rate per 100,000; source: PEDW/ONS 251 to 307 (4)193 to 251 (0) 135 to 193 (16) 77 to 135 (38) 19 to 77 (38) MSOA boundary Local authority boundary MSOAs surrounding Hanson Cement plant © Crown Copyright Licence Number 100022432 Produced by Public Health Wales Observatory

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## Emergency hospital admissions for COPD aged under 75 years

	MSOAs si	gnificantly	higher th	an overall	EASR for Wales		
label	MSOA name	annual avg	EASR	label	MSOA name	annual avg	EASR
20	Denbighshire 004	33	306.9	10 Flir	ntshire 003	19	155.7
19	Denbighshire 006	14	267.6	9 Isle	e of Anglesey 003	17	155.6
18	Flintshire 004	18	259.6	8 Wr	exham 011	10	151.6
17	Wrexham 010	15	252.6	7 Wr	exham 015	10	146.4
16	Wrexham 017	20	192.1	6 Gw	/ynedd 002	11	145.8
15	Wrexham 012	13	175.9	5 Wr	exham 005	10	143.2
14	Isle of Anglesey 007	14	169.0	4 Wr	exham 004	8	143.2
13	Gwynedd 001	8	160.6	3 De	nbighshire 001	13	141.5
12	Gwynedd 006	15	156.9	2 Co	nwy 009	13	137.6
11	Flintshire 009	14	156.2	1 Isle	e of Anglesey 009	14	131.4

#### Flintshire



## Definition

The rate per 100,000 population aged under 75 years admitted to hospital between 2004-08, for chronic obstructive pulmonary disease (COPD) on an emergency basis. This has been standardised to take account of age structure.

## About emergency hospital admissions for COPD, under 75 years

MSOA EASR with 95%

- - Local Authority

confidence interval

Cement Works

-Wales (EASR = 101.0)

Health Board (EASR = 96.5)

\_ MSOAs surrounding Hanson

A higher rate suggests a higher level of COPD requiring unplanned hospital care. COPD includes chronic bronchitis and emphysema. Emergency admissions are usually related to acute exacerbations of these chronic conditions. It is estimated that 70% of COPD in high income countries is due to tobacco smoke.<sup>9</sup> Occupational exposure, especially when combined with smoking, may also play a role, e.g. coal or silica dusts. The emergency admission rate may be affected by behaviours of individuals as well as how services are provided to the community, in relation to both prevention, and treatment.

## Pattern of emergency hospital admissions for COPD, under 75 years

The emergency hospital admission rate for COPD, under 75 year olds in North Wales is 96.5 per 100,000 population, which is the similar to the average of 101 per 100,000 population for Wales. MSOA rates in North Wales range between 109.8 and 306.9 per 100,000 population. The emergency hospital admission rates for COPD amongst under 75 year olds across the

areas surrounding the Hanson Cement Plant tend to be lower than the average for Wales; MSOA 012, 017 and 020 are similar to the Wales rate; whereas 013, 014 and 018 are lower than the Wales average. The map shows the data divided into five equal range quintiles. Note, there are four MSOAs for COPD emergency admissions that have a high rate, compared to the rest of the MSOAs in North Wales, with MSOA 004 in Flintshire included in these.

A descriptive analysis of health in the vicinity of the Hanson Cement Plant



MSOA EASR with 95%

confidence interval

Wales (EASR = 31)

**Cement Works** 

-Health Board (EASR = 29)

MSOAs surrounding Hanson

- - - Local Authority

## COPD mortality, all ages

	MSOAs	s significantly	higher th	an over	all EASR for Wales		
label	MSOA name	annual avg	EASR	label	MSOA name	annual avg	EASR
12	Denbighshire 006	4	61.9	6	Flintshire 009	6	47.3
11	Wrexham 010	5	59.1	5	Wrexham 006	5	46.1
10	Wrexham 004	4	58.5	4	Wrexham 012	5	45.6
9	Flintshire 003	9	54.5	3	Gwynedd 003	5	45.2
8	Wrexham 017	7	51.3	2	Denbighshire 004	10	44.8
7	Isle of Anglesey 003	7	47.9	1	Isle of Anglesey 009	6	43.0
				C	intchiro		





## Definition

The rate of COPD deaths per 100,000 population. This has been standardised to take account of age structure. For this indicator, 2001-08 data have been chosen to ensure the analysis is robust.

## About COPD mortality

COPD includes chronic bronchitis and emphysema. The majority of COPD is thought to be due to exposure to tobacco smoke, for further details see the COPD hospital admissions section. Confidence intervals are wide, due to the relatively low number of deaths that occur in a local area.

