EVIDENCE REVIEW & ECONOMIC ANALYSIS OF EXCESS WINTER DEATHS

for the National Institute for Health and Care Excellence (NICE)

Review 3

Delivery and implementation of approaches for the prevention of excess winter deaths and morbidity

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Abbreviations

A&E	Accident and emergency
CI	Confidence interval (95%)
CMD	Common mental disorder
COPD	Chronic obstructive pulmonary disease
COLD	Chronic obstructive lung disease
CVD	Cardiovascular disease
EHS	English Housing Survey
EWD	Excess winter death
GHQ	General Health Questionnaire
HSE	Health Survey for England
ICD	International Classification of Diseases ('ICD-9': 9th revision, 'ICD-10': 10th revision)
OR	Odds ratio
PM	Particulate matter (air pollutant)
QoL	Quality of Life
RH	Relative humidity
RR	Relative risk
SAP	Standard Assessment Procedure
Tmax	Maximum daily temperature
Tmin	Minimum daily temperature
VOC	Volatile organic compound
YLD	Years Lived with Disability
YLL	Years of life lost

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Executive summary

Background This is the third part of the 2013/14 review for NICE on excess winter death and morbidity. It is the fourth document in a series of evidence summaries and follows *Introduction to the topic*, *Factors determining vulnerability to winter- and cold-related mortality/morbidity* (review 1) and *Interventions and economic studies* (review 2). Its focus is on quantitative, qualitative, grey and good practice evidence relating to the delivery and implementation of approaches for the prevention of excess winter deaths and morbidity and the health risks associated with cold weather and cold homes. It is concerned largely with such issues as the identification and targeting of at-risk groups, and how protection measures can be effectively implemented.

Methods The literature search, based on the same search methods used in the preceding reviews, was undertaken in October 2013 on a wide range of databases and grey literature sources including, among others, MEDLINE, Social Policy and Practice, Social Science Citation Index, HMIC, PsycINFO, Avery Index and ICONDA International. The search strategies entailed a combination of subject indexing and free text search terms. Searches were limited to studies published in English, 1993-2013, and relating to OECD countries. Studies were summarized and assessed for quality of evidence by two independent assessors, and their results reported by narrative synthesis.

Results Relatively few studies were identified that provided objective assessments of the effectiveness of systems and approaches for protection against winter- and cold-related mortality/morbidity. Studies relevant to targeting have focused both on forecasting risk periods and the identification of at-risk individuals. Studies from the UK and France have shown the potential to predict periods of elevated risk using simple forecasting methods based on meteorological and other parameters, especially for disease exacerbation in COPD and for the overall pattern of mortality and hospital admission in relation to outdoor temperature. However, the precise role and utility of forecasting remains undetermined, especially given that much of the burden of cold-related mortality/morbidity lies outside the periods of the most extreme cold. Days of particular risk may nonetheless offer opportunities for communication and to promote actions needed to help reduce the overall burden of winter- and cold-related mortality/morbidity.

Disease registers and other methods have been used to identify individuals at high risk of winter mortality/morbidity and analyses of geographical data have been used to identify areas likely to contain a high proportion of individuals suitable for the targeting of housing interventions and the alleviation of fuel poverty. Although geographical markers can be used to identify important variations in fuel poverty risk, there are methodological limitations in their use and there are no detailed assessments of the degree to which the use of fuel poverty markers influences the cost-effectiveness of housing interventions. Further analyses suggest that the

prediction of cold homes can be problematic even with a reasonable level of data on household and housing characteristics.

Research evidence also suggests the potential importance of ensuring high uptake of influenza vaccination for the elderly and those with chronic illness, and uptake in the UK appears relatively favourable in international terms and has improved appreciably over time. The switch from risk-based to age group-based targeting of the elderly in England and Wales has shown some suggestive evidence of association with lower levels of pneumonia and influenza mortality in older people in the first 6 years after age group-based targeting began.

Rising fuel prices and the transition to a low carbon economy may both contribute to an increase in fuel poverty and, in the current UK policy environment, future energy efficiency programmes will in part be paid for by regressive levies on domestic energy bills which penalise financially disadvantaged households. Strategies to enhance uptake of housing interventions are needed, although there remains limited evidence on the approaches most likely to achieve high uptake. Studies from other European countries suggest there is need to take account of individual household circumstances to identify the policy approaches most likely to be successful in expanding home energy efficiency. The Cold Weather Plan for England, along with other documents, have proposed multi-faceted approaches to tackling winter mortality/morbidity, and integration of effort across agencies and sectors. In particular, a recommendation is to use opportunities for closer partnership working with the community and voluntary sector to help reduce vulnerability and to support the planning and response to cold weather. However, there is as yet very limited research evidence to demonstrate which aspects of such integrated approaches yield the greatest benefits.

Conclusions

A wide range of measures and approaches are important for tackling winter-and cold-related mortality and morbidity, with contributions across multiple agencies and sectors. Among others, those include the health and care services, local authorities, the community and voluntary sector, those involved in emergency planning and preparedness, as well as carers and neighbours of vulnerable people. There appears to be a role to support high risk individuals during periods of greater risk (e.g. very cold or icy/snowy weather), as well as the improvement of understanding of risks and protection measures against cold-related risks in the population as a whole. Long term measures, including infrastructure investments such as the improvement of home energy efficiency, are important as population-wide measures, but may also be targeted to help maximize impact especially for vulnerable groups. However, there remains a paucity of evidence on the operation and effectiveness of most strategies and approaches intended to protect against winter- and cold-related illness. Qualitative evidence suggests partnership working and integration may be important. More research and monitoring is needed to improve the evidence base to ensure well-designed programmes of health protection.

Roles in the review process

The search strategy was developed by Steve Duffy and Paul Wilkinson in consultation with NICE. The selection of studies to include in the review was made by James Milner and Paul Wilkinson. All contributed to summarizing of the research evidence and the assessment of the quality of published studies, with individual contributors assessing studies in their area of expertise. All studies were independently reviewed two members of the review team, and assessment scores agreed (PW, JM, MP, LJ).

Conflicts of interest

All members of the research team undertake research relevant to the subject of this review, and have received and continue to receive, research funding from a range of funding organizations.
These have included:

- The European Commission
- The European Climate Foundation
- UK Government departments
- The UK Research Councils (EPSRC, ESRC, MRC, NERC)
- The Wellcome Trust

1 Introduction

1.1 Context

This is the third part of the 2013/14 review for NICE on excess winter death and morbidity. It is the fourth document in a series of evidence summaries and follows *Introduction to the topic*, *Factors determining vulnerability to winter- and cold-related mortality/morbidity* (review 1) and *Interventions and economic studies* (review 2). Its focus is evidence relating to the delivery and implementation of approaches for the prevention of excess winter deaths and morbidity and the health risks associated with cold weather and cold homes. It is concerned with such issues as the identification and targeting of at-risk groups, and how protection measures can be effectively implemented.

It thus focuses more on practical and operational questions which are important to any programme of health protection against winter death/morbidity, but which are also often poorly researched. The literature is even more varied in type and quality than that covered in previous evidence reviews. Some good practice guides and theoretical policy analyses have been included to give indication of current thinking and debates even though these are not based on empirical primary research.

The findings will both help to inform multi-faceted programmes of intervention and highlight the still substantial research gaps.

1.2 Aims

To review quantitative, qualitative, grey and good practice evidence relating to the delivery and implementation of approaches for the prevention of excess winter deaths and morbidity and the health risks associated with cold weather and cold homes, and the cost-effectiveness of such approaches.

Specifically:

- *Identification and analysis of evidence on the impact of systems and strategies in local authorities and health services that support an integrated approach to*
    - *(i) the identification of risk and vulnerability and*
    - *(ii) the delivery and implementation of effective interventions and healthcare services, for example:*
- *methods to establish registers of those at risk, including scrutiny of data from health records, local authority housing tenancies and intelligence from a range of community services*
- *strategies to access at risk and vulnerable populations, increase uptake and enhance acceptability*
- *emergency planning strategies*

1.3 Research questions

Specific questions

- *What systems and strategies have been used to identify vulnerable and at risk populations and what impact do they have?*
- *What activities and interventions support the effective delivery and implementation of approaches to reduce excess winter deaths and the negative health consequences of cold weather?*
- *What influences the effectiveness of systems in delivering an integrated approach to addressing risk and vulnerability?*
- *What are the most effective methods for accessing at risk and vulnerable sub-populations?*
- *What approaches increase uptake and enhance acceptability of effective interventions?*
- *What facilitators and barriers influence the delivery and implementation?*

2 Methods

Literature searches were undertaken to identify studies primarily about excess winter deaths. The searches were also designed to identify studies about seasonal morbidity, fuel poverty, cold housing, energy efficient housing, winter related accidents and health forecasting. The search strategies were devised using a combination of indexed keyword terms and free text search terms appearing in the title and/or abstracts of database records. Search terms were identified through discussion between the research team, by scanning background literature and 'key articles' already known to the project team, and by browsing database thesauri.

The literature search involved searching a wide range of databases October 2013 and grey literature resources. Databases searched included: MEDLINE, Social Policy and Practice, Social Science Citation Index, HMIC, PsycINFO, Avery Index and ICONDA International. The searches were limited to the last twenty years (1993-2013) and to English language publications only.

The following databases and resources were searched:

- MEDLINE and MEDLINE In-Process
- EMBASE
- Social Policy & Practice
- Science Citation Index (SCI)
- Social Science Citation Index (SSCI)
- Conference Proceedings Citation Index- Science (CPCI-S)
- Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH)
- Health Management Information Consortium (HMIC)
- PsycINFO
- Cochrane Database of Systematic Reviews (CDSR)
- Database of Abstracts of Reviews of Effects (DARE)
- Cochrane Central Register of Controlled Trials (CENTRAL)
- Health Technology Assessment (HTA) database
- NHS Economic Evaluation Database (NHS EED)
- EconLit
- CEA (Cost-Effectiveness Analysis) Registry
- RePEc: Research papers in Economics
- Campbell Library
- Trials Register of Promoting Health Interventions (TRoPHI)
- Database of Promoting Health Effectiveness Reviews (DoPHER)
- Scopus
- Avery Index
- ICONDA International
- PsycEXTRA
- NICE Evidence
- OpenGrey
- RIBA Catalogue (Royal Institute of British Architects)
- NYAM Grey Literature Report (New York Academy of Medicine)

Details of the MEDLINE and other database search strategies and their results are given in Appendix 2.

As a number of databases were searched, some degree of duplication resulted. The titles and abstracts of bibliographic records were downloaded and imported into EndNote bibliographic management software to allow removal of duplicate records and subsequent processing.

In addition, searches were made of selected relevant websites including:

- http://www.eagacharitabletrust.org/ (EAGA Charitable Trust)
- http://www.euro.who.int/en/health-topics/environment-and-health/Housing-and-health (The World Health Organization Regional Office for Europe)
- http://www.energysavingtrust.org.uk/ (The Energy Saving Trust)
- http://www.cse.org.uk/ (The Centre for Sustainable Energy)

Additional searches were made of websites of key research groups in the UK and elsewhere.

Inclusion/exclusion criteria for review

Inclusion

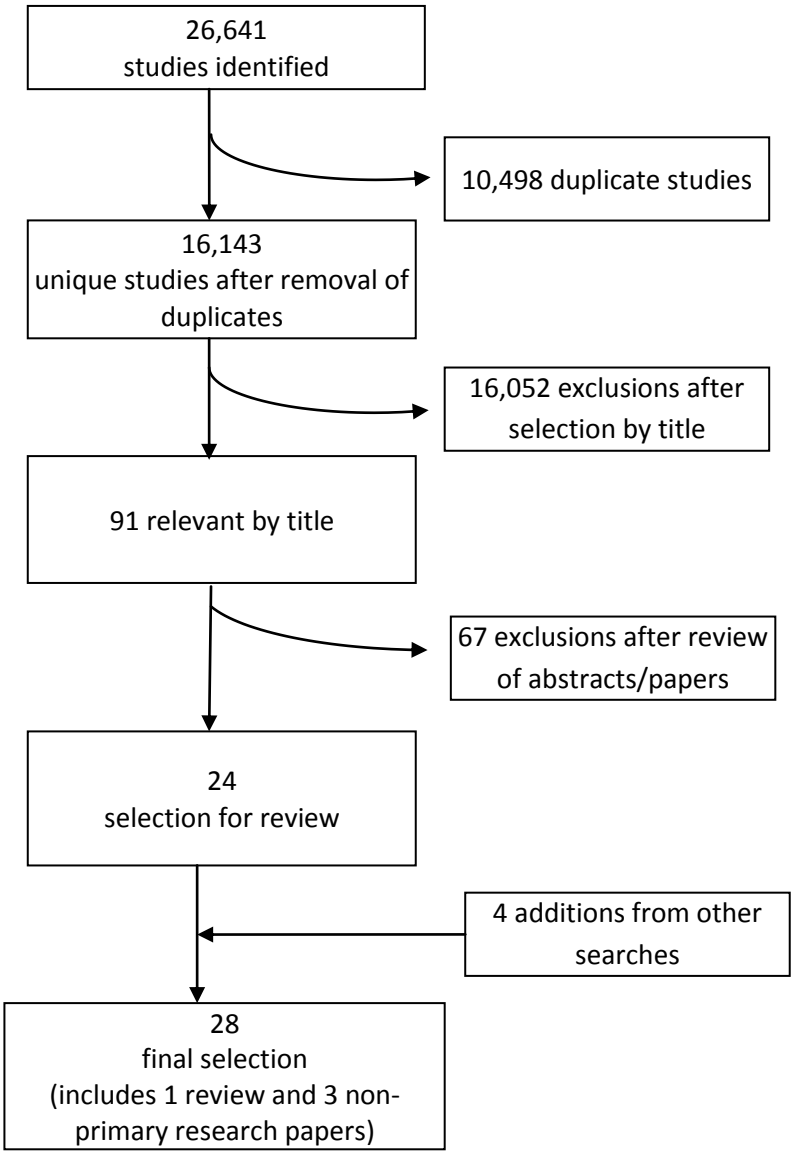
- Quantitative and qualitative (mainly) primary research papers and reports presenting evidence on the delivery and implementation of strategies aimed at reducing the risks of winter- and cold-related mortality/morbidity, including the effects of snow and ice
- Studies of populations in countries which are members of the Organization of Economic Cooperation and Development (OECD)
- Publication year 1993 onwards
- English language

Exclusion

- Publications as conference abstracts only or as simplified summaries without details of research design and methods

The papers include one review paper (relevant to influenza vaccine effect) and two papers containing non-primary research.

Flow chart of number of studies identified from different sources and numbers excluded at different stages of process and reasons for exclusion



Quality appraisal processes including consistency checking within and between appraisers, moderation at data extraction and analysis stages

Quality appraisal was made using the criteria and process for assessing quantitative observational studies and qualitative studies as outlined in the *Methods for the development of NICE public health guidance (third edition) Sept 2012.* See Appendix 6.

All evidence summaries were extracted by one reviewer and agreed/supplemented by the second reviewer. There was generally good agreement between reviewers.

Criteria for applicability

Studies were included if they contained data relevant to the *delivery and implementation* of strategies aimed at reducing winter- and cold-related mortality/morbidity rather than just measures of effect. Given the nature of the question, we included papers reporting policy and similar analyses where they were directly pertinent to the aim.

We selected papers from countries in the Organization of Economic Cooperation and Development.

Methods of synthesis and data presentation.

Studies were summarized by narrative description, highlighting main findings and strengths and weaknesses. Each description of evidence is concluded with an 'evidence statement' that attempts to sum up the number and strength of studies pointing to particular conclusions.

3 Findings

The findings will be presented firstly in relation to the identification of risk and vulnerability, both with regard to time (i.e. the forecasting of risk periods) and person, then with regard to strategies for the increased uptake of relevant interventions /services, and lastly the integration of activities.

3.1 Identification of risk and vulnerability

3.1.1 Targeting by time: forecasting risk periods

Several studies have considered the degree to which periods of vulnerability, especially for high risk groups, are predictable on the basis of time-varying risk factors, notably periods of low temperature and seasonal infections. Such studies are relevant to the concept of health forecasting and alert systems, which have been the basis of interventions aimed at the anticipatory care of patients with chronic obstructive pulmonary disease (COPD), as well as other high risk groups and more general warnings, such as the alerts implemented as part of the Cold Weather Plan for England.

In France, Laaidi et al (2013)[1] used time-series models to identify mortality-relevant thresholds from simple meteorological indicators to identify periods of dangerous cold as a basis of an alert system to trigger preventive measures. Such measures were mainly directed at homeless people, while actions focussing on the general population were mostly limited to providing advice on protection against exposure to cold. For the success of such an alert system they noted the importance of simplicity, reactivity, adaptability, and the ability to prevent health impact through specific measures. They identified a combination of minimum and maximum temperatures as the best indicator to predict the health impact of cold, and defined optimal thresholds for action in Paris at -9C and -2C for minimum and maximum temperatures respectively, while thresholds in Marseille were -3C and +4C. When both thresholds are reached in a given city, the risk of excess mortality is greater than 15%. They concluded that simple meteorological parameters could be used to identify dangerous cold episodes and help promote communication, although the study did not include a systematic assessment of the prediction characteristics and consequences of false positive and negative forecasts.

In a similar vein, Chalabi et al. (2005)[2] examined the forecasting of risk periods for patients with COPD as part of the Met Office Health Forecasting project for primary care and NHS trusts. Analyses of emergency hospital admissions data showed the risk of COPD admission to be variable (more than fourfold week-to-week variation across the year) and the risk to be largely and fairly reliably predictable from season, meteorological parameters, and measures of infectious disease activity. Emergency hospital admissions as a whole were much less variable than those for COPD. They concluded that such predictability offers the theoretical basis for improving the management of COPD patients through forecast-responsive care pathways, although formal assessment of the effectiveness of the responses to alerts was not undertaken.

Halpin et al (2011)[3] also reported on the predictability of periods of high risk in their randomised controlled trial (n=79 patients) of the effect of automated interactive calling combined with a health

risk forecast on the frequency and severity of exacerbations of COPD. The exacerbation frequency per patient per week was significantly greater during periods of predicted high risk (0.086 +/- 0.010 v 0.055 +/- 0.010), and the authors concluded that the ability of the forecast to predict high risk periods was clear. However, as reported in the previous review, this and other studies of health forecasting in COPD have yet to provide unequivocal evidence of benefit in reducing the frequency and severity of exacerbations.

In the recent evaluation of the Cold Weather Plan for England, Chalabi *et al*[4] provided temperature-mortality and temperature-morbidity functions by region to help inform alert thresholds. However, an important observation was that only a small proportion of cold-related deaths and hospital admissions occur in association with the very coldest days. Thus, although alerts may identify periods of greatest relative risk, the burden of cold-related mortality and morbidity is widely distributed throughout the winter period and beyond.

What the studies suggest is that periods of elevated risk, especially for patients who are particularly vulnerable to the effects of cold, are largely predictable using a health forecasting system, but it is not yet clear what contribution such forecasts can make to the cost-effective improvement in clinical management.

3.1 EVIDENCE STATEMENT – forecasting risk periods

A study from France[1] (quality rating +), as well as two studies of the Met Office COPD forecasting system in the UK (+)[2 3] and of the Cold Weather Plan for England (++)[4] provide evidence that periods of elevated risk for COPD patients and other target groups are predictable from forecast systems based on relatively simple meteorological parameters and other time-varying factors. However, periods of very high relative risk account for only a small proportion of cold-related mortality and morbidity burdens, and the value of using such forecast information to improve clinical management and wider prevention measures remains to be established.

3.1.2 Targeting by area and person

The identification of vulnerable groups through primary care registers has been explored by Bull and colleagues (2010),[5] who informed their selection algorithm by a simple analysis of the pattern of excess winter deaths across the West Midlands. Using this analysis, the health improvement directorate of the PCT developed an algorithm of eligibility for use by a range of health and social care professionals within the PCT to help reduce fuel poverty and improve winter warmth. The plan has been applied to target patients on the GP COPD registers and other vulnerable adults. Although described as a simple and useful tool, no evidence was presented on the performance of the algorithm and the degree to which it has helped target resources to those in most need.

A French study by Dubois (2012)[6] also considered the targeting of vulnerable groups specifically in relation to the identification of fuel poor households and the need for housing interventions. The paper notes that both the targeting/identification of vulnerable households and implementation of

measures are potentially costly and can face feasibility problems. This is particularly true in the case of fuel poverty policies, because of its multidimensional nature -- being a function of household income, the energy efficiency of the dwelling and its heating devices, and the source and cost of energy supplies. Again, the authors do not present diagnostic evidence on the performance of their proposed targeting framework, but they note that the identification of fuel poor households is key to its success.

In the UK various studies have examined the issue of identifying households who might benefit from home energy efficiency interventions or fuel poverty measures. Walker and colleagues (2012),[7] present an evidence-based approach to targeting fuel poverty in Northern Ireland noting that to date the targeting of policies has been poor, as those in greatest need cannot be identified easily. They therefore use an area-based approach using Geographic Information Systems (GIS) techniques to develop a small area fuel poverty risk index using a range of environmental and socio-economic variables. This index shows both large- and small-scale spatial variability in fuel poverty risk. These authors interpret their evidence of spatial concentration of fuel poverty risk as justifying the implementing fuel poverty strategies based on area assessments which may have the potential to guide policy-makers and improve the cost-effectiveness of anti-fuel poverty policies.

Other groups have also developed area markers of fuel poverty. They include Baker et al. (2003)[8] who describe the development of a method for predicting fuel poverty at small area level using 2001 census and 2001 English house condition survey data and discusses validation of the indicator and future development. This report also includes a comparison of the fuel poverty index (FPI) with other indicators. This approach is taken further by Fahmy et al. (2011)[9] who describes the development of a series of models for predicting the incidence of fuel poverty in England at a small-area level and examines the adequacy of the modelled results in informing our understanding of the geography of fuel poverty. Their analyses suggest that the incidence and spatial distribution of fuel poverty is highly sensitive to the way in which household incomes are measured.

None of these studies has provided a detailed analysis of what the use of area-based fuel poverty markers may achieve in improving the targeting of fuel poor households, and hence the cost-effectiveness of intervention programmes. A study which examined the ability to predict low indoor temperatures suggest that precise targeting may be a substantial challenge. Hutchinson and colleagues (2006)[10] investigated the extent to which homes with low indoor-temperatures can be identified from dwelling and household characteristics based on an analysis of data from a national survey of dwellings, occupied by low-income households, scheduled for home energy-efficiency improvements in five urban areas of England: Birmingham, Liverpool, Manchester, Newcastle and Southampton. Detailed monitoring data of indoor temperatures was used to identify cold-homes in which standardized daytime living-room and/ or nighttime bedroom-temperatures were < 16 degrees C (when the outdoor temperature was 5 degrees C). Overall, 21.0% of dwellings had standardized daytime living-room temperatures < 16 degrees C and 46.4% had standardized nighttime bedroom-temperatures below the same temperature. Standardized indoor-temperatures were influenced by a wide range of household and dwelling characteristics, but most strongly by the energy efficiency (SAP) rating and by standardized heating costs. However, even using these variables, along with other dwelling and household characteristics in a multi-variable prediction model, it would be necessary to target more than half of all dwellings in the sample to ensure at least 80% sensitivity for identifying dwellings with cold living-room temperatures. An even higher

proportion would have to be targeted to ensure 80% sensitivity for identifying dwellings with cold-bedroom temperatures. Their conclusion was that property and household characteristics provide only limited potential for identifying dwellings where winter indoor temperatures are likely to be low, presumably because of the multiple influences on home heating, including personal choice and behaviour. This suggests that the highly selective targeting of energy-efficiency programmes is difficult to achieve if the primary aim is to identify dwellings with cold-indoor-temperatures.

3.2 EVIDENCE STATEMENT – targetting households in fuel poverty

Studies which have examined methods for identifying at risk households, specifically those in fuel poverty who would benefit most from housing interventions, have used both an individual and area-based approaches. However, most of these studies give only limited assessments of the degree to which the targeting of interventions can be improved by the use of such selection algorithms. This includes a UK study reporting a household-based selection algorithm (not primary research, not rated)[5] as well as a French study that considers targeting from a largely theoretical perspective (+)[6] and three studies of area-based markers in the UK (all +).[7] [8] [9] A more analytical UK study (++)[10] suggests that the identification of the coldest homes is difficult even with reasonable information on household and dwelling characteristics.

