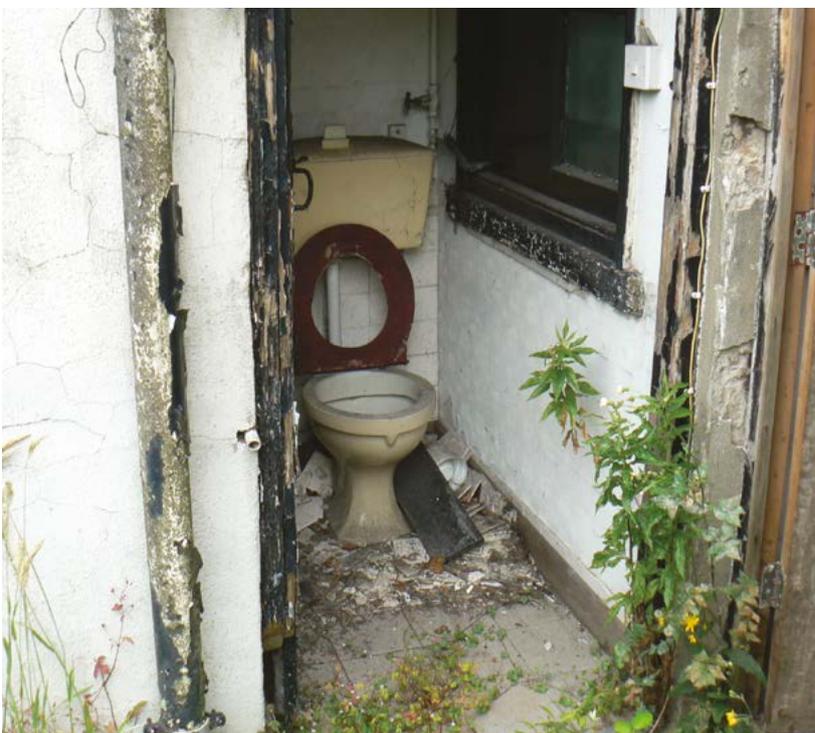


The full cost of poor housing in Wales



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Foreword

This joint report from the BRE Trust, Public Health Wales and Welsh Government looks in detail at the links between poor housing conditions, in this case ‘hazards in the home’ and their impact on health and well-being and cost to the NHS and wider society. It supplements findings in the previously published Making a Difference Housing and Health: A Case for Investment* report, and also builds on previous publications by BRE Trust and Shelter.

This publication focuses on hazards in the home which are known as ‘Category 1’ hazards under the Housing Health and Safety Rating System (HHSRS). These hazards impact on health and well-being outcomes, and pose a serious or immediate risk to a person’s health and safety. In 2017-18, there were an estimated 238,000 dwellings with a Category 1 hazard in Wales, or around 18 per cent of the total housing stock, with the most common hazards relating to falls in the home, and the consequences of living in cold housing.

This report adds to our understanding of the relationship between poor housing conditions, demands on the NHS, as well as other societal costs. It provides evidence that can be used to reinforce the need for strong partnership work, with an integrated housing dimension.

There is a continued need for organisations to work together, use their joint assets, and share intelligence that will help to address poor housing through integrated approaches to housing and health, and support people to live healthier, happier lives.

Leaving people in unhealthy and hazardous housing is not an option. We hope this report stimulates continued wider discussions around the significant contribution that housing makes to improving health and well-being, reducing healthcare costs, as well as facilitating actions that lead to healthier and more sustainable homes for the people of Wales.



A handwritten signature in black ink that reads "Simon Nicol".

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* Watson I, MacKenzie F, Woodfine L and Azam S. (2019). Making a Difference. Housing and Health: A Case for Investment. Cardiff, Public Health Wales. <https://phw.nhs.wales/news/poor-housing-costs-health-service-95m-per-year-new-report/>

Executive Summary

This report summarises the results of research commissioned by the BRE Trust, Public Health Wales (PHW) and the Welsh Government (WG) to provide estimates of the cost of poor housing to the National Health Service (NHS) in Wales. It uses the most recent Welsh Housing Conditions Survey (WHCS) 2017-18 data and the revised annual NHS treatment cost methodology used in the latest BRE Trust report on the 'The Full Cost of Poor Housing'. The key findings are:

- In 2017-18, the total number of dwellings with any Category 1 Housing Health and Safety Rating System (HHSRS) hazard in Wales was estimated to be 238,000, some 18% of the total housing stock. This is defined as 'poor housing'.
- The most common Category 1 hazards were those relating to falls in the home and the consequences of living in cold housing.
- The cost to reduce the hazards in these poor homes to an acceptable level is estimated to be £2,455 per home, on average - a total cost of £584 million for the whole stock.
- If remedial works were undertaken 'up-front' to mitigate these Category 1 hazards, it is estimated that there would be a benefit to the NHS of some £95 million per year.
- Remedial works to mitigate Category 1 hazards would pay for themselves in reduced NHS costs within six years. The costs of improving cold homes are some of the most expensive, but also the most effective in reducing costs to the NHS.
- These costs represent first year treatment costs to the NHS alone, following an accident or illness related to housing. The annual cost to the NHS represents around 10% of the full economic cost to society of leaving people in unhealthy housing in Wales, which is estimated at £1bn per year. The payback to society if remedial work were undertaken 'up-front' would be around six months.

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Introduction

This report summarises the results of new research commissioned by the BRE Trust, Public Health Wales (PHW) and the Welsh Government (WG) to provide estimates of the cost of poor housing to the National Health Service (NHS) in Wales. It uses the most recent Welsh Housing Conditions Survey 2017-18 data and the revised annual NHS treatment cost methodology used in the latest BRE Trust report on the 'The Full Cost of Poor Housing'.

