

Goodbye Warm Front: Evaluating the Delivery of Energy Efficiency Retrofits in Low-income Homes in England from 2005 to 2012

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ABSTRACT

For over 10 years, the Warm Front scheme (WFS) was the primary tool through which Government sought to improve the energy efficiency of owner occupied homes in or at risk of fuel poverty in England. Beginning in 2000, and closing in 2012/13, the WFS provided energy efficient heating and insulation measures to low income households. Targeting and delivery of retrofit measures to vulnerable households is limited by the ability to identify them from available data. Vulnerable households may be ‘unseen’ or be unable to access government programmes because they lack the means or awareness. Key questions to be addressed in evaluating the WFS are: how effective was the targeting in meeting fuel poverty need? How did changes in eligibility affect applications? And, what factors affected application success? A database collected on all WFS applications (successful and unsuccessful) was used to examine the targeting and delivery of measures. The findings show that the uptake of measures among vulnerable households broadly mirrored the concentration of fuel poverty risk across England. Ethnic minority households made fewer applications to the scheme, but were more likely to be approved. The WFS was able to treat a significant proportion of the target population over the scheme period examined, over 1.5 million households. However, higher uptake rates were affected by ethnicity, suggesting that engagement may need to be more specifically tailored in the future.

Introduction

Currently, 2.28 million English households are estimated to be in ‘fuel poverty’ (DECC, 2014a), defined as having a combination of higher than average fuel costs and an income lower than the national poverty line. Many of these households are considered to be ‘vulnerable’, i.e. they are in receipt of various income benefits, are at higher risk of living in cold homes, and are likely to experience other social and health problems.

Since 2000, the Warm Front scheme (WFS), delivered by the UK Department of Energy and Climate Change (DECC), sought to reduce heating fuel expenditure in vulnerable households. In January 2013 the scheme was closed after assisting more than 2.4 million households (~10% of English households) with a range of interventions to help reduce the burden of energy expenditure. The scheme was delivered to those households who were identified as eligible when in receipt of a selection of state-benefits for households with low-incomes. The scheme provided a range of measures from home energy advice and low energy light bulbs to more extensive retrofits to improve dwelling energy performance. The Warm Front grant provided up to £3,500 for energy efficiency improvements, focusing on heating systems, wall and loft insulation, and draft-proofing (i.e. air-tightening).

In September of 2013, DECC commissioned an evaluation of the WFS to understand how the scheme was delivered in practice, with a focus on: scheme management, value for money, targeting fuel poor households, and the customer journey through the scheme. The evaluation also sought to understand what benefits and harms were created by the scheme more broadly in the energy retrofit market.

In delivering the WFS, a key evaluation question was how effective was the targeting of the scheme in reaching households in need? Evidence on the delivery of intervention programs through means-testing shows that the take-up of the benefit can be low and subject to problems of stigma, but also can be limited by complex enrolment procedures, administrative burdens, and confusion over eligibility criteria (particularly if they change) (Stuber and Schlesinger, 2006). The delivery of the WFS was predicated on the identification of households in receipt of state means-tested benefits. Although advertisement of the scheme was extensive and was undertaken in partnership with community groups and charities, the scheme provider and delivery agents relied on households self-identifying and applying to the scheme. Ultimately, the targeting and delivery of the energy efficiency retrofit to vulnerable households is limited by the ability to identify them from available data. Many vulnerable homes may be ‘unseen’ due to language barriers or ethnicity, or unable to access government programmes because they lack the means or awareness of such programmes. Further, delivery of measures is dependent on their ability to navigate the programme eligibility requirements.

In this research, we focus on the targeting of the WFS and those factors that might have affected the rate of uptake of the retrofits. Using a database collected on all WF applications (successful and unsuccessful), this natural experiment¹ is used to examine the targeting and delivery of energy efficiency measures in vulnerable households in England. We analysed the secondary data collected during the scheme to examine the rate of uptake among the English housing population. We sought to determine if the measures provided were targeted at those areas with the highest prevalence of vulnerability. We used the data to examine the impact that changing the eligibility requirements of the scheme had on the rate of application and rejections. We analysed the types of measures received and what household and dwelling factors affected both rate of application and their success.

