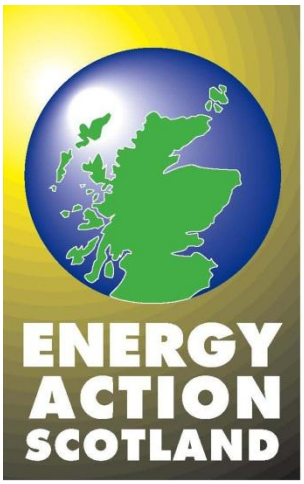


THE RELATIONSHIP BETWEEN FUEL POVERTY AND HEALTH:

A DISCUSSION PAPER

This discussion paper was written by Sara Jones and researched by

Ellen Leaver both of Energy Action Scotland

THE RELATIONSHIP BETWEEN FUEL POVERTY AND HEALTH:
A DISCUSSION PAPER

Contents

THE RELATIONSHIP BETWEEN FUEL POVERTY AND HEALTH: A DISCUSSION PAPER

Summary

This discussion paper examines some of the research and literature published to date reviewing fuel poverty, housing and health and the potential connections between cold and damp housing and the health and well-being of the occupants. In particular, it looks at excess winter deaths; cardiovascular and cerebrovascular disease; respiratory disease and mental health and well-being – health issues that are interconnected, as well as standing alone; in particular excess winter deaths can occur as a result of respiratory, cardiovascular and cerebrovascular diseases. This paper also attempts to analyse the robustness of the research and literature and stimulate further discussion, in particular around potential future research.

Introduction

In 1946, the World Health Organisation (WHO) defined heath as "a state of complete physical, mental and social well-being." In doing so, the WHO recognised health as a holistic concept, and therefore, it would seem logical that this holistic concept of health would be affected by many aspects of the world around us. Poor housing conditions ought to be generally accepted as having a significant impact upon our health, but this seems to be something which has ebbed and flowed over the years and is yet to secure buy-in across the fuel poverty, housing and health sectors.

In the mid-19th Century, reformers, such as Edwin Chadwick, were key in linking ill-health with the poor sanitation, slum conditions and industrialisation of the time. In an apparent confirmation of that connection, government responsibility for housing in the United Kingdom fell within the purview of the Ministry of Health until 1951. However, as housing conditions have largely improved post-World War Two the emphasis on the amelioration of these for health benefits has diminished.

Over recent years, government policy documents and reports have, again, increasingly acknowledged the genuine impact of cold housing and fuel poverty on people's health. The UK Fuel Poverty Strategy, published in 2001, recognises the potential positive impact on health of tackling fuel poverty and poor housing. In 2009, the Chief Medical Officer's annual report highlighted the costs to the NHS resulting from poor quality housing and in the Public Health White Paper, published in 2010, the UK Government stated, "We could prevent many of the yearly excess winter deaths – 35,000 in 2008/09 – through warmer housing […]".

Earlier this year, the independent Hills Review, commissioned by the UK Government to examine fuel poverty, emphasised that while there may not yet be a robust methodology for calculating the true percentage of excess winter deaths caused directly by poor housing and, more specifically, fuel poverty, it is likely that fuel poverty is "a significant contributor" to excess winter deaths in the UK, as well as to wider health issues that occur throughout the year.

Cold and Damp Homes

In 1985, the WHO working group recommended an indoor temperature of 21°C in the living rooms and 18^{o}C in bedrooms for a minimum of nine hours each day, although young children, older people and the sick or the disabled may need higher temperatures. This is still the stated ideal today.

In 1998, Revie identified two main categories of effect of fuel poverty on health: the impact of low temperatures and the impact of dampness. However, it ought to be noted that dampness in the home has often been shown to go hand in hand with cold homes. And, given that a

large percentage of the fuel poor live in persistently damp and cold homes and it is these living conditions, rather than being fuel poor per se, that generate health risks.

One of the peripheral, but by no means unimportant, questions that has been asked is whether people in poor housing are more likely to suffer poor health or whether people in poor health are more likely to live in poor housing? Epidemiological studies have tended to look at specific areas of social housing so finding an answer to this question has been difficult. In 1999, Marsh et al. found that people living with multiple housing deprivation had a 25% greater risk of disability or severe illness across their whole life. In considering excess winter deaths below, we also look at the connection to general deprivation, which lends further credence to the position that housing, and the environment, has a significant effect upon health.

