

# APPENDIX B. NEIGHBOURHOOD FLOOD VULNERABILITY INDEX

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## **B.1 Characteristics of vulnerability: Rationale for inclusion and supporting indicators**

The twelve individual indicators used to support the assessment of the five characteristics of flood vulnerability adopted here (see Chapter 3 of the Main Report) are discussed below. The selection builds upon previous research (Lindley *et al.*, 2011 and Kazmierczak *et al.*, 2015) as well as the useful review and summary provided by Gibson *et al.* (2016).

### **B.1.1 Age**

- The number of deaths caused by the 1953 'Big Flood' was highest among older people (Baxter, 2005), with people over 60 year olds accounting for 42% of resulting deaths in Essex (Vardoulakis and Heaviside, 2012).
- Older people are less likely than other social groups to respond to flood warnings and may be more reluctant to leave their houses (Age UK, 2016), as well as having more limited physical mobility, making it difficult to use flood defence measures, such as putting up property level flood gates (Vardoulakis and Heaviside, 2012).
- Tapsell *et al.* (2002) looked in detail at six case studies from across the UK; these showed that those over the age of 75 were more vulnerable to flooding.
- Numerous studies have highlighted the association between flooding and increased mental health and behavioural problems in children (e.g. Mort *et al.*, 2016).
- Children's stories of the impacts of the floods in Hull reveal the range of impacts which can affect younger children, including physical and mental health and the disruption of schooling and home-life (Mort *et al.*, 2016).

The individual indicators selected to characterise 'age' are summarised in Appendix Table B.1 1.

### **B.1.2 Health**

- The six detailed case studies referred to above showed that the long-term sick were more vulnerable to flooding, the flood they experienced often making their pre-existing condition worse either as a one-off 'hit', or accelerating its adverse trajectory (Tapsell *et al.*, 2002; Ebi *et al.*, 2006).
- Flooding may restrict an individual's access to medicine, e.g. due to loss or damage or it being left behind in the context of an emergency (Age UK, 2016).
- Flooding may prevent the use of complex home-based health care systems, for example home dialysis, due to direct flood damage or to loss of power (Klinger *et al.*, 2014).
- Being flooded is stressful and mental health impacts can be serious. Recorded psychological stresses caused by flooding in the UK and OECD (e.g. Tapsell *et al.*, 2002) include: post-traumatic stress disorder, depression, anxiety and domestic violence (Pendlebury and Bates, 2015). A delayed increase in suicide rates has been observed following natural disasters, although the evidence of this after flood events is very limited (Kolves *et al.*, 2013). Many of these psychological effects last much longer (2+ years) than any adverse physical health effects (Tapsell *et al.*, 2002). While post-event stress is likely to affect everyone, those with existing mental health conditions are likely to suffer the most (Sims *et al.*, 2008; Waite *et al.*, 2017).

- Telephone connectivity and transport routes are often disrupted during flood events making it difficult for carers to contact and reach their patients that are receiving care at home (Age UK, 2016). This was a problem in Lancashire during the flooding in 2015 caused by Storm Desmond.

The individual indicators selected to characterise 'health' are summarised in Appendix Table B.1 2.

### **B.1.3 Income**

- The six detailed case studies referred to above showed that low income households were more vulnerable to flooding, especially those in Wales, Scotland and coastal England (Tapsell *et al.*, 2002). The main reason for this was the lack of savings that could be used immediately to spend on repairs and replacements that would kick-start a recovery process.
- Low income households are less likely to have the capacity to fully prepare for future floods (through insurance and property level measures). Housing tenure together with low income may restrict their ability to make modifications to the home they do not own (Fielding and Burningham, 2005).

**Note:** The impact of income on access to flood insurance and property level protection is considered through the differential take-up of these adaptation measures in more and less vulnerable neighborhoods (as discussed in Appendix C).

- Disruption of transport systems by flood events is likely to particularly affect people who depend upon (rather than choose to use) public transport to get to their place of work or to access other services (for example, public transport is typically more used by low income households)<sup>1</sup>.

The individual indicators selected to characterise 'income' are summarised in Appendix Table B.1 3.

