

A retrospective health impact assessment of housing standards interventions in Derby

Renovation and refurbishment works have been carried out to 32 dwellings in Brindley Court Derby. A quantitative Health Impact Assessment (HIA) of this project is considered in this report. The HIA considers the improvements within the dwellings by relating them to the mitigation of hazards as defined by the Housing Health and Safety Rating System (HHSRS)

Brindley Court Derby

The total cost of works carried out within the project is £65,709. This work is estimated to have produced savings to the NHS of £23,191 wider society of up to £58,000 annually. The largest health cost savings are to mitigate hazards associated with Excess cold.

The three most common hazards of Excess cold, Fire and Entry by intruders have been mitigated to remove hazards that are above those expected in an average dwelling. It is estimated that these works will save 36 incidents of harm over a ten year period. Most of these expected harm outcomes would involve visits to GP surgeries or other initial NHS response but some would be expected to involve hospitalisation or death.



Introduction

Derby City Council has facilitated housing improvements in Brindley Court, one of the poorer private sector housing blocks of flats in Derby. This quantitative Health Impact Assessment (HIA) calculates the savings to the NHS and the wider society; likely cost benefit over a number of years, and the expected reduction of incidents to people as a result of those renovations. The results are also interpreted to show cost benefit in terms of break even points.

The measurements were made using the Housing Health Cost Calculator¹ (HHCC) and show the contribution to health improvement of intervention works carried out to 32 dwellings in Brindley Court.

Retrospective Health Impact Assessment (HIA)

The links between poor housing and health have been known and accepted for centuries but it is only recently that measured links have been made possible. This retrospective HIA considers the quantitative changes in health related costs predicted to occur from dwellings renovated in Brindley Court. The renovated dwellings should be healthier to live in as the housing related health hazards will have been mitigated. The HIA measures the health savings and cost benefits arising from rectifying housing related hazards such as damp and cold. Figure 1 below demonstrates some of the links between hazards found in dwellings and the health issues that may arise.

Figure 1 gives examples of six hazards that can be found in dwellings. There are in all 29 hazards that can be measured using the Housing Health and Safety Rating System³ (HHSRS) and their use in the measurement of health impact is explained further in the methodology section.

Following an explanation of the methodology the results are given in terms of hazards by considering the 'mean' costs and health benefits and; the total costs and predicted savings to the NHS and the wider society. An estimate of the reduction of incidents to people over a ten year period is made.