In a survey of a housing estate in South Devon, published in 2002, Sullivan et al. state that those in poor housing tend to suffer multiple deprivation, making it difficult to establish the independent effect of housing on health. In particular, this study noted significant effects of heavy drinking and smoking among the study sample. Nevertheless, the report authors identified that asthma, chronic bronchitis, tiredness, headache, anxiety and depression could all be positively associated with cold housing. In such studies some contributors have argued that the reliance on self-reporting is not reliable for data collection.

In a 1989 study of five housing estates (two in Edinburgh, two in Glasgow and one in London), Platt et al. were able to establish that those residents living in homes with mould reported the most ill-health symptoms, even when adjusting for other variables such as smoking and low incomes. The same study also demonstrated that cold and dampness go hand in hand but that dry and damp free homes can also experience problems maintaining adequate heat. In this particular study of 597 homes 81% of households in mouldy homes reported cold as a problem, as did 72% of households with damp but mould free homes and 62% of households with dry homes.

Moreover, in 2011, the Marmot Review team found that damp and mould are more likely to occur in cold, poorly insulated homes and thermal efficiency is strongly linked to age of property – on average, properties built before the 1920s fall within F and G EPC bands and average indoor temperatures are lower, the older the property is.

Liddell and Morris, in their 2010 review of a selection of evaluation studies, noted that increased risks of mortality during cold weather were first noted many years ago (e.g. Young, 1924). As we will see in the next section of this paper, cold indoor temperatures are strongly implicated in excess winter deaths and there is now a longstanding body of evidence describing the relationship between higher mortality rates in winter and cold temperatures, as well as higher morbidity rates.

Excess Winter Deaths

The excess winter death rate (or increased winter mortality) is defined as the difference between the number of deaths in December–March and the average of the preceding (August–November) and following (April–July) non-winter periods.

In 1986, Boardman examined data from England and Wales between 1949 and 1985 and established a close correlation between spikes in excess winter deaths and extremely low winter temperatures. Boardman also found that data on income and indoor temperatures over the period showed that those on lower incomes had lower temperatures in their homes, with the homes of the poorest being on average 3^{o}C colder than more affluent households.

Medically establishing a clear, undisputable link between cold temperatures and health risks is not difficult; rather the difficulty lies in establishing that it is indoor cold temperatures which

kill. In the 1960s and early 1970s, the general belief was that excess winter deaths were caused primarily by hypothermia. In the 1970s, Keatinge showed that even in cold homes hypothermia is in fact very rare. Death certificates for this period demonstrate that arterial thrombosis (blood clots in the arteries) and respiratory disease cause the most excess winter deaths. Both of these can be attributed, at least in part, to cold.

Influenza or hypothermia account for only a small proportion of excess winter death (Bowie, 2002) and while there is a clear link between the peaks in the rates of both, cold housing still plays a role in the development of health complications. In fact, the 2006 briefing from the Faculty of Public Health of the Royal College of Physicians states that in non-epidemic years, influenza only accounts for approximately one tenth of excess winter deaths.

In 2001, Wilkinson et al analysed over 80,000 deaths from cardiovascular disease in England between 1986 and 1996 and found deaths were 22.9% higher in winter months than the average for the rest of the year. Significantly for the purposes of this discussion paper, excess winter deaths seem to be linked to the age of the property (28.8% in properties built before 1850, only 15% in properties built after 1980).

A decade later, the Marmot Review team established that 21.5% of all excess winter deaths can be attributed to the coldest quarter of housing, due to it being cold, over and above deaths which would have occurred had these houses had the same winter excess as the warmest housing. Their report also stated that excess winter deaths in the coldest quarter of housing are almost three times as high as in the warmest quarter (based on Wilkinson et al, 2001).

In 2001, the Joseph Rowntree Foundation analysed the 1991 English House Condition Survey and national mortality data for England between 1986 and 1996, concluding that although winter mortality rises among all ages, there is a bigger rise among older people. Their analysis also showed that the percentage rise in excess winter deaths was higher among those living in homes with a poor energy efficiency rating, demonstrating a link between poorly heated homes and greater risk of winter mortality. Colder homes were found to present a 20% greater mortality risk for residents than the warmest quarter of homes.

