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BRE Client Report

A Quantitative Health Impact Assessment: The cost of private sector housing and prospective housing interventions in Wyre Forest District Council

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Date: 17 August 2016

Report Number: HED054-1024 Issue: 1

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Executive summary

- Wyre Forest District Council has recognised that poor housing has an important effect on health as most occupiers spend longer in their own home than anywhere else. Additional information is also required concerning private sector housing in order to inform the Joint Strategic Needs Assessment (JSNA).
- The council has commissioned BRE to produce housing stock models to help understand the condition of the private sector housing within their area (these are provided in a separate report). The housing stock model is based on data gathered from a number of sources (including the English Housing Survey (EHS)) and includes an assessment of dwelling hazards using the Housing Health and Safety Rating System (HHSRS). This data from the housing stock model has then been used as a basis for this Health Impact Assessment (HIA) to better understand the effect of private sector housing hazards and intervention strategies on the health of residents in Wyre Forest.
- A Health Impact Assessment (HIA) is a formal method of assessing the impact of a project, procedure or strategy on the health of a population. This HIA draws on evidence of the health impact of hazards identified using the Housing Health and Safety Rating System (HHSRS[1]) and a methodology developed by the BRE Trust and published in the "Real Cost of Poor Housing"[2] and in the more recent "The Full Cost of Poor Housing"[3]. The HHSRS is the method by which housing condition is now assessed in accordance with the Housing Act 2004. A dwelling with a category 1 hazard is considered to fail the minimum statutory standard for housing and is classified as "poor housing".
- This report provides a quantitative HIA for Wyre Forest District Council which covers:
    - The condition of private sector housing and the estimated effect on the health of occupiers
    - The cost of prospective interventions to reduce the number of hazards
    - The costs to the NHS and wider society of treating these health issues
    - The health cost benefit analysis of interventions to reduce some of these hazards
    - An analysis of Quality Adjusted Life Years (QALYs) relating to housing hazards

[1] Housing Health and Safety Rating System Operating Guidance, Housing Act 2004, Guidance about Inspections and Assessments given under Section 9, ODPM, 2006

[2] The Real Cost of Poor Housing, M Davidson *et al.*, IHS BRE Press, February 2010

[3] The Full Cost of Poor Housing, Roys M, Nicol S, Garrett H and Margoles S, IHS BRE Press, 2016

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- The main results are shown in the summary table overleaf and the headline results are as follows:

HIA for Wyre Forest District Council, private sector stock

There are an estimated 9,127 category 1 hazards in Wyre Forest's private sector stock, of which 1,413 are within the privately rented sector. *See full results*

The estimated total cost of mitigating all these hazards is £20.6 million with £3 million in the private rented sector. *See full results*

It is estimated that poor housing conditions are responsible for over 327 harmful events requiring medical treatment every year. *See full results*

The estimated cost to the NHS of treating accidents and ill-health caused by these hazards is £1.6 million each year. If the wider costs to society are considered, the total costs are estimated to be £17.5 million. *See full results*

If these hazards are mitigated then the total annual savings to society are estimated to be £17.5 million, including £1.5 million of savings to the NHS. *See full results*

Poor housing in Wyre Forest is estimated to cost around 173 quality-adjusted life-years (QALYs). *See full results*

Summary of results, private sector stock (N.B. due to data availability, some hazards are excluded from the cost benefit analysis)

Housing hazard type	Numbers of hazards (total private sector stock)	Estimated number of instances requiring medical intervention	Cost of mitigating all hazards	Potential annual costs of not mitigating hazards		Potential annual savings from mitigating hazards		Cost benefit analysis			
								Cost benefit to NHS		Cost benefit to Society	
				Costs to NHS	Costs to society	Savings to NHS	Savings to society	Positive cost benefit year where 20% works are carried out	Positive cost benefit year where 50% works are carried out	Positive cost benefit year where 20% works are carried out	Positive cost benefit year where 50% works are carried out
Damp and mould growth	60	30	£417,755	£20,140	£94,305	£20,080	£94,300	6	15	2	4
Excess cold	2,769	15	£13,309,247	£465,460	£8,343,527	£418,910	£8,338,489	4	12	1	1
Crowding and space	25	3	£424,429	£31,760	£450,896	£31,700	£450,890	15	15	2	2
Entry by intruders	39	13	£44,094	£8,750	£40,963	£8,360	£40,914	4	5	1	1
Domestic hygiene, Pests and Refuse	3	1	£2,712	£320	£1,066	£320	£1,066	Excluded	Excluded	Excluded	Excluded
Food safety	35	6	£103,843	£6,680	£17,261	£6,670	£17,261	Excluded	Excluded	Excluded	Excluded
Personal hygiene, Sanitation and Drainage	32	5	£37,753	£6,040	£15,609	£6,030	£15,608	Excluded	Excluded	Excluded	Excluded
Falls associated with baths etc	786	44	£417,208	£158,860	£1,771,052	£157,960	£1,770,977	1	3	1	1
Falling on level surfaces etc	652	36	£633,240	£138,230	£387,576	£124,400	£386,777	2	4	1	2
Falling on stairs etc	4,307	135	£4,434,067	£733,070	£5,916,941	£681,480	£5,912,396	2	4	1	1
Falling between levels	242	24	£223,905	£27,270	£131,282	£27,120	£131,271	2	7	1	2
Electrical hazards	19	1	£30,537	£4,460	£17,535	£4,450	£17,534	Excluded	Excluded	Excluded	Excluded
Fire	88	2	£418,245	£16,190	£273,903	£16,030	£273,886	4	11	1	1
Flames, hot surfaces etc	41	7	£85,000	£6,010	£28,341	£5,830	£28,323	1	1	1	1
Collision and entrapment	30	5	£17,766	£3,060	£23,045	£2,850	£23,023	2	7	1	1
TOTAL	9,127	327	£20,599,801	£1,626,300	£17,513,302	£1,512,190	£17,502,715	n/a	n/a	n/a	n/a

N.B. there are 9,127 hazards in total spread across 7,300 dwellings as some dwellings have more than one hazard. Positive cost benefit year refers to the payback period – i.e. the number of years it would for the savings to payback the mitigation costs.

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- The housing stock models estimate that there are 9,127 category 1 hazards in 7,300 dwellings across the private housing stock. This Health Impact Assessment estimates that poor housing conditions in the private sector are responsible for over 327 harmful events requiring medical intervention each year. These almost completely avoidable events range from respiratory diseases like COPD associated with cold homes, to fractures and injuries associated with homes containing fall hazards. It would cost £20.6 million to mitigate all of these serious housing hazards, but would return savings to the NHS of £1.5 million per year, with further savings to wider society of £17.5 million per year (which includes increased spending on benefits, loss of future earnings, demands on other services etc. as well as the estimated NHS savings). It is also estimated that 173 Quality Adjusted Life Years (QALYs) could be saved if all serious housing hazards were mitigated.

- The health cost benefit analysis of interventions to reduce some of these hazards has been developed to show the costs and savings to the NHS and to society as a whole from carrying out work in dwellings with the least expensive 20% and 50% of required works. By focussing on the less expensive works, the expected payback periods (the number of years to reach the break-even point) are shorter. The summary table on the previous page shows that the shortest payback periods are for the hazards of collision and entrapment and some of the falls hazards. The longest payback periods are associated with the more complex hazards of damp and mould, excess cold and crowding and space.

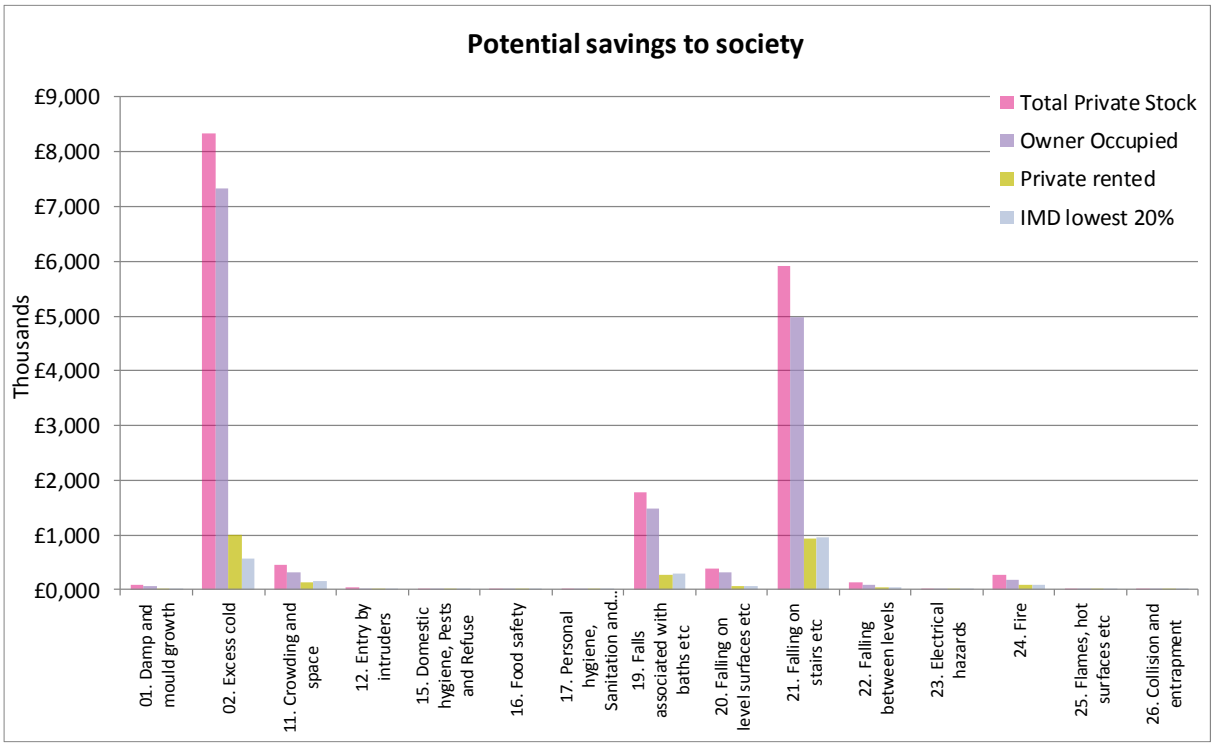
- The return on investment when all hazards are mitigated may seem rather limited and modest. However, this report considers a number of different scenarios where the mitigation of different hazards and mitigation costs are further investigated to identify more compelling scenarios. For example, mitigating all damp and mould hazards in the owner occupied stock would cost approximately £295,000. The least costly half of all these hazards could be mitigated by investing around £19,560 per year for 5 years. The return on investment, or payback period, when costs to society are considered is 3 years; therefore, 4 years after the repairs are carried out, the savings to society will be greater than the mitigation costs. For falls associated with baths, all hazards in the owner occupied sector could be mitigated for £352,000. This would save the NHS £133,170 per year thus giving a payback period of less than 3 years.

- The estimated annual savings to society of fall hazards associated with older people is estimated at £8 million. This indicates that repairs and improvements to stairs, floors and paths, plus additional safety arrangements for baths are likely to be the most cost effective.

- The estimated costs and savings can be shown by tenure. The largest costs and savings are within owner occupied dwellings but the estimated savings to society when all category 1 hazards in the privately rented sector are mitigated is £2.6 million as shown in the graph below.

- The quantitative information provided in this HIA on the impact of private sector housing on health, will provide an invaluable contribution to the JSNA. The results will contribute to the provision of evidence of the costs, savings and benefits of improving housing in the private sector, and the costs to health of not doing so. Some recommendations are provided which look at possible interventions in order to assist the council in making decisions concerning where resources can best be targeted to improve private sector dwellings in Wyre Forest Council. Local knowledge will be key in targeting resources to gain the greatest benefit in both geographical areas and population profile. The importance of a Home Improvement Agency or a Handy Person Service to help take action is identified by this report.

Potential savings to society following mitigation work, by hazard and tenure, all private sector stock and split into tenure (IMD = Index of Multiple Deprivation and is across all stock)



Main recommendations:

- The owner occupied sector contains the greatest number of category 1 hazards requiring an estimated £17.6 million to mitigate. The most common hazards are falling on stairs etc. (3,631), excess cold. (2,438), and falls associated with baths etc. (662). Therefore there should be appropriate services to assist owner occupiers in addressing these most common hazards - this may range from financial assistance to support with the specification of remedial works and finding appropriate contractors.
- This report recognises the importance of a Home Improvement Agency or a Handy Person Service to help take action. Not only will there be a need for help to be available, there should also be systems in place to identify those needing assistance; for example, setting up referral pathways between housing and health professionals so that occupational therapists or health visitors are aware and can make referrals to housing support services.
- Within the private rented sector, the annual cost to society of category 1 hazards is estimated to be £3 million. Work to mitigate these hazards will need to be carried out by landlords in accordance with legislation in the Housing Act 2004. To facilitate this, an active housing enforcement strategy will be necessary.
- Landlord Accreditation Schemes can help to educate landlords on the need to mitigate hazards.
- The hazard of damp and mould particularly affects children and can cause long term effects that may well be underestimated by this work (the evidence is not available to quantify the true cost over a long

time period). Flames and hot surfaces and falling between levels also specifically affect children. Education using a multi-agency approach with Health Visitors or through Children's Centres and accessing local knowledge will be crucial to reducing these hazards. Professionals working with families in the private rented sector should be made more aware of landlord duties.

- The evidence indicates that initiatives to reduce the incidence of falls at home should be one of the more cost effective strategies. The cost benefit scenarios show that the best value initiatives will be small-scale repair or improvement works to stairs, trip hazards within the home and to uneven paths. Targeting this initiative towards dwellings occupied by persons over 60 will bring the greatest benefit.
- The quantitative information provided in this HIA on the impact of private sector housing on health should be fed into the JSNA and Health and Wellbeing strategy. This will allow evidence on the costs, savings and benefits of improving housing in the private sector, and the costs to health of not doing so, to be compared with other areas and contribute to informed discussions identifying commissioning priorities.
- The scenario tables in **Appendix D** show the expected costs of work to mitigate the individual hazards over a period of 3, 5 and 10 years along with the payback period in terms of savings to the NHS and society. These tables can be used to give some financial quantification towards planning a strategy.

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1 Background and introduction

1.1 Background

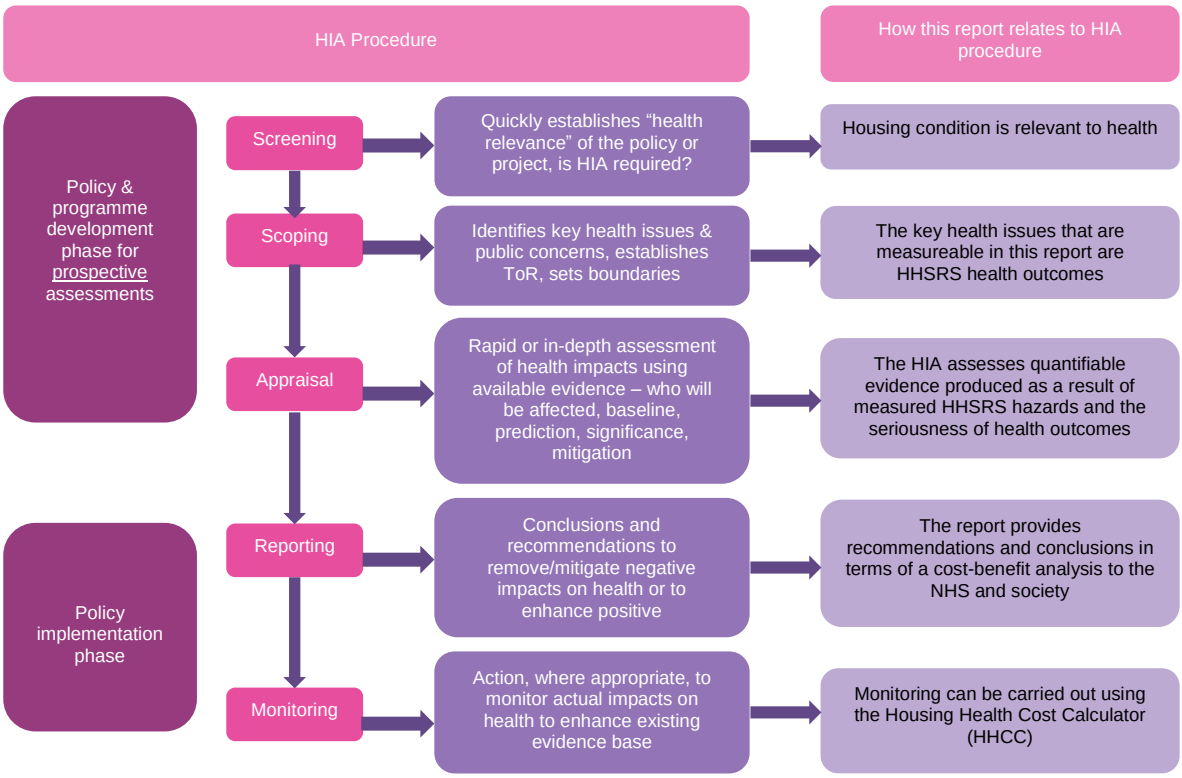
1.1.1 Health Impact Assessment (HIA)

A Health Impact Assessment (HIA) is a formal method of assessing health impact and is advocated by the World Health Organisation (WHO).

"HIA provides decision-makers with information about how any policy, programme or project may affect the health of people. HIA seeks to influence decision-makers to improve the proposal. WHO supports the use of HIA because of its ability to influence policies, programmes and/or projects. This provides a foundation for improved health and well-being of people likely to be affected by such proposals"[4].

The method suggested and used internationally is explained in **Figure 1**.

Figure 1: HIA Procedure (adapted from the WHO's Tools and Methods)[5]



[4] www.who.int/hia

[5] WHO, Tools and Methods, 2013, http://www.who.int/hia/tools/en/

The screening stage identifies that housing has an effect on the health of occupiers and visitors. The scoping stage gives examples of expected health impacts, and the appraisal stage measures these. The reporting stage provides conclusions and recommendations. Finally, the monitoring stage can be carried out in the future by evaluation of interventions and estimating the cost savings to the NHS and society by using the Housing Health Cost Calculator (HHCC[6]).

Previous research has been carried out by BRE to assess the real cost of poor housing[2] and more recently the full cost of poor housing[3], which looks in more detail at the wider costs to society. This research allows the costs of hazards associated with housing to be developed as part of an HIA.

1.1.2 The regulatory framework

The Government's White Paper "Healthy Lives, Healthy People"[7] and associated outcomes framework includes a number of indicators which specifically relate to housing, as follows (the numbers shown in brackets refer to those published in the outcomes framework):

- Fuel poverty (1.17)
- Older people's perception of community safety (1.19)
- Rate of emergency hospital admissions for falls or fall injuries in persons aged 65 and over (2.24)
- Mortality from all cardiovascular diseases (4.4)
- Age-sex standardised rate of emergency admissions for fractured neck of the femur in persons 65 and over per 100,000 (4.14)
- Excess Winter Deaths Index (4.15)

The Audit Commission's report "Building Better Lives"[8] recommends maximising the use of the existing housing stock. Furthermore, it states that improving housing can improve public health and children's education, and make communities more sustainable, as illustrated by the following quotes from the report:

"Well-targeted spending on the existing housing stock can also yield financial benefits

..Every £1 spent on providing housing support for vulnerable people can save nearly £2 in reduced costs of health services, tenancy failure, crime and residential care.

..Spending between £2,000 and £20,000 on adaptations that enable an elderly person to remain in their own home can save £6,000 per year in care costs".

The Joint Strategic Needs Assessment (JSNA) is the tool being used by local authorities, the NHS and Clinical Commissioning Groups (CCG) to quantify baseline data and the health needs of the local population. The strategy produced by the Health and Wellbeing Boards is based on the JSNA. Additional

[6] www.housinghealthcosts.org

[7] Healthy Lives, Healthy People: Our strategy for public health in England, HM Government, 30.11.2010

[8] Building Better Lives – Getting the best from strategic housing, Audit Commission, September 2009

guidance on carrying out a JSNA was published by the Department for Communities and Local Government (DCLG, previously CLG) and the Department of Health (DoH) in December 2007[9].

Since April 2013 all upper tier local authorities have been charged with setting up Health and Wellbeing Boards and producing a strategy to improve the health and wellbeing of the local population to reduce the health inequality gap by improving the health of the poorest first.

1.2 Introduction

Wyre Forest District Council has recognised that additional information is required concerning private sector housing in order to help inform the JSNA. The council has commissioned BRE to produce housing stock models to help understand the condition of the private sector housing within their area.

The BRE Housing Stock Model is based on data gathered from a number of sources (including the English Housing Survey (EHS)) and includes an assessment of dwelling hazards using the Housing Health and Safety Rating System (HHSRS). The HHSRS is the method by which housing condition is assessed in accordance with the Housing Act 2004 and the Operating Guidance[10]. A dwelling with a category 1 hazard is considered to fail the minimum statutory standard for housing (see **Appendix A** for more information on the calculation methodology for category 1 hazards).

The council has commissioned BRE to produce a housing stock model and the data from this has then been used as a basis for this HIA to better understand the effect of private sector[11] housing hazards and intervention strategies on the health of residents in Wyre Forest.

The aims of this project, therefore, are to provide a quantitative HIA for Wyre Forest District Council which:

1. Quantifies the number of poor private sector dwellings
2. Assesses the estimated effect on the health of occupiers
3. Assesses the distribution of the hazards and compares with selected health data
4. Quantifies the costs of prospective interventions to reduce the number of hazards
5. Quantifies the costs to the NHS and wider society of treating health issues caused by these hazards
6. Assesses the costs and savings to health of interventions to reduce some of these hazards
7. Assesses various cost benefit scenarios focussing on hazards which are least costly to mitigate
8. Provides recommendations for possible interventions
9. Provides an analysis of Quality Adjusted Life Years (QALYs) relating to housing hazards

The quantitative information provided in this HIA on the impact of private sector housing on health will provide an invaluable contribution to the evidence base. The results will contribute to evidence of the costs and benefits of improving housing in the private sector, and the costs to health of not doing so.

[9] Delivering Health and Wellbeing in Partnership, CLG and DoH, 2008

[10] Housing Health and Safety Rating System Operating Guidance, ODPM, 2006

[11] Note that this report is focussed on the private sector since data on the social rented stock is more readily available from other sources.

