The Cost of Ignoring Poor Housing

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Executive Summary

This new research builds on BRE's earlier Cost of Poor Housing Research and covers:

- An estimate of England-wide costs and benefits of tackling, or not tackling, poor housing over the next 30 years
- As well as NHS costs, the inclusion of a wider group of societal costs and benefits than we have previously assessed
- The development of an underlying model which can be used to help councils and others to target action and resources on unsafe homes.

While the condition of the English housing stock has improved since the first BRE publication into the cost of poor housing in 2010 (mainly due to heating and insulation upgrades), there are still some 2.4 million (10%) of homes in England which fall below the minimum standard for housing, by having Category 1 health and safety (HHSRS) hazards.

It is costing the NHS more than £1 billion per year to treat those people who are affected by poor housing.

These are the first year treatment costs alone. For many hazards there may be ongoing treatment beyond the first year. There will also be the mental health cost of suffering and trauma associated with living in an unsafe and unhealthy home. There will be 'societal costs', such as those relating to care, sometimes for the rest of the victim's lifetime. There will be a loss of economic potential (poorer educational achievement, loss of productivity, career prospects) for victims, family carers and employers.

On the other hand, improving poor housing has multiple benefits, beyond those that just relate to the health of occupants. These include reduced energy costs and carbon emissions, higher value homes, and local job creation opportunities.

This new research estimates that the cost of remedial work to make the 2.4 million poor homes healthy and safe (removing all Category 1 hazards) is around £9 billion and, if all this work were to be undertaken immediately, savings to the NHS would mean the investment would pay back in under 9 years.

When the broader costs and benefits are projected forward 30 years, early intervention to remove all Category 1 hazards would have the potential to save around £136 billion in today's prices (including £13 billion to the NHS), compared to the existing trend over the same time period.

The outputs of this research also include a new cost benefit model used to calculate the costs and quantified benefits of addressing the different health and safety hazards experienced by households. We recognise the difficulty in identifying and undertaking all the required work to make the English housing stock healthy and safe immediately: the new cost-benefit model can be used to help councils and others identify and improve specific homes and communities where action is most urgently needed.

The latest published English Housing Survey (EHS) data indicates that there are some 65,000 Category 1 damp/mouldy homes in England; works costing some £250 million in total are needed to make them healthy and safe. But the benefit to society of undertaking this work immediately is estimated to be around £4.8 billion, accrued over the next 30 years in today's prices.

The benefits we identify in this report are just those that we have been able to quantify in monetary terms with some confidence. Improving poor housing is known to have even wider benefits than these in terms of housing satisfaction, wellbeing and happiness, as well as social capital and improved environmental quality.

One of the aims of this briefing paper is to encourage discussion and further research into demonstrating the benefits of housing investment to tackle the worst housing conditions. The next stage of research could be to refine and apply the cost-benefit model to some realistic policy scenarios for accelerating the improvement of the housing stock, for different types of vulnerable people in homes of different tenures.

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Overview

BRE has been undertaking work to estimate the cost of poor housing for over 10 years. So far, our research has mainly focused on the first year costs to the NHS because we have had the tools to quantify this with more confidence, and it tells a simple, powerful story. However, the costs associated with poor housing go far beyond the immediate NHS treatment costs to the occupants affected. Improving a home to make it healthy and safe has long term implications for the life chances of occupants and their visitors, and benefits to society as a whole.

A model was developed for 'The full cost of poor housing' research[1] which estimated the costs to society (including medical costs, lost education and employment opportunities) of leaving England's poorest housing unimproved.

This new research includes a wider group of societal costs and benefits than we have previously assessed. In addition, we have developed an underlying model which can be used to help councils and others to target action and resources on unsafe homes.

By tackling our poorest housing, we will realise reductions in NHS costs as well as reductions in aftercare; improvements in education and productivity; increased asset (home) values; and reductions in energy and carbon emissions.

These benefits accrue year-on-year, while the initial costs are a one-off. So far, no serious attempt has been made to examine and quantify the longer term costs and benefits that will accrue to both the household and society if health and safety hazards are removed (or, at least, reduced to an acceptable level) over different time periods.

Consequently, one of the conclusions of our report, The cost of poor housing': 2021 Briefing Note was to recommend that "further research is undertaken to inform a full 30-year cost-benefit analysis of the impact of improving the poorest housing in England."

This briefing note reports on our first attempt to deliver this.

