JSNA: Climate & Health

Wirral Intelligence Service

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Background to JSNA – Joint Strategic Needs Assessment
What is a JSNA? A Joint Strategic Needs Assessment, better known as a JSNA, is intended to be a systematic review of the health and wellbeing needs of the local population, informing local priorities, policies and strategies that in turn informs local commissioning priorities that will improve health and wellbeing outcomes and reduce inequalities throughout the Borough. **Who is involved?** Information from Council, NHS and other partners is collected and collated to inform the JSNA and this reflects the important role that all organisations and sectors have (statutory, voluntary, community and faith) in improving the health and wellbeing of Wirral's residents. **About this document** This JSNA section looks to contain the most relevant information on the topic and provides an overview of those related key aspects **How can you help?** If you have ideas or any suggestions about these issues or topics then please email us at wirralintelligenceservice@wirral.gov.uk or go to https://www.wirralintelligenceservice.org/

Version Number	Date	Authors
1.0	October 2016	Bryan Lipscombe, Sustainability Liaison Officer, Wirral Council, Tricia Cavanagh-Wilkinson, Public Health Advisor, John Highton, JSNA Programme Lead
2.0	October 2018	Bryan Lipscombe, Sustainability Liaison Officer, Wirral Council, Tricia Cavanagh-Wilkinson, Public Health Advisor, John Highton, JSNA Programme Lead

Content overview

Abstract	This report provides an overview of the potential impacts of climate change and how that in turn will adversely affect local residents who's health will be susceptible to shifting weather patterns and increases in temperature
Intended or potential audience	**External** • Wirral Partnership • Wirral Health & Wellbeing Board **Internal** • Councillors and Senior Officers • Climate Change Strategy Group • Public Health Teams
Links with other topic areas	• Mental Health (Adult) (Children and Young People) - Respiratory disease plus COPD, Asthma – Older People – Children & Young People – CVD – Cancer – Air Quality – Food - Child and Family Poverty – Deprivation – Black, Asian Minority Ethnic groups • Wirral Intelligence Service website for all other content

Key findings

- The global climate is changing driven by a rise in global temperatures due to increasing concentrations of greenhouse gases in the atmosphere. This is principally as a result of pollution associated with burning fossil fuels for heat power and transport.

- National Government policy suggests better adaptation will secure the most benefits for a range of vulnerable groups and places. Those who provide care for vulnerable groups have a role in limiting impacts.

- Fifteen of the seventeen warmest years on record have occurred since 2000.

- Changes in the climate have profound implications for health and future health inequalities globally and locally.

- Wirral's demographics suggest certain population groups could be more susceptible to climate change events and at greater risk of the subsequent impacts and negative outcomes on health and other aspects.

- The Wirral groups most susceptible to climate impacts on their health are:
  - **residents experiencing multiple deprivation**
    - Wirral has more Wards in the most deprived quintile than the England average
    - 13.1% of the working age population are claiming out-of-work-benefit
  - **people suffering from Cardiovascular Disease (CVD)**
    - Higher CVD mortality in Wirral's areas of deprivation.
  - **older people**
    - Wirral has an older (65+ and 85+) population that will increase by 2038.
  - **residents with poor mental health**
    - higher prevalence of severe mental illness compared with the North West and England average which is the main reason for claiming Employment & Support Allowance (ESA)
  - **respiratory illnesses**
    - Significantly worse than expected prevalence of diagnosed Chronic Obstructive Pulmonary Disorder (COPD)
    - There are approximately 8,000 residents recorded as having COPD and potentially 6,500 undiagnosed sufferers.
  - **those at risk of thermal illness**
    - Wirral has a higher incidence rate per 100,000 for malignant melanoma compared to the North West and England.
  - **Young children**
    - Wirral is significantly higher than England for emergency admissions for asthma with an estimated undiagnosed population of approximately 9,000

- Hotter, drier summers will increase the risk of CVD, heat stroke, respiratory illness, and food poisoning and gastrointestinal diseases and may exacerbate mental health problems.

- Storms and flooding may lead to shocks within local food production, injuries, death, and susceptibility to respiratory illnesses, gastro-intestinal illness, food poisoning, and contaminated water and have a detrimental impact on mental health.

- Warmer winters will reduce the risk of cold related illnesses such as seasonal flu and respiratory illnesses. There are a number of areas within Wirral that are at increased risk of flooding.

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What do we know?

Why is this important?

The global climate is changing as a result of greenhouse gas pollution associated with human activities. The view of the Deputy Chief Medical Officer, David Walker, point to changes in the climate having profound implications for health. He suggests that changing weather patterns, more frequent extreme weather and rising temperatures have direct impact on population health and also pose challenges to the way in which the NHS, public health and social care system operates (Sustainable Development Unit, 2014a).

Current scientific evidence suggests that the consequences of climate change will be more severe without concerted international action to cut pollution (Intergovernmental Panel on Climate Change, 2014). Some changes are expected from the pollution already in the atmosphere. These unavoidable changes will have implications for the health and wellbeing of people in Wirral. Weather events already have implications for people's health locally. The nature and severity of local weather events is expected to change and is likely to have negative consequences for public health. Fourteen of the sixteen warmest years on record have occurred since 2000, with 2015 confirmed as the warmest year globally on record (Committee for Climate Change, 2016).

Climate change has become an important factor, affecting current and future environmental sustainability and contributing to increasing inequalities in health. The 2010 Marmot report states that tackling social inequalities in health and tackling climate change must go hand in hand.

The Met Office, *State of the UK Climate* 2017 report (2018) highlights that 2017 was the 5th warmest year for the UK in a series from 1910, 2008-2017 was on average 0.3 degrees warmer than the 1981-2010 average for the UK. A Met Office report concluded that the UK can expect milder wetter winters, more hotter drier summers. Equally, as a consequence of natural fluctuations in the UK climate, that the UK should continue to plan, and be resilient to, wet summers and cold winters (Met Office Hadley Centre, 2014). A more recent Met Office report "Climate Risk An update on the science" states that although summers are expected to be drier by 2100 any summer downpours will be heavier due to climate change (Met Office, 2015).

Research by Liverpool John Moores University, "*The impact of climate change upon health and health inequalities in the North West of England"* suggests that climate change is expected to result in regional changes in temperature, rainfall, sea levels and extreme weather events. These events could have direct and indirect impacts on health, disproportionately affecting vulnerable populations including children and the elderly (Liverpool John Moores University, 2012).

According to the report Climate change: health effects in the UK, heatwaves are likely to become more frequent in the future. At present, the health burden due to low temperature exceeds that of high temperature. However, heat-related mortality, which is currently around 2,000 premature deaths per year, is projected to increase steeply in the UK throughout the 21st century. Cold is still likely to contribute to the majority of temperature related health effects over the coming decades, although to a lesser extent than present day levels. The elderly are more vulnerable to extreme heat and cold than younger people, so future health burdens are likely to be amplified by an ageing population.

The Parliamentary Environmental Audit Committee has produced a timely report (June, 2018) suggesting that the country is ill-prepared for the impact of the increased frequency and intensity of heatwaves that are predicted to occur in the coming years. The report suggests that this issue is not being given the attention it requires by national or local government, and that budget cuts to programmes that support local authorities to tackle climate change need to be reversed.

Facts about Climate and Health

Global

- The Paris Agreement on climate change is a significant step forward. 195 nations including the UK will "pursue efforts" to prevent more than a 1.5 ˚C increase in global temperatures. Current commitments to reduce emissions however, even if fully implemented, will lead to an estimated 2.7 ˚C rise (Committee on Climate Change, 2016).
- Average global temperature could rise between 2˚C and 5.5˚C by 2100 compared to the late 1800's (Committee on Climate Change, 2015).
- The global mean temperature has increased by 0.8˚C since 1850. (Royal Society, 2010). Climate change has already at least doubled the chance of a severe heatwave in Europe (Committee for Climate Change, 2016).
- Scientists believe it is extremely likely (95%-100%) that human influence has been the cause of observed warming since the mid-20th Century (IPCC, 2013) and that the rise in global temperatures that is driving changes in the climate results from an increase in 'greenhouse gases' (GHGs) in the atmosphere associated with human activities.
- The rise in GHGs is associated with the burning of fossil fuels for heat, power and transportation; changes in land uses such as the clearance of forests; the production of concrete; the rearing of cattle for food; and the production and use of fertilisers in agriculture (Green Alliance, 2011).
- Carbon dioxide (CO_2) is an important GHG linked with human activities. Today the proportion of the volume of the atmosphere made up by CO2 is about 0.039 per cent; in pre-industrial times it was only 0.028 per cent (Green Alliance, 2011).
- Even if GHG emissions are cut dramatically in the coming years some impact will be inevitable as a result of changes to the climate already set in motion (McMullen and Jabbour, 2009).

The Committee for Climate Change (2016) has stated that the greatest climate change-related threats for the UK are:

- Large increases in flood risk
- Exposure to high temperatures and heatwave
- Shortages of water
- Substantial risk to UK wildlife and natural ecosystems
- Risk to domestic and international food production and trade
- New and emerging pests and diseases

Regions Northwest England

In North West England, looking ahead under a 'medium' GHG emissions scenario (Liverpool John Moores University, 2012) it is expected that by the 2080s:

- Winter temperature will increase by 2.6^{o}C;
- Summer temperature will increase by 3.7^{o}C;
- Summer mean daily maximum temperature will increase by 4.8^{o}C;
- There will be an increased frequency and duration of heat waves;
- Winter rainfall will increase 16%;
- Summer rainfall will reduce by 22%;
- Heavy rainfall and storm events will increase;
- Sea levels will rise by 30-32cm;
- There will be a potential for increased human exposure to UV radiation from more time spent outside due to warmer temperatures although this is expected to be countered to some degree by reduced exposure as the stratospheric ozone layer recovers;
- There will be an increased risk of flooding events due to higher winter rainfall, the

frequency of heavy rainfall events and rising sea levels; and
- Levels of some air pollutants will fall as emission reduction measures have an impact, although levels of ground level ozone are expected to increase.

The changing climate is likely to impact on patterns of mortality and morbidity. In North West England (Liverpool John Moores University, 2012), there is the potential for positive and negative impacts:

- Warmer Winters will reduce the risk of cold related illnesses such as seasonal flu and respiratory illnesses;
- Hotter Summers will increase the risk of CVD, heat stroke, respiratory illness, and food poisoning and gastrointestinal diseases;
- Extreme temperatures may exacerbate mental health problems
- More incidences of sun burn and skin cancer from exposure to UV radiation;
- Changes in pollen seasons may increase risk of allergies and asthma;
- Higher ground level ozone in the summer may result in a higher risk of respiratory diseases;
- Higher levels of air pollution may impact negatively on mood;
- A reduction in air pollution associated with the reduction in burning fossil fuels will decrease the risks of respiratory and cardiovascular diseases;
- Storms will result in injuries and deaths, damage to property, transport hazards and power supply problems that may disrupt access to services;
- Communities experiencing flooding will be more susceptible to respiratory illnesses and may experience a detrimental impact on mental health;
- Heavy rain and floods may increase the risk of food poisoning and contaminated water;
- There will be a rise in health problems associated with insect borne pathogens as a result of changes in temperature and precipitation;
- Food production and security could be more at risk with availability and access becoming more of an issue.

The overall impact on health in North West England, taking into account both positive and negative aspects, is expected to be 'overwhelmingly negative' (Liverpool John Moores University, 2012)

Groups most at risk

Weather events already impact on people's health in Wirral (Wirral Council, 2010) and further climate change will exacerbate these impacts.

Research suggests there are a number of population groups, and/or issues that might be adversely affected by any ongoing or future climate change. These cover:

- Residents experiencing multiple deprivation
- Older people
- People suffering with respiratory illness including asthma and COPD
- Those with, or potential for, CVD
- Those at risk of thermal illness - young children and individuals with impaired thermoregulation, including the elderly and those on medications
- Those at higher risk of skin cancer
- Increasing gastro-intestinal illness including food poisoning and water-borne diseases
- Residents with poor mental health and wellbeing
- Those at most at risk to insect borne disease
- Access to healthcare
- Access to affordable food

Local population figures and trends

Based upon those groups most at risk this section then highlights some of those key groups and local numbers that could be impacted upon.

Population Projections for Wirral

Using subnational population estimates for Wirral Local Authority area the overall population is projected to increase by 1.7% between 2018 and 2038, from an estimated 322,700 in 2018 to 328,300 in 2038, however there are a number of significant changes within that increase - see table 1 below.

