

Better Housing *Better Health* in Leeds



Cost-Benefit Analysis of Improving
Living Conditions

Geoff Green · Bernard Stafford · Paul Pugh

 Sheffield
Hallam University
SHARPENS YOUR THINKING

May 2011



Foreword

Acknowledgements

Executive Summary

Introduction

Method

Warmth and Comfort

Safety and Independence

Security

Social Costs and Benefits

Appendix

Summary

Foreword

Housing is not just about bricks and mortar; it is also about providing conditions where people can create warm and safe homes. It is now well established that people living in such homes are more likely to live happy and healthy lives. Too many homes in Leeds though fall short in that regard. In 2007, a survey by Leeds City Council set out both the extent and the nature of poor housing in Leeds. The next step has been to better understand the subsequent impact on health and the wider cost to the Leeds economy. This report, by Sheffield Hallam University now fills that gap. It provides compelling evidence and valuable information to guide where our public bodies can direct their resources and achieve the most positive impact for the people they serve. Making sure public money is used efficiently has never been in more focus and this assessment gives us the opportunity to do just that.

Health and wellbeing has been identified as one of the local strategic partnership's key future priorities for Leeds, and the impact of poor housing conditions on health an important target for action over the coming years. The disproportionate number of our most vulnerable residents who currently live in the worst housing conditions also makes this aspect of public health a key focus for improvements if we are to address current local health inequalities. The potential longer term cost benefits through savings in expenditure on health, reduced cost of crime, and economic benefits through reduced lost working days due to ill health identified in the report add to the overall improved quality of life from improved living conditions, suggesting that the total social benefits to cost ratio of improving poor homes is 2:1.

I am also delighted that Leeds City Council by commissioning this research has made a significant contribution to the national housing and health evidence base. In addition the report is timely. The re-organisation of the NHS will result in Local Authorities taking the local leadership role for health and well being. The opportunities for closer partnership working have never been greater. The evidence can be shared with other organisations to influence future policy and strengthen the case for continued investment to tackle poor housing conditions.

Dr Ian Cameron

Joint Director of Public Health · NHS Leeds and Leeds City Council

Authors of this report

Geoff Green

Professor of Urban Policy

Bernard Stafford

Economist

Paul Pugh

Designer

Acknowledgements

Our study and the report itself are a collective effort. Thanks especially to Mark Dolman Support Manager for Leeds City Council's Health & Environmental Action Service, who supported us throughout its production and to Andy Beattie Head of Service for commissioning the report. Nahim Mehmood-Khan, Commissioning and Contracts Manager, Housing Strategy and Solutions, was responsible for commissioning a sister report on the Leeds Supporting People Programme. Thanks too to their colleagues with Leeds City Council for information and policy guidance: Ivor Trueman, Energy Audit Coordinator; Rob Kirton, Crime Reduction Coordinator; Fiona McLaughlin, Principal Partnership Analyst; Rob Kirton, Crime Reduction Coordinator; Huw Jones, Strategy and Intelligence Manager.

Officers from partner organisations generously supplied information and feedback: Carla van Hal, Operations Manager with Community Action and Support Against Crime; Bill Rollinson, Director, Care and Repair Leeds; Marg Bamford, Leeds Tenants Federation; Huw Jones, Strategy and Intelligence Manager, Re'new; David Lynch, Research Officer, National Energy Action; Erik Coates, Warm Front General

Manager, Eaga; Myrte Elbers, Health Improvement Specialist, Leeds Health; and Simon Orange, Health Intelligence Specialist with Yorkshire and Humber Public Health Observatory.

The academic team combined social skills with harder economic skills required to make the case for sustained 'preventative' investment in a period of austerity. Professor David Ormandy, University of Warwick, provided guidance on the Housing Health and Safety Rating System which he developed for the government and Tom French added to the methodology. Economist Dr. Bernard Stafford, formerly of the University of York, undertook the cost benefit analysis. Paul Pugh designed the report to make it as accessible as possible to a wider audience in the policy communities. As co-coordinator of the study, I take responsibility for any errors and omissions.

Geoff Green

Professor of Urban Policy
Centre for Health and Social Care Research
Sheffield Hallam University

Executive Summary

Messages

- **Commission**
Commissioned by Leeds City Council, this report affirms the Leeds Vision that 'housing contributes to health and well-being.'

- **Challenge**
The root causes of health and health inequalities are to be found in the wider structures of society, largely beyond the reach of the National Health Service.

- **Warmth**
Nearly a fifth of private sector dwellings are energy-inefficient and fuel poverty is widespread in low income households, causing poor health and winter deaths.

- **Safety and Independence**
A fifth of serious hazards in the Leeds' private housing stock are those likely to cause accidents and compromise the independence of disabled and frail occupants.

- **Security**
Though crime is falling in Leeds, domestic burglaries remain high in hotspots and fear of burglary is common, eroding the mental health of residents.

- **Costs**
The cost of measures to improve the warmth, safety, independence and security of residents in private housing is in the order of £110 million.

Recommendations

- **Commission**
In a period of austerity there is a strong economic case for 'dynamic' rather than 'silo' accounting, highlighting the cross-sector benefits of investment.

- **Challenge**
Investing in Leeds' private housing stock will enhance the health of residents, reduce demands on the National Health Service and contribute to the local economy.

- **Warmth**
Improving the energy efficiency of the Leeds housing stock will improve living conditions, and reduce fuel poverty, with fewer winter deaths and better physical and mental health.

- **Safety and Independence**
There should be an integrated programme of investment in home safety measures and home adaptations to maintain the independence of disabled and older occupants.

- **Security**
Leeds partners should maintain investment in target hardening homes to improve mental health by reducing burglary and fear of crime.

- **Benefits**
The monetised benefits of measures to improve the warmth, safety, independence and security of residents in private housing is in the order of £218 million.

Introduction

Key message 1: *The root causes of population health and health inequalities are to be found in the wider structure of our society, largely beyond the reach of the National Health Service.*

Key message 2: *Investing in Leeds' housing stock will enhance the health of residents, reduce demands on the National Health Service and contribute to the local economy.*

Commission

Decent homes for everyone are the hallmark of a civilised society, with an impact way beyond four walls. There is compelling evidence that housing investment can contribute to the general health and prosperity of a city like Leeds. As affirmed by *Vision for Leeds*^{1,2} (the city's overarching community strategy) all domains of city life are connected; social with economic, economic with the environment. Creating a healthy city means 'making sure that housing contributes fully to health and well-being.'

This is the rationale behind the commission for Sheffield Hallam University to gauge the wider impacts of improving private sector housing conditions in the city. Our focus here on physical living conditions is complemented by our sister cost-benefit analysis of the Leeds *Supporting People Programme*.³

Rationale

'Prevention is better than cure' most people agree. Yet the National Health Service spends only about 4% of its budget on public health and prevention. This is not a criticism: for two reasons. *First*, it is higher than the

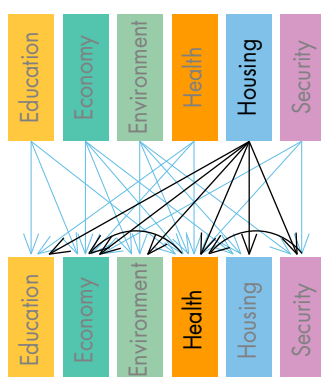
average in advanced economies and double the percentage 10 years ago. Much more is spent now on promoting healthy lifestyles. *Second*, more important, responsibility for tackling the root causes of ill-health lies beyond the remit of the NHS, with government and their local partners responsible for the wider determinants of economy, environment and social life.⁴

Dynamic accounting

Though 'joined up thinking' is a golden thread woven into *The Vision for Leeds* and a strong Local Strategic Partnership orchestrates contributions from every sector of city life, the new system for financing local government scrutinises cross-sector benefits. Area Based Grants confer welcome freedoms and flexibilities by consolidating government funding streams for specific services into a general grant for core services.⁵ However this requires greater transparency in costs and benefits, especially during a period of austerity. In turn transparency requires a better understanding of the pathways from housing investment to wider community impacts.

We develop further the methodology of our previous health impact assessments in Sheffield⁶ and Ealing,⁷ our

Figure 1.1: **Dynamic accounting**



¹ The Leeds Initiative (2004). *Vision for Leeds 2004-2020*. The Leeds Initiative. Leeds.

² Outcomes for *The Leeds Vision* are updated in Leeds Strategic Plan 2008-11.

³ Green, G., Heywood, F., Stafford, GB., Pugh, P. (2011) *Supporting People, Better Health and Well-Being: A cost-benefit analysis of Housing Related Support Services in Leeds*. Sheffield Hallam University.

⁴ Department of Health (2010) *Healthy Lives, Healthy People: Our strategy for Public Health in England*. HM Government. London.

⁵ Department of Communities and Local Government (2008) Area Based Grant, General guidance 2008 CLG. London. <http://www.communities.gov.uk/documents/localgovernment/pdf/706552.pdf>

⁶ Gilbertson, J., Green, G., Ormandy, D. (2008) *Decent Homes, Better Health: Sheffield Decent Homes Health Impact Assessment*. Sheffield Hallam University.

⁷ Gilbertson, J., Green, G., Ormandy, D., Stafford, GB. (2008) *Decent Homes, Better Health: Ealing Decent Homes Health Impact Assessment*. Sheffield Hallam University.

Introduction

2

health impact evaluation of the national Warm Front scheme for the UK government⁸ and integrated impact assessments for Neighbourhood Renewal Areas in Grimsby,⁹ North East Lincolnshire and Deeside in North Wales.

We have developed the concept and tool of dynamic accounting (as an advance on the silo accounting which has characterised local government in the past). Figure 1.1 indicates how investment in each domain within the competence of partners to the Leeds Initiative, has an impact on all the other domains. Of course investment in the housing stock will improve the quality of housing, but it also has a wider impact, for example on health and security. In turn, those who feel safer, have better health, and healthier people make a bigger contribution to the economy of Leeds.

⁸ Green, G., Gilbertson, J. For the Warm Front Study Group (2008) *Warm Front, Better Health: Health Impact Evaluation of the Warm Front Scheme*. Sheffield Hallam University.

⁹ Green, G., Stafford, GB., Pugh, P. (2009) *A new neighbourhood dynamic for Grimsby's East Marsh: An integrated impact assessment*. Sheffield Hallam University.

2

Method

Key message 1: *The national Housing Health and Safety Rating System was used innovatively to estimate the potential health impact of improvements to the worst private sector housing stock in the City of Leeds.*

Key message 2: *A preliminary cost benefit analysis was undertaken using methods which give a monetary value to gains in personal health status, reduced costs to the NHS and criminal justice system, and reduction in working days lost through ill health.*

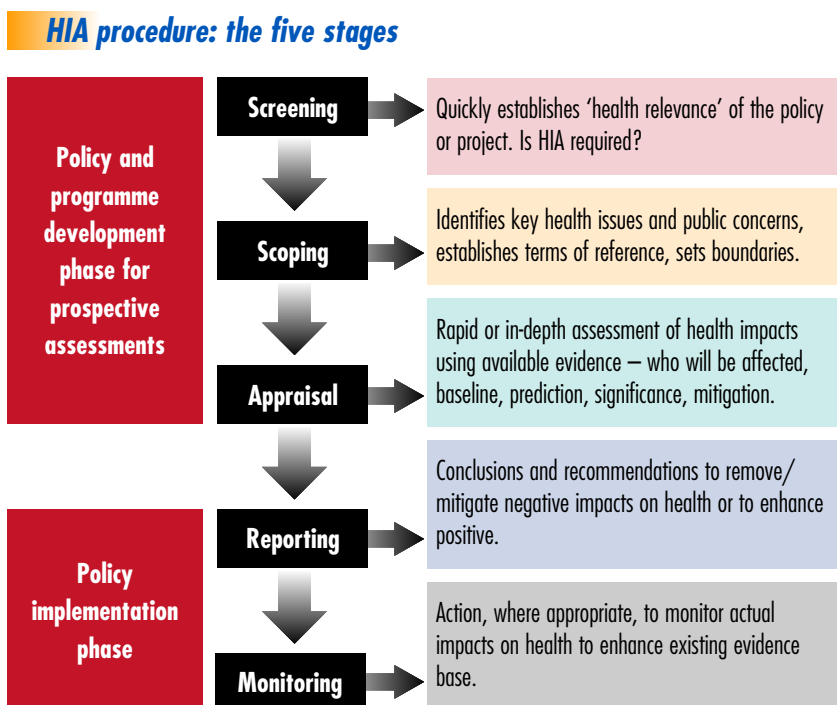
Introduction

In 2009 Leeds City Council considered how Health Impact Assessment (HIA) could highlight wider benefits of improving 81,800 dwellings classified as non-decent¹ by a Private Sector House Condition Survey.² This 'screening' was the first of a five stage process (figure 2.1) recommended by the World Health Organization.³ Our interim report⁴ then highlighted the 'scope' of health benefits which might flow from housing improvement.

This final report contains the 'appraisal' stage which quantifies the potential range and scale of health benefits flowing from a remedial investment programme. Our estimates draw on a large body of existing evidence relating housing to health (even though there are relatively few robust intervention studies which assess the impact of housing investment).⁵ We conclude with recommendations for mitigating the negative and enhancing the positive impacts on health.

To estimate the impact of housing investment on *warmth, safety* and *security* our core methodology is to apply the national Housing Health and Safety Rating System (HHSRS) to the non-decent stock dwellings

Figure 2.1: The process of Health Impact Assessment



in the city. We *start* with a ballpark estimate of health impact based on national data produced to support the HHSRS, and *then* refine it as far as we can with data from the Leeds stock condition survey. Housing conditions are rated for their impact on health, both before and after improvements potentially generated by a remedial investment programme identified by the Leeds Stock Condition Survey (LSCS). The difference between the two estimates (pre- and post-intervention) is our assessment of the potential health impact.