This new research draws upon the methodology first developed for 'The full cost of poor housing' and then 'The cost of poor housing: 2021 Briefing Note' to calculate the cost burdens to the NHS for the first year of treatment and the wider costs to society. It uses the 2019 English Housing Survey (EHS) data – the most up-to-date available - and NHS treatment costs as the main underlying data for future projections. As with all of our previous research, poor housing is defined as a home with Category 1 hazards as assessed by the Housing Health and Safety Rating System (HHSRS)[2] and so which therefore fails the statutory minimum standard for housing in England. There are 29 recognised HHSRS hazards, 26 of which are collected for the EHS[3].

[1] Roys M, Nicol S, Garrett H and Margoles S (2016), The full cost of poor housing, BRE FB 81. Bracknell, IHS BRE Press.

[2] ODPM (2004). Housing Health and Safety Rating System – Guidance (Version 2). MHCLG. London.

[3] Details of the EHS methodology to assess HHSRS hazards in dwellings can be found in its Technical Report, Chapter 5. English Housing Survey: Technical Report 2020-21 (publishing.service.gov.uk).

Summary of methodology overview

This new research builds upon the methodology originally developed for 'The full cost of poor housing' to calculate the initial cost burdens to the NHS for the first year of treatment and then the wider costs to society. The research develops this methodology to assess both a wider range of societal costs and to make future projections, using the most recently available (2019) English Housing Survey (EHS) data (and more recently published EHS HHSRS data where available) to inform projections and updated NHS treatment costs as the underlying data for future projections,

In summary, our approach was to:

1. Re-run the cost of poor housing modelled estimates on most up-to-date data sets.
2. Undertake a literature review to identify additional costs and benefits that can be quantified through these data sets.
3. Design a spreadsheet model to extrapolate these costs and benefits over 30 years, following Government 'Green Book' guidance.
4. Factor in changes to the profile of the housing stock (e.g new builds and demolitions).
5. Run the spreadsheet under several intervention scenarios.
6. Make conclusions and recommendations.

Our methodology and findings for each of these stages are presented in the following sections.

While we have followed Green Book principles[4] where practicable for this research, it is important to stress that the Green Book provides guidance on how to appraise government policies, programmes and projects. We are not undertaking any form of current policy appraisal in our research but, for the first time, designing a cost-benefit model that examines and quantifies the longer-term benefits that will accrue to households and society if all the poorest housing in the English stock is improved over different periods of time. These periods of time include immediately (i.e., tomorrow) and within 12 months, which, while not feasible in terms of policy implementation, seek to demonstrate (in theory) that acting now to stop health and safety risks becoming a reality would have the most positive results.

£136 billion
estimated saving from immediately improving England's poor housing.

[4] HM Treasury (2018). The Green Book – Central Government Guidance on Appraisal and Evaluation.

Re-run of the BRE cost of poor housing model for 2019

The first part of this research replicates the methodology first used in 'The full cost of poor housing' which will not be described in detail here. The difference is that, in this report, the most recent publicly available 2019 English Housing Survey (EHS) data and NHS treatment cost information is used as in the companion report 'The Cost of Poor Housing by Tenure'.[5]

The BRE cost of poor housing (COPH) model uses the following data, which is presented in Table 1:

1. The number of homes with each type of Category 1 hazard and the total number of homes with at least one of these hazards.[6] [7]
2. The average and total repair cost of making these homes acceptable (so that the risk of harm is no higher than average), modelled using EHS data.
3. The total repair cost of mitigating these hazards.
4. The costs to the NHS of leaving the hazards un-mitigated.
5. The NHS pay-back period of mitigating the hazards now.

In 2019, the EHS estimated that 2.4 million (10%) of England's homes had at least one Category 1 hazard and were consequently considered to be 'poor', Table 1 shows that the annual costs to the NHS have fallen since we last reported this in 2021 (based on 2018 data), from £1.37 billion to £1.04 billion. This is mainly due to improvements in the energy efficiency of housing.

The most common hazards identified were those relating to falls on stairs and excessive cold. Cold homes exacerbate a range of health problems such as chronic obstructive pulmonary disease (COPD) and arthritis as well as increasing the risk of an acute episode such as a stroke or heart attack. Conversely some hazards are so rare (such as the risk from explosions) that none were identified in the 2019 EHS.

[5] Garrett H, Margoles S, Mackay M, Nicol S (2023). The cost of poor housing in England by tenure: briefing paper. BRE Watford.
[6] Homes can have multiple Category 1 hazards; this is the number of homes with one or more Category 1 hazards.
[7] The HHSRS likelihood of harm and harm outcome scores available from the EHS are also used in the COPH model.