3.2 Strategies to access at risk and vulnerable populations, increase uptake and enhance acceptability

3.2.1 Uptake of services: vaccination

Several studies have examined the role of influenza vaccination and its uptake in target groups. Elderly people and those with long-term medical conditions are targets for influenza vaccination, although a recent systematic review by Michiels et al. (2011)[11] on the effectiveness and risks of inactivated influenza vaccines in different target groups reported inconsistent results in studies among children younger than 6 years, individuals with COPD, institutionalised elderly (65 years or older), elderly with co-morbidities and healthcare workers in elderly care homes. However, a US study by Nichol (1998)[12] on the benefits of influenza vaccination for low-, intermediate-, and high-risk senior citizens concluded that healthy senior citizens as well as senior citizens with underlying medical conditions are at risk for the serious complications of influenza, benefit from vaccination and should be immunized.

An early study on the effectiveness of the targetting of influenza vaccination at high risk individuals (those who have chronic heart, chest, or kidney disease; people who have diabetes; people who are immuno-compromised owing to treatment or disease; and people living in residential accommodation but not (at the time) routine immunisation of elderly people) was caried out by Watkins (1997).[13] His analysis of the immunization patterns in practices in Gwent showed that under half of those patients identified as high risk and recommended for vaccination received it: only 63% of patients with heart disease, 39% with diabetes, 41% with asthma, and only one in three of those

over 75. One quarter of all doses were given to patients at low risk. The study shows that advice from general practitioners accounted for 40% of all those being vaccinated, most of the remainder resulting from self referral by patients on an annual basis or on advice from the practice nurse. Under 4% of patients were recruited by proactive methods such as telephone, letter, or a message on repeat prescriptions; 80% were recruited opportunistically. Poster campaigns had little influence in targeting those who would most benefit. There was no significant difference in uptake rates between practices according to whether they were training practices or fundholders, had more than two partners, or occupied cost-rent premises. There was also no relation with list size, though those practices with the highest vaccination rates had the highest uptake in those who would most benefit. Personal advice from a general practitioner or practice nurse during the vaccination period was the greatest stimulus to vaccine uptake. There was little evidence of practices using vaccination registers to plan their vaccination programmes, and other health workers, though targeting risk groups correctly, did so infrequently.

A later UK study by Breeze et al. (2004)[14] focused on the uptake of influenza vaccination among people aged over 74 years, 1997-2000, using data from a survey of 73 general practices in Britain. Influenza vaccination policy for elderly people in Britain had changed twice since the 1997 Watkins study to increase protection against influenza. Data from the 73 pratices with sufficient data for analysis showed overall uptake among the elderly to be 48% (95% CI 45%, 55%) in 1997 and did not increase substantially until 2000 when the uptake was a third higher at 63% (50%, 66%). Vaccination uptake was lower among women than men (RR 0.9), people aged 85 or more compared to people aged under 80 (RR 0.9), those in the most deprived areas (RR 0.8) compared to the least deprived, and was relatively high for those in owner-occupied homes with central heating compared to other non-supported housing (RR for remainder = 0.9). This pattern did not change over the years studied. The authors concluded that the increased uptake in 2000 may have resulted from the additional financial resources given to practices; it was not at the expense of more disadvantaged socioeconomic groups but nor did they benefit disproportionately.

Two years later a cross-sectional postal survey of older peoples' (aged 74+ years) views on influenza vaccination uptake by Mangtani et al. (2006)[15] reported 85% of men and 75% of women were vaccinated against influenza in the previous year. Over 80% reported being influenced by a recommendation by a health care worker. The most common reason reported for non uptake was good health (44%), or illness considered to be due to the vaccine (25%). An exploration of the crude associations with socio-economic status suggested there may be some differences in the population for two main reasons: 81% of people reporting good health lived in owner occupied housing with central heating vs. 63% who did not state this as a reason ($p = 0.04$), whereas people reporting ill health due to the vaccine was associated with poorer social circumstances. 11% lived in the least deprived neighbourhood compared to 36% who did not state this as a reason ($p = 0.05$) and were less likely to be currently married than those who did not state this as a reason (25% vs 48% $p = 0.05$). Thus, although vaccine uptake was good, 1 in 4 women and 1 in 7 men aged over 74 years did not take it up. Around 70% reported they would not have the vaccine in the following year. The divergent reasons for non-uptake, and the positive influence from a health care worker, suggests further uptake will require education and encouragement from a health care worker tailored towards the different views for not having influenza vaccination.

The same group subsequently reported the impact on mortality due to pneumonia or influenza from the change from risk-based to age group-based targeting of the elderly for yearly influenza vaccination in England and Wales.[16] This study was based on time-series analyses for England and Wales of people aged 65-74 and 75+ years whose deaths were registered to underlying pneumonia or influenza between 1975/1976 and 2004/2005. The effect on average excess pneumonia and influenza deaths each winter in the 4-6 winters since age group-based targeting of vaccination was introduced (in persons aged 75+ years from 1998/1999; in persons aged 65+ years from 2000/2001) was estimated using multivariable regression adjusted for temperature, antigenic drift and vaccine mismatch, and stratified by dominant circulating influenza subtype. There was lower average excess mortality in the six winters after age group-based targeting began compared to before, though CI for the 65-74 years age group includes zero difference. Trend in baseline pneumonia and influenza mortality shows an apparent downward turning point around 2000 for the 65-74 years age group and from the mid-1990s in the 75+ years age group. This evidence is interpreted as weakly supportive that the marked increases in vaccine coverage accompanying the switch from risk-based to age group-based targeting of the elderly for yearly influenza vaccination in England and Wales was associated with lower levels of pneumonia and influenza mortality in older people in the first 6 years after age group-based targeting began.

Elsewhere, recent studies have examined the uptake of influenza vaccination in the USA,[17] Germany[18] and Spain. [19] Takayama's study (2012)[17] of the characteristics associated with the uptake of influenza vaccination among adults in the United States was based on data from the 2009 Behavioral Risk Factor Surveillance System to estimate adjusted prevalence ratios for receiving the influenza vaccine in the past 12 months. Among 134,101 adults aged 65 years, the influenza vaccination coverage level was 68.9%. Having health care coverage was the strongest predictor of vaccination in both age groups, after accounting for other sociodemographic characteristics, health behaviors, and health status. Those reporting older age, white race, higher education, non-smoking status, being physically active, or having poor physical health or a personal history of various chronic conditions were also more likely to report having received the influenza vaccine.

In Germany, Bohmer et al. (2011)[18]reported a telephone survey of 21,262 household-interviews representative of the adult population in Germany. Influenza vaccination coverage in the target population (i.e. persons >=60 years, chronically ill, healthcare workers) was 44.1%. Persons who received professional vaccination advice within the past five years were more frequently vaccinated against (tetanus and) influenza than persons without. Private physicians were identified as the most important source for vaccination advice; other factors included: having a statutory health insurance, last physician contact < 1 year ago, and living in the eastern part of Germany , while low socio-economic status, migration and the feeling of being insufficiently informed on the benefits of vaccination were independently associated with low uptake.

A Spanish study by Santos-Sancho et al. (2012)[19] compared influenza vaccination coverage among Spanish adults suffering COPD using data (n=15,355) from the European Health Survey performed in Spain in 2009/10, of whom 1,309 (8.2% 95% CI 7.7-8.7) had COPD. Overall vaccination coverage among those with COPD is 49.4% (95% CI: 46.3-52.5%) and 21.3% (95% CI: 20.7-21.9) among people without ($p < 0.001$). The probability of being vaccinated is three times greater for COPD patients (crude OR = 3.0, 95% CI: 2.6-3.5). Among COPD patients the uptake of vaccination increased with

age, being male, perceiving one's health as fair or poor, not smoking, and having seen a doctor during the previous month.

3.3 EVIDENCE STATEMENT – vaccine efficacy

A review of infuenza vaccine efficacy in the elderly (++) suggests inconsistent evidence about the efficacy of influenza vaccination in individuals with COPD, institutionalised elderly (65 years or older), elderly with co-morbidities, while an earlier US study (+)[12] concluded that healthy senior citizens as well as senior citizens with underlying medical conditions are at risk for the serious complications of influenza and benefit from vaccination. Several studies in the UK have shown a favourable trend of increasing uptake of influenza vaccination among the elderly (all +)[13 14 15 16], with reasonable, but imperfect, coverage in the elderly, and a positive effect of the switch from risk-based to age group-based targeting of the elderly for yearly influenza vaccination in England and Wales (++). [16] Other studies from the USA(+),[17] Germany(+)[18] and Spain(+)[19] have reported generally lower vaccination coverage than in the UK with varying determinants of uptake.

3.2.2 Schemes for promoting housing interventions or fuel poverty relief

An important context for the housing interventions and the relief of fuel poverty in the UK is that of rising fuel prices and the transition to a lower carbon economy. Ekins and Lockwood (2011)[20] have identified that the transition to a low-carbon economy is expected to increase levels of fuel poverty, and suggests actions is needed on two main drivers of fuel poverty: low incomes and the energy inefficiency of homes. A further National Energy Action report by Stockton and Campbell (2011) for the Joseph Rowntree Foundation[21] also examined this issue and concluded that (future) energy efficiency programmes will be paid for by regressive levies on domestic energy bills which penalise financially disadvantaged households. They concluded that targeting hard-to-treat properties occupied by the most financially disadvantaged would be the most equitable use of (government) resources.

How the effect of support for housing interventions can be maximized has been considered by Kuholski and colleagues (2010),[22] who propose a ‘one-touch approach’ to energy and housing programs and policies. Their thesis (it is not an empirical evaluation) is the need to escape from ‘silos’, which have contributed to fragmented service delivery and inefficient use of scarce resources by the agencies providing these services. A "one-touch" approach for home interventions that strategically integrates public health and energy efficiency has many potential direct and indirect benefits.

Armstrong et al (2006)[23] examined some of the impediments to uptake of housing interventions, and found that even the offer of free installation of central heating to an elderly community has limited uptake. They examined the success of a local initiative to provide free installation of central heating for a group of elderly people monitored through its different stages. Of 1181 tenants approached, only around one-quarter finally received central heating within the year. The reasons for the low

uptake included inaccuracies in estimating those eligible as well as tenants' worries over upheaval and mess, health concerns and fear of increased heating costs.

In other many other countries, the main driver for home energy efficiency upgrades is climate change and energy policy rather than fuel poverty and winter mortality/morbidity. Given different policy environments and other context, the relevance to the improvement of housing stock in the UK is limited. Nonetheless, some points of principle are relevant.

Weis et al. (2012)[24] reported the experience in Germany, a country with relatively good housing stock and progressive policies. The improvement of the energy efficiency of the existing housing stock is mainly motivated by regulatory instruments and subsidy programmes, together with communication. Success has been sub-optimal, however, with still a large potential for energy savings. The authors conclude that the specific situation homeowners face, coupled with an analysis of the energy saving potentials of their buildings, are important for understanding the mix of instruments that will purposefully encourage the most effective refurbishment measures.

An analysis of the situation in Sweden by Nair et al. (2010)[25] (*"Factors Influencing Energy Efficiency Investments in Existing Swedish Residential Buildings."*) was based on data from a survey conducted in 2008 of 3,000 owners of detached houses to analyse the factors that influence the adoption of investment measures to improve the energy efficiency of their buildings. For the majority of homeowners, it was important to reduce household energy use. Most undertook no-cost measures as compared to investment measures. Personal attributes such as income, education, age and contextual factors, including age of the house, thermal discomfort, past investment, and perceived energy cost, influence homeowners' preference for a particular type of energy efficiency measure.

3.4 EVIDENCE SATEMENT – promoting housing interventions

Two UK assessments (+)[20] [21] have concluded that the transition to a low carbon economy will increase fuel poverty and that future energy efficiency programmes will in part be paid for by regressive levies on domestic energy bills which penalise financially disadvantaged households. Strategies to enhance uptake of housing interventions have been proposed including for the USA [22] a 'one stop' approach (not empirical research, not quality rated), but there are likely to remain significant barriers to uptake (UK study, +).[23] Lessons from other European countries[24] [25] with better housing energy efficiency than the UK suggest the attention needs to be paid to the circumstances of individual householders to maximize uptake of interventions. Partnership working may be key to success (UK, +)[26] (see next section).

3.3 Integrated strategies

Few studies have specifically examined the *impact* of integration through primary research. Two studies are included here based on the evaluation of the Cold Weather Plan for England,[4] and a guide to its implementation[27] and another on the evaluation of the *Warm Homes Healthy People Fund* 2012 to 2013.[26] In addition a brief summary of a 'synthesis and guide' is included, which

identified good practice from schemes "expected to make an impact on mortality in a short timescale if delivered at a sufficient scale."[28]

Quantitative analyses in support of the CWP evaluation have been reported previously. Here we report the main messages about the operation and implementation of the Plan.[4 27] The CWP's main messages remind organizations of the need to be aware of the Cold Weather Plan, the distribution of alerts, of the need for providers and stakeholders to take action, and that there should be opportunities for closer partnership working with the community and voluntary sector to help reduce vulnerability and to support the planning and response to cold weather. It also refers to long-term planning and commissioning to reduce cold-related harm by health and wellbeing boards and included in joint strategic needs assessments and joint health and wellbeing strategies.

The evaluation of the scheme found that health and social care managers tended to think of 'vulnerability' in terms of socio-economic deprivation and existing clients (i.e. people who were in receipt of social care services such as home care) – a definition that may miss some people who are vulnerable during cold weather (such as those who don't use services) and include some people who are not (e.g. because they live in a warm home). Many services, such as home care, are contracted out to independent providers. While the CWP and the cold weather alerts were a useful aid to prompt providers about actions that should be taken during cold weather, commissioning managers could not be sure that the actions set out in the CWP for front-line staff (such as checking room temperature) were being undertaken. Engagement with primary care was also variable: while some GPs were said to be actively engaged with winter welfare initiatives (such as referring patients to household warmth interventions) others were not. Local leadership of implementation of the CWP tended to be with emergency planning staff rather than with public health staff. Emergency planners felt limited in what attention they could give to prevention.

Interviews with a sample of older people revealed that while respondents thought cold weather may exacerbate existing conditions there was little knowledge of the cardio-vascular risk association with cold temperatures. Although all respondents were in regular contact with a health professional, none had received any advice or support related to cold weather. Nearly all respondents were reliant on public transport, with participants from the rural case study in particular facing arduous journeys to access facilities such as shops, exposing them to cold outdoor temperatures. The risk of poor health during cold weather was typically mediated by instrumental social support provided by family (predominantly) or neighbours. This took the form of car journeys, hot meals, shopping, repairs, help with heating technology, and monitoring health and wellbeing.

In their evaluation of the *Warm Homes Healthy People Fund* 2012 to 2013,[26] Wookey et al examined the benefits of the interventions and the challenges faced using a mixed methods study (using an online survey for local authority leads, telephone interviews and local evaluation reports). They concluded that the fund was once well received, but that partnership working was key to successful delivery. Among the key barriers were engagement of healthcare professionals (which was a significant problem) and lack of year round funding. They considered the support of clinical commissioning groups (CCGs), local authorities and health and wellbeing boards (HWBs) essential to the continuation of the schemes, which address indicators in the three national health and social care outcome framework.

The National Inequalities National Support Team (NIHST) document (Roche, T et al 2010[28]), "How to reduce the risk of seasonal excess deaths systematically in vulnerable older people to impact at population level," is a resource guide rather than empirical research (so technically falls outside the inclusion criteria). It is included merely because it constitutes a useful summary intended to support communities to develop local plans. It proposes ten steps for managing EWD:

Step 1: Gain insight into the local picture of EWD through local analysis
Step 2: Develop a shared understanding of the agenda and role of partners
Step 3. Develop joint working
Step 4: Develop a data-sharing agreement or data-sharing protocol
Step 5: Coordinate a systematic approach across organisations for the key interventions
Step 6: Develop a risk register
Step 7: Develop a list of clients/patients
Step 8: Develop criteria for prioritisation
Step 9: Manage the list
Step 10: Develop the management framework

These statements are not based on primary research but are included as an 'example' of current thinking on good practice in the absence of a firm evidence base.

3.5 EVIDENCE STATEMENT – integration of strategies

There is little evidence specifically on the *impact* of integration of services. The 2013 evaluation of the Cold Weather Plan for England (quality rating +)[4] and the PHE guidance (synthesis/guidance document, not rated)[27] provides some insight. The CWP itself espouses closer partnership working with the community and voluntary sector and the need for long-term planning and commissioning by health and wellbeing boards and as part of joint strategic needs assessments and joint health and wellbeing strategies. Interviews with service providers suggest a number of barriers, however, for exampole that commissioning managers could not be sure that required actions were being undertaken by contracted independent providers; that engagement with primary care was variable; and that local leadership of implementation was often with with emergency planning staff who felt limited in what attention they could give to prevention. The Public Health England evaluation of *Warm Homes Healthy People Fund* 2012 to 2013 (quality rating +) identified partnership working as key to successful delivery (involving clinical commissioning groups (CCGs), local authorities and health and wellbeing boards (HWBs), but key barriers were identified as (lack of) engagement of healthcare professionals and lack of year round funding. The NIHST 'good practice' guide[28] (not primary research and not rated for quality) emphasizes the need for shared understanding, joint working, and a systematic approach

3.4 Response to specific review questions

- *What systems and strategies have been used to identify vulnerable and at risk populations and what impact do they have?*

These strategies include:

- The use of general practice registers (including disease registers and lists of at-risk individuals) primarily targeted through advice and information cascaded via health and social care professionals (the meteorological warning system of the Cold Weather Plan for England).
- Diseases-specific weather warning and anticipatory care systems, notably for patients with COPD
- The targeting of households in energy inefficient homes or at risk of fuel poverty identified by the assessed characteristics of housing in local geographical areas and/or on the basis of benefit entitlements.

The impact of such targeting strategies aimed at high risk populations has yet to be firmly established. The cold weather alert system of the national Cold Weather Plan for England is the subject of ongoing evaluations. Evaluations of the weather warning systems for COPD (largely organised by the UK Met Office) have been the subject of limited evaluations (see review 2) but further research is required to provide clear evidence on cost-effectiveness. Evaluations of housing interventions were considered in review 2. There is evidence of a range of potential health benefits. The potential role of targeted support (e.g. for households containing elderly people, those with chronic disease) will be explored in the economic modelling.

- *What activities and interventions support the effective delivery and implementation of approaches to reduce excess winter deaths and the negative health consequences of cold weather?*

The activities and interventions that potentially support the effective delivery and implementation of approaches to reduce excess winter deaths include:

- The use of registers of at-risk individuals and/or target institutions (e.g. care homes) for the delivery of targeted support (e.g. Cold Weather Plan for England)
- The use of weather health warning systems for advice during periods of elevated risk
- The use of advice to the general population through weather forecasts and by leaflets and other media
- The use of winter fuel and cold weather payments (universal entitlements for target groups, elderly)
- Targeting of home energy efficiency interventions by use of geographical targeting, referral systems and or advice websites (the later including advice on assistance with fuel costs) (e.g. http://www.macmillan.org.uk/Cancerinformation/Livingwithandaftercancer/Financialissues/Benefitsandfinancialhelp/Help_with_housing_costs/Heating_grants.aspx

The research evidence on these approaches and their impact on health outcomes has yet to be firmly established.

- *What influences the effectiveness of systems in delivering an integrated approach to addressing risk and vulnerability?*

The methods for addressing risk and vulnerability have not been clearly worked through. Vulnerability is a function of the individual and the factors that contribute to his/her exposure to cold, especially housing energy efficiency. The most important personal determinant of risk is age, and the risk of winter mortality/morbidity is quite widely distributed (small socio-economic gradient etc). Although individuals with chronic disease (especially respiratory and cardiovascular disease) are at higher relative risk of cold-related health impacts than the general population of the same age, it is very probable that the large burden of cold-related mortality/morbidity occurs in people not included in the (relatively selected) lists of patients viewed as being at risk because of pre-existing chronic illness or care needs. There are therefore still important questions about the balance between the identification vulnerable individuals/households and the use of population-wide measures.

The effectiveness of integration depends on how well there is flow of information and decision-making between professionals within and between sectors. This has not been directly address in research, but evidence of processes and ways of working suggests need for clear lines of responsibility and shared understanding of needed actions.

- *What are the most effective methods for accessing at risk and vulnerable sub-populations?*

See comments above about targeting versus population-wide approaches. Given the likely distribution of risk within the population, there is likely to be a strong case for population-wide interventions in addition to any strategy of targeting vulnerable subpopulations. Various vulnerable subpopulations may be readily identifiable through disease registers, settings (care homes), geographical area (homes with high risk of fuel poverty) etc. However the parameters of any targeting strategy need to be carefully considered in relation to each particular form of intervention. For example, methods for identifying homes that may potentially benefit from subsidized energy efficiency investments need to consider data on dwelling as well as household characteristics. This might be achieved through a two-tier process of targeting areas and then households within areas, while other routes might allow referral by the health service of patients with COPD or other conditions for housing intervention.

- *What approaches increase uptake and enhance acceptability of effective interventions?*

Factors influencing uptake may vary from intervention to intervention. For influenza, there has been a generally favourable trend of increasing uptake among the elderly over time, with a positive effect of the switch from risk-based to age group-based targeting. Opportunities to increase increase uptake exist through primary care teams.

The uptake of energy efficiency improvements appears more complex. Some studies suggest that even when free home energy efficiency improvements are offered they are sometimes declined (because of concern over disruption, future costs etc). The general message appears to be that strategies need to take account of the specific situation homeowners face and the energy saving potentials to maximize the uptake of refurbishment. Area-based strategies may be useful.

- *What facilitators and barriers influence the delivery and implementation?*

It is difficult to make generalisations on the facilitators and barriers influencing delivering and implementation. For the cascade of advice and actions targeted at high risk individuals during cold weather, it appears important that there is good communication, clarity over required actions, clear lines of responsibility and a sense of priority.

For actions aimed at longer-term interventions for households such as energy efficiency improvements, barriers appear to include inertia, (capital) cost, lack of understanding of potential benefits (financial more than health) and concern about disruption. Provision of grants or subsidies as well as good communication effectively targeted are likely to enhance uptake of such measures.

The Warm Homes Healthy People Fund evaluation suggested partnership working is key to success, while barriers included engagement with healthcare professionals (a significant problem) as well as lack of year-round funding. The support of clinical commissioning groups (CCGs), local authorities and health and wellbeing boards (HWBs) was considered important for this scheme.

3.5 Quality of studies

As with much literature on excess winter mortality and morbidity the evidence relating to the delivery and implementation of approaches for the prevention of excess winter deaths and morbidity is very heterogeneous and mixed in quality. Moreover, several of the reviewed studies take a largely theoretical stance or consider points of principle rather than presenting objective empirical evidence on the impact of particular forms of intervention. These were difficult to assess in quality terms using conventional criteria. We therefore used more ad hoc interpretations to assign quality ratings. Few of the studies reviewed in this section provided very strong objective evidence, but studies relating to targeting and influenza vaccination were mostly of reasonably high quality (+ or ++) while evidence on the uptake of home energy efficiency interventions was more mixed in quality and studies relating to integration were more descriptive than analytical.

3.6 Findings into context

The previous documents in this summary of evidence provide the case for the health benefits of a range of interventions aimed at alleviation of winter-and cold-related mortality/morbidity. The studies considered here are relevant to the very important questions of implementation and delivery. Although there remain important evidence gaps about how an integrated strategy should be designed, the evidence provides a rationale for a multi-faceted approach with both targeted and population-wide interventions involving multiple sectors. To be able to develop an effective and comprehensive plan will require further formative research and testing and the further assessment of barriers to and facilitators of success.

3.7 Implications of findings

The limited and heterogeneous nature of the evidence, with few objective assessments of the impact of different strategies, means that most conclusions can be of only a general nature. There are however a number of broad implications.