Howieson and Hogan demonstrated the general connection between deprivation and winter mortality through an analysis of correlations between the Scottish Index of Multiple Deprivation (SIMD) and excess winter death data. They found that Glasgow had the worst SIMD score and the highest likelihood of excess winter mortality. This analysis also found that across the last 30 years, excess winter death concentrations have not followed outdoor January temperature patterns across Scotland. These conclusions indicate that something other than outdoor cold explains the variation in rates of excess winter deaths, and correlations with SIMD data strongly suggest that deprivation has a significant part to play.

However, the question remains as to whether cold homes are directly responsible for excess winter deaths, rather than the cold temperatures outside. A clue to the answer lies in years of data showing that excess winter deaths in the UK are consistently high when compared with other European countries.

The Eurowinter Group findings, published in The Lancet in 1997, support the position that there is an approximately equal contribution of outdoor and indoor cold to winter mortality but also found that those living in colder climates tended on average to protect themselves more with adequate clothing, heating and movement. This latter finding indicates that in harsher cold climates, such as Scandinavian climates, humans adapt their behaviour and their homes to adequately protect themselves from the outdoor cold. According to the 2009 annual report of the Chief Medical Officer, Finland has 45% few winter deaths than the UK and the report discusses the ‘paradox of excess winter mortality’ – the fact that the

population of colder countries appears to be protected by strong cultural norms of well-heated homes and warm outdoor clothing.

Other statistics show that thermal standards in the wetter and milder cold climate in the UK are not as high as in the dry and extreme cold northern European countries. Healy undertook an international comparison of excess winter deaths in 14 European countries between 1988 and 1997. UK countries were all high on the excess winter deaths ranking, both individually and collectively. Healy's comparison also considers thermal efficiency and shows higher excess winter death rates are often found in milder winter climates, e.g. Greece, UK, Spain, Ireland and Portugal. Colder countries, with higher building standards than the UK for years, have much lower rates of excess winter deaths. In addition, it analysed lifestyle factors, such as smoking, and found there was no robust/significant relationship despite the link with non-seasonal mortality rates. Healy concluded that this indicates a strong correlation between thermal efficiency and winter mortality.

However, outside temperature is evidently not unimportant, as it clearly has an effect upon indoor temperature and most people spend part of their time outdoors, even in cold weather. In 1975, Bull and Morton examined the relationship between temperature and certain health problems, and found that one to two days following a spell of cold weather mortality from heart attacks rose; three to four days following the onset of a cold spell, mortality from strokes increased; and one week into a cold spell, mortality caused by pneumonia and bronchitis rose.

The evidence to date seems to point to a range of health problems brought on or exacerbated by the cold, by poor housing conditions and by other factors, all of which can cause excess winter deaths. The Marmot Review highlights the direct health impacts of cold housing and fuel poverty of around 40% of excess winter deaths that are attributable to cardiovascular diseases and approximately 33% of excess winter deaths that are attributable to respiratory diseases. These, and other, health problems can persist and put strain on people and public services even where they do not, in the short term, lead to mortality.

Cardiovascular and Cerebrovascular Disease

Cerebrovascular disease is brain dysfunction related to disease of the blood vessels. It can lead to strokes especially where there is a fall in blood pressure or a haemorrhage when blood pressure rises causing the narrowed blood vessels to tear. Cardiovascular disease affects the heart; it may take a number of forms and have a wide range of causes. As stated above, in 1975 Bull and Morton found that three or four days into a cold spell, mortality from heart attacks and strokes increased. It should be emphasised that this, as most studies, looks at mortality not the prevalence of the disease itself.

Other research, such as that by Collins, has established that the effects of cold on mortality differ among age groups. Collins cites a treatment trial by the Medical Research Council which found that in winter systolic blood pressure increases across all ages and sexes but that the increase in blood pressure is significantly greater among older groups (in this trial ages 63-70). As blood pressure has an established connection to strokes, heart attacks, and other health concerns, it should be of no surprise that cold weather can increase mortality. Gemmell et al. specifically found that the effect of seasonal variation in temperature on cerebrovascular disease is greatest for those over 70.