Table 1: Wirral Resident Population Projections by Age Group (Persons) Interim 2018 to 2038

Age Band	2018	2023	2028	2033	2038	% Change (2018-2038)
0-14	57.2	57.3	55.7	53.9	52.9	**-7.5%**
15-44	106.7	106.7	106.9	105.4	103.4	**-3.1%**
45-64	89.1	86.5	83.0	80.2	79.7	**-10.5%**
65-74	37.7	37.7	40.4	43.4	42.5	**12.7%**
75+	32.0	36.9	41.3	44.7	49.8	**55.6%**
ALL	**322.7**	**325.1**	**327.3**	**327.6**	**328.3**	**1.7%**

Source: Office for National Statistics, 2018

Notes: The latest subnational population projections are based on the 2016 mid-year population estimates and project forward the population from 2018 to 2038. ONS population estimates are presented in thousands and have been rounded to the nearest hundred for presentation purposes. Figures for individual age groups may not add up to the total figure due to rounding.

- The population over 75 is projected to increase at the fastest rate from 32.0 in 2018 to 49.8 in 2038, which equates an increase of over 55%.
- The older population (aged 65-74 and 75+ years) are expected to increase substantially. By 2038 this population will total 92,300, compared to 69,700 in 2018, which is 22,300 more people or almost 32% increase.
- The biggest decrease is in the 45-64 year age group, from 89.1 in 2018 to 79.7 in 2038 as a 10%, or 9,400 number, reduction.

A report by BIOPICCC Research Team (2011) looked to map extreme weather risks and growth in older populations and it highlights the vulnerability of the North West and possibly Wirral's population. It suggests within its maps that the area could be expected to have an increase in the number of heatwave events by 2030s as well as possible increase of coldwave events. With an increased older population there could be increased issues as a consequence.

Population Estimates by Wirral Ward

In table 2 below are the ward based population estimates for Wirral using 2016 mid-year ONS data release

Table 2: Estimated resident population by age group and Wirral ward/constituencies (mid-2016)

Ward of Residence (2004 boundaries)	Total Population	Under 15	15-44	45-64	65-84	85+
Bebington	15,584	2,764	5,060	4,371	2,877	512
Bidston and St James	15,630	3,540	6,067	3,852	1,974	197
Birkenhead and Tranmere	16,542	3,609	7,094	4,019	1,618	202
Bromborough	15,501	2,838	5,732	4,168	2,393	370
Clatterbridge	14,253	2,093	4,097	4,025	3,583	455
Claughton	14,565	2,398	4,809	4,152	2,704	502
Eastham	14,231	2,381	4,559	3,879	2,988	424
Greasby, Frankby and Irby	13,843	2,010	3,839	4,169	3,319	506
Heswall	13,257	1,905	3,230	3,875	3,600	647
Hoylake and Meols	13,255	2,027	4,054	3,951	2,617	606
Leasowe and Moreton East	14,626	2,955	5,112	3,871	2,368	320
Liscard	15,734	2,859	5,760	4,255	2,505	355
Moreton West and Saughall	13,973	2,236	4,585	4,092	2,711	349
New Brighton	14,919	2,376	5,214	4,397	2,508	424
Oxton	13,873	2,082	4,724	3,838	2,851	378
Pensby and Thingwall	12,973	1,923	3,692	3,702	3,183	473
Prenton	14,475	2,543	4,792	4,222	2,531	387
Rock Ferry	14,487	3,033	5,650	3,603	1,885	316
Seacombe	15,626	3,527	6,322	3,713	1,836	228
Upton	16,373	3,042	5,631	4,292	2,817	591
Wallasey	14,854	2,312	4,609	4,578	2,844	511
West Kirby and Thurstaston	12,664	2,008	3,370	3,795	2,957	534
Birkenhead Constituency	**89,572**	**17,242**	**32,859**	**24,587**	**15,149**	**2,238**
Wallasey Constituency	**89,732**	**14,137**	**26,554**	**24,000**	**17,397**	**2,858**
Wirral South Constituency	**72,826**	**11,160**	**23,007**	**20,251**	**13,784**	**2,011**
Wirral West Constituency	**69,108**	**13,922**	**25,582**	**19,981**	**12,339**	**2,180**
Wirral	**321,238**	**56,461**	**108,002**	**88,819**	**58,669**	**9,287**

Source: Office for National Statistics, 2018

Notes: The latest subnational population projections are based on the 2016 mid-year population estimates and project forward the population from 2018 to 2038. ONS population estimates are presented in thousands and have been rounded to the nearest hundred for presentation purposes. Figures for individual age groups may not add up to the total figure due to rounding.

- Wards with the highest number of residents are Birkenhead & Tranmere, Upton and Liscard. (16,542, 16,373 and 15,734 respectively)
- Birkenhead & Tranmere Bidston & St.James and Seacombe have a greater proportion of children (under 15's) residing in the ward. (3,609, 3,540 and 3,527 respectively)
- Heswall, Clatterbridge and Greasby, Frankby & Irby have the highest proportion of residents between 65 and 84 years (3,600, 3,583 and 3,319 respectively)
- Heswall, Hoylake & Meols and Upton have most residents aged above 85 years (647, 606, and 591 respectively)

For more information on specific populations please see our Wirral Intelligence Service website population information

Unemployment rates, out of work benefits and related areas of deprivation

Wirral Intelligence Service website provides a direct link to Wirral's Labour Market Profile as produced by NOMIS and to the latest profile

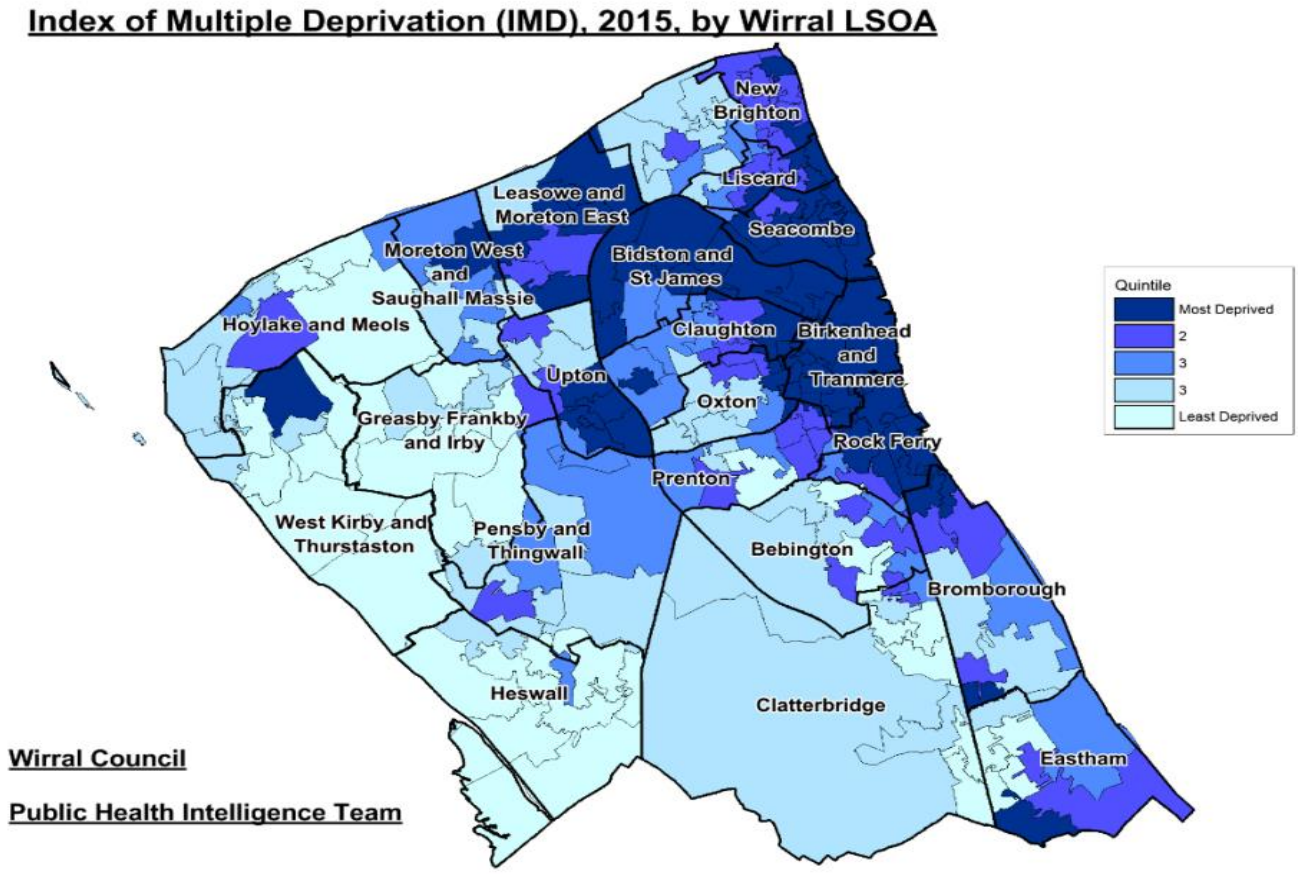
The profile suggests that:

- Wirral has 154,300 economically **active** residents (April 2017 – March 2018)
- Wirral has 43,100 economically **inactive** residents (April 2017 – March 2018) that

includes Students, those looking after family, temporary and long-term sick, retired and others

- Wirral currently has 6,000 people who are unemployed and claiming related benefits which is 3.9% of the available working age population
- Wirral has 30,930 claiming out-of-work benefits (August 2018) this includes Job Seekers, Incapacity Benefit/ESA, Lone parents, carers, Disabled, Bereaved and other income related benefits. (November 2016)

Map 1: Overview of Wirral – Indices of Multiple Deprivation, by Lower Super Output Area, 2015



- Indices of Multiple Deprivation 2015 remains the most recent review of this information
- As Map 1 shows Index of Multiple Deprivation (IMD) 2015, ranked Wirral for the first time as 66th so just outside the 20% most deprived local authorities nationally. The map (above) shows this differential in deprivation between the east and west of Wirral visually
- For more information visit our Wirral Intelligence Service website page for IMD 2015 content

Local health related issues

Key local health issues for Wirral that will be affected by climate change over the coming years are discussed in the following section.

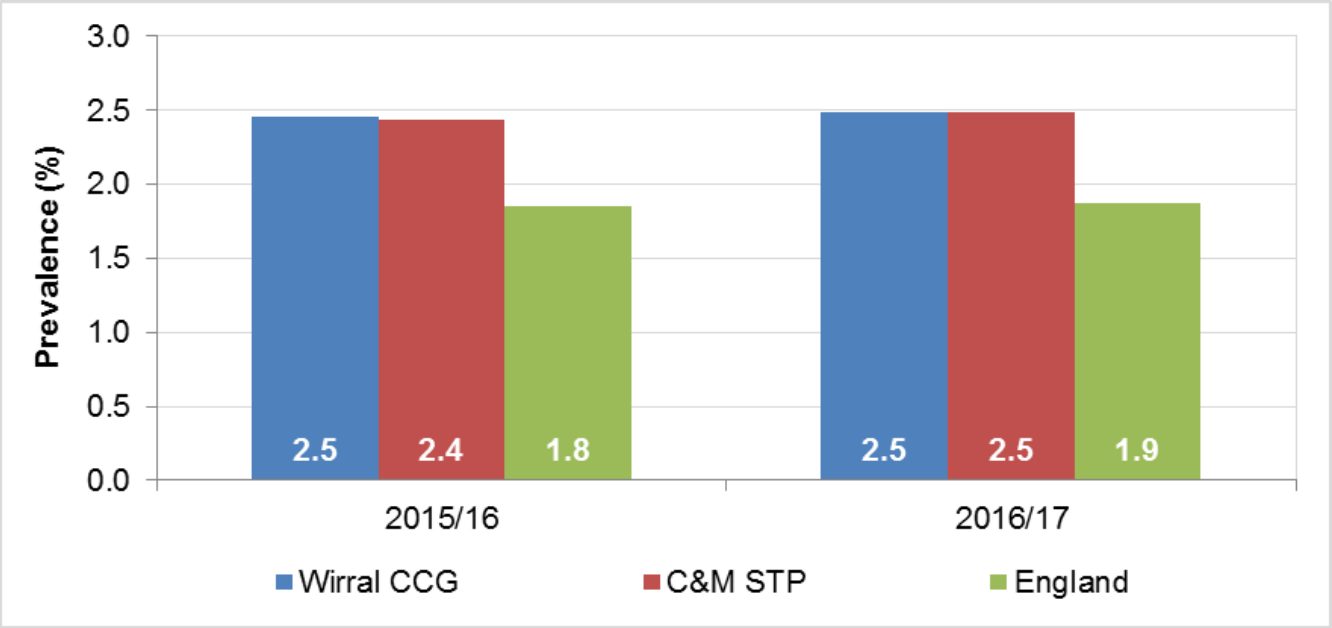
Previous studies show that current patterns of weather are associated with appreciable adverse health burdens in many cities and countries around the world (Basu, 2009; Basu and Samet, 2002; McMichael *et al*., 2008). It is envisaged that very few climate change related deaths will arise as a direct result of hyperthermia or hypothermia, but rather from temperature effects on disease, especially cardiovascular and respiratory. These heat and cold related deaths pose a significant problem to public health.