### **B.1.4 Information use**

Information is considered to influence vulnerability as follows ((Lindley *et al.*, 2011):

- Higher proportions of people recently arrived from outside the UK in an area indicate a higher vulnerability.
- People who cannot speak English are more likely to have difficulty obtaining and using information and guidance provided to the general public.

The individual indicators selected to characterise 'information use' are summarised in Appendix Table B.1-4.

### **B.1.5 Local knowledge**

- Communities where population turnover is high may be less aware of the likelihood of being affected by events like floods, how to respond and where to seek support (Penning-Rowsell *et al.*, 1986).
- Non-English speakers may also find it difficult to access flood warnings if they are not immediately available in languages other than English (Tapsell *et al.*, 2005). Currently

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<sup>1</sup> As the example below from Australia illustrates: <http://www.9news.com.au/wild-weather/2016/06/05/11/44/dangerous-weather-forces-closures-to-roads-and-public-transport-across-new-south-wales>

Environment Agency flood warnings are only available in English, and so groups of residents with no or insufficient English language skills will find them more difficult to access (Shaw *et al.*, 2005). This is exacerbated as ethnic groups often live clustered together and so may all be at flood risk, and interaction with other residents outside of this group may be limited making it more difficult for flood warning messages to penetrate the group (Robertson, 2005, cited in Environment Agency, 2009).

- People who have recently moved into an area may lack awareness of local flood risk provided through family and community clues. Blaikie *et al.* (1994) states that lack of knowledge and information is one of the most important underlying reasons for vulnerability (Werritty *et al.*, 2007).
- People living in rural areas tend to have more knowledge of local flood risk compared to urban areas, not least (but not exclusively) because they have longer residence times (Penning-Rowsell *et al.*, 1986).

The individual indicators selected to characterise 'local knowledge' are summarised in Appendix Table B.1-5.

#### **B.1.6 Property tenure**

- Social housing tenants may encounter difficulties in preparing for and responding to flooding due to their living arrangements (Climate Just, 2014), and because they are likely to have a low income (see above). Additionally, their tenure status can affect the propensity to take damage-reducing measures (e.g. Porter *et al.*, 2014; Homes, 2013).
- Tenants are often not allowed to make physical alterations to their properties, and leaseholders may be disinclined to as they may not feel the additional expense of making those changes is worthwhile given that they do not own the freehold. Landlords of social housing may be more inclined to make these alterations, but little quantified evidence exists.
- Where tenants are permitted to make physical alterations to their dwellings, there is little incentive to do so. This may be because:
  - Tenancies are often short, with limited security of tenure. The lack of ownership means tenants often have limited incentive to invest significantly in improving the property. Similarly, the average stay of tenants in a property is shorter than homeowners (The Poverty Site, 2014) so these residents are likely to be less aware of the flood risk in their neighbourhoods;
  - Tenants are generally less well-off than homeowners (The Poverty Site, 2014), and therefore cannot afford to install meaningful physical risk reducing measures.
  - Tenants are less likely than homeowners to speak English as their first language (for example, in Boston, Lincolnshire, there are more than 10,000 migrant workers the majority of whom live in rented accommodation), and so may not be easily able to access information on flood risk and preparedness.

The individual indicators selected to characterise ‘property tenure’ are summarised in Appendix Table B.1-6.

### **B.1.7 Physical mobility**

- Limited physical mobility creates a number of practical challenges in preparing for, responding to and recovering from a flood. Someone with a disability will require a higher amount of resources and planning for them to reach the same level of wellbeing as someone without that disability and this should be reflected in disaster management and evacuation plans (Cabinet Office, 2013).
- People with reduced mobility may be more reliant on others to assist them for example during evacuation either from their own homes or from serviced accommodation such as care homes. Disruption caused by a flood may prevent carers reaching those they care for and may leave assistance tools such as electronic lifts unusable.
- Where individuals are normally able to help themselves, any loss of power or internal flooding may severely reduce their capacity to do so.

The individual indicators selected to characterise ‘physical mobility’ are summarised in Appendix Table B.1-7.

### **B.1.8 Crime**

- People living in areas with higher crime rates may be more wary of taking preventative measures against flooding in case they are ‘scams’, and so may be more socially vulnerable than communities with lower crime rates.
- Where crime rates are high, residents may hesitate to evacuate properties during floods for fear of looting. For example, during the 2014 floods on the Somerset Levels, it was reported that empty houses were being targeted by thieves taking domestic heating oil (The Independent, 2014).
- Where dwelling-related crime levels are highest, residents are more likely to have extra security mechanisms on their houses such as multiple locks on doors and windows; this can cause delays in evacuation and rescue attempts.