The Public Health Research Unit Glasgow studied hospital admissions data and external temperature records between 1981 and 1993. From this they found that in the week after a cold spell, admissions for ischemic heart disease, cerebrovascular disease and respiratory disease all increased. Similarly Rudge referenced a study of excess winter deaths, hospital admissions, temperatures and average SAP ratings (ie energy ratings of buildings) in London. Although the study could not determine the effect of energy efficiency, it did find that

for all causes of death, cold weather resulted in a spike in numbers, but that the spike was higher for heart disease and respiratory disease.

Goodwin established that cold stress - the temperature shock to the body - is reduced where a person has a warm indoor climate, compared with having a cold indoors and going outside into a cold outdoors. In 1986, Lloyd argued that where only one room in a house is heated, especially if overheated, a person will suffer cold stress every time they leave that room. The importance of whole-house heating and the affordability of maintaining an adequate heating regime are therefore vital to minimising the stress cold weather imposes on the body.

If being in cold temperatures or moving between indoor cold and outdoor cold adversely affects heath then having an energy efficient home which is affordable to heat is highly important. In the case of cardiovascular disease and cerebrovascular disease, cold homes are likely to increase the risk of mortality or aggravate an existing condition rather than bring on the disease. This is distinct from respiratory disease which can be shown to be both caused and aggravated by cold and damp conditions.

Respiratory Disease

In 1989, a survey by Platt et al. of an Edinburgh council housing estate found evidence that children living in damp houses were prone to high rates of respiratory symptoms and infection. The adults surveyed who lived in damp homes showed evidence of emotional distress but not physical effects. The connection between cold, damp and respiratory disease is not difficult to pinpoint.

Damp increases the prevalence of the house dust mite, the single biggest cause of allergic asthma. Moderately cold indoor temperatures result in dampness which encourages the growth of fungi and mould, causing allergy and respiratory infection. A relative humidity of 70% or more is sufficient to sustain mould growth and warmer buildings have lower relative humidity. Inversely, very low relative humidity causes irritation to the mucosal surfaces in the respiratory tract.

Cold temperatures also have a direct physical effect upon the respiratory tract. Cold causes cooling and drying of the mucosal surfaces and triggers constriction in the respiratory tract of people with asthma or COPD (chronic obstructive pulmonary disease).

In 2000, examining the results of the Oxford Healthy Living Study, Evans et al. concluded that damp housing was strongly linked to both asthma and long standing illnesses. Those respondents who noted that they suffered damp housing were more likely to have visited their GP more than four times in the past year and have used hospital casualty and outpatient services in previous months. Somerville et al., published in the same year, showed that heating systems providing adequate warmth improved asthma symptoms and that home energy improvements could reduce the number of days children with asthma or other respiratory infections took off school through being sick by 80%.

Analysis of the 2002 Scottish House Condition Survey suggested that around 27% of Scottish households with one or more children include a child (or children) with symptoms of respiratory health problems. Significant predictors of this are related to the actual use of a heating system, tenure and dwelling type. The analysis claims that fuel poverty is not an effective predictor but does recognise that there is a difficulty in excluding socio-economic factors where these are associated both with poor housing and poor health.

In 2000, Press put forward the case that people with asthma were two to three times more likely to live in damp homes, and that temperatures below 16^{o}C lower the resistance to respiratory infection. Today, Asthma UK records 5.4m people, including 1.1m children, receiving treatment for asthma and state that children living in damp, mouldy homes are 1.5

to 3 times more likely to experience coughing and wheezing. The NHS currently spends around £1billion per year treating and caring for people with asthma, with the estimated annual cost of treating children higher than that of adults.

The Marmot Review team concluded that among the direct health impacts of cold housing and fuel poverty were a strong relationship between cold temperatures and cardiovascular and respiratory diseases, and evidence that children living in cold homes are more than twice as likely to suffer from a variety of respiratory problems than children living in warm homes.

Mental Health and Well-being

In 1987, Martin at al. found that adults demonstrated little in the way of physical effects as a result of damp, but did show evidence of emotional distress. The environment in which people live and how they feel about it unquestionably has an impact upon their mental and emotional well-being. There have continued to be many findings confirming this.