The original Cost of Poor Housing in Wales report¹, published in 2011 (using Living in Wales Property Survey 2008 data), estimated that some 363,000 (29%) of occupied dwellings in Wales had at least one Category 1 Housing Health and Safety Rating System (HHSRS) hazard and thus were deemed to be 'poor housing'. It suggested that if the most serious hazards were reduced to an acceptable level in these dwellings, there would be a benefit to the NHS of some £67 million per year.

Following the release of the latest Welsh Housing Conditions Survey (WHCS) results², BRE** was commissioned to estimate the impact on the NHS of treating the consequences of poor housing in Wales in 2017-18.

There are important differences between the data and methodologies used for the earlier publication and those used for this analysis. As a result, the summary findings for each report are not directly comparable. These key differences are:

- I. The 2017-18 Cost of Poor Housing model uses the updates and revised annual NHS treatment cost methodology from 'The Full Cost of Poor Housing'³ to allow better estimates of these costs.
- II. Since the previous report, the estimation of costs required to mitigate excess cold hazards has changed following the adoption of the latest Standard Assessment Procedure (SAP2012)^{***} methodology and the new Energy Performance Certificate (EPC) Improvements model for the WHCS. The types of energy efficiency improvement measures and the order in which these are applied changed under the new EPC Improvements model. Furthermore, analysis of SAP2012 has been undertaken to calculate risks of harm of excess cold as the health benefits of energy improvements were greatly underestimated in the previous model.

There are also minor differences in the way that the HHSRS, which forms the basis of our 'poor housing' indicator, was measured through the survey in 2017-18 and 2008.

Although any direct comparisons of the cost of poor housing in Wales between 2008 and 2017-18 are problematic, the new methodology for this report does provide the most robust approach. It is important to bear in mind that total repair costs to make homes safer are always indicative given that there will be some degree of error around the estimates e.g. sampling errors, low sample size and surveyor variability.

This report:

- Quantifies the amount of occupied poor housing in the Welsh housing stock.
- Provides an estimate of the costs of repair and energy improvement measures required to mitigate Category 1 HHSRS hazards in poor housing so that risks of harm from these are no worse than average for the age and type of dwelling.
- Estimates the treatment cost-benefits to the NHS of improving poor housing.
- Estimates the full economic health impacts of poor housing.
- Compares the estimates for Wales (2017-18) with those from England (2015) and Northern Ireland (2016-17).

** BRE is the trading name of the Building Research Establishment Ltd., which is owned by the BRE Trust

*** Following the release of version 9.93 of RdSAP 2012, U-values for solid brick, stone and cavity walls have been updated to more accurately reflect their thermal performance. As a result of these changes, SAP2012 was modelled for WHCS 2017-18 data using the updated U-values.

Poor housing in Wales

Defining poor housing

There is no standard definition of 'poor housing'. For the purpose of this research, it has been defined as **a dwelling that has one or more Category 1 HHSRS hazard**. Unlike other measures of poor housing, this focuses on health outcomes and its development was informed by a large body of research and statistics on the links between housing and health. It also has the advantage that it is measured through the WHCS and other UK national housing surveys, so comparisons can be made within and between UK nations.

The Housing Health and Safety Rating System (HHSRS)

The HHSRS is a means of identifying defects in dwellings and evaluating the potential effect of any defects on the health and safety of occupants, visitors, neighbours and passers-by⁴. The system provides a means of rating the seriousness of any hazard, so that it is possible to differentiate between minor hazards and those where there is an immediate threat of major harm, or even death. The emphasis is placed on the potential effect of any defects on the health and safety of people, particularly those who might be regarded as 'vulnerable'^{****}. There are 29 potential HHSRS hazards identified, which fall into four groups (Table 1).

Table 1: The 29 HHSRS hazards

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

The HHSRS scoring procedure uses a formula to generate a numerical score for each of the hazards identified at a property. The higher the score, the greater the severity of the hazard. Potential hazards are assessed in relation to the most vulnerable class of person who might typically occupy or visit the dwelling. For example, for falls on stairs the vulnerable group is the elderly (60+ years) while for falls between levels it is children under five years old.

**** A 'vulnerable person' is one who will be most affected by the hazard. This will typically be an adult over 60 or a child under five years old (HHSRS).

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The hazard score formula requires an inspector to make two judgements:

- The likelihood of an occurrence, which could result in a harm to a vulnerable person over the following 12-month period (the likelihood is given as a ratio e.g. 1 in 10, 1 in 500).
- The likely health outcome, or harms, that would result from the occurrence.

From any occurrence there will be a most likely outcome, and other possible ones which may be more, or less severe. For example, a fall from a second-floor window could result in a 60% chance of severe concussion, but there may also be a 30% chance of a more serious injury, and a 10% chance of something less serious. The four classes of harms and their associated weightings are listed in Table 2.

Table 2: Classes of HHSRS harms

Class	Examples	Weightings
Class 1	Death, permanent paralysis below the neck, malignant lung tumour, regular severe pneumonia, permanent loss of consciousness, 80% burn injuries	10,000
Class 2	Chronic confusion, mild strokes, regular severe fever, loss of hand or foot, serious fractures, very serious burns, loss of consciousness for days	1,000
Class 3	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, regular and severe migraine	300
Class 4	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, regular serious coughs and colds.	10

From the judgements made by a trained inspector, a hazard score can be generated for each hazard as illustrated in Table 3, using the example of falling between levels.