The individual indicators selected to characterise ‘crime’ are summarised in Appendix Table B.1-8.

### **B.1.9 Housing characteristics**

- Poor quality housing and mobile homes provided more limited protection against flood waters than structurally competent buildings. Flood waters can devastate such homes, and even place life at risk. Response to flood warnings is also likely to be lower in these properties as residents are less likely to be able to move their possessions to a place of safety (Thrush *et al.*, 2005).
- Caravans are considered in project appraisals as moveable in times of flood and therefore do not benefit from having any damage avoided as counted against the costs of flood defences (Penning-Rowsell *et al.*, 2013). Hence within the standard assessment of damages caravans rarely feature. Residents of caravans are also more likely to have a limited knowledge of the local area (McEwen *et al.*, 2002) (see above, local knowledge).

The individual indicators selected to characterise ‘housing characteristics’ are summarised in Appendix Table B.1-9.

#### **B.1.10 Direct flood experience**

- A large body of research from Kates (1962) onwards, shows that those with experience of flooding are less vulnerable in subsequent events as they have more knowledge as to what to do and how to respond. For example, Fielding *et al.* (2007) found that there was a higher level of understanding of what the EA flood warning codes meant in households that had previously flooded.
- Flood experience has often been shown to be a key factor in level of willingness to take preventative action against future floods, and also respond seriously to warnings (Tapsell *et al.*, 2005; McCarthy *et al.*, 2006; Tunstall *et al.*, 2006).
- This is characterised by the “prisoner of experience” phenomenon (e.g. Shaw *et al.*, 2005), whereby those without experience are less able to cope, and until people (unfortunately) have direct experience of flooding they are more vulnerable (although it may require homes to be flooded several times before people are willing to act).

The individual indicators selected to characterise ‘direct flood experience’ are summarised in Appendix Table B.1-10.

#### **B.1.11 Social networks**

- Connections have been made between a lack of social or community networks and levels of social deprivation in an area (Whittle *et al.*, 2010; Patrick *et al.*, 2013; Preston *et al.*, 2014). This is also linked to areas with highly transient populations, with residents less likely to have access to family or friends nearby (Zsomboky *et al.*, 2011). Individuals that are more likely to feel socially isolated include single parents, lone pensioners and new arrivals to an area.
- People with weaker social networks;
  - Struggle to maintain continuity of treatment in relation to physical or mental health treatments (WHO, 2013). Where social networks are relatively good there is evidence of a better response to emergency situations and quicker recovery (Preston *et al.*, 2014).
  - Face practical difficulties in responding to a flood where children are dependent on them as there is less direct within-the-family support (Tapsell *et al.*, 2002).
  - Adults who live alone (including those with dependent children) are more likely to struggle to take action when receiving a flood warning, for example it may be physically impossible to move furniture or other items, and they will also feel more uncertain and anxious with no-one to confide in (Thrush *et al.*, 2005).
  - Face difficulties in accessing short-term alternative accommodation from family and friends, and so are more likely to need to use public shelters in the event of an evacuation (Scawthorn *et al.*, 2006), but also may be less likely to know about the existence and location of such services.

- Informal networks are much reduced or even absent during a flood (Tapsell *et al.*, 2002; Penning-Rowse and Tapsell, 2002)

The individual indicators selected to characterise 'social networks' are summarised in Appendix Table B.1-11.