In the following section, a brief background to the Warm Front scheme is provided, including the evaluation undertaken. Then a description of the data and methods used to examine the targeting of the scheme. The results section provides a description of the findings and are followed by a discussion and lessons learned from the evaluation research.

Background

The Warm Front scheme (WFS), which ran from June 2000 to April 2013, was the primary tool through which the English government tackled fuel poverty. The main aims of the WFS were: to minimize the risk of illness due to cold and damp in the most vulnerable households in England; to improve household energy efficiency in vulnerable households and therefore reduce greenhouse gas emissions; and, to alleviate fuel poverty.

The Warm Front scheme (WFS) was the main flagship policy of the 2001 UK Fuel Poverty Strategy (DTI and DEFRA, 2001), which set out the UK Government’s policies for removing the burden of living in fuel poverty. The Strategy included a suite of policies to target the three main factors that influence fuel poverty, including: dwelling energy efficiency, fuel prices, and household income. As defined by the UK government, a household was considered to be in fuel poverty if it they would need to spend at least 10% of their income to heat the house to an acceptable level². Under WFS, vulnerable households were defined as those households containing children, or those who are elderly, sick or disabled.

¹ A natural experiment are “events, interventions or policies which are not under the control of researchers, but which are amenable to research which uses the variation in exposure that they generate to analyze their impact.” (Craig et al., 2011).

² In July 2014, the UK Government produced a consultation report that revised the definition of fuel poverty that focused on poor households (i.e. income below poverty line, including notional energy bills) and dwellings with high energy costs (i.e. greater than the median), known as low-income, high-costs (LIHC) (DECC, 2014c).

The WFS provided a range of energy efficient heating and insulation retrofits to private tenure households in receipt of certain income related benefits. The WFS eligibility criteria from 2005 to 2011 included households in receipt of at least one of the principal means tested or disability related benefits (e.g. Child Tax Credit, Pension Credit, Employment and Support Allowance, Working Tax Credit, Income Support, Disability Living Allowance, and others). In April 2011, a further eligibility requirement was that households also had to be living in properties that were poorly insulated and/or did not have a working central heating system (defined as having a SAP rating³ of 63 or below).

The process involved applying to the scheme, either online, through the mail or by telephone, where the applicant would have a benefit entitlement check to determine their eligibility. Following a successful application, a Warm Front engineer carried out a technical survey to determine what energy efficiency retrofits were needed in the dwelling. Trained installers for the WFS would then carry out the installation, which would typically include insulation, draft-proofing and/or heating system work. Installations were then subject to an inspection. The available grant maximum changed during the WFS period with a peak of up to £3,500 (or £6,000 where oil heating or renewables were recommended).

Scheme operation. The management of the WFS was contracted to a scheme provider who oversaw the day-to-day operation and ensured the scheme tackled fuel poverty in a cost-effective manner. The scheme manager was responsible for: a central applications service and call centre; marketing of the scheme, including through referrals from third parties; managing the supply chain of both surveyors and installers; customer complaints service; and, aftercare service for gas boilers installed.

The scheme manager's performance was monitored and assessed through: contractual performance indicators; governance arrangements including regular meetings with a Delivery Advisory Board; annual reports; independently produced quality assurance reports; National Audit Office reviews; and a number of external evaluations (Gilbertson et al., 2006; Green and Gilbertson, 2008; Hong et al., 2009, 2006; Oreszczyn et al., 2006).

WFS Evaluation. During the close-out period of the WFS, DECC undertook an end-of-scheme process evaluation. Process evaluations review the development and evolution of a project and its activities in order to determine if the project is being delivered as intended to a quality desired and to identify areas where the administration and delivery of a project can be improved (Kahan, 2008). DECC set out a number of research questions that focused on understanding the scheme delivery process in three main areas: 1) management of the scheme, 2) value for money, and 3) the customer journey.

The qualitative research explored the delivery process of the scheme and engagement with stakeholders and recipient. Approximately 40 in-depth interviews were carried out with key policy and scheme management representatives as well as stakeholders from advisory bodies and across the supply chain; and, 35 in-depth interviews with applicants to the WFS. The interviews were conducted between September 2013 and January 2014. The quantitative analysis explored the impact on the retrofit sector, delivery times, cost of measures, targeting of retrofits, and customer complaints. Elements of the quantitative analysis are presented here in further detail.

