Map layers and indicators used in the Climate Just Map tool

Summary and detailed information for the full set of map layers and indicators

Introduction

Central to the Climate Just website is understanding the social impacts of climate change with a focus specifically upon the impacts in disadvantaged communities. It aims to help local authorities and their partners working in other sectors to develop the skills, knowledge and expertise necessary to adapt to the impacts of climate change.

The Map tool is a key element of this work and is designed as a platform to display spatial data and provide information to improve understanding of climate change issues in neighbourhoods across England, to facilitate adaptation planning and decision-making, and support the spatial targeting of adaptation responses.

The spatial data and information included in the Map tool helps to build the evidence base available to decision makers and other stakeholders when developing climate change adaptation plans and strategies. The Map tool is for all stakeholders, including community members, to visualise vulnerability, exposure and climate hazards within a particular location, thus raising awareness, aiding decision-making and facilitating community and stakeholder participation in formulating appropriate adaptation responses.

What does this document contain?

This document contains all of the 'info' notes that are attached to the majority of the map layers in the tool. The majority of the map layers come with additional 'info' notes that explain what that mapped dataset shows. The info notes include the following sections:

- Theme
- Hazard reference
- Dimension
- Domain
- Indicator
- Assumption
- Confidence level
- Guidance for the use of this indicator
- Data Source

Contents

For all items marked * in the following table, the following applies:

Neighbourhood mapping uses Middle Super Output Areas (MSOAs) from the UK Census, 2011. More information is available in the Climate Just user guide nd list of limitations. This area-based representation could be improved with finer scale data and local data holdings.

Acknowledgements: See indicator information for relevant data acknowledgements for the inputs to this dataset. Mapping is based on Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support.

Downloaded from: http://edina.ac.uk/census

For all items marked ~ in the following table, the following applies:

Acknowledgements: See indicator information for relevant data acknowledgements for the inputs to this dataset. UK Climate Projections 2009, Crown copyright.UKCP09 data show 50th, 90th and 10th percentile estimates for each climate metric for the low (L50), medium (M50) and high (H50) emissions scenarios. Population-weighted centre-points of neighbourhoods (MSOAs) areas have been used to allocate neighbourhood-based data to the appropriate 25km grid cell. See the main report for more information[1].

[1] References Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York

Section (Table) 1. List of map layers and definitions

Item	Description
Flood disadvantage	Flood disadvantage shows how flood-related social vulnerability combines with the potential for exposure to flooding. It accounts for both the likelihood of coming into contact with a flood and also the severity of negative impacts on the health and wellbeing of local communities that could occur as a result of that contact.
River and coastal flood disadvantage*	The map of river and coastal flood disadvantage shows how flood-related social vulnerability combines with the potential for exposure to flooding from rivers and the sea. It accounts for both the likelihood of coming into contact with a flood and also the severity of negative impacts on the health and wellbeing of local communities that could occur as a result of that contact. The map shows the result of an equally-weighted combination of neighbourhood-level scores for: • Socio-spatial flood vulnerability – a map of where negative social impacts are more likely • Flood hazard-exposure – a map of where river and coastal flooding is more likely
Surface water flood disadvantage*	The map of surface water flood disadvantage shows how flood-related social vulnerability combines with the potential for exposure to surface water flooding with a 1 in 30 year probability. The map accounts for both the likelihood of coming into contact with a flood and also the severity of negative impacts on the health and wellbeing of local communities that could occur as a result of that contact. It shows the result of an equally-weighted combination of neighbourhood-level scores for: • Socio-spatial flood vulnerability – a map of where negative social impacts are more likely • Flood hazard-exposure – a map of where surface water flooding is more likely
River and coastal flood hazard-exposure*	The map of flood hazard-exposure broadly shows where river and coastal flooding is more likely. It is based on the proportion of land area in a particular neighbourhood likely to be exposed to a moderate or significant flood event. This is an imperfect representation of the likelihood of people and communities coming into contact with a flood and better measures are likely to be available locally. Users can also compare the map with the flood outline data provided elsewhere in this portal. Acknowledgements: Environment Agency, NaFRA Spatial FLC Grid – AfA106. significant - the chance of flooding in any year is greater than 1.3 per cent (1 in 75) and moderate - the chance of flooding in any year is 1.3 per cent (1 in 75) or less but greater than 0.5 per cent (1 in 200). Locally refined data and supporting information, including principal limitations can be found here.

Surface water flood hazard-exposure*	The map of surface water hazard-exposure broadly shows where surface water flooding with a 1 in 30 year probability is more likely. It is based on the proportion of land area in a particular neighbourhood likely to be exposed to an event with a 1 in 30 year probability. This is an imperfect representation of the likelihood of people and communities coming into contact with a flood and better measures are likely to be available locally. Users can also compare the map with the flood outline data provided elsewhere in this portal. Acknowledgements: Environment Agency, Risk of Flooding from Surface Water map AfA376 (1 in 30 year flood probability). Locally refined data and supporting information, including principal limitations can be found here.
Flood socio-spatial vulnerability*	Flood socio-spatial vulnerability refers to mapped social vulnerability with respect to flooding. The map shows how the personal, social and environmental factors which help to explain uneven impacts on people and communities come together in particular neighbourhoods. It shows where negative social impacts are more likely. This information can then be combined with the likelihood of events occurring to understand how this social vulnerability and potential for negative impacts translates into disadvantage. The flood socio-spatial vulnerability map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within each of the five dimensions of socio-spatial vulnerability for each neighbourhood: • Sensitivity • Enhanced Exposure • (In)ability to Prepare • (In)ability to Respond • (In)ability to Recover Acknowledgements: See indicator information for relevant data acknowledgements for the inputs to this dataset.
Heat disadvantage~	The maps of heat disadvantage show how heat-related social vulnerability combines with the potential for exposure to heat-related events. They account for both the likelihood of coming into contact with high temperatures and also the severity of negative impacts on the health and wellbeing of local communities that could occur as a result of that contact. There are eight combinations of maps bringing together two representations of social vulnerability (population-weighted and average) and four representations of heat-related hazard (see below). They show the result of an equally-weighted combination of neighbourhood-level scores for: • Socio-spatial heat vulnerability – a map of where negative social impacts are more likely. There are two types of maps both of which are represented over a 25km grid. The first shows a population-weighted representation of vulnerability and the second shows average heat-related vulnerability for each 25km grid cell across England. • High temperature hazard-exposure – a map of where high temperatures are more likely. This map uses a 25km grid over England. There are four measures of high temperature hazard-

	exposure and therefore four maps. They are: mean summer maximum temperature in the 2050s; change in mean summer maximum temperature from the climate baseline to the 2050s; change in the temperature of the warmest day from the climate baseline to the 2050s; and change in the temperature of the warmest night from the climate baseline to the 2050s. The maps are shown by 25km grid cell, conforming to climate scenario outputs from UKCP09. In line with UKCP09 guidance, maps are provided for three scenarios and three probability levels. The maps for the central (50th percentile) estimate of the medium scenario for mean summer maximum temperature in the 2050s is a recommended starting point. More information is available in the Climate Just user guide, the main report[2], UKCP09 and the Benefits and drawbacks of the maps.
Heat disadvantage (Population weighted vulnerability and mean summer maximum temperature 2050s)~	The maps of heat disadvantage show how heat-related social vulnerability combines with the potential for exposure to heat-related events. They account for both the likelihood of coming into contact with high temperatures and also the severity of negative impacts on the health and wellbeing of local communities that could occur as a result of that contact. This map shows the result of an equally-weighted combination of neighbourhood-level scores over a 25km grid for: • population-weighted socio-spatial heat vulnerability • heat hazard-exposure according to mean summer maximum temperature in the 2050s The maps are shown by 25km grid cell, conforming to climate scenario outputs from UKCP09. In line with UKCP09 guidance, maps are provided for three scenarios and three probability levels. The maps for the central (50th percentile) estimate of the medium scenario for mean summer maximum temperature in the 2050s are a recommended starting point. More information is available in the Climate Just user guide, the main report[3], UKCP09 and the Benefits and drawbacks of the maps.
Heat disadvantage (Population weighted vulnerability and mean summer maximum temperature 2050s) Medium Emissions scenario 50th percentile (Recommended)~	The maps of heat disadvantage show how heat-related social vulnerability combines with the potential for exposure to heat-related events. They account for both the likelihood of coming into contact with high temperatures and also the severity of negative impacts on the health and wellbeing of local communities that could occur as a result of that contact. This map shows the result of an equally-weighted combination of neighbourhood-level scores over a 25km grid for: • population-weighted socio-spatial heat vulnerability • heat hazard-exposure according to mean summer maximum temperature in the 2050s (**medium emissions scenario, 50th percentile**) The maps are shown by 25km grid cell, conforming to climate scenario outputs from UKCP09. **These maps for the central (50th percentile) estimate of the medium scenario for mean summer maximum temperature in the 2050s are a recommended starting point**. **However, users are encouraged**