### **B.1.12 Service availability**

- Various studies highlight the link between the degree of support provided by institutional (such as the police, the fire brigade, ambulances and local authority social care) and community support networks and the vulnerability of the individuals in those communities (Penning-Rowse *et al.*, 2013). Research by the National Flood Forum confirms this to be the case and shows that higher levels of post-flood institutional support (in this case from a charity) accelerates the pace of recovery<sup>2</sup>.
- Emergency services will aim to target the most vulnerable households in assistance efforts but the ability to do this effectively relies on the flood resilience of these services themselves. During the 2010 flood in Cockermouth, Cumbria, the police station itself was flooded which hampered the coordination of the relief effort and therefore increasingly the vulnerability of the population to the flood (BBC, 2010).
- If a school floods, children are often temporarily transferred to other schools which may be some distance away while the original school is restored. This adds to family disruption and dislocation, increasing their vulnerability<sup>3</sup>.
- The location of services that should remain accessible throughout a flood event, such as GP surgeries, is very important, especially as they can be essential in relief plans (Kazmierczak and Kenny, 2011).
- If care or nursing homes are flooded, highly vulnerable residents must be evacuated and suitable placements for them have to be found. If a care home or hospital is in a flood prone area, it is also likely that many of its employees will also live in the flood risk area, or will have to travel through a flooded area. Additionally, care homes will also often take in vulnerable residents who have been evacuated from their own homes. This system is severely hampered if the care home itself is flooded (Donovan, 2014).

The individual indicators selected to characterise 'service availability' are summarised in Appendix Table B.1-12.

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<sup>2</sup> <http://www.nationalfloodforum.org.uk/flood-recovery-and-empowering-grassroots-communities/> Accessed Oct 2016

<sup>3</sup> <http://www.nationalfloodforum.org.uk/flood-recovery-and-empowering-grassroots-communities/> Accessed Oct 2016

Appendix Table B.1-1-1 Age: Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
a1	Age	Young children (% people under 5 years)	Census, ONS	2011	Census table 102. Number of people aged 0-4 years was divided by the population and multiplied by 100.	LSOA	LSOA	DZ	SOA
a2	Age	Older people (% people over 75 years)	Census, ONS	2011	Census table 102. Number of people aged 75 years or more was divided by the population and multiplied by 100.	LSOA	LSOA	DZ	SOA

Appendix Table B.1-2 Health: Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
h1	Health	Disability / people in ill- health (% people whose day- to-day activities are limited)	Census, ONS	2011	Census table KS301. Number of people whose day to day activities are limited a lot + number of people whose day to day activities limited a little, divided by the total population and multiplied by 100.	LSOA	LSOA	DZ	SOA
h2	Health	% households with at least one person with long term limiting illness	Census, ONS	2011	Census table KS106. Number of households with one or more persons with a long-term health problem or disability divided by the total number of households and multiplied by 100.	LSOA	LSOA	DZ	SOA



Appendix Table B.1-3 **Income: Individual indicators, data sources and spatial resolution**

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
i1	Income	Unemployed (% unemployed)	Census, ONS	2011	KS501. % Unemployed in population aged 16 -74	LSOA	LSOA	DZ	SOA
i2	Income	Long-term unemployed (% who are LTU or who have never worked)	Census, ONS	2011	Census table KS611. Number of people aged 16- 74 'never worked and long-term unemployed' divided by the total number of people aged 16-74 and multiplied by 100.	LSOA	LSOA	DZ	SOA
i3	Income	Low income occupations (% in routine or semi- routine occupations)	Census, ONS	2011	Census table KS611. Number of people aged 16- 74 in routine occupations + number of people in semi- routine occupations divided by all people aged 16 to 74 and multiplied by 100	LSOA	LSOA	DZ	SOA
i4	Income	Households with dependent children and no adults in employment (%)	Census, ONS	2011	Census table KS106. Number of households 'No adults in employment in household: With dependent children' divided by the total number of households and multiplied by 100.	LSOA	LSOA	DZ	SOA
i5	Income	People income deprived (%)	ONS, National Records of Scotland, Northern Ireland Department for Communities	2010	<b>England:</b> IMD; Average Weekly Household Net Income Estimate (equalised after housing costs); <b>Scotland:</b> SIMD Income index, i.e. "percentage of people income deprived"; <b>Wales:</b> As England; <b>Northern Ireland:</b> NIIMD 2010	LSOA	LSOA	DZ	SOA

Appendix Table B.1-4 **Information use:** Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
f1	Information use	Recent arrivals to UK (% people with <1 yr residency coming from outside UK)	Census, ONS	2011	Census table QS801. Number of people within year of arrival 'Arrived 2010- 2011' divided by the total number of people and multiplied by 100.	LSOA	LSOA	DZ	SOA
f2	Information use	Level of proficiency in English	Census, ONS	2011	Census table QS205. Number of people 'Does not speak English at all' + 'Does not speak English well', divided by the total number of people and multiplied by 100.	LSOA	LSOA	DZ	SOA

