The profit of doom
Forecasting excess winter deaths due to the real increase in domestic energy prices

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Scoping the problem

In 1991 Boardman\textsuperscript{1} demonstrated that the UK has 30,000 to 60,000 more deaths between December and March than in the preceding and succeeding four month periods. Although there is some evidence demonstrating a reducing trend in excess winter deaths over the past 15 years the UK still has much higher winter death rates than other countries with similar or more severe climates, implying that it is not outdoor exposure to cold that is the key determinant. Northern Finland - where winter temperatures regularly drop to minus 20\textdegree\text{C} - has a significantly lower rate of excess winter deaths than London\textsuperscript{2} however, Finish dwellings have historically had much higher levels of insulation and whole house central heating is commonplace. In the UK 90\% of the excess winter deaths are in the elderly population and are registered under three generic disease headings: ischaemic heart, cerebrovascular and respiratory.\textsuperscript{3}

Cold damp housing and poor health

Although some of the additional winter deaths have been ascribed by the Eurowinter group\textsuperscript{4} as being due to external exposure - exacerbated by inappropriate clothing levels or culturally determined behaviour - there remains an acceptance that the majority of these deaths are essentially preventable if the elderly can be kept warm in their homes during the winter months. The biological mechanisms resulting from a lowering in core body temperatures are well known.\textsuperscript{5}

The body’s defence against cold is to shut down blood vessels in the skin to reduce heat loss from the core. This displaces around a litre of blood and overloads the central organs. In order to reduce this excess, salt and water are excreted. This in turn requires more salt and water to leave
the bloodstream through the walls of the blood capillaries. This adjusts the blood volume to the reduced capacity of the circulation system, but leaves the blood more concentrated. Some of the smaller molecules of the blood plasma - including the anti-thrombotic vitamin C - are able to redistribute through the capillary walls, but the red and white blood cells, platelets, fibrinogen and cholesterol are too large and remain in increased concentration in the blood plasma. All promote viscosity and hyper-coagulability, which increases blood pressure. Cold stress thus stimulates a range of biological processes that result in the blood becoming thicker, increasing the likelihood of cardio or cerebro vascular incidents. The immune system is also suppressed increasing the likelihood of airborne infectivity. Reasons for the increase in respiratory infections is not fully understood but it appears that colder air induces broncho-constriction and suppresses muco-
ciliary defences, resulting in local inflammation. Cold air per se is not likely to result in respiratory infections in the absence of pathogens, as shown by a study carried out by Tyrrell in ice-bound Spitzbergen, a town that lies inside the arctic circle. Despite exceptionally cold winter air temperatures, no increase in respiratory infections occurred until the arrival of the first ship in Spring carrying urban sailors/passengers with various bacterial and viral infections

Over the 21 years 1970-1991 Curwen demonstrated that for each degree the average monthly temperature dropped there were 140 excess deaths in the population under 65, 260 in the population between 65 and 74 and 680 in the population older than 75 per month. Although this work used external temperatures as the key determinant, those in fuel poverty who do not have the economic means to purchase more heat when demand increases, will experience significantly lower indoor temperatures as the thermometer falls. Typically, they will restrict heat input to the living room and can suffer severe ‘thermal shock’ when they have to move to other thermally isolated areas such as bedrooms. This is why condensation dampness and the resulting mould growth is highly correlated with the coldest exposed corner in the bedroom. It is this sharp temperature change that can trigger the physiological conditions previously outlined.

Fuel poverty and multiple deprivation
Section 95 of the Housing (Scotland) Act 2001\textsuperscript{10} produced the following definition of “fuel poverty”.

“A household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10\% of its income (including Housing Benefit or Income Support for Mortgage Interest) on all household fuel use.”