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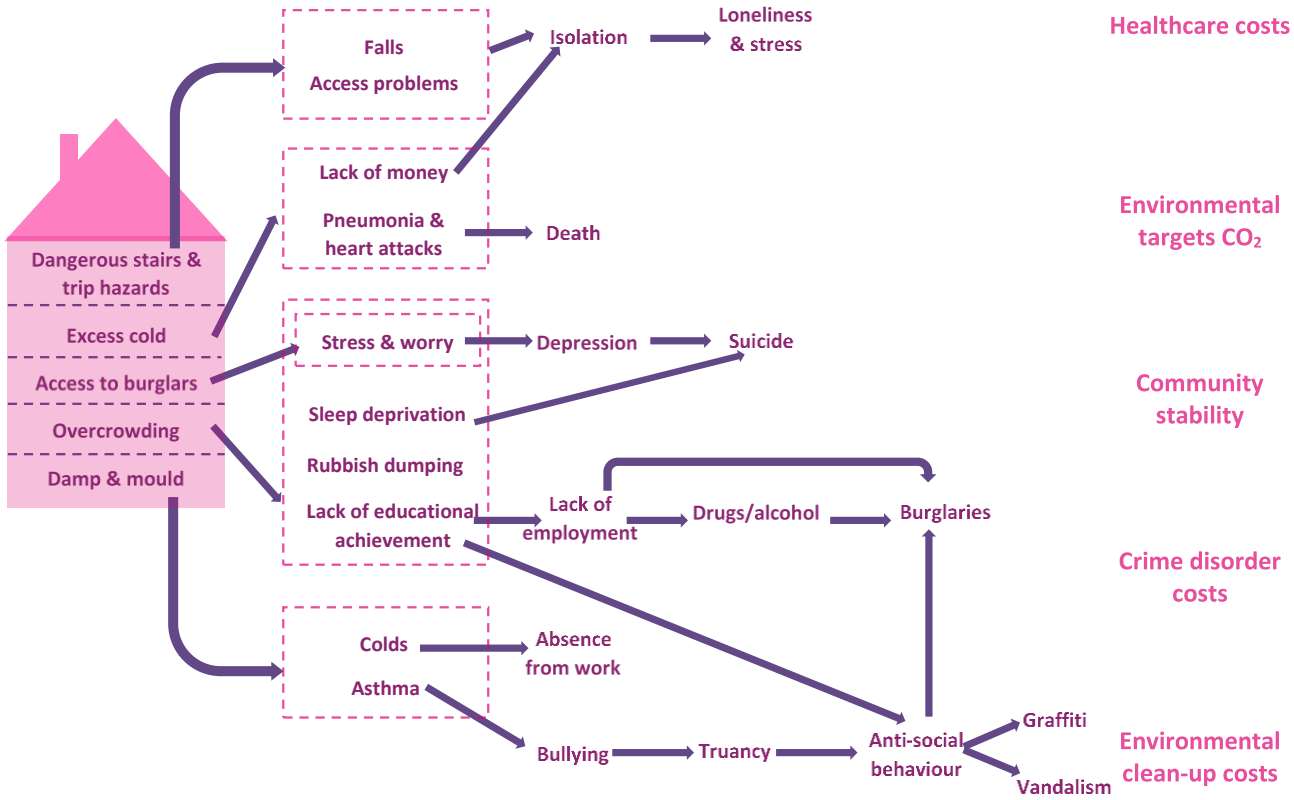
2 Housing hazards

This section provides a brief description of the types of hazards found in dwellings - more detailed descriptions are given in **Appendix B**. The links between hazards found in dwellings and the health issues that may arise are shown in **Figure 2**.

Figure 2: Relating housing hazards to health, adapted from CIEH publication[12]



[12] Good Housing Leads to Good Health, A toolkit for environmental health practitioners CIEH, September 2008

2.1 The Housing Health and Safety Rating System (HHSRS)

The HHSRS is a means of classifying defects in dwellings by assessing their potential effect on the health and safety of occupants and visitors, particularly those regarded as in the "vulnerable group"[13]. The system provides a means of rating the seriousness of any hazard to differentiate between minor hazards and those where there is an immediate threat of major harm. A brief explanation of the assessment process is included in **Appendix C**.

Where a hazard scores 1,000 or more on the HHSRS it is deemed to be a category 1 hazard and any dwelling with such a hazard is considered to be below the minimum acceptable standard for housing and thus classified as "poor housing". The presence of a category 1 hazard, therefore, is the measure used to define poor housing and where category 1 hazards are found by a local authority they are required to take action to mitigate the hazard.

This means of "measuring" hazards focuses on health outcomes, and the development of the process is informed by a large body of research and statistics on the links between housing and health. The information regarding health outcomes given in this report has been derived from the HHSRS Operating Guidance. The "HHSRS is evidence based and supported by extensive reviews of literature by detailed analyses of statistical data[14] on the impact of housing conditions on health"[15].

The HHSRS Operating Guidance defines 29 hazards as shown in **Table 1**. Of the total 25 HHSRS hazards covered in the EHS, there are 15 hazards within Wyre Forest for which there is sufficient information to quantify the number of dwellings affected.

It is estimated that 98% of all category 1 hazards found within Wyre Forest fall under these 15 hazards. The remaining hazards are rare and there is insufficient evidence with which to quantify them. The hazards are divided into those likely to cause:

- Physiological conditions
- Psychological illness
- Infection
- Accidents

[13] The "vulnerable group" is a technical term used in the HHSRS Operating Guidance. It refers to the group of persons who are more likely to be affected by the hazard than any other age group in the population. So for a hazard such as "Falling between levels", the vulnerable group is children, as they are less aware of the danger of falling; whereas for Excess cold it is persons over 65, as they are less able to keep themselves warm". Where a hazard does not affect a specific vulnerable group then the population is taken as a whole.

[14] Statistical Evidence to Support the Housing Health and Safety Rating System Volumes I.II and II, ODPM, London, 2003

[15] NICE: A Review of Interventions for Improving Health, ODPM, December 2005

Table 1: The 29 hazards covered by the HHSRS (those highlighted in bold are covered in this HIA, although the 3 infection hazards and electrical hazards are not covered in the cost benefit analysis due to insufficient information)

Physiological conditions	Psychological illness	Infection	Accidents
Damp & mould growth	**Crowding & space**	**Domestic hygiene, pests & refuse**	**Falls associated with baths etc.**
Excessive cold	**Entry by intruders**	**Food safety**	**Falling on level surfaces**
Excessive heat	*Lighting*	**Personal hygiene, sanitation & drainage**	**Falling on stairs etc.**
Asbestos	*Noise*	*Water supply*	**Falling between levels**
Biocides			**Electrical hazards**
CO & fuel combustion productions			**Fire**
Lead			**Flames, hot surfaces etc.**
Radiation			**Collision & entrapment**
Un-combusted fuel gas			*Explosions*
Volatile organic compounds			*Position & operability of amenities*
			Structural collapse & falling elements

Italics = not covered in any further detail in this report as there is insufficient data for these purposes.

The hazards can also be considered in terms of those where the health effects from exposure are immediate and those where exposure is generally required over a prolonged period before symptoms become obvious. **Figure 3** shows a plot of some of the more common hazards in terms of exposure time and severity of harm outcomes. Those hazards that have a longer term effect are the most difficult to measure in health outcome terms and their severity may be underestimated.

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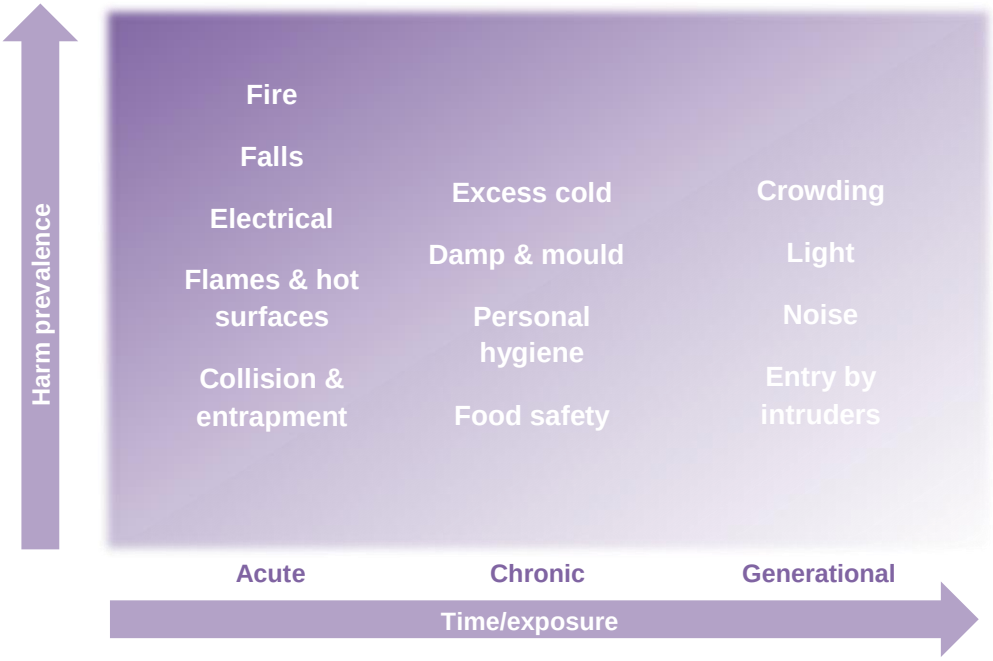
Figure 3: Some of the more common hazards and their effects in terms of time of exposure and severity



2.2 Health conditions caused by hazards in dwellings

Table 2 shows the main health conditions caused by each of the hazard types, the vulnerable groups most affected and the mitigation actions which could be taken. In addition to the hazards shown in this table, there are an estimated 25 hazards of crowding and space in the private sector in Wyre Forest. The health effects of this are far reaching and, where children are involved, long term. Detailed descriptions of the hazards and their health effects are provided in **Appendix B**.

The recent National Institute for Health and Care Excellence (NICE) Quality Standard (QS117)[16] covers the prevention of excess winter deaths and health problems associated with cold homes. Cold weather has a variety of effects on people's health including direct effects on the incidence of heart attack, stroke, respiratory disease, flu, falls and injuries and hypothermia. Furthermore, there are indirect effects of cold weather, for example mental health problems including depression. Excess winter deaths refer to the fact that the death rate in the UK is higher in the winter months[17]. These excess winter deaths are related to temperatures of 4-8ºC which cause increases in respiratory and cardiovascular issues. As temperatures fall further, the risk of illness and death increases, in fact, for people living in the coldest 10% of homes, the death rate rises 2.8% for every degree Celsius fall in external temperature[18].

[16] https://www.nice.org.uk/guidance/qs117/chapter/introduction

[17] December to March inclusive.

[18] https://www.jrf.org.uk/report/cold-comfort-social-and-environmental-determinants-excess-winter-deaths-england-1986-1996

The NICE Quality Standard states that in general it tends to be older people who are affected by excess winter deaths, for example ONS reported that in 2014/15:

- 56% of cold-related deaths were in people aged 85+
- 27% were in people aged 75-84

Table 2: Summary of the main hazards, their effects, vulnerable groups affected and potential mitigation actions

Housing Hazard type	Main health conditions	Vulnerable groups	Mitigating the hazard
Excess cold	Respiratory diseases, chronic obstructive pulmonary disease (COPD), cardio-vascular conditions Increased risk of falls Worsening of symptoms of rheumatoid arthritis and leg ulcers Excess winter deaths Work and school days lost, reduction in educational attainment (Marmot report)	Older people People in fuel poverty Families	Improving heating and thermal efficiency measures
Damp and mould growth	Asthma exacerbation, lower respiratory infections Social isolation	Children Adults	Improved heating, ventilation and addressing any structural problems
Entry by intruders	Fear of burglary Emotional stress	All	Window and door locks, security lighting and key safes
Falls in baths, on stairs, trips and slips	Accidents Fractures to older people and subsequent loss of independence General health deterioration	Older people	Stair rails, balustrades, grab rails, repair to paths
Accidents affecting children (falling between levels, flames & hot surfaces, electrical hazards, collision & entrapment)	Physical injury, falls, electrocution, severe burns and scalds	Children	Identifying hazards, provide more space, education of professionals

2.2.1 Photographic evidence of category 1 hazards

This section provides some photographic evidence of category 1 hazards in Wyre Forest.

To be completed on provision of photographs.

Photograph 1:

Photograph 2:

Photograph 3:

Photograph 4:

Photograph 5:

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3 Methodology and findings

The overall approach used in this HIA is as follows:

1. Quantify the number of poor private sector dwellings
2. Assess the estimated effect on the health of occupiers
3. Assess the distribution of the hazards and compare with selected health data
4. Quantify the costs of prospective interventions to reduce the number of hazards
5. Quantify the costs to the NHS and wider society of treating health issues caused by these hazards
6. Assess the costs and savings to health of interventions to reduce some of these hazards
7. Assess various cost benefit scenarios focussing on hazards which are least costly to mitigate
8. Provide recommendations for possible interventions
9. Provide an analysis of Quality Adjusted Life Years (QALYs) relating to housing hazards

3.1 The number of dwellings meeting the definition of poor housing and the estimated effect on the health of occupiers

3.1.1 Numbers of hazards and estimated instances requiring medical intervention

As previously discussed, the definition used for poor housing is those dwellings which have at least one category 1 hazard. The number of hazards present in dwellings has been quantified using the data sourced from the BRE Housing Stock Models provided to Wyre Forest District Council. The data includes a breakdown by tenure. Further explanation of the data sources and their application is provided in **Appendix C**.

These figures are for the whole of Wyre Forest District Council, but there will be differentiation across the council area. This is shown in more detail in the associated housing stock model report and officers with local knowledge will be best placed to interpret this further.

Figure 4 shows the numbers of hazards, grouped into major hazard categories, in Wyre Forest compared to England as a whole. Compared to England, Wyre Forest Council has fewer dwellings with category 1 hazards, in particular lower rates of excess cold. Around 20.0% of dwellings in Wyre Forest have a category 1 hazard.

Figure 5 shows the estimated number of category 1 hazards by tenure. The tenure split is important because dwellings that are privately rented should have any category 1 hazard mitigated by the landlord at their expense in order to comply with the Housing Act 2004. The chart shows the figures for all hazards and it is clear that many of the hazards are not present in sufficient numbers to be considered further in this HIA.

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Figure 4: HHSRS category 1 hazards in Wyre Forest compared to England (2012[19]), private sector stock

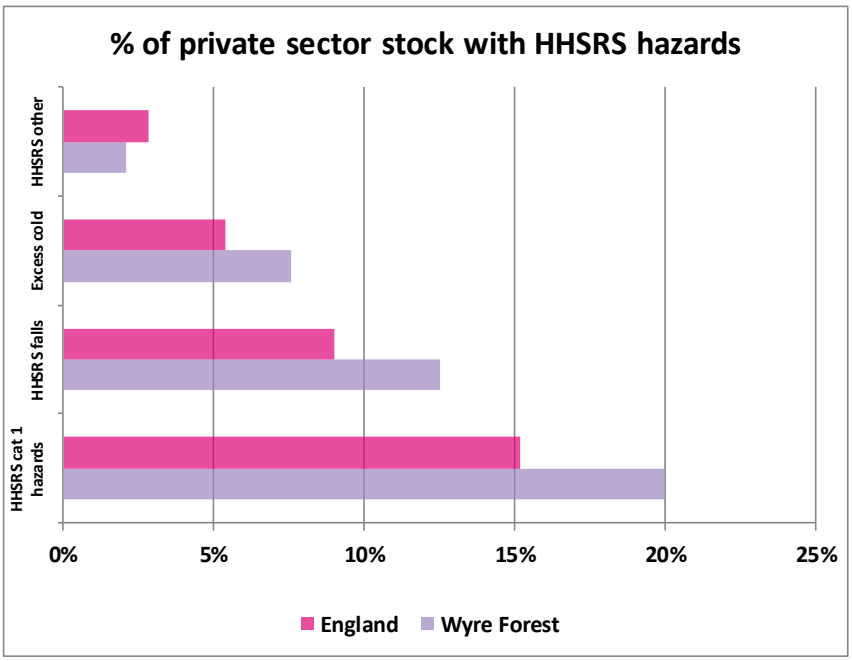
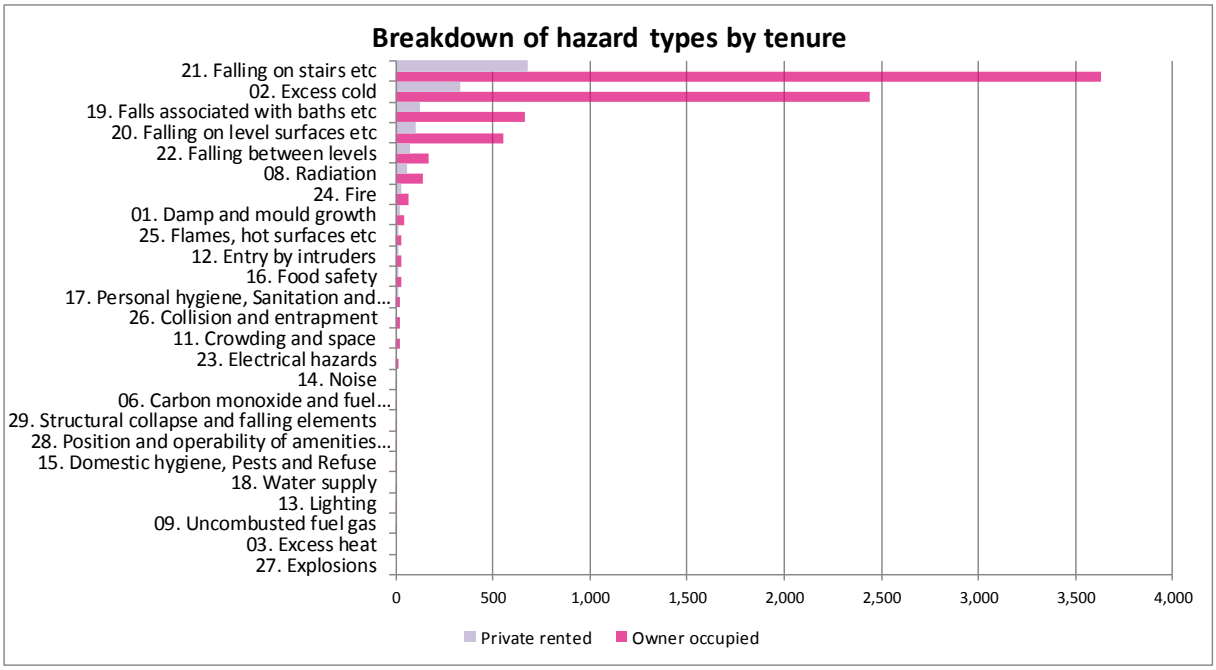


Figure 5: Estimated number of category 1 hazards in Wyre Forest by tenure, private sector stock



[19] https://www.gov.uk/government/statistical-data-sets/dwelling-condition-and-safety (DA4141)

Of the total 25 HHSRS hazards covered in the EHS, there are 15 hazards within Wyre Forest Council for which there is sufficient information to quantify the number of dwellings affected. These 15 hazards cover 98% of all hazards found in Wyre Forest. For these hazards, it is then possible to estimate the expected number of category 1 hazards and the number of harm outcomes requiring medical intervention resulting from these hazards. **Table 3** shows, for the 15 hazards discussed, the total number of category 1 hazards is 9,127 and the estimated number of instances requiring medical intervention expected within Wyre Forest is 327. The most common category 1 hazard is falling on stairs etc. and the second most common is excess cold. The most common category 1 hazards do not necessarily mean the greatest number of medical interventions as the HHSRS scoring system requires an assessment of likelihood and the extent of harm outcome. For example, it could be the case that the hazard of damp and mould causes a greater number of incidents than excess cold although the severity of harm outcome would be less. Later in the report the cost benefits of mitigating 11 of these hazards is discussed (there being insufficient data on the remaining 4).

The table shows the overall figures for the private stock and then breaks this down into owner occupied and private rented. It also shows the figures for dwellings within the local authority which form part of the 20% of the most deprived areas in England – the Index of Multiple Deprivation (IMD). It should be noted that these figures are across all stock and will be mainly, but not exclusively, social stock. The Index of Multiple Deprivation (IMD) provides a relative measure of deprivation at various geographic areas across England. The most recent is for 2010 and calculates the overall measure of deprivation experienced by people living in every Lower layer Super Output Area (LSOA) in England. Almost half of hazards are found in the most deprived areas.

Table 3: The estimated number of category 1 hazards by tenure and estimated number of instances requiring medical intervention in Wyre Forest, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Numbers of hazards				Estimated number of instances requiring medical intervention
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*	
Damp and mould growth	60	*42*	*17*	*21*	30
Excess cold	2,769	*2,438*	*331*	*186*	15
Crowding and space	25	*18*	*7*	*9*	3
Entry by intruders	39	*27*	*11*	*14*	13
Domestic hygiene, Pests and Refuse	3	*2*	*1*	*1*	1
Food safety	35	*25*	*10*	*13*	6
Personal hygiene, Sanitation and Drainage	32	*23*	*9*	*11*	5
Falls associated with baths etc	786	*662*	*123*	*128*	44
Falling on level surfaces etc	652	*549*	*102*	*106*	36
Falling on stairs etc	4,307	*3,631*	*676*	*700*	135
Falling between levels	242	*171*	*71*	*86*	24
Electrical hazards	19	*13*	*5*	*7*	1
Fire	88	*62*	*26*	*31*	2
Flames, hot surfaces etc	41	*29*	*12*	*15*	7
Collision and entrapment	30	*21*	*9*	*11*	5
TOTAL	9,127	*7,715*	*1,413*	*1,338*	327

3.1.2 Distribution of category 1 hazards in Wyre Forest

Map 1 to **Map 3** below were previously supplied in the housing stock model report and are reproduced here for ease of reference. **Map 1** shows the expected distribution of all category 1 hazards in Wyre Forest. The most prevalent hazards in Wyre Forest are estimated to be hazards associated with falls and excess cold hazards and therefore **Maps 2** and **3** focus on these hazards.

The maps are produced at COA level, which is typically made up of 125 households, usually including whole postcodes and having similar sized populations. Using the first map below (**Map 1**) as an example, it can be seen that each ward is split into several COAs and, in this instance, there are 15 COAs that have 51 - 77% of private sector dwellings estimated to have the presence of a category 1 hazard. These maps provide a useful resource to help inform decisions on how to target resources aimed at mitigating these hazards.