As described earlier there are groups at higher risk from the effects of climate change and there are a range of health conditions that could be exacerbated by changes in winter and summer climate conditions in this and future decades. These are noted below.

Chronic Obstructive Pulmonary Disorder (COPD)

It is estimated that COPD affects around 3 million people in the UK. Conditions and symptoms include emphysema and chronic bronchitis.

Figure 1: Quality Outcomes Framework recorded prevalence of COPD, for Wirral and other comparators, 2015/16 and 2016/17



Source: Quality Outcomes Framework, 2016/17, NHS Digital

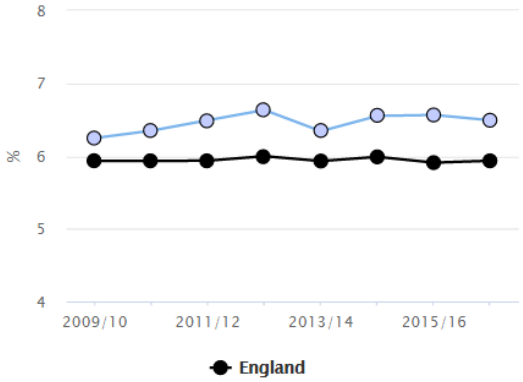
Figure 1 shows that the prevalence of COPD in Wirral in 2015/16 and 2016/17 is remaining the same at 2.5% and as is similar to that recorded in the Cheshire and Merseyside Strategic Transformation Partnership (C&M STP). However, both Wirral and C&MSTP have higher rates than the England average (1.8% increasing to 1.9%). The prevalence rate for Wirral of 2.5% (2016/17) equates to approximately 8,000 Wirral residents.

As well as the physical limitations of COPD, those diagnosed are more likely to suffer from mental health issues such as depression and anxiety. The Consultation on a Strategy for Services for COPD in England (Department of Health, 2010) sets out a number of recommendations stating that in addition to medication, people diagnosed with COPD should receive support from other agencies such as social care.

In addition to the impact on social care due to physical and emotional support needs, those diagnosed are also likely to be receiving care from a friend and/or family member. The Department of Health also recommends that specialist advice and information is accessible to carers of people with COPD.

When comparing local asthma prevalence figures, as in figure 2, with England and Regional NHS Areas, then we see that Wirral continues to have a rising count and percentage of practice population than England and Cheshire and Merseyside (2016/17).

Figure 2: Trend in asthma prevalence (all ages) using Quality Outcomes Framework for NHS Wirral CCG and comparators (percentage and count) (2009/10 – 2016/17)



Period		Count	Value	Lower CI	Upper CI	Cheshire and Merseyside	England
2009/10		20,740	6.2	6.2	6.3	6.1*	5.9
2010/11		21,109	6.3	6.3	6.4	6.2*	5.9
2011/12		21,528	6.5	6.4	6.6	6.2*	5.9
2012/13		21,964	6.6	6.5	6.7	6.2*	6.0
2013/14		21,073	6.3	6.3	6.4	6.1*	5.9
2014/15		21,822	6.6	6.5	6.6	6.2	6.0
2015/16		21,945	6.6	6.5	6.6	6.2	5.9
2016/17		22,278	6.5	6.4	6.6	6.2	5.9

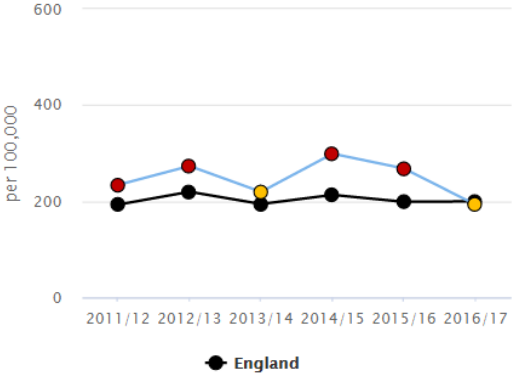
Source: QOF

Source: Public Health England: National General Practice Profiles (2018)

For asthma, as for children and young people with other long term conditions, it is important to understand local trends of emergency admissions and benchmarking against geographical and statistical neighbours that in turn support service review and redesign.

In terms of asthma hospital admission rates for under 19s we can see from figure 3 that until recently (2016/17) Wirral had higher hospital admission rates for under 19s than both national and regional averages.

Figure 3: Hospital admissions for asthma (under 19 years) for NHS Wirral CCG and comparators as Crude rate - per 100,000 (2011/12 – 2016/17)



Recent trend:

Period		Count	Value	Lower CI	Upper CI	Cheshire and Merseyside	England
2011/12		160	233.9	199.0	273.0	245.6*	192.8
2012/13		187	273.2	235.5	315.3	261.1*	219.6
2013/14		156	219.4	186.3	256.7	237.8*	194.1
2014/15		212	298.9	260.0	341.9	271.1*	213.1
2015/16		190	268.0	231.2	308.9	247.8*	198.6
2016/17		137	192.7	161.8	227.8	248.4*	199.7

Source: Public Health England: National General Practice Profiles (2018)

Cardiovascular disease (CVD)

CVD is a general term that describes a disease of the heart and/or blood vessels. Types of CVD include;

- Coronary Heart Disease (CHD)
- Heart Failure
- Hypertension (high blood pressure)
- Peripheral Arterial Disease (PAD)
- Stroke and Transient Ischaemic Attack (STIA)
- Atrial Fibrillation

By reviewing Public Health England's (PHE) Cardiovascular Disease Profiles it provides us with a greater understanding of the impact of the number of related CVD health issues that could be exacerbated by climate change:

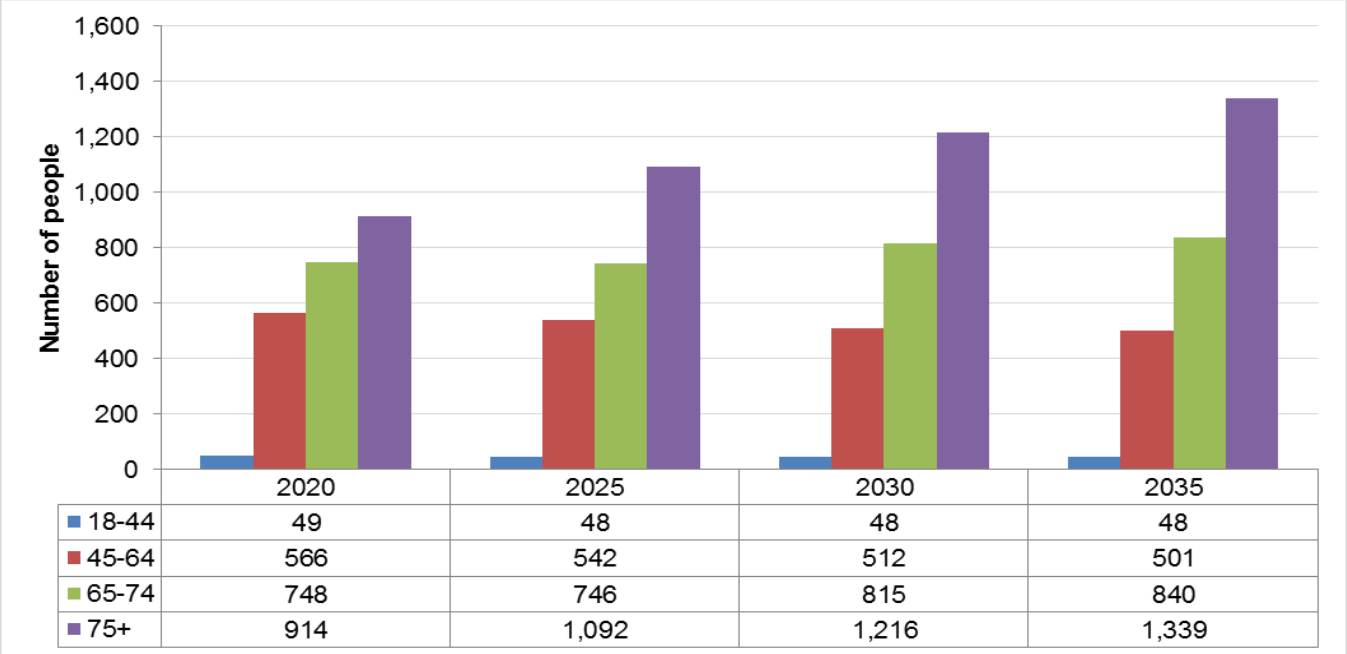
- The number of residents diagnosed with hypertension has increased from 44,000 in 2010 to over 53,000 in 2017
- Wirral has greater proportion of residents with hypertension than both Cheshire and Merseyside CCGs and England (15.6% compared to 15.2% and 13.8% respectively)

- Diabetes prevalence has increased from just over 14,000 in 2010 to almost 19,500 in 2017 with Wirral prevalence higher than both other Cheshire and Merseyside CCGs and England
- Coronary Heart disease prevalence for Wirral is similar to both Cheshire and Merseyside CCGs and England (3.8%, 3.8% and 3.2% respectively)
- There are increasing numbers of residents suffering from heart failure, in 2017 there were 3,478 patients compared to 2,446 in 2010 though we do see a similar population proportion to Cheshire and Merseyside CCGs and England
- Chronic Kidney Disease prevalence as a proportion of overall practice numbers has reduced from 5.1% to 4.9% but numbers have risen in that period from 12,248 in 2010 to 13,290 in 2017
- In terms of atrial fibrillation Wirral numbers are higher in 2017 at 8,778 compared to 5,580 in 2010 and a proportion of practice populations up from 1.8% in 2010 to 2.6% in 2017. This is now higher than Cheshire and Merseyside CCGs and England, also being second highest in the STP area for both prevalence

Supplementary Report highlighting Wirral CVD information in PHE Profiles

Different types of CVD will continue to have different impacts on social care in Wirral. Figure 4 (below) predicts that currently over 2,270 residents, rising to over 2,720 by 2035, may have a longstanding health condition as a result of a stroke with the consequences translating to increased needs for social care and support.

Figure 4: Wirral population, all ages, predicted to have a longstanding health condition caused by stroke, projected to 2035



	2020	2025	2030	2035
18-44	49	48	48	48
45-64	566	542	512	501
65-74	748	746	815	840
75+	914	1,092	1,216	1,339

Source: PANSI 2018

Further information around Cardiovascular Disease (CVD), including profiles on individual types of CVD, can be found in the Cardiovascular Disease section of the Wirral Intelligence Service website.