Appendix Table B.1-5 **Local knowledge:** Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
k1	Local knowledge	New migrants from outside the local area	Census, ONS	2011	Census table UKMIG001. Number of people who 'Lived elsewhere one year ago outside the area but within 'associated area' + 'Lived elsewhere one year ago outside the 'associated area' but within the UK' (where associated area is the next level up in the census geography hierarchy, i.e. local authority in this case), divided by the total number of residents and multiplied by 100.	MSOA	MSOA	DZ	SOA

Appendix Table B.1-6 **Tenure**: Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
f1	Tenure	Private renters (% Households)	Census, ONS	2011	Census table KS402. Number of households 'Rented: Private Landlord or Letting Agency' + 'Rented: Other', divided by the total number of households and multiplied by 100.	LSOA	LSOA	DZ	SOA
f2	Tenure	Social renters (% Households renting from Social or Council landlords)	Census, ONS	2011	Census table KS402. Number of households 'Rented: Council (Local authority)' + 'Rented: Other social rented', divided by the total number of households and multiplied by 100.	LSOA	LSOA	DZ	SOA

Appendix Table B.1-7 **Physical mobility**: Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
m1	Mobility	High levels of disability (% of population who are disabled)	Census, ONS	2011	% with 'activities limited a lot'	LSOA	LSOA	DZ	SOA
m2	Mobility	% people living in medical and care establishments	Census, ONS	2011	Census table QS421SC. Number of people in 'Medical and care establishments' divided by the total population and multiplied by 100.	LSOA	LSOA	DZ	SOA
m3	Mobility	Lack of private transport (% households with no car or van)	Census, ONS	2011	Census table KS404SC. Number of households where 'Number of cars or vans in household: No cars or vans' divided by the total number of households and multiplied by 100.	LSOA	LSOA	DZ	SOA

Appendix Table B.1-8 Crime: Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
c1	Crime	High levels of crime	Department of Communities and Local Government, Statistics for Wales, Scottish Government, NI Statistics and Research Agency	See next column	England: Indices of Deprivation 2015: Crime Domain: Crime Score (all crime); Scotland: SIMD Crime Score, 2012 Wales: SIMD Crime score, 2014; Northern Ireland: NIIMD Crime Score, 2010	LSOA	LSOA	DZ	SOA

Appendix Table B.1-9 Housing characteristics: Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
l1	Housing characteristics	% caravan or other mobile or temporary structures in all households	Census, ONS	2011	Census table KS401. 'All household spaces: Caravan or other mobile or temporary structure' divided by the total number of households and multiplied by 100.	LSOA	LSOA	DZ	SOA

Appendix Table B.1-10 Direct flood experience: Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
e1	Direct flood experience	number of properties within historical flood boundary	EA, NRW, SEPA, NI Rivers Agency	Various	Based on query of property dataset and flood outline; limited to past 50 years when date information available	LSOA	LSOA	DZ	SOA

Appendix Table B.1-11 Social networks: Individual indicators, data sources and spatial resolution