[2] Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York

[3] Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York

	to review maps for other probability levels and emissions scenarios in line with UKCP09 guidance. Maps are provided for three scenarios and three probability levels. More information is available in the Climate Just user guide, the main report[4], UKCP09 and the Benefits and drawbacks of the maps.
Heat hazard-exposure~	The maps of heat hazard-exposure broadly show where there is likely to be a greater chance of coming into contact with heat-related events. There are four representations of heat-related hazard and therefore four sets of maps. They are: mean summer maximum temperature in the 2050s; change in mean summer maximum temperature from the climate baseline to the 2050s; change in the temperature of the warmest day from the climate baseline to the 2050s; and change in the temperature of the warmest night from the climate baseline to the 2050s. The maps are shown by 25km grid cell, conforming to climate scenario outputs from UKCP09. In line with UKCP09 guidance, maps are provided for three scenarios and three probability levels. The maps for the central (50th percentile) estimate of the medium scenario for mean summer maximum temperature in the 2050s are a recommended starting point. More information is available in the Climate Just user guide, the main report[5], UKCP09 and the Benefits and drawbacks of the maps. This is an imperfect representation of the likelihood of people and communities coming into contact with heat-waves. Users should also note that people in different parts of the country are already used to different temperatures so heat health warning thresholds are different according to where you are located[6]. More information and data are available from the UKCP09 website.
Heat hazard-exposure (Mean summer maximum temperature 2050s)~	The maps of heat hazard-exposure broadly show where there is likely to be a greater chance of coming into contact with heat-related events. This set of maps shows mean summer maximum temperature in the 2050s. The maps are shown by 25km grid cell, conforming to climate scenario outputs from UKCP09. In line with UKCP09 guidance, maps are provided for three scenarios and three probability levels. The maps for the central (50th percentile) estimate of the medium scenario for mean summer maximum temperature in the 2050s are a recommended starting point. More information is available in the Climate Just user guide, the main report[7], UKCP09 and the Benefits and drawbacks of the maps. This is an imperfect representation of the likelihood of people and communities coming into contact with heat-waves. Users should also note that people in different parts of the country are already used to different temperatures so heat health warning thresholds are different according to

[4] Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York
[5] Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York
[6] Public Health England. 2013. The heat-wave plan for England 2013.
[7] Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York

	where you are located[8]. More information and data are available from the UKCP09 website.
Heat hazard-exposure (Change in mean summer maximum temperature baseline to 2050s)~	The maps of heat hazard-exposure broadly show where there is likely to be a greater chance of coming into contact with heat-related events. This set of maps shows change in mean summer maximum temperature from the climate baseline to the 2050s. The maps are shown by 25km grid cell, conforming to climate scenario outputs from UKCP09. In line with UKCP09 guidance, maps are provided for three scenarios and three probability levels. The maps for the central (50th percentile) estimate of the medium scenario for mean summer maximum temperature in the 2050s are a recommended starting point. More information is available in the Climate Just user guide, the main report[9], UKCP09 and the Benefits and drawbacks of the maps. This is an imperfect representation of the likelihood of people and communities coming into contact with heat-waves. Users should also note that people in different parts of the country are already used to different temperatures so heat health warning thresholds are different according to where you are located[10]. More information and data are available from the UKCP09 website.
Heat hazard-exposure (Change in the temperature of the warmest day baseline to 2050s)~	The maps of heat hazard-exposure broadly show where there is likely to be a greater chance of coming into contact with heat-related events. This set of maps shows change in the temperature of the warmest day from the climate baseline to the 2050s. The maps are shown by 25km grid cell, conforming to climate scenario outputs from UKCP09. In line with UKCP09 guidance, maps are provided for three scenarios and three probability levels. The maps for the central (50th percentile) estimate of the medium scenario for mean summer maximum temperature in the 2050s are a recommended starting point. More information is available in the Climate Just user guide, the main report[11], UKCP09 and the Benefits and drawbacks of the maps. This is an imperfect representation of the likelihood of people and communities coming into contact with heat-waves. Users should also note that people in different parts of the country are already used to different temperatures so heat health warning thresholds are different according to where you are located[12]. More information and data are available from the UKCP09 website.
Heat hazard-exposure (Change in the temperature of	The maps of heat hazard-exposure broadly show where there is likely to be a greater chance of coming into contact with heat-related events. This set of maps shows change in the temperature of the warmest night from the climate baseline to the 2050s. The maps are shown by 25km grid cell,

[8] Public Health England. 2013. The heat-wave plan for England 2013.
[9] Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York
[10] Public Health England. 2013. The heat-wave plan for England 2013.
[11] Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York
[12] Public Health England. 2013. The heat-wave plan for England 2013.

the warmest night baseline to 2050s)~	conforming to climate scenario outputs from UKCP09. In line with UKCP09 guidance, maps are provided for three scenarios and three probability levels. The maps for the central (50th percentile) estimate of the medium scenario for mean summer maximum temperature in the 2050s are a recommended starting point. More information is available in the Climate Just user guide, the main report[13], UKCP09 and the Benefits and drawbacks of the maps. This is an imperfect representation of the likelihood of people and communities coming into contact with heat-waves. Users should also note that people in different parts of the country are already used to different temperatures so heat health warning thresholds are different according to where you are located[14]. More information and data are available from the UKCP09 website.
Heat socio-spatial vulnerability*	Heat socio-spatial vulnerability refers to mapped social vulnerability with respect to heat-related hazard. The map shows how the personal, social and environmental factors which help to explain uneven impacts on people and communities come together in particular neighbourhoods. It shows where negative social impacts are more likely. This information can then be combined with the likelihood of events occurring to understand how this social vulnerability and potential for negative impacts translates into disadvantage. The heat socio-spatial vulnerability map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within each of the five dimensions of socio-spatial vulnerability for each neighbourhood: • Sensitivity • Enhanced Exposure • (In)ability to Prepare • (In)ability to Respond • (In)ability to Recover
Sensitivity*	Sensitivity refers to personal biophysical characteristics which affect the likelihood that a heat wave or flood event will have negative health and welfare impacts. For example, older people tend to be more susceptible to the effects of high temperatures. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the two domains associated with Sensitivity: • Age • Health
Enhanced Exposure (flood)*	Enhanced exposure refers to aspects of the physical environment, such as the availability of green space or housing characteristics, which tend to accentuate or offset the severity of heat wave or flood events. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the domains associated with respect to flooding:

[13] Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York

[14] Public Health England. 2013. The heat-wave plan for England 2013.