Table 3: Example hazard score for falls between levels

Class	Weighting		Likelihood (1 in)		Spread of harm		Hazard score	
Class 1	10,000	÷	100	x	0	=	0	
Class 2	1,000	÷	100	x	30	=	300	
Class 3	300	÷	100	x	60	=	180	
Class 4	10	÷	100	x	10	=	1	
All classes								481

Using this approach, hazard scores can range from 1 (very safe) to over 5,000 (very dangerous). **A score of 1,000 or more is considered to be a Category 1 hazard** and it is this we have taken to be our definition of 'poor housing'.

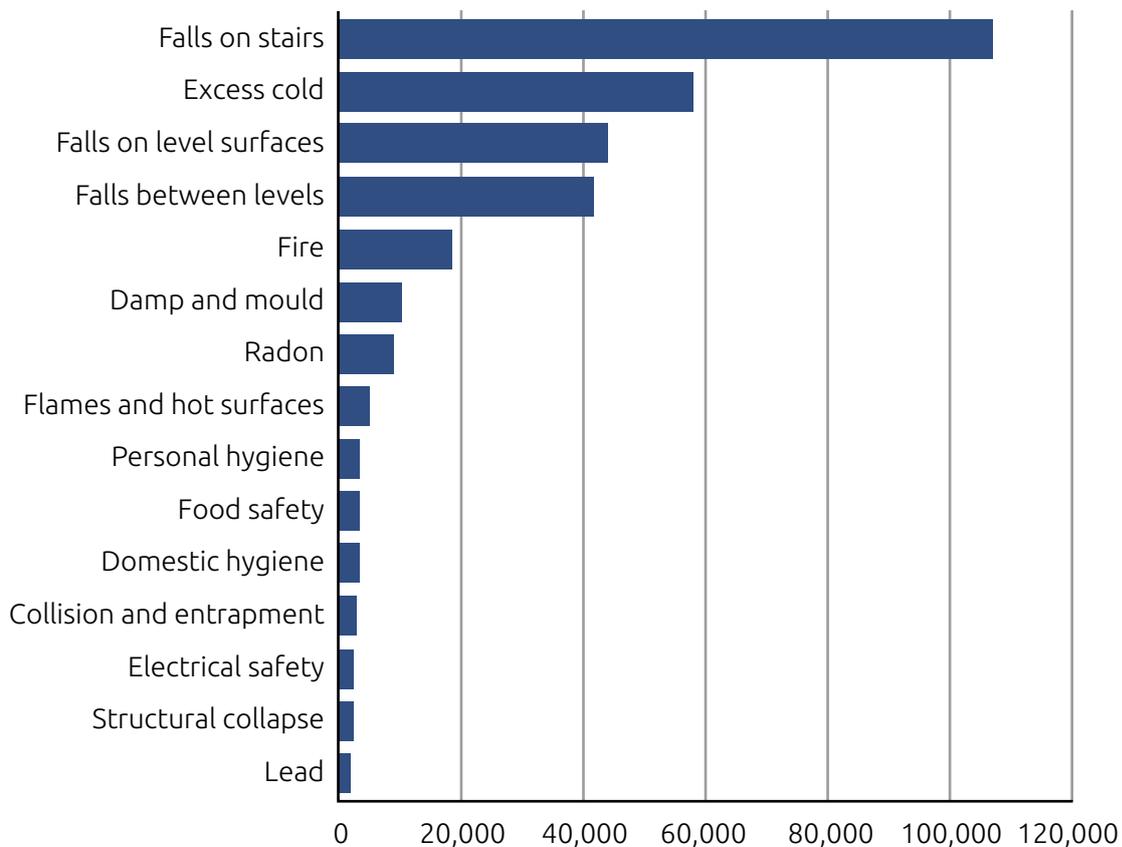
Quantifying poor housing

The HHSRS was measured through the 2017-18 WHCS, using 44 fully trained surveyors to collect information on the presence of 26 of the 29 HHSRS hazards for each dwelling sampled. The three hazards not assessed were: asbestos; biocides; and volatile organic compounds, which are uncommon in their extreme form and cannot be deduced from a non-intrusive survey. In addition to this, some hazards were modelled from other information collected by the surveyor - to save time, remove duplication and to improve consistency. These were: excess cold (which was modelled from the SAP assessment); radiation (which was modelled using postcode data); lead (which uses local plumbo-solvency data); and overcrowding (which used data on the relationship between the design of the dwelling and type of occupancy).

The 2017-18 WHCS estimated that 238,000 (18%) of dwellings had at least one of the 26 Category 1 hazards and thus, by our definition, are deemed to be 'poor housing'. This represents a significant improvement since the last survey of 2008.

The most common hazards include those from falls, cold homes and dampness (Figure 1). Some hazards were not found at all in their Category 1 form in the survey (such as 'explosions'). This is likely to be a result of the small sample size for the survey rather than an indication that no such hazards exist. Given that the total number of surveys undertaken for the WHCS is around 2,500 dwellings, it must be stressed that there is some degree of error around these estimates, although the sampling and weighting measures used in the survey do enable robust national level estimates to be produced².

