

Effectiveness of Domestic Energy- Efficiency Programmes

Fuel Poverty Action Research
Report 1:
Executive Summary



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Déaglán Ó Dónaill, ESB
Catherine Hazlett, Department of Social and Family Affairs
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Executive Summary

Despite an extensive literature in the UK and an increasing awareness of the issue, research into fuel poverty and domestic energy efficiency remains relatively scarce in Ireland. This is particularly the case for ex post analysis of domestic energy-efficiency programmes aimed at reducing fuel poverty among low-income households. To address this gap Combat Poverty and Sustainable Energy Ireland developed a fuel poverty action research project to inform public policy on the merits of domestic energy efficiency programmes.

The project involved an integrated and systematic ex post assessment of the energy, environmental, thermal comfort and health benefits of the SEI-administered Warmer Homes Scheme which retrofits private homes with insulation and other energy-saving measures. The study was set in Cork City and County Donegal.

Context

Boardman (1991) defines fuel poverty as the 'inability to heat one's home to an adequate (i.e. safe and comfortable) level owing to low household income and poor, energy inefficient housing and also the need to spend greater than 10 per cent of household income on fuel to achieve an acceptable level of comfort and amenity'. This definition is commonly accepted and reflects the close relationship between low household income, poor energy efficiency and household comfort. Applying this expenditure method of measuring fuel poverty, research by the ESRI (2008) estimated that 19 per cent of Irish households (301,368) may have experienced fuel poverty in 2008. Fuel poverty can also be measured using self-reported subjective measures such as being able to heat one's home to a temperature that is comfortable in winter. Using this measure the ESRI estimated that 3.6 per cent of Irish households (56,047) had experienced fuel poverty in 2007.¹

A review of the literature on fuel poverty suggests that there are three main factors which influence the level of fuel poverty, namely: fuel prices, household income, and energy efficiency of the housing stock. In acknowledging that fuel poverty significantly impacts on the lives of people affected (e.g. comfort, health status, quality of life etc), and the disproportionate impact on low-income households, SEI set up a Low Income Housing Programme to help establish and implement a national plan of action

¹Note that these figures are estimates given that data on fuel poverty are not routinely collected by government in Ireland.

to systematically address the problem of fuel poverty. The Programme is based on the premise that low-income households are unable to afford the capital investment measures to improve the energy efficiency of their homes. It is in response to this that the Warmer Homes Scheme was developed and implemented to support low-income households to improve the energy efficiency of their homes. Households participating in the scheme benefit from the installation of a range of energy efficiency measures such as attic insulation, draught proofing, cavity wall insulation and energy advice. It is anticipated that the scheme can make a significant contribution to a reduction in fuel poverty via improved energy efficiency of the housing stock. It is also envisaged that households participating in the scheme can benefit from improvements in household comfort, health status and general quality of life.

Scope of the Study

The scope of the study was to examine the impact of installing a range of energy efficiency measures on the thermal comfort and health status of households. The study also sought to gain some insight into the economic impacts of installing energy efficiency measures. The outcomes from the research are intended to offer direction to policy makers on the impact of energy efficiency measures and to identify areas for future research in this area.

Methodology

The study is based on a sample of 600 households – 257 intervention households who availed of interventions under the Warmer Homes Scheme and 343 comparison households who did not avail of any Warmer Home Scheme interventions. Households were surveyed prior to energy efficiency measures being installed and surveyed again following the installation of measures. In supporting the concept of adding social value, the study was implemented within a community development context with the support of local organisations in Cork City (Northside Community Enterprises Ltd) and County Donegal (Meitheal Forbartha na Gaeltachta). Fieldwork on the study was conducted between October 2006 and February 2009.

Key Findings

Fuel Poverty and Health

The research has found that the Warmer Homes Scheme has had a significant impact on reducing fuel poverty. This is evidenced by a significant decline in the number of intervention households reporting difficulty in being able to afford to heat their home in winter to a temperature that is comfortable, a significant decline in the proportion of intervention households not using rooms in their home because they are not heated or too cold, and a significant decline in the number of intervention households finding it difficult to pay their utility bills on time. Taken collectively, shifts in these indicators point to the Warmer Homes Scheme having made a positive contribution to reducing the level of fuel poverty among intervention households.