Table 1: The Cost of Poor Housing, 2019

Hazard	Number of Category 1 hazards	Average cost per dwelling (£)	Total cost to mitigate hazard (£)	Savings to the NHS per annum if hazard mitigated (£)	Payback (years)
Excess cold	719,324	6,635	4,773,049,153	532,351,186	8.97
Falls on stairs	1,014,373	1,243	1,260,411,752	215,600,225	5.85
Falls on the level	400,081	994	397,749,272	103,436,470	3.85
Falls between levels	205,747	1,409	289,922,472	58,984,825	4.92
Dampness	64,708	3,907	252,840,740	33,712,648	7.50
Fire	126,918	3,515	446,165,488	20,306,468	21.97
Lead	68,200	2,141	146,049,105	14,789,932	9.87
Hot surfaces	46,120	1,958	90,322,436	12,951,399	6.97
Radon	89,497	1,446	129,368,165	10,556,908	12.25
Collision and entrapment	14,716	741	10,906,060	6,383,856	1.71
Overcrowding	45,440	20,442	928,883,140	6,236,420	148.94
Entry by intruders	10,943	1,280	14,003,899	5,439,649	2.57
Pests (Domestic hygiene)	20,505	3,153	64,643,788	4,248,902	15.21
Sanitation (Personal hygiene)	19,265	784	15,104,220	4,085,036	3.70
Food safety	18,507	3,267	60,467,056	3,921,639	15.42
Electrical problems	11,146	2,095	23,352,024	2,376,406	9.83
Ergonomics	10,718	633	6,786,397	2,304,557	2.94
Structural collapse	13,789	2355	32,468,909	2,173,053	14.94
Noise	2,683	1,465	3,929,416	1,335,360	2.94
Carbon monoxide	5,403	638	3,448,423	1,029,125	3.35
Excess heat	3,131	635	1,988,946	419,195	4.74
Falls - baths	0	0	0	0	0
Water supply	0	0	0	0	0
Uncombusted fuel gas	0	0	0	0	0
Lighting	0	0	0	0	0
Explosions	0	0	0	0	0
Total with any Category 1 hazard	2,447,678	3,618	8,951,860,860	1,042,643,260	8.59

Table 1 Notes:

1. *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.*
2. *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.*
3. *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. There will, therefore, be a degree of uncertainty around these estimates because any calculations relating to cost benefits and payback periods are very sensitive to the mix of hazards present in England.*
4. *Three of the 29 Housing Health and Safety Rating System (HHSRS) hazards are not measured in the EHS (asbestos biocides, volatile organic compounds) because they require an intrusive inspection, which is not practicable in a sample survey.*

Literature review

A literature review has been undertaken to compile a comprehensive list of the costs and benefits of improving poor housing. These have been evaluated, in turn, to determine:
- Whether they could be quantified, reliably.
- Whether they could be applied through our cost of poor housing (COPH) model and the latest English Housing Survey (EHS) datasets.
- Whether they could be used in a 30-year cost-benefit analysis.

The literature review updates and builds on that which was reported earlier in 'The full cost of poor housing'. The following potential benefits were selected for the cost-benefit analysis:
- Reduction in NHS first year treatment costs (£)
- Reduction in long term aftercare and improved life chances (£)
- Reduction in energy costs (£)
- Reduction in future repair and maintenance costs (£)
- Reduction in insurance costs (£)
- Reduction in cost to the emergency services (ambulance, police fire service) following an accident/ health incident (£)
- Increase in asset (home) value (£)
- Increase in investment in local economy (£)

The following benefits are known to exist but have not been included in the cost-benefit analysis because they cannot either be quantified reliably, were not appropriate in this situation, or do not fit within the Green Book rules:
- Improved wellbeing, happiness and satisfaction of occupants following intervention.
- Improved social capital and social cohesion.
- Improved environmental quality.
- Improved rental value (while a positive benefit to landlords, this would have a negative impact on low-income households).
- Reduction in interventions by housing authorities and charities (it can be argued that current intervention is so sparsely funded that this would just mean that a better service could be offered in future rather than a money saving if fewer interventions were required).
- Increase in tax revenues (all of our calculations exclude VAT and other taxes, as directed in the Green Book)[8].

Reduction in carbon emissions has been included as a benefit in the volume of saved carbon following energy efficiency improvements, rather than a cost saving.