Skin Cancer (Melanoma)

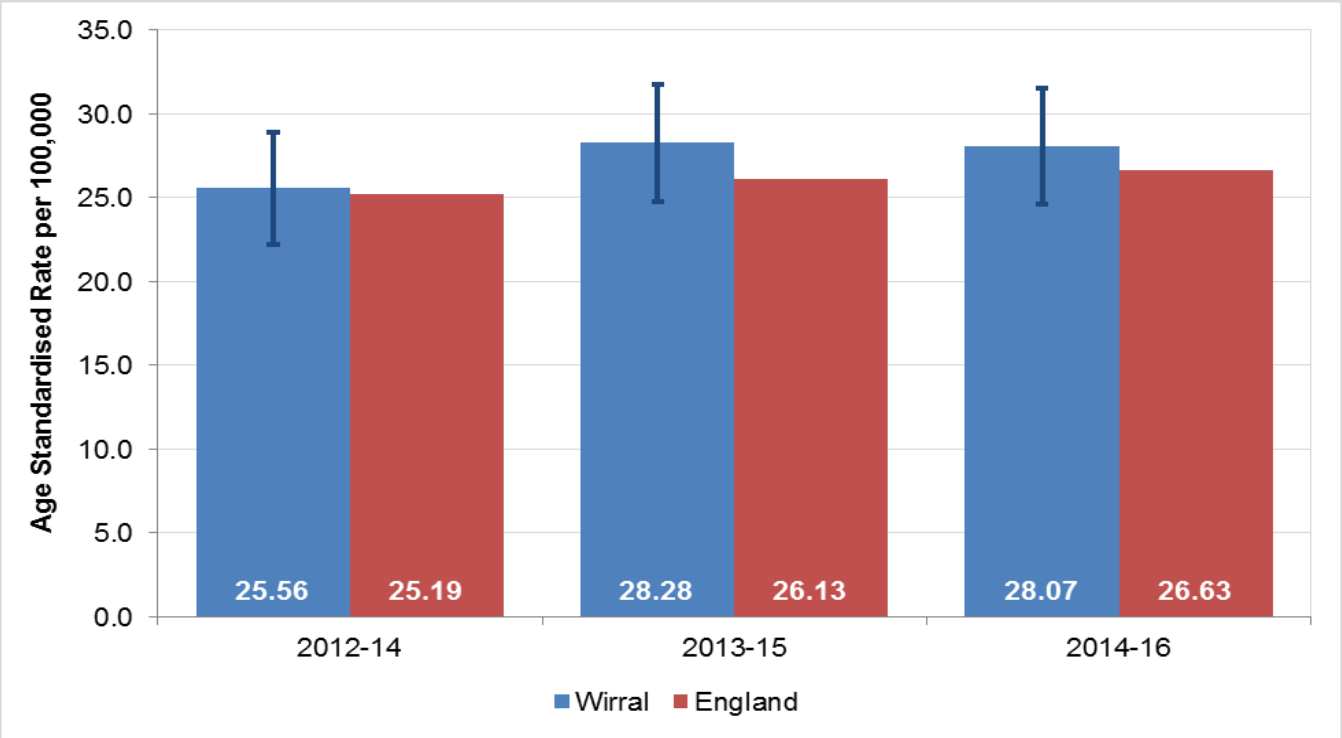
Melanoma is caused by skin cells that begin to develop abnormally. Exposure to ultraviolet (UV) light from the sun is thought to cause most melanomas, but there's evidence to suggest that some may result from sunbed exposure. The type of sun exposure that causes melanoma is sudden intense exposure – for example, while on holiday, which leads to sunburn.

To understand the effect of melanoma on the population cancer incidence rates are used. Cancer incidence rates are the number of new diagnoses of cancer per 100,000 people that are then adjusted to produce age-standardised cancer incidence rates (weighted to standardised populations).

In figure 5 below these incidence rates are compared for Wirral and England. The figure for Wirral has continued to be above the England figure since 2012-14 though there has been a slight closing in 2014-16 with the Wirral figure reducing to 28.07 cases per 100,000 population (2014-16) from 28.28 cases (2013-15). This equates to a number of 273 tumours over that 3-year period.

ONS released a presentation on Skin Cancer in England: A look at melanoma skin cancer over 20 years in July 2016.

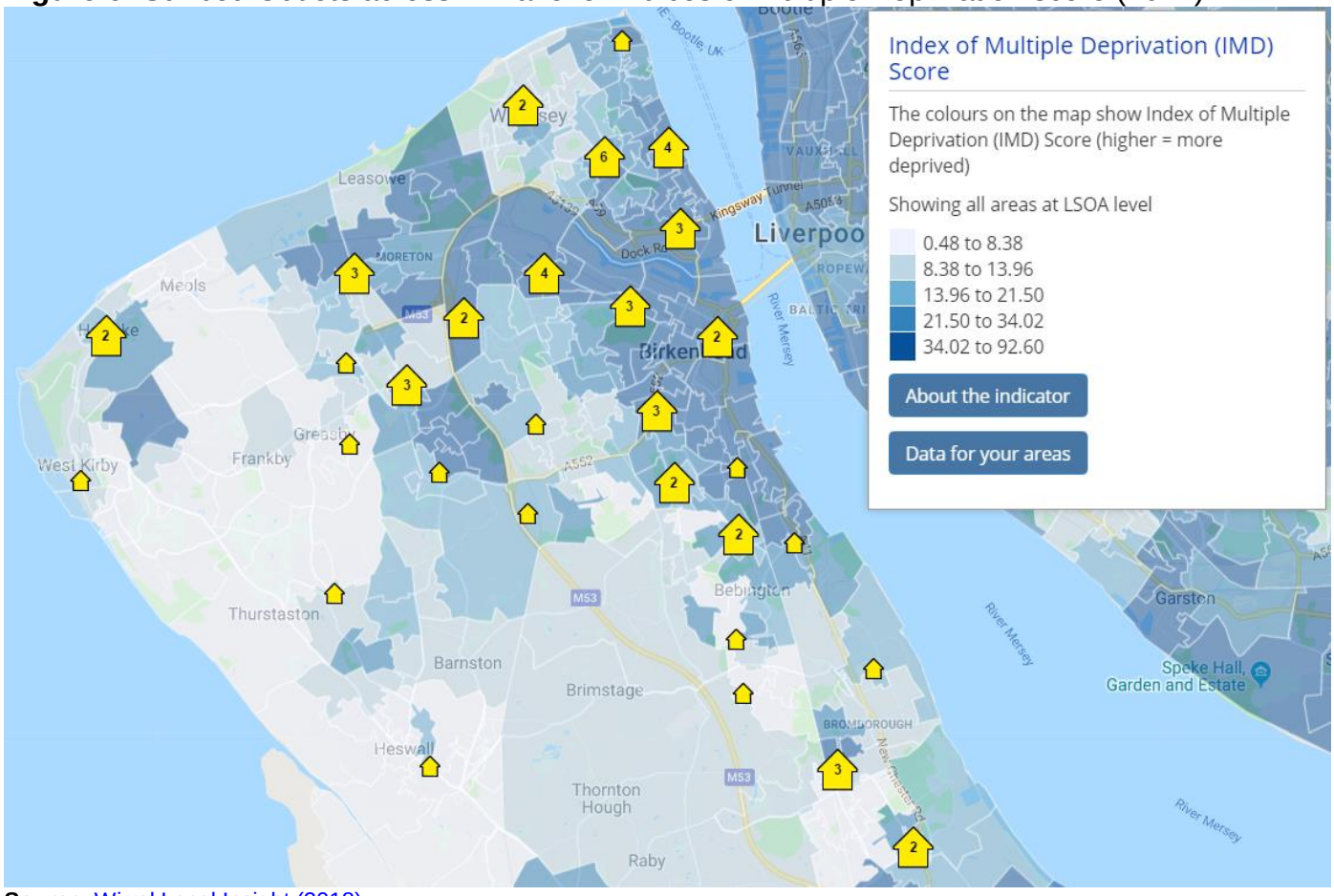
Figure 5: Malignant Melanoma: Incidence rate per 100,000 people, all age, comparison Wirral and England for 2012-14 to 2014-16



Source: Cancer Data 2018
Notes: Data is for all age and all persons. On Cancer Data page choose year range, geography, ICD10 code (C43)

In Figure 6 below it shows the sunbed outlets across Wirral overlaid onto the Indices of Multiple Deprivation score (2015). Wirral (as at 2017) had 60 outlets which is equal to that reported in the South West Public Health Observatory report, Sunbed outlets and area deprivation in the UK (2009) that went on to compare Wirral with other Local Authority areas of England. Wirral ranked 15th nationally for density at 19.5 outlets per 100,000 population which is very similar to figures in 2017.

Figure 6: Sunbed Outlets across Wirral over Indices of Multiple Deprivation score (2017)



Source: Wirral Local Insight (2018)

Mental Health

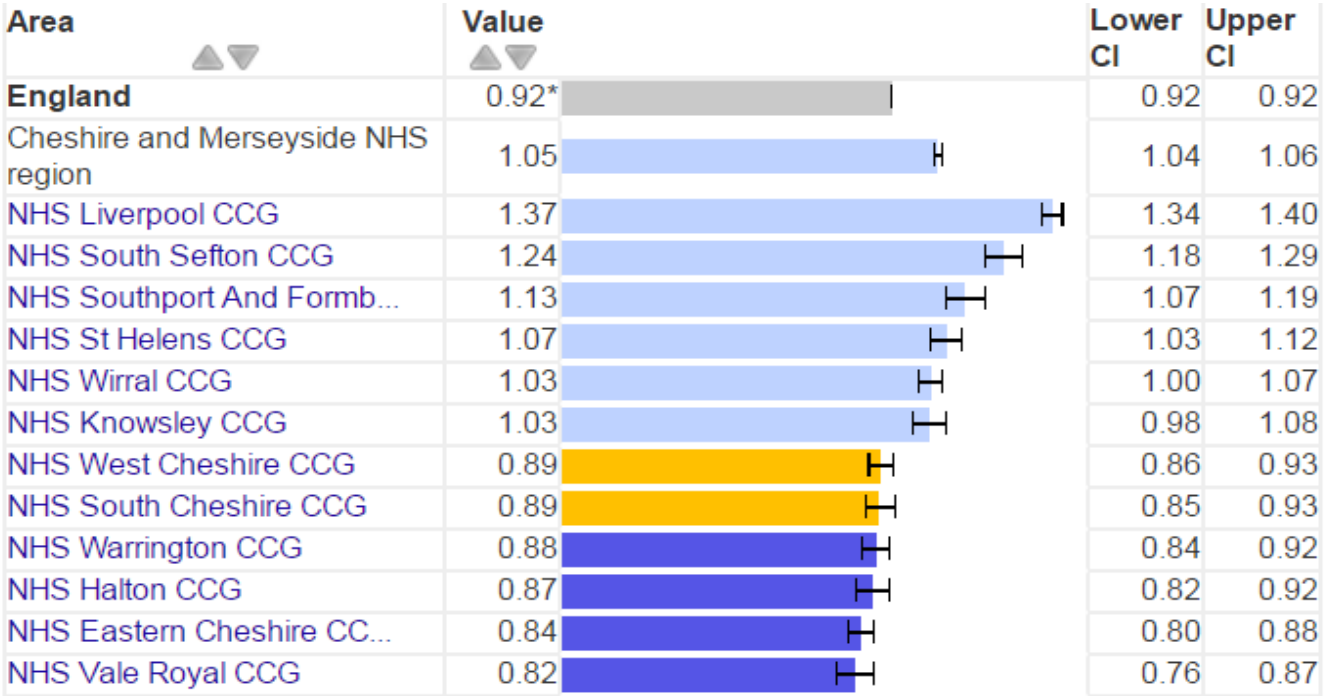
Please see section of the Mental Health content at Wirral Intelligence Service website

In various documents and this JSNA section it is noted the variety of health impacts of climate change. Global climate change is likely to be associated with spread of vector borne diseases, injuries and deaths due to extreme weather conditions such as floods, storms, and cyclones, thermal injury due to exposure to heat, risk of spread of water-borne infections due to floods and coastal water warming, and reduction in regional crop yields leading to malnutrition. The impact of global climate change on health is likely to be substantial. Mental health comprises an important component of health and is also likely to be affected by global climate change.

Key aspects related to Climate & Health are:

- National data suggests that people with a mental health problem are more likely to be on a lower income, be on welfare benefits, and live in debt.
- Mental health is also the most commonly reported reason for claiming employment and support allowance, both nationally and locally (NOMIS 2018)
- Hospital admissions data for mental health indicates a strong association between deprivation and increased admissions. Admissions for self-harm and prevalence of a common mental illness show a similar pattern. This indicates a greater need for mental health interventions in areas with higher levels of deprivation
- As seen in figure 7 below, Wirral is estimated to have a higher prevalence of severe mental illness compared with the England average but lower than average for Cheshire and Merseyside region (QOF, 2016/17)

Figure 7: Severe mental illness recorded prevalence (QOF): % of people with severe mental illness on GP practice registers (all ages) NHS Wirral CCG and other comparators (2016/17)



Area	Value	Lower CI	Upper CI
England	0.92*	0.92	0.92
Cheshire and Merseyside NHS region	1.05	1.04	1.06
NHS Liverpool CCG	1.37	1.34	1.40
NHS South Sefton CCG	1.24	1.18	1.29
NHS Southport And Formb...	1.13	1.07	1.19
NHS St Helens CCG	1.07	1.03	1.12
NHS Wirral CCG	1.03	1.00	1.07
NHS Knowsley CCG	1.03	0.98	1.08
NHS West Cheshire CCG	0.89	0.86	0.93
NHS South Cheshire CCG	0.89	0.85	0.93
NHS Warrington CCG	0.88	0.84	0.92
NHS Halton CCG	0.87	0.82	0.92
NHS Eastern Cheshire CC...	0.84	0.80	0.88
NHS Vale Royal CCG	0.82	0.76	0.87

Source: Quality and Outcomes Framework 2018

Local, Community and Stakeholder views

The latest Climate Change Strategy for Wirral, otherwise known as Cool was developed through a series of local public consultation activities to allow the public to share their views on various climate change issues which included:

2017 Wirral Residents' Survey This had survey questions about climate change included in the 2017 Version.
The survey found nine in ten Wirral residents believe in climate change (higher than the national average) and that over half of Wirral residents are prepared to make fundamental changes to their lifestyle (55%).