Figure 1: The number of homes in Wales with the most common Category 1 HHSRS hazards 2017



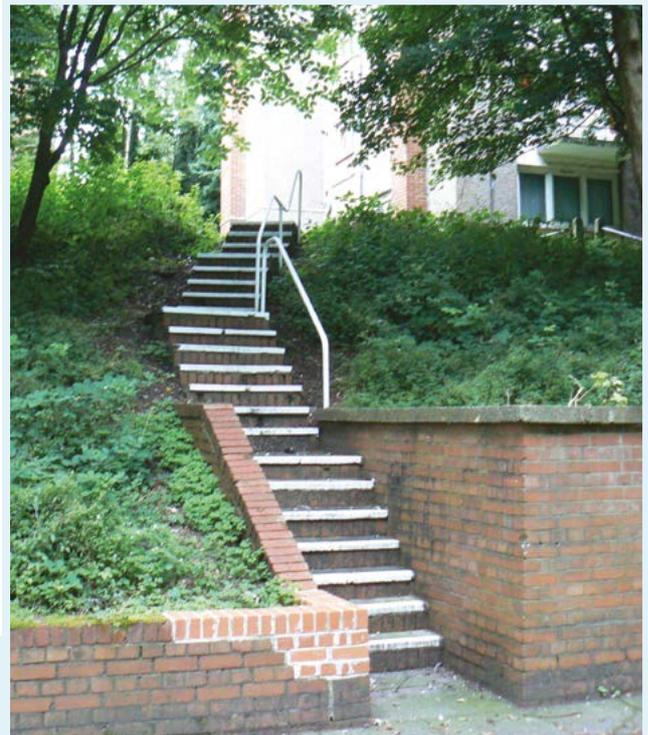
Homes can have more than one Category 1 HHSRS hazard, so the above figures do not add up to the total homes with any HHSRS hazard in Wales. Very rare hazards (such as explosions) are not included.

Examples of HHSRS hazards

Falls hazards

The design and condition of homes and their accessways has a major impact on the likelihood of a fall occurring and the seriousness of the outcome. This is particularly the case when the home is lived in by a vulnerable occupant, even more-so when the occupant is elderly and lives alone.

While fall hazards are common across UK housing, this is particularly the case in Wales. The high proportion of people living in old, narrow terraced houses is one factor, but topography is also a particular problem in Wales, with many homes built on steep hillsides with challenging external steps.



The topography of Wales presents challenges in providing safe housing accessways for vulnerable people to use.



In this home the accessway to the rear garden and garage is down a set of steep steps. These steps are in disrepair, slope dangerously and are slippery. The handrail is loose.

To make matters worse, the rain-water drainage discharges directly onto the steps which means that they are always wet. Following a very cold night they would have ice on them. As this is a regularly used accessway this is deemed to be a Category 1 hazard to a vulnerable elderly person.

If an elderly person was to have a fall on the steps the outcome would likely be severe. In the worst-case scenario, this could lead to paralysis requiring constant care. This would cost the NHS some £90,000 per year to fund.

Cold homes

Older homes are difficult to keep warm, particularly if they are poorly insulated and do not have access to gas central heating. Over 4% of homes in Wales were deemed to present a Category 1 HHSRS excess cold hazard. These were typically older, solid wall homes. A significant minority of homes in Wales have solid fuel or oil-fired systems which are expensive to use and often lead to the household living in fuel poverty (a household which would need to pay at least 10% of their income on heating to keep warm).

Some, typically rural, homes still burn solid fuel in Wales. These fires are expensive to use, particularly when supplemented by electric heaters. Such 'cold homes' may have a severe impact on both physical and mental health if the household cannot afford the heating costs; the outcome could be respiratory or circulatory problems and, in extreme cases, hypothermia.

People will not be able to live comfortably or perform tasks efficiently in a cold home, and they will be less likely to invite friends to visit.



Damp

Dampness is a major problem in Wales. It can lead to all sorts of health problems, including asthma, discomfort and mental health issues. Older homes are more likely to have defects to their roof coverings, rainwater drainage, damp proof courses, render and brickwork. The high rainfall of Wales is also a significant factor in aggravating damp problems.

General disrepair can let in water. In this case, a defective damp proof course and a broken downpipe are the sources of Category 1 dampness.



The type of housing which is poor in Wales

Poor housing is not evenly distributed through the housing stock of Wales. The older a dwelling is the more likely it is to contain a risk to health and safety. A home built before the First World War is seven times as likely to have a significant health and safety hazard than one built after 1980 (Table 4).

Table 4: Poor housing (HHSRS Category 1) in Wales by age, type and tenure

	Poor housing no.	Poor housing %	All housing no.
Construction date			
Pre-1919	120,679	34.4	351,021
1919-1944	27,560	20.7	132,984
1945-1964	31,538	14.4	219,284
1965-1980	42,158	13.9	303,954
Post-1980	15,992	4.8	334,382
Dwelling type			
Terraced house	85,762	21.9	391,715
Semi-detached	59,008	14.3	413,278
Detached	80,122	20.6	389,111
Converted flat**	7,732*	30.5	25,373
Purpose-built flat	5,303*	4.3	122,147
Tenure			
Owner-occupied	179,266	19.4	924,156
Private-rented	42,479	23.6	179,819
Social-rented	16,182	6.8	237,650
Total housing	237,927	17.7	1,341,625

**Small sample sizes, which are not statistically significant but are used to enhance the narrative.*

***Converted flat consists of 'converted flats' or 'flat and non residential dwellings'*

Converted flats are noticeable for their high proportion of health and safety hazards. This is typically due to their older design, which has often been compromised through conversion. While the numbers in Table 4 should be used with caution, due to the small sample sizes, the findings do follow the same pattern as other national surveys^{5,6}. Purpose-built flats are more likely to be modern, warm, dry and well designed.

The social housing sector is the most modern and best maintained, and hence has the lowest proportion of Category 1 hazards. The private-rented sector is the worst, particularly amongst older terraced houses and poor flat conversions.