[8] HM Treasury (2018). The Green Book – Central Government Guidance on Appraisal and Evaluation.

Developing the model to apply the Green Book guidance

Once the original BRE cost of poor housing (COPH) model had been updated using the 2019 English Housing Survey (EHS) data and the health cost data, these outputs were then used as our base figures for our cost benefit model (Year 0 in Table 2). An Excel spreadsheet was designed to include these updated figures and costs as well as all the quantifiable costs and benefits we had established through the literature review. In addition to this, further research and analysis was carried out to estimate what would happen over the next 30 years, and all modelling was based on the assumptions that the current rate of housing activity (including improvement, deterioration and new building) would continue at the same rate and that existing housing policies, such as the Decent Homes programme, would not change but continue at their current level.

For each year, the following assumptions were applied:

1. The number of dwellings for year 0 to year 2 used published EHS figures and years 3 to year 30 projections were calculated by factoring in newly built good condition homes and demolitions.
2. The number of poor condition homes for years 0 to year 2 was based on published EHS figures, later years were calculated by applying the current rate of improvement and deterioration to the housing stock (determined from the EHS).
3. The cost to make homes safer, the costs to the NHS, costs to society and the other quantifiable costs (from the literature review and EHS modelling) were applied to the predicted number of poor homes in the relevant section of the modelling. For example, additional energy costs were applied to the predicted (falling) number of homes with 'excessive cold' over the next 30 years.
4. Similarly for the benefits, the cost savings were applied to the predicted number of hazards mitigated.

All costs and benefits projections inputted into the model, were adjusted to 'real' prices for 2019, using the GDP deflator factors.[9]

The full 30-year benefits were then subtracted from the full 30-year costs and discounted[10] to provide an overall Net Present Social Value (NPSV).[11] Table 2 shows a summary output of a completed cost benefit model for 'business as usual'.

This business as usual table recognises that a net improvement in housing quality will take place over 30 years, mainly generated through housing market activity. As such it shows the cumulative cost of poor housing, but also cumulative benefits from the homes that are no longer in poor condition. However, it does not anticipate any specific additional targeting of public funding to reduce the level of poor housing in England.

9 GDP deflator is an index of the general price level in the economy as a whole, measured by the ratio of gross domestic product (GDP) in nominal (i.e., cash) terms to GDP at constant prices.

10 The discount rate adjusts the costs with different time spans applied to already adjusted real current values, this adjusts for the value society attaches to present, as opposed to future, consumption. It is based on comparisons of utility across different points in time or different generations. The discount rate applied was the standard rate.

11 The Net Present Social Value (NPSV) shows a single figure for the sum of the total cost and benefits (already in real prices), that have been discounted over the life of the proposal by the social time preference rate (the value society attaches to present as opposed to future values) to factor in the social benefits and costs.

Table 2: The 'business as usual' costs over 30 years for all tenures in England, 2019 to 2049