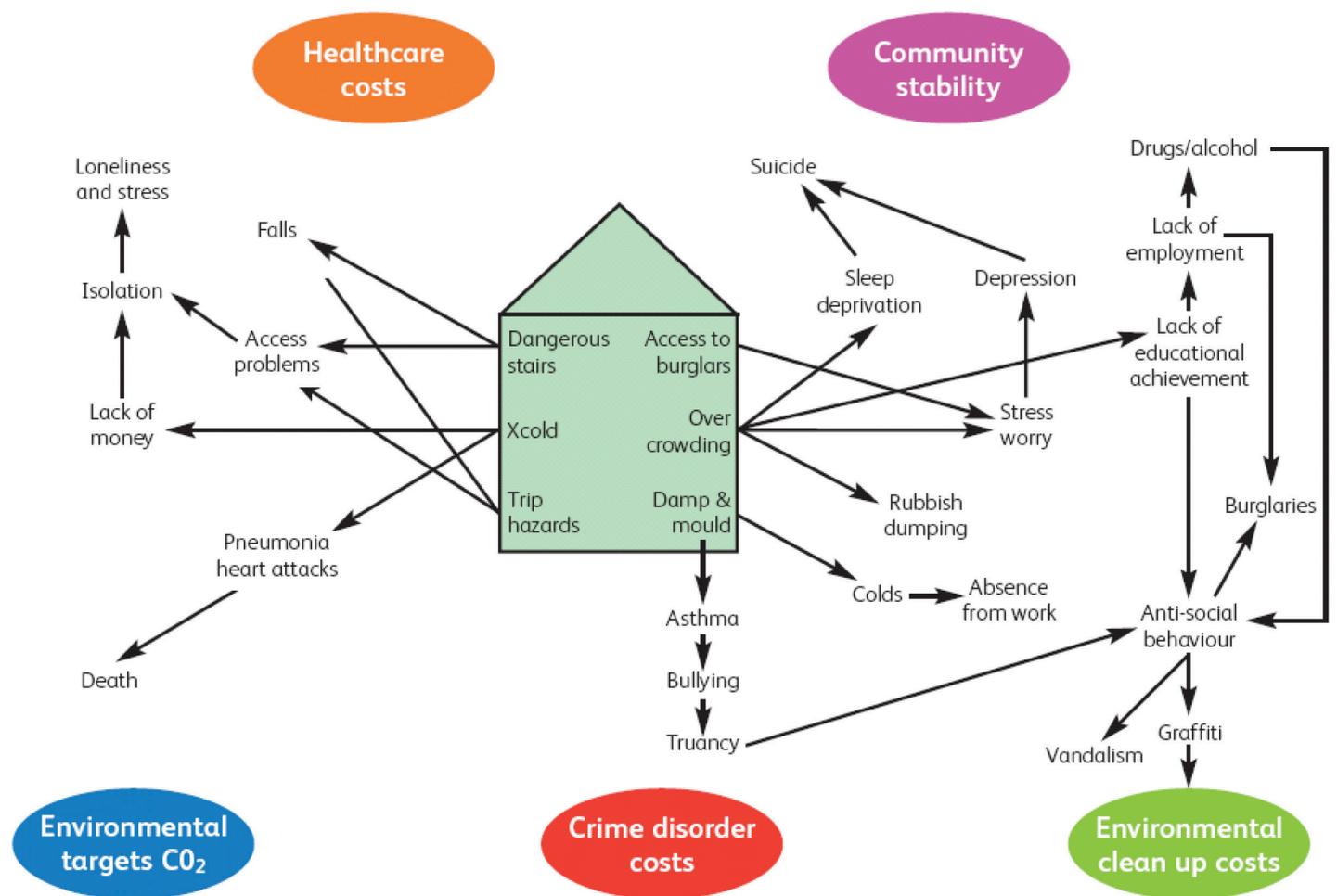


Figure 1 Relating Housing hazards to health²

1. www.housinghealthcosts.org

2. Good Housing Leads to Good Health CIEH September 2008

3. Housing Health and Safety Rating System Operating Guidance ODPM 2006

The methodology

The Housing Health and Safety Rating System⁴ (HHSRS) is the method by which the condition of dwellings is assessed by surveyors. The surveyor assesses the likelihood and associated harm outcome expected for any of the 29 hazards in accordance with the operating guidance. The requirement is to assess any 'significant' hazards.

Derby City Council entered the records of hazards mitigated following renovation work to Brindley Court into the Housing Health Cost Calculator (HHCC). The records detail 117 hazards mitigated in 32 dwellings. The records detailed the likelihood and harm outcome both before and after work to mitigate the hazards.

For each of the 117 records, the following information was entered into HHCC:

1. Hazard likelihoods and harm outcomes for the dwelling condition before mitigation works
2. Hazard likelihoods and harm outcomes on completion of the works
3. The cost of the works

HHCC has been developed as an extension of the Real Costs of Poor Housing⁵ project. It allows the value of the health benefits to be calculated and, when divided by the cost of work, to provide a payback period. The results show the health savings to the NHS and society

The spreadsheet is based on the research which underpins the Real Cost of Poor Housing publication and uses differences between pre and post improvement likelihoods and outcomes to calculate the value of benefits in savings to the health service of undertaking the works. Comparing these to the costs of works allows calculation of payback periods.

All costs are based on 'simple' sums and although commonly called 'cost benefit' are properly known as 'cost offset'. This means that for the cost of works the only sum considered is the actual cost of materials and employing a contractor to do the work, and does not include any administration costs. Similarly, the health costs are simply based on the cost attributed to the class of harm as published in the Real Cost of Poor Housing. The costs have been developed by looking at typical health outcomes and first year treatment costs which can be attributed to selected HHSRS hazards. This is an important part of the method, and as such a simplified table developed from the Real Cost of Poor Housing publication is reproduced here:

Hazard	Class 1	Class 2	Class 3	Class 4
Damp and mould growth	Not applicable	Type 1 allergy (£1,998)	Severe asthma (£1,120)	Mild asthma (£180)
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)	Not applicable	Not applicable
Falls on the level	Quadraplegic (£59,246)	Femur fracture (£25,424)	Wrist fracture (£745)	Treated cut or bruised (£67)
Falls on stairs and steps	Quadraplegic (£59,246)	Femur fracture (£25,424)	Wrist fracture (£745)	Treated cut or bruised (£67)
Falls between levels	Quadraplegic (£59,246)	Head injury (6,464)	Serous hand wound (£1,693)	Treated cut or bruised (£67)
Fire	Burn, smoke, care, death (£11,754)	Burn, smoke, care (£7,878)	Serious burn to hand (£2,188)	Burn to hand (£107)
Hot surfaces and materials	Not applicable	Serious burns (£4,652)	Minor burn (£1,234)	Treated very minor burn (£107)
Collision and entrapment	Not applicable	Punctured lung (£3,439)	Loss of finger (£1,536)	Treated cut or bruised (£67)

4. Housing Health and Safety Rating System Operating Guidance ODPM 2006

5. The real cost of poor housing. M Davidson et al IHS BRE Press December 2009

6. No annual inflation rate or interest on borrowed money is present in the calculations

Typical health outcomes and first year treatment cost for selected HHSRS hazards

Some of the classes of Harm are marked 'Not applicable'. In these cases the HHSRS class is either very rare or nonexistent. Death, for example, is very unlikely to arise from Damp and mould growth alone, so no Class 1 harms are applicable. Radon, if present and causing a health effect, is expected to cause an extreme outcome leading to lung cancer or death and so no class 3 or 4 harms are applicable. Where asterisked, the costs are as a result of treatments predicted to be required during the first 12 months. Continuing care costs after one year are likely to occur but these are not modelled.

Consolidating and simplifying these costs gives the following basic figures that can be associated with and used for costing health outcomes⁶:

Class 1 = £50,000

Class 2 = £20,000

Class 3 = £1,500

Class 4 = £100

The Real Cost of Poor Housing considers a number of methods for estimating the health costs associated with poor housing. Reviewing previous published research, it presents evidence that a fifth of the NHS clinical budget is spent on curing illness caused by unemployment, poverty, bad housing and environmental pollution. Other cited research notes that poor housing increases the likelihood of family tension and breakdown, child abuse and domestic violence.