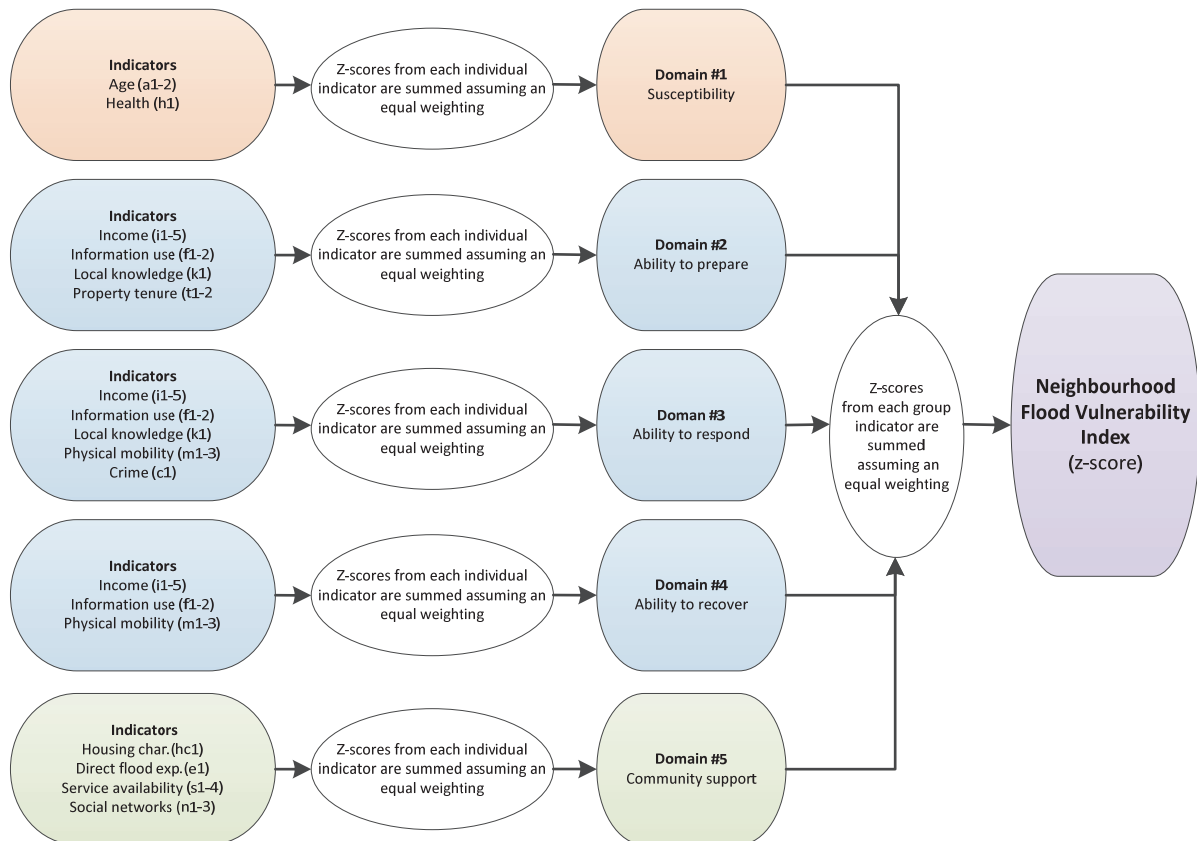
ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
n1	Social networks (non-flood)	% single-pensioner households	Census, ONS	2011	Census table QS113. Number of households 'One-person household: Aged 65 and over' divided by the total number of households and multiplied by 100.	LSOA	LSOA	DZ	SOA
n2	Social networks (non-flood)	% lone-parent households with dependent children	Census, ONS	2011	Census table QS113. Number of households of lone parent with one or more dependent children divided by the total number of households and multiplied by 100.	LSOA	LSOA	DZ	SOA
n3	Social networks (non-flood)	% children of primary school age (4-11) in the population	Census, ONS	2011	Census table QS103. Number of people aged '4- 11 years' divided by the total population and multiplied by 100.	LSOA	LSOA	DZ	SOA

Appendix Table B.1-12 **Service availability**: Individual indicators, data sources and spatial resolution

ID	Domain	Indicator description	Source and provider	Date	Indicator processing details	Spatial Unit			
						Eng	Wales	Scot	NI
s1	Service availability	% of emergency services exposed to flooding	CCRA, Sayers et al, 2015	2011	Based on query of sites against hazard data to identify proportion of sites at risk of flooding 1:75 or greater	LA	LA	LA	LA
s2	Service availability	% no. of care homes exposed to flooding	CCRA, Sayers et al, 2015	2011	Based on query of sites against hazard data to identify proportion of sites at risk of flooding 1:75 or greater	LA	LA	LA	LA
s3	Service availability	% no. of GP surgeries exposed to flooding	CCRA, Sayers et al, 2015	2011	Based on query of sites against hazard data to identify proportion of sites at risk of flooding 1:75 or greater	LA	LA	LA	LA
s4	Service availability	% no. of schools exposed to flooding	CCRA, Sayers et al, 2015	2011	Based on query of sites against hazard data to identify proportion of sites at risk of flooding 1:75 or greater	LA	LA	LA	LA

## B.2 Approach to calculating the Neighbourhood Flood Vulnerability Index (NFVI)

The Neighbourhood Flood Vulnerability Index (NFVI) is determined through a three-stage process as outlined in Figure B2-1 and described below.