Cost to mitigate Category 1 HHSRS hazards

As part of the WHCS, surveyors identified the remedial works required to reduce hazard risks to an acceptable level – this level usually being the average for the type and age of dwelling. These remedial works are costed up using standard 2017-18 prices. For the modelled hazards (apart from excess cold) a ‘typical’ package of works has been used. For excess cold we use the latest EPC improvements model for Wales, which means these costs are not directly comparable to the 2008 estimates of mitigating excess cold.

Using the WHCS data it is estimated that the average cost for reducing Category 1 hazards to an acceptable level would be £2,455 per dwelling.

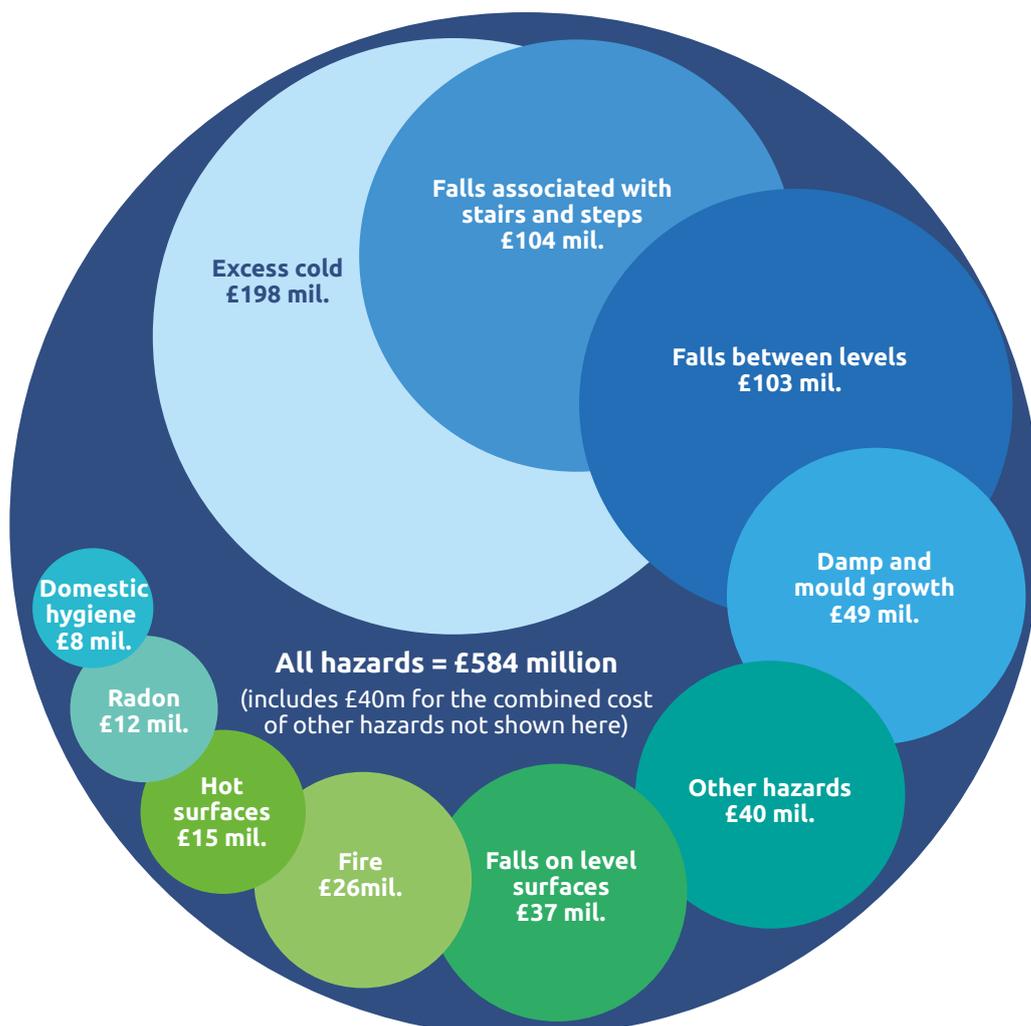
The average cost covers many different types of jobs, some of which are quite small.

Low cost jobs include re-locating a dangerously positioned cooker (£157); installing two wired smoke detectors (£194); and replacing a missing handrail on a staircase (£295).

High cost work includes: re-fitting a kitchen (£7,000); rising damp remedial works (£10,940); and solid wall insulation (£17,500).

The costs of work vary by the type of hazard. Table 5 shows the average cost per dwelling for the remedial work required to deal with each type of Category 1 hazard. We need to bear in mind that for many hazards, there is considerable variation around this average value, depending on the package of remedial work required.

Figure 2: Cost to mitigate Category 1 hazards, Wales 2017-18



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One-third of the estimated total cost to mitigate all Category 1 HHSRS hazards in Wales is associated with making cold homes more energy efficient and comfortable (Figure 2); work which includes updating heating systems and providing insulation. Mitigating the cost of all fall hazards makes up nearly 42% of the costs associated with reducing HHSRS risks to an acceptable level.