Although there remains some discussion as to whether benefits should be included as net income, the definition of a ‘satisfactory heating regime’ was clearly stated as one that achieves 21\(^\circ\)C in the living room and 18\(^\circ\)C in the other occupied rooms. Satsangi\textsuperscript{11} has previously claimed that the poorest decile of Glasgow’s population spend, on average, a remarkable 24\% of their net income on fuel, with no guarantee that these indoor temperatures are actually achieved. This compares with 3.2\% for the richest decile. A report by Energy Action Scotland\textsuperscript{12} into the effects of VAT on fuel poverty confirmed the fuel poor’s predicament; they are more likely to be living in poorly constructed, un-insulated dwellings without central heating and a high proportion are forced to use ‘expensive’ domestic tariff electricity for heating purposes. The Scottish Government have also demonstrated that for every 1\% increase in fuel costs the numbers in fuel poor in Scotland alone increases by circa 8000.

Howieson and Hogan\textsuperscript{13} have demonstrated that excess winter deaths across Scotland are positively correlated with the Scottish Index of Multiple Deprivation by region (0.35 at the 5\% confidence level). If you are over 65, the chance of becoming an EWD in Glasgow is 1 in 36, rising to 1 in 68 for North Ayrshire. This correlation goes against the influence of climatic variations (NB there is a 5\(^\circ\)C difference in average winter temperatures across the UK from south west to north east\textsuperscript{9}), house type, energy efficiency and access to the gas network.
Progress reversed

The level of excess winter deaths appear to be dropping over the last eight years with 23900 in winter 2006/07 down from 59000 in 1999/2000. The numbers in fuel poverty also mirrored this trend over a similar period, down from 6.5 million in 1996, to under 2 million by 2004. The decrease in these numbers was largely due to increasing household incomes and the introduction of winter fuel payments, with 35% being attributed to a reduction in the real cost of fuel. Despite the government’s Home Energy Efficiency Scheme (HEES), only 15% was driven by improvements in the energy efficiency of our homes. As fuel prices started to increase in 2005 the impact was immediate with 500 000 individuals being re-allocated to the fuel poverty count. Since that time there has been much larger increases in the real cost of fuel. The Government ministry responsible claims that overall, prices paid for fuel and light increased by 17.2 % between July 2007 and July 2008 with domestic electricity and gas prices, rising by 12.6 % and 12.9% respectively. There was a 16.7% increase in the price of coal and smokeless fuels and a 78.9% increase in the price of heating oils in the year to July 2008. A household’s ability to afford warmth will of course have varied significantly depending on the particular energy mix, heating system and house type.
Compositing the increases recently announced in August 2008 by the six largest energy suppliers, produces an average rise of 28% for gas and an increase of 16.5% for electricity. Over the 2 year period from Aug 2006 to August 2008 we have thus seen a compound increase in domestic energy prices greater than 44% for gas and 31% for electricity. Although the RPI for the poorest sectors of the community is above that for middle class consumers, those on fixed incomes have had less than a 7% increase in their income for this 2 year period. These price hikes therefore represent a real increase of around 37% for gas and 24% for electricity. Those on fixed incomes will have to increase their expenditure on domestic fuel by these percentages to light and heat their dwellings or face a significant drop in internal temperatures that will in turn drive a proportional increase in EWD. All the gains made by the reduction in fuel costs between 1996 and 2005 on the fuel poverty statistics have just been reversed with an additional 2.5 million persons likely to be re-classified as suffering from fuel poverty when the figures for the period 2006 – 2008 are published in 2010.

Heat or eat?

In the year April 2007-08 in Scotland the average pensioner couple - who tend to spend more time indoors and therefore have longer period demand for heating - had an expenditure on domestic energy of £1551, while a single pensioner spent £1192. Applying the recent price increases to these figures (assuming an equal balance of gas to electricity spend) will see them rise to £1896 and £1457. The increase in the winter fuel payment allowance of £50 for those aged 60 – 79 and £100 for those over 80 will offset a small part of the increases but there remains a shortfall of £295 and £165, that will have to be found if indoor temperatures are to be maintained. If however those on fixed incomes are unable to find additional financial resources, indoor temperatures will drop. The question is then; by how much and what impact is this likely to have on the number of excess winter deaths?