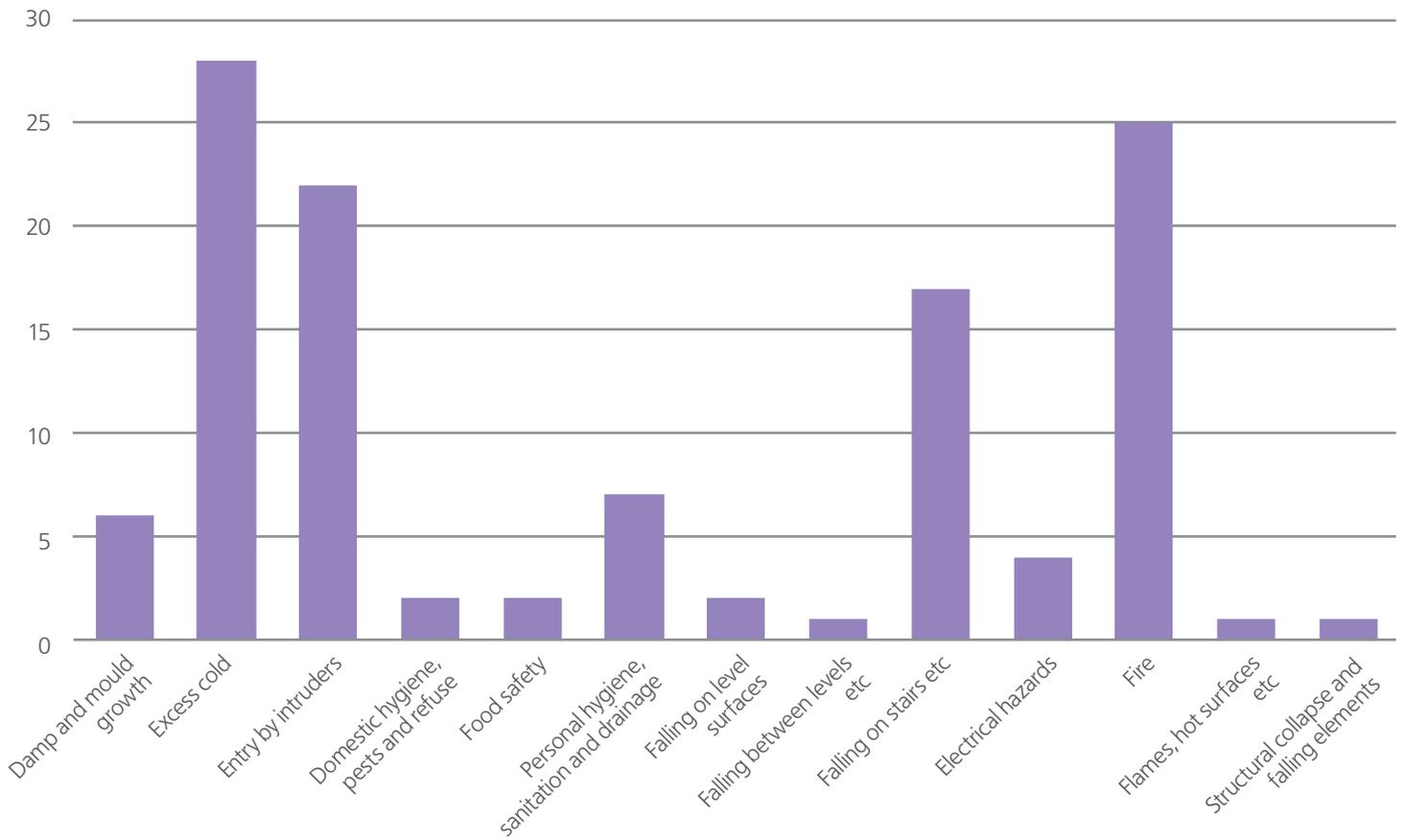
Research from the Netherlands and the United States, also cited in the Real Cost of Poor Housing, attempts to show the costs to society caused by accidents in the home relating particularly to falls on stairs. Due to the complexity of the issues, the model only includes those accidents that have direct health costs. Page 21 gives the following quote "By taking just the costs of medical treatment and care, we are only accounting for, at most, 40% of the total costs to society of the consequences of poor housing". Other costs which are relevant as costs to society include the capital value of the dwelling, loss of future earnings, increased spending on benefits, and the cost of moving and enforcement action by councils. Social Services costs following discharge from hospital may also feature and are NOT included in NHS costs.

Results

The results are given in a series of graphs where the hazard is considered in relation to the number, cost and health benefits. The following basic summary statistics of the 117 hazards are set out below.

Figure 2– Profile of Hazard type.

Number of Hazards



Typical Hazards in Brindley Court:

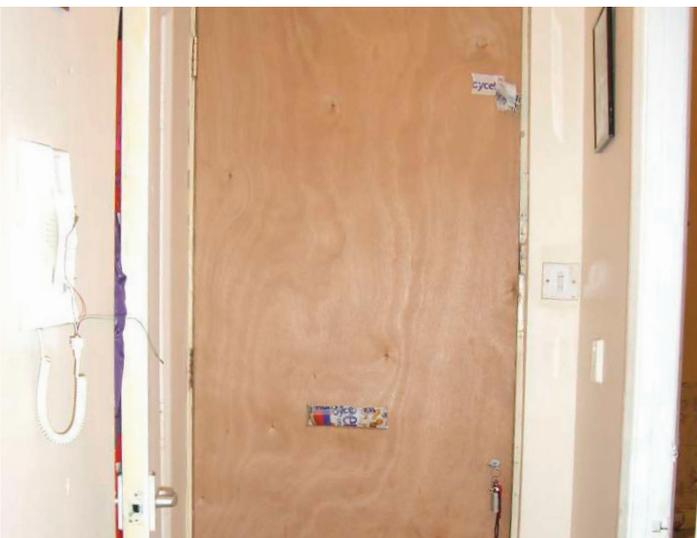
Old metal window and poor heating system contributing to an Excess cold hazard



Missing balustrading leading to a Falls between level hazard



Doors with missing locks contributing to an Entry by intruder hazard



Costs of mitigating hazards

Figure 3 shows the total cost of repair to dwellings in the 32 flats and Figure 4 gives the average cost of mitigating each hazard.