	• Physical environment • Building characteristics
Enhanced Exposure (heat)*	Enhanced exposure refers to aspects of the physical environment, such as the availability of green space or housing characteristics, which tend to accentuate or offset the severity of heat wave or flood events. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the domains associated with enhanced exposure with respect to heat: • Physical environment • Physical geography • Building characteristics
Ability to prepare (flood)*	A person's or community's ability to prepare for climate and extreme weather events is governed primarily by social factors. With respect to flooding this includes factors such as income, insurance and local knowledge. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the domains associated with respect to flooding: • Income • Tenure • Information use – language • Local knowledge • Insurance
Ability to prepare (heat)*	A person's or community's ability to prepare for climate and extreme weather events is governed primarily by social factors. With respect to heat this includes factors such as income and tenure. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the domains associated with respect to heat: • Income • Tenure • Information use – language
Ability to respond (flood)*	A person's or community's ability to respond to climate and extreme weather events is governed primarily by social factors. With respect to flooding this includes factors such as income, insurance, social networks and mobility. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the domains associated with respect to flooding: • Income • Information use – language • Local knowledge • Insurance • Social networks • Mobility • Crime • General accessibility

Ability to respond (heat)*	A person's or community's ability to respond to climate and extreme weather events is governed primarily by social factors. With respect to heat this includes factors such as social networks and mobility. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the domains associated with respect to heat: • Income • Information use – language • Social networks • Mobility • Crime • General accessibility • General infrastructure
Ability to recover (flood)*	A person's or community's ability to recover from climate and extreme weather events is governed primarily by social factors. With respect to flooding this includes factors such as income, insurance, social networks and mobility. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the domains associated with respect to flooding: • Income • Information use – language • Insurance • Social networks • Mobility • House prices
Ability to recover (heat)*	A person's or community's ability to recover from climate and extreme weather events is governed primarily by social factors. With respect to heat this includes factors such as social networks, mobility and the availability of services. The map shows the result of an equally-weighted combination of neighbourhood-level scores for indicators within the domains associated with respect to heat: • Information use – language • Social networks • Mobility • Service access

Section 2. Full list of indicators with descriptions

Item	Description
Reference	AT0_1, AT1_1, AT2_1
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare, Respond and Recover
Domain	Income
Indicator	**Unemployment (% working population unemployed)**
Assumption	Higher proportions of unemployed people in an area indicate a higher vulnerability because of their likelihood to be on lower incomes relative to other people.
Confidence level	High
Guidance for the use of this indicator	Unemployment is a recognised proxy indicator of financial deprivation; indeed, the unemployed are nearly twice as likely to experience persistent poverty compared to the population as a whole. Adaptation should address the needs of people who have lower incomes. This is because a lack of financial resources may restrict people's access to some ways of preparing for, responding to and recovering from hazard events. A range of actions appropriate to tackling these difficulties is given in our dedicated pages on this topic. Unemployment is commonly used as a measure of vulnerability[15]. For example, unemployment or irregular employment may reduce the opportunities for obtaining insurance. Unemployment is linked to other social characteristics, such as being in social or privately rented housing and a greater tendency to have poor physical and mental health. Although unemployment is taken as an indicator of a tendency towards high vulnerability, it may reduce vulnerability in some cases. For example, unemployed people may benefit from being able to respond quickly to events like floods and heat-waves and potentially getting assistance through social housing. Despite this, people in this group are significantly more likely have negative impacts on their health and wellbeing in the aftermath of flooding[16]. Additional, more refined, data may be available at the local level.
Data Source	Census, 2011, KS501, % Unemployed in population aged 16 -74 Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

[15] Twigger-Ross, C and Orr, P (2012) The UK Climate Change Risk Assessment 2012 Evidence Report Project D.4.2.1 Release 7 Annex B: Social Vulnerability to Climate Change Impacts

[16] Paranjothy S, Gallacher J, Amlôt R, Rubin GJ, Page L, Baxter T, Wight J, Kirrage D, McNaught R, Palmer SR BMC (2011) Psychosocial impact of the summer 2007 floods in England. Public Health. 3;11:145

Item	Description
Reference	AT0_2, AT1_2, AT2_2
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare, Respond and Recover
Domain	Income
Indicator	**Low income occupations (% in routine or semi-routine occupations)**
Assumption	Higher proportions of people employed in routine and semi-routine jobs in an area indicate a higher vulnerability because of their likelihood to be on lower incomes relative to other people.
Confidence level	High
Guidance for the use of this indicator	All other things being equal, people working in routine or semi-routine occupations tend to be on lower incomes compared to those in other occupational groups. Therefore this indicator is used as a proxy for low incomes. Average levels of wealth for households headed by people working in routine occupations has been estimated to be only 14% of those of working in employment classified as 'large employer or higher managerial'[17]. Adaptation should address their needs because a lack of financial resources may restrict people's access to some ways of preparing for, responding to and recovering from hazard events. A range of actions appropriate to tackling these difficulties is given in our dedicated pages on this topic. People working in routine and semi-routine occupations may also be vulnerable for other reasons, such as higher exposure to hazards due to the characteristics of their jobs or increased sensitivity due to being more likely to be in ill-health. Some actions might be targeted through employers – so-called inward looking adaptation which can be part of a wider drive to improve working conditions – or through trades associations, clubs or societies. Measures can include training, provision of appropriate equipment and clothing, improving working environments, consideration of accessibility issues (e.g. during extreme weather) and broader awareness raising. Additional, more refined, data may be available at the local level.
Data Source	Census, 2011, KS611, % people in routine and semi-routine occupations Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

[17] Office for National Statistics Wealth and Assets Survey 2006-8, cited in the Marmot Review (2010, p77)

Item	Description
Reference	AT0_3, AT1_3, AT2_3
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare, Respond and Recover
Domain	Income
Indicator	**Long-term unemployed (% who are LTU or who have never worked)**
Assumption	Higher proportions of people in an area who are long-term unemployed or who have never worked indicate a higher vulnerability because of their likelihood to be on lower incomes relative to other people.
Confidence level	High
Guidance for the use of this indicator	Unemployment is a recognised indicator of financial deprivation (see Unemployment info). The challenges facing the unemployed are heightened in terms of the long-term unemployed. Therefore this indicator is used as a proxy for low incomes. Average levels of wealth for households headed by people who are long-term unemployed or who have never worked are just 3% of those of working in employment classified as 'large employer or higher managerial'[18]. Adaptation should address the needs of people who have lower incomes. This is because a lack of financial resources may restrict people's access to some ways of preparing for, responding to and recovering from hazard events. A range of actions appropriate to tackling these difficulties is given in our dedicated pages on this topic. Although unemployment is taken as an indicator of a tendency towards high vulnerability, it may reduce vulnerability in some cases. For example, unemployed people may benefit from being able to respond quickly to events like floods and heat-waves and potentially getting assistance through social housing. Despite this, people in this group are significantly more likely have negative impacts on their health and wellbeing in the aftermath of flooding[19]. Additional, more refined, data may be available at the local level.
Data Source	Census, 2011, KS611, % people who never worked + % people in long-term unemployment Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

[18] Office for National Statistics Wealth and Assets Survey 2006-8, cited in the Marmot Review (2010, p77)
[19] Paranjothy S, Gallacher J, Amlôt R, Rubin GJ, Page L, Baxter T, Wight J, Kirrage D, McNaught R, Palmer SR BMC (2011) Psychosocial impact of the summer 2007 floods in England. Public Health. 3;11:145