An online Public survey on cutting carbon emissions in Wirral (July – August 2012) was undertaken and there were 663 respondents with findings as follows:

Survey results point to relatively strong support for actions from each main theme:

- Measures to improve energy efficiency.
- Use of solar energy as a means to advance renewable energy.
- Public transport improvements and new facilities for walking and cycling as means to advance more sustainable patterns of transport.
- Waste reduction and the promotion of local and seasonal produce as means to reduce indirect pollution.

Across themes some common elements also emerge:

- A strong belief in the role of education, awareness raising and behaviour change interventions – with the notion of a need for 'culture change'.
- The importance of local leadership. Wirral Council is expected to take a lead, but so are community institutions such as schools and churches.

- Linked with leadership, the importance of promoting tangible 'real world' examples of the things that need to happen more commonly.
- The importance of policy and regulation particularly land use planning – and the need for coherence in the implementation of policies in different areas.
- The importance of incentives, particularly financial ones, to encourage preferred actions and the role of deterrents to limit damaging ones.

A public workshop held in Wirral in November 2012 saw 44 participants take part including members of the public, representatives from businesses, voluntary and community groups, and partner organisations from the Wirral Climate Change Group, findings were as follows:

- Strengths included partnership and existing legislation.
- Weakness included a lack of awareness and information, limited finance, and a perceived lack of commitment.
- Opportunities were seen to exist in relation to education, creating employment, exploiting new funding mechanisms and developing links with the health agenda.
- Threats perceived related to the impact of spending cuts and inconsistencies between policies.

Identifying priorities for future action:

- For *ways to improve energy efficiency*, education and awareness and planning/building control featured as priorities.
- For *ways to increase renewable energy*, energy from waste, business opportunities, communications and awareness raising and leadership from the public sector leadership were the top themes.
- For *ways to encourage sustainable travel,* measures to encourage cycling and regulate use of highways and the introduction of low energy street lighting were popular.
- For *ways to reduce indirect impacts*, local food and procurement specifications were the themes that attracted most 'votes'.
- Several common ideas emerged across the different topic discussions:
- Leadership – particularly public sector leadership;
- Raising awareness and educating;
- Local business opportunities; and
- Stronger planning requirements.

The creation of exemplar eco houses was popular in discussions of both energy efficiency and renewable energy.

An online survey on ways to adapt to unavoidable climate change in Wirral (October - December 2012) was undertaken and there were 576 respondents with findings as follows. The results of the survey point to some support for actions to adapt Wirral to expected changes in the local climate. Responses to the different weather events envisaged include several common elements:

- The role of education and awareness raising efforts to bring about changes in behaviour – sometimes general and sometimes very specific
- The role of planning and regulation improving resilience of future buildings and to prevent future spatial patterns of development exacerbating negative impacts
- Concerns about impacts on the health of vulnerable groups
- Recognition of a shorter term emergency response – being prepared for and able to react to conditions on the ground as they develop - and longer term proactive response through which steps are taken to mitigate impacts in advance
- The role of the green infrastructure – green and open spaces, trees, water courses etc. in ameliorating impacts

A Public workshop on adapting to climate change in Wirral (18th April 2013) saw 53 participants take part including members of the public, representatives from voluntary and community groups, and partner organisations from the Wirral Climate Change Group, findings were as follows:

- Strengths included existing partnerships, Wirral's relative physical advantages and its early preparation of related plans
- Weaknesses included a lack of information and awareness; fragmentation and contradiction in policy; and a lack of funding
- Opportunities were seen to exist in: education and awareness work; links with the economy; the development of sustainable energy infrastructure; and the renovation and refurbishment of the built environment
- Threat was the impact of budget cuts and the economic down turn limiting both the scope and capacity for action

Areas for future action

- Common issues raised around building capacity in communities and organisations including: awareness, education, community development, networking, planning processes and role of volunteers in emergency responses.
- Common issues raised around health, well-being and adaption including: impacts of particular weather extremes; education, awareness and behaviour change; emergency preparedness and the value of investment in green infrastructure.
- Discussions around green spaces and adaptation highlighted a number of issues including: community engagement; education and awareness and the need for the creation, protection and management of green spaces.
- Common issues were raised around adapting buildings and physical infrastructure including: assessing risk to critical infrastructure; water management; stronger regulation; the incorporation of adaptation issues into design standards; and education awareness and community engagement.
- A copy of the then draft Wirral Climate Change strategy was made available for public comment between December 2013 and February 2014 with the online link to the final strategy.

What are we expecting to achieve? (Targets)

Climate Change Act 2008

The Climate Change Act 2008 establishes a legal framework for government action on climate change, both mitigation and adaptation. The current UK targets are to reduce GHG emissions by at least 34% by 2020 and at least 80% by 2050 from 1990 levels. The act establishes a system of binding five-year 'carbon budgets' to drive progress towards these targets. With respect to adaptation, there is an obligation to produce a UK Climate Change Risk Assessment (CCRA) every 5 years (the first was published in January 2012 (Defra, 2012) and an associated National Adaptation Programme (Defra, 2013).

The second UK Climate Risk Assessment was published in 2017 (HM Government, 2017) with the second National Adaptation Programme in 2018 which outlines Government adaptation plans from 2018-2023 (HM Government, 2018). The risk assessment outlines six urgent priorities for action including risks to health, well-being and productivity from high temperatures.The Act gives the Government the power to require public authorities and statutory undertakers (including utility companies) to report on how they have assessed the risks of climate change for their work, and what they are doing to address these risks.

Wirral Council seeks to demonstrate leadership in cutting carbon emissions and has set a target to reduce its own emissions by 60% by 2025 from a 2008/09 base year (Wirral Council, 2011). There are currently no local targets relating to adaptation to climate change.

Public Health Outcomes Framework 2016-2019

Improving the wider determinants of health

- 1.16 Utilisation of outdoor space for exercise/health reasons

Health Improvement

- 2.23 Self-reported wellbeing

Health Protection

- 3.01 Fraction of mortality attributable to particulate air pollution.
- Healthcare public health and preventing premature mortality
- 4.04 Under 75 mortality rate from all cardiovascular diseases (including heart diseases and stroke) *(NHSOF 1.1)
- 4.7 Under 75 mortality rate from respiratory diseases *(NHSOF 1.2)
- 4.8 Mortality rate from a range of specified communicable diseases, including influenza
- 4.15 Excess winter deaths

NHS Outcomes Framework 2016/17

Preventing people from dying prematurely:

- under 75 mortality rate from cardiovascular disease (PHOF 4.4)
- under 75 mortality rate from respiratory disease (PHOF 4.7)

Adult Social Care Outcomes Framework 2017/18

Domain 4

- Safeguarding adults whose circumstances make them vulnerable and protecting from avoidable harm:

CCG Outcomes Indicator Set 2015/2016

- Potential years of life lost from causes considered amenable to healthcare adults, children and young people (NHS OF 1a i. & ii)
- Under 75 mortality from cardiovascular disease (NHS OF 1.1)
- Under 75 mortality from respiratory disease (NHS OF 1.2)

What are we achieving? (Performance)

Nationally emissions fell from 523 million tonnes to 357 million tonnes over this period (2005-2016). In Wirral, emissions fell by around 34% between 2005 and 2016. (BEIS, 2018)

Figure 8 below provides a comparison of per capita CO2 emissions totals between 2005 and 2016 for England, North West and Wirral. This highlights Wirral being consistently lower than both North West and England over that period.

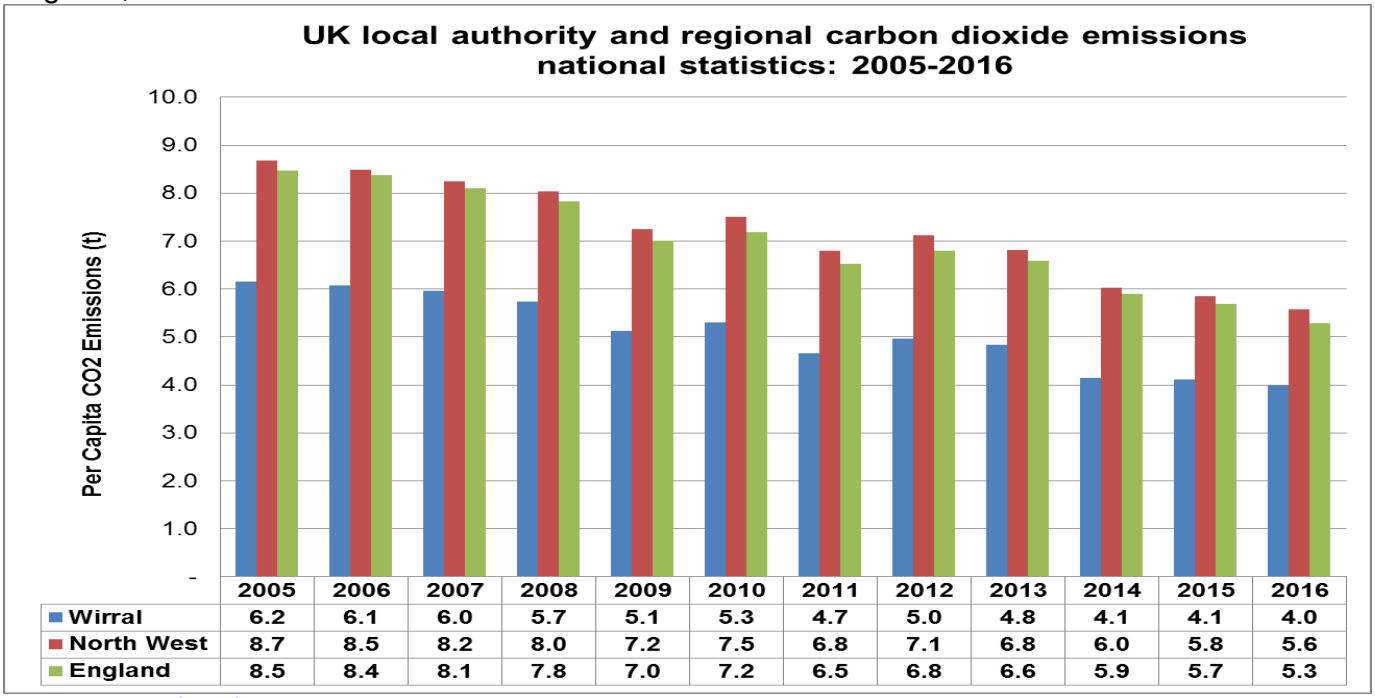
Local Authority trends since 2005

There is more variation in trends at Local Authority level than at regional level. In particular, emissions for many Local Authorities are heavily influenced by activities at industrial sites, and changes at a single site can have a big impact on emissions trends. (DECC 2018)

Since 2015, emissions have decreased in 370 out of the 391 Local Authorities (95 per cent). This is consistent with the decrease in overall UK emissions from 2015 to 2016. The main drivers of the decrease in UK emissions in 2016 were a change in the fuel mix for electricity generation, with a decrease in the use of coal and more use of gas and renewables.

As noted in Figure 8, and in line with the overall Wirral reduction, Wirral Councils own emissions are falling in line with the Council's Carbon Budget targets. These figures are produced and reported annually by Wirral Council (Wirral Council, 2018).
http://www.wirral.gov.uk/about-council/climate-change-and-sustainability/greenhouse-gas-emissions-reports

Figure 8: Comparison of per capita (person) CO2 emissions totals between 2005 and 2016 for England, North West and Wirral



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Wirral	6.2	6.1	6.0	5.7	5.1	5.3	4.7	5.0	4.8	4.1	4.1	4.0
North West	8.7	8.5	8.2	8.0	7.2	7.5	6.8	7.1	6.8	6.0	5.8	5.6
England	8.5	8.4	8.1	7.8	7.0	7.2	6.5	6.8	6.6	5.9	5.7	5.3

Source: DECC (2018)
Notes: Per capita Local CO2 emission estimates 2005-2016 (t CO2 per person) …
CO2 emissions per person in the Industrial & Commercial, Domestic and Transport sectors for all Local Authorities in the UK.
Overview: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2014

What is this telling us?