¹ Office of the Deputy Prime Minister (2004) *A Decent Home – The definition and guidance for implementation*. ODP. London., as amended by Part 1 of the Housing Act, 2004.

² Capital Project Consultancy Ltd and JE Jacobs. (2007) *Leeds Stock Condition Survey*. Leeds City Council. Leeds.

³ <http://www.who.int/hia/tools/en/> accessed 30/08/10.

⁴ Geoff Green Frances Heywood, Paul Pugh, Bernard Stafford (2010) *Better Housing, Better Health: Assessing the Wider Impact of Housing Conditions in Leeds, Interim Report*. Sheffield Hallam University.

⁵ Thomson, R., Petticrew, M., Morrison D. *Health effects of housing improvement: systematic review of intervention studies*. *BMJ* 2001;323:187-190.

Method

The Housing Health & Safety Rating System

The national guidance⁶ calculates the likelihood of a hazard giving rise to a harmful occurrence, providing evidence⁷ both on the likelihood of harm posed by each hazard (e.g. 1 in 250) and the scale of harm arising (e.g. from broken arm to death). The basic four stage sequence is summarized in figure 2.2.

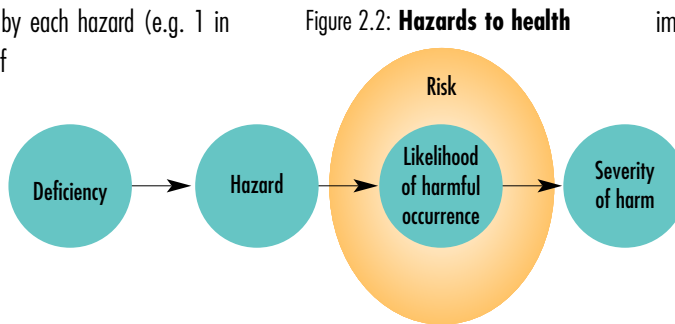


Figure 2.2: Hazards to health

cold and damp) than will give rise to an occurrence of actual harm to one of their residents (illness or death) and an even smaller number will give rise to illness which is reported or death which is attributed.

Our estimates of the impact of housing improvement on health are therefore at the conservative end of the spectrum.

The HHSRS identifies 29 hazards⁸ which harm health. They are grouped under 4 heads – (A) Physiological requirements (B) Psychological requirements (C)

Protection against Infection (D) Protection against Accidents. Hazards relate to ‘elements’ of the building such as the heating system or external wall construction. Figure 2.3 highlights (in blue) just 10 of the potential hazards which may be significantly reduced by an improvement programme. These are investigated in the following chapters.

For any cost-benefit analysis involving NHS resources, it is important to distinguish this *likelihood of actual harm* requiring medical attention (the HHSRS benchmark) from the wider risk posed by a hazardous property. Many more properties will pose a *risk* (for example by being

Figure 2.3: Potential hazards

A. PHYSIOLOGICAL REQUIREMENTS			
Hygrothermal Conditions		Pollutants (non-microbial)	
1. Damp and mould growth	4. Asbestos	8. Radiation	
2. Excess cold	5. Biocides	9. Uncombusted fuel gas	
3. Excess heat	6. Carbon Monoxide	10. Volatile organic compounds	
	7. Lead		
B. PSYCHOLOGICAL REQUIREMENTS			
Space, Security, Light and Noise			
11. Crowding and space	12. Entry by intruders	13. Lighting	14. Noise
C. PROTECTION AGAINST INFECTION			
Hygiene, Sanitation and Water Supply			
15. Domestic hygiene, pests and refuse	17. Personal hygiene, Sanitation and Drainage		
16. Food safety	18. Water supply		
D. PROTECTION AGAINST ACCIDENTS			
Falls	Electric shocks, Fires, Burns and Scolds	Collisions, Cuts and Strains	
19. Falls associated with baths etc	23. Electrical hazards	26. Collision and entrapment	
20. Falling on level surfaces	24. Fire	27. Explosions	
21. Falling on stairs etc	25. Flames, hot surfaces etc	28. Position and operation of amenities etc	
22. Falling between levels		29. Structural collapse and falling elements	

The HHSRS groups the range of health outcomes into four classes according to the degree of incapacity suffered. This allows physical injuries, serious health conditions and other health conditions to be compared.

Class I

This covers the most extreme harm outcomes. It includes: *Death from any cause; Lung cancer; Mesothelioma and other malignant lung tumours; Permanent paralysis below the neck; Regular severe pneumonia; Permanent loss of consciousness; 80% burn injuries.*

⁶ ODPM (2006) *Housing Health and Safety Rating System; Operating Guidance*. ODPM Publications. London.

⁷ Using data from the EHCS, the census and some commercially available datasets, a Housing and Population Database was produced. This contained information on housing and household characteristics. This was matched with data on injuries, the HASS, and mortality; and with data on Hospital Episode Statistics. Analysing these matched databases gave the national average

likelihood of an occurrence, that is an event or period of exposure, which could cause harm; and the national average spread of harm outcomes from such an occurrence. This is explained in *Statistical Evidence to Support the Housing Health and Safety Rating System Vol 1*, ODPM 2004.

⁸ Office of the Deputy Prime Minister (2006) *Housing Health and Safety Rating System; Operating Guidance*. ODPM Publications. London.

Method

Class II

This Class includes severe conditions, including: *Cardio-respiratory disease; Asthma; Non-malignant respiratory diseases; Lead poisoning; Anaphylactic shock; Cryptosporidiosis; Legionnaires disease; Myocardial infarction; Mild stroke; Chronic confusion; Regular severe fever; Loss of a hand or foot; Serious fractures; Serious burns; Loss of consciousness for days.*

Class III

This Class includes serious conditions such as: *Eye disorders; Rhinitis; Hypertension; Sleep disturbance; Neuro-psychological impairment; Sick building syndrome; Regular and persistent dermatitis, including contact dermatitis; Allergy; Gastro-enteritis; Diarrhoea; Vomiting; Chronic severe stress; Mild heart attack; Malignant but treatable skin cancer; Loss of a finger; Fractured skull and severe concussion; Serious puncture wounds to head or body; Severe burns to hands; Serious strain or sprain injuries; Regular and severe migraine.*

Class IV

This Class includes moderate harm outcomes which are still significant enough to warrant medical attention. Examples are: *Pleural plaques; Occasional severe discomfort; Benign tumours; Occasional mild pneumonia; Broken finger; Slight concussion; Moderate cuts to face or body; Severe bruising to body; Regular serious coughs or colds.*

In addition there is evidence of the psychosocial⁹ effects of housing improvements from both our Warm Front¹⁰ and Liverpool studies.¹¹ These relate both to improvements in mental health associated with better living conditions and to the negative impacts associated with the redevelopment process.

Local estimates

In order to gauge the health impact of improving housing conditions in Leeds for each year after completion we have selected 10 of the 29 harms for special attention. We reckon that an improvement

programme will not impact significantly on the other 19. The estimate for each of these 10 key harms is derived in 9 stages illustrated using the example of excess cold in tables 2.4, 2.5 and 2.6 below.

Table 2.4 estimates

how an improvement programme for the 21,025 least energy efficient dwellings (classified as having a 'category 1' hazard¹²) will reduce the likelihood and number of occupants seeking medical attention because of cold housing conditions.

The first baseline (1) for the least energy efficient housing stock in Leeds is derived by applying national likelihood ratios. Second (2) a more refined estimate of the baseline is derived by accounting for differences between the national and Leeds target stock profile. The ages and archetypes of the Leeds stock are recorded in the *Private Sector Housing Condition Survey (LSCS)*.

Third (3) expert members of our team estimate the lesser likelihood of harm to health following an improvement programme. The estimate is derived empirically from (a) HHSRS ratings of the private sector stock and (b) the scope of the improvement packages identified in the LSCS report as they apply to the range and number of archetypes. Harm to health in the 21,025 target properties is estimated both annually and over the 15 year life of improvement measures such as central heating boiler replacement.

Figure 2.4: **First stages in estimating the example of harm from excess cold**

	(1)	(2)	(3)	(4)
	<i>Base via English Average</i>	<i>Leeds Baseline</i>	<i>Post-improvement</i>	<i>impact = (2) minus (3)</i>
<i>Likelihood</i>	<i>1 in 380</i>	<i>1 in 150</i>	<i>1 in 800</i>	
<i>Persons affected</i>	<i>1 year</i> <i>15 years</i>	<i>55</i> <i>825</i>	<i>140</i> <i>2100</i>	<i>26</i> <i>390</i>
				<i>-114</i> <i>-1710</i>

⁹ Hiscock R., Kearns A., Macintyre S., Ellaway E. *Ontological Security and Psycho-Social Benefits from Home: Qualitative Evidence on Issues of Tenure. Housing Theory and Society 2001 : 18: 50-56.*

¹⁰ Green G., Gilbertson J. for the Warm Front Study Group (2008) *Warm Front, Better Health; Health Impact Evaluation of the Warm Front Scheme.* Sheffield Hallam University, Sheffield.

¹¹ Critchley R., Gilbertson JM., Green G., Grimsley MJ. (2004) *Housing Investment and Health in Liverpool. CRESR.* Sheffield Hallam University.

¹² Office of the Deputy Prime Minister (2006) *Housing Health and Safety Rating System; Operating Guidance.* ODPM Publications. London.

Method

Fourth (4) our estimate of the harm reduction (or health impact) is the baseline estimate (2) minus the reduced estimate (3) generated by the improvement programme. Using again the example of harm from excess cold, if our baseline estimate is 140 residents seeking medical attention and our post intervention estimate is 26, then the impact of the improvement programme is to reduce harm to occupants from excess cold by an estimated 114 in a typical year and 1710 over the estimated 15 year life of the package of energy efficiency improvements.

However figure 2.4 conveys an unwarranted level of precision in our estimates because there may be variations judgements made by assessors. We have therefore adopted the approach of the *Operating Guidance* by giving a *range* of likelihoods. Developed primarily for environmental health practitioners assessing the condition of individual properties, the *Operating Guidance* gives a 'Representative' scale point to cover a range of estimated likelihoods. (page 19). Figure 2.5 illustrates how the formula is applied to excess cold by stages (5-7).

The impact (8) shown in figure 2.5 is derived by subtracting the estimate of harm after the improvements from the baseline position before. Since both the pre- and post-intervention estimates are represented by ranges, the estimated reduction in occurrences of harm to health (impact) in 21,025 target properties is a minimum of 79 (117 minus 38) and a maximum of 141 (162 minus 21) each year and between 1185 and 2115 over 15 years.

Figure 2.5: **Later stages in estimating the example of harm from excess cold**

	(5)	(6)	(7)	(8)
	<i>Base via English Average</i>	<i>Leeds Baseline</i>	<i>Post-improvement</i>	<i>impact = (6) minus (7)</i>
<i>Likelihood</i>	1 in 320 -560	1 in 130 -180	1 in 560 -1000	
<i>Persons affected</i>	1 year 15 years	38-66 570-990	117-162 1755-2430	21-38 315-570
				79-141 1185-2115

The final stage (9) is to estimate the range of health outcomes. The *Operating Guidance* gives the spread of health outcomes for each of the 29 hazards. The distribution of classes varies from hazard to hazard. In the case of harm from excess cold illustrated in figure 2.6, 34 per cent of those affected suffer extreme (Class I)

harm, including death, and at the other end of the spectrum 42 per cent suffer Class IV harms including 'regular serious coughs and colds.' This percentage spread is applied to the overall numbers harmed in Leeds target homes. The bottom row of figure 2.6 gives the estimated reduction in each class of health outcome.

Figure 2.6: **Final stage in estimating the range of health outcomes**

	<i>Likelihood of an occurrence</i>	<i>No. of dwellings where a person suffers harm</i>	<i>Spread of health outcomes</i>			
			<i>Class I Extreme</i>	<i>Class II Severe</i>	<i>Class III Serious</i>	<i>Class IV Moderate</i>
		<i>between</i>	34.0%	6.0%	18.0%	42.0%
Before improvement	1 in 130-180	117-162	40-55	7-10	21-29	49-68
After improvement	1 in 560-1000	21-38	7-13	1-2	4-7	9-16
Reduction	1 year 15 years	79-141 1185-2115	27-48 405-720	5-9 75-135	14-25 210-375	33-59 495-885

Cost-benefit

A preliminary cost benefit analysis was undertaken using methods which give a monetary value to gains in personal health status, reduced costs to the NHS and criminal justice system, and reduction in working days lost through ill health. The methodology is summarized in the appendix to chapter 6.

3

Warmth and Comfort

Key message 1: Nearly a fifth of private sector dwellings in Leeds are not energy-efficient and fuel poverty is widespread in low income households.

Key message 1: Improving the energy efficiency of the Leeds housing stock will enhance living conditions, reduce fuel poverty and improve the health of occupants.