Although similar shifts have been recorded by comparison households, these shifts were found to be less significant. Indeed a common theme to emerge from the study is that many of the outcomes documented by intervention households have also been reported by comparison households. On this point, the research has found that both intervention and comparison households had an average of 4 energy efficiency measures installed at baseline. However, at follow-up the average number of energy efficiency measures increased significantly not only for the intervention households (an average of 6 energy efficiency measures) via the Warmer Homes Scheme, but also for comparison households (an average of 7 energy efficiency measures installed). This is consistent with other studies. In seeking to explain why there

had been a significant increase in the installation of energy efficiency measures among comparison households, a number of factors emerge such as the possibility of an interviewer effect, exposure to other energy efficiency campaigns (e.g. the Power of One campaign) and comparison households being drawn from the Warmer Homes Scheme waiting list. However, it should be borne in mind that even though comparison households did report an increase in the average number of measures installed, the findings suggest a number of additional benefits to those availing of the Warmer Homes Scheme.

Given the strong research evidence of a link between household damp and ill health, it is reassuring to find that the proportion of intervention households reporting the prevalence of damp, mould growth or condensation has fallen from 68 per cent to 22 per cent. Indeed when a range of factors was controlled for, households availing of interventions under the Warmer Homes Scheme were also more likely to report a fall in condensation level. The health impacts of a fall in household humidity are well documented in the literature (i.e. viruses giving rise to infections, nausea, respiratory symptoms, backache, fainting etc), and the evidence from this study suggests that the energy efficiency measures installed as part of the Warmer Homes Scheme have led to a significant fall in the proportion of intervention households reporting damp, mould and condensation. The implication is that by reducing the level of humidity in the intervention households (via the measures installed under the Warmer Homes Scheme), the health risks associated with

high levels of humidity have also been reduced.

At a descriptive level there is also a range of indicators which suggest health improvement. These indicators include a significant shift in the proportion of respondents in intervention households at follow-up (up from 51 per cent to 74 per cent) reporting that their health is 'good' or 'excellent', with a fall in the proportion of intervention respondents reporting a limiting long-term illness or disability (a fall from 62 per cent to 33 per cent). In relation to specific health conditions, the intervention group reported significant falls in the prevalence of health problems associated with: heart attacks, high blood pressure/hypertension, other heart/circulatory problems, problems with joints/arthritis, headaches, and disability (physical or mental). In contrast, the comparison group reported improvements only in relation to high blood pressure/hypertension and other heart/circulatory problems. The fall in health problems associated with poor joints/arthritis is consistent with what was found in an evaluation of a fuel poverty programme undertaken by the Armagh and Dungannon Health Action Zone (Shortt and Rugkåsa, 2007) as well as improvements in general physical functioning reported by the Scottish Executive in an evaluation of the Central Heating Programme in Scotland (2008).

In relation to health status as measured by self-reported health status (i.e. the SF-36, Ware 1992), the results are less conclusive. Although at a descriptive level there is evidence of improvements to vitality and general health among

the intervention sample, the differences were not sustained when other lifestyle factors were controlled for. These findings are consistent with research undertaken by the Scottish Executive to assess the health impacts of the Central Heating Programme in Scotland which found that the 'SF-36 may be relatively insensitive to changes in health associated with non-clinical interventions' and that changes in health status may only emerge over longer periods of follow-up. A study in Lambeth (Winder and Armstrong, 2003) which evaluated the impacts of central heating on older people arrived at a similar conclusion, with the authors again referring to the insensitivity of the SF-36 as well as a small sample size and the relatively short follow-up period. It may be that to fully understand the impact of the programme on health further research is required to determine any longer-term impacts on health status.