Business as usual (baseline)	Year 0	Year 5	Year 10	Year 15	Year 20	Year 25	Year 30	
Current Position	2019	2024	2029	2034	2039	2044	2049	Total
Total dwellings in sector	24,413,520	24,431,542	25,577,192	26,722,842	27,868,492	29,014,142	30,159,792	-
Total homes with one or more HHSRS Cat 1	2,447,678	1,991,650	1,623,937	1,324,114	1,079,646	880,314	717,784	-
Total cost to make healthy/safe	£8,951,860,860	£6,536,713,112	£4,754,190,027	£3,450,686,624	£2,504,577,670	£1,817,872,785	£1,319,448,585	-
Direct and indirect costs								
Cost to NHS	-£1,042,643,260	-£4,218,740,575	-£3,192,158,858	-£2,316,933,024	-£1,681,676,532	-£1,220,594,609	-£885,932,086	-£14,558,678,944
Health costs to society	-£12,708,831,481	-£51,422,442,457	-£38,909,385,941	-£28,241,213,934	-£20,498,040,388	-£14,877,889,482	-£10,798,671,056	-£177,456,474,740
Home energy additional costs for HHSRS cat 1 'excess cold' homes	-£799,744,423	-£3,502,527,843	-£2,887,182,865	-£2,323,151,266	-£1,869,307,230	-£1,504,124,837	-£1,210,283,409	-£14,096,321,873
Building insurance premium increase	-£258,621,657	-£1,046,434,310	-£791,796,626	-£574,701,897	-£417,130,181	-£302,761,465	-£219,750,353	-£3,611,196,489
Maintenance costs increase	-£52,771,938	-£213,525,684	-£161,566,678	-£117,268,341	-£85,115,717	-£61,778,698	-£44,840,220	-£736,867,275
Annual repair spend to make healthy/ safe	-£1,035,206,049	-£852,162,000	-£1,085,318,648	-£835,748,103	-£571,761,927	-£414,996,292	-£301,212,645	-£5,096,405,664
Total costs (£)	-£15,897,818,809	-£61,255,832,868	-£47,027,409,616	-£34,409,016,565	-£25,123,031,976	-£18,382,145,383	-£13,460,689,769	-£215,555,944,986
Benefits if made healthy/safe								
NHS costs saving	£54,540,228	£179,611,818	£133,006,619	£96,538,876	£70,069,855	£50,858,109	£36,913,837	£621,539,342
Health costs to society saving	£664,793,595	£2,189,297,540	£1,621,224,414	£1,176,717,247	£854,085,016	£619,912,062	£449,944,627	£7,575,974,502
Home energy costs savings	£41,834,292	£152,747,407	£120,299,286	£96,797,969	£77,887,801	£62,671,868	£50,428,475	£602,667,100
Home insurance savings	£13,528,389	£44,551,677	£32,991,526	£23,945,912	£17,380,424	£12,615,061	£9,156,265	£154,169,255
Home maintenance costs saving	£2,760,478	£9,090,802	£6,731,945	£4,886,181	£3,546,488	£2,574,112	£1,868,342	£31,458,349
Asset value uplift from home improvements	£724,644,234	£596,513,400	£759,723,054	£585,023,672	£400,233,349	£290,497,405	£210,848,852	£3,567,483,965
Economic output (base on repair work)	£310,561,815	£255,648,600	£325,595,594	£250,724,431	£171,528,578	£124,498,888	£90,363,794	£1,528,921,699
Total benefits (£)	£1,812,663,031	£3,427,461,245	£2,999,572,438	£2,234,634,289	£1,594,731,512	£1,163,627,504	£849,524,192	£14,082,214,211
Summary of cost and benefits								
Total cost NET cost/benefit (£)	-£14,085,155,778	-£57,828,371,624	-£44,027,837,178	-£32,174,382,276	-£23,528,300,463	-£17,218,517,878	-£12,611,165,577	-£201,473,730,774
Discount rate (3.5%)	-14,085,155,778	-52,291,476,880	-33,619,242,551	-20,685,458,707	-12,736,189,166	-7,847,626,520	-4,839,394,091	-
Net Present Socail Value (NPSV)	-146,104,543,692							-

Table 2 Notes:

1. *The total dwellings projections were calculated by factoring in the averages for demolitions and new builds annually.*
2. *The total homes with one or more HHSRS Category 1 hazards projections were based on the previous annual factors of improvement and deterioration rates.*
3. *The discount rate adjusts the costs with different time spans applied to already adjusted real current values, this adjusts for the value society attaches to present, as opposed to future, consumption. It is based on comparisons of utility across different points in time or different generations. The discount rate applied was the standard rate.*
4. *The Net Present Social Value (NPSV) shows a single figure for the sum of the total cost and benefits (already in real prices), that have been discounted over the life of the proposal by the social time preference rate (the value society attaches to present as opposed to future values) to factor in the social benefits and costs.*

Table 2 shows that, while the housing stock continues to improve slowly year-by-year under current conditions, the 2019 cost to the NHS of some £1 billion will rise to around a total spend of £14.6 billion (in 2019 price) after 30 years. The total cost to society rises from some £12.7 billion to £177.5 billion over the same timescale (in 2019 prices).

The 30 year costs, while huge, would be much higher were it not for the accruing benefits coming from the gradual improvement of the housing stock.

As well as the quantifiable benefits to be made in terms of monetary savings, there are also benefits in tackling excessive cold homes which can be calculated as carbon savings. Using the 'excessive cold' hazard projections used in the Table 2 'business as usual' model, Table 3 illustrates the amount of additional carbon that is being generated over the same 30 year period, and could therefore be saved by mitigating these hazards. If these homes were upgraded to an EPC band C, a total potential CO2 saving of 97 million tonnes could be realised.