Figure 3: The total cost to repair by hazard

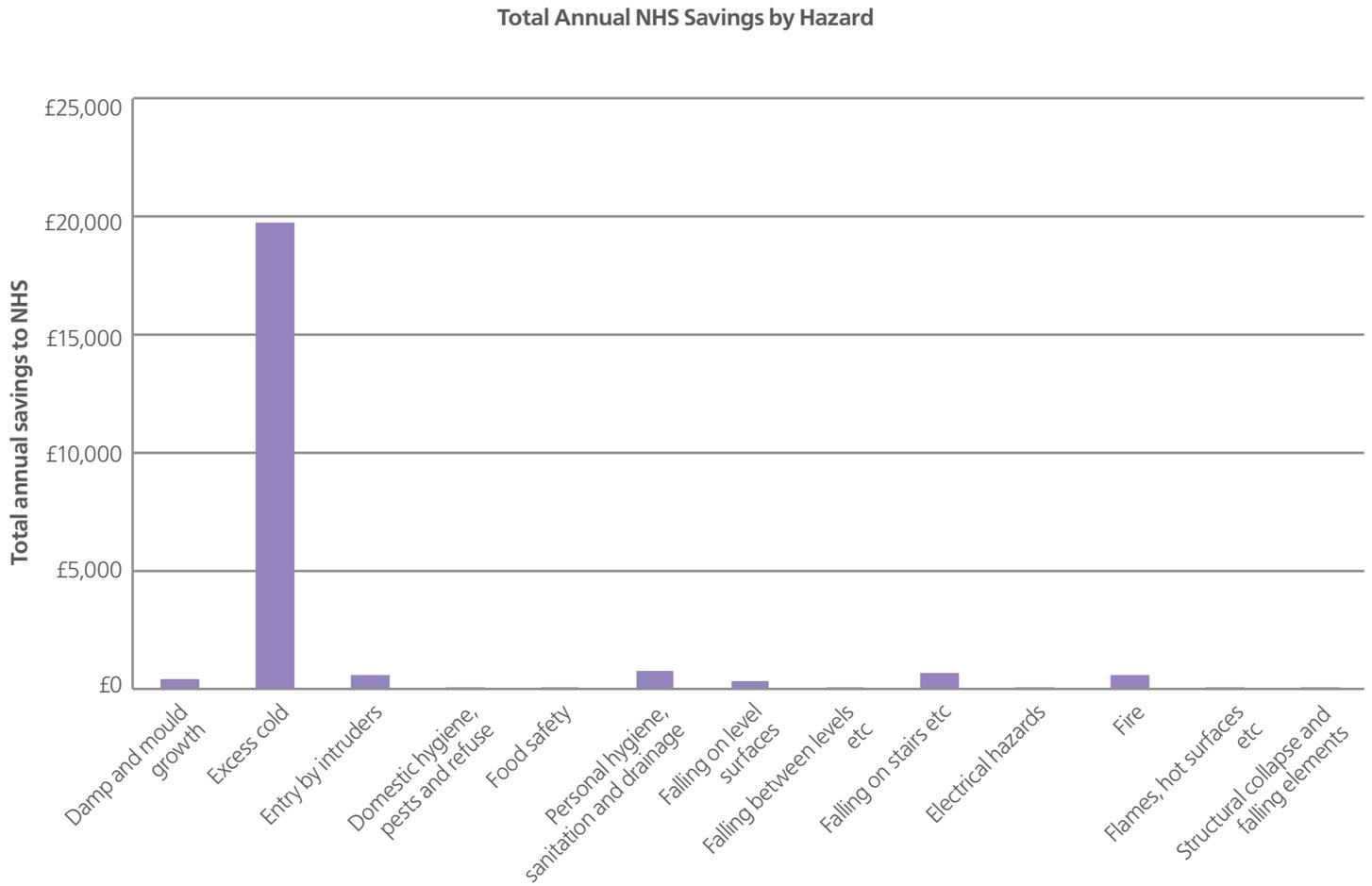
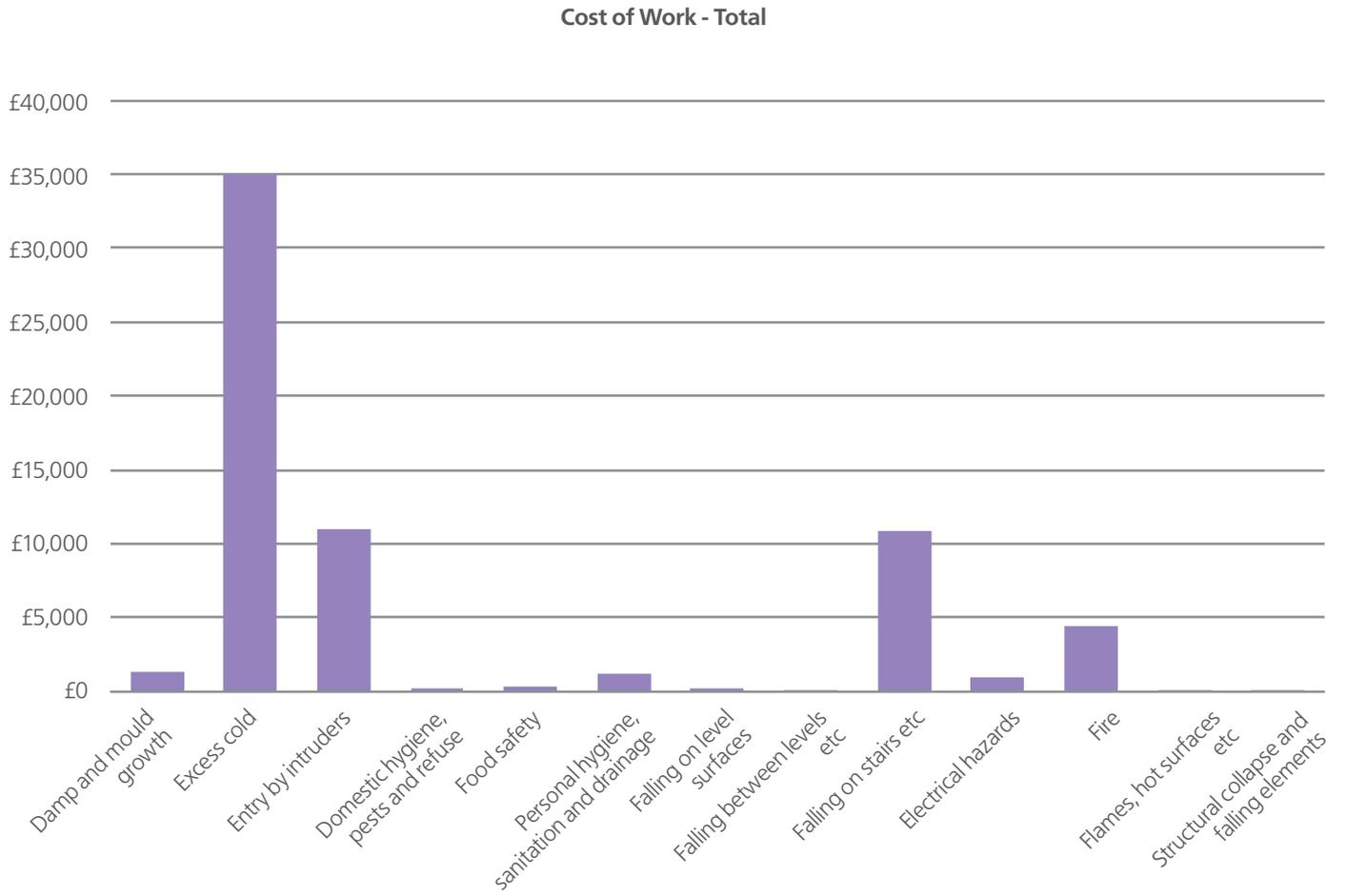