The aim of the WFS process evaluation was to assess: the effectiveness of delivery of the scheme, including its management and its engagement with stakeholders and customers; benefits or dis-benefits of the scheme on the supply chain; and the delivery of the scheme in practice. DECC sought to use the WFS process evaluation to identify those features of the scheme that did and did not work well with the intention of using the findings to inform the development and delivery of future energy efficiency schemes targeting the fuel poor, e.g. the Energy Company Obligation.

³ Government's tool for assessing the energy performance of dwellings. The higher the SAP number the better the energy efficiency performance of a dwelling.

In this research, we made use of the quantitative secondary data analysis to explore two related aspects of the WFS evaluation that is focused on the effectiveness of the targeting and factors that affected the uptake rate of the retrofits.

Research Methods

In this section we outline the data used in the analysis and the analysis method used to examine the uptake of retrofits and to understand what factors might have affected the rate of uptake of the retrofits over the scheme evaluation period.

Scheme Data. The scheme operator provided data on the Warm Front scheme for the period covering 1 April 2005 through to 31 March 2013 for the quantitative research. This included datasets on installers, inspections of gas and oil installations, applications and referrals, intervention measures, benefits being received and other information on the house and household (e.g. tenure, location, age, ethnicity). Table 2 provides details on the different datasets used in the quantitative analysis. A household-level dataset used in the analysis was created that merged all collected information of households that applied to the scheme. Not all households received a measure due to being ineligible or leaving the scheme, therefore the dataset contains more dwellings than received a measure.

To examine the targeting Warm Front measures to households at risk of being in fuel poverty, we used data from DECC that estimated the number of households at risk of being in fuel poverty at a sub-regional level (i.e. Lower Super Output Area (LSOA)). The data provides an estimate of the number of dwellings in fuel poverty (using the 10% definition) for each LSOA along with the total number of dwellings in the LSOA and the proportion of fuel poor households. For the purposes of comparison, we aggregate the LSOA statistics to the higher MSOA (Middle Super Output Area) level. MSOA's consists of between 2000- 6000 households, compared to an LSOA that has between 400-1200 households.

To estimate the number of dwellings in Fuel Poverty, DECC use a logistic regression model derived from the English Housing Survey, which includes details on the household and dwelling they occupy. The model variables include: economic status of the household, dwelling age, economic activity, region, urban or rural, education level, heating system and number of children (DECC, 2011). The model determines a household's risk of being in fuel poverty as a function of their actual income compared to the notional cost of heating their home to a defined heating standard (i.e. 21°C)

Analysis Method. To examine the uptake of retrofits among vulnerable households we used the scheme level data to determine the incidence of retrofits provided over the scheme evaluation period. The number of households assisted was compared against benefit recipients from national statistics. To examine the targeting of the retrofits among areas of high vulnerability, we used the neighbourhood level statistics on fuel poverty risk to determine whether areas of high benefit receipt coincided with areas of high Warm Front retrofits. The household-level data was used to generate a count of all dwellings that received a 'major measure' for each LSOA during the evaluation period. To examine the impact of changes in the eligibility of the programme and the impact that had on both number of households assisted and the rate of application and rejections we used the scheme level data.

To analyze what household factors affected the rate of application we used the details on whether a dwelling received a measure and used reported details on their age, ethnicity, ownership status and the route through which they entered the scheme (N.B. once in the scheme all installations were directly allocated to installers). To examine the relationship between household characteristics and the successful receipt of a warm front measures for those household who applied to the scheme we used probit regression (1=received, 0=not received). The SAS routine *Proc Logistic* was used to generate odds ratios (ORs) that describe the association of selected household variables and the successful receipt of retrofits.