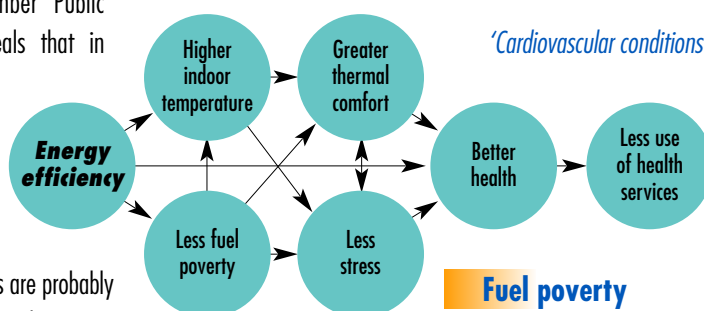
Warmth and health

Over the five year period 2005-2009, the Yorkshire and Humber Public Health Observatory reveals that in Leeds, on average, 325 more people died in each winter month compared with summer months (figure 3.2). Half these excess winter deaths are probably attributable to cold living conditions.¹

Yet deaths are only the tip of an iceberg. Figure 3.1 illustrates how energy efficiency measures can alleviate the poor health associated with low temperatures and fuel poverty. Robust evidence deployed by the UK Government's Housing Health and Safety Rating System shows that cold living conditions cause heart problems, primarily in older people. According to the Operating Guidance²:

'A healthy indoor temperature is around 21°C, although cold is not generally perceived until the temperature drops below 18°C. A small health risk of adverse health effects begins once the temperature falls below 19°C. Serious health risks occur below 16°C with a

Figure 3.1: Possible pathways to health



substantially increased risk of respiratory and cardiovascular conditions. Below 10°C the risk of hypothermia becomes appreciable, especially for the elderly.'

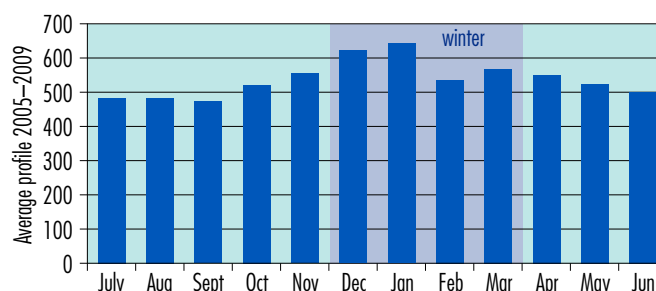
'Cardiovascular conditions (e.g. heart attacks and stroke) account for half the excess winter death, and respiratory diseases (e.g. influenza, pneumonia and bronchitis) account for another third.'

Fuel poverty

The LSCS estimates there are 43,600 (18%) private sector dwellings in Leeds where households are in fuel poverty – defined by the government as needing to spend more than 10% of their income to provide

adequate warmth and hot water. For low income households there is a trade-off between keeping warm and spending too much on fuel. Reducing fuel poverty is as important as raising indoor temperatures in impacting on health, especially mental health. In our national health impact evaluation of Warm Front (the government's home energy efficiency scheme), residents who found it 'very difficult' to pay fuel bills were 2.5 times more likely to report high or moderate stress. Those with high stress levels were 25 times more likely to report anxiety or depression.³

Figure 3.2: Excess winter deaths in Leeds



Source: Yorkshire Public Health Observatory: special extract

¹ Wilkinson, P., Armstrong, B., Stevenson, S., Pattenden, S., McKee, M., and Fletcher, T. (2001) *Cold Comfort: The Social and Environmental Determinants of Excess Winter Deaths in England 1986-1996*. Joseph Rowntree Foundation.

² Office of the Deputy Prime Minister (2006 page 60) *Housing Health and Safety Rating System: Operating Guidance*. ODP. London.

³ Green, G. Gilbertson, J. for the Warm Front Study Group. (2008) *Warm Front, Better Health: Health Impact Evaluation of the Warm Front Scheme*. Sheffield Hallam University. Sheffield.

Warmth and Comfort

Damp and health

Dampness is the second of nine hazards covered by our report. As revealed by our earlier study of residential tower blocks in Sheffield,⁴ the principal cause of damp and mould growth is condensation rather than water penetration. Figure 3.3 illustrates how damp might be cured, with a positive impact on health.

Condensation is caused partly by lifestyle, partly by lack of ventilation and predominantly by low temperatures. A number of epidemiological studies have demonstrated how damp is strongly associated with a range of symptoms, particularly respiratory problems, including asthma. The pathway of cause and effect is via airborne mould spores which grow in damp conditions and the prevalence of dust mites which thrive in humid conditions.⁵ But whereas cold conditions have most impact on older people, damp conditions (as confirmed by the *Operating Guidance*) are strongly linked to childhood illness.

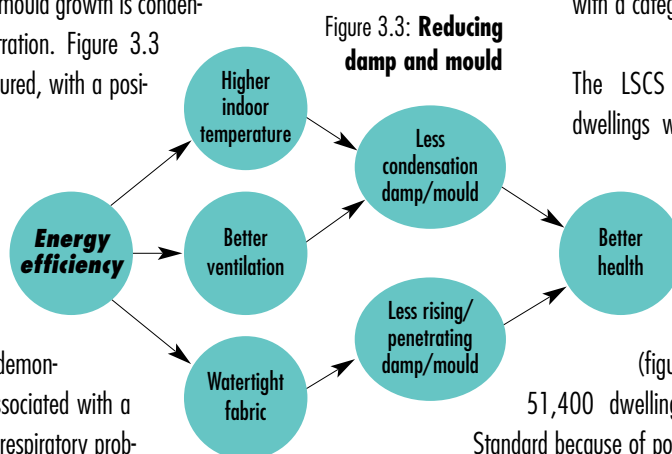


Figure 3.3: Reducing damp and mould

cold living conditions constituted a 'category 1'⁸ hazard so harmful to many occupants' health as to require urgent remedial action. Generally all dwellings with an energy efficiency rating (using a Standard Assessment Procedure) below 30 (on a scale of 1-100) were assessed with a category 1 hazard.⁹

The LSCS estimated there were 2058¹⁰ dwellings with a related hazard of **damp** so severe as to be classified as a category 1 hazard. However, because dampness arises because of poor thermal efficiency, primarily from low indoor temperature (figure 3.3) we have assumed that all 51,400 dwellings which fail the *Decent Homes* Standard because of poor thermal efficiency, are also potentially vulnerable to harm from health from damp and mould.

Third is the challenge of **fuel poverty**. The report identifies a clear correlation with low incomes.¹¹ Only 5.1% of households of the 43,000 households in fuel poverty had an income above £15,000 whereas 69% of households (30,120) with incomes below £10,000 were fuel poor. Figure 3.1 illustrates a further dynamic between fuel poverty and temperature in their influence on health. To avoid double counting we must distinguish the independent contribution of fuel poverty.

The challenge

Of the 81,800 private sector dwellings classified as non-decent by the LSCS, an estimated 51,400 failed the thermal comfort standard. Their report highlights both poor heating systems and limited thermal insulation, leading to energy-inefficient homes in this third of the Leeds private sector stock.⁶ In turn, poor energy efficiency creates the 'hazard' of excess **cold** which can have a harmful impact on the health of occupants. Surveyors estimated that in 16,250⁷ of these dwellings,

Baseline

In order to estimate the reduction in harm to health from improving the thermal efficiency of 51,400 target dwellings, a first step is to establish a baseline. As in our previous health impact assessments of the Decent Homes programme in Sheffield¹² and Ealing¹³ we estimate the

⁴ Green G., Ormandy D., Brazier J., Gilbertson JM. (2000) *Tolerant building: the impact of energy efficiency measures on living conditions and health status*, in Rudge J & Nicol F (eds) *Cutting the Cost of Cold*. E&FN Spon, London.

⁵ Oreszczyn T, Ridley I, Hong S, Wilkinson P. *Mould and winter indoor relative humidity in low income households in England*. *Indoor Built Environment* 2006; 125-135.

⁶ Capital Project Consultancy and JE Jacobs (2007, page 58) *Leeds City Council Stock Condition Survey*. Leeds City Council, Leeds.

⁷ Calculated as 61.6% (figure 5.1 of the LSCS report) of the estimated 34,300 category 1 hazards (para. 5.3.1 of the Leeds Stock Condition Report).

⁸ According to the HHSRS *Operating Guidance*, a hazard score is calculated by multiplying the likelihood of harm to health by the spread of harm by class, with class I given the most weight and Class IV the least.

⁹ In accord with government guidance. DGLC (2006) *A Decent Home: Definition and Guidance for Implementation*. Department of Communities and Local Government. London.

¹⁰ Calculated as 0.6% (figure 5.1 of the LSCS report) of the estimated 34,300 category 1 hazards (para. 5.3.1 of the Leeds Stock Condition Report).

¹¹ Capital Project Consultancy and JE Jacobs (2007, page 66) *Private Sector Housing Stock Condition Survey*. Leeds City Council.

¹² Jan Gilbertson, Geoff Green, David Ormandy (2006) *Decent Homes, Better Health: Sheffield Decent Homes Health Impact Assessment*. Sheffield Hallam University.

¹³ Jan Gilbertson, Geoff Green, David Ormandy, Bernard Stafford (2008) *Decent Homes, Better Health: Ealing Decent Homes Health Impact Assessment*. Sheffield Hallam University.

Warmth and Comfort

harmful effects of excess **cold** and **damp** by building on the national Housing Health and Safety Rating System (HHSRS). The additional impact of fuel poverty is estimated separately for its impact on mental health. This additional component is derived from evidence revealed by our Warm Front study. The *Technical Report*¹⁴ supporting the HHSRS

The harmful impact on health of **excess cold** in the Leeds private sector housing stock is estimated by referring to both (i) the LSCS report and (ii) the benchmark 'likelihoods' in HHSRS *Operating Guidance*. The report (page 60) reveals Leeds has a profile of energy efficiency (as measured by the Standard Assessment Procedure) similar to the

English national profile. The guidance gives a benchmark for all the English housing stock, with a likelihood of 1 in 380 of excess cold leading to harm to health to an occupant requiring medical attention. Our methodology translates this into likelihoods ranging between an estimated 1 in 320 and 1 in 560.

Because the Leeds and English profiles of energy efficiency are similar, it is probable that the likelihood range of harm to health from excess cold is also similar. However this applies to all 247,850 dwellings which comprise the private sector stock in Leeds. Occupants of the 51,400 target dwellings which fail standards of thermal efficiency will have a higher likelihood of suffering harm to health. After some further local modelling by officers in Leeds we estimate that a category 1 hazard of excess cold will have a likelihood of between 1 in 100 and 1 in 180 of harming an occupant and the remaining properties which

fail the thermal comfort standard a likelihood of between 180 and 320.¹⁵ Figure 3.4 gives shows these likelihoods with the estimated number of occupants harmed. The class one harms (between 68 and 121) are deaths.

Figure 3.4: Leeds private sector stock: annual baseline likelihood of harm from excess cold

	Likelihood of an occurrence of harm	No. of dwellings where a person suffers harm: between	Spread of health outcomes			
			Class I	Class II	Class III	Class IV
Category 1 Hazard before investment	1 in 100–180 16,250 dwellings	90–163	31–55 34.0%	5–10 6.0%	16–29 18.0%	38–70 42.0%
Add thermal comfort failure before investment	1 in 180–320 35,150 dwellings	110–195	37–66	7–12	20–35	46–82
Category 1 hazard + failure	51,400 dwellings	200–358	68–121	12–22	36–64	84–152

Figure 3.5: Leeds private sector stock: annual baseline likelihood of harm damp and mould

	Likelihood of an occurrence of harm	No. of dwellings where a person suffers harm: between	Spread of health outcomes			
			Class I	Class II	Class III	Class IV
Category 1 Hazard before investment	1 in 100–180 of 206 dwellings	1–2	0 0.0%	0 1.0%	0 10.0%	1–2 89.0%
Add target dwellings with thermal comfort failure before investment	1 in 180–320 of 51,194 dwellings	160–284	0	0	16–28	142–253
Category 1 hazard + failure	51,400 dwellings	161–286	0	0	16–28	143–255

Operating Guidance does not include mental health harms when estimating the impact of excess cold and though the narrative of the damp hazard refers to 'threats to mental health and social well-being' the identified harms are confined to cardio-respiratory disease (Class I & II) and 'coughs and wheezes' (Class III and IV).

¹⁴ University of Warwick/London School of hygiene and Tropical Medicine (2003) *Statistical evidence to support the Housing Health and Safety Rating System*. Vol. II. Office of the Deputy Prime Minister. London.

¹⁵ These are respectively two and one band higher than the English average.

Warmth and Comfort

Because the Leeds and English stock profiles of energy efficiency are similar, it is probable that the likelihood range of harm to health from **damp and mould** is also similar. However it will be higher in the 51,400 target dwellings where (as previously indicated) excess cold may lead (via condensation) to mould and damp. The LSCS report identifies only 206¹⁶ dwellings with a severe Category 1 hazard of damp and mould. As with excess cold we have given a likelihood of harm to health in these dwellings of between 1 in 100 and 1 in 180. We assume the remaining 51,194 target dwellings will have less likelihood of damp and mould. Given the English average of 1 in 464 is within the representative range of 1 in 320 and 1 in 560, then, as with excess cold we assume a range of 1 in 180 to 1 in 320. Figure 3.5 gives shows these likelihoods with the estimated number of occupants harmed.

The impact of **fuel poverty** on health is estimated by ‘triangulating’ evidence from a number of published sources and inserting them into the HHSRS framework. LSCS used the conventional government definition of fuel poverty to estimate 43,600 private sector households in fuel poverty in 2007, a marginally higher percentage (18%) than the English average (13.2%).¹⁷ In the same year a survey by the National Centre for Social Research (NatCen) estimated¹⁸ that an approximately equivalent percentage of English households (14%) used less fuel due to ‘worry about housing costs.’ NatCen identified this as one of four critical aspects of fuel poverty.