- Tackling winter-and cold-related mortality and morbidity entails a broad range of strategies and approaches, with potential contributions across multiple agencies and sectors. For health protection to be most successful, it would appear important to capitalise on and integrate actions from a wide range of methods and actors.
- There are potential roles for both population-wide and targeted intervention strategies, and the greatest impact is likely to entail a combination of both approaches. The optimal approach for targeting needs to be assessed on a case-by-case basis (i.e. for each form of intervention) but, for most interventions, there is currently insufficient evidence on the methods of targeting that would be most effective and efficient.
- A cold weather health warning system is an element of the national Cold Weather Plan for England and also of more local actions focused on groups such as those with COPD. Such systems are able to identify risk periods with reasonable accuracy, but further research is needed to understand their overall impact on health outcomes, and the most effective methods of implementation, including operational implications for the health and other services.
- Influenza vaccination is potentially an important contributor to the reduction of excess winter death although there appears some inconsistency in the evidence. Although uptake is reasonably high for target groups, measures which further enhance uptake are likely to be beneficial. There may also be a case for the optimization of other treatments for patients with chronic diseases.
- Infrastructure investments such as the improvement of home energy efficiency are potentially important population-wide measures. Appreciable health benefits are likely to accrue from the general improvement in energy efficiency of housing stock as a whole. The impact on health may be accelerated by targeted financial support for vulnerable groups. Further insight into how this might be implemented and the role of fuel subsidies may come from the economic modelling to be described in the next report.
- Some of the measures desirable for tackling winter mortality/morbidity are also desirable for other reasons. The principal example is improvement in home energy efficiency which is also motivated by climate change and energy security objectives. There are therefore likely to be mechanisms to capitalise on the co-benefits for health of policies largely driven from outside the health sector.
- There is a need for more research evidence to support strategy development (see below)

3.8 Limitations of the evidence, gaps

Overall, the evidence relating to the impact of different approaches and strategies for protection against winter-and cold-related mortality and morbidity is quite limited, especially with regard to operational questions and issues relating to service delivery. This is true even for the core elements of national strategy as outlined in the Cold Weather Plan for England. There is a very large body of grey literature that describes suggested principles and approaches, but limited empirical evidence

that enables objective assessment of how specific strategies are best implemented to achieve maximum impact. There is need for research in many areas, but particularly in the following:

- the appropriate balance of population-wide vs targeted strategies for different forms of intervention
- the methods and effectiveness of seeking to identify and target actions at selected high risk groups during periods of elevated risk (cold, icy/snowy weather), especially given evidence that the risk of cold-related mortality/morbidity is quite widely distributed in the population and not confined to periods of most extreme cold
- the operational responses and impact of cold weather warning systems, including the consequences of decisions taken in response to warnings by the health service and carers, and assessment of the potentially negative consequences of false positive and negative warnings
- approaches to ensure high uptake of influenza and other vaccinations in target groups, and the pre-winter season optimization of drug and other treatments for individuals with specific target conditions such as COPD
- the optimal strategies for improving home energy efficiency through combination of policies designed to encourage general uptake of home energy efficiency improvements in the population as a whole as well as more targeted financial support for vulnerable households in homes with poor energy efficiency
- the impact and role of subsidies and fuel payments aimed at helping the affordability of home heating
- the methods and operational models of integrating action across sectors to ensure the most effective and efficient use of resources

3.9 Limitations of the review and potential impact on findings

The review was limited in being confined to OECD countries since 1993. However, this ensured the evidence was largely applicable to England, and indeed many of the studies and literature reviewed were from England or the UK. In general, most of the results reported in this review were likely to be very relevant to England. The main deficiency was the limited number of high quality studies that provide objective evidence on implementation and impact.

4 Conclusions

(1) Periods of elevated risk of mortality or morbidity can be predicted from simple forecasting methods based on meteorological and other parameters. Such models exist for example in relation to disease exacerbation in COPD, and for the overall pattern of mortality and hospital admission in relation to outdoor temperature. However, the precise role and utility of forecasting remains undetermined. Much of the burden of cold-related mortality and morbidity lies outside the periods of most extreme cold. Days of particular risk may nonetheless offer opportunities for communication and to promote actions needed to help reduce the overall burden of winter and cold related mortality/morbidity. Where forecasting is used to support specific clinical interventions, more research is needed to identify the advantages and disadvantages, including in relation to false positive and negative forecasts.

(2) Methods have been used to develop algorithms identifying individuals at high risk of winter/cold-related mortality and morbidity and geographical areas for the targeting of policies. Although geographical markers in particular can be shown to identify important variations in fuel poverty risk, there are methodological limitations (notably the importance of the characterisation of household income for defining fuel poverty) and there are no detailed assessments of the degree to which the use of fuel poverty markers influences the cost-effectiveness of housing interventions. Further analyses suggest that the prediction of cold homes can be problematic even with a reasonable level of data on household and housing characteristics.

(3) Influenza vaccination is potentially an important contributor to the reduction of excess winter death although there appears some inconsistency in the evidence for patients with COPD, the institutionalised elderly (65 years or older) and the elderly with co-morbidities. The uptake of influenza vaccination in the UK appears favourable in international comparisons, and has improved appreciably over time. There has been a marked increases in vaccine coverage accompanying the switch from risk-based to age group-based targeting of the elderly in England and Wales was associated with lower suggestive levels of pneumonia and influenza mortality in older people in the first 6 years after age group-based targeting began.

(4) Rising fuel prices and the transition to a low carbon economy will both contribute to an increase in fuel poverty and, in the current UK policy environment, future energy efficiency programmes will in part be paid for by regressive levies on domestic energy bills which penalise financially disadvantaged households. Strategies to enhance uptake of housing interventions are needed, although there remains limited evidence on the approaches most likely to achieve high uptake. Studies from other European countries suggest there is need to take account of individual household circumstances to identify the policy approaches most likely to be successful in expanding home energy efficiency.

(5) The Cold Weather Plan for England, along with other documents, have proposed multi-faceted approaches to tackling winter mortality/morbidity, and integration of effort across agencies and sectors. In particular, a recommendation is to use opportunities for closer partnership working with the community and voluntary sector to help reduce

vulnerability and to support the planning and response to cold weather. However, there is as yet very limited research evidence to demonstrate which aspects of such integrated approaches yield the greatest benefits.

(6) A wide range of measures and approaches are important for tackling winter-and cold-related mortality and morbidity, with contributions across multiple agencies and sectors. Among others, those include the health and care services, local authorities, the community and voluntary sector, those involved in emergency planning and preparedness, as well as carers and neighbours of vulnerable people. There appears to be a role to support high risk individuals during periods of greater risk (e.g. very cold or icy/snowy weather), as well as the improvement of understanding of risks and protection measures against cold-related risks in the population as a whole.

(7) Long term measures, including infrastructure investments such as the improvement of home energy efficiency, are important as population-wide measures, but may also be targeted to help maximize impact especially for vulnerable groups.

(8) There are opportunities to capitalize on the co-benefits for health of investments motivated by policies outside of the health sector, notably in relation to the improvement of home energy efficiency. Ensuring there is an integrated approach that makes use of such opportunities could help to extend the overall public health impact and help provide additional rationale for intervention which may be marginal on the basis of health criteria alone.

(9) There is a very limited body of evidence on the operation and effectiveness of most approaches intended to protect against winter- and cold-related illness, which is handicap to the development of well-designed and effective health protection programmes. More research and monitoring is needed in many areas, but particularly to examine issues relating to the balance of targeted *vs* population-wide interventions, the operational responses and impact of warning systems, the optimal strategies for improving home energy efficiency and the affordability of home heating, and the methods of integrated action across sectors.

Appendices

Appendix 1 Review team

The review team and their expertise are summarized in the table below.

Person (institution)	*Experience and expertise*
LSHTM	
Paul Wilkinson (Professor of Environmental Epidemiology)	Researcher in environmental epidemiology with long-standing interest in excess winter deaths, with multiple contributions in this area particularly for the UK. Expertise: topic expertise (excess winter death), study design and methods for quantifying the effect of seasonal/cold-related risks and modification by social, environmental and other factors.
Zaid Chalabi (Senior Lecturer in Health Impact Analysis and Modelling)	Mathematical modeller with wide expertise in environmental health risk assessment, health impact analysis, cost-effectiveness analysis, value of information and uncertainty analyses, and decision analysis. Expertise: evidence regarding cost-effectiveness (CE) of methods to identify at risk populations; CE of interventions to prevent excess mortality & morbidity; CE of systems for delivery and implementation of approaches to prevent excess mortality & morbidity
Lorelei Jones (Research fellow)	A health services researcher with long-standing interests in UK health policy and health services, especially the sociology of health service organisation. Previously a research fellow on the NICE clinical guideline for diabetes in pregnancy she has extensive experience of systematic reviews and guideline development. Currently has a core role in the on-going *Evaluation of the National Cold Weather Plan for England.* Expertise: literature review especially with regard to behavioural responses and interventions
James Milner (Lecturer)	Research interests involving modelling the interactions between the urban environment and health, including the effects on health of air pollutants, and indoor air quality and housing. Has also developed techniques to assess the health impacts of changes in environmental exposures due to climate change mitigation policies in different sectors of society, including the housing sector. Expertise: modelling of health impacts, especially with regard to housing related health risks
Mark Petticrew (Professor of Public Health Evaluation)	Researcher with long-standing interests in evidence-based policymaking, systematic reviews, and the evaluation of the health effects of social policies. He is an editor of the new Cochrane Public Health Review Group, and is closely involved in the Cochrane/Campbell Health Equity Field. He has co-authored Petticrew M, Roberts H (2006) *Systematic Reviews in the Social Sciences: A practical guide.* Oxford: Blackwell Publishing) Expertise: methods for systematic review and assessment of evidence for policy.
University of York	
Steve Duffy	Information analyst with extensive experience of the development and implementation

(Information Analyst)	of search methods for literature review. Expertise: database searches/literature review

Appendix 2 Search strategies

Literature searches were undertaken to identify studies primarily about excess winter deaths. The searches were also designed to identify studies about seasonal morbidity, fuel poverty, cold housing, energy efficient housing, winter related accidents, and health forecasting.

The search strategies were devised using a combination of indexed subject heading terms and free text search terms appearing in the title and/or abstracts of database records. Search terms were identified through discussion between the research team, by scanning background literature and 'key articles' already known to the project team, and by browsing database thesauri.

The searches were limited by date range to the last 20 years (1993 to the present), and to English language publications only. The final MEDLINE search strategy was peer reviewed for accuracy by another Information Specialist based at CRD (Melissa Harden).

The literature searches involved searching a wide range of databases covering health, social care, mental health, economics, environmental issues, and architecture. The following databases and resources were searched:

- MEDLINE and MEDLINE In-Process
- EMBASE
- Social Policy & Practice
- Science Citation Index (SCI)
- Social Sciences Citation Index (SSCI)
- Conference Proceedings Citation Index-Science (CPCI-S)
- Conference Proceedings Citation Index-Social Science & Humanities (CPCI-SSH)
- Health Management Information Consortium (HMIC)
- PsycINFO
- Cochrane Database of Systematic Reviews (CDSR)
- Database of Abstracts of Reviews of Effects (DARE)
- Cochrane Central Register of Controlled Trials (CENTRAL)
- Health Technology Assessment (HTA) database
- NHS Economic Evaluation Database (NHS EED)
- EconLit
- CEA (Cost-Effectiveness Analysis) Registry
- RePEc: Research Papers in Economics
- Campbell Library
- Trials Register of Promoting Health Interventions (TRoPHI)
- Database of Promoting Health Effectiveness Reviews (DoPHER)
- Scopus
- Avery Index to Architectural Periodicals
- ICONDA International
- PsycEXTRA

- NICE Evidence
- OpenGrey
- RIBA Catalogue (Royal Institute of British Architects)
- NYAM Grey Literature Report (New York Academy of Medicine)

Details of the search strategies and the results of all searches are given below.

As a number of databases were searched, some degree of duplication resulted. In order to manage this issue, the titles and abstracts of bibliographic records were downloaded and imported into EndNote bibliographic management software and duplicate records removed.

Databases and resources searched

Resource	Interface/url	Date range	Search date	Results
MEDLINE and MEDLINE In-Process	OvidSP	1946-2013/Sep week 2	23 Sep 2013	8451
EMBASE	OvidSP	1974-2013/week 38	24 Sep 2013	5445
Social Policy & Practice	OvidSP	1890s-201307	30 Sep 2013	1357
Science Citation Index (SCI)	Web of Science	1900–2013/09/27	2 Oct 2013	4433
Social Sciences Citation Index (SSCI)	Web of Science	1956–2013/09/27	2 Oct 2013	1291
Conference Proceedings Citation Index-Science (CPCI-S)	Web of Science	1990–2013/09/27	2 Oct 2013	238
Conference Proceedings Citation Index-Social Science & Humanities (CPCI-SSH)	Web of Science	1990–2013/09/27	2 Oct 2013	112
Health Management Information Consortium (HMIC)	OvidSP	1979-2013/Mar	30 Sep 2013	352
PsycINFO	OvidSP	1806-2013/Sep week 4	30 Sep 2013	829
Cochrane Database of Systematic Reviews (CDSR)	Wiley Online Library; The Cochrane Library	2013: Issue 9/12	1 Oct 2013	22
Database of Abstracts of Reviews of Effects (DARE)	Wiley Online Library; The Cochrane Library	2013: Issue 3/4	1 Oct 2013	7
Cochrane Central Register of Controlled Trials (CENTRAL)	Wiley Online Library; The Cochrane Library	2013: Issue 9/12	1 Oct 2013	554
Health Technology Assessment (HTA) database	Wiley Online Library; The Cochrane Library	2013: Issue 3/4	1 Oct 2013	1
NHS Economic Evaluation Database (NHS EED)	Wiley Online Library; The Cochrane Library	2013: Issue 3/4	1 Oct 2013	8
EconLit	OvidSP	1961-2013/Aug	30 Sep 2013	745
CEA Registry	www.cearegistry.org	3 Oct 2013	3 Oct 2013	0
RePEc	http://repec.org/	3 Oct 2013	3 Oct 2013	119
Campbell Library	http://www.campbellcollabo	3 Oct 2013	3 Oct	1

	ration.org/library.php		2013	
TRoPHI	EPPI-Centre	3 Oct 2013	3 Oct 2013	8
DoPHER	EPPI-Centre	3 Oct 2013	3 Oct 2013	5
OpenGrey	http://www.opengrey.eu/	3 Oct 2013	3 Oct 2013	45
NICE Evidence	https://www.evidence.nhs.uk/	18 Oct 2013	18 Oct 2013	67
RIBA Catalogue	http://riba.sirsidynix.net.uk/uhtbin/webcat	18 Oct 2013	18 Oct 2013	26
NYAM Grey Literature Report	http://www.greylit.org/	18 Oct 2013	18 Oct 2013	0
Scopus	Elsevier	1823-2013/Oct	21 Oct 2013	1696
Avery Index	ProQuest	1934-2013/Oct	24 Oct 2013	244
ICONDA International	Ovid	1976-2013/Oct	25 Oct 2013	492
PsycEXTRA	Ovid	1908-2013/Oct	25 Oct 2013	93
TOTAL				**26,641**
TOTAL after deduplication				**16,143**

Search strategies

MEDLINE and MEDLINE In-Process (OvidSP). 1946-2013/Sep week 2. Searched 23 September 2013.

1 exp Cold Temperature/ (60709)
2 Snow/ or Ice/ (4363)
3 1 or 2 (64253)
4 exp Death/ (114941)
5 exp Mortality/ or mo.fs. (576727)
6 exp Morbidity/ (373172)
7 Risk Factors/ (567327)
8 or/4-7 (1396264)
9 3 and 8 (1725)
10 (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (788)
11 (weather adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (239)
12 (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (1273)
13 ((cold or colder) adj4 (spell$ or season$ or month$ or period$ or condition$ or event$1 or related or excess or excessive or severe or severity or extreme)).ti,ab. (6057)
14 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$).ti,ab. (3171249)
15 13 and 14 (1243)
16 ((excess or excessive or severe or severity or exposure) adj3 winter).ti,ab. (472)
17 (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (177)
18 (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (343)
19 (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (75)
20 ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (194)
21 Seasons/ and (Death/ or Mortality/ or Morbidity/ or Risk Factors/) (5119)
22 (season$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or risk$1 or vulnerabl$ or suceptib$)).ti,ab. (1222)
23 or/9-12,15-22 (11237)
24 ((fuel or energy or gas or electricity) adj3 (poverty or poor or afford or affordable or affordability or tariff$)).ti,ab. (455)
25 (winter adj3 fuel).ti,ab. (14)
26 (winter adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (19)
27 ((cold or weather) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (44)
28 ((heat$ or gas or electricity) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (177)
29 or/24-28 (705)
30 exp Housing/ (25422)
31 exp Cold Temperature/ (60709)
32 Heating/ (4100)
33 30 and (31 or 32) (433)
34 ((cold or freez$ or frozen) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (129)

35 ((warm$ or heat$ or underheat$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (682)
36 ((damp$ or humid$ or mold or moldy or mould or mouldy or condensation$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (505)
37 ((cold or freez$ or frozen) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (17)
38 ((warm$ or heat$ or underheat$ or temperature$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (39)
39 ((damp or humid or mold or moldy or mould or mouldy) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (48)
40 ((energy adj3 efficien$) and (home or homes or house or houses or household$ or housing)).ti,ab. (117)
41 ((energy adj3 efficien$) and (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$ or domestic$)).ti,ab. (53)
42 (home energy adj3 (program$ or assist$)).ti,ab. (3)
43 (insulat$ adj4 (home or homes or house or houses or household$ or housing)).ti,ab. (86)
44 (insulat$ adj4 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (8)
45 (Warm Front or Warm Deal or Green Deal or Warm Zone or Energy Company Obligation).ti,ab. (21)
46 thermal comfort.ti,ab. (558)
47 or/33-46 (2481)
48 exp Accidents/ (138538)
49 exp *"Wounds and Injuries"/ (547370)
50 Snow/ or Ice/ (4363)
51 *Seasons/ (14654)
52 (48 or 49) and (50 or 51) (607)
53 ((fall or falls or falling or slip or slips or slipping) adj3 (winter or snow or ice or weather or season$)).ti,ab. (1558)
54 ((accident$ or injury or injuries or injured or fracture$ or trauma$) adj3 (winter or snow or ice or weather or season$)).ti,ab. (881)
55 ((grit or gritted or gritting or gritter$) adj3 (road$ or pavement$ or sidewalk$ or driveway$ or pathway$ or path$1)).ti,ab. (5)
56 or/52-55 (2913)
57 Forecasting/ and Weather/ (174)
58 ((forecast$ or alert$ or warning$ or alarm$) adj3 (cold or colder or weather or winter or met office or meteorological office)).ti,ab. (224)
59 health forecast$.ti,ab. (18)
60 or/57-59 (392)
61 23 or 29 or 47 or 56 or 60 (17234)
62 exp Animals/ not Humans/ (4031668)
63 (exp Plants/ or exp Plant Structures/ or exp Plant Physiological Phenomena/) not humans/ (447136)
64 (comment or editorial or letter).pt. (1234425)
65 61 not (62 or 63 or 64) (13264)

66 limit 65 to (english language and yr="1993 -Current") (9279)

NB. After removal of duplicate records the final results total was 8451

Key:

/	subject heading (MeSH)
exp	explode subject heading (MeSH)
.ti,ab.	searches are restricted to the title and abstract fields
adj	searches for adjacent terms
adj3	searches for terms within three words of each other
$	truncation symbol
$1	truncation restricted to one character
or/1-4	combine sets 1 to 4 using OR

Embase (OvidSP). 1974-2013/week 38. Searched 24 September 2013.

1 *winter/ (4511)
2 *cold/ (9790)
3 *snow/ or *ice/ (2997)
4 or/1-3 (17247)
5 exp *death/ (100114)
6 exp *mortality/ (81918)
7 exp *morbidity/ (17192)
8 *risk factor/ (25240)
9 or/5-8 (211937)
10 4 and 9 (236)
11 (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (926)
12 (weather adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (291)
13 (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (1478)
14 ((cold or colder) adj3 (spell$ or season$ or month$ or period$ or condition$ or event$1 or related or excess or excessive or severe or severity or extreme)).ti,ab. (6539)
15 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$).ti,ab. (4143060)
16 14 and 15 (1398)
17 ((excess or excessive or severe or severity or exposure) adj3 winter).ti,ab. (556)
18 (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (217)
19 (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (397)
20 (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (93)
21 ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (232)
22 *season/ and (exp *death/ or exp *mortality/ or exp *morbidity/ or *risk factor/) (487)
23 (season$ adj2 (death$ or fatalit$ or mortalit$ or morbidit$ or risk$1 or vulnerabl$ or suceptib$)).ti,ab. (759)
24 or/10-13,16-23 (6277)
25 ((fuel or energy or gas or electricity) adj3 (poverty or poor or afford or affordable or affordability or tariff$)).ti,ab. (632)

26 (winter adj3 fuel).ti,ab. (20)
27 (winter adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (22)
28 ((cold or weather) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (64)
29 ((heat$ or gas or electricity) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (246)
30 or/25-29 (979)
31 *housing/ (7070)
32 *cold/ (9790)
33 *heating/ (3074)
34 31 and (32 or 33) (117)
35 ((cold or freez$ or frozen) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (155)
36 ((warm$ or heat$ or underheat$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (887)
37 ((damp$ or humid$ or mold or moldy or mould or mouldy or condensation$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (604)
38 ((cold or freez$ or frozen) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (20)
39 ((warm$ or heat$ or underheat$ or temperature$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (63)
40 ((damp or humid or mold or moldy or mould or mouldy) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (70)
41 ((energy adj3 efficien$) and (home or homes or house or houses or household$ or housing)).ti,ab. (163)
42 ((energy adj3 efficien$) and (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$ or domestic$)).ti,ab. (85)
43 (home energy adj3 (program$ or assist$)).ti,ab. (3)
44 (insulat$ adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (94)
45 (insulat$ adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (16)
46 (Warm Front or Warm Deal or Green Deal or Warm Zone or Energy Company Obligation).ti,ab. (31)
47 thermal comfort.ti,ab. (694)
48 or/34-47 (2838)
49 exp *accident/ (74718)
50 exp *injury/ or exp *fracture/ (841006)
51 *snow/ or *ice/ (2997)
52 *season/ (10421)
53 (49 or 50) and (51 or 52) (481)
54 ((fall or falls or falling or slip or slips or slipping) adj2 (winter or snow or ice or weather or season$)).ti,ab. (1748)
55 ((accident$ or injury or injuries or injured or fracture$ or trauma$) adj2 (winter or snow or ice or weather or season$)).ti,ab. (702)
56 ((grit or gritted or gritting or gritter$) adj3 (road$ or pavement$ or sidewalk$ or driveway$ or pathway$ or path$1)).ti,ab. (9)

57 or/53-56 (2878)
58 *forecasting/ and *weather/ (52)
59 ((forecast$ or alert$ or warning$ or alarm$) adj3 (cold or colder or weather or winter or met office or meteorological office)).ti,ab. (396)
60 health forecast$.ti,ab. (22)
61 or/58-60 (442)
62 24 or 30 or 48 or 57 or 61 (13179)
63 (editorial or letter or note).pt. (1872994)
64 62 not 63 (12925)
65 limit 64 to human (7380)
66 limit 65 to (english language and yr="1993 -Current") (5445)

Key:

/	subject heading (EMTREE)
exp	explode subject heading (EMTREE)
*	focus subject heading (EMTREE)
.ti,ab.	searches are restricted to the title and abstract fields
adj	searches for adjacent terms
adj3	searches for terms within three words of each other
$	truncation symbol
$1	truncation restricted to one character
or/1-4	combine sets 1 to 4 using OR

Social Policy & Practice (OvidSP). 1890s-201307. Searched 30 September 2013.