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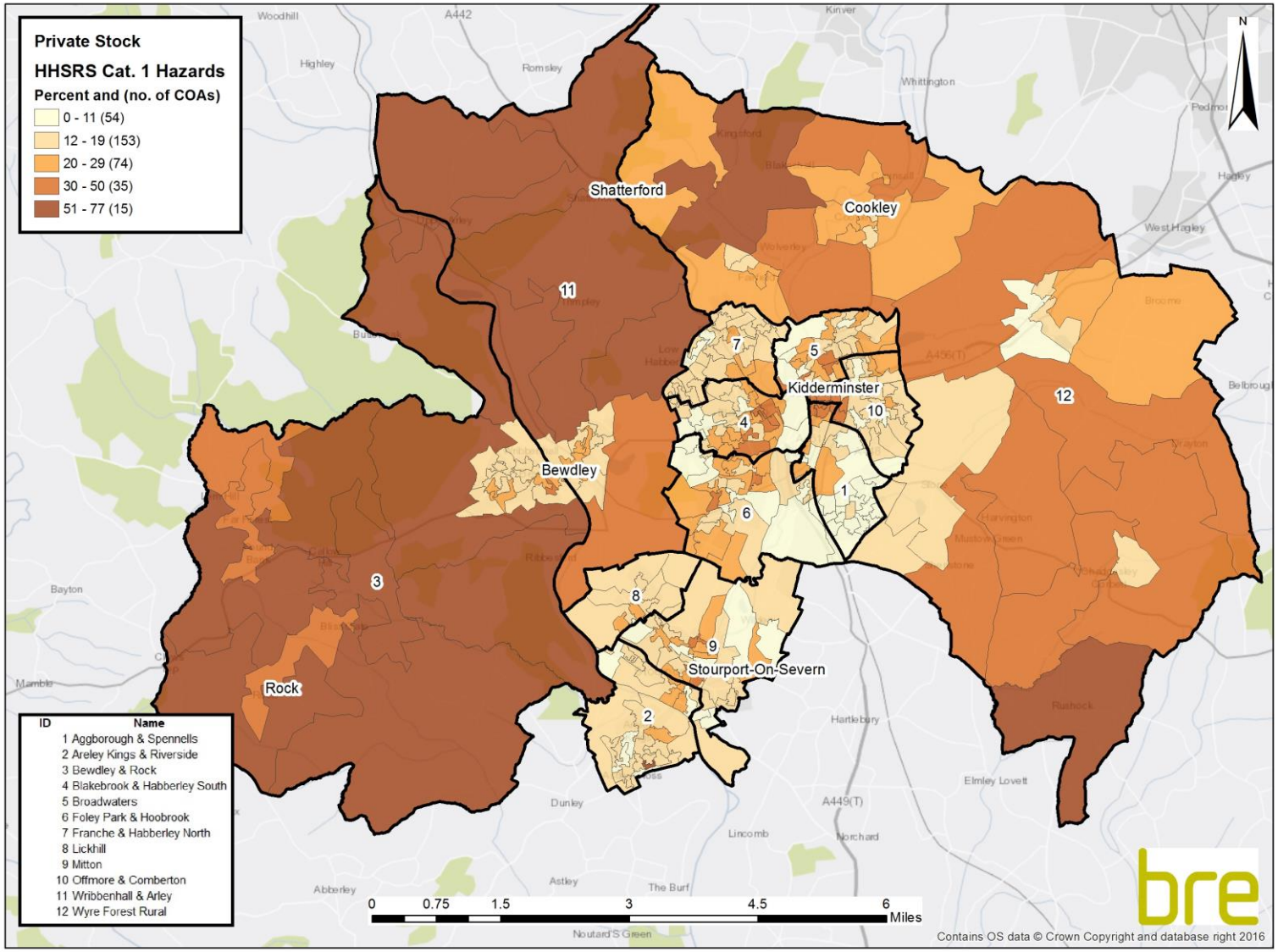
Map 1: Expected distribution of HHSRS category 1 hazards in Wyre Forest, private sector stock



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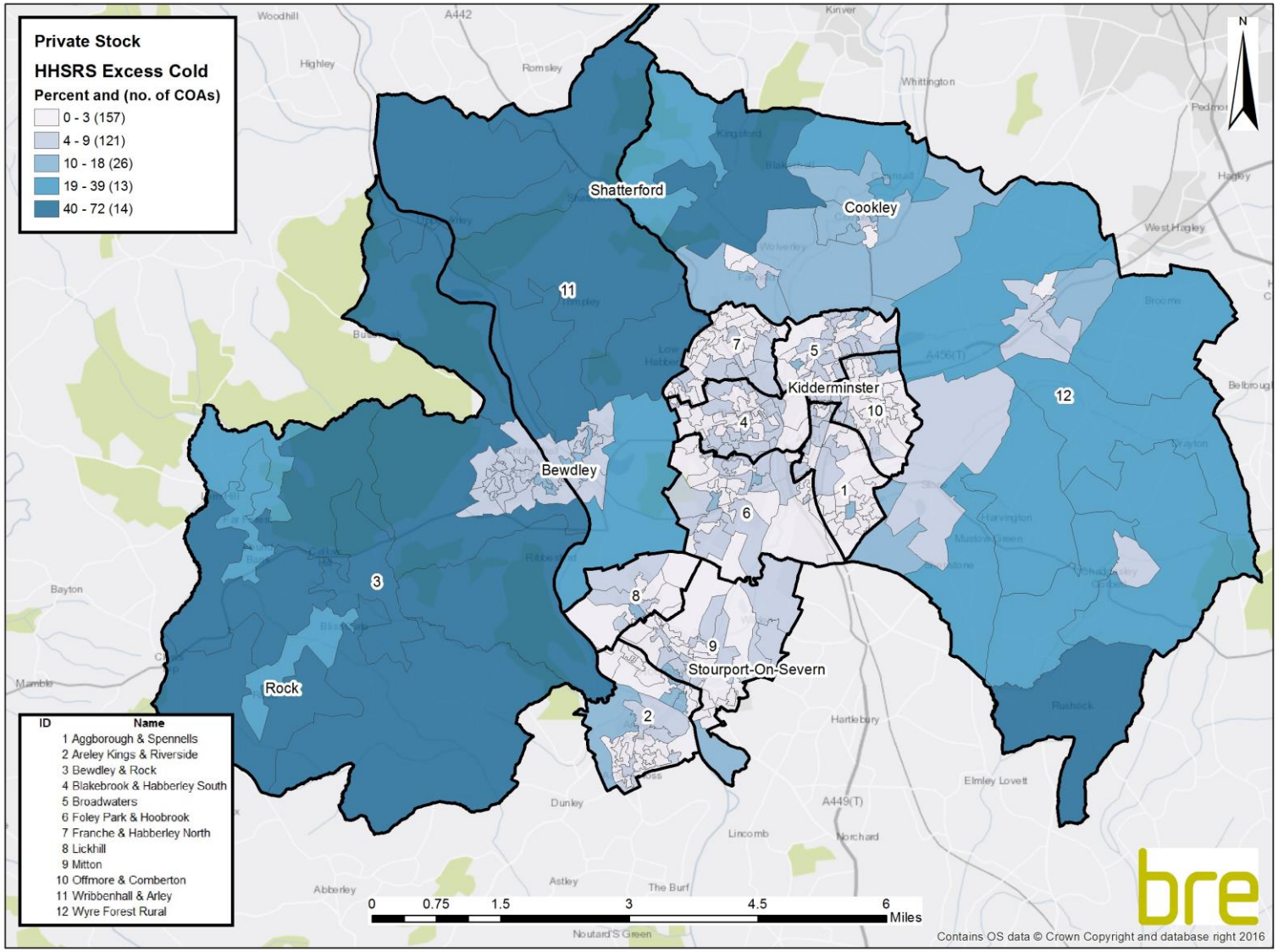
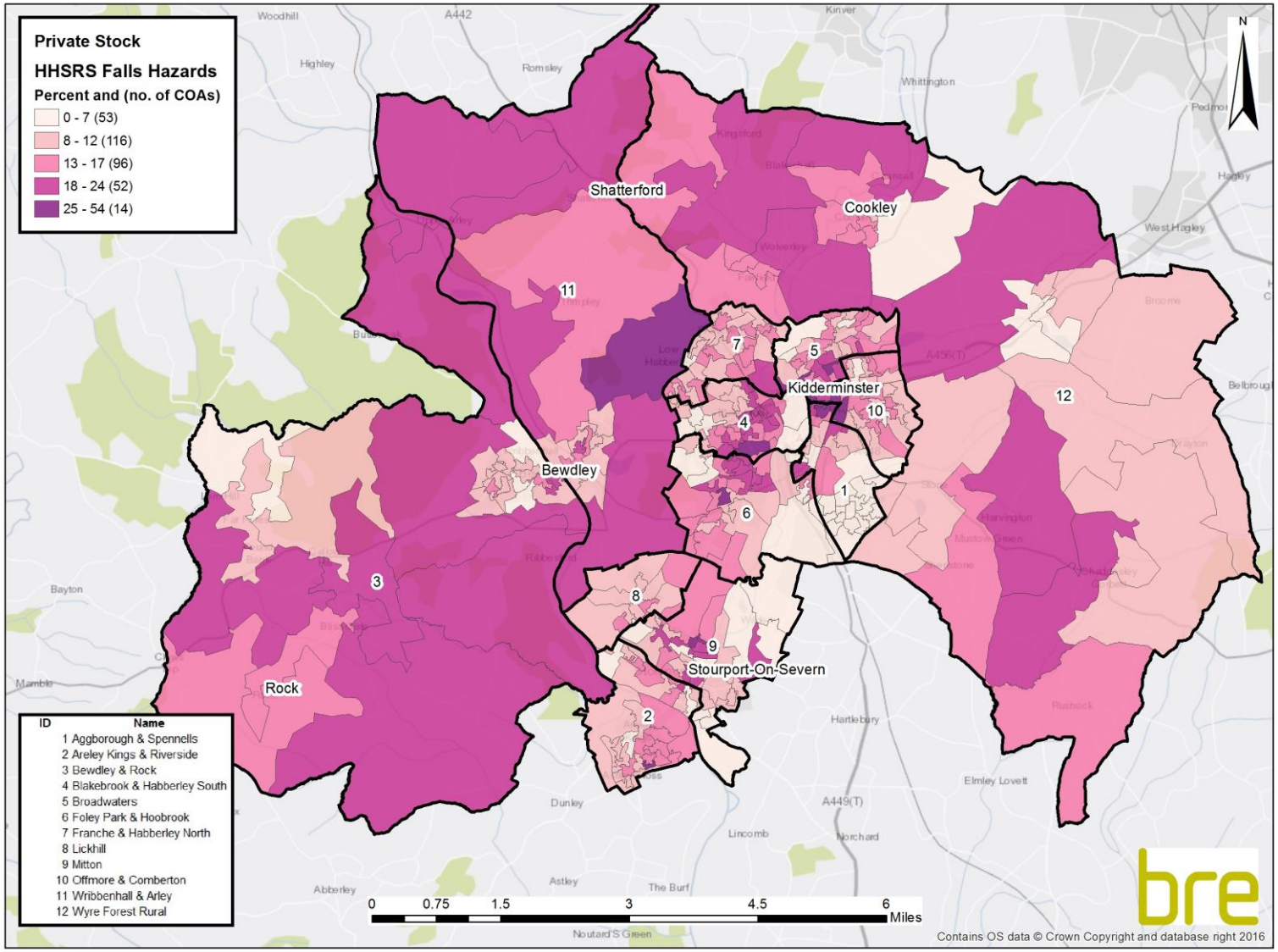
Map 2: Expected distribution of HHSRS category 1 excess cold in Wyre Forest, private sector stock



Map 3: Expected distribution of HHSRS category 1 fall hazards in Wyre Forest Council, private sector stock



3.1.3 Relating housing conditions to available health data

As part of this project a comparison between poor housing conditions and health data from the population has been carried out.

The estimated distribution of falls hazards, as provided in **Map 3** shows dwellings where there are most likely to be falls related injuries. **Map 4** shows the prevalence of hospital admissions due to hip fractures in over 65s. Whilst they use different geographical boundaries (COA compared with MSOA), a comparison of the two shows that although there does not appear to be a general match between areas with higher levels of both falls hazards and hip fractures, there are a few areas where there are higher levels of both – e.g. the areas of Kidderminster and the Areley Kinds and Riverside ward.

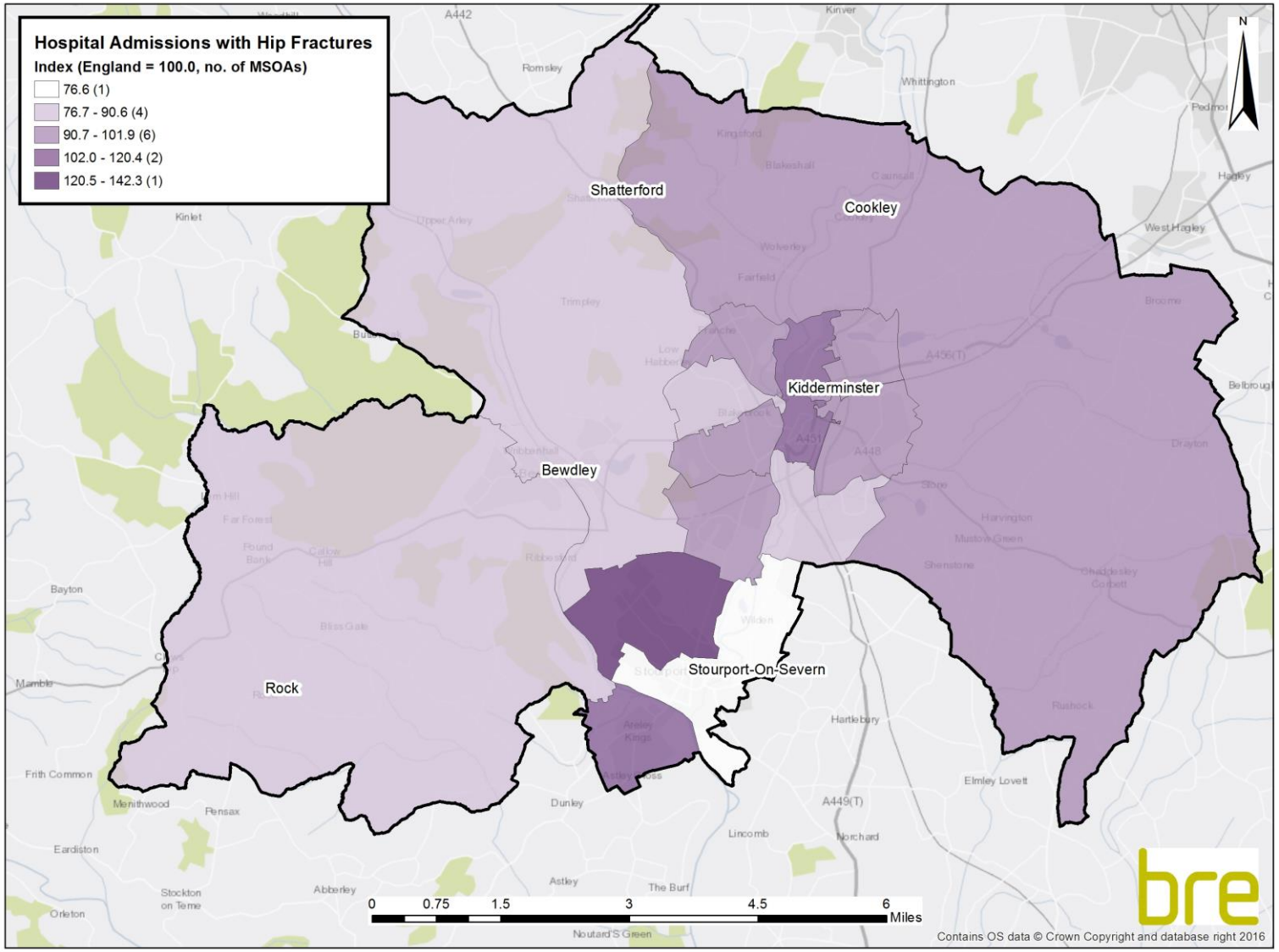
Map 5 shows the distribution of the over 65 population in Wyre Forest which could be helpful in identifying areas with higher populations of older people which may be more at risk from falls hazards.

As mentioned in **Section 2.2**, cold weather has a variety of effects on people's health including direct effects on the incidence of heart attack, stroke, respiratory disease, flu, falls and injuries and hypothermia. In order to consider the effects of cold homes on health, this analysis also considers the prevalence of Chronic Obstructive Pulmonary Disease (COPD) across the GP practices in Wyre Forest, as shown in **Map 6**. There is evidence that COPD can be linked to living in housing suffering from excess cold. However, a comparison of **Map 6** with the excess cold map (**Map 2**) suggests that generally this is not the case with some areas of high incidences of COPD having lower levels of excess cold. However, it is important to note that the information relating to COPD is based on GP practices, and as such, higher concentrations do not necessarily reflect where patients reside.

Map 7 shows the prevalence of asthma in Wyre Forest. There is a higher prevalence in the Bewdley area - however, this area does not have particularly high levels of excess cold compared to other areas.

This provides useful geographical information as to areas which may benefit from a targeted approach to improving housing and health. It should be noted however, that GP practices may have a wide geographical reach with some patients attending from outside the immediate area.

Map 4: The prevalence of hospital admissions due to hip fractures in over 65s in Wyre Forest (source: http://www.localhealth.org.uk)



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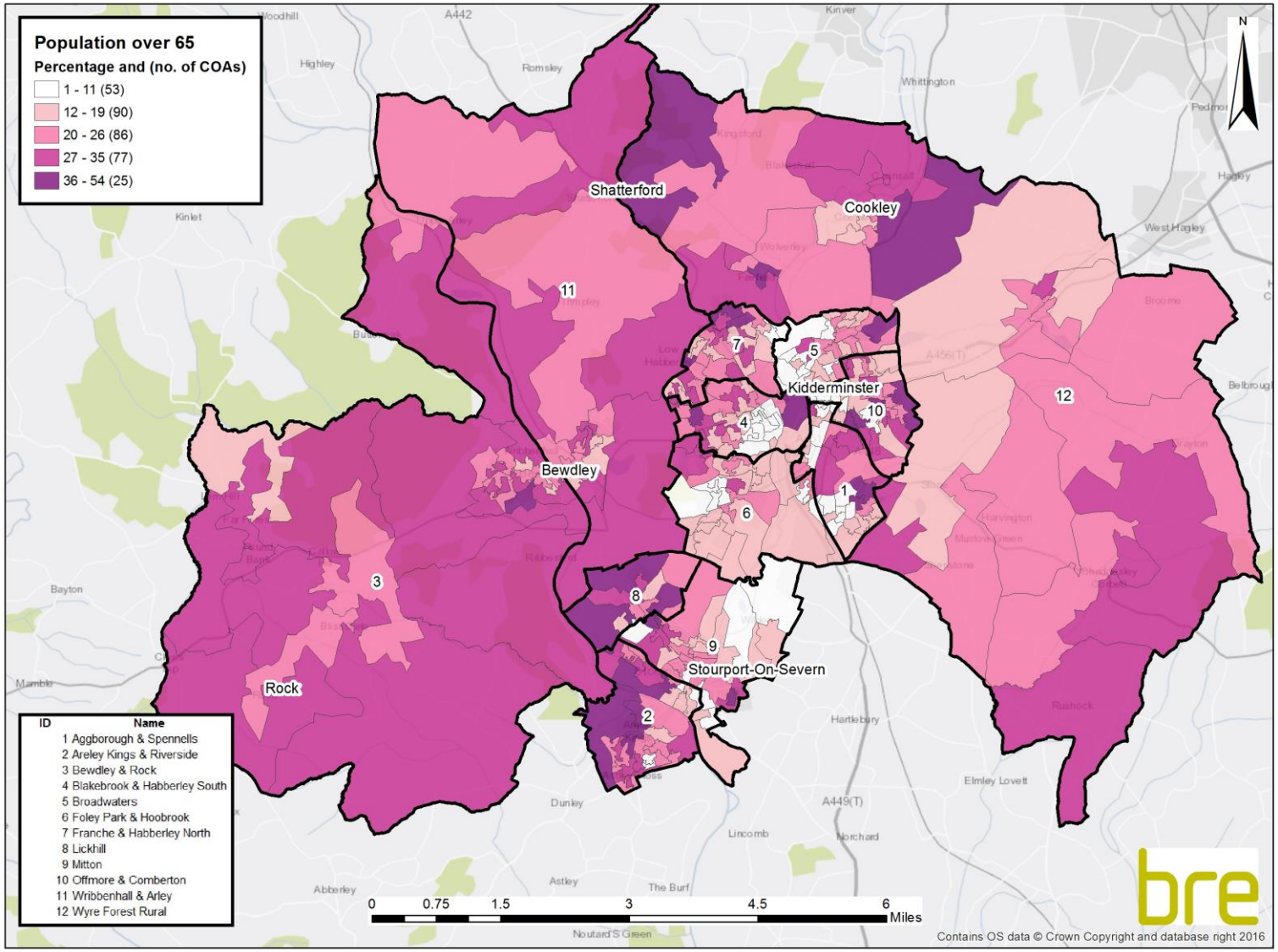
Map 5: Number of persons over 65 in Wyre Forest