Item	Description
Reference	AT0_4, AT1_4, AT2_4
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare, Respond and Recover
Domain	Income
Indicator	**Households with dependent children and no adults in employment (%)**
Assumption	Higher proportions of unemployed people with dependent children in an area indicate a higher vulnerability because of their likelihood to be on lower incomes relative to other people.
Confidence level	High
Guidance for the use of this indicator	Unemployment is a recognised indicator of financial deprivation (see Unemployment Info) and is commonly used as a measure of vulnerability. The indicator is therefore used as a proxy for low incomes. Adaptation should address the needs of people who have lower incomes. This is because a lack of financial resources may restrict people's access to some ways of preparing for, responding to and recovering from hazard events. When people who are unemployed have additional caring responsibilities, it may place further stresses upon them. Despite having additional financial support, compared with unemployed people without dependents, it may be insufficient to fully compensate for the additional financial burdens required to effectively prepare for, respond to and recover from events like floods and heat-waves. Additional, more refined, data may be available at the local level.
Data Source	Census, 2011, KS106, % households with no adults in employment and dependent children Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT0_9, AT1_9, AT2_9
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare, Respond and Recover
Domain	Income
Indicator	**Weekly household income estimate (Pounds)**
Assumption	Lower mean weekly household incomes in an area indicate a higher vulnerability.
Confidence level	High
Guidance for the use of this indicator	People on low incomes are less able to prepare for, respond to and recover from extreme weather events, for example due to struggling to afford home insurance. See our dedicated pages on this topic for more information on actions associated with this group. The mapped indicator shows weekly incomes from low to high. It is therefore important to note that in contrast with most other indicators in the portal where higher values represent higher vulnerability, higher values for this indicator indicate lower vulnerability. Additional, more refined, data may be available at the local level.
Data Source	Office of National Statistics 2007-2008, Income: Model-Based Estimates at MSOA Level Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT0_10, AT1_10, AT2_10
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare, Respond and Recover
Domain	Income
Indicator	**All pensioner households**
Assumption	All pensioner households tend to have lower incomes compared to other – particularly working – households and this indicates a higher vulnerability.
Confidence level	Medium
Guidance for the use of this indicator	This indicator is used as a proxy for low incomes. Adaptation should address their needs because a lack of financial resources may restrict people's access to some ways of preparing for, responding to and recovering from hazard events. A range of actions appropriate to tackling these difficulties is given in our dedicated pages on this topic. This indicator has a medium level of confidence as there is a very high variability in incomes within the pensioner group. Furthermore, there is some evidence that all pensioner households tend to have proportionally higher incomes than single pensioner households, particularly compared to single female pensioners. Therefore users may wish to review the data layer showing patterns with single pensioner households, which for the purposes of this mapping work, is used as a proxy indicator of social networks. Additional, more refined, data may be available at the local level.
Data Source	Census 2011, QS113, % all pensioner households Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT0_11
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare
Domain	Tenure
Indicator	**Social renters (% Households renting from Social or Council landlords)**
Assumption	Higher proportions of social renters in an area indicate a higher vulnerability as renters have a lower ability to adapt their homes.
Confidence level	High
Guidance for the use of this indicator	Social renters are less able to prepare for extreme weather events, for example due to inability to modify their homes to prepare for flooding or heatwaves. See our dedicated pages on this topic for more information and for actions associated with this group. Additional, more refined, data may be available at the local level.
Data Source	Census 2011, KS402, % households social rented: council (rented from local authority) + % households social rented: other Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT0_12
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare
Domain	Tenure
Indicator	**Private renters (% Households)**
Assumption	Higher proportions of private renters in an area indicate a higher vulnerability as renters have a lower ability to adapt their homes.
Confidence level	High
Guidance for the use of this indicator	Private renters are less able to prepare for extreme weather events, for example due to inability to modify their homes to prepare for flooding or heatwaves. See our dedicated pages on this topic for more information and for actions associated with this group. Additional, more refined, data may be available at the local level.
Data Source	Census 2011, KS402, % households Private Rented; Private Landlord or Letting Agency + % households Private Rented; Other Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT0_13, AT1_12, AT2_12
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare, Ability to Respond, Ability to Recover
Domain	Information use - language
Indicator	**Born outside UK/Ireland (%)**
Assumption	Higher proportions of people born outside of the UK and Ireland in an area indicate a higher vulnerability since they are more likely to have difficulties understanding the English language compared to people born within the UK and Ireland.
Confidence level	Medium
Guidance for the use of this indicator	People born outside of the UK and Ireland are less able to prepare for, respond to and recover from extreme weather events than other people. All other things being equal, people in this group are more likely to have difficulty obtaining and using information and guidance provided to the general public. However, some within this group may have English as their mother tongue and/or have no difficulties understanding the English language. Note that the indicator source was selected to allow a more direct comparison with the equivalent 2001 indicator. An improved indicator (QS205EW) 'Proficiency in English' has been made available for the first time in 2011.
Data Source	Census 2011, KS204, % Born outside UK and Ireland Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT0_24_AT1_20
Theme	Vulnerability
Hazard reference	Flood
Dimension	Ability to Prepare and Ability to Respond
Domain	Local Knowledge
Indicator	**Lack of flood experience (% area affected by past events)**
Assumption	People who live in areas which have had no previous flooding are more vulnerable than those who live in areas which has had previous flooding
Confidence level	Medium – this is a proxy measure and its suitability is open to debate
Guidance for the use of this indicator	People who live in areas which have had previous flooding have a higher likelihood to be able to prepare and respond to future flood events. For example, they are more likely to know where to look for information, they are more likely to live in areas with a flood plan and they are more likely to have community and other support in place. The mapped indicator shows relative proportions of land area affected from low to high. It is therefore important to note that in contrast with most other indicators in the portal where higher values represent higher vulnerability, higher values for this indicator indicate lower vulnerability. There are some sources of uncertainty with this indicator. Firstly, it could be argued that past flooding increases vulnerability, due to factors such as lack of affordable insurance or previous impacts on health and wellbeing which increase people's sensitivity. Furthermore the land area affected by flooding is not a direct indicator of properties – and people - affected.
Data Source	Environment Agency, Historic Flood Map – AfA013/A1631. Further information about these data are available here. This indicator was developed from polygon (area) data available in August 2010. It covers known past flood events from rivers, groundwater and the sea as held in Agency records. Refined data may be available at the local level. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT0_25, AT1_21, AT2_16
Theme	Vulnerability
Hazard reference	Flood
Dimension	Ability to Prepare, Ability to Respond and Ability to Recover
Domain	Insurance
Indicator	**Low availability of affordable insurance (% area potentially exposed to severe flooding)**
Assumption	People who live in areas where a large proportion of land area is potentially exposed to severe flooding are less likely to be able to obtain affordable insurance and are therefore more vulnerable than people living in other areas.
Confidence level	Low – this is a proxy measure and its suitability is open to debate
Guidance for the use of this indicator	In 2013, Defra launched a consultation on the future of flood insurance in the UK. It explains that "A series of agreements on flood insurance have been made between Governments in the UK and the insurance industry since the 1960s. The current "Statement of Principles" agreements, which are about to expire, require members of the Association of British Insurers (ABI) to make insurance including cover for flooding available to some, but not all, properties in areas at significant flood risk. The Statement of Principles does not control or limit the price that insurers can charge for this cover." This is the basis of the assumption that people who live in areas classified as being at significant flood risk are more likely to have difficulty obtaining insurance. The indicator was developed before the announcement of "Flood Re", a new deal struck by the UK government and the ABI, which should be implemented by 2015 and will cap insurance premiums for properties located in areas with high flood probability. Though this is an important development it does not mean that insurance will be equally affordable to householders in the future, just as it isn't today. There are also expected to be a number of households excluded from access to the Flood Re premiums. Therefore this indicator may still be useful as a broad guide to areas in which affordable insurance may be relatively difficult to obtain and, accordingly, a measure of how far people are able to prepare for, respond to and recover from events. There are several other sources of uncertainty with this indicator. The land area affected by flooding is not a direct indicator of properties – and people - affected. Other factors may also affect whether affordable insurance is available, including the likelihood of other forms of flooding. Finally, the specific data used have some uncertainties and are only intended to be used as a 'broad brush' indication of the chance of flooding. The data portal provides alternative flood zone data. Users should note that these data are associated with similar caveats and note appropriate for identifying the chance of flooding at individual properties.
Data Source	Environment Agency, NaFRA Spatial FLC Grid – AfA106. Significant - the chance of flooding in any year is greater than 1.3% (1 in 75). Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT0_26_AT1_39_AT2_53
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Ability to Prepare, Ability to Respond, Ability to Recover
Domain	Information use - language
Indicator	**Recent arrivals to UK (% arrived in UK less than a year ago)**
Assumption	Higher proportions of people recently arrived from outside the UK in an area indicate a higher vulnerability.
Confidence level	Medium
Guidance for the use of this indicator	People recently arrived from outside of the UK are less able to prepare for, respond to and recover from extreme weather events than other people. They are more likely to have difficulty obtaining and using information and guidance provided to the general public. However, some within this group may have English as their mother tongue and/or have no difficulties understanding the English language. They are also likely to have less local knowledge and less familiarity with national and local services. Note that the indicator source was selected to allow a more direct comparison with the equivalent 2001 indicator. An improved indicator (QS205EW) 'Proficiency in English' has been made available for the first time in 2011.
Data Source	Census 2011, QS801, % people with <1 yr residency coming from outside UK Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT1_23, AT2_18
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Ability to Respond and Ability to Respond
Domain	Social networks
Indicator	**Single pensioner households (%)**
Assumption	Areas with higher proportions of single pensioner householders are more likely to have socially isolated people and therefore higher social vulnerability compared to areas with lower proportions of single pensioner households.
Confidence level	Medium
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with a higher proportion of single pensioner households (as is measured by this indicator), but more specifically places where communities are likely to have socially isolated individuals with poor social networks. However, it is also important to develop actions to target places where there may be fewer single pensioner households but where individuals might still be socially or physically isolated, perhaps within areas which otherwise have low social vulnerability. Responses in places with high concentrations of single pensioner households may differ from those in places with low concentrations, for example, if there are more intermediary organisations or networks such as community organisations who can work with older people with particular needs. See the separate message on social isolation for more evidence and possible responses. Additional, more refined, data on older people, their relative sensitivities and other characteristics which tend to make them more or less vulnerable may be available at the local level.
Data Source	Census, 2011, QS113, % Single pensioner household Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT1_26, AT2_21
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Adaptive capacity: Ability to respond and ability to recover
Domain	Social networks
Indicator	**% lone parent households with dependent children**
Assumption	A higher proportion of lone parents with dependent children is assumed to be a proxy indicator of higher vulnerability as a result of potential isolation.
Confidence level	Low – this is a proxy measure and its suitability is open to debate.
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with a higher proportion of lone parents with dependent children (as is measured by this indicator), but more specifically places where communities are likely to include socially isolated people who have poor social networks. The use of this indicator as a proxy for social networks and the assumption that higher proportions of lone parents with dependent children may result in more potential for isolation is open to debate. There is conflicting evidence which points to both the potential for stronger networks and also the chance for higher rates of isolation within this group. Although this indicator is used as a proxy measure of networks, considering the distributions of lone parents with dependent children may be helpful as an indicator of other vulnerability factors since this also points to greater responsibilities which may reduce their capacity for responding to extreme events relative to other groups. Other measures of social networks for people with young children may be available from internal data sources or from local organisations working with vulnerable people.
Data Source	Census, 2011, % Lone parent households with dependent children Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT1_28, AT2_23
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Ability to Respond and Ability to Recover
Domain	Social networks
Indicator	**Lack of carers (% people not providing unpaid care)**
Assumption	Areas with higher proportions of unpaid carers – i.e. communities where more people provide a caring role outside of formal employment - are assumed to be associated with more extensive social networks compared to areas with higher proportions.
Confidence level	Low
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with poorer social networks. There is evidence that the process of providing care helps to extend social networks and enhance wider 'social capital'[20] for both the carers and those being cared for. In turn, social capital has been shown to be connected to health benefits in both individuals and also wider communities. However, the use of this indicator as a proxy for social networks is open to debate. Higher proportions of unpaid caring can be indicative of higher proportions of ill-health in an area. Furthermore, there is evidence that unpaid carers themselves tend to have less good health compared to the health of people not providing unpaid care. It could also be argued that in some cases unpaid carers might be more isolated than other people as a result of the demands of their caring duties. They may face specific challenges when faced with extreme events. The low level of confidence in this particular indicator is also influenced by unpaid carers encompassing a very broad group. The indicator does not differentiate types of carers, who they care for and on what basis or level of paid care provision. More detailed local datasets may be available to help refine this indicator in the context of particular local circumstances.
Data Source	Census, 2011, KS301, % people who not provide unpaid care (original data subtracted from 100%) Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