Table 5: Average cost per dwelling for remedial work for each type of hazard, 2017 Wales

Hazard	Number of dwellings with Cat 1 Hazards	Average cost per dwelling (£)	Total cost to mitigate hazard across Wales (£)
Excess cold	56,576	3,495	197,738,955
Falls on level surfaces	43,708	836	36,520,670
Food safety	3,278	1,962	6,429,862
Falls associated with stairs and steps	104,301	996	103,926,228
Damp and mould growth	10,366	4,691	48,622,769
Fire	18,089	1,422	25,723,000
Falls between levels	41,310	2,504	103,421,010
Domestic hygiene, pests and refuse	3,383	2,340	7,914,495
Personal hygiene, sanitation and drainage	3,533	1,221	4,313,020
Electrical hazards	2,650	1,924	5,100,276
Radon (radiation)	8,798	1,368	12,038,368
Lighting	-	-	-
Lead	2,062	2,019	4,164,028
Entry by intruders	1,437	1,227	1,763,843
Water supply for domestic purposes	-	-	-
Structural collapse and falling elements	2,495	2,458	6,134,003
Position and operability of amenities (ergonomics)	887	603	534,987
Carbon monoxide and fuel combustion products	935	603	563,540
Un-combusted fuel gas	-	-	-
Explosions	-	-	-
Hot surfaces and materials	4,715	3,177	14,980,924
Collision and entrapment	2,784	699	1,946,520
Falls associated with baths etc.	1,576	763	1,202,819
Crowding and space	405	19,290	7,811,017
Noise	-	-	-
Excess heat	-	-	-
Totals	237,927	2,455	584,199,138

The total sum required to remedy all Category 1 hazards is less than the total number of Category 1 hazards multiplied by the average costs; this is because the modelling avoids the double counting of costs where repair work/energy improvements mitigate more than one hazard.

The total sum of all dwellings with Category 1 hazards will be less than the sum of the individual hazards as some dwellings will have more than one Category 1 hazard.

Sample sizes for some Category 1 hazards are very small and are included for quantification purposes only. For some, like explosions, no cases were identified in the survey.

The total cost of dealing with HHSRS Category 1 hazards in Wales is estimated to be some £584 million in 2017.

The cost benefits to the NHS of improving homes

There is a long established, recognised relationship between poor housing and poor health but the methodology developed by the BRE Trust, which underpins the 2008 Cost of Poor Housing in Wales report, is perhaps the most rigorous attempt to measure the cost of this to the NHS and to society. This original methodology is well documented in the earlier reports¹ and will not be repeated here.

In 2016, BRE published an update to the original methodology entitled 'The Full Cost of Poor Housing'³. The earlier reports for England⁷ and Wales¹ were based on data that is now over 10 years old. It was felt that the data sources needed updating to reflect new knowledge and information that had become available. There were two main factors to the change in calculating health cost-benefits; these were re-calculating the health benefits associated with energy efficiency improvements; and using updated (2011) UK NHS treatment costs.

The health benefits of energy improvements were greatly underestimated in the previous model as a comparison was made between homes which were only just severe enough to achieve a Category 1 hazard score and the average for the stock. Unfortunately, many homes had energy efficiencies much worse than this cut off value, and it was clear that there was great potential benefit in improving the homes with really poor energy efficiency. A methodology was therefore developed to allow SAP calculations to be used for estimating the likelihood of harm (from excess cold). Average SAP in homes with a Category 1 excess cold hazard could then be compared with a home with an average SAP score. This provided a greater distinction between these two groups, increasing the potential benefit of the interventions and hence significantly reducing the payback period for reducing this hazard.

The NHS costs for a few key hazards were updated to 2011 figures to provide a fair indication of the additional cost of treating some of the outcomes associated with the housing hazards. These new numbers were simplified into representative values in a way very similar to the original 'cost of poor housing' reports (Wales¹, England⁷ and Northern Ireland⁸) and are summarised in Table 6.

Table 6: Revised representative cost to the NHS health outcome values

Cost value*	Class I harm (£)	Class II harm (£)	Class III harm (£)	Class IV harm (£)
Revised representative cost (2011)	90,000	30,000	1,800	120

* These are the first year treatment costs to the NHS after an HHSRS incident

As a result of these modelling enhancements, the findings suggest that the cost-benefits of housing improvement have perhaps been understated in the past. Also, as NHS costs appear to be racing ahead of inflation, it makes sense to invest in poor housing now as a preventative measure to save costs (and unnecessary suffering) in the future.

Earlier, we calculated that the total cost of reducing the Category 1 housing hazards in Wales to an acceptable level (the average for their age and type) was some £584 million. For the hazards that were fully measured through the WHCS, we have a 'likelihood' score for all homes with a Category 1 hazard, and we have an average likelihood score for the same home for its age and type. Using the difference between the actual score and the average for the whole stock, an estimate for the additional total annual treatment cost to the NHS due to poor housing can be calculated. **In 2017 this was around £95 million per year in Wales if the homes were left unimproved** (Table 7). Using this information, **the direct payback period for all hazards can be calculated at 6.1 years**, if the repairs or improvements are all made 'up-front'. The payback period varies greatly according to the type of hazard, with remedial work for the various fall hazards in the home estimated to deliver some of the fastest returns on investment.

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It must be stressed that there is considerable uncertainty around these estimates because any calculations relating to cost benefits and payback periods are very sensitive to the mix of hazards present.

Table 7: The costs, and benefits to the NHS, of reducing HHSRS Category 1 hazards to an acceptable level, Wales 2017-18.