Table 3: The 'business as usual' potential CO2 savings if homes failing Category 1 'excessive cold hazard were improved to EPC band C over 30 years in England, 2019 to 2049

Business as usual (baseline)	Year 0	Year 5	Year 10	Year 15	Year 20	Year 25	Year 30	
Current Position	2019	2024	2029	2034	2039	2044	2049	Total
CO2 potential saving tonness(1000kg)	4,165,692	19,611,580	17,727,315	16,024,089	14,484,507	13,092,847	11,834,897	96,940,927

Run iterations of the cost benefit model

Table 2 estimates the costs and benefits that are likely to accrue over a 30-year period if no intervention is undertaken to accelerate the current gradual improvement of the housing stock. However, now the cost/benefit model is in place, it can be used to calculate 'what-if scenarios' for interventions to reduce the level of poor housing over various time periods. For illustrative purposes, this has been undertaken for five possible scenarios which are summarised in Table 4 below:

1. **Do nothing to target the improvement of poor housing.**
   This is essentially a summary of the figures in Table 2, above. It recognises that both housing improvement and deterioration will take place over 30 years, typically generated through housing market activity. But it does not anticipate any future targeting of funding to reduce the level of poor housing in England.

2. **Undertake all of the work to make poor housing healthy and safe immediately.**
   We have included this scenario for illustrative purposes as it is simply not possible to identify and undertake all the required work to make the English housing stock healthy and safe immediately. But this scenario shows what would happen if we could eradicate poor housing before any further damage to health and safety can be done. The costs are not zero in the years after the intervention because it is recognised that deterioration of housing continues without future attention.

3. **Undertake all of the work to make poor housing healthy and safe over a year.**
   Again, this would be unrealistic to deliver in practice, but this scenario recognises the risks that are present over the next year following an HHSRS Category 1 diagnosis, and that the disbenefits accrue long into the future.

4. **Undertake a programme of work designed to eradicate poor housing over a 10-year period.**
   While, for illustrative purposes, this is applied to all Category 1 HHSRS homes of all tenures, this scenario is more aligned with the type of programmes that Government does introduce, such as the Decent Homes programme. We have assumed that the improvement work is spread evenly across the years of the programme but, of course, there will be some homes that have to wait several years (with rising risks and costs) before being brought up to standard.

5. **Undertake a programme of work designed to eradicate poor housing over a 30 year period.**
   With finance being limited to undertake the sort of massive intervention that is required to eradicate poor housing over a short timescale, this scenario shows what might happen if it is spread out over the full 30 years of the cost-benefit analysis.

Table 4: 30-year costs and benefits of different timings and approaches to improving poor housing, 2019 to 2049

Cat 1 Hazards all / £ billions	1. Current trend with no intervention	2. All work undertaken immediately	3. All work undertaken by 1 year	4. 10-year programme of work	5. 30-year programme of work
NHS costs	-£14.6	-£0.9	-£2.0	-£5.4	-£11.2
Other society costs	-£201.0	-£20.7	-£34.5	-£80.8	-£157.7
All costs	-£215.6	-£21.6	-£36.4	-£86.3	-£168.8
NHS benefits	£0.6	£1.1	£1.0	£1.0	£0.8
Other society benefits	£13.5	£23.5	£21.8	£21.4	£18.3
All benefits	£14.1	£24.6	£22.8	£22.3	£19.1
Total costs/benefits	-£201.5	£3.0	-£13.6	-£63.9	-£149.7
Total NPSV	-£146.1	£6.4	-£10.6	-£57.1	-£116.9

Table 4 Notes:

1. *'2. All work undertaken immediately', the year 0 benefits from repair/ mitigating the hazards are immediate gains. All other year's costs and benefits are factored in the same way.*
2. *The Net Present Social Value (NPSV) shows a single figure for the sum of the total cost and benefits (already in real prices), that have been discounted over the life of the proposal by the social time preference rate (the value society attaches to present as opposed to future values) to factor in the social benefits and costs.*

Table 4 shows that different proposed interventions to mitigate HHSRS Category 1 hazards result in range in the NPSV figure; it highlights that:

- If it was possible to act immediately and remove all the Category 1 HHSRS hazards in the housing stock before they impacted on the health of occupants, there would be a positive investment return to society of some £6.4 billion over the next 30 years, along with a £146.1 billion spend saving. In turn this would reduce NHS costs from £14.6 billion to around £1 billion over the same period.
- For the scenario where all the work is undertaken in the first year (and the benefits are received in the following year), there would be substantial reduction in total NPSV from -£146.1 billion to -£10.6 billion over 30 years, an accrued benefit of £135.5 billion. In addition, it reduces the NHS spending costs from £14.6 billion to £2.0 billion, and results in an overall cost and benefit saving of around £13.0 billion over the same period.