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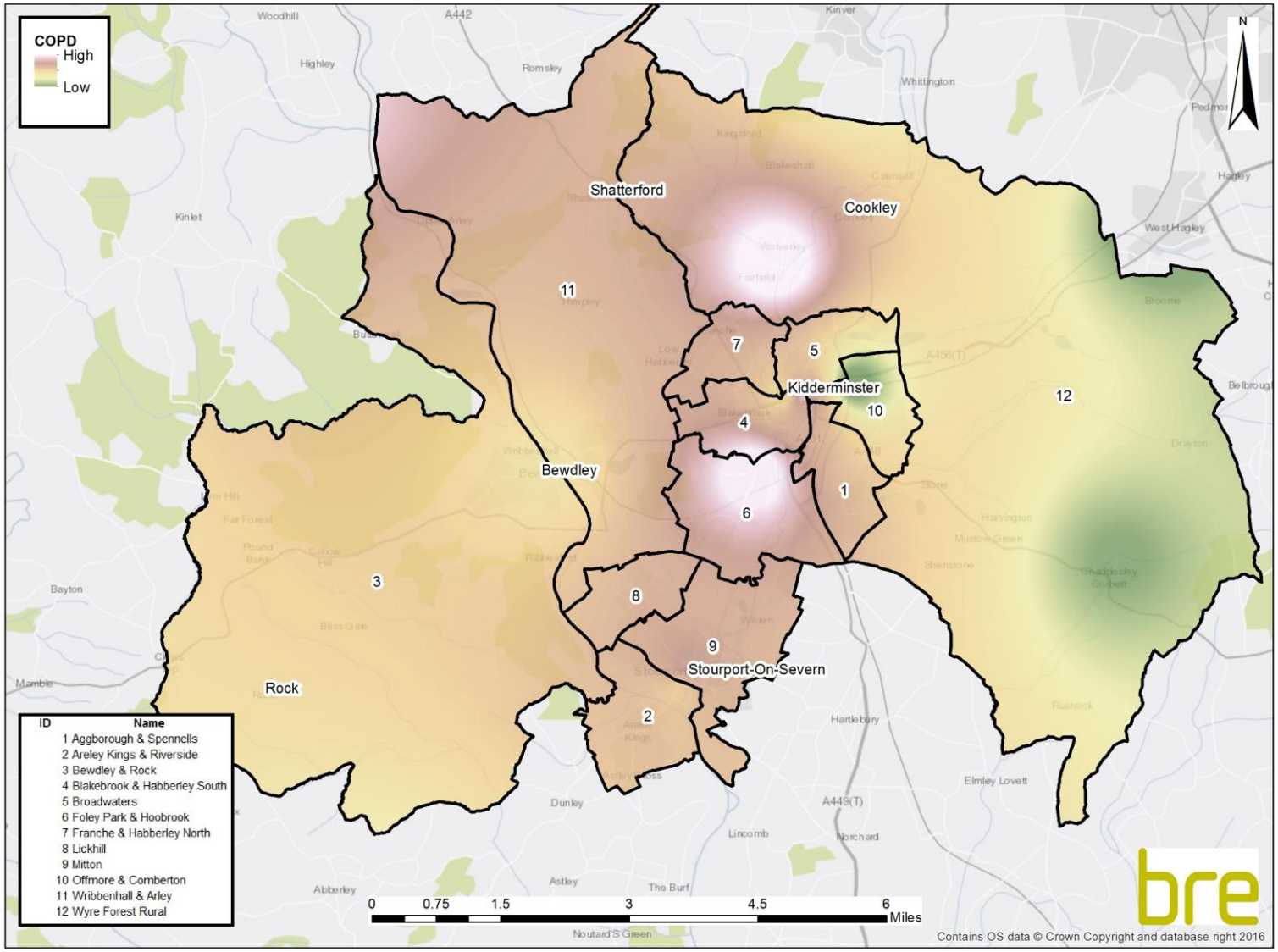
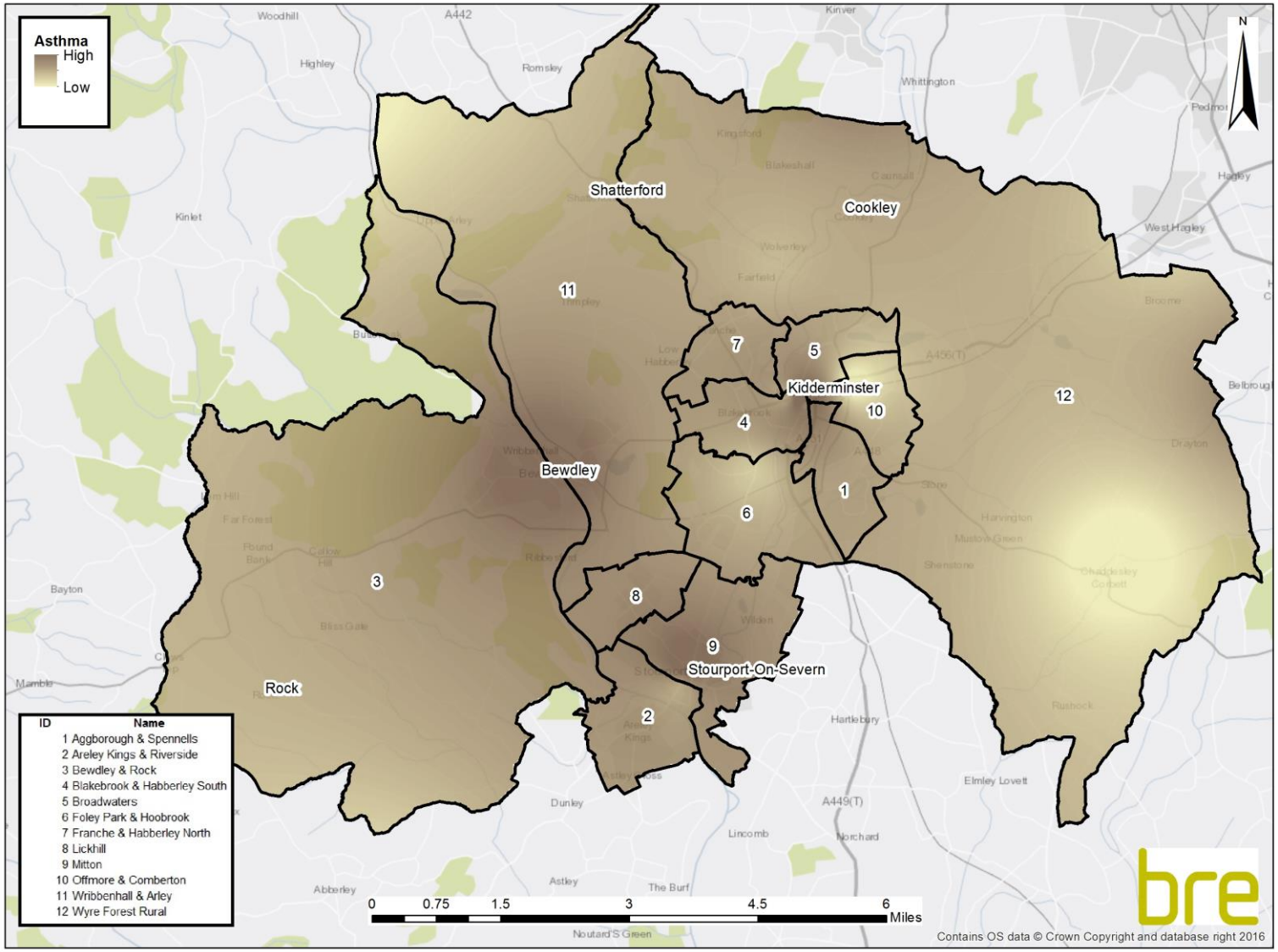
Map 6: The prevalence of Chronic Obstructive Pulmonary Disease (COPD) in Wyre Forest (source: http://fingertips.phe.org.uk)



Map 7: The prevalence of asthma in Wyre Forest (source: http://fingertips.phe.org.uk)



3.2 The cost of prospective interventions to reduce the number of hazards

The cost of work necessary to mitigate the hazards is representative of local (at a regional level) costs based on information from the English Housing Survey (EHS) and consistent with "The Cost of Poor Housing to the NHS[20]" briefing paper produced by BRE as an update to "The Real Cost of Poor Housing[2]" report. The cost is based on mitigating the hazard and bringing the dwelling up to the standard for an "average dwelling". The average dwelling likelihoods of harm, and harm outcomes, are given in the HHSRS Operating Guidance (**Appendix A** provides further explanation). The exception to the rule of bringing dwellings up to the average is for the hazard of excess cold, which is discussed below.

For the hazard of excess cold, a "better than average" likelihood following mitigation work is used. The average likelihood according to the Operating Guidance of an over 65 year old being in a dwelling and suffering a hazard of excess cold is currently 1 in 380. (The figure of 320 is used as the representative scale point. The use of representative scale points is explained in **Appendix C**). The statistical tables determining the "average" (and required to be used in accordance with the Operating Guidance) are based on the years 1997 – 1999.

The calculations in this report result in a "likelihood", following mitigation works for excess cold, of 1 in 1,800 rather than 1 in 320. It is felt that this "better than average" likelihood is a helpful demonstration of the benefit of proposed mitigation works. Dwellings are expected to be improved to a standard "better than average" for insulation to help comply with energy efficiency targets. For mitigating a category 1 hazard of excess cold, total costs would be expected to include installing or improving loft insulation to 300mm (above the average), the installation of cavity wall insulation, the installation of central heating (where not already present) and a room thermostat.

Comparing these works with dwellings assessed as part of the CLG worked examples and LACORs (Local Authority Coordinators of Regulatory Services, now renamed Local Government Regulation) examples, then a likelihood of 1 in 1,800 is used to reflect the higher level of loft insulation (300mm rather than the average of 100mm) and the fact that if a new boiler is fitted it is required by building regulations to be of a highly efficient condensing type.

Taking this into account, the costs of works used to mitigate category 1 hazards and bring them up to the average (or "better than average" for excess cold) are shown in **Table 4**. These costs are estimated to be an average across the whole range of work. So, for example, to mitigate damp and mould growth may require a range of different work from comprehensive works to replace the roof, installing a damp proof course or to simply replacing a piece of guttering.

In the health cost benefit part of this report (**Section 3.5**), consideration is given to mitigating only a percentage of category 1 hazards, the least expensive 50% and the least expensive 20%.

Table 4 provides a summary of the total estimated costs of mitigating the main hazards by tenure as well as the average costs per dwelling.

[20] BRE Briefing Paper: The cost of poor housing to the NHS, Nicol S, Roys M and Garrett H, BRE Trust, 2015 - http://www.bre.co.uk/filelibrary/pdf/87741-Cost-of-Poor-Housing-Briefing-Paper-v3.pdf

Table 4: The total cost of mitigating all category 1 hazards by tenure in Wyre Forest and the average cost per dwelling, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Cost of mitigating hazards				Avg. mitigation cost per dwelling
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*	
Damp and mould growth	£417,755	*£295,147*	*£122,608*	*£148,683*	£7,016
Excess cold	£13,309,247	*£11,718,289*	*£1,590,957*	*£894,012*	£4,807
Crowding and space	£424,429	*£299,862*	*£124,567*	*£151,058*	£16,646
Entry by intruders	£44,094	*£31,152*	*£12,941*	*£15,693*	£1,137
Domestic hygiene, Pests and Refuse	£2,712	*£1,916*	*£796*	*£965*	£895
Food safety	£103,843	*£73,366*	*£30,477*	*£36,959*	£2,948
Personal hygiene, Sanitation and Drainage	£37,753	*£26,673*	*£11,080*	*£13,437*	£1,185
Falls associated with baths etc	£417,208	*£351,723*	*£65,486*	*£67,769*	£531
Falling on level surfaces etc	£633,240	*£533,846*	*£99,394*	*£102,860*	£972
Falling on stairs etc	£4,434,067	*£3,738,089*	*£695,978*	*£720,245*	£1,029
Falling between levels	£223,905	*£158,191*	*£65,715*	*£79,690*	£924
Electrical hazards	£30,537	*£21,575*	*£8,962*	*£10,869*	£1,646
Fire	£418,245	*£295,493*	*£122,752*	*£148,857*	£4,748
Flames, hot surfaces etc	£85,000	*£60,053*	*£24,947*	*£30,252*	£2,049
Collision and entrapment	£17,766	*£12,552*	*£5,214*	*£6,323*	£597
TOTAL	£20,599,801	*£17,617,927*	*£2,981,874*	*£2,427,673*	

The cost of excess cold makes up the largest proportion of the total mitigation costs at around £13.3 million. When added together, the fall hazards affecting the vulnerable group of persons over 60 (falls associated with baths, falling on level surfaces and falling on stairs) also represents a large proportion of the total. This is summarised in **Table 5** which shows that the total cost of mitigating these fall hazards is estimated at £5.5 million.

Table 5: Costs of mitigating fall hazards where the vulnerable group is people over 60, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Cost of mitigating hazards			
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*
Falls associated with baths etc	£417,208	*£351,723*	*£65,486*	*£67,769*
Falling on level surfaces etc	£633,240	*£533,846*	*£99,394*	*£102,860*
Falling on stairs etc	£4,434,067	*£3,738,089*	*£695,978*	*£720,245*
TOTAL	£5,484,515	*£4,623,657*	*£860,858*	*£890,873*

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3.3 The costs to the NHS and wider society of treating these health issues

This section describes how the costs are determined. The results for Wyre Forest Council are presented in **Section 3.4**.

3.3.1 Costs to the NHS

Costs to the NHS are based on real estimates of the costs of incidents occurring as a result of the hazards and have been developed by looking at typical health outcomes and first year treatment costs that can be attributed to selected HHSRS hazards. This information is published in "The Real Cost of Poor Housing"[2] and the table is reproduced here (**Table 6**). Some of the classes of harm are marked "n/a" and in these cases the HHSRS class is either very rare or non-existent. Death, for example, is very unlikely to arise from damp and mould growth alone so no class 1 harms are applicable. Furthermore, radon, if present and causing a health effect, is expected to cause an extreme outcome leading to lung cancer or death, and hence no class 3 or 4 harms are applicable.

Table 6: Typical health outcomes and first year treatment costs for selected HHSRS hazards

Hazard	Class of Harm Outcome			
	Class 1	**Class 2**	**Class 3**	**Class 4**
Damp & mould growth	n/a	Type 1 allergy *(£2,034)*	Severe asthma *(£1,027)*	Mild asthma *(£242)*
Excess cold	Heart attack, care, death *(£19,851)*	Heart attack *(£22,295)**	Respiratory condition *(£519)*	Mild pneumonia *(£84)*
Radon (radiation)	Lung cancer, then death *(£13,247)*	Lung cancer, survival *(£13,247)**	n/a	n/a
Falls on the level	Quadriplegic *(92,490)**	Femur fracture *(£39,906)**	Wrist fracture *(£1,545)*	Treated cut or bruise *(£115)*
Falls on stairs & steps	Quadriplegic *(£92,490)**	Femur fracture *(£39,906)**	Wrist fracture *(£1,545)*	Treated cut or bruise *(£115)*
Falls between levels	Quadriplegic *(£92,490)**	Head injury *(£6,464)**	Serious hand wound *(£2,476)*	Treated cut or bruise *(£115)*
Fire	Burn, smoke, care, death *(£14,662)**	Burn, smoke, care *(£7,435)**	Serious burn to hand *(£1,879)*	Burn to hand *(£123)*
Hot surfaces and materials	n/a	Serious burns *(£7,378)*	Minor burn *(£1,822)*	Treated very minor burn *(£123)*
Collision & entrapment	n/a	Punctured lung *(£5,152)*	Loss of finger *(£1,698)*	Treated cut or bruise *(£115)*

* = the costs are as a result of treatments predicted to be required during the first 12 months – continuing care costs are likely after this period but these are not modelled.

The figures in **Table 6** have been consolidated as shown below, and used throughout the report:

Class I = £90,000
Class II = £30,000
Class III = £1,800
Class IV = £120

The data has been used to calculate the cost to the NHS of incidents arising where category 1 hazards are estimated to be present. This was achieved by importing the data for Wyre Forest Council into a customised version of the BRE Health Cost Calculator spreadsheet developed as part of the Real Cost of Poor Housing[2] project and adapted to take into account the new costs to society (see following section) in the Full Cost of Poor Housing[3] project.

3.3.2 Costs to society

Costs to the NHS simply include costs which are directly related to the first year of treatment and do not take into account the more complex nature of the wider cost impacts to society.

Additional costs to society could include, but are not limited to, the following:

- Social services costs following discharge from hospital
- Capital value of the dwelling
- Loss of future earnings
- Increased spending on benefits
- Cost of moving
- Cost of enforcement action by councils

"The Full Cost of Poor Housing"[3] report provides updated estimates for the costs to society. The previous methodology was based on the costs to society being two and a half times those of the NHS costs i.e. the NHS costs only account for an estimated 40% of the total costs to society; however, this updated methodology provides costs to society for each class of harm outcome and is therefore more consistent with the breakdown for estimating costs to the NHS. The costs to society are as follows:

Class I = £1,703,822
Class II = £45,600
Class III = £3,800
Class IV = £200

All costs are for a 12 month period. The results of the analysis of the costs to the NHS and to society of not mitigating hazards are provided in the next section, alongside the potential savings achievable from mitigating the hazards.

The costs to society are considered to be the preferred way of modelling health cost benefits as they represent a truer cost – for example, the fall hazards initially cause accidents that incur costs to the NHS but following on care costs can last for long periods. This cost to society based model is also preferred where the hazard is more likely to have an effect on children, as the outcomes can continue for a lifetime.

3.4 The costs and savings to health of interventions to reduce some of these hazards

3.4.1 Costs

The methodology for estimating costs to the NHS and to society of not mitigating hazards have been discussed in the previous section and the results for Wyre Forest District Council are presented in the following tables, showing the annual costs to the NHS (**Table 7**) and the annual costs to society (**Table 8**).

Table 7: Estimated annual costs to the NHS of category 1 hazards in Wyre Forest, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Potential annual costs to the NHS of not mitigating hazards			
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*
Damp and mould growth	**£20,140**	*£14,230*	*£5,910*	*£7,170*
Excess cold	**£465,460**	*£409,820*	*£55,640*	*£31,260*
Crowding and space	**£31,760**	*£22,440*	*£9,320*	*£11,300*
Entry by intruders	**£8,750**	*£6,180*	*£2,560*	*£3,110*
Domestic hygiene, Pests and Refuse	**£320**	*£220*	*£90*	*£110*
Food safety	**£6,680**	*£4,720*	*£1,960*	*£2,370*
Personal hygiene, Sanitation and Drainage	**£6,040**	*£4,270*	*£1,770*	*£2,150*
Falls associated with baths etc	**£158,860**	*£133,920*	*£24,930*	*£25,800*
Falling on level surfaces etc	**£138,230**	*£116,530*	*£21,690*	*£22,450*
Falling on stairs etc	**£733,070**	*£618,010*	*£115,060*	*£119,070*
Falling between levels	**£27,270**	*£19,260*	*£8,000*	*£9,700*
Electrical hazards	**£4,460**	*£3,150*	*£1,310*	*£1,590*
Fire	**£16,190**	*£11,440*	*£4,750*	*£5,760*
Flames, hot surfaces etc	**£6,010**	*£4,240*	*£1,760*	*£2,140*
Collision and entrapment	**£3,060**	*£2,160*	*£890*	*£1,080*
TOTAL	**£1,626,300**	*£1,370,590*	*£255,640*	*£245,060*

Table 8: Estimated annual costs to society of category 1 hazards in Wyre Forest, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Potential annual costs to society of not mitigating hazards			
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*
Damp and mould growth	£94,305	*£66,627*	*£27,678*	*£33,564*
Excess cold	£8,343,527	*£7,346,161*	*£997,366*	*£560,454*
Crowding and space	£450,896	*£318,561*	*£132,335*	*£160,478*
Entry by intruders	£40,963	*£28,940*	*£12,022*	*£14,579*
Domestic hygiene, Pests and Refuse	£1,066	*£753*	*£313*	*£379*
Food safety	£17,261	*£12,195*	*£5,066*	*£6,143*
Personal hygiene, Sanitation and Drainage	£15,609	*£11,028*	*£4,581*	*£5,555*
Falls associated with baths etc	£1,771,052	*£1,493,065*	*£277,987*	*£287,680*
Falling on level surfaces etc	£387,576	*£326,741*	*£60,834*	*£62,956*
Falling on stairs etc	£5,916,941	*£4,988,209*	*£928,732*	*£961,114*
Falling between levels	£131,282	*£92,752*	*£38,530*	*£46,725*
Electrical hazards	£17,535	*£12,388*	*£5,146*	*£6,241*
Fire	£273,903	*£193,515*	*£80,389*	*£97,485*
Flames, hot surfaces etc	£28,341	*£20,023*	*£8,318*	*£10,087*
Collision and entrapment	£23,045	*£16,282*	*£6,764*	*£8,202*
TOTAL	£17,513,302	*£14,927,241*	*£2,586,061*	*£2,261,642*

It is worth noting that the cost to the NHS of excess cold hazards is £465,460, whereas focussing in on the three fall hazards where the vulnerable group is persons over 60 years of age, the total cost is £1 million - as shown in **Table 9**. This gives an indication of the particularly high costs to the NHS (and society) of fall hazards in Wyre Forest.

Table 9: Estimated annual costs to the NHS of category 1 fall hazards where the vulnerable group is people over 60, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Potential annual costs to the NHS of not mitigating hazards			
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*
Falls associated with baths etc	£158,860	*£133,920*	*£24,930*	*£25,800*
Falling on level surfaces etc	£138,230	*£116,530*	*£21,690*	*£22,450*
Falling on stairs etc	£733,070	*£618,010*	*£115,060*	*£119,070*
TOTAL	£1,030,160	*£868,460*	*£161,680*	*£167,320*

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3.4.2 Savings

Alongside the costs, it is useful to look at the potential savings achievable from carrying out interventions to reduce hazards. These savings have been quantified by calculating the difference between the estimated costs of hazards to the NHS/society *before* mitigation work and the estimated costs *after* mitigation work[21]. Savings are calculated where there is a sufficient degree of reliability. In some cases the reason for not presenting figures is not just insufficient numbers of dwellings where the hazard is present, but also insufficient confidence in the costs attributed to mitigating the hazard.

Table 10 shows the annual savings to the NHS by tenure where hazards are mitigated and **Table 11** shows the annual savings to society. These savings are also shown graphically in **Figure 6** and **Figure 7**. It is interest to also note the high proportion of dwellings estimates to contain category 1 hazards that are also occupied by households in the most deprived areas.

Table 10: Estimated annual saving to the NHS from mitigating category 1 hazards, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Potential annual savings to the NHS from mitigating hazards			
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*
Damp and mould growth	£20,080	*£14,180*	*£5,890*	*£7,140*
Excess cold	£418,910	*£368,840*	*£50,070*	*£28,130*
Crowding and space	£31,700	*£22,390*	*£9,300*	*£11,280*
Entry by intruders	£8,360	*£5,910*	*£2,450*	*£2,970*
Domestic hygiene, Pests and Refuse	£320	*£220*	*£90*	*£110*
Food safety	£6,670	*£4,710*	*£1,950*	*£2,370*
Personal hygiene, Sanitation and Drainage	£6,030	*£4,260*	*£1,770*	*£2,140*
Falls associated with baths etc	£157,960	*£133,170*	*£24,790*	*£25,650*
Falling on level surfaces etc	£124,400	*£104,880*	*£19,520*	*£20,200*
Falling on stairs etc	£681,480	*£574,520*	*£106,960*	*£110,690*
Falling between levels	£27,120	*£19,160*	*£7,950*	*£9,650*
Electrical hazards	£4,450	*£3,140*	*£1,300*	*£1,580*
Fire	£16,030	*£11,320*	*£4,700*	*£5,700*
Flames, hot surfaces etc	£5,830	*£4,120*	*£1,710*	*£2,070*
Collision and entrapment	£2,850	*£2,010*	*£830*	*£1,010*
TOTAL	£1,512,190	*£1,272,830*	*£239,280*	*£230,690*

[21] Here the difference between dwellings with a category 1 hazard and those with an average level of risk is calculated and as such implicitly assumes that it is not possible to mitigate 100% of risk.