1 (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab,de. (64)
2 (weather adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab,de. (12)
3 (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab,de. (28)
4 ((cold or colder) adj4 (spell$ or season$ or month$ or period$ or condition$ or event$1 or related or excess or excessive or severe or severity or extreme)).ti,ab,de. (46)
5 ((excess or excessive or severe or severity or exposure) adj3 winter).ti,ab,de. (48)
6 (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab,de. (13)
7 (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab,de. (5)
8 (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab,de. (14)
9 ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab,de. (9)
10 (season$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or risk$1 or vulnerabl$ or suceptib$)).ti,ab,de. (23)
11 or/1-10 (160)
12 (fuel adj3 (poverty or poor or afford or affordable or affordability or tariff$)).ti,ab,de. (469)
13 (winter adj3 fuel).ti,ab,de. (42)
14 (winter adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab,de. (43)
15 ((cold or weather) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab,de. (26)

16 ((heat$ or gas or electricity) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab,de. (57)
17 or/12-16 (556)
18 ((cold or freez$ or frozen) adj3 (home or homes or house or houses or household$ or housing)).ti,ab,de. (64)
19 ((warm$ or heat$ or underheat$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab,de. (528)
20 ((damp$ or humid$ or mold or moldy or mould or mouldy or condensation$) adj3 (home or homes or house or houses or households or housing)).ti,ab,de. (162)
21 ((cold or freez$ or frozen) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab,de. (3)
22 ((warm$ or heat$ or underheat$ or temperature$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab,de. (24)
23 ((damp or humid or mold or moldy or mould or mouldy) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab,de. (4)
24 (energy efficienc$ adj3 (home or homes or house or houses or household$ or housing)).ti,ab,de. (343)
25 (energy efficienc$ adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$ or domestic$)).ti,ab,de. (75)
26 (home energy adj3 (program$ or assist$)).ti,ab,de. (6)
27 (insulat$ adj3 (home or homes or house or houses or household$ or housing)).ti,ab,de. (265)
28 (insulat$ adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab,de. (16)
29 (Warm Front or Warm Deal or Green Deal or Warm Zone or Energy Company Obligation).ti,ab,de. (122)
30 thermal comfort.ti,ab,de. (32)
31 or/18-30 (1146)
32 ((fall or falls or falling or slip or slips or slipping) adj3 (winter or snow or ice or weather or season$)).ti,ab,de. (2)
33 ((accident$ or injury or injuries or injured or fracture$ or trauma$) adj3 (winter or snow or ice or weather or season$)).ti,ab,de. (6)
34 ((grit or gritted or gritting or gritter$) adj3 (road$ or pavement$ or sidewalk$ or driveway$ or pathway$ or path$1)).ti,ab,de. (2)
35 or/32-34 (10)
36 ((forecast$ or alert$ or warning$ or alarm$) adj3 (cold or colder or weather or winter or met office or meteorological office)).ti,ab,de. (13)
37 health forecast$.ti,ab,de. (1)
38 36 or 37 (14)
39 11 or 17 or 31 or 35 or 38 (1590)
40 limit 39 to yr="1993 -Current" (1357)

Key:

.ti,ab,de.	searches are restricted to the title, abstract and descriptor fields
adj	searches for adjacent terms
adj3	searches for terms within three words of each other

$	truncation symbol
$1	truncation restricted to one character
or/1-4	combine sets 1 to 4 using OR

Science Citation Index (SCI) (Web of Science). 1900 – 2013-09-27. Searched 2 October 2013.

# 34	4,433	(#33) AND Document Types=(Article OR Book OR Book Chapter OR Meeting Abstract OR Proceedings Paper OR Review) Databases=SCI-EXPANDED Timespan=1993-2013
# 33	4,743	#27 NOT #32 Databases=SCI-EXPANDED Timespan=1993-2013
# 32	14,445,591	#28 or #29 or #30 or #31 Databases=SCI-EXPANDED Timespan=1993-2013
# 31	7,053,047	SU=(Agriculture or "Astronomy & Astrophysics" or "Biochemistry & Molecular Biology" or "Biodiversity & Conservation" or Chemistry or Crystallography or Electrochemistry or "Energy & Fuels" or Entomology or "Evolutionary Biology" or Fisheries or "Food Science & Technology" or Forestry or "Geochemistry & Geophysics" or Geology or "Marine & Freshwater Biology" or "Medical Laboratory Technology" or Oceanography or Parasitology or"Plant Sciences" or Spectroscopy or "Veterinary Sciences" or Zoology) Databases=SCI-EXPANDED Timespan=1993-2013
# 30	11,740,697	WC=(Agricultural or Agriculture or Agronomy or Astronomy or Astrophysics or Biochemistry or "Biodiversity Conservation" or "Molecular Biology" or Chemistry or "Computer Science" or Ecology or "Energy & Fuels" or Engineering or Entomology or "Evolutionary Biology" or Fisheries or "Food Science & Technology" or Forestry or Genetics or Heredity or Geology or Geosciences or Horticulture or "Marine & Freshwater Biology" or "Materials Science" or "Meteorology & Atmospheric Sciences" or Mineralogy or "Mining & Mineral Processing" or Oceanography or Parasitology or Physics or "Plant Sciences" or "Soil Science" or Spectroscopy or "Veterinary Sciences" or "Water Resources" or Zoology) Databases=SCI-EXPANDED Timespan=1993-2013
# 29	1,751,630	TS=(tree or trees or woodland or forest or forests or plant or plants or leaf or leaves or soil or agriculture or agricultural or agronomy or crop or crops or grass or grasses) Databases=SCI-EXPANDED Timespan=1993-2013
# 28	3,144,056	TS=(rat or rats or mouse or mice or murine or hamster or hamsters or animal or animals or dogs or dog or canine or pig or pigs or cats or bovine or cow or cattle or sheep or ovine or porcine or monkey or monkeys or hen or hens or chicken or chickens or poultry or rabbit or rabbits or fish or fishes or salmon or bird or birds or insect or insects) Databases=SCI-EXPANDED Timespan=1993-2013

# 27	18,313	#8 or #12 or #20 or #26 Databases=SCI-EXPANDED Timespan=1993-2013
# 26	3,464	#21 or #22 or #23 or #24 or #25 Databases=SCI-EXPANDED Timespan=1993-2013
# 25	24	TS=("health forecast*") Databases=SCI-EXPANDED Timespan=1993-2013
# 24	1,788	TS=(("forecast" or "alert" or "alerts" or "warning" or "warnings" or "alarm" or "alarms") NEAR/3 ("cold" or "colder" or "weather" or "winter" or "met office" or "meteorological office")) Databases=SCI-EXPANDED Timespan=1993-2013
# 23	15	TS=((grit or gritted or gritting or gritter*) NEAR/3 (road* or pavement* or sidewalk* or driveway* or pathway* or path*1)) Databases=SCI-EXPANDED Timespan=1993-2013
# 22	1,217	TS=(("accident" or "accidents" or "injury" or "injuries" or "injured" or fracture*) NEAR/3 ("winter" or "snow" or "ice" or "weather")) Databases=SCI-EXPANDED Timespan=1993-2013
# 21	443	TS=(("falls" or "falling" or "slip" or "slips" or "slipping") NEAR/3 ("winter" or "snow" or "ice" or "weather")) Databases=SCI-EXPANDED Timespan=1993-2013
# 20	2,873	#13 or #14 or #15 or #16 or #17 or #18 or #19 Databases=SCI-EXPANDED Timespan=1993-2013
# 19	193	TS=("Warm Front" or "Warm Deal" or "Green Deal" or "Warm Zone" or "Energy Company Obligation") Databases=SCI-EXPANDED Timespan=1993-2013
# 18	272	TS=(insulat* NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 17	13	TS=("home energy " NEAR/3 (program* or assist*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 16	332	TS=("energy efficien*" NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling* or domestic*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 15	119	TS=(damp NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 14	1,758	TS=((warm* or heat* or underheat* or temperature*) NEAR/2 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 13	365	TS=((cold or freez* or frozen) NEAR/3 (home or homes or house or

		houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 12	1,073	#9 or #10 or #11 Databases=SCI-EXPANDED Timespan=1993-2013
# 11	500	TS=(("heating" or gas or electricity) NEAR/2 (payment* or allowance* or benefit* or grant* or voucher*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 10	246	TS=((winter or cold or weaher) NEAR/3 (payment* or allowance* or benefit* or grant* or voucher*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 9	334	TS=("fuel" NEAR/3 (winter or poverty or poor or afford or affordable or affordability or tariff*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 8	11,193	#1 or #4 or #5 or #6 or #7 Databases=SCI-EXPANDED Timespan=1993-2013
# 7	1,678	TS=(season* NEAR/2 (death* or fatalit* or mortalit* or morbidit* or "risk" or "risks" or vulnerabl* or suceptib*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 6	1,552	TS=((winter or weather or temperature* or cold or colder) NEAR/2 (vulnerab* or "risk" or "risks" or suceptib*)) Databases=SCI-EXPANDED Timespan=1993-2013
# 5	1,719	TS=((excess or excessive or severe or severity or exposure) NEAR/3 winter) Databases=SCI-EXPANDED Timespan=1993-2013
# 4	1,365	#2 and #3 Databases=SCI-EXPANDED Timespan=1993-2013
# 3	2,799,726	TS=(death* or fatalit* or mortalit* or morbidit* or illness* or disease*) Databases=SCI-EXPANDED Timespan=1993-2013
# 2	13,498	TS=((cold or colder) NEAR/2 (spell* or season* or month* or period* or condition* or event or related or excess or excessive or severe or severity or extreme)) Databases=SCI-EXPANDED Timespan=1993-2013
# 1	5,890	TS=((winter or weather or temperature*) NEAR/3 (death* or fatalit* or mortalit* or morbidit* or illness* or disease*)) Databases=SCI-EXPANDED Timespan=1993-2013

Key:

TS Topic (searches terms in Title, Abstract, Author Keywords and Keywords Plus fields)

SU Research Area (specific fields of study)

WC Web of Science Category (specific fields of study)

NEAR searches for adjacent terms

NEAR/3 searches for terms within three words of each other
* truncation symbol
" " phrase search

Social Sciences Citation Index (SSCI) (Web of Science). 1956 – 2013-09-27. Searched 2 October 2013.

# 34	1,291	(#33) AND Document Types=(Article OR Book OR Book Chapter OR Meeting Abstract OR Proceedings Paper OR Review) Databases=SSCI Timespan=1993-2013
# 33	1,399	#27 NOT #32 Databases=SSCI Timespan=1993-2013
# 32	364,512	#28 or #29 or #30 or #31 Databases=SSCI Timespan=1993-2013
# 31	80,352	SU=(Agriculture or "Astronomy & Astrophysics" or "Biochemistry & Molecular Biology" or "Biodiversity & Conservation" or Chemistry or Crystallography or Electrochemistry or "Energy & Fuels" or Entomology or "Evolutionary Biology" or Fisheries or "Food Science & Technology" or Forestry or "Geochemistry & Geophysics" or Geology or "Marine & Freshwater Biology" or "Medical Laboratory Technology" or Oceanography or Parasitology or"Plant Sciences" or Spectroscopy or "Veterinary Sciences" or Zoology) Databases=SSCI Timespan=1993-2013
# 30	212,424	WC=(Agricultural or Agriculture or Agronomy or Astronomy or Astrophysics or Biochemistry or "Biodiversity Conservation" or "Molecular Biology" or Chemistry or "Computer Science" or Ecology or "Energy & Fuels" or Engineering or Entomology or "Evolutionary Biology" or Fisheries or "Food Science & Technology" or Forestry or Genetics or Heredity or Geology or Geosciences or Horticulture or "Marine & Freshwater Biology" or "Materials Science" or "Meteorology & Atmospheric Sciences" or Mineralogy or "Mining & Mineral Processing" or Oceanography or Parasitology or Physics or "Plant Sciences" or "Soil Science" or Spectroscopy or "Veterinary Sciences" or "Water Resources" or Zoology) Databases=SSCI Timespan=1993-2013
# 29	115,582	TS=(tree or trees or woodland or forest or forests or plant or plants or leaf or leaves or soil or agriculture or agricultural or agronomy or crop or crops or grass or grasses) Databases=SSCI Timespan=1993-2013
# 28	83,105	TS=(rat or rats or mouse or mice or murine or hamster or hamsters or animal or animals or dogs or dog or canine or pig or pigs or cats or bovine or cow or cattle or sheep or ovine or porcine or monkey or monkeys or hen or hens or chicken or chickens or poultry or rabbit or rabbits or fish or fishes or salmon or bird or birds or insect or insects)

		Databases=SSCI Timespan=1993-2013
# 27	2,123	#8 or #12 or #20 or #26 Databases=SSCI Timespan=1993-2013
# 26	259	#21 or #22 or #23 or #24 or #25 Databases=SSCI Timespan=1993-2013
# 25	16	TS=("health forecast*") Databases=SSCI Timespan=1993-2013
# 24	92	TS=(("forecast" or "alert" or "alerts" or "warning" or "warnings" or "alarm" or "alarms") NEAR/3 ("cold" or "colder" or "weather" or "winter" or "met office" or "meteorological office")) Databases=SSCI Timespan=1993-2013
# 23	4	TS=((grit or gritted or gritting or gritter*) NEAR/3 (road* or pavement* or sidewalk* or driveway* or pathway* or path*1)) Databases=SSCI Timespan=1993-2013
# 22	127	TS=(("accident" or "accidents" or "injury" or "injuries" or "injured" or fracture*) NEAR/3 ("winter" or "snow" or "ice" or "weather")) Databases=SSCI Timespan=1993-2013
# 21	29	TS=(("falls" or "falling" or "slip" or "slips" or "slipping") NEAR/3 ("winter" or "snow" or "ice" or "weather")) Databases=SSCI Timespan=1993-2013
# 20	557	#13 or #14 or #15 or #16 or #17 or #18 or #19 Databases=SSCI Timespan=1993-2013
# 19	11	TS=("Warm Front" or "Warm Deal" or "Green Deal" or "Warm Zone" or "Energy Company Obligation") Databases=SSCI Timespan=1993-2013
# 18	44	TS=(insulat* NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=SSCI Timespan=1993-2013
# 17	8	TS=("home energy " NEAR/3 (program* or assist*)) Databases=SSCI Timespan=1993-2013
# 16	210	TS=("energy efficien*" NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling* or domestic*)) Databases=SSCI Timespan=1993-2013
# 15	17	TS=(damp NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=SSCI Timespan=1993-2013
# 14	239	TS=((warm* or heat* or underheat* or temperature*) NEAR/2 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=SSCI Timespan=1993-2013
# 13	92	TS=((cold or freez* or frozen) NEAR/3 (home or homes or house or

		houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=SSCI Timespan=1993-2013
# 12	287	#9 or #10 or #11 Databases=SSCI Timespan=1993-2013
# 11	150	TS=(("heating" or gas or electricity) NEAR/2 (payment* or allowance* or benefit* or grant* or voucher*)) Databases=SSCI Timespan=1993-2013
# 10	19	TS=((winter or cold or weaher) NEAR/3 (payment* or allowance* or benefit* or grant* or voucher*)) Databases=SSCI Timespan=1993-2013
# 9	122	TS=("fuel" NEAR/3 (winter or poverty or poor or afford or affordable or affordability or tariff*)) Databases=SSCI Timespan=1993-2013
# 8	1,150	#1 or #4 or #5 or #6 or #7 Databases=SSCI Timespan=1993-2013
# 7	277	TS=(season* NEAR/2 (death* or fatalit* or mortalit* or morbidit* or "risk" or "risks" or vulnerabl* or suceptib*)) Databases=SSCI Timespan=1993-2013
# 6	319	TS=((winter or weather or temperature* or cold or colder) NEAR/2 (vulnerab* or "risk" or "risks" or suceptib*)) Databases=SSCI Timespan=1993-2013
# 5	166	TS=((excess or excessive or severe or severity or exposure) NEAR/3 winter) Databases=SSCI Timespan=1993-2013
# 4	135	#2 and #3 Databases=SSCI Timespan=1993-2013
# 3	284,868	TS=(death* or fatalit* or mortalit* or morbidit* or illness* or disease*) Databases=SSCI Timespan=1993-2013
# 2	693	TS=((cold or colder) NEAR/2 (spell* or season* or month* or period* or condition* or event or related or excess or excessive or severe or severity or extreme)) Databases=SSCI Timespan=1993-2013
# 1	439	TS=((winter or weather or temperature*) NEAR/3 (death* or fatalit* or mortalit* or morbidit* or illness* or disease*)) Databases=SSCI Timespan=1993-2013

Key:

TS Topic (searches terms in Title, Abstract, Author Keywords and Keywords Plus fields)

SU Research Area (specific fields of study)

WC Web of Science Category (specific fields of study)

NEAR searches for adjacent terms

NEAR/3 searches for terms within three words of each other

* truncation symbol

" " phrase search

Conference Proceedings Citation Index-Science (CPCI-S) (Web of Science). 1990 – 2013-09-27. Searched 2 October 2013.

# 33	238	#27 NOT #32 Databases=CPCI-S Timespan=1993-2013
# 32	4,622,783	#28 or #29 or #30 or #31 Databases=CPCI-S Timespan=1993-2013
# 31	1,199,928	SU=(Agriculture or "Astronomy & Astrophysics" or "Biochemistry & Molecular Biology" or "Biodiversity & Conservation" or Chemistry or Crystallography or Electrochemistry or "Energy & Fuels" or Entomology or "Evolutionary Biology" or Fisheries or "Food Science & Technology" or Forestry or "Geochemistry & Geophysics" or Geology or "Marine & Freshwater Biology" or "Medical Laboratory Technology" or Oceanography or Parasitology or"Plant Sciences" or Spectroscopy or "Veterinary Sciences" or Zoology) Databases=CPCI-S Timespan=1993-2013
# 30	4,304,050	WC=(Agricultural or Agriculture or Agronomy or Astronomy or Astrophysics or Biochemistry or "Biodiversity Conservation" or "Molecular Biology" or Chemistry or "Computer Science" or Ecology or "Energy & Fuels" or Engineering or Entomology or "Evolutionary Biology" or Fisheries or "Food Science & Technology" or Forestry or Genetics or Heredity or Geology or Geosciences or Horticulture or "Marine & Freshwater Biology" or "Materials Science" or "Meteorology & Atmospheric Sciences" or Mineralogy or "Mining & Mineral Processing" or Oceanography or Parasitology or Physics or "Plant Sciences" or "Soil Science" or Spectroscopy or "Veterinary Sciences" or "Water Resources" or Zoology) Databases=CPCI-S Timespan=1993-2013
# 29	350,620	TS=(tree or trees or woodland or forest or forests or plant or plants or leaf or leaves or soil or agriculture or agricultural or agronomy or crop or crops or grass or grasses) Databases=CPCI-S Timespan=1993-2013
# 28	353,128	TS=(rat or rats or mouse or mice or murine or hamster or hamsters or animal or animals or dogs or dog or canine or pig or pigs or cats or bovine or cow or cattle or sheep or ovine or porcine or monkey or monkeys or hen or hens or chicken or chickens or poultry or rabbit or rabbits or fish or fishes or salmon or bird or birds or insect or insects) Databases=CPCI-S Timespan=1993-2013
# 27	723	#8 or #12 or #20 or #26 Databases=CPCI-S Timespan=1993-2013
# 26	219	#21 or #22 or #23 or #24 or #25 Databases=CPCI-S Timespan=1993-2013

# 25	4	TI=("health forecast*") Databases=CPCI-S Timespan=1993-2013
# 24	133	TI=(("forecast" or "alert" or "alerts" or "warning" or "warnings" or "alarm" or "alarms") NEAR/3 ("cold" or "colder" or "weather" or "winter" or "met office" or "meteorological office")) Databases=CPCI-S Timespan=1993-2013
# 23	0	TI=((grit or gritted or gritting or gritter*) NEAR/3 (road* or pavement* or sidewalk* or driveway* or pathway* or path or paths)) Databases=CPCI-S Timespan=1993-2013
# 22	61	TI=(("accident" or "accidents" or "injury" or "injuries" or "injured" or fracture*) NEAR/3 ("winter" or "snow" or "ice" or "weather")) Databases=CPCI-S Timespan=1993-2013
# 21	22	TI=(("falls" or "falling" or "slip" or "slips" or "slipping") NEAR/3 ("winter" or "snow" or "ice" or "weather")) Databases=CPCI-S Timespan=1993-2013
# 20	198	#13 or #14 or #15 or #16 or #17 or #18 or #19 Databases=CPCI-S Timespan=1993-2013
# 19	3	TI=("Warm Front" or "Warm Deal" or "Green Deal" or "Warm Zone" or "Energy Company Obligation") Databases=CPCI-S Timespan=1993-2013
# 18	34	TI=(insulat* NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=CPCI-S Timespan=1993-2013
# 17	1	TI=("home energy " NEAR/3 (program* or assist*)) Databases=CPCI-S Timespan=1993-2013
# 16	41	TI=("energy efficien*" NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling* or domestic*)) Databases=CPCI-S Timespan=1993-2013
# 15	6	TI=(damp NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=CPCI-S Timespan=1993-2013
# 14	89	TI=((warm* or heat* or underheat* or temperature*) NEAR/2 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=CPCI-S Timespan=1993-2013
# 13	27	TI=((cold or freez* or frozen) NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=CPCI-S Timespan=1993-2013
# 12	31	#9 or #10 or #11

		Databases=CPCI-S Timespan=1993-2013
# 11	23	TI=(("heating" or gas or electricity) NEAR/2 (payment* or allowance* or benefit* or grant* or voucher*)) Databases=CPCI-S Timespan=1993-2013
# 10	5	TI=((winter or cold or weaher) NEAR/3 (payment* or allowance* or benefit* or grant* or voucher*)) Databases=CPCI-S Timespan=1993-2013
# 9	3	TI=(fuel NEAR/3 (winter or poverty or poor or afford or affordable or affordability or tariff*)) Databases=CPCI-S Timespan=1993-2013
# 8	278	#1 or #4 or #5 or #6 or #7 Databases=CPCI-S Timespan=1993-2013
# 7	42	TI=(season* NEAR/3 (death* or fatalit* or mortalit* or morbidit* or "risk" or "risks" or vulnerabl* or suceptib*)) Databases=CPCI-S Timespan=1993-2013
# 6	70	TI=((winter or weather or temperature* or cold or colder) NEAR/3 (vulnerab* or "risk" or "risks" or suceptib*)) Databases=CPCI-S Timespan=1993-2013
# 5	20	TI=((excess or excessive or severe or severity or exposure) NEAR/3 winter) Databases=CPCI-S Timespan=1993-2013
# 4	10	#2 and #3 Databases=CPCI-S Timespan=1993-2013
# 3	197	TI=((cold or colder) NEAR/2 (spell* or season* or month* or period* or condition* or event or related or excess or excessive or severe or severity or extreme)) Databases=CPCI-S Timespan=1993-2013
# 2	134,816	TI=(death* or fatalit* or mortalit* or morbidit* or illness* or disease*) Databases=CPCI-S Timespan=1993-2013
# 1	147	TI=((winter or weather or temperature*) NEAR/3 (death* or fatalit* or mortalit* or morbidit* or illness* or disease*)) Databases=CPCI-S Timespan=1993-2013

Key:

TS Topic (searches terms in Title, Abstract, Author Keywords and Keywords Plus fields)
SU Research Area (specific fields of study)
WC Web of Science Category (specific fields of study)
NEAR searches for adjacent terms
NEAR/3 searches for terms within three words of each other
* truncation symbol
" " phrase search

Conference Proceedings Citation Index-Social Science & Humanities (CPCI-SSH) (Web of Science). 1990 – 2013-09-27. Searched 2 October 2013.