Sullivan et al. noted that visible mould has an especially significant connection to mental health among their study participants. Sullivan cited a study in Newcastle, which showed improvement in individual mental health scores following a series of repairs and renovations of the housing and a holistic regeneration of the area. Although mental health improved and there was a decline in smoking among the residents, no impact on respiratory health or use of health services was discernable. Sullivan suggested that physical effects of poor housing could persist over the longer term despite housing improvements, whereas attitude and mental well-being are more likely to see a quicker uplift.

This is borne out by the argument Peters and Stevenson put forward that reduced impact of housing on the health service may not be significant until the next generation in which all children grow up in warm, dry homes. As a result of a series of interviews the authors held with residents of two public housing estates in East London, Barrow and Buchan concluded that poor housing can inhibit lives in many ways. They went on to note that an accumulation of problems with the home can result in people being less able to address even small everyday problems.

Hopton and Hunt used the GHQ30 – General Health Questionnaire – as a measure of ill health in their study of residents in a Glasgow public sector housing estate. Residents were also asked about their housing and environment. The authors found that the reporting of cold and damp housing was significantly associated with mental ill health as measured using the GHQ30. In comparison, overcrowding and noise showed far less an association with mental ill health.

The effects of poor housing can also have secondary impacts upon mental and emotional well-being. Residents who feel their homes are cold, damp or mouldy are more likely to be unwilling to invite people into their home, this is especially so with older people. This can result in social isolation which is a risk factor for depression.

In 1998, the Scottish Office recognised that as well as resulting in physical ill-health, poor housing can have a demoralising impact and can impair well-being. There is, of course, a cost to the NHS resulting from poor mental health. In the 1996 Health of the Nation report, mental ill-health was said to account for 20% of NHS expenditure in England, and that one third of patients seeking help from their GP did so for emotional distress. If poor housing conditions are a contributory factor to mental ill health, then cold, damp and mouldy homes are costing the NHS.

L. Harker and Shelter (2006) suggested children in bad housing conditions, including cold homes, are more likely to have mental health problems such as anxiety and depression,

have respiratory problems and experience slow physical growth and delayed cognitive development.

A Warm Front evaluation study, carried out by Green and Gilbertson in 2008 at Sheffield Hallam University, showed receiving Warm Front packages was associated with better mental health in the short and medium term. In particular, residents with a bedroom temperature of 21°C were 50% less likely to suffer depression and anxiety than those with temperatures of 15°C.

The Marmot Review, which picked up on the results across five evaluations into various domestic energy efficiency programmes and initiatives, found that mental health is negatively affected by fuel poverty and cold housing for any age group and that the scale of the problem was unexpected. The report also stated that more than 1 in 4 adolescents living in cold housing were at risk of multiple mental health problems compared with 1 in 20 adolescents who had always lived in warm housing.

What Does The Health Sector Say?

According to the 2006 briefing, the Faculty of Public Health of the Royal College of Physicians recognises that living in a cold home can increase the likelihood of residents suffering from a range of health problems from hypertension to asthma and that tackling fuel poverty can, at one end of the spectrum, help save lives. In addition, improvements in housing and a subsequent reduction in fuel poverty could more generally help prevent ill health and reduce admissions to hospital, thereby reducing costs to the NHS.

As discussed previously in this paper, fuel poverty can often be an issue of multiple disadvantage and inequalities, with households on low incomes amongst those groups most at risk from fuel poverty. The 2006 NHS briefing acknowledges that the cost of heating the home can often have a negative impact on other important living costs, such as ensuring a good nutritional diet, as families have to choose on which vital basic needs they will spend their small income.

The briefing also recommends establishing local fuel poverty action teams to bring together key partners, including health services, local authorities, and energy suppliers. “The NHS has a vital role to play in tackling fuel poverty. Frontline staff are in a prime position to identify those at risk […] staff can also encourage individuals to accept help.”

In the 2009 Chief Medical Officer’s report, the annual cost to the NHS of treating winter-related disease due to cold private housing alone is estimated to be £859 million. This figure does not include any additional spending by other agencies in the public sector, such as social services, nor does it cover any additional economic or social costs to society as a whole. The report also states that, “Interventions to tackle fuel poverty work. The relief from cold and debt can reduce depression by half and visits to general practitioners by a quarter.”