Hazard	Total cost to mitigate hazard (£)	Savings to the NHS per annum if hazard mitigated (£)	Payback (years)
Excess cold	197,738,955	41,280,093	4.8
Falls on level surfaces	36,520,670	16,639,713	2.2
Food Safety	6,429,862	380,030	16.9
Falls associated with stairs and steps	103,926,228	15,967,003	6.5
Damp and mould growth	48,622,769	3,028,167	16.1
Fire	25,723,000	3,608,665	7.1
Falls between levels	103,421,010	8,968,744	11.5
Domestic hygiene, pests and refuse	7,914,495	405,806	19.5
Personal hygiene, sanitation and drainage	4,313,020	409,866	10.5
Electrical hazards	5,100,276	354,445	14.4
Radon (radiation)	12,038,368	738,189	16.3
Lighting	-	-	-
Lead	4,164,028	255,491	16.3
Entry by intruders	1,763,843	400,538	4.4
Water supply for domestic purposes	-	-	-
Structural collapse and falling elements	6,134,003	214,662	28.6
Position and operability of amenities (ergonomics)	534,987	106,648	5.3
Carbon monoxide and fuel combustion products	563,540	90,768	6.2
Un-combusted fuel gas	-	-	-
Explosions	-	-	-
Hot surfaces and materials	14,980,924	1,836,692	8.2
Collision and entrapment	1,946,520	288,868	6.7
Falls associated with baths etc	1,202,819	268,176	4.5
Crowding and space	7,811,017	38,936	196
Noise	-	-	-
Excess heat	-	-	-
Totals	584,199,138*	95,281,500	6.1**

Actual costs for individual hazards are produced to build up the total picture. In reality, there are large error margins around some of these figures which reflect the sample size of the WHCS.

*This is the total number of category 1 hazards multiplied by the average cost to mitigate all such hazards. It assumes that all required remedial work is undertaken up front and so removes the double counting of costs where repair work/energy improvements mitigate more than one hazard

**Pay back years = Total cost to mitigate hazard/Total savings to the NHS

Recent estimates for the UK⁹ suggest that the annual treatment costs to the NHS of people living in poor housing are in the same broad region as that from smoking or alcohol (Table 8).

Table 8: UK treatment cost burden to the NHS of selected hazards

Risk Factor	Total cost burden to the NHS
Physical inactivity	£0.9 – £1.0 billion
Overweight and obesity	£5.1 – £5.2 billion
Smoking	£2.3 – £3.3 billion
Alcohol intake	£3.0 – £3.2 billion
Poor housing	£1.6 – £2.5 billion

£1.6bn is the latest poor housing figure for England, Wales and Northern Ireland using the same HHSRS based method. The £2.5bn figure is an extrapolation for the whole of the UK, which includes Category 2 (significantly worse than average for the type of dwelling), as well as Category 1 (severe) HHSRS hazards.

The cost to society of hazards in poor housing in Wales

The BRE Trust ‘cost of poor housing’ methodology focuses on first year treatment costs to the NHS because there is comprehensive data available on this which can be linked directly to the way we measure hazards in the home in the housing surveys of England⁵, Wales² and Northern Ireland⁶. However, these first-year treatment costs are just part of the cost to society.

For many hazards there may be ongoing treatment beyond the first year. There may be care costs, sometimes for the rest of the victim’s lifetime. There could be a loss of economic potential (poorer educational achievement, loss of working days and career prospects). There will be the mental cost of suffering and trauma.

The previous cost of poor housing in Wales report estimated that the annual cost to the NHS of treating Category 1 hazards accounted for a maximum of 40% of the total cost to society. Since this publication, a literature review has been undertaken for analysis into the cost of poor housing in England. The review concluded that the best way to assess the total cost to society is to use a tried-and-tested formula, such as the one developed by the Transport Research Laboratory (TRL)¹⁰, which evaluates the costs of both fatal and non-fatal injuries. These costs include human impacts (pain, grief and suffering), indirect economic impacts, as well as direct medical costs. TRL have also conducted research for the Royal Society for the Prevention of Accidents (RoSPA) to value the impact of home accidents using these costs¹⁰.

Using this approach, it is estimated that the total cost to society of poor housing in Wales is some £1 billion per annum (Table 9). This suggests that the annual treatment costs to the NHS is around 10% of the societal costs of all poor housing in Wales. The societal payback will be some 10 times quicker than the savings to the NHS if all of the remedial work could be undertaken ‘up-front’.

When considering the potential benefit to society of mitigating these hazards, ‘excess cold’ dominates the findings, with nearly three-quarters of all the potential savings. As with the potential treatment cost savings to the NHS, it must be stressed that there is a very large amount of uncertainty around these estimates since calculations relating to cost benefits and payback periods are very sensitive to the mix of hazards present.

Table 9: The full health cost-benefit to society of improving poor housing

Hazard	Full health impact cost savings per annum if hazard reduced to an acceptable level (£)
Excess cold	735,074,284
Falls on stairs	127,379,108
Falls on level surfaces	37,675,380
Falls between levels	34,296,783
Fire	56,516,082
Collision and entrapment	762,578
Falls – baths	3,054,256
Dampness	7,554,935
Hot surface	6,032,700
Lead	619,902
Entry by intruders	999,296
Radon	13,515,888
Sanitation (Personal Hygiene)	1,089,508
Food safety	1,010,198
Pests (Domestic Hygiene)	794,668
Overcrowding	623,713
Noise	–
Carbon monoxide	213,920
Structural collapse	2,319,054
Electrical problems	1,632,618
Ergonomics	273,753
Un-combusted fuel gas	–
Lighting	–
Water supply	–
Excess heat	–
Explosions	–
Total with any Cat 1 hazard	1,031,438,624

Other benefits associated with improving poor housing

When you improve poor housing there will be multiple benefits, both to the people who will live there and to wider society. There will be health benefits to which we can now put a cost. But there will also be other paybacks:

- There will be an increase in the asset value of the home
- There will be a reduction in maintenance costs
- There will be a reduction in energy and running costs
- There will be a reduction in carbon emissions
- Insurance premiums may be lower
- The emergency services are less likely to be required to attend
- There will be less need for public assistance and intervention
- There will be improvements to the quality of the environment

The list goes on and demonstrates that even high cost housing improvements will pay back the investment costs to society very quickly.