# 33	112	#27 NOT #32 Databases=CPCI-SSH Timespan=1993-2013
# 32	120,196	#28 or #29 or #30 or #31 Databases=CPCI-SSH Timespan=1993-2013
# 31	11,270	SU=(Agriculture or "Astronomy & Astrophysics" or "Biochemistry & Molecular Biology" or "Biodiversity & Conservation" or Chemistry or Crystallography or Electrochemistry or "Energy & Fuels" or Entomology or "Evolutionary Biology" or Fisheries or "Food Science & Technology" or Forestry or "Geochemistry & Geophysics" or Geology or "Marine & Freshwater Biology" or "Medical Laboratory Technology" or Oceanography or Parasitology or"Plant Sciences" or Spectroscopy or "Veterinary Sciences" or Zoology) Databases=CPCI-SSH Timespan=1993-2013
# 30	105,727	WC=(Agricultural or Agriculture or Agronomy or Astronomy or Astrophysics or Biochemistry or "Biodiversity Conservation" or "Molecular Biology" or Chemistry or "Computer Science" or Ecology or "Energy & Fuels" or Engineering or Entomology or "Evolutionary Biology" or Fisheries or "Food Science & Technology" or Forestry or Genetics or Heredity or Geology or Geosciences or Horticulture or "Marine & Freshwater Biology" or "Materials Science" or "Meteorology & Atmospheric Sciences" or Mineralogy or "Mining & Mineral Processing" or Oceanography or Parasitology or Physics or "Plant Sciences" or "Soil Science" or Spectroscopy or "Veterinary Sciences" or "Water Resources" or Zoology) Databases=CPCI-SSH Timespan=1993-2013
# 29	17,347	TS=(tree or trees or woodland or forest or forests or plant or plants or leaf or leaves or soil or agriculture or agricultural or agronomy or crop or crops or grass or grasses) Databases=CPCI-SSH Timespan=1993-2013
# 28	6,472	TS=(rat or rats or mouse or mice or murine or hamster or hamsters or animal or animals or dogs or dog or canine or pig or pigs or cats or bovine or cow or cattle or sheep or ovine or porcine or monkey or monkeys or hen or hens or chicken or chickens or poultry or rabbit or rabbits or fish or fishes or salmon or bird or birds or insect or insects) Databases=CPCI-SSH Timespan=1993-2013
# 27	226	#8 or #12 or #20 or #26 Databases=CPCI-SSH Timespan=1993-2013
# 26	39	#21 or #22 or #23 or #24 or #25 Databases=CPCI-SSH Timespan=1993-2013
# 25	1	TS=("health forecast*") Databases=CPCI-SSH Timespan=1993-2013
# 24	22	TS=(("forecast" or "alert" or "alerts" or "warning" or "warnings" or "alarm" or "alarms") NEAR/3 ("cold" or "colder" or "weather" or "winter"

		or "met office" or "meteorological office")) Databases=CPCI-SSH Timespan=1993-2013
# 23	1	TS=((grit or gritted or gritting or gritter*) NEAR/3 (road* or pavement* or sidewalk* or driveway* or pathway* or path*1)) Databases=CPCI-SSH Timespan=1993-2013
# 22	11	TS=(("accident" or "accidents" or "injury" or "injuries" or "injured" or fracture*) NEAR/3 ("winter" or "snow" or "ice" or "weather")) Databases=CPCI-SSH Timespan=1993-2013
# 21	5	TS=(("falls" or "falling" or "slip" or "slips" or "slipping") NEAR/3 ("winter" or "snow" or "ice" or "weather")) Databases=CPCI-SSH Timespan=1993-2013
# 20	78	#13 or #14 or #15 or #16 or #17 or #18 or #19 Databases=CPCI-SSH Timespan=1993-2013
# 19	0	TS=("Warm Front" or "Warm Deal" or "Green Deal" or "Warm Zone" or "Energy Company Obligation") Databases=CPCI-SSH Timespan=1993-2013
# 18	12	TS=(insulat* NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=CPCI-SSH Timespan=1993-2013
# 17	2	TS=("home energy " NEAR/3 (program* or assist*)) Databases=CPCI-SSH Timespan=1993-2013
# 16	31	TS=("energy efficien*" NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling* or domestic*)) Databases=CPCI-SSH Timespan=1993-2013
# 15	0	TS=(damp NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=CPCI-SSH Timespan=1993-2013
# 14	26	TS=((warm* or heat* or underheat* or temperature*) NEAR/2 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=CPCI-SSH Timespan=1993-2013
# 13	13	TS=((cold or freez* or frozen) NEAR/3 (home or homes or house or houses or household* or housing or accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)) Databases=CPCI-SSH Timespan=1993-2013
# 12	27	#9 or #10 or #11 Databases=CPCI-SSH Timespan=1993-2013
# 11	17	TS=(("heating" or gas or electricity) NEAR/2 (payment* or allowance* or benefit* or grant* or voucher*)) Databases=CPCI-SSH Timespan=1993-2013
# 10	1	TS=((winter or cold or weaher) NEAR/3 (payment* or allowance* or

		benefit* or grant* or voucher*)) Databases=CPCI-SSH Timespan=1993-2013
# 9	9	TS=("fuel" NEAR/3 (winter or poverty or poor or afford or affordable or affordability or tariff*)) Databases=CPCI-SSH Timespan=1993-2013
# 8	87	#1 or #4 or #5 or #6 or #7 Databases=CPCI-SSH Timespan=1993-2013
# 7	12	TS=(season* NEAR/2 (death* or fatalit* or mortalit* or morbidit* or "risk" or "risks" or vulnerabl* or suceptib*)) Databases=CPCI-SSH Timespan=1993-2013
# 6	34	TS=((winter or weather or temperature* or cold or colder) NEAR/2 (vulnerab* or "risk" or "risks" or suceptib*)) Databases=CPCI-SSH Timespan=1993-2013
# 5	20	TS=((excess or excessive or severe or severity or exposure) NEAR/3 winter) Databases=CPCI-SSH Timespan=1993-2013
# 4	7	#2 and #3 Databases=CPCI-SSH Timespan=1993-2013
# 3	12,795	TS=(death* or fatalit* or mortalit* or morbidit* or illness* or disease*) Databases=CPCI-SSH Timespan=1993-2013
# 2	88	TS=((cold or colder) NEAR/2 (spell* or season* or month* or period* or condition* or event or related or excess or excessive or severe or severity or extreme)) Databases=CPCI-SSH Timespan=1993-2013
# 1	17	TS=((winter or weather or temperature*) NEAR/3 (death* or fatalit* or mortalit* or morbidit* or illness* or disease*)) Databases=CPCI-SSH Timespan=1993-2013

Key:

TS Topic (searches terms in Title, Abstract, Author Keywords and Keywords Plus fields)
SU Research Area (specific fields of study)
WC Web of Science Category (specific fields of study)
NEAR searches for adjacent terms
NEAR/3 searches for terms within three words of each other
* truncation symbol
" " phrase search

HMIC (OvidSP). 1979-2013/March. Searched 30 September 2013.

1 exp Winter/ (180)
2 Snow/ or Ice/ (4)
3 1 or 2 (183)
4 exp Death/ (2782)
5 exp Mortality/ (5160)

6 exp Morbidity/ (3077)
7 exp Risk factors/ (3899)
8 or/4-7 (12869)
9 3 and 8 (30)
10 exp "Cold as cause of disease"/ (48)
11 (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (58)
12 (weather adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (6)
13 (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (20)
14 ((cold or colder) adj4 (spell$ or season$ or month$ or period$ or condition$ or event$1 or related or excess or excessive or severe or severity or extreme)).ti,ab. (52)
15 ((excess or excessive or severe or severity or exposure) adj3 winter).ti,ab. (49)
16 (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (11)
17 (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (17)
18 (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (2)
19 ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (6)
20 exp Seasonal factors/ and (Death/ or Mortality/ or Morbidity/ or Risk Factors/) (20)
21 (season$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or risk$1 or vulnerabl$ or suceptib$)).ti,ab. (39)
22 or/9-21 (224)
23 exp Fuel poverty/ (40)
24 ((fuel or energy or gas or electricity) adj3 (poverty or poor or afford or affordable or affordability or tariff$)).ti,ab. (79)
25 (winter adj3 fuel).ti,ab. (6)
26 (winter adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (3)
27 ((cold or weather) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (10)
28 ((heat$ or gas or electricity) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (12)
29 or/23-28 (118)
30 exp Housing/ (3183)
31 exp Winter/ or exp Seasonal Factors/ (286)
32 exp building climatic services/ (390)
33 warmth/ (36)
34 30 and (31 or 32 or 33) (17)
35 ((cold or freez$ or frozen) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (26)
36 ((warm$ or heat$ or underheat$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (64)
37 ((damp$ or humid$ or mold or moldy or mould or mouldy or condensation$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (24)
38 ((cold or freez$ or frozen) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (2)
39 ((warm$ or heat$ or underheat$ or temperature$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (0)

40 ((damp or humid or mold or moldy or mould or mouldy) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (0)
41 ((energy adj3 efficien$) and (home or homes or house or houses or household$ or housing)).ti,ab. (38)
42 ((energy adj3 efficien$) and (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$ or domestic$)).ti,ab. (12)
43 (home energy adj3 (program$ or assist$)).ti,ab. (1)
44 (insulat$ adj4 (home or homes or house or houses or household$ or housing)).ti,ab. (9)
45 (insulat$ adj4 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (0)
46 (Warm Front or Warm Deal or Green Deal or Warm Zone or Energy Company Obligation).ti,ab. (4)
47 thermal comfort.ti,ab. (10)
48 or/34-47 (150)
49 exp Accidents/ (2703)
50 exp wounds & injuries/ (2186)
51 Winter/ or Snow/ or Ice/ (183)
52 exp seasonal factors/ (131)
53 (49 or 50) and (51 or 52) (0)
54 exp Weather hazards/ (51)
55 ((fall or falls or falling or slip or slips or slipping) adj3 (winter or snow or ice or weather or season$)).ti,ab. (9)
56 ((accident$ or injury or injuries or injured or fracture$ or trauma$) adj3 (winter or snow or ice or weather or season$)).ti,ab. (5)
57 ((grit or gritted or gritting or gritter$) adj3 (road$ or pavement$ or sidewalk$ or driveway$ or pathway$ or path$1)).ti,ab. (0)
58 or/53-57 (65)
59 exp Weather/ and exp Forecasting/ (4)
60 ((forecast$ or alert$ or warning$ or alarm$) adj3 (cold or colder or weather or winter or met office or meteorological office)).ti,ab. (18)
61 health forecast$.ti,ab. (9)
62 or/59-61 (26)
63 22 or 29 or 48 or 58 or 62 (482)
64 limit 63 to yr="1993 -Current" (352)

Key:

/	subject heading
exp	explode subject heading
.ti,ab.	searches are restricted to the title and abstract fields
adj	searches for adjacent terms
adj3	searches for terms within three words of each other
$	truncation symbol
$1	truncation restricted to one character
or/1-4	combine sets 1 to 4 using OR

PsycINFO (OvidSP). 1806-2013/Sep week 4. Searched 30 September 2013.

1 temperature effects/ or cold effects/ (3080)
2 "death and dying"/ (21318)
3 exp Morbidity/ (2616)
4 risk factors/ (41469)
5 1 and (2 or 3 or 4) (21)
6 (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (37)
7 (weather adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (17)
8 (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. (57)
9 ((cold or colder) adj4 (spell$ or season$ or month$ or period$ or condition$ or event$1 or related or excess or excessive or severe or severity or extreme)).ti,ab. (531)
10 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$).ti,ab. (314094)
11 9 and 10 (55)
12 ((excess or excessive or severe or severity or exposure) adj3 winter).ti,ab. (86)
13 (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (32)
14 (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (20)
15 (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (25)
16 ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. (13)
17 seasonal variations/ and ("death and dying"/ or exp Morbidity/ or risk factors/) (78)
18 (season$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or risk$1 or vulnerabl$ or suceptib$)).ti,ab. (110)
19 or/5-8,11-18 (490)
20 ((fuel or energy or gas or electricity) adj3 (poverty or poor or afford or affordable or affordability or tariff$)).ti,ab. (85)
21 (winter adj3 fuel).ti,ab. (0)
22 (winter adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (9)
23 ((cold or weather) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (2)
24 ((heat$ or gas or electricity) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. (20)
25 or/20-24 (115)
26 housing/ and (Temperature effects/ or cold effects/) (4)
27 ((cold or freez$ or frozen) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (17)
28 ((warm$ or heat$ or underheat$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (93)
29 ((damp$ or humid$ or mold or moldy or mould or mouldy or condensation$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. (17)
30 ((cold or freez$ or frozen) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (2)
31 ((warm$ or heat$ or underheat$ or temperature$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (4)
32 ((damp or humid or mold or moldy or mould or mouldy) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (1)

33 ((energy adj3 efficien$) and (home or homes or house or houses or household$ or housing)).ti,ab. (37)
34 ((energy adj3 efficien$) and (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$ or domestic$)).ti,ab. (9)
35 (home energy adj3 (program$ or assist$)).ti,ab. (7)
36 (insulat$ adj4 (home or homes or house or houses or household$ or housing)).ti,ab. (12)
37 (insulat$ adj4 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. (0)
38 (Warm Front or Warm Deal or Green Deal or Warm Zone or Energy Company Obligation).ti,ab. (2)
39 or/26-38 (185)
40 (exp accidents/ or exp Injuries/) and exp Seasonal Variations/ (22)
41 ((fall or falls or falling or slip or slips or slipping) adj3 (winter or snow or ice or weather or season$)).ti,ab. (372)
42 ((accident$ or injury or injuries or injured or fracture$ or trauma$) adj3 (winter or snow or ice or weather or season$)).ti,ab. (78)
43 ((grit or gritted or gritting or gritter$) adj3 (road$ or pavement$ or sidewalk$ or driveway$ or pathway$ or path$1)).ti,ab. (0)
44 or/40-43 (463)
45 ((forecast$ or alert$ or warning$ or alarm$) adj3 (cold or colder or weather or winter or met office or meteorological office)).ti,ab. (87)
46 health forecast$.ti,ab. (1)
47 45 or 46 (88)
48 19 or 25 or 39 or 44 or 47 (1312)
49 limit 48 to (human and english language and yr="1993 -Current") (829)

Key:

/	subject heading
.ti,ab.	searches are restricted to the title and abstract fields
adj	searches for adjacent terms
adj3	searches for terms within three words of each other
$	truncation symbol
$1	truncation restricted to one character
or/1-4	combine sets 1 to 4 using OR

Cochrane Library: CDSR, DARE, CENTRAL, NHS EED and HTA (Wiley). 2013:Issue 9/12 and 3/4. Searched 1 October 2013.

#1 MeSH descriptor: [Cold Temperature] explode all trees 1110
#2 MeSH descriptor: [Snow] this term only 5
#3 MeSH descriptor: [Ice] this term only 83
#4 #1 or #2 or #3 1181
#5 MeSH descriptor: [Death] explode all trees 1500
#6 MeSH descriptor: [Mortality] explode all trees 10049
#7 [mh /MO] 20804

#8 MeSH descriptor: [Morbidity] explode all trees 10513
#9 MeSH descriptor: [Risk Factors] this term only 17598
#10 #5 or #6 or #7 or #8 or #9 46439
#11 #4 and #10 35
#12 (winter near/4 (death* or fatalit* or mortalit* or morbidit* or illness* or disease*)):ti,ab,kw 26
#13 (weather near/3 (death* or fatalit* or mortalit* or morbidit* or illness* or disease*)):ti,ab,kw 5
#14 (temperature* near/3 (death* or fatalit* or mortalit* or morbidit* or illness* or disease*)):ti,ab,kw 131
#15 ((cold or colder) near/4 (spell* or season* or month* or period* or condition* or event or events or related or excess or excessive or severe or severity or extreme)):ti,ab,kw 280
#16 (death* or fatalit* or mortalit* or morbidit* or illness* or disease*):ti,ab,kw 173933
#17 #15 and #16 92
#18 ((excess or excessive or severe or severity or exposure) near/3 winter):ti,ab,kw 18
#19 (winter near/4 (vulnerab* or risk or risks or suceptib*)):ti,ab,kw 5
#20 (temperature* near/3 (vulnerab* or risk or risks or suceptib*)):ti,ab,kw 26
#21 (weather near/3 (vulnerab* or risk or risks or suceptib*)):ti,ab,kw 3
#22 ((cold or colder) near/3 (vulnerab* or risk or risks or suceptib*)):ti,ab,kw 17
#23 MeSH descriptor: [Seasons] this term only 707
#24 MeSH descriptor: [Death] this term only 64
#25 MeSH descriptor: [Mortality] this term only 390
#26 MeSH descriptor: [Morbidity] this term only 664
#27 MeSH descriptor: [Risk Factors] this term only 17598
#28 #24 or #25 or #26 or #27 18533
#29 #23 and #28 43
#30 (season* near/3 (death* or fatalit* or mortalit* or morbidit* or risk or risks or vulnerabl* or suceptib*)):ti,ab,kw 68
#31 #11 or #12 or #13 or #14 or #17 or #18 or #19 or #20 or #21 or #22 or #29 or #30 411
#32 ((fuel or energy or gas or electricity) near/3 (poverty or poor or afford or affordable or affordability or tariff*)):ti,ab,kw 18
#33 (winter near/3 fuel):ti,ab,kw 0
#34 (winter near/3 (payment* or allowance* or benefit* or grant* or voucher*)):ti,ab,kw 3
#35 ((cold or weather) near/3 (payment* or allowance* or benefit* or grant* or voucher*)):ti,ab,kw 10
#36 ((heat* or gas or electricity) near/3 (payment* or allowance* or benefit* or grant* or voucher*)):ti,ab,kw 21
#37 #32 or #33 or #34 or #35 or #36 51
#38 MeSH descriptor: [Housing] explode all trees 252
#39 MeSH descriptor: [Cold Temperature] explode all trees 1110
#40 MeSH descriptor: [Heating] this term only 120
#41 #38 and (#39 or #40) 12
#42 ((cold or freez* or frozen) near/3 (home or homes or house or houses or household* or housing)):ti,ab,kw 3

#43 ((warm* or heat* or underheat* or temperature*) near/3 (home or homes or house or houses or household* or housing)):ti,ab,kw 48
#44 ((damp* or humid* or mold or moldy or mould or mouldy or condensation*) near/3 (home or homes or house or houses or household* or housing)):ti,ab,kw 25
#45 ((cold or freez* or frozen) near/3 (accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)):ti,ab,kw 0
#46 ((warm* or heat* or underheat* or temperature*) near/3 (accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)):ti,ab,kw 2
#47 ((damp or humid or mold or moldy or mould or mouldy) near/3 (accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)):ti,ab,kw 0
#48 ((energy near/3 efficien*) and (home or homes or house or houses or household* or housing)):ti,ab,kw 6
#49 ((energy near/3 efficien*) and (accommodation* or rent or rents or rented or tenancy or tenancies or dwelling* or domestic*)):ti,ab,kw 0
#50 ("home energy" near/3 (program* or assist*)):ti,ab,kw 0
#51 (insulat* near/4 (home or homes or house or houses or household* or housing)):ti,ab,kw 8
#52 (insulat* near/4 (accommodation* or rent or rents or rented or tenancy or tenancies or dwelling*)):ti,ab,kw 0
#53 ("Warm Front" or "Warm Deal" or "Green Deal" or "Warm Zone" or "Energy Company Obligation"):ti,ab,kw 0
#54 "thermal comfort":ti,ab,kw 60
#55 #41 or #42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 or #50 or #51 or #52 or #53 or #54 137
#56 MeSH descriptor: [Accidents] explode all trees 4421
#57 MeSH descriptor: [Wounds and Injuries] explode all trees 14069
#58 MeSH descriptor: [Snow] this term only 5
#59 MeSH descriptor: [Ice] this term only 83
#60 MeSH descriptor: [Seasons] this term only 707
#61 (#56 or #57) and (#58 or #59 or #60) 55
#62 ((fall or falls or falling or slip or slips or slipping) near/3 (winter or snow or ice or weather or season*)):ti,ab,kw 67
#63 ((accident* or injury or injuries or injured or fracture* or trauma*) near/3 (winter or snow or ice or weather or season*)):ti,ab,kw 17
#64 ((grit or gritted or gritting or gritter*) near/3 (road* or pavement* or sidewalk* or driveway* or pathway* or path or paths)):ti,ab,kw 0
#65 #61 or #62 or #63 or #64 137
#66 MeSH descriptor: [Forecasting] this term only 455
#67 MeSH descriptor: [Weather] this term only 25
#68 #66 and #67 1
#69 ((forecast* or alert* or warning* or alarm*) near/3 (cold or colder or weather or winter or "met office" or "meteorological office")):ti,ab,kw 7
#70 health next forecast*:ti,ab,kw 3
#71 #68 or #69 or #70 10
#72 #31 or #37 or #55 or #65 or #71 722

#73 #31 or #37 or #55 or #65 or #71 from 1993 598

Key:

MeSH descriptor	subject heading (MeSH)
explode all trees	explode subject heading (MeSH)
:ti,ab,kw	searches are restricted to the title, abstract and keyword fields
near	searches for adjacent terms
near/3	searches for terms within three words of each other
*	truncation symbol

EconLit (OvidSP). 1961-2013/Aug. Searched 30 September 2013.

1 (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab,kw. (12)
2 (weather adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab,kw. (18)
3 (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab,kw. (13)
4 ((cold or colder) adj4 (spell$ or season$ or month$ or period$ or condition$ or event$1 or related or excess or excessive or severe or severity or extreme)).ti,ab,kw. (115)
5 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$).ti,ab,kw. (13550)
6 4 and 5 (12)
7 ((excess or excessive or severe or severity or exposure) adj3 winter).ti,ab,kw. (7)
8 (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab,kw. (3)
9 (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab,kw. (20)
10 (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab,kw. (139)
11 ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab,kw. (4)
12 (season$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or risk$1 or vulnerabl$ or suceptib$)).ti,ab,kw. (44)
13 or/1-3,6-12 (253)
14 (fuel adj3 (poverty or poor or afford or affordable or affordability or tariff$)).ti,ab,kw. (87)
15 (winter adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab,kw. (3)
16 ((cold or weather) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab,kw. (6)
17 ((heat$ or gas or electricity) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab,kw. (132)
18 or/14-17 (227)
19 ((cold or freez$ or frozen) adj3 (home or homes or house or houses or household$ or housing)).ti,ab,kw. (15)
20 ((warm$ or heat$ or underheat$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab,kw. (80)
21 ((damp$ or humid$ or mold or moldy or mould or mouldy or condensation$) adj3 (home or homes or house or houses or households or housing)).ti,ab,kw. (13)
22 ((cold or freez$ or frozen) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab,kw. (1)
23 ((warm$ or heat$ or underheat$ or temperature$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab,kw. (6)

24 ((damp or humid or mold or moldy or mould or mouldy) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab,kw. (1)
25 (energy efficienc$ adj3 (home or homes or house or houses or household$ or housing)).ti,ab,kw. (88)
26 (energy efficienc$ adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$ or domestic$)).ti,ab,kw. (18)
27 (home energy adj3 (program$ or assist$)).ti,ab,kw. (2)
28 (insulat$ adj3 (home or homes or house or houses or household$ or housing)).ti,ab,kw. (20)
29 (insulat$ adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab,kw. (0)
30 (Warm Front or Warm Deal or Green Deal or Warm Zone or Energy Company Obligation).ti,ab,kw. (8)
31 thermal comfort.ti,ab,kw. (21)
32 or/19-31 (245)
33 ((fall or falls or falling or slip or slips or slipping) adj3 (winter or snow or ice or weather or season$)).ti,ab,kw. (33)
34 ((accident$ or injury or injuries or injured or fracture$ or trauma$) adj3 (winter or snow or ice or weather or season$)).ti,ab,kw. (4)
35 ((grit or gritted or gritting or gritter$) adj3 (road$ or pavement$ or sidewalk$ or driveway$ or pathway$ or path$1)).ti,ab,kw. (0)
36 or/33-35 (37)
37 ((forecast$ or alert$ or warning$ or alarm$) adj3 (cold or colder or weather or winter or met office or meteorological office)).ti,ab,kw. (66)
38 health forecast$.ti,ab,kw. (1)
39 37 or 38 (67)
40 13 or 18 or 32 or 36 or 39 (793)
41 limit 40 to yr="1993 -Current" (745)

Key:

.ti,ab,kw.	searches are restricted to the title, abstract and keyword fields
adj	searches for adjacent terms
adj3	searches for terms within three words of each other
$	truncation symbol
$1	truncation restricted to one character
or/1-4	combine sets 1 to 4 using OR

CEA Registry (www.cearegistry.org). Searched 3 October 2013.

The Basic search option only allows one word/phrase at a time: searched each line separately and then browsed for potentially useful records.

winter	1 (0 potentially relevant)
snow	2 (0 potentially relevant)
weather	1 (0 potentially relevant)
season	33 (0 potentially relevant: mostly about influenza vaccination)

seasonal 16 (0 potentially relevant: mostly about influenza vaccination)
fuel 1 (0 potentially relevant)
housing 3 (0 potentially relevant)
energy 15 (0 potentially relevant)
falls 37 (0 potentially relevant: general falls prevention, not winter specific)
forecast 19 (0 potentially relevant)

RePEc (http://repec.org/). Searched 3 October 2013.