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Table 11: Estimated annual savings to society from mitigating category 1 hazards, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Potential annual savings to society from mitigating hazards			
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*
Damp and mould growth	£94,300	*£66,624*	*£27,676*	*£33,562*
Excess cold	£8,338,489	*£7,341,725*	*£996,764*	*£560,115*
Crowding and space	£450,890	*£318,557*	*£132,333*	*£160,476*
Entry by intruders	£40,914	*£28,906*	*£12,008*	*£14,562*
Domestic hygiene, Pests and Refuse	£1,066	*£753*	*£313*	*£379*
Food safety	£17,261	*£12,195*	*£5,066*	*£6,143*
Personal hygiene, Sanitation and Drainage	£15,608	*£11,027*	*£4,581*	*£5,555*
Falls associated with baths etc	£1,770,977	*£1,493,002*	*£277,975*	*£287,667*
Falling on level surfaces etc	£386,777	*£326,068*	*£60,709*	*£62,826*
Falling on stairs etc	£5,912,396	*£4,984,378*	*£928,018*	*£960,376*
Falling between levels	£131,271	*£92,744*	*£38,527*	*£46,721*
Electrical hazards	£17,534	*£12,388*	*£5,146*	*£6,240*
Fire	£273,886	*£193,502*	*£80,383*	*£97,479*
Flames, hot surfaces etc	£28,323	*£20,010*	*£8,312*	*£10,080*
Collision and entrapment	£23,023	*£16,266*	*£6,757*	*£8,194*
TOTAL	£17,502,715	*£14,918,145*	*£2,584,570*	*£2,260,377*

Table 10 shows that the total potential annual saving to the NHS is £1.5 million and for the hazard of excess cold the potential annual saving to the NHS is over £418,910.

Table 10 shows that within the private rented sector it is estimated that the NHS could save an estimated £239,280 annually if all category 1 hazards were mitigated. The cost of these works could be recovered from private sector landlords during enforcement activities.

For the fall hazards most likely to affect older persons (defined earlier as falls involving stairs and steps, associated with baths and trips and slips) the potential saving to the NHS is £963,840 as shown in **Table 12**.

Table 12: Estimated annual savings to the NHS from mitigating fall hazards where the vulnerable group is people over 60, private sector stock (IMD lowest 20% is across all stock)

Housing hazard type	Potential annual savings to the NHS from mitigating hazards			
	Total Private Stock	*Owner occupied*	*Private rented*	*IMD lowest 20%*
Falls associated with baths etc	£157,960	*£133,170*	*£24,790*	*£25,650*
Falling on level surfaces etc	£124,400	*£104,880*	*£19,520*	*£20,200*
Falling on stairs etc	£681,480	*£574,520*	*£106,960*	*£110,690*
TOTAL	£963,840	*£812,570*	*£151,270*	*£156,540*

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Figure 6: Estimated annual savings to the NHS from mitigating hazards in Wyre Forest, all private sector stock and split into tenure (IMD lowest 20% is across all stock)

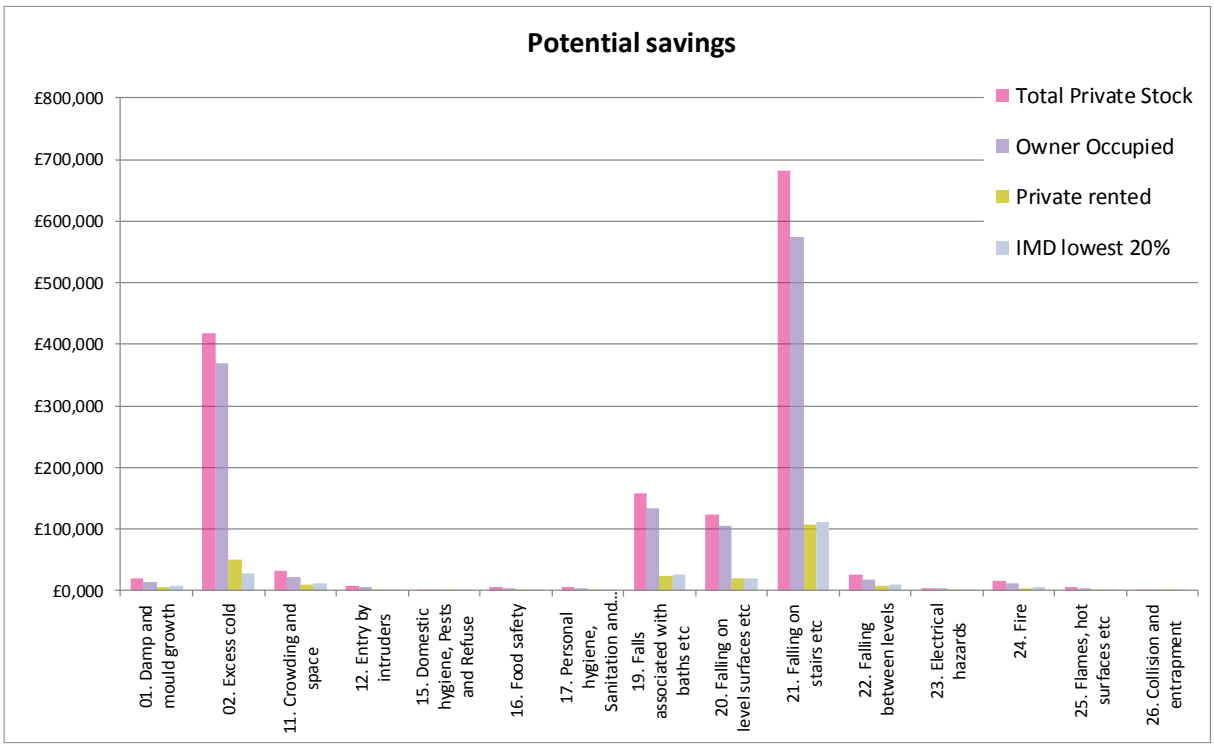
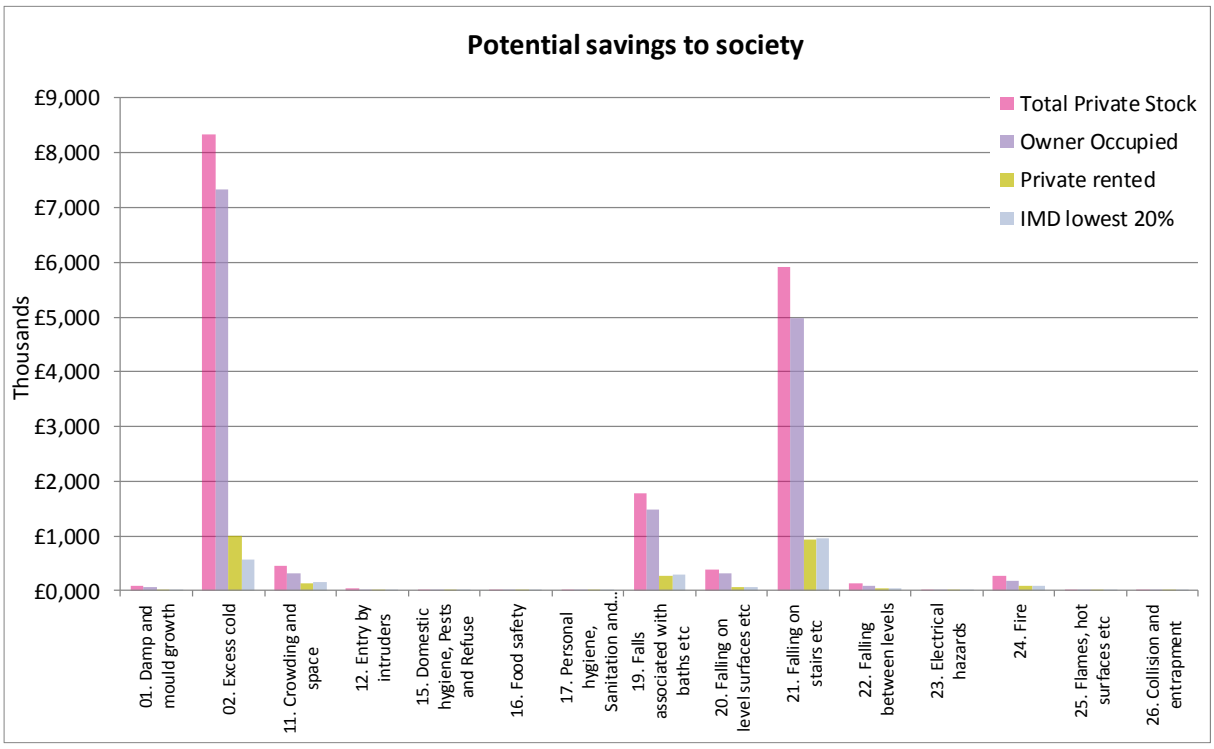


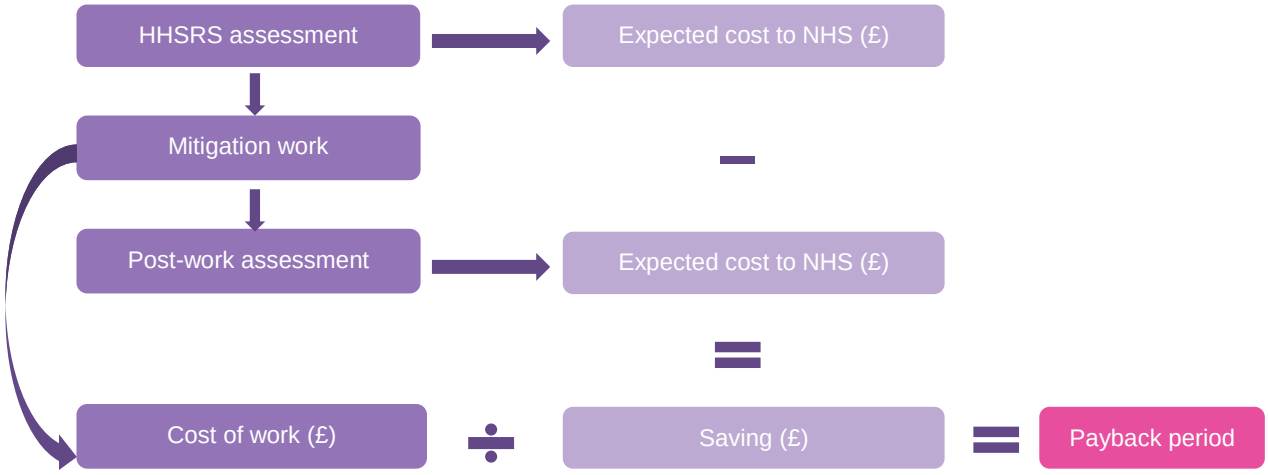
Figure 7: Estimated annual savings to society from mitigating hazards in Wyre Forest, all private sector stock and split into tenure (IMD lowest 20% is across all stock)



3.5 Health cost benefit scenarios

Taking this a step further it is possible to look at a cost benefit analysis and determine the likely payback periods of mitigating hazards. The payback period is the time taken to break even on an investment and, in this case, is based on the cost of mitigating the hazard and the savings achieved from carrying out the mitigation work to an individual dwelling. **Figure 8** below shows how the cost benefit methodology works.

Figure 8: Calculating savings and simple payback periods[22]



In some cases mitigating category 1 hazards in Wyre Forest will be too expensive and not cost effective. An example might be where a flight of stairs is too steep and narrow but the dwelling has no room for replacement stairs and demolition is the only option. Such dwellings are exceptional but there is still an argument for mitigating the easier to fix hazards first and therefore scenarios based on mitigating the least expensive hazards first have been developed. These scenarios are:

- Mitigation of the least expensive 20% of hazards
- Mitigation of the least expensive 50% of hazards

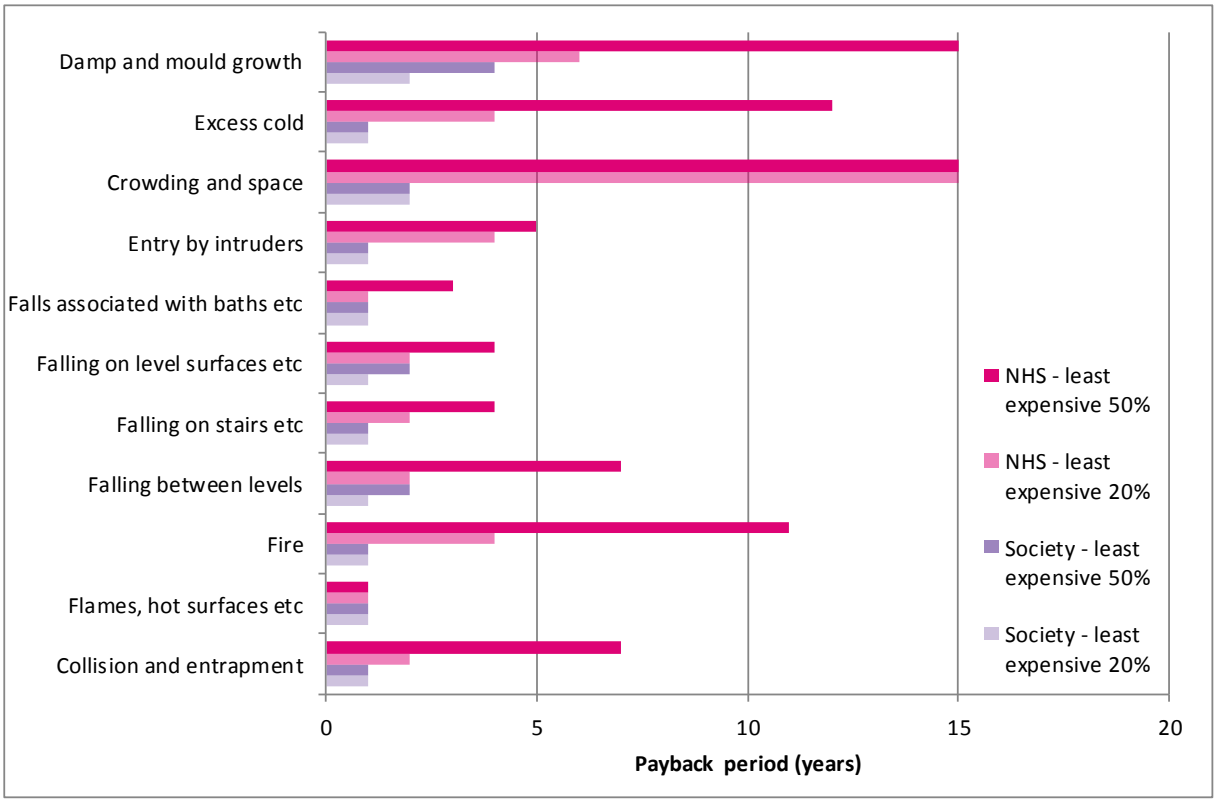
Because it is not possible to account for building type, local knowledge of the particular characteristics will be important for making decisions on whether a particular dwelling type is more cost effective for priority spending or whether the decision should be made in accordance with occupier need.

The results for each hazard assessed are depicted in **Figure 9** which shows that the lowest payback periods are always achieved for the society analysis because the savings are greater than for the NHS but the mitigation costs are the same. The hazards with the shortest payback periods are falls associated with baths and collision and entrapment since mitigation of these hazards can be achieved at relatively low cost. The hazards with the longest payback periods are those which are

[22] The Price of Health, Environmental Health News, Issue 5, 12/03/2010

more complex and therefore more costly to mitigate, such as damp and mould, excess cold and crowding and space.

Figure 9: Payback periods for the NHS and society by hazard – where the least expensive 50% and 20% of hazards are mitigated, private sector stock *(N.B. hazards not shown on this chart have not been assessed here as there is insufficient data, either as the hazards are not present in sufficient numbers or there is insufficient background information from EHS data)*



Appendix D provides the detailed results for all hazards modelled in the cost benefit analysis to help aid decision makers on the most cost effective solutions. The results are produced for each hazard and by tenure and also show the results for mitigating all hazards, rather than just the least expensive proportions.

In the remainder of this section some of the main hazards found within Wyre Forest in terms of estimated total number of hazards, are covered in more detail.

3.5.1 Fall hazards affecting older people

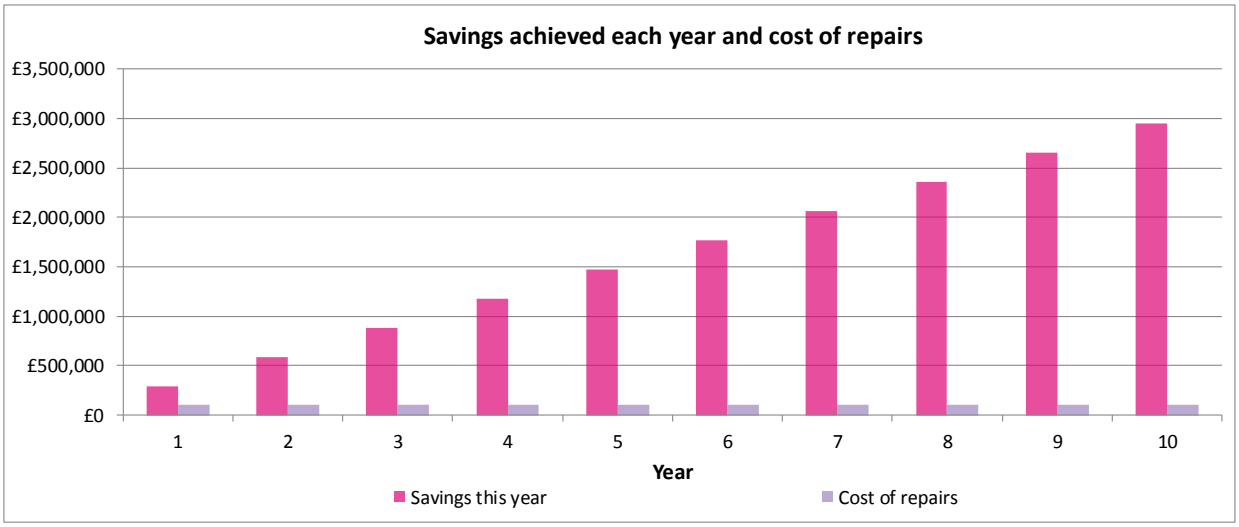
The fall hazards where the vulnerable group is persons over 60 are defined as falls involving stairs and steps, associated with baths and trips and slips (falls on a level surface).

Falling on stairs

Figure 10 shows the estimated annual costs and savings to society if the least expensive 50% of falling on stairs hazards were mitigated. This shows that an annual spend of around £107,958 could result in a saving of £3 million to society annually by year 10. It should be noted that these are optimum figures and in reality it would be difficult to carry out a scenario such as that suggested for only tackling the least expensive 50% of dwellings but it is likely that for practical purposes a large

proportion of such dwellings may be missing something as simple as a hand rail and this analysis clearly shows the benefit.

Figure 10: Potential annual costs and savings to society of mitigating the least expensive 50% category 1 falling on stairs etc. hazards in all private sector dwellings



The disadvantage of carrying out easy work first is that the more difficult work is left for future years. The average cost of work suggested in the 50% scenario is £502 per dwelling.

For the hazard of falling on stairs, two additional scenarios have been developed which consider the effect of targeting all the hazards (least expensive first) with a capital budget of:

- £50,000 per year
- £100,000 per year

The results are shown in **Figure 11** and **Figure 12** and demonstrate the cumulative savings to society over a 10 year period. The cumulative saving where £50,000 is spent every year for 10 years is £2.3 million. Where £100,000 is spent every year for 10 years the cumulative saving is £3.4 million.