## Pattern of COPD mortality

The chart shows the rate for Wales and North Wales as 31 and 29 respectively. MSOA rates in North Wales range between 13 and 62 per 100,000 population. The rates across the areas surrounding the Hanson Cement Plant are broadly lower than Wales; however, except for MSOA 013 and MSOA 019 these are not beyond what one might expect due to chance alone. MSOA 020 has a higher rate than Wales, but not significantly so.



## Emergency hospital admissions for asthma aged under 75 years

MSOAs sigr	nificantly higher that	an overall EASR fo	r Wales
label	MSOA name	annual avg	EASR
9	Denbighshire 004	15	210.2
8	Conwy 009	14	182.4
7	Wrexham 017	14	177.5
6	Denbighshire 007	7	173.2
5	Gwynedd 002	12	171.2
4	Wrexham 013	9	169.9
3	Wrexham 006	11	168.4
2	Conwy 002	10	164.0
1	Wrexham 010	10	155.2



#### Definition

The rate per 100,000 population aged under 75 years admitted to hospital for asthma on an emergency basis. This has been standardised to take account of age structure. For this indicator, 2001-08 data have been chosen to ensure the analysis is robust.

## About emergency hospital admissions for asthma, under 75 years

A higher rate suggests a higher level of asthma in the community requiring unplanned hospital care. This could in turn reflect poorer control of asthma. It may also reflect behaviours of individuals and how services are provided, for example in primary care. Admissions for asthma are relatively rare, reflected in the wide confidence intervals.

## Pattern of emergency hospital admissions for asthma, under 75 years

The emergency hospital admission rate for asthma, under 75 year olds in North Wales is 114 per 100,000 population, which is lower than the average of 122 per 100,000 population for Wales. MSOA rates in North Wales range between 48 and 211 per 100,000 population. The emergency hospital admission rates are lower than the average for Wales. This is beyond what would be expected by chance alone for MSOAs 013, 014, 018, 019 and 020.

# 6.22 Rate of respiratory infection emergency hospital admissions, under 75 years



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## Emergency hospital admissions for respiratory infections aged under 75 years

	MSOAs s	ignificantly	higher th	nan over	all EASR for Wales		
label	MSOA name	annual avg	EASR	label	MSOA name	annual avg	EASR
14	Denbighshire 004	80	10.8	7	Denbighshire 005	41	8.4
13	Gwynedd 002	63	10.0	6	Isle of Anglesey 008	36	8.3
12	Denbighshire 006	51	9.8	5	Wrexham 017	61	8.3
11	Gwynedd 006	67	9.4	4	Conwy 013	49	8.2
10	Conwy 005	63	8.9	3	Gwynedd 007	41	8.0
9	Denbighshire 007	36	8.8	2	Wrexham 010	54	7.9
8	Denbighshire 011	37	8.7	1	Flintshire 004	45	7.9

MSOA EASR with 95% confidence interval
<ul> <li>Wales (EASR = 6.9)</li> <li>Health Board (EASR = 6.7)</li> <li>MSOAs surrounding the Hanson Cement Plant</li> </ul>

#### Flintshire

	004	7.9	
	011	7.8 •	<b></b> ●
	015	6.9 <mark>I</mark>	<u> </u>
	003	6.8 💾	
	005	6.8 +	
	007	6.7 -	
	002	6.6 🛏 🕨	
	009	6.5 +	
	016	6.3 +	-1
ð	017	6.3 🛏 🗝	-1
Š	800	6.3 🗖	-1
-	013	6.1 -	4
	014	6.0 ⊢	-1
	012	6.0 ⊢	-1
	006	5.7 -	
	020	5.5	
	001	5.3 + • +	
	010	5.2 ⊢∙––∎	Flintahina
	019	5.1 ⊢	
	018	4.3 - 4.3	- LASK = 0 $-$
		EASR per 1,000	

## Definition

The rate per 1,000 population aged under 75 years admitted to hospital between 2004-08, for respiratory infections on an emergency basis. This has been standardised to take account of age structure.

## About emergency hospital admissions for respiratory infections, under 75 years

A higher rate is suggestive of a higher level of morbidity requiring unplanned hospital care. This may, in turn, reflect behaviours of people in seeking healthcare and the way in which health services are provided in both primary and secondary care. Admissions for respiratory infection may reflect underlying conditions that predispose individuals to acquiring respiratory infections.