Appendix Figure B.2-1 The process used to calculate the NFVI

### B.2.1 Stage 1: Determine the z-score for Individual Indicators

Each indicator ('age' etc as described in the previous section) is normalised to a z score. The z score is derived by subtracting the mean value and dividing by the standard deviation. If an indicator is already in the form of a rank (e.g. as is the Index of Multiple Deprivation, IMD), the equivalent z score is determined by assuming the rank is drawn from a normal distribution and calculating the number of standard deviations from the mean associated with that rank. This is done so that each indicator has the same numerical parameters, rather than its original numbers (which might be a %, a number, a rank, a fraction, etc.), and to enable them to be compared and combined on the "same playing field".

### B.2.2 Stage 2: Determine the z-score for each domain

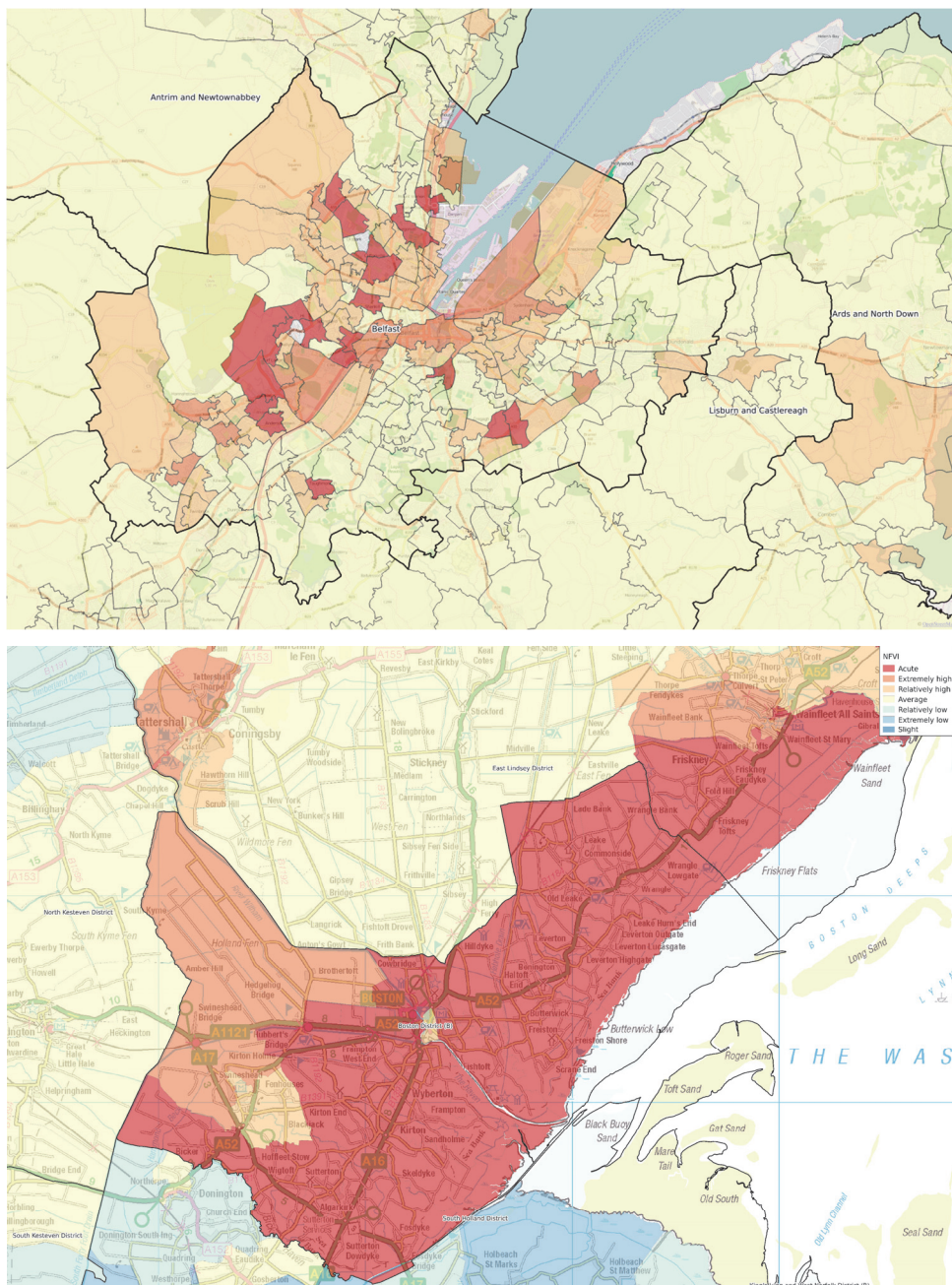
Z scores for the individual indicators that contribute to each domain (Susceptibility, Ability to Prepare, Respond and Recover, and Community Support) are combined based upon the assumption of equal weighting (