IDEAS search interface

(winter | weather | temperature) + (death | deaths | fatality | fatalities | mortality)
In: Title
Publication Date Range: 1993 to 2013
20 records retrieved

(winter | weather | temperature) + (death | deaths | fatality | fatalities | mortality)
In: Abstract
Publication Date Range: 1993 to 2013
127 records retrieved

(season | seasonal) + (death | deaths | fatality | fatalities | mortality)
In: Title
Publication Date Range: 1993 to 2013
4 records retrieved

(season | seasonal) + (death | deaths | fatality | fatalities | mortality)
In: Abstract
Publication Date Range: 1993 to 2013
75 records retrieved

("fuel poverty" | "winter fuel" | "winter payment" | "cold payment" | "weather payment" | "winter payments" | "cold payments" | "weather payments")
In: Title
Publication Date Range: 1993 to 2013
32 records retrieved

("fuel poverty" | "winter fuel" | "winter payment" | "cold payment" | "weather payment" | "winter payments" | "cold payments" | "weather payments")
In: Abstract
Publication Date Range: 1993 to 2013
65 records retrieved

"cold home" | "cold homes" | "cold house" | "cold houses" | "cold household*" | "cold housing"
In: Title

Publication Date Range: 1993 to 2013
8 records retrieved

"cold home" | "cold homes" | "cold house" | "cold houses" | "cold household*" | "cold housing"
In: Abstract
Publication Date Range: 1993 to 2013
3 records retrieved

"warm home" | "warm homes" | "warm house" | "warm houses" | "warm households" | "warm housing" | "warmer home" | "warmer homes" | "warmer house" | "warmer houses" | "warmer households" | "warmer housing"
In: Title
Publication Date Range: 1993 to 2013
2 records retrieved

"warm home" | "warm homes" | "warm house" | "warm houses" | "warm households" | "warm housing" | "warmer home" | "warmer homes" | "warmer house" | "warmer houses" | "warmer households" | "warmer housing"
In: Abstract
Publication Date Range: 1993 to 2013
0 records retrieved

"heating home" | "heating homes" | "heating house" | "heating houses" | "heating households" | "heating housing" | "Warm Front" | "Warm Deal" | "Green Deal" | "Warm Zone" | "Energy Company Obligation"
In: Title
Publication Date Range: 1993 to 2013
9 records retrieved

"heating home" | "heating homes" | "heating house" | "heating houses" | "heating households" | "heating housing" | "Warm Front" | "Warm Deal" | "Green Deal" | "Warm Zone" | "Energy Company Obligation"
In: Abstract
Publication Date Range: 1993 to 2013
12 records retrieved

"damp home" | "damp homes" | "damp house" | "damp houses" | "damp household*" | "damp housing"
In: Title
Publication Date Range: 1993 to 2013
0 records retrieved

"damp home" | "damp homes" | "damp house" | "damp houses" | "damp household*" | "damp housing"
In: Abstract

Publication Date Range: 1993 to 2013
1 record retrieved

"energy efficient home" | "energy efficiency home" | "energy efficient homes" | "energy efficiency homes" | "energy efficient house" | "energy efficiency house" | "energy efficient houses" | "energy efficiency houses" | "energy efficient households" | "energy efficiency households" | "energy efficient housing" | "energy efficiency housing"
In: Title
Publication Date Range: 1993 to 2013
6 records retrieved

"energy efficient home" | "energy efficiency home" | "energy efficient homes" | "energy efficiency homes" | "energy efficient house" | "energy efficiency house" | "energy efficient houses" | "energy efficiency houses" | "energy efficient households" | "energy efficiency households" | "energy efficient housing" | "energy efficiency housing"
In: Abstract
Publication Date Range: 1993 to 2013
15 records retrieved

("energy efficient" | "energy efficiency") + cost
In: Title
Publication Date Range: 1993 to 2013
34 records retrieved
[NB almost 600 records when searched in Abstract]

"winter falls" | "winter accidents" | "winter injuries" | "seasonal falls" | " seasonal accidents" | " seasonal injuries"
In: Title
Publication Date Range: 1993 to 2013
0 records retrieved

"winter falls" | "winter accidents" | "winter injuries" | "seasonal falls" | " seasonal accidents" | " seasonal injuries"
In: Abstract
Publication Date Range: 1993 to 2013
0 records retrieved

"health forecast" | "health forecasts" | "health forecasting"
In: Title
Publication Date Range: 1993 to 2013
1 record retrieved

"health forecast" | "health forecasts" | "health forecasting"
In: Abstract
Publication Date Range: 1993 to 2013

1 record retrieved

Key:
| OR
+ AND
" " phrase search

Campbel Library (http://www.campbellcollaboration.org/library.php). Searched 3 October 2013.

0	title is winter OR weather OR season* OR temperature OR cold OR colder	0
1	keywords is winter OR weather OR season* OR temperature OR cold OR colder	0
2	title is fuel	0
3	keywords is fuel	0
4	title is house OR houses OR housing	2
5	keywords is house OR houses OR housing	1
6	title is damp* OR mold* OR mould*	0
7	keywords is damp* OR mold* OR mould*	0
8	title is "energy efficient" OR "energy efficiency"	0
9	keywords is "energy efficient" OR "energy efficiency"	0
10	title is falls OR falling OR slip OR slips OR slipping	0
11	keywords is falls OR falling OR slip OR slips OR slipping	0
12	title is accident* OR injury OR injuries OR injured OR fracture*	3
13	keywords is accident* OR injury OR injuries OR injured OR fracture*	2
14	title is forecast*	0
15	keywords is forecast*	0
16	title is winter OR weather OR season* OR temperature OR cold OR colder or keywords is winter OR weather OR season* OR temperature OR cold OR colder or title is fuel or keywords is fuel or title is house OR houses OR housing or keywords is house OR houses OR housing or title is damp* OR mold* OR mould* or keywords is damp* OR mold* OR mould* or title is "energy efficient" OR "energy efficiency" or keywords is "energy efficient" OR "energy efficiency" or title is falls OR falling OR slip OR slips OR slipping or keywords is falls OR falling OR slip OR slips OR slipping or title is accident* OR injury OR injuries OR injured OR fracture* or keywords is accident* OR injury OR injuries OR injured OR fracture* or title is forecast* or keywords is forecast*	6

NB. Only 1 record was retrieved; the other 5 records were irrelevant

Key:
title searches are restricted to the title field
keywords searches are restricted to the keywords field
* truncation symbol
" " phrase search

Trials Register of Promoting Health Interventions (TRoPHI) (EPPI-Centre database interface). Searched 3 October 2013.

Freetext: "winter death*" OR "winter fatalit*" OR "winter mortalit*" OR "winter morbidit*" OR "winter illness*" OR "winter disease*" 0
Freetext: "weather death*" OR "weather fatalit*" OR "weather mortalit*" OR "weather morbidit*" OR "weather illness*" OR "weather disease*" 0
Freetext: "temperature* death*" OR "temperature* fatalit*" OR "temperature* mortalit*" OR "temperature* morbidit*" OR "temperature* illness*" OR "temperature* disease*" 0
Freetext: "cold* death*" OR "cold* fatalit*" OR "cold* mortalit*" OR "cold* morbidit*" OR "cold* illness*" OR "cold* disease*" 0
Freetext: (excess OR excessive OR severe OR severity OR exposure) AND (winter OR weather OR "temperature*" OR cold OR colder) 9
Freetext: ("vulnerab*" or risk OR risks OR "suceptib*") AND (winter OR weather OR "temperature*" OR cold OR colder) 8
Freetext: "season*" AND ("death*" OR "fatalit*" OR "mortalit*" OR "morbidit*" OR "risk*" OR "vulnerabl*" OR "suceptib*") 17
Freetext: "fuel poverty" OR "winter fuel" OR "winter payment*" OR "cold payment*" OR "weather payment*" 0
Freetext: (cold OR "freez*" OR frozen) AND (home OR homes OR house OR houses OR "household*" OR housing) 1
Freetext: ("warm*" OR "heat*" OR "underheat*" OR "temperature*" OR "insulat*") AND (home OR homes OR house OR houses OR "household*" OR housing) 8
Freetext: ("damp*" OR "mold*" OR "mould*") AND (home OR homes OR house OR houses OR "household*" OR housing) 2
Freetext: "energy efficien*" OR "home energy" OR "Warm Front" OR "Warm Deal" OR "Green Deal" OR "Warm Zone" OR "Energy Company Obligation" OR "thermal comfort" 0
Freetext: (falls OR falling OR slip OR slips OR slipping) AND (winter OR snow OR ice OR weather OR "season*") 2
Freetext: ("accident*" OR injury OR injuries OR injured OR "fracture*" OR "trauma*") AND (winter OR snow OR ice OR weather OR "season*") 9
Freetext: ("forecast*" OR "alert*" OR "warning*" OR "alarm*") AND (cold OR colder OR weather OR winter OR "met office" OR "meteorological office") 1
Freetext: "health forecast*" 0
1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 44

NB. Only 8 records were retrieved; the other 36 records were irrelevant

Key:

Freetext	searches are restricted to the text fields (title, author and abstract)
*	truncation symbol
" "	phrase search
" *"	ensures truncation search works

Database of Promoting Health Effectiveness Reviews (DoPHER) (EPPI-Centre database interface). Searched 3 October 2013.

Freetext: "winter death*" OR "winter fatalit*" OR "winter mortalit*" OR "winter morbidit*" OR "winter illness*" OR "winter disease*" 0
Freetext: "weather death*" OR "weather fatalit*" OR "weather mortalit*" OR "weather morbidit*" OR "weather illness*" OR "weather disease*" 0
Freetext: "temperature* death*" OR "temperature* fatalit*" OR "temperature* mortalit*" OR "temperature* morbidit*" OR "temperature* illness*" OR "temperature* disease*" 0
Freetext: "cold* death*" OR "cold* fatalit*" OR "cold* mortalit*" OR "cold* morbidit*" OR "cold* illness*" OR "cold* disease*" 0
Freetext: (excess OR excessive OR severe OR severity OR exposure) AND (winter OR weather OR "temperature*" OR cold OR colder) 2
Freetext: ("vulnerab*" or risk OR risks OR "suceptib*") AND (winter OR weather OR "temperature*" OR cold OR colder) 5
Freetext: "season*" AND ("death*" OR "fatalit*" OR "mortalit*" OR "morbidit*" OR "risk*" OR "vulnerabl*" OR "suceptib*") 3
Freetext: "fuel poverty" OR "winter fuel" OR "winter payment*" OR "cold payment*" OR "weather payment*" 0
Freetext: (cold OR "freez*" OR frozen) AND (home OR homes OR house OR houses OR "household*" OR housing) 1
Freetext: ("warm*" OR "heat*" OR "underheat*" OR "temperature*" OR "insulat*") AND (home OR homes OR house OR houses OR "household*" OR housing) 6
Freetext: ("damp*" OR "mold*" OR "mould*") AND (home OR homes OR house OR houses OR "household*" OR housing) 2
Freetext: "energy efficien*" OR "home energy" OR "Warm Front" OR "Warm Deal" OR "Green Deal" OR "Warm Zone" OR "Energy Company Obligation" OR "thermal comfort" 3
Freetext: (falls OR falling OR slip OR slips OR slipping) AND (winter OR snow OR ice OR weather OR "season*") 0
Freetext: ("accident*" OR injury OR injuries OR injured OR "fracture*" OR "trauma*") AND (winter OR snow OR ice OR weather OR "season*") 2
Freetext: ("forecast*" OR "alert*" OR "warning*" OR "alarm*") AND (cold OR colder OR weather OR winter OR "met office" OR "meteorological office") 0
Freetext: "health forecast*" 0
1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 14

NB. Only 5 records were retrieved; the other 9 records were irrelevant

Key:

Freetext	searches are restricted to the text fields (title, author and abstract)
*	truncation symbol
" "	phrase search
" *"	ensures truncation search works

OpenGrey (http://www.opengrey.eu/). Searched 3 October 2013.

("winter death*" OR "winter fatalit*" OR "winter mortalit*" OR "winter morbidit*" OR "winter illness*" OR "winter disease*" OR "fuel poverty" OR "winter fuel" OR "winter payment*" OR "cold payment*" OR "weather payment*" OR "cold home" OR "cold homes" OR "cold house" OR "cold houses" OR "cold household*" OR "cold housing" OR "warm* home" OR "warm* homes" OR "warm* house" OR "warm* houses" OR "warm* household*" OR "warm* housing" OR "heat* home" OR "heat* homes" OR "heat* house" OR "heat* houses" OR "heat* household*" OR "heat* housing" OR "Warm Zone" OR "Energy Company Obligation")

Key:
* truncation symbol
" " phrase search

NICE Evidence (https://www.evidence.nhs.uk/). Searched 18 October 2013.

Limited by 'Types of information': Drug/Medicines Management; Drug Costs; Commissioning Guides; Evidence Summaries; Grey literature; Guidelines; Health Technology Assessments; Policy and Service Development; Population Needs Assessment; Primary Research; Systematic Reviews - *Not* Population Intelligence; Patient Information

"winter deaths" OR "winter death"
"winter mortality" OR "winter morbidity"
"fuel poverty"
"weather payments" OR "weather payment"
"cold homes" OR "cold house" OR "cold houses" OR "cold housing"
"energy efficient homes" OR "energy efficient house" OR "energy efficient houses" OR "energy efficient housing"
"home energy" OR "home insulation"
"Warm Front" OR "Warm Deal" OR "Green Deal" OR "Warm Zone" OR "Energy Company Obligation"
"winter fall" OR "winter falls" OR "winter accident" OR "winter accidents"
"weather forecast" OR "weather forecasts" OR "weather forecasting" OR "weather alert" OR "weather alerts"
"health forecast" OR "health forecasts" OR "health forecasting"

Key:
" " phrase search

RIBA Catalogue (http://riba.sirsidynix.net.uk/uhtbin/webcat). Searched 15 October 2013.

Advanced Search
Keyword(s)

winter ADJ death$
(winter OR temperature$ OR cold OR colder) AND mortalit$
(winter OR temperature$ OR cold OR colder) AND morbidit$

(winter OR weather OR temperature$ OR cold OR colder) AND (vulnerab$ OR risk OR risks OR suceptib$)
fuel ADJ poverty
(cold OR freez$ OR frozen) ADJ (home OR homes OR house OR houses OR household$ OR housing)
(warm$ OR heat$ OR underheat$ OR temperature$) (home OR homes OR house OR houses OR household$ OR housing)
(damp$ OR humid$ OR mold$ OR mould$) ADJ (home OR homes OR house OR houses OR household$ OR housing)
(energy ADJ efficien$) AND (home OR homes OR house OR houses OR household$ OR housing)
(energy ADJ efficien$) AND (home OR homes OR house OR houses OR household$ OR housing)
(home ADJ energy) AND (program$ OR assist$)

1993 - 2013

Key:
ADJ adjacent terms
$ truncation symbol

NYAM Grey Literature Report (http://www.greylit.org/). Searched 18 October 2013.

Each line was searched separately

winter death
winter mortality
winter morbidity
fuel poverty
weather payments
weather payment
cold homes
cold house
cold housing
energy efficient home
energy efficient house
home energy
home insulation
winter falls
winter accident
weather forecast
weather alert

Scopus (Elsevier). 1823-2013/Oct. Searched 18 October 2013.

Advanced search

((TITLE-ABS-KEY("Warm Front" OR "Warm Deal" OR "Green Deal" OR "Warm Zone" OR "Energy Company Obligation")) OR (TITLE-ABS-KEY("winter falls" OR "winter accident*" OR "winter injur*")) OR (TITLE-ABS-KEY("health forecast*")) OR ((TITLE-ABS-KEY("winter death" OR "winter fatalit*" OR "winter mortalit*" OR "winter morbidit*")) OR (TITLE-ABS-KEY(weather W/2 (death* OR fatalit* OR mortalit* OR morbidit*))) OR (TITLE-ABS-KEY("season* death" OR "season* fatalit*" OR "season* mortalit*" OR "season* morbidit*")) OR (TITLE-ABS-KEY((winter OR weather OR cold OR colder) W/2 (vulnerab* OR risk OR risks OR suceptib*))) OR (TITLE-ABS-KEY("fuel poverty" OR "winter fuel" OR "winter payment*" OR "winter allowance*" OR "weather payment*" OR "weather allowance*")) OR (TITLE-ABS-KEY((cold OR freez* OR frozen) W/2 (home OR homes OR house OR houses OR household* OR housing))) OR (TITLE-ABS-KEY("energy efficien*" W/2 (home OR homes OR house OR houses OR household* OR housing))) OR (TITLE-ABS-KEY("home energy" W/2 (program* OR assist*))))) AND NOT ((ALL((rat OR rats OR mouse OR mice OR murine OR hamster OR hamsters OR animal OR animals OR dogs OR dog OR canine OR pig OR pigs OR cats OR bovine OR cow OR cattle OR sheep OR ovine OR porcine))) OR (ALL((monkey OR monkeys OR hen OR hens OR chicken OR chickens OR poultry OR rabbit OR rabbits OR fish OR fishes OR salmon OR bird OR birds OR insect OR insects))) OR (ALL((tree OR trees OR woodland OR forest OR forests OR plant OR plants OR leaf OR leaves OR soil OR agriculture OR agricultural OR agronomy OR crop OR crops OR grass OR grasses)))) AND (LIMIT-TO(PUBYEAR, 2014) OR LIMIT-TO(PUBYEAR, 2013) OR LIMIT-TO(PUBYEAR, 2012) OR LIMIT-TO(PUBYEAR, 2011) OR LIMIT-TO(PUBYEAR, 2010) OR LIMIT-TO(PUBYEAR, 2009) OR LIMIT-TO(PUBYEAR, 2008) OR LIMIT-TO(PUBYEAR, 2007) OR LIMIT-TO(PUBYEAR, 2006) OR LIMIT-TO(PUBYEAR, 2005) OR LIMIT-TO(PUBYEAR, 2004) OR LIMIT-TO(PUBYEAR, 2003) OR LIMIT-TO(PUBYEAR, 2002) OR LIMIT-TO(PUBYEAR, 2001) OR LIMIT-TO(PUBYEAR, 2000) OR LIMIT-TO(PUBYEAR, 1999) OR LIMIT-TO(PUBYEAR, 1998) OR LIMIT-TO(PUBYEAR, 1997) OR LIMIT-TO(PUBYEAR, 1996) OR LIMIT-TO(PUBYEAR, 1995) OR LIMIT-TO(PUBYEAR, 1994) OR LIMIT-TO(PUBYEAR, 1993)) AND (LIMIT-TO(LANGUAGE, "English")) AND (LIMIT-TO(SUBJAREA, "DECI") OR LIMIT-TO(SUBJAREA, "MEDI") OR LIMIT-TO(SUBJAREA, "ENVI") OR LIMIT-TO(SUBJAREA, "SOCI") OR LIMIT-TO(SUBJAREA, "BUSI") OR LIMIT-TO(SUBJAREA, "NURS") OR LIMIT-TO(SUBJAREA, "ECON") OR LIMIT-TO(SUBJAREA, "PSYC") OR LIMIT-TO(SUBJAREA, "HEAL") OR LIMIT-TO(SUBJAREA, "PHAR") OR LIMIT-TO(SUBJAREA, "DECI") OR LIMIT-TO(SUBJAREA, "MULT"))

Key:

SUBJAREA	Subject Areas
TITLE-ABS-KEY	searches are restricted to the title, abstract and keyword fields
W	searches for adjacent terms
W/3	searches for terms within three words of each other
*	truncation symbol
" "	phrase search

Avery Index to Architectural Periodicals (ProQuest). 1934-2013/Oct. Searched 24 October 2013.

TI,AB(winter NEAR/4 (death* OR fatality* OR mortality* OR morbidity* OR illness* OR disease*)) OR (TI,AB(winter NEAR/4 (death* OR fatality* OR mortality* OR morbidity* OR illness* OR disease*)) OR (TI,AB(weather NEAR/3 (death* OR fatality* OR mortality* OR morbidity* OR illness* OR disease*)) OR TI,AB(temperature* NEAR/3 (death* OR fatality* OR mortality* OR morbidity* OR illness* OR disease*)))) OR TI,AB((cold OR colder) NEAR/4 (spell* OR season* OR month* OR period* OR

condition* OR event*1 OR related OR excess OR excessive OR severe OR severity OR extreme)) OR TI,AB((excess OR excessive OR severe OR severity OR exposure) NEAR/3 winter) OR TI,AB(winter NEAR/4 (vulnerable* OR risk*1 OR suceptib*)) OR TI,AB(temperature* NEAR/3 (vulnerable* OR risk*1 OR suceptib*)) OR TI,AB(weather NEAR/3 (vulnerable* OR risk*1 OR suceptib*)) OR TI,AB((cold OR colder) NEAR/3 (vulnerable* OR risk*1 OR suceptib*)) OR TI,AB(season* NEAR/3 (death* OR fatality* OR mortality* OR morbidity* OR risk*1 OR vulnerable* OR suceptib*)) OR TI,AB(fuel NEAR/3 (poverty OR poor OR afford OR affordable OR affordability OR tariff)) OR TI,AB(winter NEAR/3 fuel) OR TI,AB(winter NEAR/3 (payment* OR allowance* OR benefit* OR grant* OR voucher*)) OR TI,AB((cold OR weather) NEAR/3 (payment* OR allowance* OR benefit* OR grant* OR voucher*)) OR TI,AB((cold OR free* OR frozen) NEAR/3 (home OR homes OR house OR houses OR household* OR housing)) OR TI,AB((warm* OR heat* OR underseat* OR temperature*) NEAR/3 (home OR homes OR house OR houses OR household* OR housing)) OR TI,AB((damp* OR humid* OR mold OR moldy OR mould OR mouldy OR condensation*) NEAR/3 (home OR homes OR house OR houses OR household* OR housing)) OR TI,AB((cold OR free* OR frozen) NEAR/3 (accommodation* OR rent OR rents OR rented OR tenancy OR tenancies OR dwelling*)) OR TI,AB((warm* OR heat* OR underseat* OR temperature*) NEAR/3 (accommodation* OR rent OR rents OR rented OR tenancy OR tenancies OR dwelling*)) OR TI,AB((damp* OR humid* OR mold OR moldy OR mould OR mouldy OR condensation*) NEAR/3 (accommodation* OR rent OR rents OR rented OR tenancy OR tenancies OR dwelling*)) OR TI,AB("energy efficien* home" OR "energy efficien* homes" OR "energy efficien* house" OR "energy efficien* houses" OR "energy efficien* household*" OR "energy efficien* housing") OR TI,AB("energy efficien* accommodation*" OR "energy efficien* rent" OR "energy efficien* rents" OR "energy efficien* rented" OR "energy efficien* tenancy*" OR "energy efficien* tenancies" OR "energy efficien* dwelling*" OR "energy efficien* domestic*") OR TI,AB("home energy program*" OR "home energy assist*") OR TI,AB("Warm Front" OR "Warm Deal" OR "Green Deal" OR "Warm Zone" OR "Energy Company Obligation") OR TI,AB("thermal comfort") OR TI,AB((falls OR falling) NEAR/3 (winter OR snow OR ice OR weather)) OR TI,AB((accident* OR injury OR injuries OR injured OR fracture* OR trauma*) NEAR/3 (winter OR snow OR ice OR weather)) OR TI,AB((grit OR gritted OR gritting OR gritter*) NEAR/3 (road* OR pavement* OR sidewalk* OR driveway* OR pathway* OR path*1)) OR TI,AB((forecast* OR alert* OR warning* OR alarm*) NEAR/3 (cold OR colder OR weather OR winter OR "met office" OR "meteorological office")) OR TI,AB("health forecast*")

Key:

TI,AB	searches are restricted to the title and abstract fields
NEAR	searches for adjacent terms
NEAR/3	searches for terms within three words of each other
*	truncation symbol
*1	truncation restricted to one character
" "	phrase search

ICONDA International (Ovid). 1976-2013/Oct. Searched 25 October 2013.