Table 1. Warm Front Scheme Dataset Details

Dataset	Level (Records)	Description (Selection)
Installers	Installers (N= 1,218)	Information on installers (i.e. companies), including: name, number of measures installed, and total value of work.
Inspections	Household (N= 558,793)	Information on inspections, including: inspectors, date of creation and inspection, and working days between.
Complaints	Household (N= 47,638)	Details on complaints, including: type, status, date, resolution, installer, and deliverable.
Referral	Household (N= 2,455,075)	Details on referrals, including: date, channel, source, tenure, ethnicity, and age band.
Measures	Measure level (N= 9,937,130)	Details on each measure, service or administrative feature for a dwelling, including: type of measure installed, service provided and administration offered.
Hard to treat & reach	Household (N= 832,011)	Details on household hard-to-treat or hard-to-reach status and features.
Benefits	Benefit level (N=4,329,322)	Details on type of benefits received by households (including multiple per household)
Survey	Household (N= 493,534)	Details on referral to survey (from 2008 onward), including: date of application and survey and working days.

Results

Impact of the Warm Front Scheme – Uptake of Retrofits

The WFS assisted over 1.5 million households from 2005 to 2013, with ~922,000 properties receiving a major measure⁴, with the average dwelling receiving two measures (excluding CFLs) – see Figure 1. The proportion of successful applicants living in ‘hard-to-treat’ properties⁵ were a major target group for the program, rising to 80% of all homes assisted in 2012/2013 following the change in eligibility.

Targeting of Retrofits

Using the LSOA-level data on the prevalence of the risk of being in fuel poverty the mapping of shows that neighbourhoods at the highest risk of being in Fuel Poverty were located in the Northern regions of England, the West of England, and a high concentration in the South West. The risk of being in fuel poverty was lowest in London and the surrounding counties, including north around Cambridge.

Throughout the evaluation period 2005-2014, ‘major’ Warm Front measures concentrated within the Northern English regions and along the East of England coastline and South West England. There are few retrofits within the counties directly west of London and north around Cambridge (see Figure 2). This concentration of measures appears to mirror the estimates of fuel poverty prevalence. However, the concentration of measures provided to the South West region does not match the estimate of fuel poverty risk, with the number of households at risk of being fuel poor above 30%.

⁴ Major measures are all energy efficiency measures including: loft and cavity wall insulation, heat system replacements (e.g. boilers) and draught-proofing. These measures exclude compact florescent light (CFL) bulbs.

⁵ Homes with solid walls; those built pre-1929; those without a loft cavity; and those not on the gas network.