In terms of use of health services, there is some evidence, at a descriptive level, that respondents in intervention households at follow-up are less likely to report visiting a doctor in the previous year, with a similar trend recorded for attending hospital outpatient departments. Finally, in relation to health behaviours, smoking prevalence between baseline and follow-up among the intervention group fell significantly, with no difference recorded among the comparison group. There was also a significant increase in the level of moderate physical activity reported by the intervention group, with no change among the comparison group.

Comfort and Thermal Temperature

Based on the use of temperature thermometers, and after controlling for a number of other factors, the evidence from this study shows no significant rise in the indoor temperature of intervention households. However, household temperature was found to increase significantly as the number of energy efficiency measures increased. Based on this evidence, the positive correlation between number of energy efficiency measures installed and increased temperature strongly underscores the importance of the Warmer Homes Scheme in improving the thermal comfort of households. This is particularly the case with low-income households who, through lack of resources, would struggle to improve the physical fabric of their homes in the absence of a capital improvement programme such as the Warmer Homes Scheme. The benefits of the scheme are also highlighted by the finding that at follow-up there was a significant reduction in the proportion of intervention households falling below the World Health Organisation's (ibid) benchmark of heating the most commonly lived-in room to 20°C.

As was the case with health outcomes, a common theme to emerge in the analysis of the impact of the programme on comfort and thermal temperature is that many of the changes reported by intervention households have also been reported in comparison households. This may help explain why there was also a significant increase in the proportion of comparison households heating their most commonly occupied room to a temperature consistent with the WHO recommended level.

In addition to providing households with a range of energy efficiency measures, the Warmer Homes Scheme is also tasked with promoting awareness of energy efficiency including awareness of the appropriate household temperature. The evidence from this research suggests that the programme has had a significant impact on household awareness of the WHO benchmark temperature (20°C), with intervention households showing a more marked increase in awareness relative to comparison households.

There is also evidence that intervention households are finding it easier to heat their homes to a temperature that is comfortable, although this was also found to be the case among comparison households. There are a number of possible explanations for this including the positive impacts of the energy efficiency measures in households as well as a better awareness of energy efficiency issues. However, the research did find that there was a significant increase in the proportion of all households availing of fuel subsidies at follow-up (up from 69 per cent to 85 per cent among intervention households and up from 66 per cent to 83 per cent of comparison households). It is likely that this may have contributed to increased affordability.

Setting aside the evidence of an association between the installation of energy efficiency devices and improved thermal comfort, the research also found a fall in the proportion of intervention households reporting indoor 'cold strain' (i.e. being in a suboptimal temperature), with this trend also reported by comparison households, albeit at a less

significant level. A fall in the level of 'cold strain' suggests that improvements in thermal comfort may have reduced the risk of adverse health effects such as cardiovascular strain and potentially more serious conditions such as hypothermia and pneumonia. Similarly, in relation to 'cold stress' (i.e. shivering when going outside on a cold winter's night), the research has found a fall (down from 4 per cent to 1 per cent) in the proportion of intervention respondents reporting this problem.

Economic Impacts

The research has found that both intervention and comparison group households reported small savings of approximately €85 on fuel costs at the time of the follow-up survey in comparison to baseline, with the difference in savings between the two groups negligible and not statistically significant. With the increase in thermal comfort documented earlier it could be concluded that improved thermal comfort has been achieved at a similar or marginally reduced price.

In assessing the economic benefits it is important to acknowledge that during the study period a number of social welfare changes were introduced including:

- an increase in the rate of the National Fuel Scheme by €4 per week, to €18, from January 2007
- an increase in the income threshold for entitlement to fuel allowances from €51 per week in excess of the State Pension (Contributory) rate to €100 per week in excess of that rate from January 2007
- increases in the maximum weekly personal rate for all State and related social insurance pensions (increased by €16 from the first week of January 2007), with an increase in the maximum personal weekly rate of the State Pension (Non-Contributory) by €18 from the first week in January 2007.