Conclusion

The connection between poverty, fuel poverty, socio-economic deprivation and poor housing is unavoidable. That this impacts on health in some way is also largely accepted, albeit defining how one specific factor causes ill health is more difficult. There is therefore little doubt that these issues not only all interact with one another, but that they also need to be addressed.

The principal difficulty in irrefutably establishing a connection between cold and/or damp homes and ill health is the number of variables which impact on any analysis. In the vast majority of the studies into the causative relationship between health and housing, a variety of additional factors are considered by the authors to be relevant. Therefore, drawing

conclusions at anything more than a generic level is extremely difficult to back up with robust evidence.

In addition, the current policies and initiatives that exist are not necessarily designed with easy cross-policy analysis in mind. For example, in area-based programmes, not everyone taking up the offer of energy efficiency measures will be in fuel poverty or have existing health issues that can be linked to their accommodation. Even if the individuals are carefully selected to meet all these criteria, some choose to retain low indoor temperatures after energy efficiency measures have been installed to save money, rather than achieve an increased indoor temperature.

There have been relatively few studies undertaken to date that have included sample sizes over a sufficient time period that provide the desired evidentiary base. As the Marmot Review concludes, in the UK, we can only really say that anticipated physical health impacts from tackling fuel poverty have been relatively modest, particularly on adults. Yet significant effects on the very young were more evident, especially in terms of the infants' weight gain and hospital admission rates, for example. In addition, one outcome that has been apparent in a number of the evaluations and reviews has been the, often underestimated, mental health impact of living in fuel poverty and/or poor quality housing.

Improvements in health can often take time to be clinically visible. In one study looking at the costs to the NHS of energy inefficiency, Peters and Stevenson warn that savings resulting from improvements may be longer term, perhaps not evident until the next generation in which all children are raised in energy efficient homes. Such an assertion should highlight that exposure to cold and damp has long term health impacts, putting continued pressure on the NHS over a number of years. And, despite the difficulty establishing causal links, a number of epidemiological studies over the years have shown that there are repeated and strong associations. Cold housing increases the level of minor illnesses such as colds and flu and exacerbates existing conditions such as arthritis and rheumatism.

Establishing that an inability to maintain a warm, dry home is key to health and well-being not only supports the case for adequate action to address the problems of fuel poverty and energy inefficiency but it builds a case for including the NHS in that action. If health and well-being are impaired by poor housing conditions, improving those housing conditions could have the significant benefit of reducing pressure on health services.

It has been estimated that in the late 1990s people in poor housing were using health services 50% more than average at a cost of at least £2 billion a year to the NHS. Research undertaken by Energy Action Scotland in Paisley showed that respondents who reported problems with condensation, damp, mould and draughts went to their GP more than 10 times a year, on average an additional 2.56 visits a year compared with respondents who did not report the same problems.

The total costs to the NHS and the country are unknown. A study by Liddell in 2008 showed that investing £1 in keeping homes warm saved the NHS 42 pence in health costs. This could be particularly crucial at a time when budgets are under immense pressure and the call on the NHS is continuing to increase.

The idea of the NHS contributing to reducing winter injury and death is not new. In the winter of 2009-10, NHS County Durham and Darlington contributed £500,000 of its budget towards the gritting of roads, paths and pavements in priority areas. Perhaps unsurprisingly therefore, some of the strongest arguments for working together to tackle fuel poverty are to be found within the NHS itself. In 2007, the NHS Confederation acknowledged that there was sufficient evidence "to link agendas and argue for concerted government action to tackle

fuel poverty and thereby improve quality of life and health, as well as reduce CO_2 emissions".

And finally, as the briefing from the Faculty of Public Health states, "The NHS has much to gain by tackling fuel poverty. Not only will the overall health of residents be improved but, by decreasing excess winter mortality and morbidity, both primary and secondary care will suffer less in terms of winter pressures on their resources. It is therefore imperative that initiatives to tackle fuel poverty are mainstreamed within the NHS."