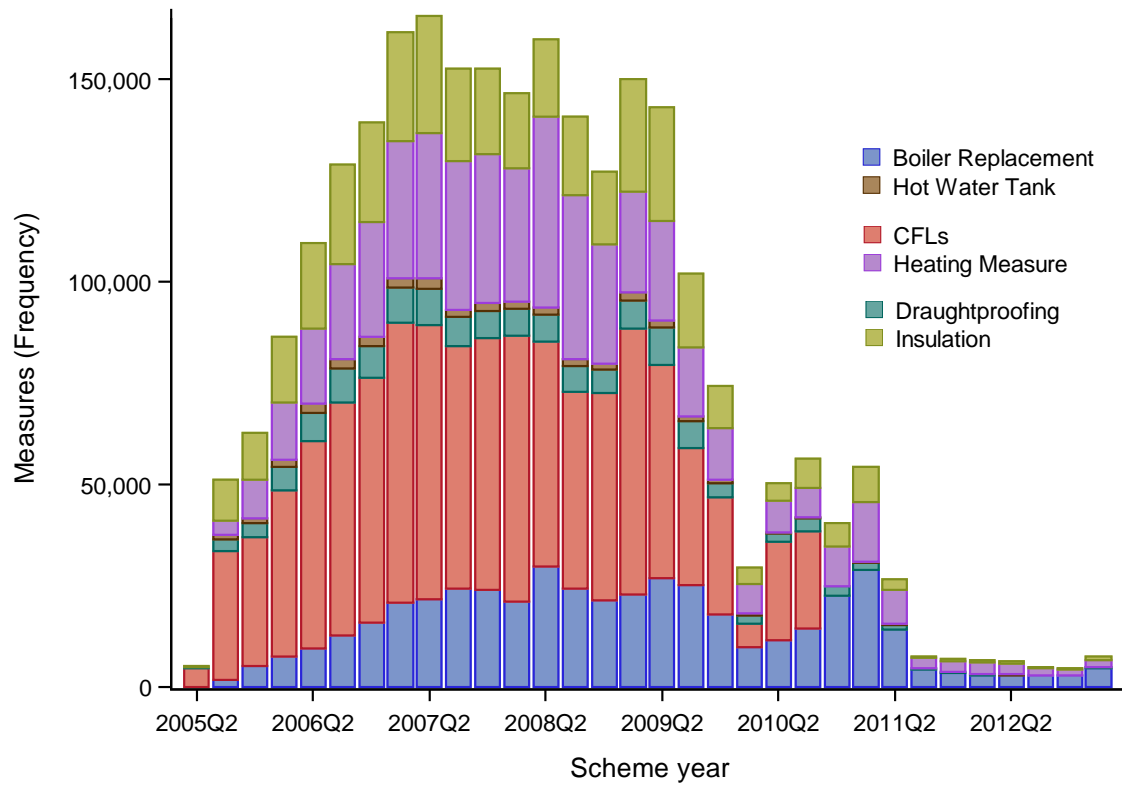


Figure 1. Frequency of measures installed under Warm Front by measure and quarter