NatCen reported 27% of respondents from these households suffered from anxiety or depression, over twice the proportion of those not in fuel poverty (table 7.1). And of these, only 1 in 4 is likely to seek medical attention.¹⁹ These coefficients (1 in 3.7 and 1 in 4) are multiplied

Figure 3.6: Leeds private sector stock: annual likelihood of harm from fuel poverty

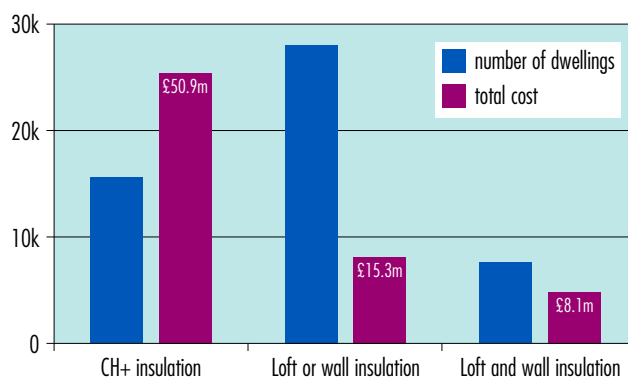
	Likelihood of an occurrence	No. of dwellings where a person suffers harm: between	Spread of health outcomes			
			Class I	Class II	Class III	Class IV
			0.0%	0.1%	9.1%	90.8%
Fuel poverty before investment	1 in 10–18 43,600 households	2422–4360	0	24–43	220–397	2199–3959

together to produce a likelihood of harm leading to medical attention of 1 in 15. This fits into a HHSRS representative scale range of 1 in 10 to 1 in 18. The NatCen report defined anxiety and depression as ‘common mental disorder’ which is primarily a Class IV harm in the HHSRS.²⁰

Investment programme

LSCS recommend an improvement programme costing £74 million to remedy thermal comfort failures (page 59) of which £40 million is earmarked for the severe category 1 hazards. Figure 3.7 summarises the three types of remedial action, the number of properties which would benefit and the total cost. First, in 15,000 dwellings with room heaters only, they propose central heating is installed at an average cost of £3370 and a total cost of £50.9m. Second there are 28,700 dwellings requiring loft or wall insulation at an average cost of £530 and a total cost of £15.3 million. Third, there are 7,600 dwellings with electric storage heaters or LPG/solid fuel

Figure 3.7: Remedial action for thermal comfort failure



¹⁶ Calculated as 0.6% (page 43) of 34,300 dwellings with Category 1 hazards (page 42).

¹⁷ National Statistics (2009) *Report on Fuel Poverty Statistics*. Department of Energy and Climate Change. London.

¹⁸ Harris J., et al (2010) *Health, mental health and housing conditions in England*. National Centre for Social Research/Eaga. London.

¹⁹ Centre for Economic Performance: Mental Health Policy Group. (2006) *The Depression Report: a new deal for depression and anxiety disorders*. London School of Economics. London.

²⁰ The spread of harms is assumed the same as for the hazard of entry by intruders which relates wholly to mental health impacts. University of Warwick/London School of Hygiene & Tropical Medicine (2003) *Statistical evidence to support the Housing Health and Safety Rating System*. Office of the Deputy Prime Minister, London.

Warmth and Comfort

central heating requiring both loft and wall insulation at an average cost of £1060 and a total cost of £8.1 million.

Potential impact on health

We estimate that the improvement programme recommended by LSCS will substantially reduce the hazard of excess **cold** from a likelihood of 1 in 100-320 to 1 in 560-1000, the representative range of risk just below the English average (figure 3.8). The annual reduction in harms to health is between 109 and 307. The estimated reduction in Class 1 harms is between 37 and 104. According to the *Operating Guidance*, all of these are deaths, primarily from heart disease. The maximum estimated impact is to reduce annual excess winter deaths in the City of Leeds (see figure 3.2) by up to a third (325 minus 104).

We estimate that the improvement programme recommended by LSCS will similarly reduce the hazard of **mould and damp** from a likelihood of 1 in 100-320 to 1 in 560-1000, the representative range of risk just below the English average (figure 3.9). The annual reduction in harms to health is between 69-235, with children as the main beneficiaries of a reduction in respiratory disease, and class IV harms of coughs and wheezes.

We estimate that the improvement programme recommended by LSCS will reduce the number of households in **fuel poverty** from 43,600 to an estimated 39,200. This estimate is derived via evidence from our Warm Front study showing that insulation measures reduced difficulty paying fuel bills by 16% and heating plus insulation measures reduced the difficulty by 43%. These differential coefficients are applied to the 36,300 dwellings recommended by LSCS for insulation only and the 15,100 dwellings recom-

mended for new heating systems plus insulation. The estimated 10.1% reduction in fuel poverty (of 4,400 households) reduces harm to mental health in up to 2183 households, though the worst case scenario is no reduction at all. Over 15 years these households (or their replacements) will have an occupant with better mental health, resulting in up to 32,745 fewer contacts with health services.

Figure 3.8: Leeds private sector stock: reduced likelihood of harm from excess cold

	Likelihood of an occurrence of harm in 51,400 dwellings	No. of dwellings where a person suffers harm Between	Spread of health outcomes			
			Class I	Class II	Class III	Class IV
Before improvement	1 in 310–560	200–358	68–121	12–22	36–64	84–152
After improvement	1 in 560–1000	51–91	17–31	3–5	9–16	21–39
Reduction 1 year		109–307	37–104	7–19	20–53	45–131
15 years		1635–4605	555–1560	105–285	300–795	675–1965

Figure 3.9: Leeds private sector stock: reduced likelihood of harm from damp and mould

	Likelihood of an occurrence of harm in 51,400 dwellings	No. of dwellings where a person suffers harm Between	Spread of health outcomes			
			Class I	Class II	Class III	Class IV
Before improvement	1 in 100–320	161–286	0	0	16–28	143–255
After improvement	1 in 560–1000	51–92	0	0	5–9	45–82
Reduction 1 year		69–235	0	0	7–23	61–210
15 years		1035–3525			105–345	915–3150

Figure 3.10: Leeds private sector stock: reduced likelihood of harm from fuel poverty

	Likelihood of an occurrence of harm in 43,600 households	No. of dwellings where a person suffers harm Between	Spread of health outcomes			
			Class I	Class II	Class III	Class IV
Fuel poverty before improvement	1 in 10–18 of 43,600 households	2422–4360	0	2–4	220–397	2199–3959
Fuel poverty after improvement	1 in 10–18 of 39,200 households	2177–3920	0	2–4	200–357	1977–3559
Reduction 1 year		0–2183	0	0–2	0–197	0–1982
15 years		0–32,745		0–30	0–2955	0–29,730

Warmth and Comfort

Summary impacts

Remediating thermal comfort failure in the 51,400 dwellings will both improve living conditions and reduce fuel poverty. The programme to improve energy efficiency recommended by LSCS will reduce the hazard of excess *cold* and the incidence of heart disease, respiratory infections, bronchitis and strokes. Up to 104 excess winter deaths will be prevented annually and up to 1560 over the estimated 15 years life of the energy efficiency measures. Older people are the main beneficiaries.

Since thermal comfort failure and resulting low temperatures are the primary cause of *mould and damp*, investment in energy efficiency will reduce this hazard and improve the health of up to 235 occupants who would previously have sought medical attention. The main beneficiaries are children who previously visited their General Practitioner for coughs and wheezes. Improvements in energy efficiency will reduce the number of households in *fuel poverty* from 43,600 to an estimated 39,200, reducing the number of occupants seeking medical attention for anxiety and depression by up to 2183 annually. Over 15 years there will be an estimated reduction in consultations of up to 32745.

In aggregate there is a reduction between 178 and 2725 of harms to health from excess *cold, damp, mould and fuel poverty*. There is a big difference between these worst and best case (least impact/most impact) scenarios caused primarily by uncertainty over the impact on mental health of reducing fuel poverty. The later cost-benefit chapter takes a mid-point. There will of course be many other people who suffer harm to health other than those identified via the Housing Health and Safety Rating System methodology. In this chapter, as in the HHSRS, only those seeking medical attention or dying are recorded.

4

Safety and Independence

Key message 1: A fifth of serious hazards in the Leeds' private housing stock are those likely to cause accidents and injury.

Key message 2: There should be an integrated programme of investment in home safety measures and home adaptations to maintain the independence of older residents.

Challenge

Safety and independence go hand in hand. A safe and secure home encourages independence in children and protects older people from harm. Of the near three million accidents which befall the UK population every year, the majority are in the home.¹ The Government's Housing, Health and Safety Rating System (HHSRS) identifies falls, electric shocks, fires, burns and scolds as potential hazards.

The LSCS report reveals all these hazards present in the Leeds housing stock, with the risk of falls on the level or on stairs being the most serious. This is the first challenge highlighted in this chapter: to improve safety and reduce harm to health. A second, related challenge identified in the *Leeds Joint Strategic Needs Framework*² is 'to promote and prolong the possibility of independent living.' Of course a basic requirement for independent living is to reduce hazards which compromise safety. Then, in addition the LSCS report identifies adaptations required in the homes of 31,100 households in Leeds with one or more residents with a disability.

Older people

Older people will be the main beneficiaries of any investment to improve safety. Published in 2001, the Government's *National Service Framework for Older People*³ emphasised falls as a

major cause of disability and the leading cause of mortality from accidents. The HHSRS identifies falls as the most common type of accident and residents aged over 60 as the most likely to fall. The strategic report on *Accident Prevention in Leeds*⁴ reveals over 400 hip fractures annually and estimates the cost implications for health and social care services.

Active Ageing

Of course older people currently use more health and social care services than others. However age does not necessarily – or usually- bring dependency in its train. The World Health Organization recommends a life course approach which promotes intervention in early and middle life to prevent dependency and a supportive physical and social environment for those already in need of help.⁵ The key message is invest 'upstream' in the home to prevent disability and dependency.

Integrated approach?

Leeds could pioneer an approach which properly integrates housing investment into the promotion of independent living as recommended by Standard 6 of the *National Framework*. Too often the focus of falls prevention strategies is solely on the individual and excludes the living environment. Figure 4.1 illustrates three essential components. (i) The

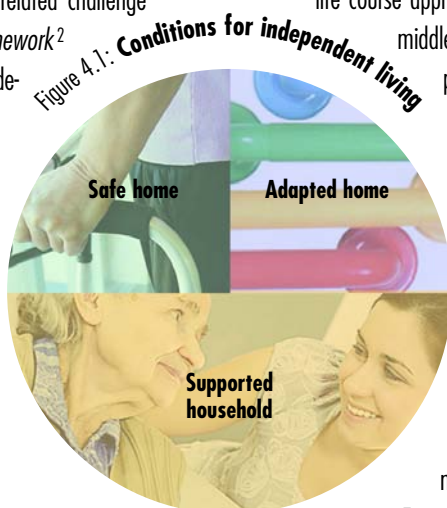


Figure 4.1: Conditions for independent living

¹ Royal Society for the Prevention of Accidents. www.rosipa.com/homesafety/advice/general/facts_figures.htm . Accessed 20/12/2009

² Leeds City Council/Leeds NHS (2009) *Implementing the Leeds Joint Strategic Needs Assessment Framework*. Leeds City Council/Leeds NHS.

³ Department of Health (2001) *National Service Framework for Older People*. DH. London

⁴ Leeds Multi-Agency Accident Prevention Group. (2008) *Accident Prevention in Leeds: Strategic Framework 2008-2011*. Leeds City Council. :

⁵ Noncommunicable diseases prevention and health promotion department. (2002) *Active Ageing: A policy framework*. World Health Organization. Geneva.

Safety and Independence

council's Health and Environmental Action Service has a vital role in ensuring the removal of physical hazards which compromise *safe living conditions*. (ii) Leeds Care and Repair is an independent home improvement agency contracted by the council to provide services for *disabled adaptations*, prevention of falls service and other support for independent living. (iii) Housing Related Support Services provide both physical and *social support* for vulnerable individuals and households to live in the community. The scope, costs and benefits of this service are analysed in a companion report.⁶

Accidents

Eleven of all the 29 hazards identified in the *Housing Health and Safety Rating System*⁷ lead to accidents. Of these 1,248,000 falls (figure 4.2) are the biggest sub-group,⁸ accounting for 46% of all home accidents in the UK for which medical attention was sought. The great majority of these relate to the design, construction and maintenance of the dwelling.

Most properly recorded falls are on the same level. The ODPM *Operating Guidance* distinguishes falls in bathrooms (hazard 19) from other falls on the level (hazard 20) with the main cause as *'slipping when getting into and out of the bath. Thus the slip resistance of the internal surfaces of the baths and showers when wet will affect the likelihood of an incidence occurring.'* The most common injuries are cuts or lacerations (27 per cent), swelling or bruising (26 per cent) or fractures (11 per cent). For falls

on the level, the *Guidance* identifies *'the construction, evenness, inherent slip resistance, drainage (for outdoor path surfaces) and maintenance of the floor or path surface as affecting the likelihood of an occurrence and the severity of an outcome.'* As with bathrooms, functional space and ergonomics also affect likelihood. These falls usually result in relatively minor injuries, though about 15 per cent can result in Class I or Class II injury such as fractures to head, brain and spine.

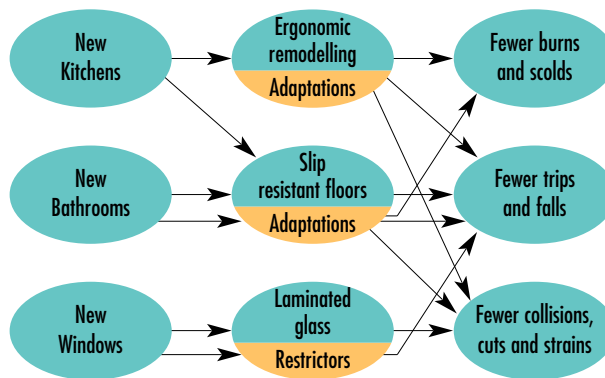
Figure 4.2: Annual UK falls in the home

Type of fall	Annual number
1. On same level (slip/trip/tumble)	417,893
2. On/from stairs/steps	306,168
3. On/from ladder/step ladder	35,281
4. From building/structure	11,624
5. Other fall ⁶	476,994
Total	1,247,960

Source: HASS Table 1. DTI. 24th (Final Report) of the Home Accident Surveillance System:2000, 2001,2002 data.