Written by: Sara Jones
Research by: Ellen Leaver
Energy Action Scotland
2012

BIBLIOGRAPHY

Barrow M., and Bachan R., University of Sussex, *The Real Cost of Poor Homes: How poor quality housing affects the lives of residents and service providers*, (1997) Royal Institute of Chartered Suryeors

BERR, *The UK Fuel Poverty Strategy*, (2001) BERR

Boardman, B., University of Sussex, *Seasonal Mortality and Cold Homes*, (1986) Institute of Environmental Health Officers, University of Warwick

Bowie N., *The Raised Incidence of Winter Deaths*, (2002) Register Office for Scotland

Bull G.M. and Morton J., *Relationships of temperature with death rates from all causes and from certain respiratory and arteriosclerotic diseases in different age groups*, (1975) Age and Ageing, vo. 4, pp. 232-46

Carr-Hill R.A., Coyle D. and Ivens C., *Poor housing: poor health?* (1993) Unpublished, funded by the Department of the Environment. Cited in Lawson R., *Bills of Health*, (1997) Radcliffe Medical Press

Chief Medical Officer/Department of Health, *On the state of public health: Annual report of the Chief Medical Officer 2009*, (2010) Department of Health [for England]

Collins K.J., *Low Indoor Temperatures and Morbidity in the Elderly*, (1986) Age and Ageing:15: 212-220

Collins, K., *Chapter 3: Cold, cold housing and respiratory illnesses.* Janet Rudge and Fergus Nicol, Editors, *Cutting the Cost of Cold: Affordable Warmth for Healthier Homes*, (2000) E@FN Spon

Department of Health, *Healthy lives, healthy people: our strategy for public health in England*, (2010) Department of Health

Energy Action Scotland, *Fuel Poverty and Health in Paisley*, (1999)

Energy Saving Trust, *F and G banded homes in Great Britain*, (2010) Energy Saving Trust

Eurowinter Group, *Cold exposure and winter mortality from ischemic heart disease, cerebrovascular disease, respiratory disease and all causes in warm and cold regions of Europe*, (1997) The Lancet, Issue 9062, pp.1341-46

Faculty of Public Health of the Royal College of Physicians of the United Kingdom, *Fuel Poverty and Health: Briefing Statement*, (2006) Faculty of Public Health

Gemmel I., Mloone P., Boddy A., Watt G. and Dickinson G., University of Glasgow, *Seasonal Variation in Mortality and Morbidity in Scotland 1981-93: An Analysis of Routinely Available Data*, (1999) University of Glasgow Public Health Research Unit

Goodwin J., *Chapter 4: Cold stress, circulatory illness and the elderly .*In Janet Rudge and Fergus Nicol, Editors, *Cutting the Cost of Cold: Affordable Warmth for Healthier Homes*, (2000) E@FN Spon

Green G. and Gilbertson J., *Warm Front: better health: Health impact evaluation of the warm front scheme*, (2008) Centre for Regional Social and Economic Research, Sheffield Hallam University

Harker L. and Shelter, *Chance of a lifetime: the impact of bad housing on children's lives*, (2006) London: Shelter

Healy J.D., *Excess winter mortality in Europe: a cross country analysis identifying key risk factors*, (2003) Journal of Epidemiology and Community Health, Vol 57, No 10

Healy J.D., *Housing, Fuel poverty and health: A Pan-European analysis*, (2004), Ashgate

Hills J., Getting the measure of fuel poverty: Final report of the fuel poverty review, (2012) Centre for Analysis of Social Exclusion, LSE

Hopton J.L. and Hunt S.M., *Housing conditions and mental health in a disadvantaged area in Scotland*, (1996) Journal of Epidemiology and Community Health, 50:56-61

Howieson S. & Hogan M., *Multiple deprivation and excess winter deaths in Scotland*, (2004) University of Strathclyde and Energy Action Scotland

Joseph Rowntree Foundation, *The impact of housing conditions on excess winter deaths*, (2001) JRF

Keatinge W.R. and Donaldson G.C., *Chapter 1: Cold weather, cold homes and winter mortality.* In Janet Rudge and Fergus Nicol, Ed, *Cutting the Cost of Cold: Affordable Warmth for Healthier Homes*, (2000) E@FN Spon

Liddell C. and Morris C., *Fuel poverty and human health: A review of recent evidence*, (2010) Energy Policy 38, pp. 2987-2997