[20] Putnam et al (1993:167) define social capital as those "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions". Putnam RD, Leonardi R, Nanenetti R (1993). Making democracy work: civic traditions in modern Italy. Princeton, NJ, Princeton University Press.

Item	Description
Reference	AT1_29, AT2_24
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Ability to Respond
Domain	Mobility
Indicator	**Disability (% people whose day-to-day activities are limited a lot)**
Assumption	Areas with larger proportions of people whose day-to-day activities are limited a lot are more likely to be communities with mobility problems and therefore have higher social vulnerability compared with communities with lower proportions of people whose day-to-day activities are limited a lot.
Confidence level	High
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with a higher proportion of people whose day-to-day-activities are limited a lot (as is measured by this indicator). However, it is also important to develop actions to support people with disability-related mobility problems more generally, perhaps within areas which otherwise have low social vulnerability.
Data Source	Census, 2011, KS301, % of people whose day to day activities are limited a lot Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT1_30, AT2_25
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Ability to Respond and Ability to Recover
Domain	Mobility
Indicator	**Lack of private transport (% households with no car or van)**
Assumption	Areas with higher proportions of households which have no private transport are more likely to be communities with mobility problems and therefore have higher social vulnerability compared with communities with lower proportions of households with no private transport.
Confidence level	High
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with a higher proportion of households with no private transport. This may restrict people's ability to respond during events like floods and to assist dependents, for example. Furthermore, they may be particularly affected during disruptions to public transport services. It is also important to consider how householders with no private transport might be supported more generally, perhaps within areas which otherwise have low social vulnerability. For example, this may be through community-based solutions, such as help with organizing car sharing and dedicated transport during extreme events. Additional, more refined, data may be available at the local level.
Data Source	Census, 2011, KS404, % households with no car Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT1_33
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Ability to Respond
Domain	Crime
Indicator	**Index of Multiple Deprivation crime score**
Assumption	People living in areas with higher rates of crime may be more reluctant to take preventative measures in reaction to warnings of extreme events and therefore have higher social vulnerability compared with communities with lower crime rates.
Confidence level	Medium
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places where people may be reluctant to take preventative measures during, or immediately prior to, events like floods and heat-waves. For example, if there is a fear of crime in an area people may feel less able to leave windows open at night during heat-wave events. Fear of crime was found to be one of the major factors explaining why some people were more negatively affected than others in the 1995 heat-wave in Chicago, for example.[21] People may also be less inclined to deploy measures like flood gates since this can indicate that the householder is away. This is a proxy indicator which has been given a medium confidence rating. It is uncertain because the factor of interest is fear of crime which may not necessarily correspond to the reality of crime rates in an area. It is also recognised that there are different types of crime, not all of which will have the same impact on individual and community perceptions. Nevertheless, measures which address reasons for people not feeling able to respond to warnings may be an important consideration when working towards more resilient communities. Additional and finer scale indicators are available through the Index of Multiple Deprivation and crime statistics datasets. Further sources of information may also be available at a local level.
Data Source	Office of National Statistics, The English Indices of Deprivation 2010: Crime Domain. Recalculated from 2001 LSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. The index is created by the Social Disadvantage Research Centre at the Department of Social Policy and Social Work at the University of Oxford Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

[21] Klinenberg, E. (2002) Heatwave: A Social Autopsy of Disaster in Chicago. Chicago, IL: University of Chicago Press