Vulnerability to climate change effects

Neighbourhoods and communities

The report, *Climate change, justice and vulnerability* (2011) by Joseph Rowntree Foundation (JRF) suggests the existence of a number of key neighbourhoods and groups who are likely susceptible to the negative effects of climate change. The report suggests that extreme weather events make a variety of dimensions of well-being insecure. Measures of the impacts of climate events such as flooding and heatwaves on well-being tend to focus on loss of life, damage to physical health and the loss of income and property. While these are important, a focus on these alone seriously underestimates the losses in well-being involved. Impacts of floods include, for example, living in temporary accommodation, the disruption of children's education, the irreplaceable loss of memorabilia and the loss of control of daily routines. These do not just matter for their impacts on health and livelihood. They are important losses in central dimensions of well-being in themselves.

The results of the JRF work points to extremes in climate-related social vulnerability in the UK. They go onto describe that it is only where neighbourhoods with high socially deprived vulnerability have the potential to come into contact with hazards of a sufficiently large magnitude that climate disadvantage will occur. It is in climate-disadvantaged areas where adaptation efforts must be prioritised.

Most, but not all, extremely socially vulnerable neighbourhoods are in the UK's large urban centres and there is a notable coastal component. Many neighbourhoods have joint climate-related social vulnerability in relation to heat and flood and this includes parts of Wirral (see maps in JRF report).

For the UK this is true for about two thirds of the most extremely socially vulnerable neighbourhoods. The North West and Yorkshire and The Humber regions have the highest proportions of extremely socially flood-vulnerable neighbourhoods.

A more recent report from the JRF "*Climate Justice: How did we get there*" claims that the poorest people suffer most from climate change and are often excluded from policy decision making. Climate justice links climate change and social justice and is an emerging global issue. The report highlights the importance of the United Nations climate change negotiations taking place in late 2015 where the drafting of post-2015 global sustainable development goals will take place (Joseph Rowntree Foundation, 2014).

In late 2015 the JRF published "*Community resilience to climate change: an evidence review"* that focuses on three key areas of action, flood risk management, food growing and community energy (https://www.jrf.org.uk/report/community-resilience-climate-change). The report defines community resilience as "the ability of communities to reduce exposure to, prepare for, cope with, recover better from, adapt and transform as needed to, the direct and indirect effects of climate change, where these effects can be both shocks and stresses".
The report goes on to say that the most vulnerable communities are the least likely to be able to develop community-led resilience actions and lists key recommendations for local authorities:

- Develop clearer local climate resilience strategies and actions.
- Develop multi-stakeholder partnerships to secure funding for climate change resilience initiatives.
- Build community capacity, skills and networks.
- Identify people and places that face high social vulnerability to the consequences of climate change and facilitate partnerships to carry out actions to support them.

The JRF commissioned Paul Watkiss Associates to complete a study on *"Climate Change impacts on Future Cost of Living"* (Watkiss et al, 2016)

The report found that the household food bill of the average family could rise by 9% by 2050 which would impact lower income households the most. It also found that heating costs would fall, water costs would rise marginally and that increased flooding could lead to major life-changing impacts for low income households due to the lack of contents insurance. Overall the study concludes that there are likely to be relatively modest impacts on the costs of living and household budgets in the UK from climate change up to the middle of the century, though potentially large increases in household costs thereafter.

The Climate Just map tool shows geography of England's vulnerability to climate change at a neighbourhood scale (2016) (free registration with site required)

Flooding and Wirral Flood Risk Areas

Damages from flooding and coastal change are already high, averaging an estimated £1 billion per year in the UK; Warming of 4^{o}C or more implies inevitable increases in flood risk across all UK regions even in the most ambitious adaptation scenarios considered, (Committee for Climate Change, 2016). There are a limited number of flood areas across Wirral. These can be seen in Map 2 and Map 3 below. You can check if your own property is in a flood risk area by following link. However, there are other areas not highlighted on the maps below that may suffer from ground water flooding due to heavy rain.

Map 2: Flood Map for Planning for North Wirral (Rivers/Sea/Flood Warning Areas) 2018

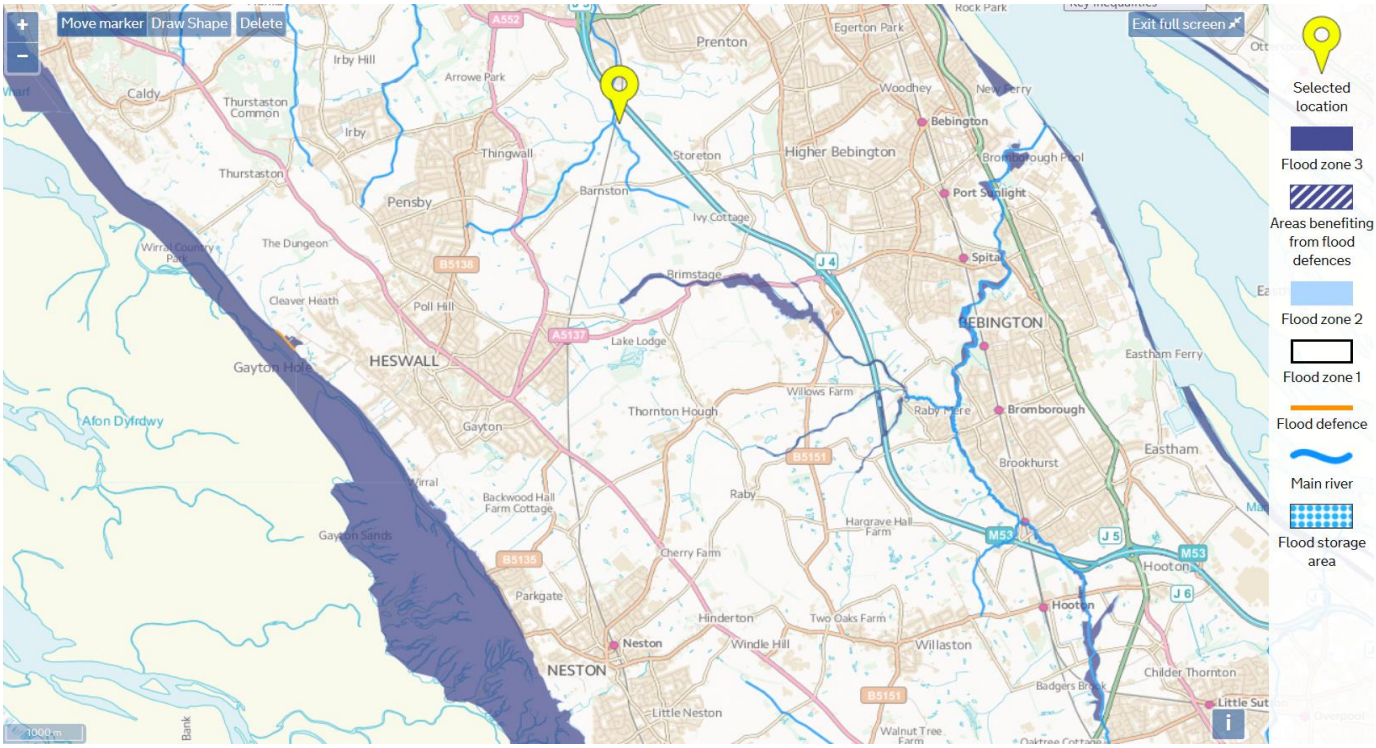
Source: Gov.uk - 2018
Notes: Was formerly The Environment Agency search engine that allowed the input of individual post codes in order to see if they would be affected by different types of flooding. Now available at https://flood-map-for-planning.service.gov.uk/

Wirral Council commissioned a Section 19 Flood Investigation to look at the causes of flooding on 22nd August and 2nd September 2015. AECOM carried out the investigation into the intense rainfall across Wirral on the above dates where both internal and external flooding was reported that was caused by surface water, sewer, combination and river flooding. The report highlights some lessons learned:

- Communications and contingency planning need to be improved, including the development of a multi-agency severe weather contingency plan and better capacity within the council's switchboard contact system.
- Community resilience needs to be improved as the results of a residents survey found that most of the affected residents are uncertain how to find out more information about flood risk, how to improve the resilience to flooding or how to obtain additional support if needed. The report suggests that establishing community flood groups, developing a flood toolkit and holding a flood fair for residents would help as would reviewing the council's decision not to provide sandbags during floods.

The report recommended that an action plan be developed to work through the recommendations within it.

Map 3: Flood Map for Planning for South Wirral (Rivers/Sea/Flood Warning Areas) 2018



Source: Gov.uk - 2018
Notes: Was formerly The Environment Agency search engine that allowed the input of individual post codes in order to see if they would be affected by different types of flooding. Now available at https://flood-map-for-planning.service.gov.uk/

Food Insecurity and Nutrition

A Met Office report (2012), *"Climate impacts on food security and nutrition",* states that one of the most significant impacts of climate change will be an increase in food insecurity and malnutrition. This will be due to extreme weather events with potential to destroy crops and infrastructure and long-term and gradual climate risks such as the rise in sea levels. Effects arising from the exacerbation of existing threats to food security could include the increased frequency and intensity of climate hazards, reduced agricultural yields and production, health and sanitation risks, water scarcity and conflicts over scarce resources (IPCC, 2007).

As a society we are increasingly distanced from our food – how it's grown, how it's produced and what's in it. The type of food we eat has a huge impact on our society for a number of reasons but one is the impact it has on the environment and climate change. Better Food Wirral looks to develop a good food culture so people understand how food is grown, learn about sustainability, make connections with health and the impact we make on the environment, and caring about what we eat and how it was produced or reared.

The more we understand about where our food comes from, how we farm and process it, how we cook and eat it, the more we can build a good food culture, and educate future generations to respect our food, our health and our wider environment. Better Food Wirral 2014 documents including Launch Event & Conference Report, Research paper and what other areas are doing about local food can be found on Wirral Intelligence Service website under Food Poverty

The Committee on Climate Change Risk Assessment 2017 synthesis report (2016) states that, access to safe, nutritious and affordable food in the UK is subject to domestic and international risks. Areas that need further action include:

- Weather related shocks to global food production: droughts can disrupt production within regions whilst other events such as flooding can cause supply chain problems.

- Longer-term, incremental climate change will shift the balance of global food production between regions.
- The changes will influence markets, trade and domestic prices and in turn impact UK businesses – especially farmers – and lower income households.

Risks to soils and agricultural production from changes in rainfall: domestic agricultural production is likely to be constrained by reduced water availability and increased soil aridity and erosion. Conversely, a trend towards wetter winters is likely to increase problems such as soil compaction and erosion, unless good management practices are adopted

Key potential future impacts

Previous research "*The impact of climate change upon health and health inequalities in the north west of England*", suggests that climate change is expected to result in regional changes in temperature, rainfall, sea levels and extreme weather events. These events could have direct and indirect impacts on health, disproportionately affecting vulnerable populations including children and the elderly (Liverpool John Moores University, 2012).

A new report by the Royal College of Physicians (2016) *"Every breath we take: the lifelong impact of air pollution"*, focuses on air pollution, stating that, air pollution plays a role in many of the major health challenges of our day, and has been linked to cancer, asthma, stroke and heart disease, diabetes, obesity, and changes linked to dementia.

For more information see Wirral Intelligence Service website content on Air Quality

Respiratory diseases including asthma

High levels of air pollution and periods of hotter than average temperatures are associated with increased risk of respiratory illnesses, (Liverpool John Moores University, 2012). Incidence of asthma and other respiratory allergies increase with exposure to air pollutants. Populations experiencing flooding are at higher risk of respiratory illnesses.

High levels of air pollution contribute to the risk of respiratory illnesses including asthma. It is believed that children who reside in areas of low socioeconomic status may be at an increased risk of developing asthma. Diagnosis of asthma, cases of severe asthma and hospitalisation for asthma are all associated with individual and area-based indicators of social disadvantage (Cesaroni et al, 2003)

Respiratory disease - Temperature

Studies suggest that incidence of respiratory illness may increase during or immediately following periods of high temperature, with estimated increases of mortality varying from 12%-80% during and following heat waves in the UK, Europe and USA (D'Ippoliti et al, 2010; Huynen et al., 2001; Revich and Shaposhnikov,2008; Rooney et al., 1998). Increased respiratory illness has been identified as the greatest contributor to increased mortality during extreme heat events (Revich and Shaposhnikov, 2008; Huynen et al., 2001).