Figure 11: Targeting falling on stairs hazards with a capital budget of £50,000 per annum, private sector stock (the least expensive hazards first)

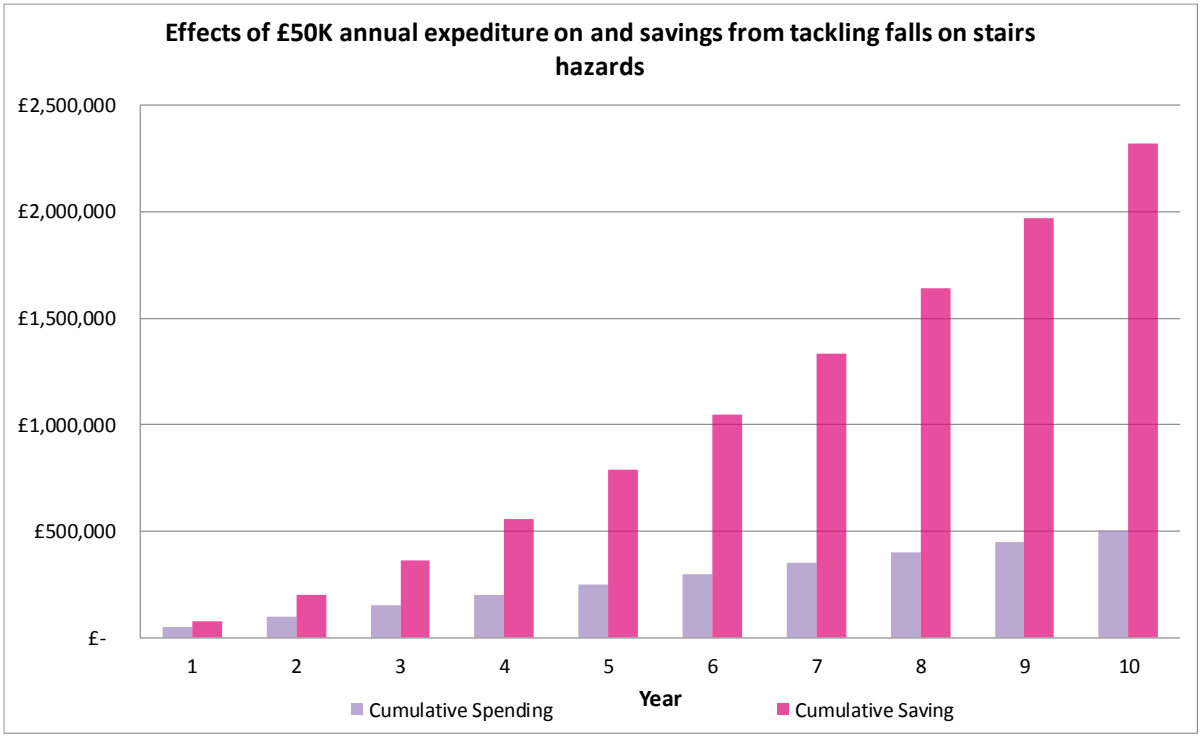
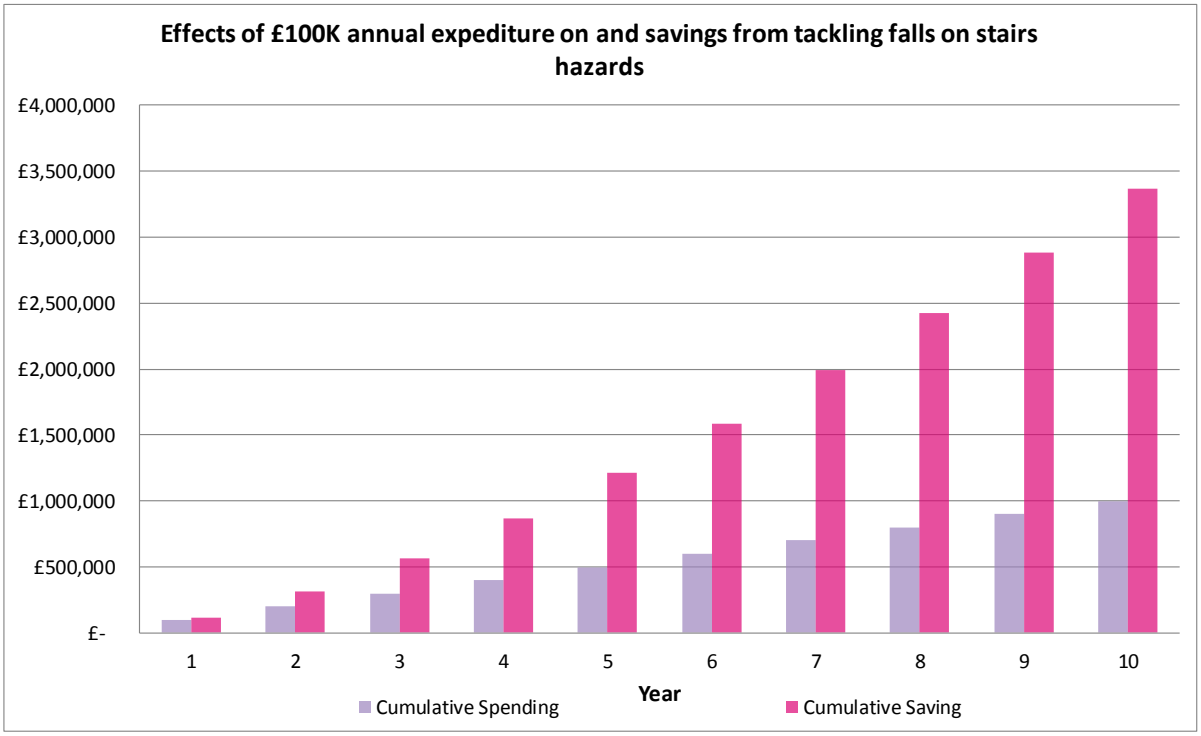


Figure 12: Targeting falling on stairs hazards with a capital budget of £100,000 per annum, private sector stock (the least expensive hazards first)

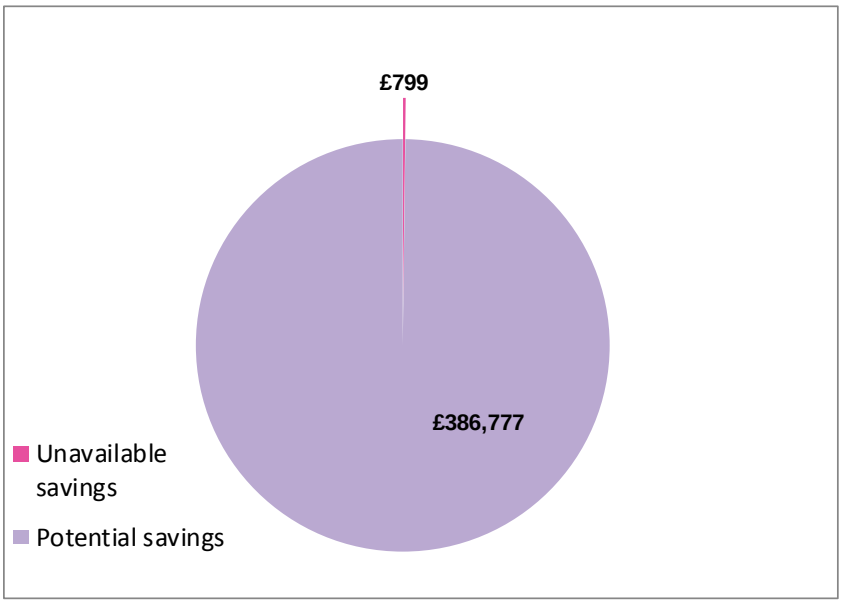


The other fall hazards that affect older people

These hazards are falling on level surfaces, commonly called slips and trips, and falls associated with baths. Again the payback periods are short - 1 year where the cheapest 20% and 50% of hazards are mitigated (see **Figure 9**).

Figure 13 shows that £386,777 per year could be saved if all trip and slip hazards were mitigated. Unavailable savings refer to the fact that it is impossible to eliminate all risk.

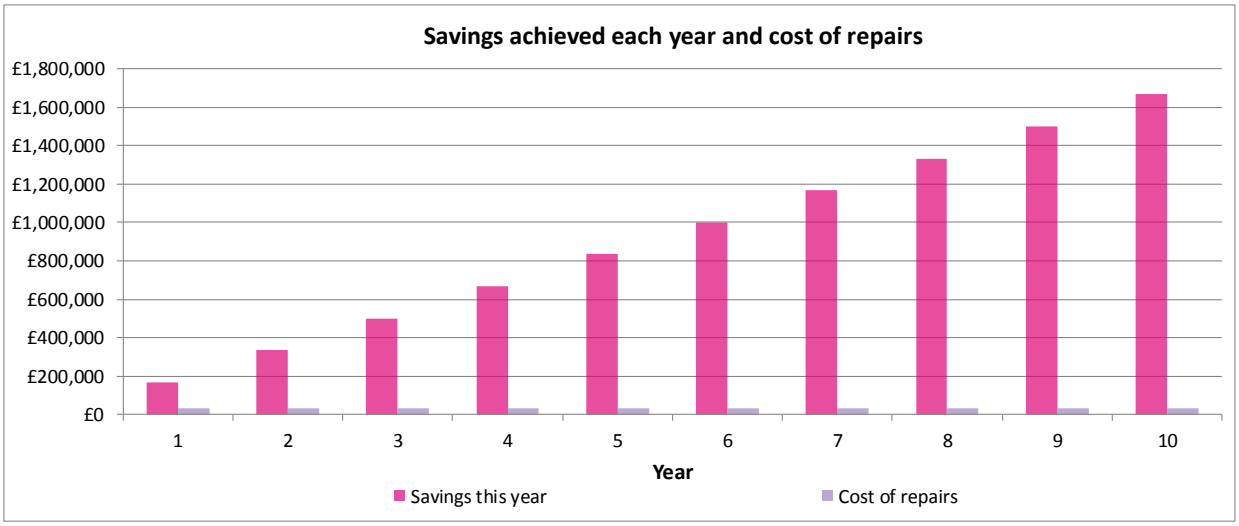
Figure 13: Estimated annual saving to society of mitigating category 1 falling on the level hazards, private sector stock



3.5.2 Excess cold

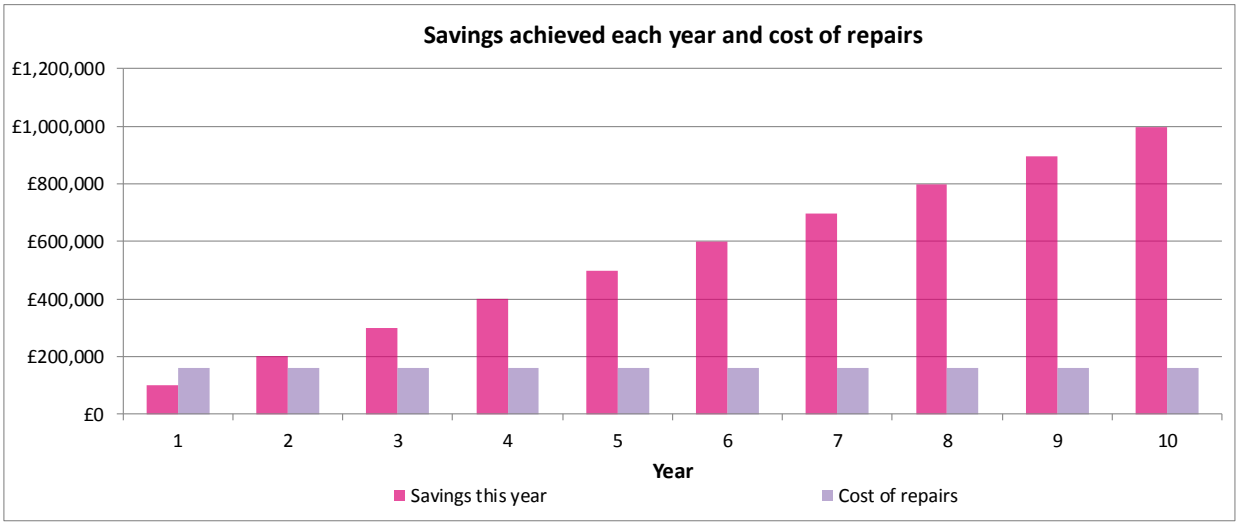
Whilst the hazard of excess cold has the second largest total number of estimated hazards in Wyre Forest, it can be seen from **Figure 9** that the payback periods associated with this hazard are generally longer than for many of the other hazards. This is due to the higher costs of work generally required to mitigate excess cold, however where the 20% least expensive works are carried out the benefits can be seen in 4 years for the NHS and 1 year for society. **Figure 14** shows the annual costs and savings to society where the least expensive 20% of excess cold hazards were mitigated over 10 years - from year 10 there is an estimated annual saving of £1.7 million.

Figure 14: Annual costs and savings to society where the least expensive 20% category 1 excess cold hazards were mitigated over a 10 year period in all dwellings, private sector stock



Focussing in on the private rented sector - of which there are an estimated 331 category 1 excess cold hazards in Wyre Forest (see **Table 3**) - **Figure 15** shows the savings to society that could be expected if landlords were required to mitigate these hazards. It is important to remember that the responsibility for improvement works to rented properties lies with the landlord; therefore the cost of repairs may not be borne by the local authority or NHS.

Figure 15: Annual costs and savings to society where all category 1 excess cold hazards were mitigated over a 10 year period, private rented stock



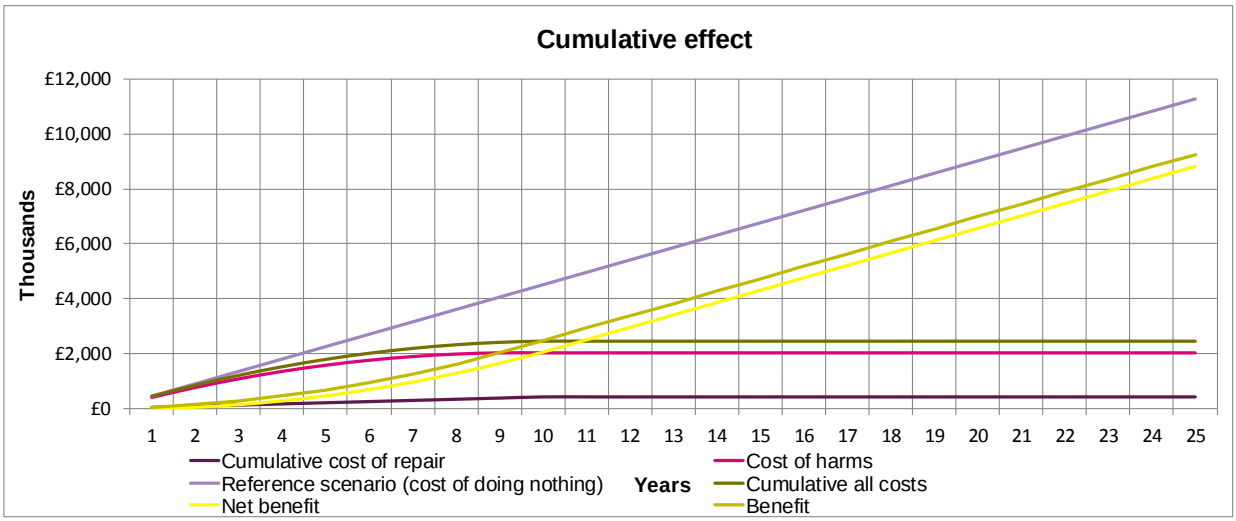
3.5.3 Damp and mould

The category 1 damp and mould hazards estimated to be present within Wyre Forest Council are considered to be important as the vulnerable group for this hazard is children under 14, and the effects can last over a lifetime. It is estimated that NHS savings of £94,300 could be made if all damp and mould category 1 hazards were mitigated. The payback periods are around 3 years where the cheapest works are carried out (see **Figure 9**).

3.5.4 Crowding and space and entry by intruders

Both of these hazards have more psychological health effects than physical, therefore the cost and potential savings to the NHS and wider society are more difficult to measure. It is also difficult to accurately predict the costs to mitigate these hazards as simply building more dwellings may not be possible. **Figure 16** looks at the cumulative effect over 25 years and shows the long term effect and cost of harms of doing nothing[23].

Figure 16: Cumulative effect to society of category 1 crowding and space hazards in all dwellings, private sector stock



3.5.5 Accident hazards affecting children

Falling between levels, electrical hazards, flames and hot surfaces and collision and entrapment are all more likely to affect children. Measuring the cost savings to the NHS or to society of mitigating these hazards is more difficult because of the scattered nature of the hazards within the housing stock and whether children are present within those dwellings presenting the hazards, but some indications are given in **Figure 9** which shows that fixing the cheaper hazards can give a payback period to society of 1 year or less.

[23] For simplicity, a 0% interest rate has been assumed. Whilst this is unlikely, it is expected that both costs and benefits will have similar rates and that the overall effect in comparison terms will be similar.

3.6 Recommendations for possible interventions

The figures in this report will require careful consideration and can be fed into the JSNA and the Health and Wellbeing Boards to decide where resources can best be targeted. To aid this process, the following recommendations are made:

1. The areas with the largest number of category 1 hazards will represent some of the poorest housing in Wyre Forest District Council, and action to improve these dwellings should be of the greatest benefit. The BRE Housing Stock Models give more information on these areas.

2. These areas with the largest number of category 1 hazards should be compared to areas showing the greatest deprivation. Following this process it will be easier to decide whether targeting geographical areas could be the preferred method of maximising the reduction of the health impact of poor housing.

3. Further details on the distribution of particular hazards may be found through interpretation of private sector housing enforcement complaints and local officer knowledge. Analysis using the Housing Health Cost Calculator (HHCC)[24] will quantify this data.

4. Within the private rented sector, the annual cost to society of category 1 hazards is around £3 million. Work to mitigate these hazards will need to be carried out by landlords in accordance with legislation in the Housing Act 2004. To facilitate this, an active housing enforcement strategy is necessary.

5. Landlord Accreditation Schemes can help to educate landlords on the need to mitigate hazards.

6. The hazard of damp and mould particularly affects children and can cause long term effects that may well be underestimated by this piece of work (the evidence is not available to quantify the true cost over a long time period). Flames and hot surfaces and falling between levels also specifically affect children. Education using a multi-agency approach with health visitors or through Children's Centres and accessing local knowledge will be crucial to reducing these hazards. In the private rented sector professionals should be made more aware of landlord duties.

7. The evidence indicates that initiatives to reduce the incidence of falls at home should be one of the more cost effective strategies. The cost benefit scenarios show that the best value initiatives will look to small-scale repair or improvement works to stairs, trip hazards within the home and to uneven paths. Targeting this initiative towards dwellings occupied by persons over 60 will bring the greatest benefit.

8. The fitting of improved security measures reduces the hazard of entry by intruders, and again the evidence shows that the less expensive actions of fitting additional locks to windows and doors will be more cost effective than complex burglar alarms.

9. The scenario tables in **Appendix D** show the expected costs of work to mitigate the individual hazards over a period of 3, 5 and 10 years along with the payback period in terms of savings

[24] www.housinghealthcosts.org

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to the NHS and society. These tables can be used to give some financial quantification towards planning a strategy.

10. It is recommended that HHSRS assessments of the hazards discussed above are recorded as they allow future associated health costs to be quantified. The estimated cost of mitigation work should also be recorded. In addition to the hazards discussed in this HIA, the following hazards are also likely to be important and the same approach should be applied:

- Carbon monoxide
- Food safety
- Personal hygiene, sanitation and drainage

13 This HIA only considers quantitative interventions. By recording the results of positive qualitative interventions, further evidence can be gathered of the effect on individuals of mitigating hazards. A series of case studies could be built up to help demonstrate the positive effects.

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4 Analysis of Quality Adjusted Life Years (QALYs) relating to housing hazards

4.1 Health economics

When evaluating any intervention it is perhaps as important to consider the benefits that arise as it is to consider the costs. In the early days of health economic evaluation, the benefits of interventions were measured in clinical outcomes. The problem with this is that it limits making comparisons between interventions for different conditions. First proposed back in the mid-1980s, the Quality Adjusted Life Year (QALY) has been introduced and is used by the NHS to measure benefit.

4.2 What is a QALY?

A QALY takes into account both the *quantity* and *quality* of life generated by health influencing activities. The National Institute for Health and Care Excellence (NICE) defines the QALY as a *'measure of a person's length of life weighted by a valuation of their health-related quality of life'*. It is the arithmetic product of life expectancy and a measure of the quality of the remaining life-years.

In the calculation of QALYs, the number of life years over which an individual will experience a particular condition or life expectancy is combined with an assessment of their quality of life during those years. Quality of life in the calculation of QALYs is measured on a 0 to 1 scale where 0 is equated to 'being dead' and 1 is 'full/normal health'. Values between 0 and 1 are known as 'health state utilities'. This can therefore embrace a whole range of different elements of people's lives, not just their health status.

4.2.1 Medical example[25]

The calculation of a QALY can be illustrated using a hypothetical example, as illustrated in **Figure 17**. For a patient with chronic renal failure the standard treatment is dialysis, with which the patient would live for 10 years and their quality of life (utility value) is measured at 0.6, so this person would have 6 QALYs. An alternative to dialysis is a kidney transplant. If a patient has a transplant their life expectancy could increase by 10 years (from 10 years to 20 years) and would return the patient to full health (i.e. a utility value of 1)[26]. A person who had a transplant would therefore have 20 QALYs. The QALY gain from having a transplant over continuing dialysis is therefore 14 QALYs (20 – 6) as shown by the shaded area in **Figure 17**.

[25] http://www.gcph.co.uk/latest/blogs/334_economics_of_public_health_blog_6

[26] In reality many such patients will suffer from background morbidity.

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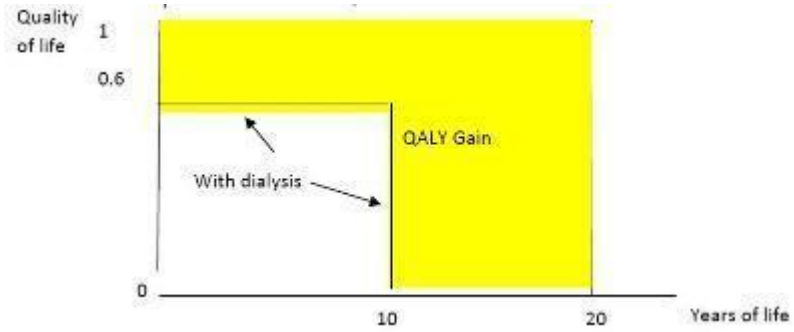
Figure 17: Diagram showing how QALYs are calculated using a medical example



4.2.2 Incremental Cost-Effectiveness Ratio (ICER)

Having used the QALY measurement to compare how much someone's life can be extended and improved, NICE then consider cost effectiveness in terms of the cost of the drug or treatment per QALY. This is the cost of using the drugs or treatment to provide a year of the best quality of life available - it could be one person receiving one QALY, but is more likely to be a number of people receiving a proportion of a QALY - for example 20 people receiving 0.05 of a QALY. Different treatments can therefore be compared using the Incremental Cost-Effectiveness Ratio (ICER) expressed as '£ per QALY'. Each drug would be considered on a case-by-case basis. Generally, however, if a treatment costs more than £20,000-30,000 per QALY, then it would not be considered cost effective.

4.3 Using HHSRS data

The cost of poor housing calculations discussed earlier in this report look at a preventative measure which would reduce the probability of harm occurring, rather than a treatment which might improve a person's quality of life. It is therefore difficult to make a direct comparison with the described NICE methodology. However, it is possible to apply a QALY calculation to the model to determine the cost effectiveness of different interventions. A number of assumptions have been made to enable calculation.

Firstly, it is assumed that the norm is no intervention to the hazard - thus the quality of life frame-of-reference is based on a vulnerable person living in the current conditions of the house for the next 12 months. In a similar way to the cost-benefit analysis, there is a probability that harm will occur to the individual in that timeframe. The severity of this potential harm is also defined by a probability distribution of possible harm outcomes. It is also assumed that the probability of harm and possibly the distribution of harm outcomes will be changed if an intervention occurs. The same probabilities and harm distributions used in the cost benefit analysis can be used in the QALY estimate.

4.3.1 Quality of life

Under the cost benefit model, a cost to the NHS value is estimated for each level of harm. A similar estimation process can be used for the QALY calculation. It is therefore assumed that the level of harm for Class I is 1 QALY (since Class I is an extreme health outcome such as death) and that the other harms are based on the proportion of severity between the harms already established within the HHSRS methodology, see **Table 13**.

Table 13: Comparison ratios for HHSRS harms and QALY estimates

Hazard	Class I	Class II	Class III	Class IV
HHSRS harm ratios	10,000	1,000	300	10
Equivalent QALY estimate	1	0.1	0.03	0.001

4.3.2 Quantity of life

The age of the person in the vulnerable group is different for different hazards. It is assumed that the vulnerable person in each assessment will live to the average life expectancy for the nation, currently 81 years of age. The number of QALYs for a person experiencing a Class I harm should therefore be multiplied by the number of years lost. Hence for some hazards the vulnerable person is 65 years old, and the number of QALYs for a Class I harm would then be 81-65 = 16. For a hazard affecting a young person of 5 years of age, the QALY for a Class I harm would be 81-5 = 75.