Item	Description
Reference	AT1_35
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Ability to Respond
Domain	General accessibility
Indicator	**Low road density (% area not road)**
Assumption	People living in area with lower road density have lower general accessibility and therefore higher social vulnerability compared with communities with higher road density.
Confidence level	Medium
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with relatively poor accessibility and where people may not be able to respond as quickly in an emergency as in other areas with better general accessibility. Road density is only a proxy indicator for accessibility. Alternative local datasets may be available to help refine this indicator.
Data Source	Land Use Statistics (Generalised Land Use Database - GLUD) 2005 Office for National Statistics and Communities and Local Government. Indicator calculated by subtracting area of road from 100% and recalculating for 2011 Census boundaries using an area-weighted averaging approach. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT1_36
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Respond
Domain	General infrastructure
Indicator	**Density of retail units**
Assumption	Shops and other community-related infrastructure can act as informal refuges during extreme events. People living in areas with lower densities of infrastructure which might perform this function are assumed to have higher vulnerability compared to people living in places with higher densities. The mapped indicator shows densities from low to high. It is therefore important to note that in contrast with most other indicators in the portal where higher values represent higher vulnerability, higher values for this indicator indicate lower vulnerability.
Confidence level	High
Guidance for the use of this indicator	Community resilience can be enhanced in areas where retail and other community infrastructure is available, however informally, as places of potential refuge. For example, any air conditioned space can provide an informal refuge during heat-wave events as well as a source of wider assistance. For example, an analysis of the 1995 Chicago heat-wave identified cases where people combined visits to the grocery store with the opportunity to cool down.[22] All other things being equal, adaptive capacity in areas with a lower density of community and commercial facilities can be expected to be lower compared to areas where the density is higher, even where spaces are not air conditioned. Nevertheless, it should also be noted that other individual and neighbourhood characteristics may influence the extent to which people are able to take advantage of these opportunities, e.g. due to restrictions on personal mobility or fear of crime. Particular measures may be needed to address the specific challenges associated with places where these opportunities are limited. There may be opportunities to formalise arrangements in some areas. For example, heatwave planning in parts of Greece involves formalised arrangements with owners of air conditioned spaces which are not fully accessible to the wider public. Additional sources of information may also be available at a local level, e.g. lists of public buildings which may be air conditioned or which could act as possible cool spaces relative to flats in high-rise buildings, for example.
Data Source	Office for National Statistics (ONS) Business Registers Unit (BRU). VAT-based enterprises. 2011. Local Units by Broad Industry Group: Urban/Rural. Number of enterprises divided by the area of MSOA. High number = low vulnerability Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

[22] Klinenberg, E. (2002) Heatwave: A Social Autopsy of Disaster in Chicago. Chicago, IL: University of Chicago Press

Item	Description
Reference	AT1_37
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Respond
Domain	General infrastructure
Indicator	**% change in the number of enterprises**
Assumption	Shops and other community-related infrastructure can act as informal refuges during extreme events. People living in areas with declining levels of infrastructure which might perform this function are assumed to have higher vulnerability compared to people living in places where infrastructure is not declining. Declining neighbourhoods are also indicative of other sources of community vulnerability. The mapped indicator shows positive to negative change. Higher positive values for this indicator indicate lower vulnerability in contrast with many of the other indicators in this portal.
Confidence level	High
Guidance for the use of this indicator	An analysis of the 1995 Chicago heatwave event found that neighbourhood decline helped to explain differences in mortality rates.[23] Community resilience can be enhanced in areas where retail and other community infrastructure is increasing and eroded where this infrastructure is being lost. Indeed, the loss of such infrastructure can be an indicator of wider community decline. For more information, also see the 'Density of retail units' indicator Info. Additional sources of information may also be available at a local level.
Data Source	Office for National Statistics (ONS) Business Registers Unit (BRU). VAT-based enterprises. 2009-11. Local Units by Broad Industry Group: Urban/Rural. Number of enterprises divided by the area of MSOA. High number = low vulnerability Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

[23] Klinenberg, E. (2002) Heatwave: A Social Autopsy of Disaster in Chicago. Chicago, IL: University of Chicago Press

Item	Description
Reference	AT1_40, AT2_55
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Ability to Respond (flood) and Ability to Recover (heat)
Domain	Mobility
Indicator	**Working away from home (% not working at home)**
Assumption	Areas with higher proportions of people working away from home are more likely to be communities with relatively slow responses to heat-wave and flood events (or associated warnings) compared with communities where there are higher proportions of home workers.
Confidence level	Medium
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places where high proportions of people may be away from home during flood events. This may restrict people's ability to respond during events like floods and to assist dependents, for example. There may also be greater challenges in supporting dependents affected by heatwaves.
Data Source	Census, 2011, QS701, % not home workers. indicator calculated by subtracting home workers from 100% Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_27
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Recover
Domain	Service access
Indicator	**Travel time to nearest GP by walking/public transport**
Assumption	People living in areas with higher travel time to the nearest GP by foot or by public transport are assumed to be more socially vulnerable since communities have a lower access to medical help during heat-wave events.
Confidence level	High
Guidance for the use of this indicator	This is one of several similar indicators which account for the relative accessibility of medical services in a local area. Specific measures may be helpful in areas with low accessibility to services in order to support people potentially affected by heat-wave events. Alternative measures at finer spatial scales may be available through the SHAPE and Public Health Outcomes Framework tools.
Data Source	Office for National Statistics (ONS) Accessibility statistics 2010. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_30
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Recover
Domain	Service access
Indicator	**% of at risk population (no car) outside of 15 minutes by walking/public transport to nearest GP**
Assumption	Areas with higher proportions of people with no private transport living more than 15 minutes away from the nearest GP by foot or public transport are assumed to be more socially vulnerable since communities have a lower access to medical help during heatwave events.
Confidence level	High
Guidance for the use of this indicator	This is one of several similar indicators which account for the relative accessibility of medical services in a local area. Specific measures may be helpful in areas with low accessibility to services in order to support people potentially affected by heat-wave events. Alternative measures at finer spatial scales may be available through the SHAPE and Public Health Outcomes Framework tools.
Data Source	Office for National Statistics (ONS) Accessibility statistics 2010. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_32
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Recover
Domain	Service access
Indicator	**Number of GPs within 15 minutes by walking/public transport**
Assumption	Areas with lower numbers of GPs within 15 minutes travel by foot or public transport are assumed to be more socially vulnerable since communities have a lower access to medical help during heat-wave events. The mapped indicator shows the number from low to high. It is therefore important to note that in contrast with most other indicators in the portal where higher values represent higher vulnerability, higher values for this indicator indicate lower vulnerability.