Figure 4 Mean cost to mitigate each hazard



Savings to NHS and society

The methodology adopted for quantifying the savings to the NHS involves measuring the change in likelihood and the spread of harm outcomes for the hazards that have been mitigated. Each harm outcome has a cost associated with it as explained earlier. All these costs are annual estimates. The savings to the wider society are estimated by multiplying the NHS savings by 2.5 as the costs to the NHS are estimated as being only 40% of the cost to wider society.

The average payback period for each of the hazards was generated by dividing the average cost by the average benefit of repairs.

Average Saving per Hazard

Table 1 Average cost of Works by hazard with Estimated Annual Cost Benefit and mean payback period to NHS and Society

Hazard	Mean cost to repair	Mean NHS savings	Mean payback period	Mean savings to society	Mean payback to society*
01. Damp and mould growth	£221	£68	8	£170	3
02. Excess cold	£1,249	£706	15	£1,764	6
12. Entry by intruders	£500	£27	19	£68	8
15. Domestic hygiene, pests and refuse	£97	£1	97	£1	39
16. Food safety	£145	£1	17	£1	7
17. Personal hygiene, sanitation and drainage	£165	£111	1	£278	1
20. Falling on level surfaces etc.	£110	£166	1	£415	0
21. Falling on stairs etc.	£100	£13	8	£33	3
22. Falling between levels	£642	£40	27	£101	11
23. Electrical hazards	£246	£13	123	£31	49
24. Fire	£176	£22	19	£56	8
25. Flames, hot surfaces etc	£55	£3	18	£8	7
29. Structural collapse and falling elements	£116	£4	29	£10	12

**where the mean payback to society is 0 this indicates that the savings to society will exceed the cost of the work within 6 months*

Table 1 is perhaps the most interesting as it details the average costs, benefits and payback period from each hazard. All hazard types show the value of the mitigation work in monetary terms. Table 1 shows that the most effective work (in terms of rapid payback) has been work to mitigate Personal hygiene, sanitation and drainage and Falling on level surfaces hazards, while the most inefficient work, in payback terms, is that to Electrical hazards. These figures may initially look disappointing but it must be remembered that they are annual figures.

Figure 5 Average payback to the NHS for each hazard mitigated.