Additionally, the risk of respiratory illness may increase in the days and weeks following a period of colder temperature (Hajat et al., 2002). It is suggested that cold weather is likely to increase rates of mortality from flu and flu-like conditions (Kunst et al., 1993), and therefore the predicted warmer average temperatures in the coming century may have a positive impact by reducing cases of flu and other respiratory illnesses during the winter months.
Please consider *"Wirral Excess Winter Deaths"* page of Wirral Intelligence Service website

Respiratory illness has a strong effect on increasing mortality risk during periods of high temperatures, particularly for elderly people over the age of 85. Respiratory-related deaths also increase during times of cold weather in both the over 85 years and the 0-64 years populations. Individuals living in nursing and residential homes are identified as being particularly at risk from respiratory illnesses during both hot and cold weather and their needs must be considered, Hajat et al (2007).

Flooding

Studies from the UK suggest that individuals who have experienced flooding may be at risk of respiratory diseases. In the days following flooding residents in flooded areas are susceptible to cold like symptoms including sore throats and coughs and in the following weeks and months may experience respiratory and chest illnesses (Reacher et al., 2004; Tapsell and Tunstall, 2008; Tunstall et al., 2006). These effects are attributed to the cold flood waters and the stress of cleaning up and having to live in cold and damp conditions. Exposure to fungal spores in damp housing is believed to relate to respiratory conditions including asthma (Cecchi et al., 2010)
You can check if your own property is in a flood risk area

Flooding - Precipitation
An association between thunderstorms and hospital admissions related to asthma is well established and therefore increasing incidence of storms this century may result in higher numbers of cases of asthma attacks (Cecchi et al., 2010).

Cardiovascular disease (CVD)

CVD, particularly coronary heart disease (CHD) and stroke, is the leading cause of death in the UK and accounts for approximately 200,000 deaths per year (Scarborough et al., 2010). Hot and cold temperatures and air pollution are associated with increased risk of CVD.

CVD - Temperature
Experiencing hot and cold temperatures can increase risk of cardiovascular problems by impacting upon a number of physiological factors including blood pressure, blood viscosity, blood cholesterol, thrombosis and hyperthermia. Studies of mortality rates during heat waves demonstrate that the risk of mortality and hospitalisations due to CVD, ischaemic heart disease and pulmonary disease may increase during periods of extreme higher temperatures (Braga et al., 2002; D'Ippoliti et al., 2010; Huynen et al., 2001; Revich and Shaposhnikov, 2008). A similar effect has been demonstrated during cold spells with higher incidence of cardiovascular-related illness and mortality during cold weather with the elderly particularly susceptible (Revich and Shaposhnikov, 2008; Huynen et al., 2001). Warmer average temperatures may therefore reduce the risk of CVD during future winters.

For more information see Wirral Intelligence Service website content on cardiovascular disease

Air Quality

Short-and long-term exposure to pollutants including particulate matter, sulphur dioxide and carbon monoxide is associated with increased risk of cardiovascular-related mortality (Department of Health, 2006; Pope et al., 2004; Pope and Dockery, 2006). CVD may be particularly affected by exposure to high levels of particulate matter (Dennekamp and Carey, 2010; Dockery, 2001; Pope et al., 2004).

Changes to climate could contribute to increasing the risk of cardiovascular disease which may in turn impact upon residents in the most deprived areas in the North West, typically found in urban areas.

The Health Survey for England 2011 reported that for men and women aged 35 and over, the prevalence of CVD varied by household income and the area level Index of Multiple Deprivation.

Lower numbers of residents with heart disease were in the highest fifth of the income distribution (5% in men, 2% in women) compared with higher number (11% and 5% respectively) with heart disease in each of the lowest two fifths for income distribution. Similarly, prevalence of heart disease increased from 6% of men and 3% of women in the least deprived areas to 11% and 7% respectively in the most deprived (The Health and Social Care Information Centre, 2011).

Although Wirral has a small ethnic minority population, (see BME JSNA chapter here), South Asian residents are considered to be at a higher risk of cardiovascular illnesses, with mortality rates for CHD and stroke considerably higher in Indian, Pakistani and Bangladeshi individuals compared to the general population in the UK (Fischbacker et al., 2007; Wild et al., 2007).

For more information see Wirral Intelligence Service website content on Air Quality

Skin Cancer

Increased exposure to UV radiation due to ozone layer depletion is associated with increased risk of skin cancers. Increasing temperatures in the North West in the 21st Century may increase time spent outdoors and consequently UV radiation exposure. Populations in the least deprived areas of the North West may be most at risk. Incidence of melanoma skin cancer in the North West has increased dramatically since the 1980s and is predicted to increase from approximately 1,000 new cases per year in 2003-2005 to over 2,500 new cases per year by 2018-2020 (Shack et al., 2007).

Skin Cancer - Ozone Layer depletion

The relationship between ozone layer depletion and exposure to UV radiation is well established and increased exposure to UV radiation is associated with higher risk of skin cancer (van der Leun et al., 2008; Diffey, 2004; Norval et al., 2007; Rigel, 2008).

The Montreal Protocol is an international treaty which aims to reduce the emissions of substances that are believed to contribute to the depletion of the ozone layer. It is hoped that if the terms and amendments to the Montreal Protocol are followed, then UV radiation in the UK should return to pre-1980 levels in the second half of this century (Diffey, 2004).
For more information see Wirral Intelligence Service website content on Air Quality

Skin Cancer - Temperature

Risk of non-melanoma skin cancer in the USA has been associated with higher than average exposure to UV radiation and maximum average daily temperature (van der Leun et al., 2008). During periods of higher temperatures, individuals may be more likely to spend time outside and in the sun, increasing exposure to UV radiation. In the UK, risk of skin cancer may therefore be expected to increase as temperatures rise during the next century. It is predicted that in the first half of this century, before ozone levels are expected to recover, there will be an additional 5,000 cases of skin cancer per year in the UK (Diffey, 2004).

Skin Cancer - Precipitation

Less precipitation during the summer months suggests more hours of sunlight per day in the future. This is likely to encourage people to spend more time outdoors and increase risk of exposure to UV radiation.

Thermal Illness

In very hot conditions the body is unable to cool itself through sweating and heat-related illnesses can occur (Health Protection Agency, 2011a). Young children and individuals with impaired thermoregulation, including the elderly and those on medications, are believed to be particularly at risk during heat waves as their bodies are less able to regulate temperature and are therefore at risk of overheating, dehydration and heatstroke (Department of Health, 2011).
Severe heatstroke can cause multiple organ damage and can quickly cause death within hours of onset (Kovats and Hajat, 2008).

Further examples of thermal illnesses include heat cramps, heat rash, heat syncope and heat exhaustion (Department of Health, 2011) and sunburn, which may be painful and is predicted to relate to the onset of skin cancer (Health Protection Agency, 2011b). The projected increase in summer temperatures and the frequency and intensity of heat waves in the UK during the 21st century is likely to increase the risk of heatstroke. Additionally, increased time spent outdoors in the sun due to higher temperatures and reduced cloud cover is likely to increase risk of sunburn in the UK.

Children under four years of age, and those who are overweight or on medication are particularly at risk during heat waves (Health Protection Agency, 2011a).

Gastro-intestinal illness including food poisoning and water-borne diseases

Rising temperatures, increased rainfall and flood events are predicted to increase the risk of gastrological illnesses during the 21st century. Contamination of food and water supplies due to higher temperatures and increased frequencies of heavy rainfall and flooding are predicted to increase the risk of food poisoning and intestinal illnesses.

Gastro-intestinal illness - Temperature
Rising temperatures may result in increased risk of food poisoning. Evidence indicates that cases of food poisoning, salmonellosis and other foodborne illness increases during periods of higher temperatures (Bentham and Langford, 1995; 2001; Kovats et al., 2004; Lake et al., 2009; D'Souza et al., 2004; Zhang et al., 2010). It is predicted that with a 1 ˚C rise in temperature, an extra 4.5% cases of food poisoning may occur and middling estimates predict an extra 10,000 reported cases in England and Wales per year (Department of Health, 2008). Generally, the effects on incidence of food poisoning have been shown to emerge between one and five weeks after a period of high temperature.

Gastro-intestinal illness - Precipitation and flooding
There is evidence in the UK that flooding is associated with increased risk of gastro-intestinal illnesses. In the weeks and months following floods in England and Wales, gastro-intestinal illnesses were the highest reported physical health effect experienced with between 10% and 73% of individuals in different towns being affected (Reacher et al., 2004; Tapsell and Tunstall, 2008; Tunstall et al., 2006). The range may be explained by the depth of flooding in towns, for example, with deeper flooding reported to have significantly increased the risk of gastroenteritis among residents in Lewes (Reacher et al., 2004).
You can check if your own property is in a flood risk area

Mental health and well-being

Experiencing flooding and natural disasters that cause damage to property, relocation and loss of possessions can have a detrimental effect upon mental health, including Post-Traumatic Stress Disorder (PTSD). High levels of air pollution and high temperatures may also impact negatively upon mood. Heat waves may increase risk of mortality and psychological problems among people with mental health problems.

Mental health - Flooding and natural disasters

Floods have been associated with psychological distress including PTSD, anxiety and depression and studies indicate that effects can be long lasting (Mason et al., 2010; Reacher et al., 2004; Tunstall et al., 2006). Over a quarter (28%) of individuals who experienced flooding in Tewkesbury in 2007 met the criteria for PTSD and over a third (35%) met criteria for depression (Mason et al, 2010).

Following flooding in Lewes in 2000, nearly three quarters of persons taking part in a study reported experiencing negative psychological effects.

You can check if your own property is in a flood risk area

Mental health -Temperature

Incidence of mental illness is thought to increase during periods of high temperatures and individuals with mental illness are particularly vulnerable (Hansen et al., 2008). On average, the North West has lower use of Mental Health Services compared to the rest of England. In the North West, use of services is highest in Merseyside and Greater Manchester and the north of Cumbria and these areas may be at higher risk from aspects of climate change predicted to impact upon mental health.

The North West Mental Wellbeing Survey 2012/13 (Jones et al., 2013) has provided important information about the state of the North West population's mental wellbeing and the differences from the baseline survey conducted in 2009. Findings reveal that while overall mental wellbeing does not appear to have improved (mean WEMWBS score 27.66, compared with 27.70 in 2009), satisfaction with life has increased significantly.

Throughout the region lower levels of well-being were more likely amongst the following groups: 40-54 year olds, those living in the most deprived areas, white adults, individuals who are unemployed and individuals with few qualifications. It therefore appears likely that more deprived areas could be at higher risk from climate change impacting upon mental well-being.

Insect-borne diseases

Mosquitoes, flies, fleas, ticks and other biting insects cause great harm worldwide through the spread of diseases such as Plague, West Nile virus, Lyme disease (borreliosis) and malaria, which causes around one million deaths a year worldwide (World Health Organisation, 2010). It is believed that due to climate change, conditions may become more conducive in the UK for the spread of insect-borne diseases. Public Health England (PHE) is reminding people to be 'tick aware' by launching new leaflets and a toolkit that both advises practitioners on raising awareness and the public on how to prevent tick bites and the risk of contracting Lyme disease.

Rising summer temperatures and warmer winters will be more favourable conditions for the spread of malaria and prolonged seasons of tick activity (Gray, 2008; Hunter, 2003). However it is believed that climate change is unlikely to impact on the incidence of malaria and similar diseases in the UK (Department of Health, 2008) due to the advanced medical facilities and public health strategies common to developed countries.

Recent research carried out by Medlock and Leach (2015) into vector borne diseases highlights that environmental changes such as the creation of wetlands and urban green space to mitigate climate change also affect the risk of vector-borne disease.

It goes on to say that current and future climate change will permit the territorial expansion of three species of mosquitos into the UK, particularly southern England. If this were to happen then the large numbers of imported dengue and chikungunya cases who travel to the UK would pose a source of infection to the established UK mosquitoes.

The research also states that West Nile Virus is transmitted by several European mosquitoes, many of which are found in the UK and the predicted increase in summer temperatures promote their development and abundance.

Public Health England is currently developing guidelines for the Environment Agency and wetland managers on how risks can be mitigated during disease outbreak. The research also states that a study has predicted that by 2080 as far north as southern Scotland will be climatically suitable for Malaria although it is thought that the incidence will be low and availability of anti-malarial and the current health-care system should minimise malarial risk.

Medlock and Leach (2015) also discuss ticks and tick-borne disease stating that the Public Health England tick surveillance scheme has reported an increase in tick problems in urban areas which may be exacerbated by climate change adaptation strategies to promote urban green space. Urban cases of Lyme disease are being reported at an increasing rate in the UK. Local Authorities are being advised to develop plans to mitigate tick issues through environment and greenspace management and tick awareness strategies. The research goes on to say that changes in weather and extreme weather will affect tick activity and abundance. Mild and wet winters will prolong winter tick activity as will warmer springs. Human behaviour change i.e. spending more time outside will also have an effect.