Confidence level	High
Guidance for the use of this indicator	This is one of several similar indicators which account for the relative accessibility of medical services in a local area. Specific measures may be helpful in areas with low accessibility to services in order to support people potentially affected by heat-wave events. Alternative measures at finer spatial scales may be available through the SHAPE and Public Health Outcomes Framework tools.
Data Source	Office for National Statistics (ONS) Accessibility statistics 2010. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_33
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Recover
Domain	Service access
Indicator	**Number of GPs within 15 minutes by car**
Assumption	Areas with lower numbers of GPs within 15 minutes travel by car are assumed to be more socially vulnerable since communities have a lower access to medical help during heat-wave events. The mapped indicator shows the number from low to high. It is therefore important to note that in contrast with most other indicators in the portal where higher values represent higher vulnerability, higher values for this indicator indicate lower vulnerability.
Confidence level	High
Guidance for the use of this indicator	This is one of several similar indicators which account for the relative accessibility of medical services in a local area. Specific measures may be helpful in areas with low accessibility to services in order to support people potentially affected by heat-wave events. Alternative measures at finer spatial scales may be available through the SHAPE and Public Health Outcomes Framework tools.
Data Source	Office for National Statistics (ONS) Accessibility statistics 2010. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_38
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Recover
Domain	Service access
Indicator	**Travel time to nearest hospital by walking/public transport**
Assumption	Areas with higher travel times to the nearest hospital are assumed to be more socially vulnerable since communities have a lower access to medical help during heatwave events.
Confidence level	High
Guidance for the use of this indicator	This is one of several similar indicators which account for the relative accessibility of medical services in a local area. Specific measures may be helpful in areas with low accessibility to services in order to support people potentially affected by heat-wave events. Alternative measures at finer spatial scales may be available through the SHAPE and Public Health Outcomes Framework tools.
Data Source	Office for National Statistics (ONS) Accessibility statistics 2010. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_39
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Recover
Domain	Service access
Indicator	**% of at risk population (no car) outside of 30 minutes by walking/public transport to nearest hospital**
Assumption	Areas with higher proportions of people with no private transport living more than 30 minutes away from the nearest hospital by foot or public transport are assumed to be more socially vulnerable since communities have a lower access to medical help during heat-wave events.
Confidence level	High
Guidance for the use of this indicator	This is one of several similar indicators which account for the relative accessibility of medical services in a local area. Specific measures may be helpful in areas with low accessibility to services in order to support people potentially affected by heat-wave events. Alternative measures at finer spatial scales may be available through the SHAPE and Public Health Outcomes Framework tools.
Data Source	Office for National Statistics (ONS) Accessibility statistics 2010. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_41
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Recover
Domain	Service access
Indicator	**Number of hospitals within 30 minutes by walking/public transport**
Assumption	Areas with lower numbers of hospitals within 30 minutes travel by foot or public transport are assumed to be more socially vulnerable since communities have a lower access to medical help during heatwave events. The mapped indicator shows the number from low to high. It is therefore important to note that in contrast with most other indicators in the portal where higher values represent higher vulnerability, higher values for this indicator indicate lower vulnerability.
Confidence level	High
Guidance for the use of this indicator	This is one of several similar indicators which account for the relative accessibility of medical services in a local area. Specific measures may be helpful in areas with low accessibility to services in order to support people potentially affected by heat-wave events. Alternative measures at finer spatial scales may be available through the SHAPE and Public Health Outcomes Framework tools.
Data Source	Office for National Statistics (ONS) Accessibility statistics 2010. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_42
Theme	Vulnerability
Hazard reference	Heat
Dimension	Ability to Recover
Domain	Service access
Indicator	**Number of hospitals within 30 minutes by car**
Assumption	Areas with lower numbers of hospitals within 30 minutes travel by car are assumed to be more socially vulnerable since communities have a lower access to medical help during heat-wave events. The mapped indicator shows the number from low to high. It is therefore important to note that in contrast with most other indicators in the portal where higher values represent higher vulnerability, higher values for this indicator indicate lower vulnerability.
Confidence level	High
Guidance for the use of this indicator	This is one of several similar indicators which account for the relative accessibility of medical services in a local area. Specific measures may be helpful in areas with low accessibility to services in order to support people potentially affected by heat-wave events. Alternative measures at finer spatial scales may be available through the SHAPE and Public Health Outcomes Framework tools.
Data Source	Office for National Statistics (ONS) Accessibility statistics 2010. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	AT2_50
Theme	Vulnerability
Hazard reference	Flood
Dimension	Ability to Recover
Domain	House Prices
Indicator	**Low/no growth in house prices (median change 2004-9)**
Assumption	People living in areas where house prices show relatively low or no growth are assumed to be more socially vulnerable and have the potential to have a longer recovery time compared to other areas. The basis for this indicator is the assumption that areas with low or falling house prices are more likely to be associated with general decline and where residents themselves may have lower long-term mobility and less financial security. The mapped indicator shows positive to negative change. Higher positive values for this indicator indicate lower vulnerability in contrast with many of the other indicators in this portal.
Confidence level	Medium
Guidance for the use of this indicator	The impact of flood events on property prices is a common concern in the aftermath of flood events[24]. Research by the Royal Institution of Chartered Surveyors suggests that house prices are affected, but not by as much as householders may initially fear. Property price reductions in the region of around 9-12% have been reported[25]. However, the same evidence does suggest that this may be a temporary phenomenon with a considerable recovery of property prices over the subsequent 3-4 year period and few reported examples of a complete collapse of house values as a result of flooding[26]. Nevertheless, this may not fully allay residents' concerns and some of the worry and concern impacting on people's recovery. For example, there is evidence that residents are concerned about house price falls, the possibility of some neighbours moving away regardless and then the changes in community character as a result[27]. This is a medium confidence proxy indictor which is subject to considerable uncertainty and debate. For example, there can be many reasons for relative changes in house prices which have no connection to the chance of flooding or how frequently or severely it has already occurred. Even so, declining areas are still relevant to post-flood recovery since they are more broadly indicative of declining communities and lower social mobility. Where an area is affected by flooding and the property market is already weak or declining then the impacts on residents could be all the greater. The issue raises wider questions about how to tackle the issue of declining neighbourhoods in areas associated with potential exposure to extreme events like flooding or coastal erosion. While these issues are beyond the remit of Climate Just they may be a topic for wider debate at the local level. Despite some limitations, the indicator can be useful as part of the suite of factors which characterise particular places and help explain why the people living there may take longer to recover. A stagnant or declining house price market may act as an additional