As the timetable slips with the less ambitious programmes, the costs increase and the benefits are less apparent, but all interventions show substantial savings to society compared to doing nothing. The clear message to take from this is that early intervention to remove health and safety risks from our homes will save billions of pounds in future expenditure to deal with the consequences of inaction.

The scenarios in Table 4 are illustrative of the potential gains to be realised if we identify and improve the poorest housing. In reality, the cost-benefit model could be used, in association with the latest EHS data, to model realistic scenarios for targeting poor homes and vulnerable occupiers. Such options could include for example:

- Modelling the impact of targeting homes with HHSRS Category 1 hazards in the private rented sector.
- Cost/benefit of introducing a higher Decent Homes Standard for social and private rented housing.
- Targeting vulnerable elderly people with limited means living in 'poor' owner-occupied housing.
- Targeting poor housing in deprived areas.

One example of finer targeting might be to use the model to identify vulnerable families living in HHSRS Category 1 damp and mouldy homes and estimate the costs and benefits of making their homes healthy and safe (Table 5).

In Table 1 the research shows that there are some 65,000 Category 1 damp/mouldy homes in England, with a total cost of some £250 million backlog of work needed to make them healthy and safe. But the benefit to society of undertaking this work immediately is estimated to be £4.8 billion over 30 years, and £4.3 billion over the same period if the work was undertaken in the first year.

Table 5: The cost and benefits of improving Category 1 damp and mouldy housing, 2019 to 2049

Cat 1 HHSRS damp homes only (65,000) / £ millions	1. Current trend with no intervention	2. All work undertaken immediately	3. All work undertaken by 1 year
NHS costs	-£474.0	-£24.0	-£57.7
Other society costs	-£6,269.4	-£575.4	-£1,011.9
All costs	-£6,743.3	-£599.4	-£1,069.6
NHS benefits	£19.0	£34.6	£25.6
Other society benefits	£321.5	£705.7	£592.9
All benefits	£340.5	£740.4	£618.5
Total costs/benefits	-£6,402.8	£141.0	-£451.0
Total NPSV	-£4,659.9	£189.1	-£366.2

Table 5 Notes:

1. *'2. All work undertaken immediately', the year 0 benefits from repair/ mitigating the hazards are immediate gains. All other costs and benefits are factored in the same way.*
2. *The Net Present Social Value (NPSV) shows a single figure for the sum of the total cost and benefits (already in real prices), that have been discounted over the life of the proposal by the social time preference rate (the value society attaches to present as opposed to future values) to factor in the social benefits and costs.*

To some observers, the figure of 65,000 damp homes will seem small. This is because HHSRS Category 1 sets the bar high (extreme risk) and there are many other damp homes, which fall below this threshold, that will also have an impact on health. As this research focuses on homes in the official Category 1 grouping, this wider group of damp homes are not included in the definition of 'poor housing' used in the report.

The model can even be used to calculate the costs and benefits of improving individual dwellings. Appendix 1 presents one such example of a damp and mouldy home.

Conclusions and recommendations

In 2019 there were 2.4 million (10%) homes in England which fall below the minimum standard for housing by having Category 1 health and safety (HHSRS) hazards.

It is costing the NHS more than £1.0 billion per year to treat people living in these homes. There are wider and more costly 'societal costs', such as loss of economic potential and the mental health cost of suffering and trauma.

This research has demonstrated that it is possible to produce a cost-benefit model for evaluating the impact of housing interventions tackling the poorest homes. It can be used to calculate 'what-if scenarios' for interventions to remove/reduce populations of poor housing over various time periods. While, in reality, it is not feasible to improve all of England's poorest housing now, the model provides a clear message that if we could deliver major improvements now, there would be benefits to households and wider society.

This new research estimates that the cost of remedial work to make the 2.4 million 'poor homes' healthy and safe is around £9 billion and, if all this work could be undertaken immediately, the NHS costs alone would be paid back in under 9 years.

When the broader costs and benefits are projected forward 30 years, early intervention to remove all Category 1 hazards would have the potential to save around £136 billion (including £13 billion in savings and benefits to the NHS), compared to the existing trend over the same time period.

Our research has also highlighted that the sooner poor housing is mitigated, the greater the long-term benefits and savings are.