The second most common occurrence – accounting for around 25 per cent of home falls, is falling on steps and stairs, both inside and outside the home. The likelihood is greater on narrow and winding stairs, with irregular treads, without handrails or carpets. Though stair falls are not as common as falls on the level, the likelihood of a fatal accident is higher and fractures may lead to deterioration in health over the ensuing weeks and months. Falls between levels, generally out of windows, are a rare event, but can prove fatal especially from the first floor and above.

Figure 4.3: Reducing accidents



There is a second cluster of three hazards associated with electric shocks, fires, burns and scalds. *First*, Electric shocks are rare and caused by deficiencies in electric wiring, plugs, leads and appliances, most often in the living/dining room and kitchen. The majority of injuries are not severe and about half result in burns as well as shock.

Second, according to the *Guidance* there are around 70,000 dwelling fires reported to the Fire Brigades in the UK each year, with an additional 280,000 (small scale) fires going unreported. Over 80 per cent of accidental fires result from occupier carelessness or misuse of equipment or appliances. About half relate to cooking appliances, with a

⁶ Geoff Green, Frances Heywood, Bernard Stafford, Paul Pugh. (2011) *Better Housing, better health: a cost-benefit analysis of housing improvement in the city of Leeds*. Sheffield Hallam University.

⁷ Office of the Deputy Prime Minister. (2006) *Housing Health and safety Rating System: Operating Guidance*. ODPM Publications.

⁸ Department of Trade and Industry. (2002) *24th (Final Report) of the Home Accident Surveillance System:2000, 2001, 2002 data*. DTI London.

Safety and Independence

minority of these caused by deficiencies in equipment or how the cooker is sited.

Though over 90 per cent of fires do not result in injury, death can result from burns and being overcome by gas or smoke. *Third*, the likelihood of scalds and burns is influenced by ‘the design and layout of kitchens, the relationship between the kitchen and living/dining areas, the cooker location, the design or adjustment of fixed heating appliances, and the means of heating water.’ There is a relatively high risk of scalds and burns from flames or hot surfaces in homes with unfixed heaters and poor kitchen layout, resulting in spills from cups, kettles,

tea and coffee pots, saucepans, chop pans and deep fryers. Consequently around 112,000 people visit UK hospital accident and emergency units and a further 250,000 visit GP surgeries for burns and scald injuries, incurred principally in the home.

Reviewing the whole range of hazards, sometimes children are most at risk; sometimes older people. Older people are more likely to be injured in bathrooms and to fall down stairs. Though children under five are more likely to trip, stumble or fall on the level, the impact on older people is generally more severe, with immediate physical injury and longer term loss of confidence. Children are more likely to fall out of

windows, to receive an electric shock or suffer scalds and burns from other sources. And though a household with children is twice as likely to experience a fire as one without, it is older people with impaired mobility who are least likely to escape.

Figure 4.4: Leeds private sector stock: annual baseline likelihood of harm from accidents

HAZARD	Identified	Likelihood of an occurrence of harm (no of dwellings)	No of dwellings where person suffers harm between:	Spread of health outcomes			
				Class I extreme	Class II severe	Class III serious	Class IV moderate
Falls associated with baths & WC	Failure Decent Homes facilities (7100)	1 in 1000–1800	4–7	0–0	0–0	0–1	3–6
	Disabled adaptations needed (4060)	1 in 1000–1800	2–4	0–0	0–0	0–0	2–4
Falls on level	Category 1 hazard (3253)	1 in 18–32	102–181	0–0	14–25	28–49	59–106
	Failure Decent Homes facilities (7100)	1 in 56–100	71–127	0–0	10–17	19–34	42–74
	Disabled adaptations needed (1570)	1 in 56–100	16–28	0–0	2–4	3–6	9–16
Falls on stairs	Category 1 hazard (6795)	1 in 32–56	121–212	2–4	8–14	26–46	84–148
	Disabled adaptations needed (1570)	1 in 56–100	16–28	0–1	1–2	3–6	10–20
Falls between levels	Category 1 hazard (1244)	1 in 6–10	124–207	0–0	2–4	12–20	109–182
Fire	Category 1 hazard (2712)	1 in 56–100	27–48	2–3	1–1	8–14	17–29
Hot surface	Category 1 hazard (191)	1 in 6–10	19–32	0–0	0–0	3–6	15–26
	Failure Decent Homes facilities (7100)	1 in 100–180	39–71	0–0	1–1	7–13	32–57
Total			539–944	4–8	39–68	109–195	382–668

Baseline

The LSCS report three categories of dwelling where there are hazards likely compromise *safety* and cause harm to health. *First* are circa 15,000 dwellings with severe ‘category 1’ hazards.⁹ *Second*, a further 7,300 fail to meet the Decent Homes standards for modern kitchen and bathroom facilities, increasing risk to health. *Third*, the report identifies a requirement for 1570 more grab/hand rails, and the redesign of 150 more kitchens, 1540 WCs and 2520 bathrooms to better support the 31,000 households occupied by one or more residents with a disability. Figure 4.4

⁹ Calculated by adding the relevant percentages on page 43 to the 31,900 dwellings identified on page 42 as having category 1 hazards. Though some dwellings may more than one of the hazards, each is treated independently and cumulatively.

Safety and Independence

estimates the baseline number of dwellings at risk from six hazards (identified by the *Operating Guidance*) likely to cause accidents.

First, for dwellings with a category 1 hazard, our estimated likelihoods of harm to health are derived by tracking back the calculations behind the LSCS surveyors' assessments. According to the *Operating Guidance*, a hazard score is derived by multiplying the likelihood of risk by a weighting for each class of harm to health. The English average likelihood of risk from falling down stairs is 1 in 245, giving a score of 134. A higher risk of 1 in 33 gives a 'category 1' hazard score of 1000. Similarly the category 1 likelihood of falling on the level is 1 in 25 compared with the English average of 1 in 135; the category 1 likelihood of falling between levels is 1 in 8 compared with the English average of 1 in 1693; the category 1 likelihood of fire is 1 in 82 compared with the English average of 1 in 4760; the category 1 likelihood from hot surfaces is 1 in 7 compared with an English average of 1 in 182. The likelihoods shown in figure 4.4 are shown as a representative range to account for variation in the judgements of surveyors. These are applied to the number of dwellings with each hazard, every hazard having a different spread of harms.

Second, we have assumed that there is a higher than (England) average likelihood of accidents in the 7100 dwellings failing to meet the Decent Homes Standard for modern facilities. The LSCS allocates failure equally to ageing bathroom and kitchen facilities, but it is likely that both will have failed for the dwelling to be classified as non-decent. **Third**, we have assumed that the absence of certain adaptations for disabled people will increase the risk of falls. The LSCS identifies 1570 households needing grab or hand rails and 4060 house-

holds needing either or both a redesigned WC or bathroom.

Impact of improvements

We estimate that remedying the c15,000 'category 1' hazards which cause accidents will reduce the raised likelihood of harm down to the English average or one band below. Installing modern facilities in 7,100 dwellings, primarily kitchens and bathrooms, will reduce the above average likelihood of harm to the English average in the case of fire hazards, and to one or two bands below in the case of falls in bathrooms, on the level or down stairs. Additionally providing grab or hand rails for 1570 households is likely to reduce the risk of falls down stairs or on the level from one or two bands above the English average to the band below. Redesigning WCs or bathrooms for 4060 households is estimated to reduce falls from two bands above the English average to the average.

Figure 4.5: Leeds private sector stock: estimated reduction in harm from accidents

HAZARD	Improvement programme	Likelihood of an occurrence of harm (no of dwellings)	No of dwellings where person suffers harm between:	Spread of health outcomes			
				Class I extreme	Class II severe	Class III serious	Class IV moderate
Falls associated with baths & WC	Before	1 in 1000–1800 (11,169)	6–11	0–0	0–0	0–1	5–10
	After	1 in 3200–5600	2–3	0–0	0–0	0–0	2–3
	Reduction		3–9	0–0	0–0	0–1	2–8
Falls on level	Before	1 in 18–100 (11,923)	189–336	0–0	26–46	50–89	110–196
	After	1 in 180–320	37–66	0–0	5–9	10–18	22–39
	Reduction		123–299	0–0	17–39	32–79	71–174
Falls on stairs	Before	1 in 32–100 (8365)	137–240	2–4	8–14	26–46	84–148
	After	1 in 320–560	14–26	0–0	1–2	3–6	10–18
	Reduction		111–226	2–4	6–15	20–40	66–138
Falls between levels	Before	1 in 6–10 (1244)	124–207	0–0	2–4	12–20	109–182
	After	1 in 1800–3200	0–1	0–0	0–0	0–0	0–1
	Reduction		123–207	0–0	2–4	12–20	108–182
Fire	Before	1 in 56–100 (2712)	27–48	2–3	1–1	8–14	17–29
	After	1 in 3200–5600	0–1	0–0	0–0	0–0	0–1
	Reduction		26–48	2–3	1–1	8–14	16–29
Hot surface	Before	1 in 6–180 (7291)	58–103	0–0	1–1	10–19	47–83
	After	1 in 320–560	13–23	0–0	0–0	2–4	11–19
	Reduction		35–90	0–0	0–0	6–17	28–72
Total reduction	1 year		404–850	4–7	26–59	78–171	291–603
	15 years		6060–12,750	60–105	390–885	1170–2565	4365–9045

Safety and Independence

Summary

17

Different combinations of the three programme interventions recommended by LSCS are applied to each of the six hazards likely to cause harm to health from accidents. *First*, the small number of hazards in the bathrooms and WCs of circa 11,000 dwellings are tackled both by modernisation generally and adaptations for disabled households. *Second*, falls on the level causing harm are reduced by between 122 and 298 annually by addressing category 1 hazards in addition to the modernisation and adaptation programmes. *Third*, falls on stairs causing harm are reduced by between 95 and 198 annually by addressing category 1 hazards and providing grab and hand rails as part of the adaptations programme. *Fourth* and *fifth*, both falls between levels and fire hazards are addressed solely by addressing category 1 hazards. Finally, *sixth* addressing category 1 hazards and the modernisation program reduces the risk of harm from scolds and burns from hot surfaces by between 35 and 90 annually.

In total, the three programmes reduce the estimated harm to health from accidents by between 404 and 850 annually, or between 6060 and 12,750 over 15 years. Three-quarters of the reduction (291-603) is concentrated in the moderate classification (IV) of harm which includes broken fingers, slight concussion, moderate cuts to face or body and severe bruising of the body. A reduction of up to 7 extreme harms (class I) includes avoiding death from falls or fire, permanent paralysis below the neck and 80% burn injuries. Up to 59 class II harms are avoided, including loss of a hand or foot; serious fractures or burns. Finally between 78 and 171 class III harms are avoided including the loss of a finger, fractured skull and severe concussion; serious puncture wounds to head or body; severe burns to hands; serious strain or sprain injuries.

Our estimates of harm to health are conservative, because the Operating Guidance limits likelihood to those who are harmed and seek medical attention. As with our previous Health Impact Assessment for the Ealing Decent Homes programme chapter 6 will estimate a monetary value to the public purse and to individuals of reducing such harms to health. In this report we are unable to monetise the costs and benefits of adaptations enabling already disabled people to live independent lives.

5 Security

Key message 1: Domestic burglaries in Leeds have fallen over the past few years but the rate remains higher than the national average and much higher in ‘hotspot’ districts. Residents’ mental health is likely to suffer.

Key message 2: A target hardening programme for circa 20,000 private sector dwellings in Leeds, split evenly between those already burgled and those in burglary hotspots, will improve the mental health of nearly 2,000 occupants.

Challenge

Freedom from crime and fear of crime is a top priority for the people of Leeds. *Vision for Leeds*,¹ the city’s overarching strategy, devolves responsibility for intervention to achieve this goal to the Safer Leeds Partnership² of the police, local and health authorities and the third sector. Their *Partnership Plan*³ makes domestic burglary a priority and since 2004 the trend is down, though still higher than the national average. The rate of burglary reported by private sector householders to LSCS surveyors in 2007 was 6.7%, nearly three times the national average reported during the same period by the *British Crime Survey* of residents.⁴

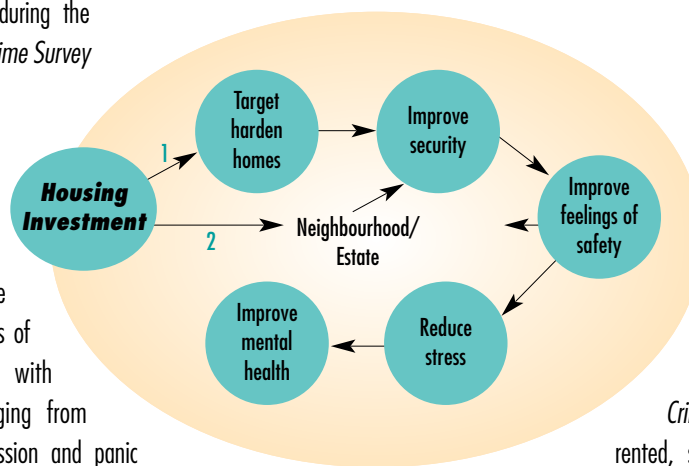
The health impacts of crime and fear of crime are well documented. According to the British Crime Survey, over 83% of victims of burglary are affected with emotions (figure 5.1) ranging from anger and shock to depression and panic

Figure 5.1: Emotional impact of burglary, England 2002/03

	All burglary	Burglary with entry	Attempted burglary
% Respondent was emotionally affected	83	85	81
% Not affected	17	15	19
Type of emotional response from those affected*			
Anger	49	57	39
Shock	32	40	21
Fear	24	25	24
Difficulty sleeping	25	29	20
Crying/tears	14	19	6
Depression	11	15	5
Anxiety or panic attacks	12	15	10
Loss of confidence or feeling vulnerable	25	29	21
Annoyance	39	38	41

Source: British Crime Survey 2002/3; table 4e, Crime in England & Wales, 2002/03
* more than one response was allowed. Figures shown are percentages.