[24] Pitt (2008) Learning Lessons from the 2007 Floods

[25] Lamond, J., Proverbs, D., and Hamond, F. (2008), A transactional analysis of the impact of flood events on the price of residential property, RICS research report, In review, Royal Institute of Chartered Surveyors, cited Pitt (2008) Learning Lessons from the 2007 Floods

[26] Pitt (2008) Learning Lessons from the 2007 Floods

[27] Whittle et al. (2010) After the Rain – learning the lessons from flood recovery in Hull, final project report for 'Flood, Vulnerability and Urban Resilience: a real-time study of local recovery following the floods of June 2007 in Hull', Lancaster University, Lancaster UK

	pressure for affected residents. If considered applicable to the local area under study, it may be possible to supplement this indicator with additional, finer-scale data.
Data Source	Office for National Statistics (ONS) Price Indicators for All Dwellings; Median (2009-2004 GBP change) Calculated by subtracting median house price 2004 from median house price 2009. Recalculated from 2001 MSOA spatial units (2010 data) by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	E_1
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Enhanced Exposure
Domain	Physical Environment
Indicator	**Built up area (% area not greenspace)**
Assumption	The more built up an area, the more likely it is that flood and heat-wave impacts are more severe.
Confidence level	High
Guidance for the use of this indicator	This indicator accounts for the additional impact that local environments can have during events like floods and heat-waves. In this case, areas with higher proportions of green space can be assumed to have better drainage and cooling functions compared to areas with lower proportions of greenspace. More information about this indicator is available in the adapting buildings and greenspace messages, including actions which can be taken to respond. Additional, more refined, data may be available at the local level, e.g. through data agreements with the Ordnance Survey.
Data Source	Land Use Statistics (Generalised Land Use Database - GLUD) 2005 Office for National Statistics and Communities and Local Government. Indicator calculated by subtracting the area of greenspace from 100%. Recalculated from 2001 MSOA spatial units by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	E_2
Theme	Vulnerability
Hazard reference	Flood and Heat
Dimension	Enhanced Exposure
Domain	Physical Environment
Indicator	**Lack of domestic gardens (area of buildings/domestic gardens)**
Assumption	The higher the ratio of domestic buildings relative to domestic gardens, the more likely it is that flood and heat-wave impacts are more severe.
Confidence level	Medium
Guidance for the use of this indicator	This indicator accounts for the additional impact that local environments can have during events like floods and heat-waves. Gardens can provide better drainage and a cooling function. Therefore areas where housing tends to have relatively small gardens are more likely to see severe impacts compared with areas where housing tends to be associated with relatively large gardens. There is some uncertainty since cooling and drainage functions are strongly affected by the way that property owners develop their gardens. Background information relevant to this indicator is available in the adapting buildings and green space messages in the main portal, including actions which can be taken to respond. Additional, more refined, data may be available at the local level, e.g. through data agreements with the Ordnance Survey.
Data Source	Land Use Statistics (Generalised Land Use Database - GLUD) 2005 Office for National Statistics and Communities and Local Government. Indicator calculated by dividing the area of domestic buildings by area of gardens. Recalculated from 2001 MSOA spatial units by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	E_3
Theme	Vulnerability
Hazard reference	Heat
Dimension	Enhanced Exposure
Domain	Physical Environment
Indicator	**Built up area (% area not bluespace)**
Assumption	The more built up an area, the more likely it is that heat-wave impacts are more severe.
Confidence level	High
Guidance for the use of this indicator	This indicator accounts for the additional impact that local environments can have during heat-waves, in this case where a greater proportion of land area associated with water bodies, such as lakes, provides a cooling function. More information about this indicator is available in the adapting buildings message in the main portal, including actions which can be taken to respond. Additional, more refined, data may be available at the local level, e.g. through data agreements with the Ordnance Survey.
Data Source	Land Use Statistics (Generalised Land Use Database - GLUD) 2005 Office for National Statistics and Communities and Local Government. Indicator calculated by subtracting the area of greenspace from 100%. Recalculated from 2001 MSOA spatial units by area-weighted averages for 2011 MSOAs. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	E_4
Theme	Vulnerability
Hazard reference	Heat
Dimension	Enhanced Exposure
Domain	Physical Geography
Indicator	**Distance to coast**
Assumption	The closer an area is to the coast, the more likely it is to be cooler relative to areas inland.
Confidence level	Medium
Guidance for the use of this indicator	This indicator accounts for the additional impact that physical location can have during events like heat-waves. All other things being equal, coastal areas are more likely to be cooler compared to inland areas due to the effects of onshore breezes. Additional, more refined, data may be available at the local level, e.g. through data agreements with the Ordnance Survey.
Data Source	2011 MSOA population weighted centroids and UK boundary line Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	E_9
Theme	Vulnerability
Hazard reference	Flood
Dimension	Enhanced Exposure
Domain	Housing Characteristics
Indicator	**Homes with basements (% households with lowest floor basement/semi basement)**
Assumption	The higher the proportion of dwellings with basements in an area the more likely its residents are to be affected by flooding, relative to areas with large proportions of other dwelling types.
Confidence level	Medium
Guidance for the use of this indicator	This indicator accounts for the additional impact that housing characteristics can have during floods. Houses with basements are more likely to be affected by flooding than those without basements. Background information relevant to this indicator is available in the adapting buildings section of the main portal, including actions which can be taken to respond. There is some uncertainty with this indicator since data are only available for 2001. Additional, more refined, data may be available at the local level, e.g. property level data through data agreements with the Ordnance Survey.
Data Source	Census, 2001, Office for National Statistics, 2001 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	E_10
Theme	Vulnerability
Hazard reference	Flood
Dimension	Enhanced Exposure
Domain	Housing Characteristics
Indicator	**Ground level homes (% householder with lowest floor ground level)**
Assumption	The higher the proportion of ground level dwellings in an area, the more likely its residents are to be affected by flooding compared to areas with two or more storey dwellings.
Confidence level	Medium
Guidance for the use of this indicator	This indicator accounts for the additional impact that housing characteristics can have during floods. Ground level houses are more likely to be affected by flooding than two or more storey dwellings. Background information relevant to this indicator is available in the adapting buildings section of the portal, including actions which can be taken to respond. There is some uncertainty with this indicator since data are only available for 2001. Additional, more refined, data may be available at the local level, e.g. property level data through data agreements with the Ordnance Survey.
Data Source	Census, 2001, Office for National Statistics, 2001 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	E_11
Theme	Vulnerability
Hazard reference	Heat
Dimension	Enhanced Exposure
Domain	Housing Characteristics
Indicator	**High rise homes (% households with lowest floor 5th floor or above)**
Assumption	The higher the proportion of dwellings at 5th floor or above in an area, the more likely its residents are to be affected by high temperatures during heat-waves.
Confidence level	Medium
Guidance for the use of this indicator	This indicator accounts for the additional impact that housing characteristics can have during heat-waves. Houses in the upper levels of tower blocks are more likely to be affected by heat-waves than some other types of accommodation. Background information relevant to this indicator is available in the adapting buildings section of the main portal, including actions which can be taken to respond. There is some uncertainty with this indicator since data are only available for 2001. Additional, more refined, data may be available at the local level, e.g. property level data through data agreements with the Ordnance Survey.
Data Source	Census, 2001, Office for National Statistics, 2001 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	S1
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Sensitivity
Domain	Age
Indicator	**Young children (% people under 5 years)**
Assumption	Higher proportions of children under 5 in an area indicate a higher vulnerability.
Confidence level	High
Guidance for the use of this indicator	This indicator shows areas which have an above average proportion of young children in the population and therefore where the population is more sensitive to the impacts of both flood and heat-related hazards. Young children can be affected anywhere that floods and high temperatures occur. However, there is a case for particular targeting of areas: where there are more children exposed; where the characteristics of areas increase exposure; or where children have other characteristics affecting sensitivity or exposure, such as ill-health or disabilities. General advice and guidance can also be delivered through pre-schooling, nurseries and doctor's surgeries to reach parents, carers and, using appropriate means, children themselves. Advice needs to recognise both that there is a higher chance of being affected and also that children are less able to adapt their own behaviour and so may not recognise the dangers of hot temperatures or flood waters. Additional, more refined, data on children, their relative sensitivities and other characteristics which tend to make them more or less vulnerable may be available at the local level. Also consider data available in the SHAPE and Public Health Outcomes Framework tools.
Data Source and Acknowledgements	Census 2011, KS102, % 0-4 years. Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	S3
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Sensitivity
Domain	Age
Indicator	**Older people (% people over 75 years)**
Assumption	Higher proportions of people over 75 in an area indicate a higher vulnerability.
Confidence level	High
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with a high density of older people (as is measured by this indicator) and also places where there may be fewer older people but where they may be socially or physically isolated, perhaps within areas which otherwise have low social vulnerability. Responses in places with high concentrations of older people may differ from those in places with low concentrations, for example, if there are more community organisations, facilities and networks in such areas to support action. These may be used to disseminate good practice and promote appropriate self-help alongside responses delivered through social services. Government guidance is available to specifically target this group, e.g. as part of the heatwave and cold weather plans. Adaptation needs to take account of the growing trend towards further concentrations of older populations in the future. Additional, more refined, data on older people, their relative sensitivities and other characteristics which tend to make them more or less vulnerable may be available at the local level. Also consider data available in the SHAPE and Public Health Outcomes Framework tools. See the separate message on older people for more evidence and possible responses.
Data Source	Census, 2011, KS102, % 75 yrs and older Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	S7
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Sensitivity
Domain	Health
Indicator	**Households containing at least one person in ill-health**
Assumption	Higher proportions of households containing at least one person in ill-health indicate a higher vulnerability.
Confidence level	High
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with a high density of people in ill-health (as is measured by this indicator) and also places where there may be fewer people in ill-health but where they may be socially or physically isolated, perhaps within areas which otherwise have low social vulnerability. Responses may need to be targeted differently to take account of this, working with existing health and social care service providers and also voluntary and community sector organisations who may support these groups. More information about this indicator is available in the poor health message in the main portal, including actions which can be taken to respond. Additional, more refined, health data may be available at the local level, as well as from tools such as SHAPE and the Public Health Outcomes Framework tools.
Data Source	Census, 2011, KS106, One Person in Household with a Long-Term Health Problem or Disability; With/No Dependent Children Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census

Item	Description
Reference	S4
Theme	Vulnerability
Hazard reference	Flood & Heat
Dimension	Sensitivity
Domain	Health
Indicator	**People in ill-health (% people whose day-to-day activities are limited)**
Assumption	Higher proportions of people in ill-health in an area indicate a higher vulnerability.
Confidence level	High
Guidance for the use of this indicator	Adaptation needs to address the specific challenges associated with places with a high density of people in ill-health (as is measured by this indicator) and also places where there may be fewer people in ill-health but where they may be socially or physically isolated, perhaps within areas which otherwise have low social vulnerability. Responses may need to be targeted differently to take account of this, working with existing health and social care service providers and also voluntary and community sector organisations who may support these groups. More information about this indicator is available in the poor health message in the main portal, including actions which can be taken to respond. Additional, more refined, health data may be available at the local level, as well as from tools such as SHAPE and the Public Health Outcomes Framework tools.
Data Source	Census, 2011, KS301, sum of two indicators: (% of people whose day to day activities are limited a lot) + (% of people day to day activities limited a little) Office for National Statistics, 2011 Census: Aggregate data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://infuse.mimas.ac.uk. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2]. Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: http://edina.ac.uk/census