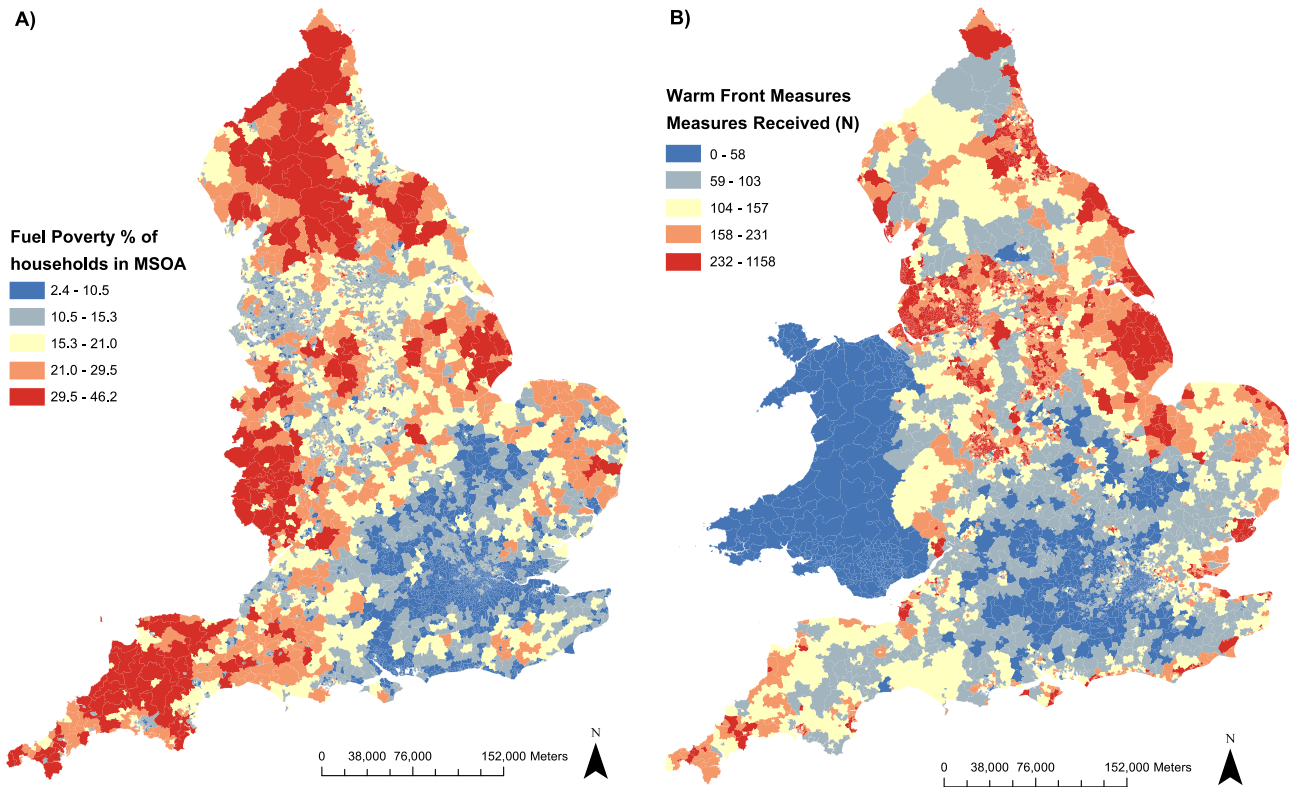
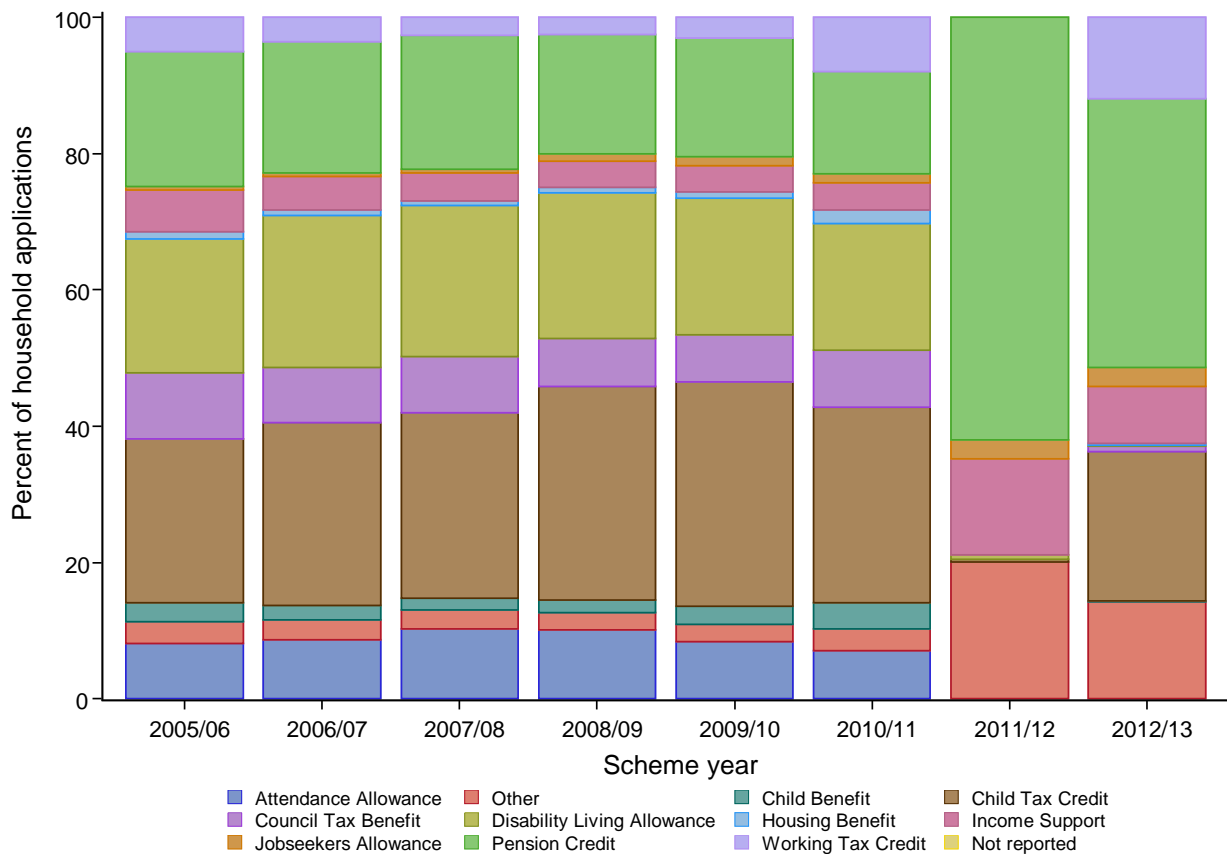


Figure 2. a) Fuel Poverty Risk Prevalence and b) Warm Front Measures Installed by English MSOA