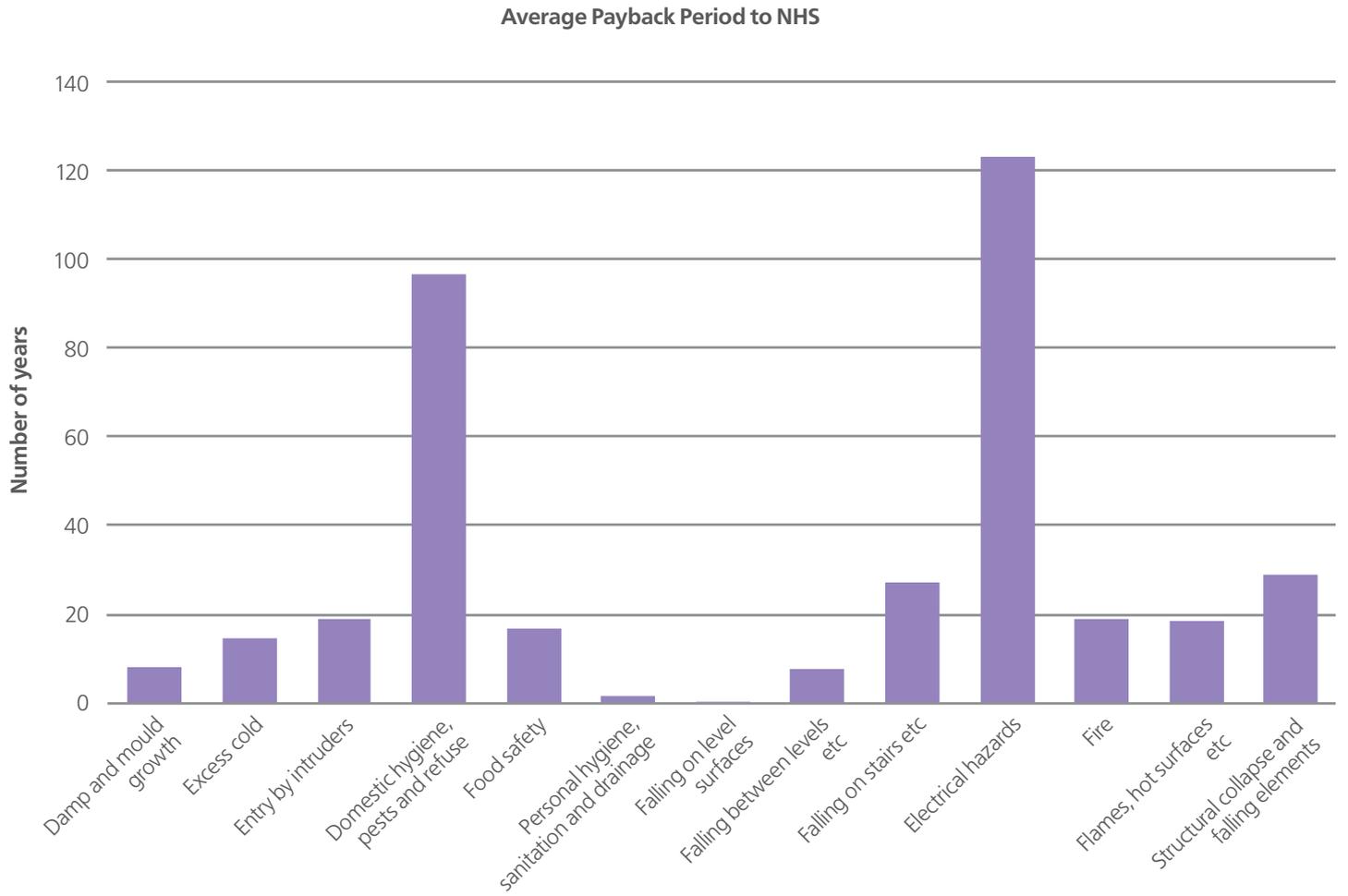


Figure 5 shows which hazards give the quickest monetary payback. Apart from Domestic hygiene, pests and refuse and Electrical hazards these are all within 25 years. In a substantial refurbishment scheme most works would be expected to last for this length of time, Payback period to society is two and a half times as quick.