Figure 5.2: Secure by Design



attacks.⁵ There can be significant impacts on both mental⁶ and physical health⁷ which are highlighted in the Housing Health and Safety Rating System.

Investment

The mental and physical health of residents should be improved by investment in ‘target hardening.’ (figure 5.2). There is considerable research evidence to show that home security measures reduce the chance of burglary⁸ though the benefits of remodelling the layout of neighbourhoods are more difficult to evaluate.

The Safer Leeds Partnership identifies both the dwellings of burglary victims (reactive) and ‘hot spot’ neighbourhoods (pro-active) for target hardening. Grant aided prevention programmes undertaken by *Care & Repair* (the Leeds Home Improvement Agency) and *Community Action & Support against Crime* are provided for all tenures, private rented, social housing and owner occupied.

¹ The Leeds Initiative (2004) *Vision for Leeds 2004-2020*. The Leeds Initiative. Leeds

² The Safer Leeds Partnership is a statutory Crime and Disorder Reduction Partnership

³ Safer Leeds (2008) *Safer Leeds Partnership Plan 2008/11*. Leeds Community Safety Partnership.

Target hardening packages include window locks, enhanced door locks, door chains, sash window jammers, door chains, door viewers and drain pipe protection. The average package costs £150.

Baseline: Victims of burglary

To gauge the potential impact of the target hardening measures on health we first establish the baseline position, the potential harm to health in 2011 arising *first* for **victims of burglary** and *second* for **burglary hotspots**. Our model for this section plugs in data from primary sources for Leeds and differs from but complements the methodology of the Housing Health and Safety Rating System. The LSCS reports that 6.7% (1 in 15) of 237,000 private sector households experienced burglary in the previous year. The preferred baseline data for our estimate of health impact in 2011 is based on the 8716 domestic burglaries (both entry and attempted) recorded for all dwelling tenures in Leeds in 2010. These convert to a rate of 2.6% recorded burglaries (per 330,500 dwellings) and an estimated actual rate of 3.8 or 1 in 26 assuming the recorded rate is in line with the 32% under-reporting indicated by the *British Crime Survey*.⁹

Applied proportionately¹⁰ to the 255,000 private sector properties¹¹ in Leeds, a rate of 3.8% gives an estimated 9690 burglaries. We assume that without target hardening, the number and rate of private sector households experiencing burglaries in 2011 will be similar. We also make the conservative assumption

that only one occupant is harmed. An earlier *British Crime Survey* report indicates that 83% of respondents (circa 8000) were emotionally affected by burglary (both entry or attempted)¹² with reactions ranging from anger and shock to anxiety and panic attacks (figure 5.1). The government's *Housing Health and Safety Rating System*¹³ (used by environmental health officers locally to assess the health impact of hazards present in the housing stock) converts this range of emotional reactions to 'intruders' into four classes of harm to mental health. The percentages (based on previous scientific surveys) are shown in figure 5.3. Most harm is moderate.

The HHSRS methodology identifies only those with harms who seek medical attention (important for our cost-benefit analysis). The influential Layard report¹⁴ suggests that 1 in 4 respondents with mental

Figure 5.3: Leeds private sector stock: baseline annual impact of burglary victimisation on mental health

		Spread of health outcomes			
		Class I Extreme	Class II Severe	Class III Serious	Class IV Moderate
	<i>Likelihood of burglary in 255,000 private sector dwellings</i>	0.0%	0.1%	9.1%	90.8%
1 in 26 households	9690 households burgled	0	8	728	7264
	Occupants seeking medical attention	0	2	182	1816

health problems do so and this ratio is confirmed by a national survey¹⁵ of 'Common Mental Disorder.' Applying this ratio, then there are 2000 occupants whose mental health is harmed sufficiently for them to seek medical attention.

⁴ Kershaw, C., Nicholas, S., Walker, A. (2008). *Crime in England and Wales 2007/8: Findings from the British Crime Survey and police recorded crime*. Home Office Statistical Bulletin. Home Office. London.

⁵ Nicolas S. & Wood, M. British Crime Survey 2002/3: table 4e. *Crime in England & Wales 2002/3*. Home Office. London.

⁶ Green, G., Gilbertson J., Grimsley MFJ. (2002) Fear of crime and health in residential tower blocks: A case study in Liverpool. UK. *European Journal of Public Health*. Vol. 12: pages 10-15.

⁷ Sundquist K., et al (2006) Neighbourhood violent crime and unemployment increase the risk of coronary heart disease: A multilevel study in an urban setting. *Social Science and Medicine*. Vol. 62: pages 2061-2071.

⁸ Nicholas S., Povey D., Walker A. & Kershaw, C. (2005) (Table4.01) *Crime in England and Wales 2004/5*. Home Office Statistical Bulletin. National Statistics. London.

⁹ John Flatley, Chris Kershaw, Kevin Smith, Rupert Chaplin, Debbie Moon. (2010) *Crime in England and Wales 2009/10: Findings from the British Crime Survey and Police Recorded Crime*. Home Office. London.

¹⁰ High burglary rates for the private sector because of the large student population are offset by low rates for owner-occupation and overall are approximately equivalent to rates for social housing. Source: Strategic Intelligence Unit. Leeds City Council.

¹¹ Derived by subtracting 58,598 Local authority dwellings & 16,793 Housing Association dwellings from the total of 330,448 dwellings registered for council tax in 2011. Source: Leeds City Council and Leeds Re'New.

¹² Nicolas S., and Wood, M. (2003) Chapter 4. Property Crime in England and Wales. *Crime in England and Wales, 2002/3*. Home Office. London.

¹³ Office of the Deputy Prime Minister (2006) *Housing Health and Safety Rating System: Operating Guidance*. ODPM. London.

¹⁴ Layard et al. Centre for Economic Performance: Mental Health Policy Group. (2006) *The Depression Report: a new deal for depression and anxiety disorders*. London School of Economics. London.

¹⁵ Sally McManus, Howard Meltzer, Traolach Brugha, Paul Bebbington, Rachel Jenkins (eds) (2009) *Adult Psychiatric Morbidity in England 2007: Results of a household survey*. National Centre for Social Research/Department of Health Sciences, University of Leicester.

Security

Figure 5.4: Leeds private sector stock: baseline annual impact of burglaries in selected 'hotspot' districts

	Likelihood of burglary in 10,000 hotspot dwellings	No. of occupants harmed	Spread of health outcomes			
			Class I Extreme 0.0%	Class II Severe 0.1%	Class III Serious 9.1%	Class IV Moderate 90.8%
1 in 15 households	667 households burgled	667	0	1	61	605
	Occupants seeking medical attention	167	0	0	15	151

Baseline: Hot spots

The Safer Leeds Partnership has identified 'hotspot' districts with high rates of burglary for pro-active intervention. Those with large student populations have the highest rates. We have selected three with mixed populations because the impact on health is higher. The three local government wards of Armley, Burmantofts & Richmond Hill and Gipton & Harehills have an average recorded burglary rate of 4.5% (1 in 22) compared with the Leeds average of 2.6%.

In line with the 32% underreporting revealed by the British Crime Survey we estimate the actual percentage in the three 'hotspot' wards is 6.6% (1 in 15 households). *Second*, we assume that 10,000 private sector households are identified for target hardening. Applying the ratio 1 in 15 we estimate 667 of these 10,000 households are potentially victimised by burglary. *Third*, we assume conservatively that only one occupant is harmed. Fourth we assume 83% of these 667 occupants suffer some emotional damage. However only 167 occupants (1 in 4) whose mental health is harmed are likely to seek medical attention. Figure 5.4 summarises the baseline position.

Target hardening for victims

The *reactive* target hardening measures for the *victims of burglary* will impact on health in two ways. *First*, by reducing the risk of repeat

burglary they will prevent additional damage to the mental health of occupants. According to an analysis by *Community Action & Support against Crime*, repeat burglaries are reduced from 14.5% (1 in 7) to 1.1%¹⁶ following their intervention with a package of target hardening measures.¹⁷ Applied to the estimated 9690 private sector households projected to experience burglaries in 2011, only 107 will be repeat-burgled if they are target hardened compared with 1405 without

this intervention (figure 3). In these dwellings only 22 occupants will¹⁸ suffer harm to health and seek medical attention compared with 292 should there be no intervention, a reduction of 270.

The *second* driver is the impact of target hardening on reducing the fear victims may have of another burglary and consequently improving their mental health. To calculate the impact we establish the baseline *first* by identifying the residual 8285 private sector households (9690 minus 1405) and target, conservatively, one occupant per household likely to be harmed.

Then, we distinguish the mental health impacts of burglary crime from fear of burglary. Both may be concurrent in burglary victims and embrace similar feelings. Only 10% of the adult population is fairly or very worried about burglary crime, rising only to 13% for those burgled in the previous 12 months. Applying these coefficients, 1077 (13%) of the 8285 victims of burglary are fearful of anticipated burglary. Utilising data from a study by Michal Marmot and colleagues¹⁹, an estimated 270 (circa 25%) of these fearful occupants have common mental disorder, of which 68 (1 in 4) is likely to seek medical attention.

According to the evaluation report²⁰ 94% of recipients indicate the target hardening scheme had assisted them in reducing their fear of crime. The intervention is unlikely to completely remove the fear of crime because the perception is a product of many influences and

¹⁶ These figures are comparable to the national prevalence of repeat burglary (14%) and burglary in dwellings with basic security (0.9%). (Figure 2.10 and table 4.01) John Flatley, Chris Kershaw, Kevin Smith, Rupert Chaplin, Debbie Moon. (2010) *Crime in England and Wales 2009/10: Findings from the British Crime Survey and Police Recorded Crime*. Home Office. London.

¹⁷ Policy Research Institute (Tom Burden) (2005) *Evaluation of the Burglary Reduction Unit. BRIL Phase II*. Leeds Metropolitan University. Leeds.

¹⁸ 107 x (83% who suffer harm to health) x (25% seeking medical attention) assuming conservatively that only one occupant per household is harmed.

¹⁹ Mai Stafford, Tarani Chandola, Michael Marmot. (2007) Association between fear of crime and mental health and physical functioning. *American Journal of Public Health*. Vol.97. No.11. pages 2076-2081.

²⁰ Policy Research Institute (Tom Burden) (2005) *Evaluation of the Burglary Reduction Unit. BRIL Phase II*. Leeds Metropolitan University. Leeds.

Security

predispositions. Indeed at a national level, circa 10% of the population are fairly or very worried about burglary whether not they have been burgled. If we assume that fear of burglary crime is reduced from 13% to the national average of 10%, then the target number of those worried by burglary crime falls from 1077 to 828. The number seeking medical attention falls from 68 to 52, a reduction of 16.

Target hardening hot spots

The *pro-active* target hardening measures in hotspot districts will reduce burglary and remove the associated damage to mental health. To calculate the impact of target hardening of 10,000 dwellings in 'hot spot' districts we *first* assume that the burglary rate falls from 6.6% (1 in 15) to 0.9% (1 in 111) in line with the risk for dwellings with enhanced security identified by the 2009/10 *British Crime Survey*.²¹ Applying the ratio 1 in 111 to these 10,000 households indicates only 90 are potentially victimised by burglary. *Second*, we assume of the 90 occupants, 75 (83%) suffer some emotional damage. *Third*, we assume that 19 of these 75 occupants (1 in 4) will seek medical attention. Comparing rates for pre (figure 5.4) and post target hardening, the reduction in harm to health of occupants seeking medical attention (figure 5.7) is 148 annually.

IMPACT

Figure 5.5: Target hardening: projected **reduction** in repeat burglary and harm to mental health

		No. of occupants harmed seeking medical attention	Spread of health outcomes			
			Class I Extreme	Class II Severe	Class III Serious	Class IV Moderate
Likelihood of a repeat burglary in 9690 burgled households			0.0%	0.1%	9.1%	90.8%
1 in 7	Before Target hardening 1405 households report repeat burglary	292	0	0	27	265
1 in 91	After Target hardening 106 households report repeat burglary	22	0	0	2	20
Reduction		270	0	0	25	245

Figure 5.6: Target hardening: projected **reduction** in mental ill-health following a reduction in fear of crime

		No. of occupants harmed seeking medical attention	Spread of health outcomes			
			Class I Extreme	Class II Severe	Class III Serious	Class IV Moderate
Likelihood of burglary but not repeat burglary in Leeds private sector households			0.0%	0.1%	9.1%	90.8%
1 in 31	Not target hardened	68	0	0	6	62
8285 households	Target hardened	52	0	0	5	47
Reduction		16	0	0	1	15

Figure 5.7: Projected **reduction** in mental ill-health following **target hardening** of 10,000 dwellings in hotspot districts

		No. of occupants harmed seeking medical attention	Spread of health outcomes			
			Class I Extreme	Class II Severe	Class III Serious	Class IV Moderate
Likelihood of burglary in 10,000 hotspot dwellings			0.0%	0.1%	9.1%	90.8%
1 in 15	667 before hardening	167	0	0	15	152
1 in 111	90 after hardening	19	0	0	2	17
Reduction		148	0	0	13	135

²¹ John Flatley, Chris Kershaw, Kevin Smith, Rupert Chaplin, Debbie Moon. (2010) *Crime in England and Wales 2009/10: Findings from the British Crime Survey and Police Recorded Crime*. Home Office. London.