Improving our least energy efficient homes that are excessively cold would also deliver carbon savings. If these homes were upgraded to an EPC band C, a potential CO2 saving of 97 million tonnes could be realised.

Moving forward our model could have the following applications:

- It can be used to make the case for cost-effective investment to improve the housing stock, whether this is from central or local government, by landlords, developers, or by owner-occupiers.
- It can be used to plan and target resources on the most urgent situations and the most vulnerable households.
- It can be used to plan capital programmes and apply economies of scale to areas of sub-standard housing.

The next stage would be to apply this to some realistic scenarios for accelerating the improvement of the housing stock, for different types of vulnerable people in homes of different tenures.
The BRE methodology is underpinned by robust EHS data and modelling but we recognise that there are other methodologies that can be adopted. We hope that our report will stimulate debate and further studies into the impact of poor housing and make the case for economic investment to mitigate it.

Appendix 1: Example of the costs and benefits of improving one damp home

Applying the COPH model at individual case level

The model used in the national estimates above can be applied at the individual dwelling and scheme level. The illustrative example, below, demonstrates that an immediate intervention to provide a family living with an HHSRS Category 1 damp problem with a warm, dry home has multiple benefits, not least their own health and safety. It is put together from various data sources and does not represent an actual occupied home.

Poor Housing Case Study 1

This home is a privately rented, two bedroomed, terraced house, built around 50 years ago. It is of an unusual design, with all habitable accommodation on the first floor, including the second bedroom over a driveway. On the ground floor is an integral garage, bathroom, hall/stairs and storage. The house was partially modernised (including a new kitchen and bathroom) after it was purchased from the local authority through Right To Buy in the mid-1980s but has fallen into disrepair recently. The house is occupied by a small, single parent, family on limited means that has lived there for six months.

The design and condition of the house, as it stands, presents a serious threat to the health and safety of anyone who lives there - in particular, a household with young, vulnerable children. The flat roof leaks, the walls are wet and there is evidence of damp and mould, especially in the bedrooms. This is exacerbated by the lack of roof and wall insulation. The child's bedroom over the driveway, which also has a cold, uninsulated floor, is dangerously affected by damp and mould.

The home has been scored as having a Category 1 hazard under 'damp and mould growth', following an inspection. The likelihood of a vulnerable person (in this case a child under 5) requiring medical attention from sleeping in such a damp, mouldy bedroom over a one-year period under these circumstances is assessed as being a 1 in 2 (50%) chance. The medical outcomes might include respiratory problems, poorer mental health, sleeping problems and, in extreme cases, long term asthma.

The cost of living in such 'poor housing' has an impact way beyond the NHS treatment costs to those directly affected. There will be long term impacts on educational attendance, performance, productivity and life chances of individuals affected, plus care costs and the impact on the whole family.

This above discussion relates only to the Category 1 HHSRS hazard of damp and mould. HHSRS Category 1 sets the bar high - at immediate and severe risks only. This house also has an inadequate heating system and insulation, which represents a high scoring Category 2 HHSRS excessive cold hazard. While such a house could be heated sufficiently (at a cost), this low-income household is in fuel poverty and cannot afford to do so currently. As part of any recommended improvements, the heating and insulation should be upgraded along with sorting out the damp problem.

The kitchen and bathroom would also fail the current Decent Homes Standard due to their age and condition, so it would make sense to upgrade these as part of any improvement package. This is not costed here.

A summary of the impact of a recommended improvement package to just make the home healthy and safe is presented in Table 1, below:

Table A1. Improving a home with a Category 1 HHSRS damp problem.

Costs at 2019 prices	Dwelling as it stands	Dwelling after intervention
Cost of intervention	£0	£18,000
HHSRS damp/mould	Category 1 damp hazard	No damp hazard
SAP (energy efficiency band)	54 / Energy Efficiency Rating Band E	74 / Energy Efficiency Rating Band C
Annual fuel cost	£1,770	£895
Carbon emissions	7,666 kg pa	3,598 kg pa
Household in Fuel Poverty	Yes	No
Cost of damp/mould to NHS pa	£730	£0
Cost of damp to NHS and society pa	£9,500	£0
30-year cost of damp to NHS and society	£197,000	£0
Asset value (to landlord)	£81,500	£94,100

*Intervention includes:
- Roof repairs, including insulation
- New ceilings to upstairs rooms
- Cavity wall insulation
- Floor insulation to part first-floor
- New efficient gas central heating system to whole house
- Plaster work/re-decoration.

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