Total Annual Savings to Health

Figure 6 Total Annual Savings to the NHS

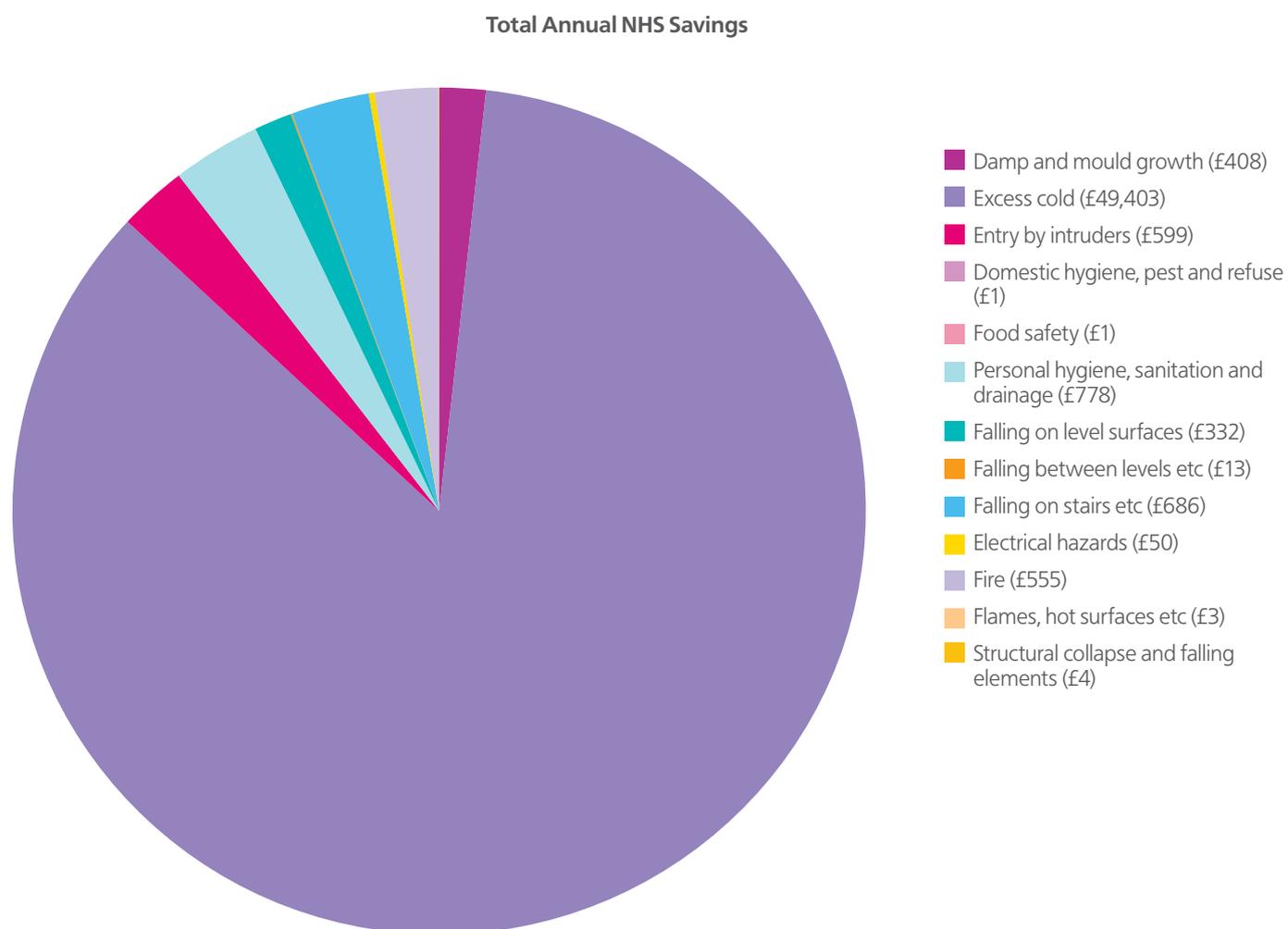


Figure 6 shows the total annual estimated savings to the NHS to be nearly £23,191 per annum. The saving through mitigating Excess cold hazards alone is estimated as £19,761 where the vulnerable group is over 65.