Security

Summary

23

The burglary reduction strategy of the Safer Leeds Partnership has both reactive and pro-active components. We estimate that the **reactive** component has a bigger impact on mental health, especially on the moderate harms of anxiety and depression. Targeting the estimated 9690²² private sector dwellings likely to be burgled in 2011 will reduce the number of occupants seeking medical attention for harm to their mental health by 286 annually by reducing fear of crime in those who have been burgled and also reducing the likelihood of repeat burglary. **Proactive** target hardening of 10,000 private sector dwellings in hotspot districts of Leeds will reduce harm to the health of 148 occupants who would have sought medical attention following burglary.

The report highlights the one in four occupants who seek medical attention for the harm to their mental health. Target hardening will have also a positive impact on the three in four occupants who, though their mental health is harmed, do not seek medical attention. The overall annual reduction of 434 private sector occupants seeking medical attention for anxiety and depression will deliver cost savings to the National Health Service. These are conservative estimates for two reasons. *First* we have assumed that only one occupant per household is harmed. *Second*, the 1422 occupants harmed who would not have sought medical attention for their anxiety and depression, will nevertheless now lead better lives because of the Leeds target hardening programme. ***In summary a target hardening programme for circa 20,000 private sector dwellings in Leeds, split evenly between those already burgled and those in burglary hotspots, will improve the mental health of nearly 2000 occupants.***

²² Assumes only 68% of domestic burglaries (entry plus attempted) are recorded. Ref: John Flatley, Chris Kershaw, Kevin Smith, Rupert Chaplin, Debbie Moon. (2010) *Crime in England and Wales 2009/10: Findings from the British Crime Survey and Police Recorded Crime*. Home Office. London.

6

Social Costs and Benefits

Key message *The monetised benefits to residents' health and wider society of investing in energy efficiency, safety and security measures in the Leeds private sector stock far outweigh the costs.*

Scope and context

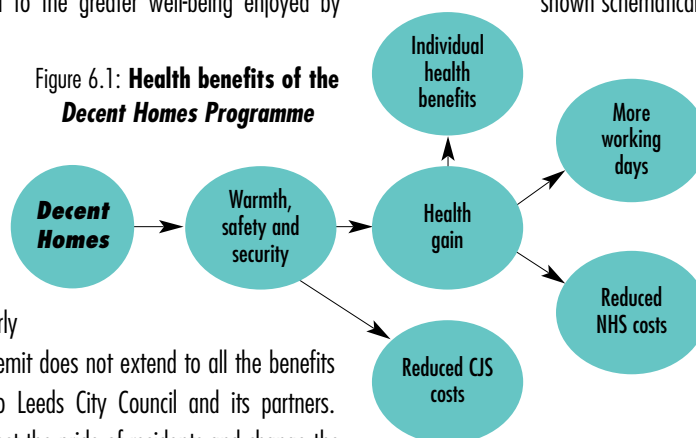
Previous chapters estimate gains in physical and psychological health stemming from improvements in warmth, safety and security generated by investment to bring the Leeds private sector stock up to Decent Homes Standard. To help secure further funding for the programme outlined in the *LSCS Report* this chapter gives a very broad indication of the monetary value of a range of social benefits deriving from improvements to the non-decent stock of 81,800 dwellings. Benefits include but are not confined to the greater well-being enjoyed by healthier individuals. The money value of the range of benefits is compared to the cost of the investment programmes from which they derive.

Although we focus on a fairly wide range of benefits, our remit does not extend to all the benefits that would be of interest to Leeds City Council and its partners. Refurbished dwellings can boost the pride of residents and change the perceptions of others. Such less tangible benefits contribute to the social cohesion to the city as a whole, but are very difficult to measure. We have not attempted to do so here.

Neither have we attempted to calibrate the individual and societal benefits arising from the promotion of independent living by removing hazards to household safety and installing adaptations to overcome disabilities. Though we have emphasised the strong interrelationship between independence and safety our focus here is on the benefits of

health itself rather than the benefits of independence, to the individual, their carers and to society. It is beyond the scope of this study to undertake a cost-benefit of independence though a methodology is being developed¹ and our sister report for Leeds City Council gives an indication of the cost savings to the public purse.²

There are three types of measurable benefits derived from health gains in addition to the reduced costs of operating the criminal justice system stemming from improvements in household security. These are shown schematically in figure 7.1 and listed below.



■ the gains in physical and psychological health enjoyed by individuals as a result of greater warmth, comfort, safety and security. In the case of improved security health gains stem from both reductions in crime and reductions in the fear of crime

■ the reduction in working days lost through physical and psychological ill-health

■ the reduction of NHS treatment costs resulting from gains in physical and psychological health

■ the reduction of cost in the criminal justice system stemming from the reduction in household burglaries caused by the investment in security

¹ Frances Heywood & Lynn Turner (2007) *Better outcomes, lower costs: implications for health and social care budgets of investment in housing adaptations, improvement and equipment; a review of evidence.* Office for Disability Issues. London.

² Geoff Green, Frances Heywood, Bernard Stafford, Paul Pugh. (2011) *Supporting People, Better Health and Well-being: A cost-benefit analysis of Housing Related Support Services in Leeds.* Sheffield Hallam University. Sheffield.

Social Costs and Benefits

The estimates below show that significant benefits derive from a modest investment in the security of dwellings. These estimates are based on the assumption of zero crime displacement – that reducing the opportunity for burglary by the target hardening of dwellings does not result in crime displacement of a spatial, target or offense kind: a switch by offenders to dwellings elsewhere, or to non domestic properties or to different types of crime. Whether or not crime displacement exists has been analysed and vigorously debated since the early 1990s but only recently have elements of a consensus begun to emerge. Recent analyses of UK and international data suggest that no significant crime displacement can be identified empirically³.

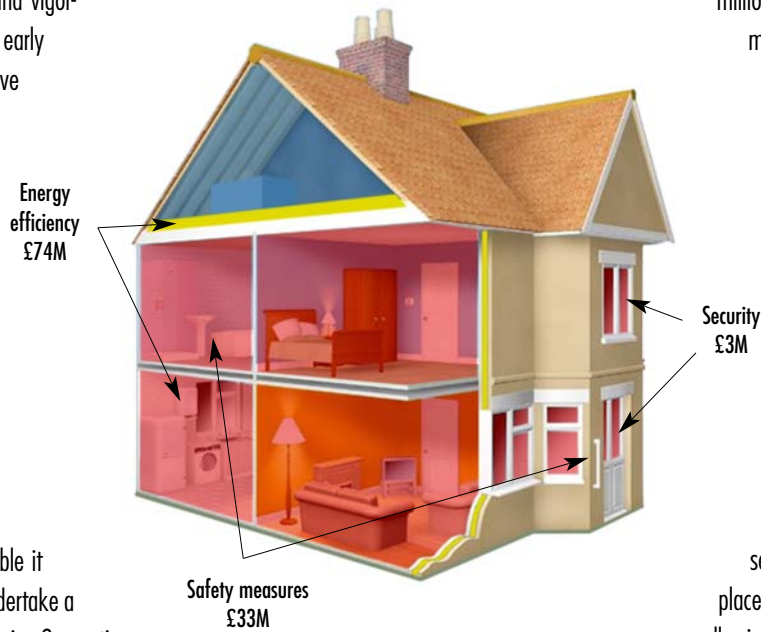
Estimation

Within the resources available it has not been possible to undertake a full-scale cost-benefit analysis. Our estimates are provisional and the figures are indicative only. We must emphasise that the triangulation exercise by which these results are derived means that they are to be read only as illustrative estimates of broad orders of magnitude.

In the chapters on warmth, safety and security, our estimates of health gain are derived indirectly using evidence from the *Housing Health and Safety Rating System*. Those chapters presented a probable range of health gains. In order to simplify computation, this chapter assumes mid-range estimates for each domain. The four types of benefit associated with these health gains illustrated in figure 6.1 are derived indirectly using relevant published studies and sources. As is indicated above the health gains stemming from the security investment arise

through two additive effects: reductions in burglary crime and reductions in the fear of burglary crime. The computational methods used are fully described in the Appendix which also identifies the studies and sources.

Figure 6.2:
Components of investment in the NRA



The costs of key elements of the programme are shown in figure 6.2. Health gains from greater warmth and comfort will be generated from £74 million invested in energy efficiency measures. Health gains from improvements in safety will stem from the £33 million investment in adaptations and removing hazards. And health gains from greater security will come from £3 million invested in target hardening dwellings. Our calculation is simplified by assuming all the investments in warmth, safety and security are assumed to take place entirely in 2011/2012. A smaller investment programme will reap proportionately fewer health benefits and cost savings; phased investment will defer benefits.

Coefficients derived from these studies are applied to each of the key components of warmth, safety and security. For health benefits, well established Quality Adjusted Life-years (QALYs) are applied to the four classes of harm. The number of working days saved is derived from Home Office estimates⁴ as are the reduced costs of the Criminal Justice System. Savings to the NHS are derived by multiplying the average treatment cost per case⁵ by the estimated annual reduction in cases by class of harm to health. Savings to the Criminal Justice System in the case of security investment are derived from the Home Office estimates referred to above. The benefits stemming from the investments in

³ See R T Guerette *Analysing Crime Displacement and Diffusion*, Office of US Department of Justice, Office of Community Oriented Policing Services, June 2009; and D McLennan and A Whitworth *Displacement of Crime or Diffusion of Benefits: Evidence from the New Deal for Communities*, Department of Communities and Local Government, April 2008.

⁴ Home Office (2005) *“The Economic and Social Costs of Crime Against Individuals and Households”* Online Report 30/05.

⁵ NHS *National Schedule of Reference Costs Year 2008-09, NHS Trusts and PCTs combined*, Appendix NSRC4.

Social Costs and Benefits

Figure 6.3: **Warmth Programme: Social costs and benefits**

Costs £ million	Discounted present value of lifetime benefits (15 years) £ million		
<i>Energy efficiency measures Improved heating systems plus insulation</i>	Reduced cold		
	Health gains	£31.8	
	Reduction in working days lost	£16.9	
	Reduction in NHS costs	£10.2	
	Total	£58.9	
	Reduced damp and mould		
	Health gains	£7.9	
	Reduction in working days lost	£0.06	
	Reduction in NHS costs	£1.5	
	Total	£9.5	
Reduced fuel poverty			
Health gains	£25.7		
Reduction in working days lost	£0.2		
Reduction in NHS costs	£0.9		
Total	£26.8		
Total	£74.0	Total	£95.2

Figure 6.4: **Safety Programme: Social costs and benefits**

Costs £ million	Discounted present value of lifetime benefits (15 years) £ million		
<i>Removing major hazards to safety, installing grab rails and redesigned bathrooms to reduce the incidence of falls</i>	Health gains	£49.1	
	Reduction in working days lost	£2.6	
	Reduction in NHS costs	£10.5	
Total	£33.0	Total	£62.2

warmth, safety and security investments are assumed to extend over a 15 year life span. Figures are rounded up. Again it should be stressed that estimates derived by these indirect methods can only be illustrative of broad orders of magnitude.

Warmth Programme: Social Costs and Benefits

The illustrative estimates of social benefit and the estimate of costs are shown in figure 6.3. All estimates are derived using the sources and methods described in the Appendix. The figures in column 2 are discounted present values (see Appendix section 5). The cost figure does not include any estimate of the disruption caused to residents.

The favourable overall ratio of social benefits to cost is just under 1.3 to 1. This is largely a reflection of the value of the health gains to individuals stemming from reduced cold and less fuel poverty. In the

former case there is a relatively large number who are rescued from extreme (class 1) ill health and death. In the latter case there is a much larger number who are rescued from the least serious ill health class IV. (See chapter 3 table 3.6).

Safety Programme: Social Costs and Benefits

Figure 6.4 shows the illustrative estimates of social benefit and the estimate of costs, which are computed on the same basis as the estimates for reduced cold and reduced damp and mould in figure 6.3.

This programme shows an even more favourable overall ratio of social benefit to costs than the warmth programme, of 1.9 to 1. This is again largely a reflection of the high value of health gains, but in this case arising from large numbers of beneficiaries under the two less serious classes of ill health (classes III, serious and IV, moderate) (See chapter 4 table 4.5).

Security Programme: Social Costs and Benefits

The illustrative estimates of social benefit and the estimate of costs of target hardening are shown in figure 6.5. Specific to this table is

- an assumption of zero crime displacement
- the inclusion of savings in the cost of the criminal justice system as a social benefit

Figure 6.5: **Security Programme: Social costs and benefits**

Costs £ million	Discounted present value of lifetime benefits (15 years) £ million		
<i>Target hardening</i>	Reactive programme		
	Health gains	£18.6	
<i>Reactive programme 9690 dwellings</i>	Reduction in working days lost	£0.2	
	Reduction in NHS costs	£0.8	
	Reduction in CJS costs	£20.1	
	Total	£39.7	
<i>Proactive programme 10,000 dwellings</i>	Proactive programme		
	Health gains	£11.6	
<i>10,000 dwellings</i>	Reduction in working days lost	£0.08	
	Reduction in NHS costs	£0.4	
	Reduction in CJS costs	£8.9	
	Total	£21.0	
Total	£3.0	Total	£60.7

Social Costs and Benefits

28

As is described in chapter 5, the security programme comprises two component elements: a *reactive* component designed to reduce repeat burglaries and the fear of crime; and a *proactive* component designed to reduce burglary crime in “hot spot” neighbourhoods. In both cases the estimated benefits flow from reduced mental ill health.