Impact of Changes in Eligibility

To successfully apply to the WFS, householders had to meet a set of eligibility criteria. The purpose was to try to target households most at risk of living in fuel poverty. The eligibility criteria were based on a requirement for applicants to be in receipt of certain household benefit payments. Figure 3 shows the proportion of eligible households by their benefit receipt during the scheme operation. The major beneficiaries of the scheme are households in receipt of the Child Tax Credit, the Pension Credit and the Disability Living Allowance. In 2011, the eligibility criteria were subsequently narrowed with the removal of DLA and Attendance Allowance as qualifying benefits and the introduction of SAP ratings as a qualifying criterion. Figure 3 below clearly shows the change in the profile of scheme beneficiaries following the eligibility criteria change in 2011.

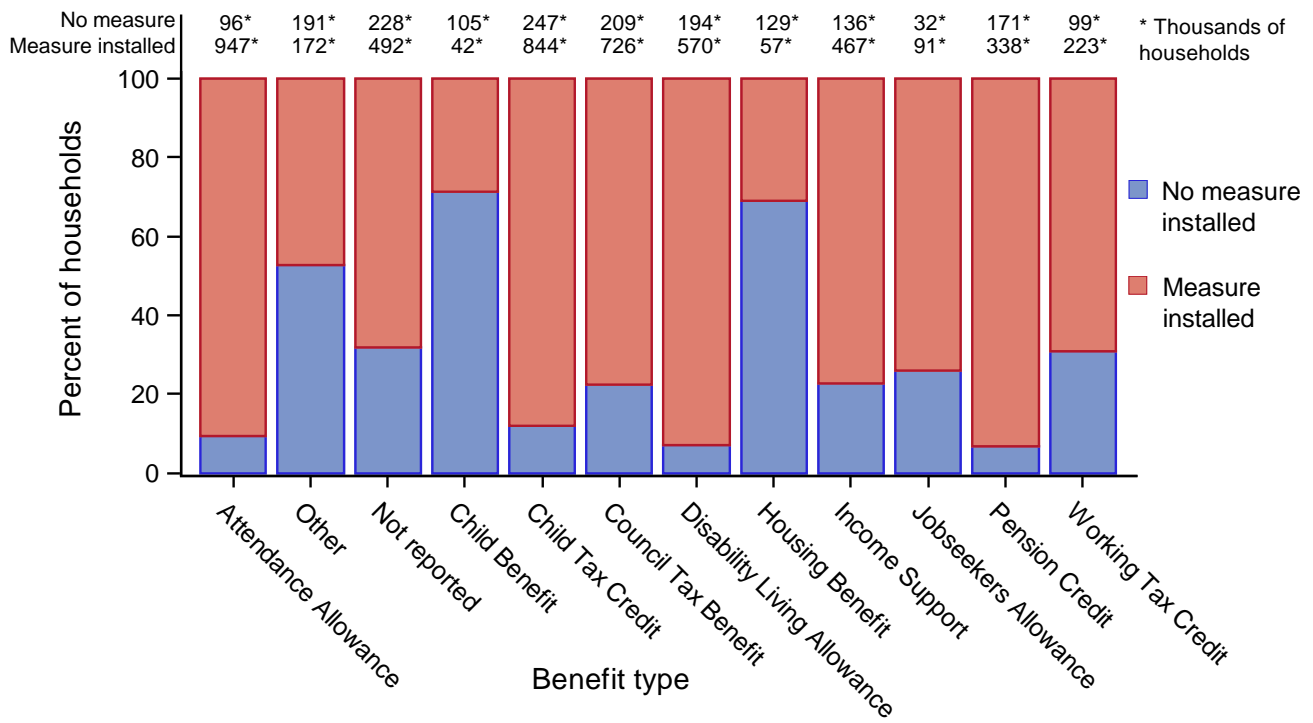


'Other' includes all benefit types with <1% of total applications (3.3% of scheme); N.B. households may receive multiple benefits

Figure 3. Qualifying Benefit of Warm Front Beneficiaries across the Different Years of the Scheme

Figure 4 and Figure 5 shows the percentage of applicant households that did and did not receive a Warm Front measure installed by benefit type. It shows that the majority of Disability Living Allowance⁶, Child Tax Credit and Pension Credit recipients received a measure (less than 8% did not). Applicants in receipt of other benefit types had a more variable level of success. The figure also shows the types of measures installed for successful applicants qualifying through different benefit types. With the exception of Child Benefit and Not Reported, the proportion of measures across recipients was fairly consistent, with similar uptake of boilers, heating systems and insulation.