Figure 7 Annual Savings to Society

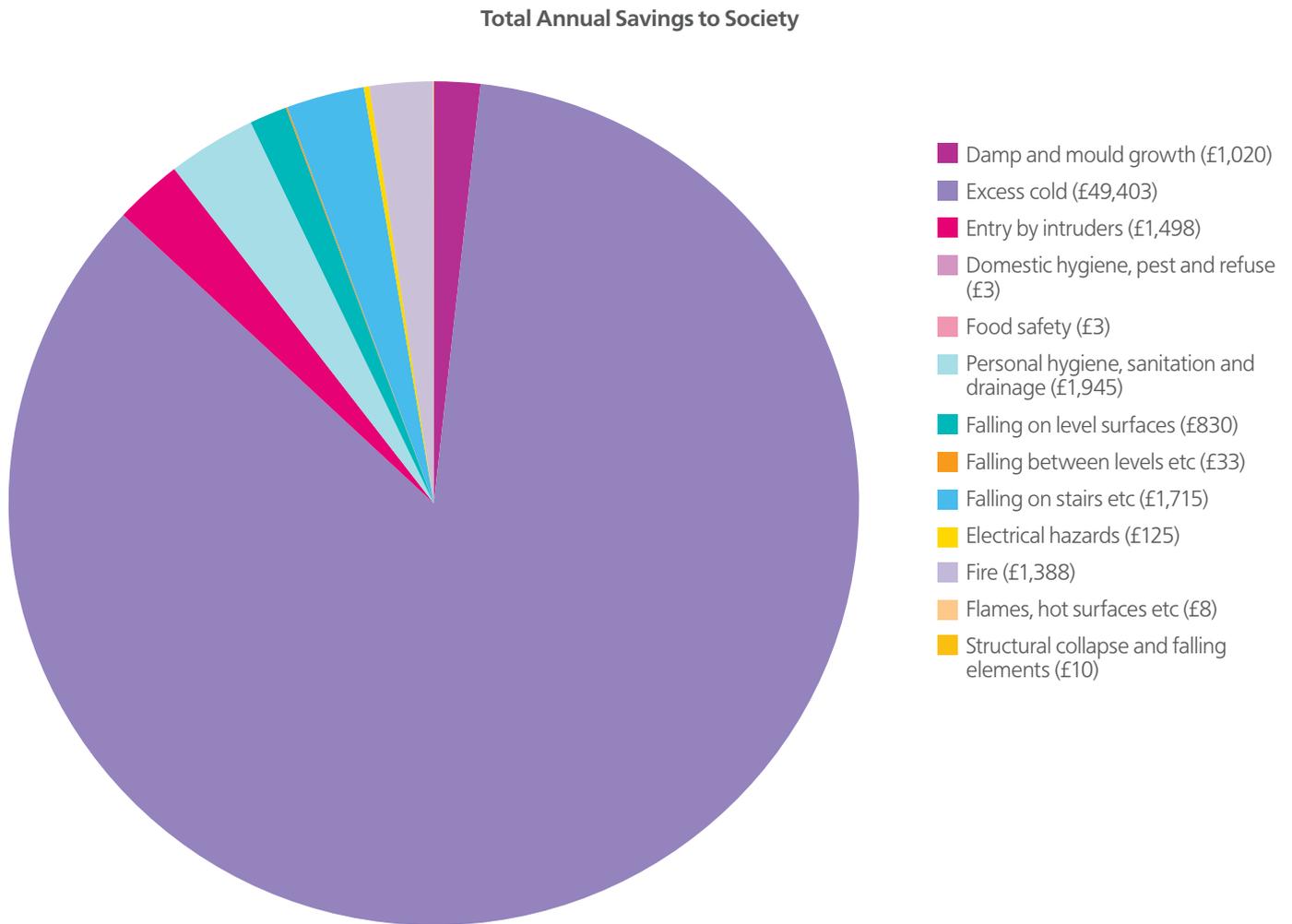


Figure 7 shows the same distribution as Figure 6 The NHS totals being multiplied up to show the total for society. Over a ten year period the estimated savings are £585,000. The work to mitigate hazards has been assumed to have been to a high standard. It is therefore considered reasonable to consider savings over 25 years.

**Savings to society
 are £58,000
 annually.
 Over 25 years
 £1.5 million**

Hazard profile

Each of the hazards associated with dwellings has a specific range of health effects some of which are related to a particular vulnerable group of persons. The most frequently occurring hazards in Brindley Court are considered here in more depth:

- Excess cold
- Fire
- Entry by intruders

Excess cold

The hazard of Excess cold particularly affects older people, and the vulnerable group is the over-65 year olds who are expected to spend a greater degree of time indoors.

Approximately a third of incidences would be expected to result in an extreme harm outcome, leading to death or a heart attack followed by death. Severe and serious harm outcomes lead to cardiovascular and respiratory illnesses. Excess cold has been shown to contribute to a worsening of symptoms of other illnesses such as rheumatoid arthritis and leg ulcers. Mitigating the 28 Excess cold hazards is expected to show an average saving, for each hazard, of £706 to the NHS and to society of £1,764 annually.

It is estimated that one or two people per year will have been saved harm outcomes as a result of the work to reduce Excess cold. Over a ten year period this translates into 3-4 deaths or other extreme harm outcomes have been prevented along with 2 severe outcomes such as cardio-respiratory disease or stroke. A further 3 serious harms requiring hospitalisation for a matter of days, have been prevented and 5 visits to GP surgeries. Altogether this is a reduction of 11-12 incidents or 12 people not adversely affected due to cold. There are also the other

affects which need to be considered. The savings in monetary terms to the NHS are not the only savings, for example, asthma and respiratory infections could 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 giving evidence of the effect of Excess cold on children and vulnerable families, as well as just older people.

Fire

The health outcomes associated with this hazard require little explanation. The vulnerable group for this hazard is persons over 60 due to impairment of mobility. There is also evidence that households with children are twice as likely to experience a fire as those without.

The average saving to society for each of the 25 Fire hazards mitigated is £56. It is expected that at least one incident has been saved over a ten year period due to the renovation works and this could have been serious. These incidents saved are only those measurable in terms of medical assistance and do not include concern or worry over a lack of escape from fire unless this is sufficiently serious to cause stress resulting in a medical condition. The average saving to society does not include all the costs saved to the emergency services.

Entry by Intruders

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. The hazard can affect any age group.

It is expected that two or three incidents a year have been saved and over a ten year period this is 23 cases of which two would have involved some hospitalisation and associated mental health illness.

Summary of Results

The report shows the savings to both the NHS and the wider society of the hazards found within the 32 dwellings in Brindley Court. The savings to society from the main hazards annually and over a 10 and 25 year period are summarised in the table below

Savings to Society annually and over 10 and 25 years by Hazard

Hazard	Mean saving to society	Mean saving over 10 years	Mean saving over 25 years
01. Damp and mould growth	£170	£1,700	£4,250
02. Excess cold	£1,764	£17,644	£44,109
12. Entry by intruders	£68	£681	£1,702
15. Domestic hygiene, pests and refuse	£1	£13	£31
16. Food safety	£1	£13	£31
17. Personal hygiene, sanitation and drainage	£278	£2,779	£6,946
20. Falling on level surfaces etc.	£415	£4,150	£10,375
21. Falling on stairs etc.	£33	£325	£813
22. Falling between levels	£101	£1,009	£2,522
23. Electrical hazards	£31	£313	£781
24. Fire	£56	£555	£1,388
25. Flames, hot surfaces etc	£8	£75	£188
29. Structural collapse and falling elements	£10	£100	£250

Cost extrapolation to 10 and 25 years.

The renovations undertaken as part of the work to Brindley Court are in many cases comprehensive work and would be expected to last a minimum of 30 years. The mitigation works would have included some lower costing repair work but it seems reasonable to expect the works to last for at least 25 years and to therefore provide a satisfactory comparison for pay back periods. Maintenance and replacement has not been included.

The three most common hazards of Excess cold, Fire and Entry by intruders have been mitigated to remove hazards that are above those expected in an average dwelling. It is estimated that these works will save 36 incidents of harm over a ten year period. Most of these expected harm outcomes would involve visits to GP surgeries or other initial NHS response but some would be expected to involve hospitalisation or death.

BRE Trust

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