Improving housing has wider benefits than just the health of the people who live there



Figure 3: Case study example of the cost-benefits of housing improvement

This example shows the impact of poor housing on one household and some of the cost-benefits of improving the home.

This pre-1919 terraced house in Wales is occupied by a vulnerable elderly owner whose only income is the state pension. The home has been partially improved over the years but is still too expensive for the occupant to heat effectively. It represents a Category 1 HHSRS excess cold hazard and the household is in fuel poverty.

A modest range of energy improvements is suggested to bring this home up to the average energy efficiency for the age and type of the dwelling. If the household takes advantage of the heating improvements, the HHSRS cold risk will be minimised and the household will be taken out of fuel poverty.

The chances of the occupant ending up in hospital requiring treatment will be reduced substantially.



If the improvement scheme was to include full insulation to the solid walls and floors, plus solar water heating, the costs of improvement would go up to £23,766 but with no additional health benefits over the basic model. However, there would be additional fuel cost and carbon emission savings.

	Pre-improvement	Post-improvement
Walls	Solid, uninsulated	Not improved
Ground floor	Solid, uninsulated	Not improved
Loft insulation	50mm	Topped up to 270mm
Double-glazing	Partial	Full
Space heating	Gas fire with back boiler	Condensing boiler
Heating controls	Boiler controls only	Room thermostat, programmer and TRVs
Hot water cylinder	Un-insulated, no thermostat	80mm jacket and thermostat fitted
Low energy lights	Partial	Full
Solar water heating	No	No
Cost of upgrade (WHCS)	£0	£4,766
Energy efficiency (SAP)	21	57
Annual fuel cost	£1,770	£895
Household in Fuel Poverty	Yes	No
CO2 emissions	8,430	3,960
HHSRS excess cold (band)	A	E
Cost savings to NHS pa	-	£730
Payback to NHS (yrs)	-	7

Comparison with other UK nations

The HHSRS is measured in the same way through the English Housing Survey and the Northern Ireland House Condition Survey as the WHCS, as are the costs of repair and improvement. While there are some differences in the treatment of vacant dwellings and in the energy models, it is possible to make broad comparisons between the housing of these countries (Table 10).

While Scotland does undertake a Scottish House Condition Survey (SHCS)¹¹, the HHSRS is not applied and so this indicator of poor housing cannot be used. The SHCS also uses different repair and improvement models to the other surveys.

Table 10: Comparison between the housing conditions of Wales, England and Northern Ireland

Country	Housing stock (thousand dwellings)	% pre 1919	% poor condition (HHSRS Cat 1)	Total cost of mitigation works £m	Annual treatment cost to NHS £m	Full annual health cost of poor housing £m
Wales*	1,342	26%	18%	584	95	1,031
England	22,718	21%	15%	10,072	1,413	18,667
Northern Ireland	780	11%	9%	305	40	401

**Wales includes occupied homes only. England and Northern Ireland includes vacant dwellings. Wales = 2017-18, England = 2015, N. Ireland = 2016-17*

The comparison shows that Wales has the highest proportion of poor housing among the UK nations, in a large part due to its older housing stock. Consequently, it has a very high burden on the NHS for the treatment of housing related illnesses and accidents.

Comparisons with Europe

A study undertaken by BRE for Eurofound (EU Agency for the improvement of living and working conditions) in 2016⁹ showed that the UK had the oldest housing stock of all EU member states. As Wales has the oldest housing in the UK, it must also have the oldest housing stock in the EU. A model developed for the study, using statistical extrapolations from the BRE 'cost of poor housing' research, estimated that the UK had the highest health costs related to poor housing in the EU. It lags far behind countries like Denmark, which has a very high-quality housing stock.



Wales has the oldest housing stock in Europe, largely due to its legacy of pre-1919 terraced houses

Conclusions

Poor housing can seriously damage people's physical and mental health and affect their future well-being and prosperity.

If the most severe hazards were removed from housing in Wales, there would be benefits to the National Health Service of some £95m a year in saved treatment costs.

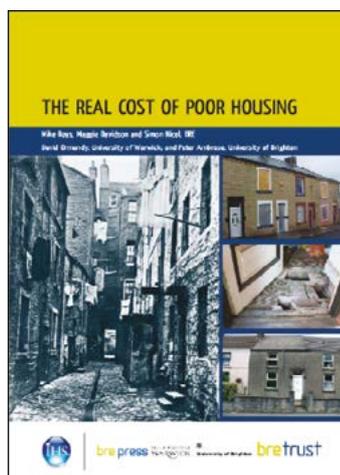
The full cost to society of leaving people living in poor housing in Wales is estimated to be around £1 billion per annum.

Although tackling poor housing conditions can be expensive, it has multiple benefits.

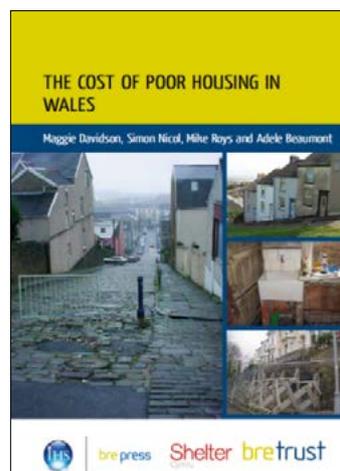
It makes sense to invest in improving housing rather than pay for the consequences of poor housing through the NHS and other agencies.

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2010 England



2011 Wales



2016 England

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