These shortfalls cannot be wholly ascribed to space heating alone as lighting, appliances, water heating, cooking and standing charges will take up a significant proportion. It is of course a stark
choice whether to cook, sit in the dark, bathe or heat the dwelling to ‘thermally safe’ temperatures, but in all likelihood the latter is the more obvious choice to cut when savings have to be made. The alternative is to run up large fuel debts and self-disconnection is not uncommon where individuals are on pre-payment meters.

On this basis it is not unreasonable to suggest that a large proportion of this fuel shortfall will be found from reducing space-heating use, resulting in lower internal temperatures. The following calculations are based on the assumption that 75% of the shortfall will be taken from a gas fired space-heating budget. At a cost of 3.8p per unit of gas the shortfall represents a reduction in purchased gas units of 3256 and 5822kWhs respectively for individual pensioners and couples. The reduction in internal temperature will then be a product of the dwellings local climate, its heat loss parameter and the efficiency of the heating system. The average National Home Energy Rating (NHER) for the Scottish housing stock is 6 (marginally better then the average for England and Wales) however the fuel poor are more likely to live in dwellings that are older and have higher heat losses. The average gas use for dwellings in the UK is around 20 000kWhs per annum. Of this between 65-75% will be used for space heating (13 000 - 15 000kWhs) that represents an annual expenditure of £570 – a figure close to that paid out by the average pensioner in Scotland on gas alone. The shortfall caused by increased prices thus represents a significant reduction in delivered heat that will in turn lower internal temperatures across the heating season, the length of which varies across the UK.

In January for instance, when demand is greatest and the elderly are at their most vulnerable, heating requirements will demand around 2800kWhs if comfort conditions are to be achieved across the dwelling (average use in Scotland multiplied by 1.7 due to climate severity requiring greater heat input). This will normally equate to a temperature differential of circa 18°C in the living room and 15°C in the bedroom (presuming an average external temperature of 3°C for January). This equates to circa 175kWhs for each 1°C temperature rise over the month. If over the heating season we have a shortfall of 3256kWh, for the elderly living on their own, this
equates to 270kWhs per 9 month heating season, but in January this would increase to 460kWhs as the heat demand is greater. This shortfall means that internal temperatures will drop by over 2.6°C. As each drop of 1°C has been predicted to result in an extra 1080 EWDs per month, this equates to around 2840 EWDs in January alone. Over the 6 month winter period (Nov – April) we can thus expect over 15 000 EWDs driven solely by the recent real increase in gas prices. With food RPI currently running at for 14% the fuel poor will have to endure an additional burden. The choice will be to heat or eat?

**Health impacts**

EWD's are relatively easy to measure and may be considered as the acute outcome of cold housing. Mortality rates however, are the tip of an expensive morbidity 'iceberg'. House conditions play a decisive role - not only in determining at what age adults die - but more importantly, impact on occupant health and quality of life. Investment in energy efficiency measures such as central heating, insulation, double-glazing and complementary ventilation strategies to ensure ‘thermal safety” and good indoor air quality, will drive major improvements in public health and reduce excess winter deaths. Cold damp housing conditions result in increased external costs such as, hospital admissions, prescription charges, medical consultations and absenteeism.

**Recommendations**

Investing in energy efficiency measures is the most cost-effective long-term solution to fuel poverty and can produce an increasing and highly competitive return on capital invested, in terms of better public health reducing primary and acute health care costs, reduction in excess winter deaths and carbon emissions. Such a strategy will however take a minimum of 10 years to complete. Short to medium term measures are thus required to ameliorate the acute problems faced by the elderly and most vulnerable fuel poor. Winter fuel allowances are currently paid to everyone over 65. The government should now withdraw this hand-out to high rate taxpayers – who clearly do not require such assistance – and re-direct the funds to those over 65 who do not pay income tax. Such an approach has two main benefits; it does not require the elderly fuel poor
to complete complex paper work and is fiscally neutral. No more money requires to be found. It can target the elderly fuel poor using the tax system to identify the cohort in greatest need. Such a strategy could keep the elderly fuel poor warm this winter and minimise - or even eradicate - the shameful phenomenon that is the incidence of excess winter deaths in the UK.

References