The Committee for Climate Change (2016) state that the impacts of new and emerging pests and diseases are potentially high for otherwise healthy people, animals and plants. The warmer, wetter conditions expected with climate change will allow some pests and diseases to extend their range. It goes on to say that there is an urgent need for further research to inform government policy and operational measures, such as additional surveillance of emerging pathogens and monitoring of existing problem species.

Impact on the access to healthcare

Access - Flooding and extreme weather events

Extreme weather events and flooding can be expected to increase the risk to health in many different ways, including acute health issues for residents in flooded areas and emergency services. According to Public Health England, *"The effects of flooding on health are extensive and significant, ranging from death from drowning and injuries from accident, to infectious diseases and mental health problems (short and long term)"* (Public Health England, 2014). Additionally, flooding has the potential to cause damage to infrastructure, as flooding events may pose a risk to buildings including healthcare facilities, water and electricity sources and roads and other transport facilities.

This could result in injury or illness and difficulty for the public in accessing healthcare or access for emergency services to those in need. A risk assessment of flooding in Greater Manchester concluded that types of infrastructure that could be at risk in the city include electricity substations, water storage/treatment plants and the city's transport systems (Kazmierzak and Kenny, 2011).

Across England and Wales, the number of hospitals, GP surgeries, emergency service stations or care homes located in areas of significant flood risk are projected to increase by the 2050's by between 3 and 24% under a 2 ˚C scenario, and between 27 and 110% under a 4 ˚C scenario (Committee on Climate Change, 2016).
You can check if your own property is in a flood risk area

See Wirral Council's *Local Climate Change Impact Profile Media Trawl (2005 - 2014)*

Key inequalities

Changes in the climate are likely to have different impacts for different groups. This might cover such aspects as: people on low incomes are more likely to live in homes without adequate insurance against property damage from weather events. The Marmot report (2010) into health inequalities in England argues that tackling social inequalities in health and tackling climate change must go hand in hand. Marmot highlighted that many potential actions have co-benefits.

Milder winters should reduce the costs of heating homes and other buildings, helping to alleviate fuel poverty and reduce the number of winter deaths from cold. However, cold weather is expected to remain a significant cause of death and more action is needed to address the poor thermal performance of housing if this opportunity is to be realised, (Committee on Climate Change, 2016).

Potential inequalities

- Poor housing conditions have a negative impact on health; improving these conditions can increase energy efficiency, reduce fuel poverty and help cut GHG emissions.

- Promoting more active travel such as walking and cycling can cut emissions, increase physical activity and reduce air pollution.

- A lack of green space can harm the chance to reduce the urban 'heat island' effect and have a negative impact on mental and physical health.

- Building community resilience to weather events can reduce social isolation.

- Asthma, COPD and hayfever sufferers and inner-city residents are at particular risk to respiratory illness due to higher levels of ground level ozone in summer, a changing pollen season increasing risk of all allergies and asthma and periods of hotter than average temperatures. Populations experiencing flooding are also at higher risk of respiratory illness.

- Older people, people experiencing fuel poverty and inner-city residents are at risk of CVD due to exposure to warmer and cooler spells of temperature.

- People with pale skin, children, outdoor workers and those people susceptible to skin cancer for medical reasons are at risk of developing skin cancer due to the depletion of the ozone layer.

This increased exposure to UV radiation could result in an increased risk of skin cancer. However the ozone layer is now recovering so risk will gradually decrease and rising temperatures may increase time spent outdoors and consequently exposure to UV radiation and risk of sunburn.

- People whose bodies are unable to regulate temperature: young children, the elderly, disabled people, people using medication are more at risk of developing thermal illness due to more frequent hot days and heatwaves which may increase risk of heat stroke and also rising temperatures may increase time spent outdoors and increase risk of sunburn.

- Those people who are Immune deficient will be more at risk of gastro-intestinal diseases due to rising temperatures increasing the risk of food poisoning.

- The mental health and wellbeing of those with low socioeconomic status, homeless, individuals with pre-existing conditions (including depression, anxiety), those living in low lying areas and river valleys, inner-city residents may be affected by high levels of air pollution which may impact negatively upon mood, extreme temperatures may exacerbate mental health problems and experiencing flooding can have a detrimental effect upon mental health.

- People that work with animals, outdoor or rural workers, tourists and those enjoying the countryside in a recreational capacity will be more at risk of insect-borne diseases as warmer winters and higher summer temperatures may make conditions more conducive to this along with the risk of insect-borne disease potentially increasing in regions experiencing a rise in precipitation.

- Residents of low-lying areas, disabled people and others may experience reduced access to health care as storms resulting in structural damage, loss of power, driving hazards and floods.

- All populations are at risk of the health effects associated with flooding; however, poorer communities are at higher risk of coastal flooding in the UK, while higher income households tend to be at higher risk of river flooding. Limited evidence indicates that the elderly are most at risk of flood mortality in the UK.

What are we doing and why?

Current activity and services

The Cool Wirral Partnership (formerly Wirral Climate Change Group) is a forum that provides a mechanism for the co-ordination of local action and the exchange of information between local partner organisations. It oversaw the creation of the latest Wirral climate change strategy COOL. This strategy provides a framework to guide local action.

The Wirral Emergency Volunteer (WEV) scheme has been created and is made up of volunteers recruited from various communities, agencies, organisations and the general public. All WEV's have been given induction training and the opportunity to attend additional specialised training such as flood warden. The WEVs will be called upon to help the Council assist in the response to emergencies whenever they happen – day or night.

A practical guide for small businesses has been adapted and published by CLASP for the Liverpool City Region (CLASP, 2016). It covers areas such as insurance and premises and people preparedness for severe weather.

What are the challenges?

Key gaps in knowledge and services

There is clear evidence to support action on climate change to protect public health. Information is freely available about actions that can be taken in response to climate change. However, there appears to be a gap between what can and what is being done.

This JSNA topic paper provides one means to raise awareness and so inform further action. Case studies and tools also exist to help health practitioners develop a response to climate change. However, with limited information about local practical action on climate and health, it is not clear how widely this material is being used.

The Cool Wirral Partnership provides a forum to champion and help co-ordinate local action, but participation is voluntary and there is presently limited representation from the health sector.

What is coming on the horizon?

Internationally, attention is shifting to how to keep average global temperature rises to within 1.5^{o}C, not just 2^{o}C (we are currently on course to overshoot both limits). The rules to underpin the UN's Paris Agreement are also being developed through international negotiations. It is likely there will be greater pressure for stronger national targets and accelerated action.
In the UK, the Government is moving towards setting a 'net zero' target for 2050. With respect to adaptation, the independent Committee on Climate Change will respond to the Government's recently produced 2nd National Adaptation Programme.

Locally, work to develop a successor strategy to the present climate change strategy will commence shortly. The present strategy runs to 2019.

What does the research suggest as further actions?

The information gathered makes clear all have a potential role with respect to action on climate change. Wirral's climate change strategy encourages action to:

- Use energy more efficiently
- Utilise renewable energy
- Travel more sustainably
- Reduce indirect impacts by thinking about the implications of our decisions, eliminating waste, changing our food we eat and our consumption patterns; and
- Assess risk and develop resilience

More specifically, for those with an interest in health and wellbeing, the implications of climate change should be a taken into consideration by those working in the interests of:

- Residents experiencing multiple deprivation;
- Older people; people suffering with respiratory illness including asthma and COPD;
- Those with, or potential for, CVD;
- Young children and individuals with impaired thermoregulation, including the elderly and those on medications;
- Those at higher risk of skin cancer;
- Residents with poor mental health and wellbeing; and those at most at risk to insect borne disease.

Climate change implications should also be taken into consideration by those concerned with:

- Gastro-intestinal illness including food poisoning and water-borne diseases;
- Access to healthcare; and
- Access to affordable food

Providing evidence about climate change and its implications for local health is a starting point to justify interventions. However, it is unlikely to be sufficient to encourage action across all stakeholders; not all information will be relevant to all interests.

There is a need to consider the potential roles of different stakeholders in the health and social care arena, and engage these different groups with tailored information and tools.

Key content

Links

- **Climate Change Northwest** http://climateuk.net/content/clasp-climate-support
- **Cool Wirral** www.wirral.gov.uk/coolwirral
- **Environment Agency** http://www.environment-agency.gov.uk/
- **Department of Energy and Climate Change** https://www.gov.uk/government/organisations/department-of-energy-climate-change
- **Environmental Change Institute** http://www.eci.ox.ac.uk/
- **Global Food Security** http://www.foodsecurity.ac.uk/research/current/consumer-choice.html
- **MetOffice** http://www.metoffice.gov.uk/climate-guide/climate-change/impacts/food
- **UK CIP** http://www.ukcip.org.uk/
- **Sustainable Development Unit (NHS and PHE)** http://www.sduhealth.org.uk/
- **Carbon cost saving tool** https://trakeo.com/sduhealth/
- **Climate Just** www.climatejust.org.uk

Relevant and related National and local strategies

Local

Wirral's latest climate change strategy Cool is designed to encourage and co-ordinate widespread local climate-related action and so boost its impact. It was developed by Wirral's Climate Change Group now known as the Cool Wirral Partnership, in consultation with the public, and covers the period 2014 to 2019. The strategy provides a framework to guide action with respect to mitigation and adaption during this period.

Also any local implications of the **UK Climate Change Risk Assessment 2017** need to be considered across local agencies to inform and provide a local adaptive response.

Wirral Council has an "All Hazards Emergency Plan – 2011" in place to deal with a variety of emergencies in Wirral. The document is not publically available but includes information on duty officer mobilisation, emergency management centre and temporary accommodation.

Merseyside Local Resilience Forum (MRF) is a local forum whose aim is to set out the response arrangements of agencies who are Category 1 and 2 Responders, as defined in the Civil Contingencies Act 2004 (CCA), to an emergency or other incident that requires multi-agency co-ordination at any one or any combination of Operational, Tactical and Strategic levels. Wirral Council is a category 1 responder.

The MRF has several plans in place locally to deal with emergencies; these plans are listed below but are not available to the public;

- Merseyside Emergency Response Manual
- Merseyside Multi-Agency response to a flooding event
- Severe Weather Activation Guidance

The **Environment Agency** has in place a "Greater Manchester, Merseyside and Cheshire Drought Plan"; again this is not available to the public.

National

Nationally, mitigation is driven by a series of five year 'carbon budgets' set by the independent climate change committee. The Governments recently adopted Clean Growth Strategy sets out how the Government intends to keep emissions on target.
http://www.legislation.gov.uk/ukpga/2008/27/contents

National Government response has been through the National Adaptation Programme (NAP). This contains a register of actions that include all the actions agreed in the programme so far. It also aligns risks identified in the Climate Change Risk Assessment to actions being undertaken or to be undertaken and the timescales according to the 6 themes including Healthy and resilient communities.

For the NHS, Public Health and the social care system "Sustainable, Resilient, Healthy People and Places – A Sustainable development Strategy for the NHS, Public Health and Social Care System 2014" includes a goal to ensure communities and services are resilient for the changing times and climates (Sustainable Development Unit, 2014c)

The **Cabinet Office** has released several pieces of public guidance around emergencies and these include;

- Identifying people who are vulnerable in a crisis
- Emergency Response and Recovery

The **Local Government Association** has produced "A guide for communicating during extreme weather".

Public Health England (PHE) Heatwave Plan for England 2018 includes new resources
The Heatwave Plan for England (PHE, 2018) is a plan intended to protect the population from heat-related harm to health. It aims to prepare for, alert people to, and prevent, the major avoidable effects on health during periods of severe heat in England.
It recommends a series of steps to reduce the risks to health from prolonged exposure to severe heat for:

- The NHS, local authorities, social care, and other public agencies
- Professionals working with people at risk
- Individuals, local communities and voluntary groups

Public Health England (PHE) Cold Weather for England Plan 2015, 2017
The Cold Weather Plan for England is a framework intended to protect the population from harm to health from cold weather. It aims to prevent the major avoidable effects on health during periods of cold weather in England by alerting people to the negative health effects of cold weather, and enabling them to prepare and respond appropriately (PHE, 2017).

The Cold Weather Plan includes some key public health messages for the public which include Get your flu jab if you are aged 65 or older and heat your home to the right temperature: of 18°C (65°F) if you have an existing health condition then heating the home slightly higher than this may be beneficial to health (PHE, 2017).

References

These are the references for the Climate & Health JSNA section (October 2018)

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