## Pattern of emergency hospital admissions for respiratory infections, under 75 years

The emergency hospital admission rate for respiratory infections, under 75 year olds in North Wales is 6.7 per 1,000 population, which is slightly lower than the average of 6.9 per 1,000 population for Wales. MSOA rates in North Wales range between 4 and 11 per 1,000 population. The emergency hospital admission rates for respiratory infections amongst under 75 year olds across the areas surrounding the Hanson Cement Plant are lower than the average for Wales. This is beyond what is expected due to chance alone for MSOAs 018, 019 and 020.

## 7 Discussion

This report describes some key routine health related data for the areas surrounding the Hanson Cement Plant, Padeswood, in the context of Flintshire, North Wales and Wales as a whole.

Across Wales, North Wales and Flintshire there is wide variation in the levels of mortality, hospital admissions and cancer incidence. Some of the variation measured will be random or due to chance. Some of the variation will relate to factors that influence health, like deprivation at a community level or smoking at an individual level, or to other factors such as the way in which health services are provided.

In terms of general health, both all cause mortality and under 75 mortality was generally as good or better in the vicinity of the cement plant than experienced across Flintshire or Wales. There are generally fewer admissions to hospital in terms of overall admissions, elective admissions or emergency admissions.

Deaths from circulatory disease, both all ages and under 75s show a largely similar pattern i.e. better than Flintshire and Wales. The proportion of babies born of low birth weight, a general indicator of health both in early life and pregnancy, show levels that are similar to or lower than the average across Wales.

Looking at respiratory disease, emergency hospital admission rates among those aged 75 or under are generally similar to, or lower than rates elsewhere in Wales. This is the case for respiratory disease as a whole, respiratory infections, COPD and asthma.

Death rates from respiratory disease and COPD in the vicinity of the Hanson Cement Plant are broadly similar to that experienced elsewhere in Wales.

Cancer incidence for prostate, breast and lung cancer are similar in all areas to the Wales average. In some cases rates are higher, in some lower. However, in this analysis none are beyond what might be expected by chance alone for these individual cancers.

Six of the seven areas had an all cancer incidence similar to the Wales average. In one case (MSOA Flintshire 020) the rate is statistically significantly higher, i.e. beyond what one might expect from chance alone. This is one of two such MSOAs in Flintshire and one of fourteen such MSOAs in North Wales. Deaths rates from all cancer were not statistically significantly higher than Wales in any of the seven areas, but in two areas (MSOA 019 and MSOA 010) they were lower than what might be expected due to chance alone. Deaths and incidence may show different patterns due to a number of factors. These include that not all cancers have a high mortality, there is a time lag between diagnosis and death and the effect of chance, or random variation, on relatively small numbers. All cancer incidence and mortality are relatively non-specific indicators influenced by a large variety of factors (see section 5.4).

The areas surrounding the Hanson Cement Plant tend to be areas with relatively less deprivation compared to some other parts of Flintshire, North Wales and Wales, as measured by the WIMD, 2008. This may explain, at least in part, why these communities show relatively healthy profiles in comparison to Wales as a whole.

The data presented here is routine data, and its reliability is dependent on where the data comes from. Mortality data is complete and should be of high quality. However, deaths are

relatively rare events and at this local level, analysis for those aged under 75 is not possible for many indicators. In contrast, hospital admissions are relatively common occurrences. However, they do not represent the burden of ill health as directly. Emergency admission for different respiratory conditions will often reflect acute exacerbations of chronic problems. This is likely to be appropriate if concerns relate to exacerbation of such conditions. However, rates may also reflect medical management of these conditions.

Cancer incidence is provided to show the general pattern of cancer. More specific work on cancer is being undertaken by the Welsh Cancer Intelligence and Surveillance Unit as part of the investigation.

In any analysis of this nature type I and type II errors should be considered. When looking at information at such a local level, for many indicators a number of years have to be aggregated to provide data suitable for analysis. Even so, confidence intervals for a number of indicators remain wide and real differences in underlying health may be hidden. Attributing cause and effect is not possible from the descriptive analysis. It is impossible to disentangle the many factors that contribute to health status within these different communities. It should also be remembered that these indicators relate to the residence of an individual when an event, such as death or hospital admission, occurred. They do not necessarily relate to residence of those individuals at the time of any exposures that might have influenced the development of a condition.

One indicator in one area was classed as statistically significantly high. This result needs to be considered in the context of the number of analyses undertaken.

It would be expected that, if there were no true difference in the underlying rates across these seven areas, three or four results would be statistically significantly high due to chance alone given the number of indicators analysed. Similarly, three or four would be statistically significantly low due to chance alone across these areas and indicators. These would be considered a type I error (i.e. classed as unlikely to be due to chance, when in fact they are due to chance). The fact that only one is statistically significantly high, whereas there were thirty-two different results where an indicator was statistically significantly low in an area in the vicinity of the Hanson Cement Plant reinforces the generally positive picture of health reflected across the indicators analysed.