Appendix Table B.2-1). The only exception is the individual indicator associated with ‘direct flood experience’ (e1). In this case the weighting is negative as it acts to reduce the relative vulnerability of one neighbourhood compared to another.

The resulting values for each domain are then themselves transformed into a z score.

### B.2.3 Stage 3: Determine the NFVI

For each neighbourhood, the z scores derived for each Indicator are summed with equal weighting. The final z score is calculated based on these results and used as the NFVI.



Top: Belfast, Bottom: Boston

Figure B-1 Example Neighbourhood Flood Vulnerability Index Maps



**Appendix Table B.2-1 Indicator weighting**

Neighbourhood Flood Vulnerability: Weighting of individual indicators							Relative weighting in NFVI
Individual indicator	Weighted contribution to each characteristic					Suscept.	
	Ability to prepare	Ability to respond	Ability to recover	Community support			
<b>Age</b>							<b>0.10</b>
a1	Young children (% people under 5 years)	0.25					0.05
a2	Older people (% people over 75 years)	0.25					0.05
<b>Health</b>							<b>0.10</b>
h1	Disability / people in ill- health (% people whose day- to-day activities are limited)	0.25					0.05
h2	% households with at least one person with long term limiting illness	0.25					0.05
<b>Income</b>							<b>0.30</b>
i1	Unemployed (% unemployed)		0.10	0.08	0.10		0.06
i2	Long-term unemployed (% who are LTU or who have never worked)		0.10	0.08	0.10		0.06
i3	Low income occupations (% in routine or semi- routine occupations)		0.10	0.08	0.10		0.06
i4	Households with dependent children and no adults in employment (%)		0.10	0.08	0.10		0.06
i5	People income deprived (%)		0.10	0.08	0.10		0.06
<b>Information use</b>							<b>0.12</b>
f1	Recent arrivals to UK (% people with <1 year residency coming from outside UK)		0.10	0.08	0.10		0.06
f2	Level of proficiency in English		0.10	0.08	0.10		0.06
<b>Local knowledge</b>							<b>0.04</b>
k1	New migrants from outside the local area		0.10	0.08			0.04
<b>Tenure</b>							<b>0.04</b>
t1	Private renters (% Households)		0.10				0.02
t2	Social renters (% Households renting from Social or Council landlords)		0.10				0.02
<b>Physical mobility</b>							<b>0.12</b>
m1	High levels of disability (% of population who are disabled)			0.08	0.10		0.04
m2	% people living in medical and care establishments			0.08	0.10		0.04
m3	Lack of private transport (% households with no car or van)			0.08	0.10		0.04
<b>Crime</b>							<b>0.02</b>
c1	High levels of crime			0.08			0.02
<b>Housing characteristics</b>							<b>0.02</b>
hc1	Caravan or other mobile or temporary structures in all households (%)					0.11	0.02
<b>Direct flood experience</b>							<b>-0.02</b>
e1	Properties exposed to significantly flood risk (% of homes in floodplain)					-0.11	-0.02
<b>Service availability</b>							<b>0.09</b>
s1	Emergency services exposed to flooding (%)					0.11	0.02
s2	Care homes exposed to flooding (%)					0.11	0.02
s3	GP surgeries exposed to flooding (%)					0.11	0.02
s4	Schools exposed to flooding (%)					0.11	0.02
<b>Social networks (non-flood)</b>							<b>0.07</b>
n1	Single-pensioner households (%)					0.11	0.02
n2	Lone-parent households with dependent children (%)					0.11	0.02
n3	Children of primary school age (4-11) in the population (%)					0.11	0.02

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