1 (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. 3
2 (weather adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. 2

3 (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. 0
4 ((cold or colder) adj4 (spell$ or season$ or month$ or period$ or condition$ or event$1 or related or excess or excessive or severe or severity or extreme)).ti,ab. 246
5 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$).ti,ab. 2252
6 4 and 5 0
7 ((excess or excessive or severe or severity or exposure) adj3 winter).ti,ab. 39
8 (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab. 5
9 (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. 13
10 (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. 17
11 ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. 3
12 (season$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or risk$1 or vulnerabl$ or suceptib$)).ti,ab. 7
13 1 or 2 or 3 or 6 or 7 or 8 or 9 or 10 or 11 or 12 87
14 ((fuel or energy or gas or electricity) adj3 (poverty or poor or afford or affordable or affordability or tariff$)).ti,ab. 116
15 (winter adj3 fuel).ti,ab. 1
16 (winter adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. 4
17 ((cold or weather) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. 8
18 ((heat$ or gas or electricity) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. 46
19 14 or 15 or 16 or 17 or 18 174
20 ((cold or freez$ or frozen) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. 36
21 ((warm$ or heat$ or underheat$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. 396
22 ((damp$ or humid$ or mold or moldy or mould or mouldy or condensation$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. 88
23 ((cold or freez$ or frozen) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. 2
24 ((warm$ or heat$ or underheat$ or temperature$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. 52
25 ((damp or humid or mold or moldy or mould or mouldy) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. 9
26 (energy efficien$ adj3 (home or homes or house or houses or household$ or housing)).ti,ab. 294
27 (energy efficien$ adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$ or domestic$)).ti,ab. 30
28 (home energy adj2 (program$ or assist$)).ti,ab. 2
29 (insulat$ adj2 (home or homes or house or houses or household$ or housing)).ti,ab. 103
30 (insulat$ adj2 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. 35
31 (Warm Front or Warm Deal or Green Deal or Warm Zone or Energy Company Obligation).ti,ab. 12

32 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 1009
33 ((falls or falling or slip or slips or slipping) adj3 (winter or snow or ice or weather)).ti,ab. 15
34 ((accident$ or injury or injuries or injured or fracture$ or trauma$) adj3 (winter or snow or ice or weather)).ti,ab. 34
35 ((grit or gritted or gritting or gritter$) adj3 (road$ or pavement$ or sidewalk$ or driveway$ or pathway$ or path$1)).ti,ab. 2
36 33 or 34 or 35 51
37 ((forecast$ or alert$ or warning$ or alarm$) adj3 (cold or colder or weather or winter or met office or meteorological office)).ti,ab. 50
38 health forecast$.ti,ab. 0
39 37 or 38 50
40 13 or 19 or 32 or 36 or 39 1353
41 limit 40 to (english and yr="1993 -Current") 492

Key:
.ti,ab. searches are restricted to the title and abstract fields
adj searches for adjacent terms
adj3 searches for terms within three words of each other
$ truncation symbol
$1 truncation restricted to one character
or/1-4 combine sets 1 to 4 using OR

PsycEXTRA (Ovid). 1908-2013/Oct. Searched 25 October 2013.

1 (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. 3
2 (weather adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. 4
3 (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. 2
4 ((cold or colder) adj4 (spell$ or season$ or month$ or period$ or condition$ or event$1 or related or excess or excessive or severe or severity or extreme)).ti,ab. 51
5 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$).ti,ab. 20625
6 4 and 5 8
7 ((excess or excessive or severe or severity or exposure) adj3 winter).ti,ab. 3
8 (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab. 3
9 (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. 2
10 (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. 7
11 ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab. 5
12 (season$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or risk$1 or vulnerabl$ or suceptib$)).ti,ab. 1
13 or/1-3,6-12 33
14 ((fuel or energy or gas or electricity) adj3 (poverty or poor or afford or affordable or affordability or tariff$)).ti,ab. 5
15 (winter adj3 fuel).ti,ab. 0
16 (winter adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. 0

17 ((cold or weather) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. 1
18 ((heat$ or gas or electricity) adj3 (payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab. 3
19 or/14-18 9
20 ((cold or freez$ or frozen) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. 0
21 ((warm$ or heat$ or underheat$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. 14
22 ((damp$ or humid$ or mold or moldy or mould or mouldy or condensation$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab. 2
23 ((cold or freez$ or frozen) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. 0
24 ((warm$ or heat$ or underheat$ or temperature$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. 0
25 ((damp or humid or mold or moldy or mould or mouldy) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. 0
26 (energy efficien$ adj3 (home or homes or house or houses or household$ or housing)).ti,ab. 0
27 (energy efficien$ adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$ or domestic$)).ti,ab. 0
28 (home energy adj2 (program$ or assist$)).ti,ab. 6
29 (insulat$ adj2 (home or homes or house or houses or household$ or housing)).ti,ab. 0
30 (insulat$ adj2 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab. 0
31 (Warm Front or Warm Deal or Green Deal or Warm Zone or Energy Company Obligation).ti,ab. 0
32 thermal comfort.ti,ab. 13
33 or/20-32 34
34 ((falls or falling or slip or slips or slipping) adj3 (winter or snow or ice or weather)).ti,ab. 5
35 ((accident$ or injury or injuries or injured or fracture$ or trauma$) adj3 (winter or snow or ice or weather)).ti,ab. 24
36 ((grit or gritted or gritting or gritter$) adj3 (road$ or pavement$ or sidewalk$ or driveway$ or pathway$ or path$1)).ti,ab. 0
37 or/34-36 29
38 ((forecast$ or alert$ or warning$ or alarm$) adj3 (cold or colder or weather or winter or met office or meteorological office)).ti,ab. 28
39 health forecast$.ti,ab. 0
40 or/38-39 28
41 13 or 19 or 33 or 37 or 40 126
42 limit 41 to (english language and yr="1993 -Current") 93

Key:
.ti,ab. searches are restricted to the title and abstract fields
adj searches for adjacent terms

adj3	searches for terms within three words of each other
$	truncation symbol
$1	truncation restricted to one character
or/1-4	combine sets 1 to 4 using OR

Appendix 3 Bibliography of included studies

1. Laaidi K, Economopoulou A, Wagner V, et al. Cold spells and health: prevention and warning. *Public Health* 2013; **127**(5): 492-9.
2. Chalabi Z, Raine R, Stevens M, Wilkinson P. Evaluation of the Met Office Health Forecasting project for primary care and NHS trusts Final report. London: Department of Health, 2005.
3. Halpin DM, Laing-Morton T, Spedding S, et al. A randomised controlled trial of the effect of automated interactive calling combined with a health risk forecast on frequency and severity of exacerbations of COPD assessed clinically and using EXACT PRO. *Prim* 2011; **20**(3): 324-31, 2 p following 31.
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5. Bull A, Mahmood H, Cush N. Identifying people at risk of fuel poverty to prevent excess winter deaths. *Nurs Times* 2010; **106**(49-50): 12-3.
6. Dubois U. From Targeting to Implementation: The Role of Identification of Fuel Poor Households. *Energy Policy* 2012; **49**(1): 107-15.
7. Walker R, McKenzie P, Liddell C, Morris C. Area-based targeting of fuel poverty in Northern Ireland: An evidenced-based approach. *Appl Geogr* 2012; **34**: 639-49.
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10. Hutchinson EJ, Wilkinson P, Hong SH, Oreszczyn T, Warm Front Study G. Can we improve the identification of cold homes for targeted home energy-efficiency improvements? *Applied Energy* 2006; **83**(11): 1198-209.
11. Michiels B, Govaerts F, Remmen R, Vermeire E, Coenen S. A systematic review of the evidence on the effectiveness and risks of inactivated influenza vaccines in different target groups. *Vaccine* 2011; **29**(49): 9159-70.
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13. Watkins J. Effectiveness of influenza vaccination policy at targeting patients at high risk of complications during winter 1994-5: cross sectional survey. *Bmj* 1997; **315**(7115): 1069-70.
14. Breeze E, Mangtani P, Fletcher AE, Price GM, Kovats S, Roberts J. Trends in influenza vaccination uptake among people aged over 74 years, 1997-2000: survey of 73 general practices in Britain. *BMC Fam Pract* 2004; **5**: 8.
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16. Mann AG, Mangtani P, Russell CA, Whittaker JC. The impact of targeting all elderly persons in England and Wales for yearly influenza vaccination: excess mortality due to pneumonia or influenza and time trend study. *BMJ Open* 2013; **3**(8).
17. Takayama M, Wetmore CM, Mokdad AH. Characteristics associated with the uptake of influenza vaccination among adults in the United States. *Prev Med* 2012; **54**(5): 358-62.
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19. Santos-Sancho JM, Jimenez-Trujillo I, Hernandez-Barrera V, et al. Influenza vaccination coverage and uptake predictors among Spanish adults suffering COPD. *Hum Vaccin Immunother* 2012; **8**(7).

20. Ekins P, Lockwood M. Tackling fuel poverty during the transition to a low-carbon economy. York: Joseph Rowntree Foundation, 2011.
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Appendix 4 Excluded studies

Bouzarovski and colleagues (2012), "Energy Poverty Policies in the EU: A Critical Perspective." Energy Policy 49(1): 76-82
Considers adoption of policies aimed at addressing energy poverty using evidence gathered from an international workshop and semi-structured interviews with decision-makers, experts and advocacy activists in Brussels and Sofia.

Saunders et al. (2012), Can Premium Tariffs for Micro-generation and Small Scale Renewable Heat Help the Fuel Poor, and If So, How? Case Studies of Innovative Finance for Community Energy Schemes in the UK." Energy Policy 42(1): 78-88
Used a theoretical causal framework to assess whether, with appropriate financial intermediaries, it is possible for renewable energy incentives to be used to alleviate fuel poverty. Microgeneration only.

O'Farrell, A. and D. De La Harpe "Excess Winter Mortality in the Elderly in Ireland 2005-2009: Has a Change in the Fuel Allowance the Potential to Affect It?" Irish Journal of Medical Science 2012; 181: S124-S124.
Analysis of a potential impact rather than an empirical or intervention study.

Walls M. Policies To Encourage Home Energy Efficiency Improvements: Comparing Loans, Subsidies, and Standards, 2012.
A policy analysis using a version of the US Energy Information Administration's National Energy Modeling System (NEMS-RFF) to compute the energy and CO_2 effects and standard formulas to calculate the welfare costs of the policies.

Appendix 5 Evidence tables

Studies are sorted by category, year of publication (most recent first) and then author.

Ref. no.	Study: authors, year. Citation	Aim of study	Study design	Validity score		Population and setting	Methods of classifying exposure	Outcomes	Methods of analysis	Results	Notes
				Int	Ext						
Targeting by time: forecasting risk periods											
2	Chalabi Z, Raine R, Stevens M, Wilkinson P. Evaluation of the Met Office Health Forecasting project for primary care and NHS trusts. Final report, 2005. [2]	A formative evaluation of a health forecasting system for COPD in eight Strategic Health Authorities in England based on analysis of health forecasting data and interviews with NHS staff in pilot areas.	Observational study of health forecsting system	+/-	+	Met Office pilot health forecasting system in eight Strategic Health Authorities of England.	Receipt of COPD health forecast. Not controlled.	Accuracy of forecast models for COPD / acute hospital admission Reported changes in practice Personal assessments of the forecasting scheme.	Descriptive Analysis of forecst accuracy	COPD admission varied more than fourfold week to week and was largely predicatble from season, meteorological parameters, and measures of infectious disease activity. In the pilot practices, staff were generally very positive about the potential of the COPD forecasting scheme to improve quality of care of COPD patients through locally-developed forecast-responsive care plans. The reported advantages included greater focus on preventative actions; improved contact between high risk patients and primary care staff; more integrated, protocol-based care; and empowerment of patients to manage their own condition. Although these benefits may be as much related to the increased focus on COPD as to the forecasts themselves, the forecasts appear to be the essential catalyst. However, establishing forecast-responsive COPD management requires leadership from	

										senior staff, good communication and training, and it is not yet possible to quantify the net benefits in relation to the required resources. Formal assessment of cost-effectiveness is needed once more experience of how best to use health forecasting has been gained. In contrast, the potential utility of forecasts for acute hospital admissions as a whole is less clear at this stage, and further development and enquiry is needed to clarify its possible role in operational decisions.	
4	Chalabi P, Erens B, Hajat S *et al*. N. Evaluation Of The Implementation And Health-Related Impacts Of The National Cold Weather Plan For England (interim report to the Dept of Health). London: Department of Health, 2013.[4]	To assess the implementation of the Cold Weather Plan (CWP) in 2012/13, in parallel with analysis of weather-health relationships and trends over time.	Time-series and other analyses of routine population health data <u>Survey/qual component</u> Semi-structured in-depth telephone interviews with health and social care managers (n=52) in 10 purposively sampled LAs in England. Interviews	+	++	Mortality data for England by region, 1996-2006 [to be updated to 2011]. Emergency hospital admissions data for 1997-2011, and A&E visits data for 2007-2011.	Weather data (temperature) from region-specific meteorological monitoring stations	All-cause and cause-specific mortality, hospital admissions, A&E visits due to falls	Regionally-stratified time-series analyses. Subgroups by age, cause. <u>Confounding control</u>: (time series) seasonality, day of week, [influenza – when updated] <u>Qualitative component</u> Exploration of issues related to the implementation of the CWP and of cold weather planning and response more generally. Thematic analysis.	Evidence of increase in mortality and (less marked) hospital admissions with low outdoor temperatures in all regions. Thresholds (for cold effect on mortality) vary by region, but are at around 6 deg Celsius. All large cause-of-death categories affected, especially cardiovascular disease (largest attributable burden) and respiratory death (greatest relative risk for a 1 deg Celsius decrease in temperature below the cold threshold). Rise in risk with age. Increased A&E visits from falls occur with snow and ice at all ages, but greatest relative increase in the working age population – not the elderly who show only a small increase in risk during periods of lying snow, nor the young, whose greatest risk of fracture occurs in the summer months.	

			with a sample of older people (n=35)							The large majority of cold-deaths occur on days that are NOT at the extreme of the temperature distribution and therefore not on days when alerts are issued by the CWP. <u>Qualitative component</u> Health and social care managers tended to think of 'vulnerability' in terms of socio-economic deprivation and existing clients (i.e. people who were in receipt of social care services such as home care). The authors conclude that this definition may miss some people who are vulnerable during cold weather (such as those who don't use services) and inclue some people who are not (e.g. because they live in a warm home). Many services, such as home care, are contracted out to independent providers. While the CWP and the cold weather alerts were a useful aid to prompt providers about actions that should be taken during cold weather, commissioning managers could not be sure that the actions set out ion the CWP for front-line staff (such as checking room temperature) were being undertaken. Engagement with primary care was variable: While some GPs were said to be actively engaged with winter welfare initiatives (such as referring patients to household warmth interventions) others were not. Local leadership of implementation of	

										the CWP tended to be with emergency planning staff rather than with public health staff. Emergency planners felt limited in what attention they could give to prevention. Interviews with a sample of older people: While respondents thought cold weather may exacerbate existing conditions there was little knowledge of the cardio-vascular risk association with cold temperatures. Although all respondents were in regular contact with a health professional, none had received any advice or support related to cold weather. There was a universal preference for turning the heating off at night (for comfort). There was also a universal fear of falling during icy conditions which was the greatest concern for participants. As a consequence respondents would stay inside when the risk of falling was thought to be high (i.e. during periods of ice and snow). Respondents would however go out as soon as it was thought safe to do so, to socialise or fulfil responsibilities (such as voluntary work) or simply to 'get out'. Nearly all respondents were reliant on public transport, with participants from the rural case study in particular facing arduous journeys to access facilities such as shops, exposing them to cold outdoor temperatures. The risk of poor health during cold	

										weather was mediated by instrumental social support provided by family (predominantly) or neighbours. This took the form of car journeys, hot meals, shopping, repairs, help with heating technology, and monitoring health and wellbeing.	
3	Halpin DM, Laing-Morton T, Spedding S, et al. A randomised controlled trial of the effect of automated interactive calling combined with a health risk forecast on frequency and severity of exacerbations of COPD assessed clinically and using EXACT PRO. Prim 2011; 20(3): 324-31.[3]	(i) To assess whether the EXACT-PRO health forecasting system can predict periods of higher risk, and (ii) and to assess the effect of the service on the frequency and severity of COPD exacerbations .	Prospective randomised controlled trial.	+	+	79 people aged over 40 with a diagnosis of COPD at three general practices in Devon, UK. All eligible patients were invited to participate. All who completed trial daily diary were entered into the study.	Automated alert calls made to patients' normal telephone service if an elevated risk of exacerbations was forecast. Patients randomised to either receive alert calls or not. 40 people in intervention group, 39 controls.	Patient reported outcome measures using EXACT system. Primary outcomes were frequency of exacerbations (defined using Anthonisen criteria) and proportion of patients experiencing one or more exacerbation. Secondary outcomes were ability to predict increased frequency of exacerbations, frequency, severity and duration of events, and changes in health status.	Exacerbation and event rates compared using a negative binomial model to allow for inter-subject variability. Ability to predict periods of increased risk analysed using a mixed linear model.	58% in intervention group experienced one or more exacerbation compared with 68% in control group. Exacerbation frequency (+/- standard error of the mean) in patients receiving alert calls was lower (0.95±0.27 v 1.17±0.29, p=0.52) but not statistically significant. No difference in mean EXACT scores between study groups. 34% of intervention group experienced one or more EXACT exacerbation compared with 53% in control group. Authors suggest that the ability of the forecast to predict high risk periods was confirmed unequivocally.	The evaluation team included those from the service provider (UK Met Office).
1	Laaidi K, Economopoulou	To point out the kinds of	Evaluation of effectiveness	+	+	Paris and Marseilles as	Pertinence criteria used	Criteria included ability to prevent	Investigated in two pilot cities, using	Combined minimum and maximum temperatures were the best indicators	

	A, Wagner V, Pascal M, Empereur-Bissonnet P, Verrier A, Beaudeau P. Cold spells and health: prevention and warning. Public Health 2013; 127: 492-499.[1]	measures that should be implemented to protect the population from the health effects of cold and when to put them into action.	of a cold weather alert system.			pilot cities.	to determine if an alert system would be relevant to trigger preventive measures.	health impact through specific measures, simplicity, reactivity, adaptability, and the possibility to find indicators able to predict a health impact of cold.	time-series models to identify mortality-relevant thresholds, if any.	to predict the health impact of cold temperatures on mortality. Associated optimal thresholds for action in Paris were -9 °C and -2 °C for minimum and maximum temperatures respectively, while thresholds in Marseille were -3 °C and +4 °C. When both thresholds were reached in a given city, the risk of excess mortality was greater than 15%. Authors conclude that simple meteorological indicators could be used to improve the detection of dangerous cold episodes and promote communication.	
Targeting by area and person											
8	Baker W, Starling G, Gordon D. Predicting fuel poverty at the local level. Bristol: Centre for Sustainable Energy, 2003.[8]	To develop a methodology for predicting fuel poverty at small area level.	Development of a predictive model.	+	+	Every electoral ward in England.	Small area, predictive 'Fuel Poverty Indicator' (FPI) based on the 1991 census. 1996 English House Condition Survey used to produce 'weightings' for the FPI's component Census variables.	Predictions of the number and proportion of households in fuel poverty for every ward in England.	Various methods used for validating the indicator. Including comparisons with local surveys of fuel poverty.	Authors conclude that FPI gives a good reflection of actual levels of fuel poverty at small area level.	
5	Bull A. Identifying people at risk of	To develop an algorithm to identify those	Development of a predictive algorithm.	na	na	West Midlands.	Algorithm to predict risk of excess winter	Analysis of excess winter deaths across the West	Unclear.	Higher levels of excess winter deaths were found in the NHS Birmingham East and North area than in the rest of	Limited reporting of method and

	fuel poverty to prevent excess winter deaths. Nursing Times 2010; 106: 12-13.[5]	at risk of excess winter death and fuel poverty.					death and fuel poverty developed by Primary Care Trust for use by health and social care professions within the PCT.	Midlands. Predictions of excess winter deaths and fuel poverty.		the region. No reporting of model results.	results. Authors include energy provider.
6	Dubois U. From targeting to implementation : the role of identification of fuel poor households. Energy Policy 2012; 49: 107-115.[6]	To evaluate the efficiency of fuel poverty policies by looking at them as a three-step process.	Application of a 'remediablen ess' approach to the design of fuel poverty policy.	+	+/-	Applied to fuel poverty policy in France.	NA	Evaluation of fuel poverty policy.	Fuel poverty policy evaluated in three steps (policy targeting, identification of households, and implementation of measures). Framework applied to (2010) French fuel poverty policy.	Targeting on low income homeowners who are frequently elder people living in rural areas has several consequences in terms of identification. Role of identification of fuel poor households highlighted as a key factor for the success of the policy. Authors note the importance of strongly linking the programme with existing local structures, and conclude that the efficiency of such policies has to be viewed in a comprehensive way.	Proposed analysis method only.
9	Fahmy E, Gordon D, Patsios D. Predicting fuel poverty at a small-area level in England. Energy Policy 2011; 39: 4370-77.[9]	To describe the development of a series of models for predicting the incidence of fuel poverty in England at a small-area level and to examine the adequacy of the modelled	Development and evaluation of a predictive model.	+	+	England, using data from English Housing Condition Survey.	Fuel poverty predictions at small-area level based on synthetic estimation of fuel poverty vulnerability.	Hazard (odds) ratios of fuel poverty.	Alternative approaches to model specification based upon two different approaches to the treatment of household income (Building Research Establishment's 'BREDEM-12' and UK Government's 'Households Below Average Incomes'	Estimates of fuel poverty prevalence broadly comparable between BRE and HBAI methods. However, overlap between methods very poor. Estimates not well correlated with subjective measures of fuel poverty. Authors conclude that our understanding of the incidence and spatial distribution of fuel poverty is highly sensitive to the way in which household incomes are measured.	

		results.							methods). Validation by comparison against subjective measures of affordable warmth.		
10	Hutchinson EJ, Wilkinson P, Hong SH, Oreszczyn T, the Warm Front Study Group. Can we improve the identification of cold homes for targeted home energy-efficiency improvements? Applied Energy 2006; 83: 1198-1209.[10]	To investigate the extent to which homes with low indoor-temperatures can be identified from dwelling and household characteristics.	Analysis of data from a national survey of dwellings.	++	++	Five urban areas of England (Birmingham, Liverpool, Manchester, Newcastle and Southampton). Dwellings occupied by low-income households, scheduled for home energy-efficiency improvements.	Half-hourly living-room temperatures recorded for two to four weeks in dwellings over the winter periods November to April 2001–2002 and 2002–2003.	Identification of cold homes.	Regression of indoor on outdoor temperatures used to identify cold homes in which standardized daytime living-room and/or nighttime bedroom-temperatures were <16 °C (when the outdoor temperature was 5 °C). Tabulation and logistic regression used to examine the extent to which these cold homes can be identified from dwelling and household characteristics.	Overall, 21.0% of dwellings had standardized daytime living-room temperatures <16 °C, and 46.4% had standardized nighttime bedroom-temperatures below the same temperature. Standardized indoor temperatures were influenced by a wide range of household and dwelling characteristics, but most strongly by the energy efficiency (SAP) rating and by standardized heating costs. However, even using these variables, along with other dwelling and household characteristics in a multi-variable prediction model, it would be necessary to target more than half of all dwellings in the sample to ensure at least 80% sensitivity for identifying dwellings with cold living-room temperatures. An even higher proportion would have to be targeted to ensure 80% sensitivity for identifying dwellings with cold-bedroom temperatures. Authors conclude that property and household characteristics provide only limited potential for identifying dwellings where winter indoor	

										temperatures are likely to be low, presumably because of the multiple influences on home heating, including personal choice and behaviour.	
7	Walker R, McKenzie P, Liddell C, Morris C. Area-based targeting of fuel poverty in Northern Ireland: An evidence-based approach. Applied Geography 2012; 34:639-649.[7]	To develop a small area fuel poverty risk index for Northern Ireland to improve targeting of fuel poverty policies.	Development of a predictive model.	+	++	Northern Ireland.		Identification of households in fuel poverty.	Evidence-based approach, using Geographic Information Systems (GIS) techniques, used to develop a small area fuel poverty risk index for Northern Ireland using a range of environmental and socio-economic variables. Areas at highest risk of fuel poverty identified and both large- and small-scale spatial variability found in risk using analyses of spatial association.	Risk found to be highest in open countryside and in medium-sized towns. Evidence of spatial concentration of fuel poverty risk demonstrated that there is a justified rationale for implementing fuel poverty strategies from an area-based platform.	
Methods to encourage the uptake of home energy efficiency measures											
23	Armstrong D, Winder R, Wallis R. Impediments to policy implementation : The offer of free installation of central	To examine the success of a local initiative to provide free installation of central heating for a group of	Cohort study.	+/-	+	1,181 local authority tenants aged 70 and over and without central heating in a London borough.	Eligible tenants were identified from the Council's housing database were initially sent a letter	Uptake of central heating. Views of tenants obtained by interviews.	The uptake of the offer of central heating was monitored through its different stages. Where possible, comments were invited from the	Only around 25% received central heating within the year. Reasons for the low uptake included inaccuracies in estimating those eligible as well as tenants' worries over upheaval and mess, health concerns and fear of increased heating costs.	Poorly reported study.