# 8 Conclusions

For the majority of indicators examined (146 of 147 comparisons), health, or the surrogate used, e.g. emergency hospital admissions, was similar to or better than typical for Wales, in the areas surrounding the Hanson Cement plant in Padeswood.

One indicator, all cancer incidence, in one area (MSOA Flintshire 020) was statistically significantly higher than the all Wales rate. This reflects a diverse group of cancer types with differing underlying risk factors. All cancer mortality did not show a similar pattern, and two MSOAs (MSOA Flintshire 013 and 019) were statistically significantly lower than the all-Wales rate.

The factors that contribute to levels of health in an area are numerous and complex. The relatively low levels of deprivation are likely to contribute to the levels of health seen in the area.
A descriptive analysis of health in the vicinity of the Hanson Cement Plant

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#### Appendix A Summary of statistical significance





# Appendix B Indicator Definitions

Indicator	Definition
All cause mortality	All deaths, for all cause, all age as a rate of the population
All cause mortality under 75 years	All deaths, for all cause, aged under 75 years as a rate of the under 75 population
Low birth weight	Singleton (i.e. not twins) births with a weight of less than 2500g as a rate of singleton live births
Circulatory mortality	Deaths from circulatory (ICD-10 codes I00-I99), all age as a rate of the population
Circulatory mortality under 75 years	Deaths from circulatory (ICD-10 codes I00-I99), under 75 years as a rate of the under 75 population
Coronary heart disease mortality	Deaths from coronary heart disease (ICD-10 codes I20-I25), all age as a rate of the population
Hospital admissions aged under 75 years	Persons aged under 75 years, patient class 1, all admission methods, during 2008 for all diagnoses. Each person was only counted once, well-babies were excluded from this analysis
Emergency hospital admissions under 75 years	Persons aged under 75 years, admissions method between 21 and 29, during 2008 for all diagnoses. Each person was only counted once, well-babies were excluded from this analysis
Elective hospital admissions under 75 years	Persons aged under 75 years, admissions method between 11 and 15, during 2008 for all diagnoses. Each person was only counted once, well-babies were excluded from this analysis
All cancer incidence	Cancer incidence (ICD-10 codes C00-C97 excluding C44 ('other skin')), all age, between 2004-8
All cancer mortality	Deaths from cancer (ICD-10 codes C00-C97 excluding C44 ('other skin')), all age as a rate of the population between 2004-8
Lung cancer incidence	Lung cancer incidence (ICD-10 codes C33-C34), all age, between 2004-8
Lung cancer mortality	Deaths from lung cancer (ICD-10 codes C33-C34), all age as a rate of the population between 2001-8

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Indicator	Definition
Prostate cancer incidence	Prostate cancer incidence (C61), males, all age, between 2004-8
Breast cancer incidence	Breast cancer incidence (C50), females, all age, between 2004-8
Emergency admissions for respiratory disease under 75 years	Persons aged under 75 year, patient class 1, admission method 21 to 29, between 2004-8, where primary diagnosis between J00 and J99
Respiratory mortality	Deaths from respiratory disease (ICD-10 codes J00-J99), all age as a rate of the population
Emergency admissions for COPD under 75 years	Persons aged under 75 years, patient class 1, admission method 21 to 29, between 2004-8, where primary diagnosis between J40-J44 and J47. <sup>10</sup>
COPD mortality	Deaths from COPD (ICD-10 codes J40-J44 and J47 <sup>10</sup> ), all age as a rate of the population between 2001-2008
Emergency admissions for asthma under 75 years	Persons aged under 75 years, patient class 1, admission method 21 to 29, between 2001-8, where primary diagnosis was J45
Emergency admissions for respiratory infections under 75 years	Persons aged under 75 years, patient class 1, admission method 21 to 29, between 2004-8, where primary diagnosis between J00 and J22

# Appendix C

#### Glossary

ADBE	Annual District Birth Extract
ADDE	Annual District Death Extract
COPD	Chronic Obstructive Pulmonary Disease
EASR	European age-standardised rates
ICD-10	International Classification of Diseases $10^{th}$ Revision
LA	Local authority
LSOA	Lower Super Output Area
MSOA	Middle Super Output Area
MYE	Mid Year Estimates
ONS	Office for National Statistics
PEDW	Patient Episode Database Wales
USOA	Upper Super Output Area
WIMD	Welsh Index of Multiple Deprivation