Liddell C., *The Impact of Fuel Poverty on Children*, (2008) School of Psychology, University of Ulster, for Save the Children

Lloyd E., *Hypothermia and Cold Stress*, (1986) Croom Helm. Cited in Roger Critchley Health & Housing Group, *Cold Homes and Health*, (1997) Eaga Charitable Trust

Marmot Review Team, *The Health Impacts of Cold Homes and Fuel Poverty*, (2011), Friends of the Earth

Martin C.J, Platt S.D. and Hunt S.M., *Housing Conditions and Ill Health*, (1987) British Medical Journal, Volume 294, p 1125

Alex Marsh, David Gordon, Christina Pantazies and Pauline Heslop, University of Bristol, *Home Sweet Home? The impact of poor housing on health*, (1999) The Policy Press

New Economics Foundation (nef), Johnson V. and Simms A., *Taking the temperature: Towards an NHS response to global warming*, (2007) NHS Confederation

Peters J. and Stevenson M., *Chapter 11: Modelling the health cost of cold damp housing.* In Janet Rudge and Fergus Nicol, Ed, *Cutting the Cost of Cold: Affordable Warmth for Healthier Homes*, (2000) E@FN Spon

Platt S.D., Martin C.J., Hunt S.M. and Lewis C.W., *Damp housing, mould growth, and symptomatic health state*, (1989) British Medical Journal, Volume 298, p 1973

Press V., *Fuel Poverty and Health. A toolkit for primary care organisations, and public health and primary care professionals*, (2003) National Heart Forum, Eaga Partnership Charitable Trust, Faculty of Public Health Medicine, Help the Aged and the Met Office

Public Health Alliance, Scotland, *Housing and Health in Scotland: A Report by the Public Health Alliance*, (1993) PHA and Shelter, Scotland.

Revie C., Energy Action Scotland, *The Impact of Fuel Poverty and Housing Conditions on Scotland's Health: A review of available literature*, (1998) Energy Action Scotland

Rudge J., *Chapter 10: Winter morbidity and fuel poverty: mapping the connections.* In Janet Rudge and Fergus Nicol, Ed, *Cutting the Cost of Cold: Affordable Warmth for Healthier Homes*, (2000) E@FN Spon

Rudge J. and Gilchrist R., *Excess winter morbidity among older people at risk of cold homes: a population-based study in a London borough*, (2005) Journal of Public Health, 27(4), pp.353–358

Scottish Government, *Scottish House Condition Survey 2002 – Housing and Health in Scotland*, (2002) Scottish Government

The Scottish Office Department of Health, *Working Together for a Healthier Scotland: A Consultation Paper*, (1998) The Scottish Office

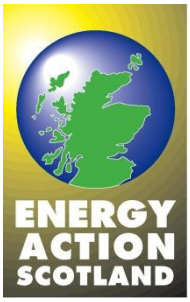
Sullivan S., Somerville M., Hyland M. and Barton A., Plymouth and South Devon Research and Development Support Unit, *The Riviera Housing and Health Survey*, (2002) Eaga Charitable Trust

Thomson H, Petticrew M and Morrison D, *Housing Improvement and Health Gain: A summary and systematic review*, (2002) Occasional Paper No 5, Medical Research Council Social and Public Health Sciences Unit

Wilkinson P, Landon M, Armstrong B, Stevenson S, Pattenden S, McKee M and Fletcher T, *Cold Comfort: The Social and Environmental Determinants of Excess Winter Deaths in England 1986–96*, (2001) The Policy Press

World Health Organisation, *Preamble to the Constitution of the World Health Organisation as adopted by the International Health Conference,* New York, 19 June - 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organisation, no. 2, p. 100) and entered into force on 7 April 1948, WHO

World Health Organisation, *Health Impact of Low Indoor Temperatures, Report on a WHO Meeting 1985*, (1987) WHO



This report was produced by Energy Action Scotland (EAS)

Suite 4a, Ingram House, 227 Ingram Street, Glasgow G1 1DA

Tel: 0141 226 3064 Email: eas@eas.org.uk Website: www.eas.org.uk

Energy Action Scotland is the national charity working for warm, dry homes.

Company limited by guarantee. Registered in Scotland No. 101660.

Charity No. SCO 09280

November 2012