The (spectacularly) favourable overall ratio of social benefits to costs in the security programme of 20 to 1 is a reflection of the very low programme cost of £3 million relative to two factors: i) the scale of estimated health gains to individuals and ii) the scale of savings to the criminal justice system, which in turn reflects a substantial estimated total annual reduction in burglaries.

Conclusions

Although the illustrative nature of the estimates presented above does not allow precise conclusions to be drawn, the approximate and prima facie evidence for Leeds suggests that:

- *burglary crime and ill health caused by cold, damp and unsafe dwellings impose very substantial social costs on residents, public services and the economy*
- *investment in the warmth, safety and security of dwellings can substantially reduce these costs in a highly cost-effective fashion, especially so in the case of investment in security.*
- *although the benefits of such investments accrue predominantly in the form of better health and an improved quality of life of residents, significant additional gains accrue in the form of reduced expenditure in the criminal justice system and the NHS and increased economic output stemming from reduced working days lost through illness.*

Appendix: Sources and Methods

Estimation of the Money Value of Annual Health Gains

QALY is an acronym for a “quality adjusted life-year” which is a measure health taking into account both the quantity and quality of life. Thus one year of perfect health scores a QALY value of 1, a year of less than perfect health scores a QALY value of less than 1, and death is considered to be equivalent to a score of 0. QALY measures are widely used in the evaluation of the health effects of medical treatments and many other public investments effecting health. For an overview of the definition, measurement and uses of the QALY concept see Phillips and Thompson (2004)¹.

The annual monetary value of the gain in the well-being of beneficiaries stemming from the programmes’ health gains is estimated in three stages:

- *By converting the health classes HV into QALY equivalents*
- *By multiplying the QALY gains thus derived by the number of beneficiaries – which gives the total number of QALYS gained per annum*
- *By multiplying the number of QALYS gained per annum by an estimate of the monetary value of a QALY – which gives the monetary value of health gains per annum*

The health class-QALY conversions are as follows:

	QALY score Safety Programme and Warmth Programmes except for reduced fuel poverty	QALY score Security Programme and reduced fuel poverty component of Warmth Programme
Class I	0.125	0.08
Class II	0.375	0.31
Class III	0.625	0.57
Class IV	0.875	0.80

It is strongly to be emphasised that these conversions are presented as no more than plausible broad orders of magnitude. The ascending QALY score across classes I-IV reflect the diminishing seriousness of the ill health states described by those classes. The lower QALY score for a given health class under the security programme and for reduced fuel poverty reflects the greater prevalence of losses of emotional and psychological health – rather than physical health – caused by burglaries and fuel poverty, and the greater impact on well being of psychological ill health. This follows the differential treatment of physical and psychological conditions in the estimation of health losses caused by crime (see Home Office (2005) section 3)². The QALY score of 0.80 for the class IV ill health state under the security programme is consistent with that used by Layard et al. (2007)³.

The monetary value of a QALY is taken as £30,000, which is within the range estimated by Mason et al. (2009) for health improving interventions which extend life but which are not immediately life saving⁴. This value is also consistent with

conventional interpretations of the NICE threshold value of treatment costs per QALY (see NICE (2010))⁵.

An example of the estimation is as follows:

The warmth programme delivers an annual reduction of 66 cases of class I ill health by reducing excess cold which equates to an annual QALY gain of $66 \times (1 \text{ minus } 0.125)$ which equals 57.75. The monetary value of this annual health gain is $57.75 \times \text{£}30,000$ which equals $\text{£}1,732,500$.

Estimation of the Money Value of Working Days Saved

Because ill health causes working days to be lost a second social benefit of the programme is the gain in economic output provided by a reduction in working days lost. The monetary value of working days saved is estimated in three stages:

- *By converting the health classes HV into estimated working days lost per case per person*

The health class-working days lost conversion is as follows:

	Safety Programme and Warmth Programmes except for reduced fuel poverty	Security Programme and reduced fuel poverty component of Warmth Programme
Class I	5000	6420
Class II	400	500
Class III	30	40
Class IV	3	8

These conversions are derived from Home Office (2005) table 3.1 and are also presented as no more than plausible broad orders of magnitude. The greater loss for a given health class under the security programme and for reduced fuel poverty reflects the greater prevalence of losses of emotional and psychological health – rather than physical health - caused by burglaries and fuel poverty, and the greater impact of psychological ill health on the ability to work (see Home Office (2005 op.cit) section 3). As in the Home Office exercise these estimates are discounted rather than annual values – estimates of the present value of an annual sequence of working days lost derived by applying the HM Treasury discount rate of 3.5% (see section 5 below).⁶

- *By multiplying working days lost per person by the estimated number of beneficiaries – to give an estimate of the total reduction in working days lost*
- *By multiplying the total reduction in working days lost by average hours per working day in Leeds in 2010 derived from Nomis Leeds Labour Market Profile (2010)⁷ – to give an estimate of the total reduction in working hours lost. According to Nomis average working hours per day in Leeds in 2010 is 7.75 hours.*

¹ C Phillips, and G Thomson. (2004) “What is a QALY?” *Evidence Based Medicine*. Vol. 1 No. 6 (at www.evidence-based-medicine.co.uk).

² Home Office (2005) *The Economic and Social Costs of Crime Against Individuals and Households* Online Report 30/05.

³ R Layard, D Clark, M Knapp and G Mayraz, *Cost Benefit Analysis of Psychological Therapy* *National Institute Economic Review* 202: 90 (2007).

⁴ H Mason, M Jones Lee and C Donaldson, *Modelling the Monetary Value of a QALY: a New Approach Based on UK Data*, *Health Economics* 18 933-950 (2009).

⁵ National Institute for Health and Clinical Excellence, *Measuring Effectiveness and Cost Effectiveness: the QALY*, April 2010.

⁶ The time horizon over which the discounting exercise is carried out is not stated in Home Office (2005). We assume a period of 15 years.

⁷ At www.nomisweb.co.uk

Appendix: Sources and Methods

- By multiplying the estimate of total reduction in working hours lost by an estimate of the gross hourly wage rate earned by beneficiaries of the of the investment programmes . Here we use the conservative assumption that this wage rate is 10% greater than the 2010 adult Minimum Wage Rate of £5.93 per hour – which is £6.50 per hour. This assumption is consistent with the equivalent used by Layard et al. (2007 op. cit).

An example of the estimation is as follows:

The warmth programme delivers an annual reduction of 66 cases of class I III health by reducing excess cold which generates a present value of reduced working days lost of 66 x 5000 = 330,000 which converts to 2,557,500 working hours. The present discounted monetary value of this reduction is 2,557,500 x £6.50 which equals £16,623,750.

Estimation of the Annual Savings in NHS Costs

A third element of social benefit is the reduction in NHS costs arising from the programmes' health gains. The annual NHS savings are estimated in two stages:

- By assigning an average treatment cost per case to Class I-IV ill health states. These are as follows:

	NHS Treatment Costs per case 2008/9 for Safety Programme and Warmth Programmes except for reduced fuel poverty	NHS Treatment Costs per case 2008/9 for Security Programme and reduced fuel poverty component of Warmth Programme
Class I	£10,000	£2600
Class II	£5000	£1300
Class III	£2250	£600
Class IV	£700	£200

These unit costs are taken from NHS National Schedule of Reference Costs 2008-09⁸ as being broadly appropriate for the ill health states described under the class I-IV headings. The lower costs for the security programme reflect the generally much lower treatment costs of mental ill health compared to physical ill health.

- By multiplying the average treatment cost per case by the estimated annual reduction in cases by health class

Estimation of the Annual Cost Savings in the Criminal Justice System

A social benefit specific to the security programme is the reduction in the costs of the criminal justice system stemming from the estimated reduction in burglaries. The Home Office estimate of the criminal justice system costs per burglary is £1137 in 2003/04 prices (Home Office (2005 op.cit, table 2.1)). This figure was up-rated by the UK GDP deflator to produce an estimate of £1299 in 2008/09 prices. The total annual savings in criminal justice service costs is the product of this figure and the estimated total annual reduction in cases of burglary – which is 1876.

Adjusting for the Timing of Benefits

It is assumed that the cost of the programmes is entirely incurred in year 1 and that the benefits flow evenly across years 1 to 15 – the length of life of all investments is 15 years.

In order that benefits accruing at different times are placed on a comparable basis they are computed as a sum of discounted present values, using a discount rate of 3.5% as recommended in HM Treasury Green Book (HM Treasury (2003))⁹. The effect of discounting is to reduce the value of more distant benefits.

⁸ NHS National Schedule of Reference Costs Year 2008-09, NHS Trusts and PCTs Combined Appendix NSRC4.

⁹ HM Treasury (2003) "Green Book 2003" HMSO.

7

Summary

Introducing this report we asked two questions. First ‘does improving the private sector housing stock in Leeds homes make a positive impact on the health and security of residents?’ Second, ‘Is it cost effective?’ We conclude ‘yes’ on both counts: such investment has a positive impact on health (figure 7.2) with monetary gains both to individual residents and wider society.

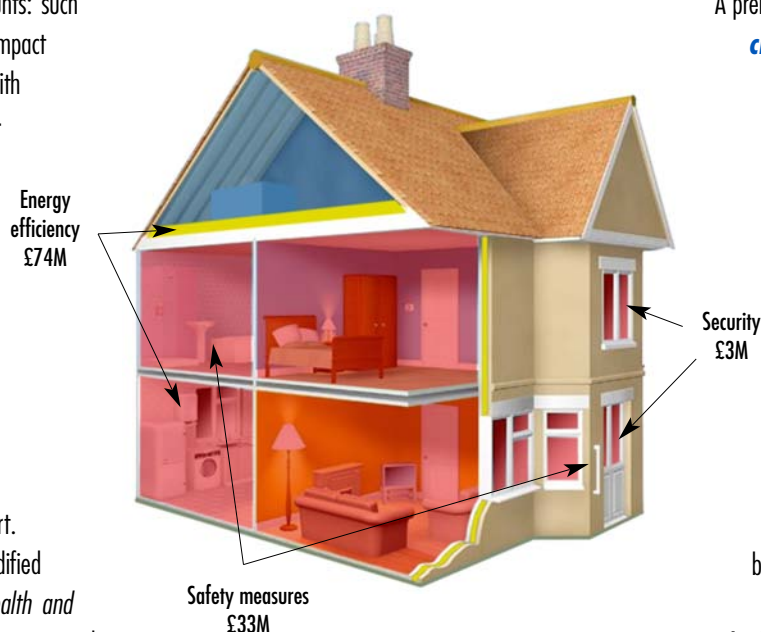
Figure 7.1 shows the principal components of the potential housing investment programme of £110 million signalled by the Leeds Stock Condition Survey Report. Chapters 3 – 6 use a modified version of the *Housing Health and Safety Rating System* to estimate the health impact of each component.

Chapter 3 shows how improvements to heating and insulation will improve warm and comfort and reduce the likelihood of heart disease and winter deaths of older people. Raised temperatures and better ventilation will reduce damp and mould and the likelihood of respiratory problems, especially childhood asthma. Reducing fuel poverty will improve mental health.

Chapter 4 shows how adapting homes and eliminating hazards will increase safety, reduce the risk of falls and promote independent living.

Chapter 5 shows how target hardening reduces both burglary and fear of crime with a positive impact on the mental health of occupants.

Figure 7.1:
Components of investment in the NRA

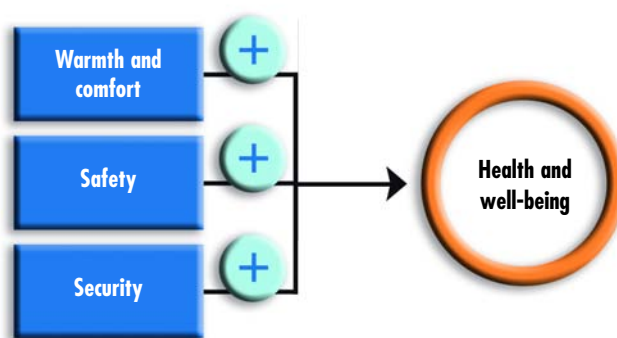


A preliminary cost-benefit analysis in **chapter 6** identifies (a) improvements in residents’ health (b) savings to the National Health Service (c) fewer working days lost through ill-health (d) savings in the criminal justice system. A smaller investment programme will reap proportionately fewer benefits and cost savings: phased investment will defer benefits.

Two final points about the relatively modest improvements to **physical** health revealed in chapters 3 and 4. *First*, to facilitate cost-benefit analysis, our estimates are confined to those residents previously harmed enough to seek medical attention from the NHS. There will be many more beneficiaries who have not sought attention.

Second, **physical** improvements in warmth, safety and security give residents a greater sense of ‘Home as a haven’ contributing predominantly to their **mental** health and well-being. In turn better mental health enhances the economic and social prospects outlined in the *Vision for Leeds*.

Figure 7.2: **Impacts on health**





SHARPENS YOUR THINKING

May 2011

Printed copies of this report
are available from:

Centre for Health and Social Care Research, Faculty of Health and Wellbeing
Sheffield Hallam University · Collegiate Crescent Campus · Sheffield · S10 2BP · United Kingdom

tel 0114 225 3073 · fax 0114 225 2197

price £10.00 inc p&p · ISBN 978-1-84387-338-9

Design: www.paulpugh.co.uk