4.3.3 Applying Wyre Forest Council's data

Applying this calculation to the Housing Stock Model data for Wyre Forest Council enables the production of a number of variables which can be used to compare hazards. Firstly, it is possible to calculate the QALY cost of category 1 hazards before mitigation where harm will statistically occur. For example, if there are 10 category 1 hazards where it has been estimated that there is a 1 in 10 likelihood of a harmful occurrence over the next twelve months, the expected number of incidents leading to harm would be considered to be 10 multiplied 10%, or 1 incident occurring from this group of hazards. If harm is expected within the year, the harm distribution (i.e. how likely the harmful event is to fall within each of the four classes of harm) can be calculated giving a value for QALYs lost. Hazards with a higher probability of death clearly stand out, such as excess cold, falling on stairs and overcrowding. The total QALY saving if the repairs are carried out can be seen in **Table 14**. Since the cost of repair is known, the ICER for each hazard can be estimated. Only two of the hazards, however, have an ICER under £30,000 (falls associated with baths and collision and entrapment).

Table 14: The QALY benefit and ICER of reducing HHSRS category 1 hazards to an acceptable level

Housing hazard type	QALY years for all stock (years)			ICER before work
	Before work	After work	Saving	
Damp and mould growth	2	0	2	£195,189
Excess cold	78	8	70	£170,731
Crowding and space	10	0	10	£40,433
Entry by intruders	1	0	1	£74,304
Domestic hygiene, Pests and Refuse	0	0	0	£671,605
Food safety	0	0	0	£1,879,178
Personal hygiene, Sanitation and Drainage	0	0	0	£755,524
Falls associated with baths etc	21	0	20	£20,320
Falling on level surfaces etc	2	0	2	£281,869
Falling on stairs etc	64	6	58	£68,760
Falling between levels	4	0	4	£58,435
Electrical hazards	0	0	0	£73,290
Fire	3	0	3	£125,875
Flames, hot surfaces etc	1	0	1	£145,965
Collision and entrapment	1	0	1	£22,893
TOTAL	187	15	173	£4,584,371

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It is worth noting that the ICER figures in **Table 14** are based on treating category 1 hazards across the whole stock, regardless of repair costs. As has been demonstrated above with the health cost benefit scenarios, the cost distribution of repairs for each hazard varies considerably and therefore, if less expensive repairs to mitigate category 1 hazards were selected, the ICER would be more favourable. **Table 15** shows the hazards which now have an ICER below £30,000, based on mitigating hazards with lower repair costs (only hazards that provide an ICER of below £30,000 for more than 10% of their original numbers are shown). Assessing the data in such a way means that the total number of hazards with an ICER below £30,000 is increased from 2 to 9. The total number of QALYs that could be saved by improving the housing stock and mitigating these 3,610 category 1 hazards is therefore around 66, with falls on stairs and excess cold standing out as hazards with a good QALY return for the treatment costs.

The cost distribution of mitigating category 1 hazards is determined for the health cost benefit scenarios and therefore it is also possible to estimate the total cost of works required to mitigate only those category 1 hazards that would provide an ICER below £30,000. **Table 16** shows the total cost of such works as well as the maximum cost to mitigate a hazard which could be considered cost effective. For example on falls from stairs the maximum acceptable repair cost is estimated to be £405.

Table 15: Determining the proportion of category 1 hazards that have an average cost of repair at a value to generate an ICER of £30,000 or below

Housing hazard type	Original no. of category 1 hazards	% of all category 1 hazards	No. of category 1 hazards	Total QALY saving of repair (years)
Damp and mould growth	60	15.9%	9	0.3
Excess cold	2,769	30.0%	830	21.0
Crowding and space	25	0.0%	0	0.0
Entry by intruders	39	0.0%	0	0.0
Domestic hygiene, Pests and Refuse	3	<10%	-	-
Food safety	35	0.0%	0	0.0
Personal hygiene, Sanitation and Drainage	32	0.0%	0	0.0
Falls associated with baths etc	786	59.3%	465	12.1
Falling on level surfaces etc	652	<10%	-	-
Falling on stairs etc	4,307	50.0%	2,152	29.0
Falling between levels	242	39.2%	95	1.5
Electrical hazards	19	<10%	-	-
Fire	88	39.1%	34	1.3
Flames, hot surfaces etc	41	60.6%	25	0.4
Collision and entrapment	30	0.0%	0	0.0
TOTAL	9,127	-	3,610	65.7

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Table 16: Estimating the total cost of works to mitigate all category 1 hazards that would produce an ICER of below £30,000 i.e. dealing with the least expensive to mitigate hazards

Housing hazard type	Threshold cost	Mean cost of works below threshold	Total cost of work
Damp and mould growth	£1,078	£1,331	£14,489
Excess cold	£760	£413	£363,848
Crowding and space	-	£0	£0
Entry by intruders	-	£0	£0
Domestic hygiene, Pests and Refuse	-	-	-
Food safety	-	£0	£0
Personal hygiene, Sanitation and Drainage	-	£0	£0
Falls associated with baths etc	£780	£397	£199,185
Falling on level surfaces etc	£93	-	-
Falling on stairs etc	£405	£252	£584,558
Falling between levels	£472	£259	£28,382
Electrical hazards	-	-	-
Fire	£1,120	£720	£28,576
Flames, hot surfaces etc	£420	£170	£4,931
Collision and entrapment	-	£0	£0
TOTAL	-	-	£1,223,969

5 Conclusion

This prospective HIA has quantified the number of private sector dwellings in Wyre Forest Council which are in poor condition and estimated the effect on the health of occupiers of each of the hazards considered. The study has also assessed the costs of prospective mitigation measures to reduce the number of hazards. The costs to the NHS and to wider society of treating health issues caused by these hazards was then considered, followed by the financial benefits of reducing these hazards. Finally, various cost benefit scenarios were investigated, focussing on mitigating those hazards which are least costly to mitigate.

The costs of 15 of the 29 HHSRS hazards associated with housing have been quantified by this report. These are estimated to account for 98% of category 1 hazards within Wyre Forest. These are the most common hazards and the costs to health are therefore expected to be the largest; however, other hazards causing poor health outcomes will be present and will still need mitigating when found.

The headline results show that there are an estimated total number of hazards in private sector housing in Wyre Forest of 9,127, which we estimate will give rise to 327 incidents requiring medical intervention per year. The greatest numbers of hazards are for falling on stairs etc. and excess cold. The total annual cost to society of poor housing is estimated to be £17.5 million; of which £8 million is for fall hazards affecting older people and £8.34 million is for cold dwellings.

The savings in monetary terms to the NHS are not the only savings however; asthma and respiratory infections could mean work and school days lost, affecting both the household's and the national economy and educational attainment. Interest rates are excluded, as costs to both mitigation work and health are expected to rise. The fall hazards initially cause accidents that incur costs to the NHS, but following this, care costs can last for long periods. The costs to society are therefore considered to be the preferred way of modelling health cost benefits as they represent a truer cost. This cost to society based model is also preferred where the hazard is more likely to have an effect on children, as the outcomes can continue for a lifetime.

All costs are based entirely on estimated costs of carrying out work and modelled costs of harm to health.

All the fall hazards show a short payback period and demonstrate the health cost benefit to the NHS of preventing falls. In contrast the higher mitigation costs generally associated with excess cold result in longer payback periods which results in a less compelling case for investment despite the health implications being significant. The greatest cost saving to the NHS would be where falling on stairs can be prevented or reduced. Falling on level surfaces and falls associated with baths show the shortest payback periods. The most vulnerable group associated with these hazards is the over 60 year olds. This is the fastest growing age group within the population which has implications for future health costs caused by hazards in dwellings. The following figures published in the Handy Persons evaluation report[27] concur with the Wyre Forest Council HIA:

These preventive services are cost effective; for example:

- postponing entry into residential care by a year saves on average £28,080 per person

[27] Handy Person Literature Review, Karen Croucher and Karin Lowson, The University of York, Department for Communities and Local Government, 2012

- preventing a fall leading to a hip fracture saves the state £28,665 on average
- housing adaptations reduce the costs of home care (saving £1,200 to £29,000 a year)
- hospital discharge services speed up patient release, saving £120

An analysis by Care and Repair Cymru of the outcomes of their Rapid Response Adaptations[28] programmes identified that every £1 spent generated £7.50 cost savings to the NHS. These savings were associated with quicker hospital discharge, prevention of people going into hospital and prevention of accidents and falls in the home.

This HIA report highlights the areas where intervention actions would produce positive health impacts. The tables present a range of alternatives which should help Wyre Forest Council look at the health impact of its policies and actions with regard to housing interventions, and to make the case for funds to help to mitigate category 1 hazards. The tables should also help to make justifiable decisions concerning the most effective areas for spending.

This report contains early use of the methodology developed by BRE to estimate the cost of poor housing in terms of QALYs. It suggests that if all category 1 hazards in the private sector were mitigated, around 173 QALYs could be realised. When the costs of repairs are compared to the QALY benefit, the most cost effective repairs are those targeting falls associated with baths.

[28] Written by Jeremy Porteus, Author of All Party Parliamentary Group on Housing with Care for Older People, Living Well at Home Inquiry Report for the Housing Learning and Improvement Network Housing LIN, Viewpoint 21, November 2011

Appendix A Brief explanation of the HHSRS hazard score calculation and banding reproduced from the Operating Guidance[29]

This appendix provides a brief explanation of the Housing Health and Safety Rating System (HHSRS) for a fuller explanation the Operating Guidance should be consulted[29].

HHSRS requires an assessment by a surveyor who considers both:

1. The likelihood of an occurrence of the identified hazard resulting in harm to a member of the vulnerable group over the next 12 months. This is expressed as a ratio.
2. The range of potential outcomes from such an occurrence – i.e. the spread of possible harms. This is expressed as a percentage for each of the four classes of harm.

This information is then combined with a weighting for each class of harm which is given in the guidance – this generates a hazard score. The different classes of harm and their respective weightings and examples are provided in the table below.

Classes of harms and weightings used in the HHSRS

Class	Examples	Weightings
Class I	Death, permanent paralysis below the neck, malignant lung tumour, regular severe pneumonia, permanent loss of consciousness, and 80% burn injuries	10,000
Class II	Chronic confusion, mild strokes, regular severe fever, loss of a hand or foot, serious fractures, very serious burns and loss of consciousness for days	1,000
Class III	Chronic severe stress, mild heart attack, regular and persistent dermatitis, malignant but treatable skin cancer, loss of a finger, fractured skull, severe concussion, serious puncture wounds to head or body, severe burns to hands, serious strain or sprain injuries and regular and severe migraine	300
Class IV	Occasional severe discomfort, chronic or regular skin irritation, benign tumours, occasional mild pneumonia, a broken finger, sprained hip, slight concussion, moderate cuts to face or body, severe bruising to body, 10% burns and regular serious coughs or colds	10

[29] Housing Health and Safety Rating System Operating Guidance, Housing Act 2004, Guidance about Inspections and Assessments given under Section 9, ODPM, 2006

The method of calculating the hazard score using these three pieces of information uses the sum of the products of the weightings for each class of harm, multiplied by the likelihood of an occurrence, and the percentage spread of harms. The table below, reproduced here from the guidance, shows the formula used to generate the hazard score. Hazard scores of over 1,000 are deemed to be a category 1 hazard and any dwelling with such a hazard is considered to be below the minimum acceptable standard for housing, thus classified as “poor housing”.

The HHSRS formula used to generate the hazard score

Figure 1 – The HHSRS Formula

		Class of Harm Weighting		Likelihood		Spread of Harm (%)
SI	=	10,000	X	$\frac{1}{L}$	X	O1
SII	=	1,000	X	$\frac{1}{L}$	X	O2
SIII	=	300	X	$\frac{1}{L}$	X	O3
SIV	=	10	X	$\frac{1}{L}$	X	O4

Hazard Score = (S1 + S2 + S3 + S4)

Where –
L = the Likelihood of an occurrence
O = the Outcome expressed as a percentage for each Class of Harm
S = the row product for each Class of Harm.

Surveyors carrying out HHSRS assessments are required, in accordance, with the Operating Guidance to use “representative scale points” to judge the likelihood and spread of harm outcomes. This means that a single figure is used to represent a range of likelihoods or harm outcomes. The same procedure is used throughout the calculations underpinning this HIA report. The assessment methodology requires a consideration of the “average” hazard within a dwelling and how the dwelling being assessed compares with that average. Within all dwellings there are already some potential hazards e.g. electrical systems, stairs etc. and therefore hazards are only assessed when they are considered to be significant. The Operating Guidance provides details of the average expected likelihoods and spread of harm outcomes for each hazard.

It is the percentage harm outcome score for each class of harm that provides the information to generate the costs of harm data developed for the HIA.

Appendix B Description of hazards

Hazards leading to physiological conditions

Damp and mould growth

Physiological health effects from asthma associated with allergens and dust mites, which prefer a humid environment for growth, are the most important negative health outcomes for under 14 year olds (the vulnerable age group). Whilst this hazard is predominantly associated with physiological conditions, the HHSRS guidance states that “the mental and social health effects of mould or damp staining and the smells associated with damp and mould can cause depression and anxiety” and that these “feelings of shame and embarrassment can lead to social isolation”. These psychological impacts can have an effect on all ages and the household as a whole which can last a lifetime.

Excess cold

The hazard of excess cold particularly affects older people, and the vulnerable group are those over 65 who are expected to spend a greater degree of time indoors. Excess cold has been shown to contribute to a worsening of symptoms of other illnesses such as rheumatoid arthritis and leg ulcers. Extreme harm caused be excess cold can be death, or a heart attack followed by death. Severe and serious harm outcomes lead to cardiovascular and respiratory illnesses.

Asthma and respiratory infections could also mean work and school days lost, affecting both the household's and the national economy and educational attainment. This is evidenced by the recent report by the Marmot review team[30] giving evidence of the effect of excess cold on children and vulnerable families, as well as on older people.

Hazards leading to psychological conditions

Crowding and space

Potential harm can affect any age group. Lack of space and overcrowded conditions have been linked to a number of health outcomes including psychological distress and mental disorders, especially those associated with a lack of privacy and childhood development. Crowding also poses an increased hygiene risk, a spread of infectious disease and accidents.

Overcrowding does not occur in isolation and a recent study into multiple risk factors[31] showed that overcrowding for young children was significantly linked to other problems faced by parent(s) with whom they lived, including: financial stress, not working, violence at home, alcohol abuse and depression.

Entry by intruders

This hazard can affect any age group and the potential health effects are the fear of a possible burglary, the stress and anguish caused by a burglary and injuries associated with an aggravated burglary. The most common health impact, which occurs in 90% of cases where an incidence is recorded as likely, is fear and associated stress which can lead to other conditions. This may be due to insecure windows or

[30] The Health Impacts of Cold Homes and Fuel Poverty, Marmot Review Team for Friends of the Earth, 2011

[31] Multiple risk factors in young children’s development by Sabates, R and Dex ,S, 2011

doors but can also apply where door entry systems are inadequate or security lights would reassure the occupiers.

Hazards that can cause accidents

Falls associated with baths etc.

Injuries arising from a fall in bathrooms may be more severe both because the person falling is not protected by clothing and because of the hard projections and surfaces commonly found. Children are the most likely to fall but older people suffer greater harm and are therefore considered as the most vulnerable group. Injuries to an elderly person typically result in a general deterioration leading to cardio-respiratory illness including heart attack and pneumonia.

Falling on stairs etc.

Falls on stairs account for 25% of all falls in the home, and are more likely than other falls to lead to a fatality or extreme health outcome. Fractures of the neck of the femur (hip fractures) are commonly associated with falling on stairs. Although any age group can fall on stairs, a fall affecting an elderly person is more likely to result in a general deterioration of health and the vulnerable group is considered to be persons over 60.

Falling on level surfaces etc.

Falls on the level within the home are more common than falls on stairs, but they are less likely to lead to significant harm outcomes, and consequently there are generally fewer category 1 falling on level surfaces hazards than there are falling on stair hazards. The health effects are physical injury, including fractures, but health deterioration following a fall can lead to death or cardio respiratory illness. The vulnerable group is persons aged 60 and over.

This type of fall hazard can be considered alongside falling on stairs and falling on the level, as all three hazards have a greater effect on persons over 60.

Falling between levels

Situations typically included are falls from windows, balconies, landings and climbable roofs. The health outcomes will range from a fatality from a fall from a high building to a few bruises when a less serious fall is cushioned. The vulnerable group for this hazard is children under 5.

Electrical hazards

When electricity passes through the human body, it causes shock to the nervous system. The shock effect ranges from mild tingling sensations to disruptions of the regular contractions of the heart or respiratory muscles, causing death. Heat generated can cause burns. The majority of injuries are not severe. The most vulnerable group are those under 5 years of age as they are not so aware of the dangers.

Fire

The health outcomes associated with this hazard are burns. The vulnerable group for this hazard is persons over 60 due to impairment of mobility.

Flames and hot surfaces

Common causes of injuries due to this hazard involve utensils containing hot liquids being pulled over, most often in the kitchen. The vulnerable group for this hazard is persons under 5 years old and over half the injuries recorded are to this age group.

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Collision and entrapment

This hazard includes both colliding with parts of the building such as low beams and glazing and the trapping of limbs including fingers. The most common accident in this group (most often to a child) involves part of the body being trapped in a door.

Other hazards

Other housing hazards are present within dwellings in Wyre Forest Council but not of sufficient numbers for further analysis.

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Appendix C Data sources

C.1 Number of dwellings with a category 1 HHSRS hazard

In order to carry out a HIA it is necessary to determine the number of dwellings that suffer from each of the HHSRS hazards for which an impact assessment is to be carried out[32]. BRE have calculated the expected numbers for each hazard using the BRE housing stock model and data from the EHS using the following process:

1. Obtain the data from the dwelling level housing stock model produced by BRE for Wyre Forest District Council in 2016, regarding category 1 hazards.

2. In order to estimate the number of dwellings in Wyre Forest Council with a falling on the stairs hazard, the number of dwellings with a category 1 falling on stairs as a percentage of all dwellings with any type of fall hazard was determined and then multiplied by the estimated number of dwellings with fall hazards in Wyre Forest Council.

3. This same principle was used to calculate the likely incidence of other category 1 hazards in Wyre Forest Council. The proportions of hazards may vary across the country, so it is not necessarily appropriate to apply national proportions to Wyre Forest Council. Ideally the specific proportions for Wyre Forest Council should be applied, but these are not known. The proportions for the rest of England are too small to enable some of the less common hazards to be captured, and so for these hazards the three “overall regions“ used in the EHS outputs (the “North”, “London and the South East”, and the “rest of England”) have been used.

4. Because some hazards are quite rare, there will not always be enough cases in the EHS to allow the estimation of the likelihoods of harm and other figures required for a HIA. This means that some of the rarer hazards, such as water safety or structural collapse, are not included in the HIA. The extent to which this unavailable data affects the overall result will vary from authority to authority depending on the composition of hazards within that authority. For Wyre Forest Council it is estimated that 71% of all hazards present have been covered by the HIA report.

[32] As the HIA does not consider all HHSRS hazards, it is not necessary to determine the exact numbers for all hazards.

C.2 Repair costs to mitigate category 1 hazards

The English Housing Survey (EHS) is a continuous national survey commissioned by the Department for Communities and Local Government (DCLG). It collects information about people's housing circumstances and the condition and energy efficiency of housing in England. Approximately 6,000 house condition surveys are carried out each year by trained surveyors.

The EHS surveyors estimate the costs of remedial work when a HHSRS hazard has been identified. These costs are not for the eradication of the hazard altogether, but to reduce it to an acceptable level – this level usually being the average for the age and type of dwelling rather than to meet some ideal or higher standard.

BRE calculates repair costs from information collected via the EHS in 2 ways:

1. For the fully measured hazards, details of the required work to remedy the category 1 hazard identified by the surveyor in the HHSRS section of the physical survey form (which would in itself or in combination with 2 (below)– remedy the hazard to an 'average' level of risk)
2. Repair cost work identified throughout the survey

The modelling ensures that costs are not duplicated e.g. replacement of windows may be required to remedy a category 1 noise hazard and a category 1 excess cold hazard in the same dwelling but the cost of replacement is only counted once.

The suite of programmes which provide notional costs to make safe (from the HHSRS section of the form and the repair costs model) are complicated. To offer an insight however, for the work identified in the HHSRS section of the form, a 'typical' specification has been devised by an experienced HHSRS practitioner. For example, for the action 'remove obstacle' that appears under the hazard of falling on stairs etc., it is assumed that the obstacle is a central heating radiator. This job has been broken down into its component parts: draining down the system; moving floor boards; re-routing copper pipe; removing radiator; installing radiator in new location; refilling, bleeding and testing system; and making good any damaged floorboards or decoration.

The costs of all detailed specifications have been calculated by a quantity surveyor using building cost data. The costs remain constant each year but an inflation/deflation factor is applied to reflect the price of the work in the EHS survey year. In the event that a cost cannot be generated using the information given by the surveyor, a default cost for a typical job is used.

For excess cold, an appropriate cost for each measure applied is assigned to each case using prices from the EHS repair cost modelling or (in the case of costs not included in repair costs) which have been derived by a quantity surveyor using building cost data. These costs include year-specific factors which reflect the price of the work in that year.

It is not possible to summarise the repair cost model that feeds into the modelling, but if further information was required, all the assumptions and methodology from the EHS technical report could be consulted[33].

[33] See Chapter 5, Annex 5.5 of https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335434/Chapter_5_Data_processing.pdf

For the purposes of this HIA, as it is recognised that the cost of repair works varies across the country, a further regional inflationary figure is applied to make it more local to the particular local authority area, as shown in the following table.

Price adjustment factors for the cost of repair work, by region

Region	Price adjustment factor
East Midlands	0.93
East of England	1.01
Greater London	1.09
North East	0.94
North West	0.94
South East (excl. Greater London)	1.10
South West	1.00
West Midlands	0.93
Yorkshire and Humberside	0.93

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Appendix D Cost benefit scenario tables for individual hazards

The cost benefit results are developed from a series of calculations which look at the payback periods over a 3 to 10 year time period. The payback period is a straight comparison between the cost of mitigating the hazard and the cost to the NHS or to society. The tables also show the payback periods for the following cost benefit scenarios:

- Mitigation of the cheapest 20% of hazards
- Mitigation of the cheapest 50% of hazards

The logic behind this is that there will always be some dwellings where mitigation of the hazard is too difficult or too expensive. An example for excess cold might be where the dwelling is constructed from single skin brickwork with a corrugated iron roof and regulations would require a rebuild to bring the dwelling up to the “average” or above. With the hazard of falling on stairs etc. some dwellings have steep narrow stairs with insufficient room to replace them. The cost differentials for the cheapest 20% and 50% of cases have been estimated from EHCS data and then applied to the “real” local costs of works to dwellings.