Of these policy changes an increase in the income threshold for fuel allowances is likely to have had some impact on fuel

expenditure by households, which is evidenced by the significant increase between baseline and follow-up in the proportion of households availing of the fuel subsidy allowance. The other key factor likely to influence household expenditure on energy is variations in the market price of fuel and electricity. The policy changes documented above are also consistent with the finding of increased affordability of heating homes to a level that is comfortable.

A further indicator of economic impact is the fall in the highest average home-heating bill in winter which was recorded for both the intervention and comparison households, although the fall in average spend was more significant among the intervention households. Similarly, in summer there was a significant fall in the average home-heating bill among the intervention households, with no significant change among comparison households.

Combining the evidence of reduced expenditure on fuel bills, moderate savings on fuel expenditure and the policy changes introduced during the study period, it is not surprising to find a significant rise in the proportions of both intervention and comparison households who are finding it easier to pay their utility bills on time, which, using this measure, suggests a decline in fuel poverty.

Finally, the economic data suggest little difference between baseline and follow-up in relation to savings on health-care expenditure. Differences in four types of estimated health costs between individuals in the intervention and

comparison groups who answered both surveys – costs of GP visits, outpatient clinic attendance, A&E attendance, inpatient hospital admittance – were calculated. Only the estimated inpatient costs showed a significant difference, with the cost savings apparently only for the comparison group. However, this result vanished when subjected to a multivariate analysis incorporating the effects of 'life style' variables.

Conclusions

Study Findings

Taking these findings collectively we can conclude that the energy interventions made available under the Warmer Homes Scheme have brought health, thermal comfort and economic benefits to households who participated in the scheme. Also, based on the basket of fuel-poverty indicators used in this study, the evidence points to a significant fall in the proportion of intervention households classified as suffering from fuel poverty. These findings suggest that the Warmer Homes Scheme can make a significant contribution to reducing fuel poverty as well as reducing the health risks associated with energy inefficient homes.

Initially it was intended to implement the study as a randomised case control study but this proved problematic given the challenges in attempting to match intervention households on a like-for-like basis. This was further compromised by the finding that a significant proportion of 'comparison' households had also installed a range of energy efficiency measures during the study period which may help explain why many of the positive impacts recorded by the intervention households were also recorded by the comparison households. This suggests that regardless of the origin of the intervention, energy efficiency measures are linked to improvements across a range of domains. It should also be acknowledged that 'comparison' households installing energy efficiency measures is not specific to this study, but has also been reported in other studies such as an evaluation of the Warm Homes initiative in Northern Ireland and an evaluation of the Scotland's

Central Heating Programme (CHP). Indeed, the importance of the Warmer Homes Scheme in targeting low-income households is borne out by the finding of a positive correlation between number of energy efficiency measures installed, and increased thermal temperature of households.

Reflections on Methodology

Reflecting on the research approach, the study has highlighted the difficulties in controlling for a range of possible confounding factors such as household exposure to other energy efficiency schemes, the interviewer effect during data collection, the need to use health measures which are sensitive enough to identify change within a limited time period and the impact of changes to public policy, all of which make it more challenging to disentangle the effects of programme interventions. In considering future research in this area it may be possible to use more sophisticated energy and temperature monitoring equipment, e.g. data loggers and smart meters to record both internal and external temperatures, although this is likely to be at a significant cost premium.

On a methodological point, this research has highlighted the challenges in implementing studies involving intervention and comparison households, not least the difficulties in matching households on similar characteristics. Although the study has recorded positive impacts on a range of indicators, future studies in this area may benefit from a longer period between baseline and follow-up, particularly in relation to

identifying the effect of the interventions on health status. Future studies should also consider linking patient health data with survey data as a means of gaining a more comprehensive understanding of the impact of capital investment interventions on respondent health status. This will require getting the consent of respondents as well as the support of primary health-care professionals.

However, even with these methodological limitations the study is a good example of how to engage with local communities to undertake research at a local level, and for these communities to derive a high level of social value from the employment and capacity-building opportunities provided by this type of approach. It is anticipated that the learning acquired from this study can contribute to further refinements in the research process and that potential confounding factors and methodological challenges can be controlled for and, where possible, removed at the study design stage.