	heating to an elderly community has limited uptake. Public Health 2006; 120: 161-66.[23]	elderly people.					from the Housing Department inviting interest in an offer of free installation of gas-fired central heating.		elderly tenants to whom the offer was made. A sub-sample was interviewed about their views.	Authors conclude that successful policy implementation requires not only command of appropriate financial resources and the backing of local 'implementers', but also the local resources with which the policy will engage, especially local knowledge, and the 'targets' of the policy initiative.	
20	Ekins P, Lockwood M. Tackling fuel poverty during the transition to a low-carbon economy. York: Joseph Rowntree Foundation, 2011.[20]	To conduct an analysis of fuel poverty in the transition to a low carbon economy	Policy anlaysis	+	++	UK	Fuel prices	Fuel poverty	Data synthesis and secondary analysis	Energy prices are rising as governments implement measures to reduce carbon dioxide emissions and combat climate change. Since price increases can now largely be attributed to imported fossil fuels, the transition to a low-carbon economy is expected to increase levels of fuel poverty. Until the transition is complete, a new approach is required that gives far more attention to the other two main drivers of fuel poverty: low incomes and the energy inefficiency of homes. • As energy prices rise, fuel poverty can only be reduced by an intensified focus on the energy efficiency and energy bills of those in fuel poverty, especially low-income vulnerable households. • The long-term solution to fuel	

										poverty, and one that also supports the objective of reducing carbon emissions, is to increase dramatically the energy efficiency of fuel-poor households' homes. • Fuel-poor households should be incentivised by the prospect of energy bill rebates. • Rebates should be conditional on energy efficiency assessments, the implementation of energy efficiency measures, and the promotion of advice on achieving greater reductions in energy bills through broader energy-saving behaviour.	
22	Kuholski K, Tohn E, Morley R. Healthy energy-efficient housing: Using a one-touch approach to maximise public health, energy, and housing programs and policies. Journal of Public Health Management Practice 202010; 16: S68-S74.[22]	Discussion piece. On the value of a 'one stop shop' approach to energy efficiency /public health	Hypothesis	n/a	n/a					Hypothesisized: "one-touch" approach for home interventions that strategically integrates public health and energy efficiency has many potential direct and indirect benefits. This approach may play an important role in housing policy due to the increasing support for green housing and residential energy efficiency.	
25	Nair G, Gustavsson L, Mahapatra K. Factors influencing energy efficiency	To analyse the factors that influence the adoption of investment measures to improve the	Survey.	+	+	National survey of owners of Swedish detached houses conducted		Survey questions relating to uptake of specific energy efficiency measures, inferred preference for	Analysis of survey data.	For the majority of Swedish home owners, it was important to reduce their household energy use, and most of them undertook no-cost measures as compared to investment measures. Personal attributes such as income,	

	investments in existing Swedish residential buildings. Energy Policy 201; 38: 2956-63.[25]	energy efficiency of their buildings.				during May–July 2008 to understand their adoption of energy efficiency building envelope measures.		specific measures,		education, age and contextual factors, including age of the house, thermal discomfort, past investment, and perceived energy cost, influenced home owners 'preference for a particular type of energy efficiency measure.	
21	Stockton H, Campbell R. Time to reconsider UK energy and fuel poverty policies? York: Joseph Rowntree Foundation, 2011.[21]	To inform the energy and social justice debate by exploring how UK energy and fuel poverty policy can contribute towards a socially just transition to a low carbon society.	Analysis of programme for the reduction of fuel poverty.	+	++	UK.	Various energy efficiency programmes analysed including Energy Efficiency Standards of Performance (1994-2002), the Energy Efficiency Commitment (2002-06), the Carbon Emissions Reduction Target (2006-12), the Community Energy Saving Programme (2009-12), Feed-in Tariffs, and the Green Deal. Also considers	NA.	Narrative description.	Authors conclude that future energy policy can only contribute to a socially just transition to a low carbon society if households experiencing fuel poverty are given the resources to reduce their energy demand and can heat their homes to a satisfactory standard at an affordable cost at the same time. Mitigating the impact on financially disadvantaged households while ensuring equal access to the benefits of energy-efficient policies should be a key element of the transition to a low carbon economy and society.	Discussion paper only.

							fuel poverty programme the Energy Company Obligation.				
24	Weiss J, Dunkelberg E, Vogelpohl. Improving policy instruments to better tap into homeowner refurbishment potential: Lessons learned from a case study in Germany. Energy Policy 2012; 44: 406-415.[24]	How to improve or supplement political instruments in order to increase refurbishment rates and tap potential savings.	Analysis of existing policy instruments.	+	+	Germany.			Analysis of policy instruments focussing on the most promising types of building and refurbishment measures. Also took into account the barriers responsible for the discrepancy between potential and actual refurbishment rates.	Found that consideration of the specific peculiarities and situations homeowners face, coupled with an analysis of the energy saving potentials of their buildings, offers valuable insights and is critical for evaluating policy instruments and finding the mix of instruments that will purposefully encourage the most effective refurbishment measures.	
Vaccine efficacy and methods to encourage the uptake of vaccination											
11	Michiels B, Govaerts F, Remmen R, Vermeire E, Coenen S. A systematic review of the evidence on the effectiveness and risks of inactivated influenza vaccines in different target groups. Vaccine 2011; 29(49):	To systematically review the evidence regarding the efficacy, effectiveness and risks of the use of inactivated influenza vaccines in children, healthy adults, elderly individuals	Search of Cochrane database of systematic reviews supplemented with searches of the Cochrane Central Register of Controlled Trials database and Medline.	++	+	Global literature	Influenza vaccination	Efficacy, effectiveness and risks of inlfuneza vaccination	Independent assessment of study quality	The inactivated influenza vaccine has been proven effective in preventing laboratory-confirmed influenza among healthy adults (16-65 years) and children (>= 6 years) (GRADE A evidence). However, there is strikingly limited good-quality evidence (all GRADE B, C or not existing) of the effectiveness of influenza vaccination on complications such as pneumonia, hospitalisation and influenza-specific and overall mortality. Inconsistent results are found in studies among children younger than 6 years, individuals with COPD,	

	9159-70.[11]	and individuals with comorbidities such as diabetes, chronic lung disease, cardiovascular disease, kidney or liver disease and immune suppression								institutionalised elderly (65 years or older), elderly with co-morbidities and healthcare workers in elderly homes, which can only be explained by bias of unknown origin. The vaccination of pregnant women might be beneficial for their newborns, and vaccination of children might be protective in non-recipients of the vaccine of all ages living in the same community (one RCT, Grade B evidence)	
12	Nichol KL, Wuorenma J, von Sternberg T. Benefits of influenza vaccination for low-, intermediate-, and high-risk senior citizens. *Arch Intern Med* 1998; **158**(16): 1769-76.[12]	To clarify the benefits of influenza vaccination among low-risk senior citizens while concurrently assessing the benefits for intermediate- and high-risk senior citizens.	Cohorts	+	+	Analysis of elderly members of a large health maintenance organization included in each of 6 consecutive cohorts	Vaccination status, and classification of individuals with regard to risk status: high risk (having heart or lung disease), intermediate risk (having diabetes, renal disease, stroke and/or dementia, or rheumatologi c disease), and low risk.	Data from health maintenance organization	Analysis of outcomes comparing vaccinated and unvaccinated subjects after controlling for baseline demographic and health characteristics.	Vaccination over 6 flu seasons was associated with an overall reduction of 39% for pneumonia hospitalizations (P<.001), a 32% decrease in hospitalizations for all respiratory conditions (P<.001), and a 27% decrease in hospitalizations for congestive heart failure (P<.001). Immunization was associated with a 50% reduction in all-cause mortality (P<.001). Vaccine effectiveness was 29%, 32%, and 49% for high-, intermediate-, and low-risk senior citizens for reducing hospitalizations for pneumonia and influenza (for high and low risk, P< or =.002; for intermediate risk, P = .11). Effectiveness was 19%, 39%, and 33% (for each, P< or =.008), respectively, for reducing hospitalizations for all respiratory conditions and 49%, 64%, and 55% for reducing deaths from all causes (for each, P<.001). Vaccination was also associated with	

										direct medical care cost savings of $73 per individual vaccinated for all subjects combined (P = .002).	
16	Mann AG, Mangtani P, Russell CA, Whittaker JC. The impact of targeting all elderly persons in England and Wales for yearly influenza vaccination: excess mortality due to pneumonia or influenza and time trend study. BMJ Open 2013; 3: e002743.[16]	To investigate the impact on mortality due to pneumonia or influenza of the change from risk-based to age group-based targeting of the elderly for yearly influenza vaccination in England and Wales.	Longitudinal study.	+	++	People aged 65-74 and 75+ years whose deaths were registered to underlying pneumonia or influenza between 1975/1976 and 2004/2005 in England and Wales.	Excess mortality estimated using time series of deaths registered to pneumonia or influenza, accounting for seasonality, trend and artefacts. Non-excess mortality plotted as proxy for long-term trend in mortality.	Multiplicative effect on average excess pneumonia and influenza deaths each winter in the 4–6 winters since age group-based targeting of vaccination was introduced (in persons aged 75+ years from 1998/1999; in persons aged 65+ years from 2000/2001).	Multivariable regression adjusted for temperature, antigenic drift and vaccine mismatch, and stratified by dominant circulating influenza subtype.	There was a suggestion of lower average excess mortality in the six winters after age group based targeting began compared to before (however the CI for the 65–74 years age group includes no difference). Authors conclude that this is weakly supportive evidence that the marked increases in vaccine coverage accompanying the switch from risk-based to age group-based targeting of the elderly for yearly influenza vaccination in England and Wales were associated with lower levels of pneumonia and influenza mortality in older people in the first 6 years after age group-based targeting began.	
19	Santos-Sancho JM, Jimenez-Trujillo I, Hernandez-Barrera V, et al. Influenza vaccination coverage and uptake predictors among Spanish adults suffering COPD. Hum Vaccin Immunother 2012; 8(7).[19]	To compare influenza vaccination coverage among Spaniards aged 40 years or over who suffer from chronic obstructive pulmonary disease (COPD) with those without this illness to identify the	Cross-sectional study based on analysis of survey data.	+	+/-	People aged 40 years and above in Spain. Data extracted from the European Health Survey performed in Spain in 2009/10. Data analyzed on 15,355 people, of	Answer (yes/no) to the question about whether or not the interviewed person had been vaccinated against influenza in the previous flu season.	Seasonal influenza vaccination status. COPD status. Social demographic characteristics, health related variables, and the utilization of health care services.	Unclear.	Vaccination coverage among patients with COPD was 49.4% (95% CI: 46.3-52.5%) and 21.3% (95% CI: 20.7-21.9) among people without (p < 0.001). The probability of being vaccinated was three times greater for COPD patients (OR = 3.0, 95% CI: 2.6-3.5). Among COPD patients the uptake of vaccination increased with age. Other factors associated with an increase in vaccination coverage were: being male, perceiving one's health as fair or poor, not smoking, and having seen a doctor during the previous	Statistical methods unclear.

		factors that influence vaccination uptake among patients with COPD.				whom 1,309 had COPD.				month.	
18	Bohmer MM, Walter D, Krause G, Muters S, Gosswald A, Wichmann O. Determinants of tetanus and seasonal influenza vaccine uptake in adults living in Germany. Hum Vaccin 2011; 7(12): 1317-25.[18]	To assess determinants of vaccine uptake in adults living in Germany exemplified by one standard vaccination (tetanus) and one vaccination targeting specific risk-groups (seasonal influenza).	Telephone household-interviews.	+	+	Adults in Germany. Data from 21,262 telephone household-interviews representative of the adult population were collected in 2009 and analysed	Sufficient tetanus vaccination status according to national recommendations obtained from interviews.	Uptake of tetanus and seasonal influenza vaccine.	Univariate analyses used to determine the association between vaccination uptake and demographic, socio-economic, health-relevant and informational factors.	Persons who received professional vaccination advice within the past five years were more frequently vaccinated against tetanus and influenza than persons without (p< 0.001). Private physicians were identified as the most important source for vaccination advice. Having a statutory health insurance, last physician contact < 1 year ago, and living in the eastern part of Germany were independently associated with higher tetanus and influenza vaccine uptake. Low socio-economic status, two-sided migration background, and the feeling of being insufficiently informed on the benefits of vaccination were independently associated with low uptake of tetanus but not influenza vaccines. The authors conclude that, since physicians' advice has a major impact on the vaccination decision, physician reminder systems could provide a method to increase vaccination coverage in adults. For tetanus, information activities should target population groups with an increased risk of being under-vaccinated.	

14	Breeze E, Mangtani P, Fletcher AE, Price GM, Kovats S, Roberts J. Trends in influenza vaccination uptake among people aged over 74 years, 1997-2000: survey of 73 general practices in Britain. BMC Fam Pract 2004; 5: 8.[14]	To evaluate changes in vaccination policy retrospectively in terms of overall uptake and variation by socioeconomic status in over 74 year olds during the period 1997–2000.	Longitudinal study.	+	++	British people aged over 74 years. Vaccination information for 1997–2000 collected directly from general practices taking part in a MRC-funded Trial of the Assessment and Management of Older People in the Community.	Vaccination uptake obtained from GP records.	Vaccination uptake and various demographic and socioeconomic characteristics.	Regression modelling used to assess relative probabilities of having vaccination according to year, gender, age, area and individual socioeconomic characteristics.	Uptake was 48% (95% CI 45%, 55%) in 1997 and did not increase substantially until 2000 when the uptake was a third higher at 63% (50%, 66%). Vaccination uptake was lower among women than men (RR 0.9), people aged 85 or more compared to people aged under 80 (RR 0.9), those in the most deprived areas (RR 0.8) compared to the least deprived, and was relatively high for those in owner-occupied homes with central heating compared to other non-supported housing (RR for remainder = 0.9). This pattern did not change over the years studied. Authors conclude that increased uptake in 2000 may have resulted from the additional financial resources given to practices; it was not at the expense of more disadvantaged socioeconomic groups but nor did they benefit disproportionately.	
15	Mangtani P, Breeze E, Stirling S, Hanciles S, Kovats S, Fletcher A. Cross-sectional survey of older peoples' views related to influenza vaccine uptake.	To obtain the views of people over the age of 74 years regarding vaccine uptake.	Cross-sectional survey.	+	++	British people aged 75 years and over.	Influenza vaccine uptake obtained using a postal questionnaire.	Influenza vaccine uptake. Views of respondents regarding uptake.	Responses analysed by vaccine uptake records and by socio-demographic and medical factors.	85% of men and 75% of women were vaccinated against influenza in the previous year. Over 80% reported being influenced by a recommendation by a health care worker. The most common reason reported for non uptake was good health (44%), or illness considered to be due to the vaccine (25%). 81% of people reporting good health	

	BMC Public Health 2006; 6: 249.[15]									lived in owner occupied housing with central heating vs. 63% who did not state this as a reason (p = 0.04), whereas people reporting ill health due to the vaccine was associated with poorer social circumstances. 11% lived in the least deprived neighbourhood compared to 36% who did not state this as a reason (p = 0.05) and were less likely to be currently married than those who did not state this as a reason (25% vs 48% p = 0.05). Authors conclude that the divergent reasons for non-uptake, and the positive influence from a health care worker, suggests further uptake will require education and encouragement from a health care worker tailored towards the different views for not having influenza vaccination. Non-uptake of influenza vaccine because people viewed themselves as in good health may explain the modest socio-economic differentials in influenza vaccine uptake in elderly people noted elsewhere. Reporting of ill-health due to the vaccine may be associated with a different, poorer background.	
17	Takayama M, Wetmore CM, Mokdad AH. Characteristics associated with the uptake of	To identify characteristics associated with influenza vaccination that might	Analysis of surveillance data.	+	+	134,101 adults in the USA.	Vaccine uptake based on data from the 2009 "Behavioral Risk Factor	Receipt of influenza vaccine in the past 12 months. Characteristics of	Multivariable Poisson regression with robust variance to estimate unbiased adjusted prevalence	Among adults aged ≥65 years, the influenza vaccination coverage level was 68.9%. Among 286,867 younger adults aged 18-64 years, coverage was markedly	

	influenza vaccination among adults in the United States. Prev Med 2012; 54(5): 358-62.[17]	inform strategies for increasing coverage.					Surveillance System (BRFSS)".	BRFSS respondents.	ratios for influenza vaccination coverage. Backward stepwise selection used to identify characteristics independently associated with influenza vaccination.	lower: 31.8%. Having health care coverage was the strongest predictor of vaccination in both age groups, after accounting for other sociodemographic characteristics, health behaviours, and health status. Those reporting older age, white race, higher education, non-smoking status, being physically active, or having poor physical health or a personal history of various chronic conditions were also more likely to report having received the influenza vaccine. Authors conclude that vaccine uptake in the United States is related to social position as well as other health behaviours.	
13	Watkins J. Effectiveness of influenza vaccination policy at targeting patients at high risk of complications during winter 1994-5: cross sectional survey. BMJ 1997; 315(7115): 1069-70.[13]	To investigate the implementation of current vaccine policy.	Survey.	-	+	64 general practices in the county of Gwent, with a registered population of 291 908. Information submitted on 21,001 patients.	Data collection from patients at the time of vaccination.	Uptake rates of vaccine in at risk groups. Patients asked their age, whether they suffered with any of the conditions for which influenza vaccination is recommended, and the method by which they came to receive vaccination.	Unclear.	Under half of those patients identified as high risk and recommended for vaccination received it: only 63% of patients with heart disease, 39% with diabetes, 41% with asthma, and only one in three of those over 75. Advice from general practitioners accounted for 40% of all those being vaccinated, most of the remainder resulting from self referral by patients on an annual basis or on advice from the practice nurse. Other health professionals, particularly hospital consultants, played an insignificant part in vaccine promotion.	General Practice report. Method of statistical analysis not reported.

										Under 4% of patients were recruited by proactive methods such as telephone, letter, or a message on repeat prescriptions; 80% were recruited opportunistically. Poster campaigns had little influence in targeting those who would most benefit. There was no significant difference in uptake rates between practices according to whether they were training practices or fund holders, had more than two partners, or occupied cost-rent premises. There was also no relation with list size, though those practices with the highest vaccination rates had the highest uptake in those who would most benefit. Author concludes that personal advice from a general practitioner or practice nurse during the vaccination period was the greatest stimulus to vaccine uptake. There was little evidence of practices using vaccination registers to plan their vaccination programmes, and other health workers, though targeting risk groups correctly, did so too infrequently to make an impact.	
Integrated strategies											
4	See chalabi et al 2013 above[4]										
27	Public Health England, Local	To summarize actions and	Synthesis document	n/a	n/a	England (general and	Alert system, for periods of	Health protection actions	Synthesis document, not	Summarizes current guidance on implermentation of the Cold Weather	

	Government Association, Met Office, NHS England. Cold Weather Plan for England 2013. Protecting health and reducing harm from cold weather. PHE publications gateway number: 2013231 London: Public Health England, 2013.[27]	guidance relating to the Cold Weather Plan for England				at-risk population)	cold or hazardous weather, developed in collaboration with the Met Office, which operates in England from 1 November to 31 March each year (The Met Office will issues alerts for forecast periods of severe cold weather on the basis of either low temperatures of 2°C or less; and/or heavy snow and ice		analytical	Plan for England and specifically its alert system. Emphasizes: -- action at alert level 0 (year round planning) and level 1 (winter preparedness and action) to reflect that the greatest total health burden occurs at relatively moderate cold temperatures -- the importance of a long-term strategic approach by health and wellbeing boards (HWBs) and commissioners to reducing winter morbidity and mortality -- making a clearer distinction between the health effects and interventions for cold temperatures, and those for snow and ice The plan is a good practice guide and the actions denoted within it are illustrative. Five key messages that are recommended to all local areas: -- All local organisations should satisfy themselves that the suggested actions and cold weather alerts are understood across the system, and that local plans are adapted as appropriate to the local context. -- NHS and local authority commissioners should satisfy themselves that the distribution of cold weather alerts will reach those that need to take action, especially in light of recent structural changes. -- NHS and local authority commissioners should satisfy	

										themselves that providers and stakeholders take appropriate action according to the cold weather alert level in place and their professional judgements. -- Opportunities should be taken for closer partnership working with the community and voluntary sector to help reduce vulnerability and to support the planning and response to cold weather. -- Long-term planning and commissioning to reduce cold-related harm is considered core business by HWBs and should be included in joint strategic needs assessments (JSNAs) and joint health and wellbeing strategies (JHWSs)	
26	Wookey R, Austyn K, Bone A, (Extreme Events and Health Protection). Warm Homes Healthy People Fund 2012 to 2013. London: Public Health England; 2012-13.[26]	To evaluate the Warm Homes Health People Fund (WHHP), through identifying the benefits of the interventions and the challenges faced.	Mixed methodology: online survey for local authority leads, telephone interviews and local evaluation reports	+	++	Fund recipients	Fund recipients (England).	Views of scheme; barriers and facilitators	Descriptive	The fund was once again universally well received. Partnership working was considered key to successful delivery. Barriers and challenges to delivery were identified including engagement with healthcare professionals, which continued to be a major barrier to reaching those most vulnerable to the effects of cold. Lack of year round funding challenges the development of these projects. The evaluation demonstrates the need for greater co-operation from health professionals and supports the case for year round funding for projects of this nature.	

										The support of clinical commissioning groups (CCGs), local authorities and health and wellbeing boards (HWBs) is considered essential to the continuation of these schemes, which address indicators in the three national health and social care outcome frameworks.	
28	Roche T. How to reduce the risk of seasonal excess deaths systematically in vulnerable older people to impact at population level. London: Department of Health, 2010.[28]	Guide on how to reduce risks of seasonal excess death	Best practice guidance ("how to" guide). Not empirical study	n/a	n/a	England and Wales	n/a	n/a	The resource manual was built around good practice identified from the visits of schemes that are expected to make an impact on mortality in a short timescale if delivered at a sufficient scale.	Resource guide published by the [Health Inequalities National Support Team] HINST – a manual containing a range of information, resources and tools, including a series of 'How to guides' and 'Masterclass reports'. Their proposal for manging local demand has 10 steps, though the evidence base is not presented: Step 1: Gain insight into the local picture of EWD through local analysis Step 2: Develop a shared understanding of the SED agenda and the role of partners Step 3. Develop joint working Step 4: Develop a data-sharing agreement or data-sharing protocol Step 5: Coordinate a systematic approach across organisations for the key interventions Step 6: Develop a risk register Step 7: Develop a list of clients/patients Step 8: Develop criteria for prioritisation Step 9: Manage the list Step 10: Develop the management framework	

Appendix 6 Example criteria for assessing study quality

The quality of reviewed studies was assessed using a prescribed checklist of 19 criteria relating to study design, conduct, analysis and reporting as appropriate for quantitative observational studies. The list of criteria is given below, and the Excel spreadsheet of results of the assessment for included studies is separately attached. Where there was also qualitative component, the criteria listed below were included.

Questions/criteria for assessment of the quality studies

- Description of the source population?
- Is the eligible population representative of the source population?
- Do the selected participants represent the eligible population?
- Minimisation of bias in exposure classification and comparison group?
- Was selection of exposure variables based on a sound theoretical basis?
- Was contamination acceptably low?
- How well were confounding factors identified and controlled for?
- Is the setting applicable to the UK?
- Were outcome measures and procedures reliable?
- Were outcome measurements complete?
- Were all important outcomes assessed?
- Was there a similar follow-up time of exposure and comparison groups?
- Was follow-up meaningful?
- Was the study sufficiently powered?
- Were multiple exposure variables considered in the analyses?
- Were analytical methods appropriate?
- Was the precision of association given or calculable?
- Are the study results internally valid (unbiased)?
- Are the findings generalisable to the source population (externally valid)?

Qualitative component of studies

- Study: authors, year. Citation
- Research parameters: Research questions. Theoretical approach (e.g. grounded in theory, IPA) taken (if specified). State how data were collected: what method, by whom, what settings, when
- Population and sample selection: The population the sample were recruited from; how they were recruited. Report how many participants were recruited; specific inclusion criteria; state specific exclusion criteria.
- Outcomes and methods of analysis -- Description of method and processes of analysis. Key themes relevant to this review (with illustrative quotations if available) Limitations identified by the authors. Limitations identified by the review team.

- Limitations identified by review team: Evidence gaps and/or recommendations for future research. Sources of funding -- e.g. government (NHS), voluntary/charity, pharmaceutical company, and the role of funding organizations.