The first table below shows the cost benefit results for the NHS and the second table provides the results for society. The tables include the results for each of the hazards discussed in this report and are broken down into:

- Tenure (all private stock, owner occupied, privately rented)
- The number of years over which the repairs are spread (3, 5 or 10)
- The proportion of hazards to be repaired (all, cheapest 20% or cheapest 50%)

The results show:

- The **annual repair cost** to mitigate the hazard – longer time frames results in lower annual costs. Choosing the cheapest 20% or 50% will results in an exponential drop in cost because fewer dwellings are repaired and the cost to each dwelling is reduced.
- The **payback period** – the time taken (in years) to break even on an investment – i.e. the cost of mitigating the hazard and the savings achieved for the NHS and to society from carrying out the mitigation work to an individual dwelling.

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Table D. 1: NHS - payback periods and repair costs for cost benefit scenarios – by hazard and tenure

Hazard	Tenure	Measure	3 - All	5 - All	10 - All	3 - Cheapest 50%	5 - Cheapest 50%	10 - Cheapest 50%	3 - Cheapest 20%	5 - Cheapest 20%	10 - Cheapest 20%
Damp and mould growth	Private stock	payback period	21	21	21	14	14	14	6	6	6
		cost	£139,252	£83,551	£41,776	£46,142	£27,685	£13,843	£7,025	£4,215	£2,107
	Owner Occupied	payback period	21	21	21	14	14	14	6	6	6
		cost	£98,382	£59,029	£29,515	£32,600	£19,560	£9,780	£4,963	£2,978	£1,489
	Private rented	payback period	21	21	21	14	14	14	6	6	6
		cost	£40,869	£24,522	£12,261	£13,542	£8,125	£4,063	£2,062	£1,237	£619
Excess cold	Private stock	payback period	32	32	32	11	11	11	4	4	4
		cost	£4,436,416	£2,661,849	£1,330,925	£753,283	£451,970	£225,985	£96,895	£58,137	£29,068
	Owner Occupied	payback period	32	32	32	11	11	11	4	4	4
		cost	£3,906,096	£2,343,658	£1,171,829	£663,237	£397,942	£198,971	£85,312	£51,187	£25,594
	Private rented	payback period	32	32	32	11	11	11	4	4	4
		cost	£530,319	£318,191	£159,096	£90,046	£54,027	£27,014	£11,583	£6,950	£3,475
Crowding and space	Private stock	payback period	14	14	14	14	14	14	14	14	14
		cost	£141,476	£84,886	£42,443	£70,500	£42,300	£21,150	£28,200	£16,920	£8,460
	Owner Occupied	payback period	14	14	14	14	14	14	14	14	14
		cost	£99,954	£59,972	£29,986	£49,809	£29,885	£14,943	£19,924	£11,954	£5,977
	Private rented	payback period	14	14	14	14	14	14	14	14	14
		cost	£41,522	£24,913	£12,457	£20,691	£12,415	£6,207	£8,277	£4,966	£2,483
Entry by intruders	Private stock	payback period	6	6	6	5	5	5	3	3	3
		cost	£14,698	£8,819	£4,409	£6,034	£3,620	£1,810	£1,671	£1,003	£501
	Owner Occupied	payback period	6	6	6	5	5	5	3	3	3
		cost	£10,384	£6,230	£3,115	£4,263	£2,558	£1,279	£1,181	£708	£354
	Private rented	payback period	6	6	6	5	5	5	3	3	3
		cost	£4,314	£2,588	£1,294	£1,771	£1,063	£531	£491	£294	£147
Domestic hygiene, Pests and Refuse	Private stock	payback period	9	9	9	1	1	1	1	1	1
		cost	£904	£542	£271	£24	£14	£7	£9	£6	£3
	Owner Occupied	payback period	9	9	9	1	1	1	1	1	1
		cost	£639	£383	£192	£17	£10	£5	£7	£4	£2
	Private rented	payback period	9	9	9	1	1	1	1	1	1
		cost	£265	£159	£80	£7	£4	£2	£3	£2	£1
Food safety	Private stock	payback period	16	16	16	14	14	14	7	7	7
		cost	£34,614	£20,769	£10,384	£14,559	£8,735	£4,368	£2,801	£1,681	£840
	Owner Occupied	payback period	16	16	16	14	14	14	7	7	7
		cost	£24,455	£14,673	£7,337	£10,286	£6,172	£3,086	£1,979	£1,187	£594
	Private rented	payback period	16	16	16	14	14	14	7	7	7
		cost	£10,159	£6,095	£3,048	£4,273	£2,564	£1,282	£822	£493	£247
Personal hygiene, Sanitation and Drainage	Private stock	payback period	7	7	7	6	6	6	5	5	5
		cost	£12,584	£7,551	£3,775	£5,324	£3,194	£1,597	£1,962	£1,177	£589
	Owner Occupied	payback period	7	7	7	6	6	6	5	5	5
		cost	£8,891	£5,335	£2,667	£3,761	£2,257	£1,128	£1,386	£832	£416
	Private rented	payback period	7	7	7	6	6	6	5	5	5
		cost	£3,693	£2,216	£1,108	£1,562	£937	£469	£576	£345	£173
Falls associated with baths etc	Private stock	payback period	3	3	3	3	3	3	1	1	1
		cost	£139,069	£83,442	£41,721	£70,599	£42,360	£21,180	£4,767	£2,860	£1,430
	Owner Occupied	payback period	3	3	3	3	3	3	1	1	1
		cost	£117,241	£70,345	£35,172	£59,518	£35,711	£17,855	£4,019	£2,411	£1,206
	Private rented	payback period	3	3	3	3	3	3	1	1	1
		cost	£21,829	£13,097	£6,549	£11,081	£6,649	£3,324	£748	£449	£224
Falling on level surfaces etc	Private stock	payback period	6	6	6	4	4	4	2	2	2
		cost	£211,080	£126,648	£63,324	£67,791	£40,675	£20,337	£13,114	£7,869	£3,934
	Owner Occupied	payback period	6	6	6	4	4	4	2	2	2
		cost	£177,949	£106,769	£53,385	£57,151	£34,290	£17,145	£11,056	£6,634	£3,317
	Private rented	payback period	6	6	6	4	4	4	2	2	2
		cost	£33,131	£19,879	£9,939	£10,641	£6,384	£3,192	£2,058	£1,235	£618

Table D. 1 cont.: NHS - payback periods and repair costs for cost benefit scenarios – by hazard and tenure

Hazard	Tenure	Measure	3 - All	5 - All	10 - All	3 - Cheapest 50%	5 - Cheapest 50%	10 - Cheapest 50%	3 - Cheapest 20%	5 - Cheapest 20%	10 - Cheapest 20%
Falling on stairs etc	Private stock	payback period	7	7	7	4	4	4	2	2	2
		cost	£1,478,022	£886,813	£443,407	£360,577	£216,346	£108,173	£58,914	£35,348	£17,674
	Owner Occupied	payback period	7	7	7	4	4	4	2	2	2
		cost	£1,246,030	£747,618	£373,809	£303,981	£182,388	£91,194	£49,667	£29,800	£14,900
	Private rented	payback period	7	7	7	4	4	4	2	2	2
		cost	£231,993	£139,196	£69,598	£56,597	£33,958	£16,979	£9,247	£5,548	£2,774
Falling between levels	Private stock	payback period	9	9	9	6	6	6	2	2	2
		cost	£74,635	£44,781	£22,391	£26,544	£15,926	£7,963	£1,894	£1,136	£568
	Owner Occupied	payback period	9	9	9	6	6	6	2	2	2
		cost	£52,730	£31,638	£15,819	£18,753	£11,252	£5,626	£1,338	£803	£401
	Private rented	payback period	9	9	9	6	6	6	2	2	2
		cost	£21,905	£13,143	£6,571	£7,790	£4,674	£2,337	£556	£333	£167
Electrical hazards	Private stock	payback period	7	7	7	1	1	1	1	1	1
		cost	£10,179	£6,107	£3,054	£281	£169	£84	£111	£67	£33
	Owner Occupied	payback period	7	7	7	1	1	1	1	1	1
		cost	£7,192	£4,315	£2,157	£199	£119	£60	£79	£47	£24
	Private rented	payback period	7	7	7	1	1	1	1	1	1
		cost	£2,988	£1,793	£896	£83	£50	£25	£33	£20	£10
Fire	Private stock	payback period	27	27	27	10	10	10	4	4	4
		cost	£139,415	£83,649	£41,824	£25,121	£15,073	£7,536	£3,422	£2,053	£1,027
	Owner Occupied	payback period	27	27	27	10	10	10	4	4	4
		cost	£98,498	£59,099	£29,549	£17,748	£10,649	£5,325	£2,418	£1,451	£725
	Private rented	payback period	27	27	27	10	10	10	4	4	4
		cost	£40,917	£24,550	£12,275	£7,373	£4,424	£2,212	£1,004	£603	£301
Flames, hot surfaces etc	Private stock	payback period	15	15	15	1	1	1	1	1	1
		cost	£28,333	£17,000	£8,500	£760	£456	£228	£232	£139	£70
	Owner Occupied	payback period	15	15	15	1	1	1	1	1	1
		cost	£20,018	£12,011	£6,005	£537	£322	£161	£164	£98	£49
	Private rented	payback period	15	15	15	1	1	1	1	1	1
		cost	£8,316	£4,989	£2,495	£223	£134	£67	£68	£41	£20
Collision and entrapment	Private stock	payback period	7	7	7	7	7	7	1	1	1
		cost	£5,922	£3,553	£1,777	£2,984	£1,791	£895	£181	£108	£54
	Owner Occupied	payback period	7	7	7	7	7	7	1	1	1
		cost	£4,184	£2,510	£1,255	£2,108	£1,265	£633	£128	£77	£38
	Private rented	payback period	7	7	7	7	7	7	1	1	1
		cost	£1,738	£1,043	£521	£876	£526	£263	£53	£32	£16

Table D. 2: Society - payback periods and repair costs for cost benefit scenarios – by hazard and tenure

Hazard	Tenure	Measure	3 - All	5 - All	10 - All	3 - Cheapest 50%	5 - Cheapest 50%	10 - Cheapest 50%	3 - Cheapest 20%	5 - Cheapest 20%	10 - Cheapest 20%
Damp and mould growth	Private stock	payback period	5	5	5	3	3	3	2	2	2
		cost	£139,252	£83,551	£41,776	£46,142	£27,685	£13,843	£7,025	£4,215	£2,107
	Owner Occupied	payback period	5	5	5	3	3	3	2	2	2
		cost	£98,382	£59,029	£29,515	£32,600	£19,560	£9,780	£4,963	£2,978	£1,489
	Private rented	payback period	5	5	5	3	3	3	2	2	2
		cost	£40,869	£24,522	£12,261	£13,542	£8,125	£4,063	£2,062	£1,237	£619
Excess cold	Private stock	payback period	2	2	2	1	1	1	1	1	1
		cost	£4,436,416	£2,661,849	£1,330,925	£753,283	£451,970	£225,985	£96,895	£58,137	£29,068
	Owner Occupied	payback period	2	2	2	1	1	1	1	1	1
		cost	£3,906,096	£2,343,658	£1,171,829	£663,237	£397,942	£198,971	£85,312	£51,187	£25,594
	Private rented	payback period	2	2	2	1	1	1	1	1	1
		cost	£530,319	£318,191	£159,096	£90,046	£54,027	£27,014	£11,583	£6,950	£3,475
Crowding and space	Private stock	payback period	1	1	1	1	1	1	1	1	1
		cost	£141,476	£84,886	£42,443	£70,500	£42,300	£21,150	£28,200	£16,920	£8,460
	Owner Occupied	payback period	1	1	1	1	1	1	1	1	1
		cost	£99,954	£59,972	£29,986	£49,809	£29,885	£14,943	£19,924	£11,954	£5,977
	Private rented	payback period	1	1	1	1	1	1	1	1	1
		cost	£41,522	£24,913	£12,457	£20,691	£12,415	£6,207	£8,277	£4,966	£2,483
Entry by intruders	Private stock	payback period	2	2	2	1	1	1	1	1	1
		cost	£14,698	£8,819	£4,409	£6,034	£3,620	£1,810	£1,671	£1,003	£501
	Owner Occupied	payback period	2	2	2	1	1	1	1	1	1
		cost	£10,384	£6,230	£3,115	£4,263	£2,558	£1,279	£1,181	£708	£354
	Private rented	payback period	2	2	2	1	1	1	1	1	1
		cost	£4,314	£2,588	£1,294	£1,771	£1,063	£531	£491	£294	£147
Domestic hygiene, Pests and Refuse	Private stock	payback period	3	3	3	1	1	1	1	1	1
		cost	£904	£542	£271	£24	£14	£7	£9	£6	£3
	Owner Occupied	payback period	3	3	3	1	1	1	1	1	1
		cost	£639	£383	£192	£17	£10	£5	£7	£4	£2
	Private rented	payback period	3	3	3	1	1	1	1	1	1
		cost	£265	£159	£80	£7	£4	£2	£3	£2	£1
Food safety	Private stock	payback period	7	7	7	6	6	6	3	3	3
		cost	£34,614	£20,769	£10,384	£14,559	£8,735	£4,368	£2,801	£1,681	£840
	Owner Occupied	payback period	7	7	7	6	6	6	3	3	3
		cost	£24,455	£14,673	£7,337	£10,286	£6,172	£3,086	£1,979	£1,187	£594
	Private rented	payback period	7	7	7	6	6	6	3	3	3
		cost	£10,159	£6,095	£3,048	£4,273	£2,564	£1,282	£822	£493	£247
Personal hygiene, Sanitation and Drainage	Private stock	payback period	3	3	3	3	3	3	2	2	2
		cost	£12,584	£7,551	£3,775	£5,324	£3,194	£1,597	£1,962	£1,177	£589
	Owner Occupied	payback period	3	3	3	3	3	3	2	2	2
		cost	£8,891	£5,335	£2,667	£3,761	£2,257	£1,128	£1,386	£832	£416
	Private rented	payback period	3	3	3	3	3	3	2	2	2
		cost	£3,693	£2,216	£1,108	£1,562	£937	£469	£576	£345	£173
Falls associated with baths etc	Private stock	payback period	1	1	1	1	1	1	1	1	1
		cost	£139,069	£83,442	£41,721	£70,599	£42,360	£21,180	£4,767	£2,860	£1,430
	Owner Occupied	payback period	1	1	1	1	1	1	1	1	1
		cost	£117,241	£70,345	£35,172	£59,518	£35,711	£17,855	£4,019	£2,411	£1,206
	Private rented	payback period	1	1	1	1	1	1	1	1	1
		cost	£21,829	£13,097	£6,549	£11,081	£6,649	£3,324	£748	£449	£224
Falling on level surfaces etc	Private stock	payback period	2	2	2	2	2	2	1	1	1
		cost	£211,080	£126,648	£63,324	£67,791	£40,675	£20,337	£13,114	£7,869	£3,934
	Owner Occupied	payback period	2	2	2	2	2	2	1	1	1
		cost	£177,949	£106,769	£53,385	£57,151	£34,290	£17,145	£11,056	£6,634	£3,317
	Private rented	payback period	2	2	2	2	2	2	1	1	1
		cost	£33,131	£19,879	£9,939	£10,641	£6,384	£3,192	£2,058	£1,235	£618

Table D. 2 cont.: Society - payback periods and repair costs for cost benefit scenarios – by hazard and tenure, cont.

Hazard	Tenure	Measure	3 - All	5 - All	10 - All	3 - Cheapest 50%	5 - Cheapest 50%	10 - Cheapest 50%	3 - Cheapest 20%	5 - Cheapest 20%	10 - Cheapest 20%
Falling on stairs etc	Private stock	payback period	1	1	1	1	1	1	1	1	1
		cost	£1,478,022	£886,813	£443,407	£360,577	£216,346	£108,173	£58,914	£35,348	£17,674
	Owner Occupied	payback period	1	1	1	1	1	1	1	1	1
		cost	£1,246,030	£747,618	£373,809	£303,981	£182,388	£91,194	£49,667	£29,800	£14,900
	Private rented	payback period	1	1	1	1	1	1	1	1	1
		cost	£231,993	£139,196	£69,598	£56,597	£33,958	£16,979	£9,247	£5,548	£2,774
Falling between levels	Private stock	payback period	2	2	2	2	2	2	1	1	1
		cost	£74,635	£44,781	£22,391	£26,544	£15,926	£7,963	£1,894	£1,136	£568
	Owner Occupied	payback period	2	2	2	2	2	2	1	1	1
		cost	£52,730	£31,638	£15,819	£18,753	£11,252	£5,626	£1,338	£803	£401
	Private rented	payback period	2	2	2	2	2	2	1	1	1
		cost	£21,905	£13,143	£6,571	£7,790	£4,674	£2,337	£556	£333	£167
Electrical hazards	Private stock	payback period	2	2	2	1	1	1	1	1	1
		cost	£10,179	£6,107	£3,054	£281	£169	£84	£111	£67	£33
	Owner Occupied	payback period	2	2	2	1	1	1	1	1	1
		cost	£7,192	£4,315	£2,157	£199	£119	£60	£79	£47	£24
	Private rented	payback period	2	2	2	1	1	1	1	1	1
		cost	£2,988	£1,793	£896	£83	£50	£25	£33	£20	£10
Fire	Private stock	payback period	2	2	2	1	1	1	1	1	1
		cost	£139,415	£83,649	£41,824	£25,121	£15,073	£7,536	£3,422	£2,053	£1,027
	Owner Occupied	payback period	2	2	2	1	1	1	1	1	1
		cost	£98,498	£59,099	£29,549	£17,748	£10,649	£5,325	£2,418	£1,451	£725
	Private rented	payback period	2	2	2	1	1	1	1	1	1
		cost	£40,917	£24,550	£12,275	£7,373	£4,424	£2,212	£1,004	£603	£301
Flames, hot surfaces etc	Private stock	payback period	4	4	4	1	1	1	1	1	1
		cost	£28,333	£17,000	£8,500	£760	£456	£228	£232	£139	£70
	Owner Occupied	payback period	4	4	4	1	1	1	1	1	1
		cost	£20,018	£12,011	£6,005	£537	£322	£161	£164	£98	£49
	Private rented	payback period	4	4	4	1	1	1	1	1	1
		cost	£8,316	£4,989	£2,495	£223	£134	£67	£68	£41	£20
Collision and entrapment	Private stock	payback period	1	1	1	1	1	1	1	1	1
		cost	£5,922	£3,553	£1,777	£2,984	£1,791	£895	£181	£108	£54
	Owner Occupied	payback period	1	1	1	1	1	1	1	1	1
		cost	£4,184	£2,510	£1,255	£2,108	£1,265	£633	£128	£77	£38
	Private rented	payback period	1	1	1	1	1	1	1	1	1
		cost	£1,738	£1,043	£521	£876	£526	£263	£53	£32	£16

Glossary of terms

Category 1 hazard	Hazards with a HHSRS score of > 1,000. A dwelling with a category 1 hazard is considered to fail the minimum statutory standard for housing
CCG	Clinical Commissioning Group
CLG	Department for Communities and Local Government
COA	Census Output Area
COPD	Chronic Obstructive Pulmonary Disease
Cost to NHS	Cost of treatment, procedures etc. expected to be carried out by the NHS (including a school nurse, the GP surgery or hospital etc.) during the first 12 months
Cost to society	Considers the wider costs to society of hazards (including the cost to the NHS). The cost is related to the class of harm outcome and is between 1.6 times the cost to the NHS for a class IV harm and almost 19 times the cost to the NHS for a class I harm outcome This cost encompasses all aspects of the costs associated with ill health including the human costs, indirect economic costs of lost output and direct medical costs.
Cumulative payback period	Includes the continuing cost to the NHS of incidences while mitigation works are carried out over a 3, 5 and 10 year time period. The cumulative payback period is always greater than the payback period
DCLG	Department for Communities and Local Government
ECO	Energy Companies Obligation
Fuel poverty	The original definition of fuel poverty states that a household is in fuel poverty if it needs to spend more than 10% of their income on fuel to maintain an adequate level of warmth (10% definition). The new definition now adopted by government is that a household is said to be in fuel poverty if they have fuel costs that are above average and were they to spend that amount they would be left with a residual income below the official poverty line (Low Income High Costs definition)
GIS	Geographic Information System
HCS	House Condition Survey
HHSRS	Housing Health and Safety Rating System
HIA	Health Impact Assessment – a formal method of assessing the impact of a project, procedure or strategy on the health of a population

HMO	Houses in Multiple Occupation An entire house or flat which is let to 3 or more tenants who form 2 or more households and who share a kitchen, bathroom or toilet A house which has been converted entirely into bedsits or other non-self-contained accommodation and which is let to 3 or more tenants who form two or more households and who share kitchen, bathroom or toilet facilities A converted house which contains one or more flats which are not wholly self-contained (i.e. the flat does not contain within it a kitchen, bathroom and toilet) and which is occupied by 3 or more tenants who form two or more households A building which is converted entirely into self-contained flats if the conversion did not meet the standards of the 1991 Building Regulations and more than one-third of the flats are let on short-term tenancies In order to be an HMO the property must be used as the tenants' only or main residence and it should be used solely or mainly to house tenants. Properties let to students and migrant workers will be treated as their only or main residence and the same will apply to properties which are used as domestic refuges
HSM	Housing Stock Model Desktop based modelling used to determine the condition of the housing stock
IMD	Index of Multiple Deprivation - a relative measure of deprivation at various geographic areas across England. The most recent is for 2010 and calculates the overall measure of deprivation experienced by people living in every Lower layer Super Output Area (LSOA) in England.
Jenks' Natural Breaks	The natural breaks classification method is a data clustering method determining the best arrangement of values into different classes. It is achieved through minimising each class's average deviation from the class mean while maximising each class's deviation from the means of the other groups. The method seeks to reduce the variance within classes and maximise variance between classes thus ensuring groups are distinctive
JSNA	Joint Strategic Needs Assessment
LACORs	Local Authority Coordinators of Regulatory Services – now renamed Local Government Regulation

LSOA	Lower Super Output Area
	Designed for statistical purposes, built from census output areas, approximately 400 households
MSOA	Medium Super Output Area
	Designed for statistical purposes, built from lower super output areas, approximately 2,000 households
NHS	National Health Service
Older people	People over 65 for the excess cold hazard, people over 60 for the fire and fall hazards (excl. falling between levels)
Payback period	The time taken to break even on an investment – i.e. the cost of mitigating the hazard and the savings achieved for the NHS and to society from carrying out the mitigation work to an individual dwelling
Poor housing	Dwellings where a category 1 hazard is present
Private sector housing	Housing not owned by the local authority or a housing association
PSHCS	Private Sector House Condition Survey
Vulnerable age group	The group of persons who are more likely to be affected by the particular hazard as defined by the HHSRS Operating Guidance
WHO	World Health Organisation

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