⁶ Note that many in receipt of Disability Living Allowance were also likely to be in receipt of other benefits.



'Other' includes all benefit types with <1% of total applications (3.3% of scheme); N.B. Households may receive multiple benefits

Figure 4. Success of Applicant by Benefit Type

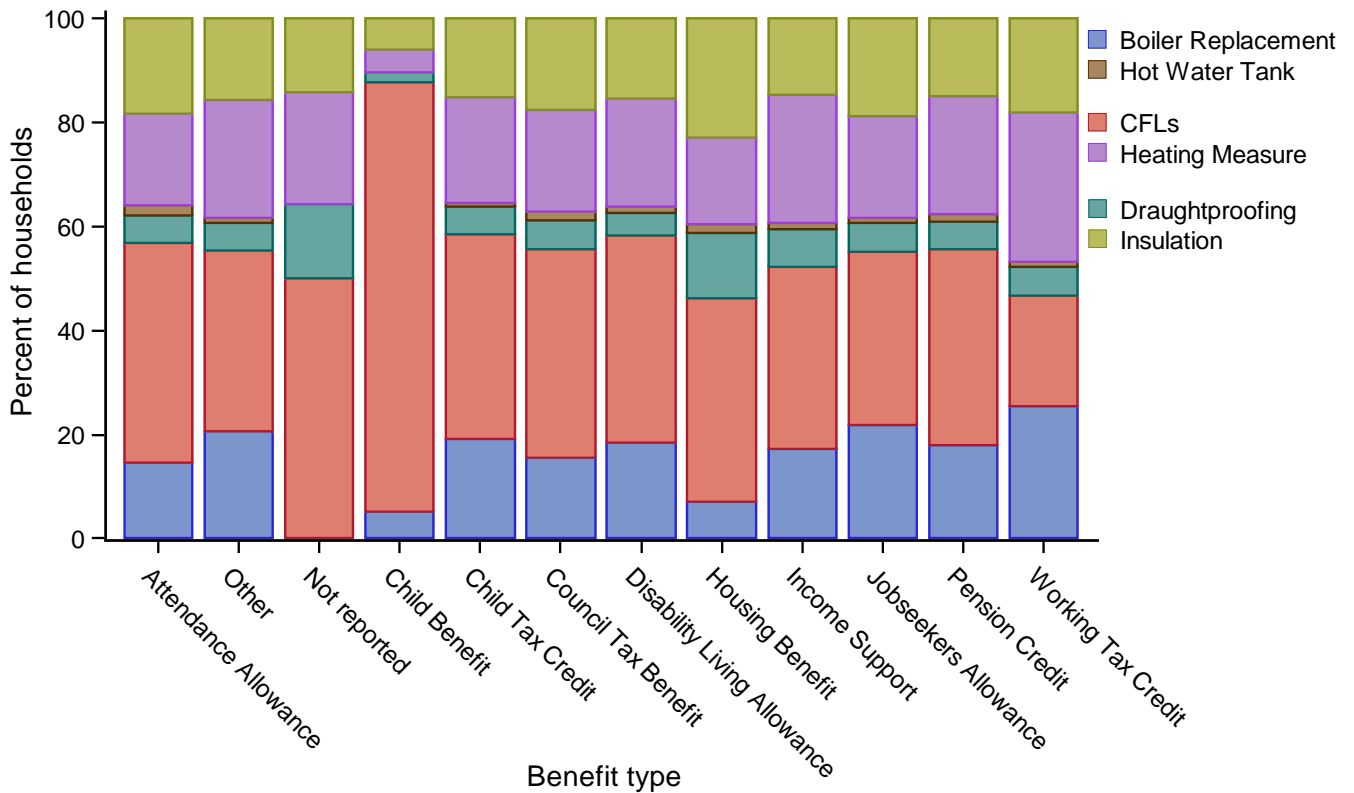
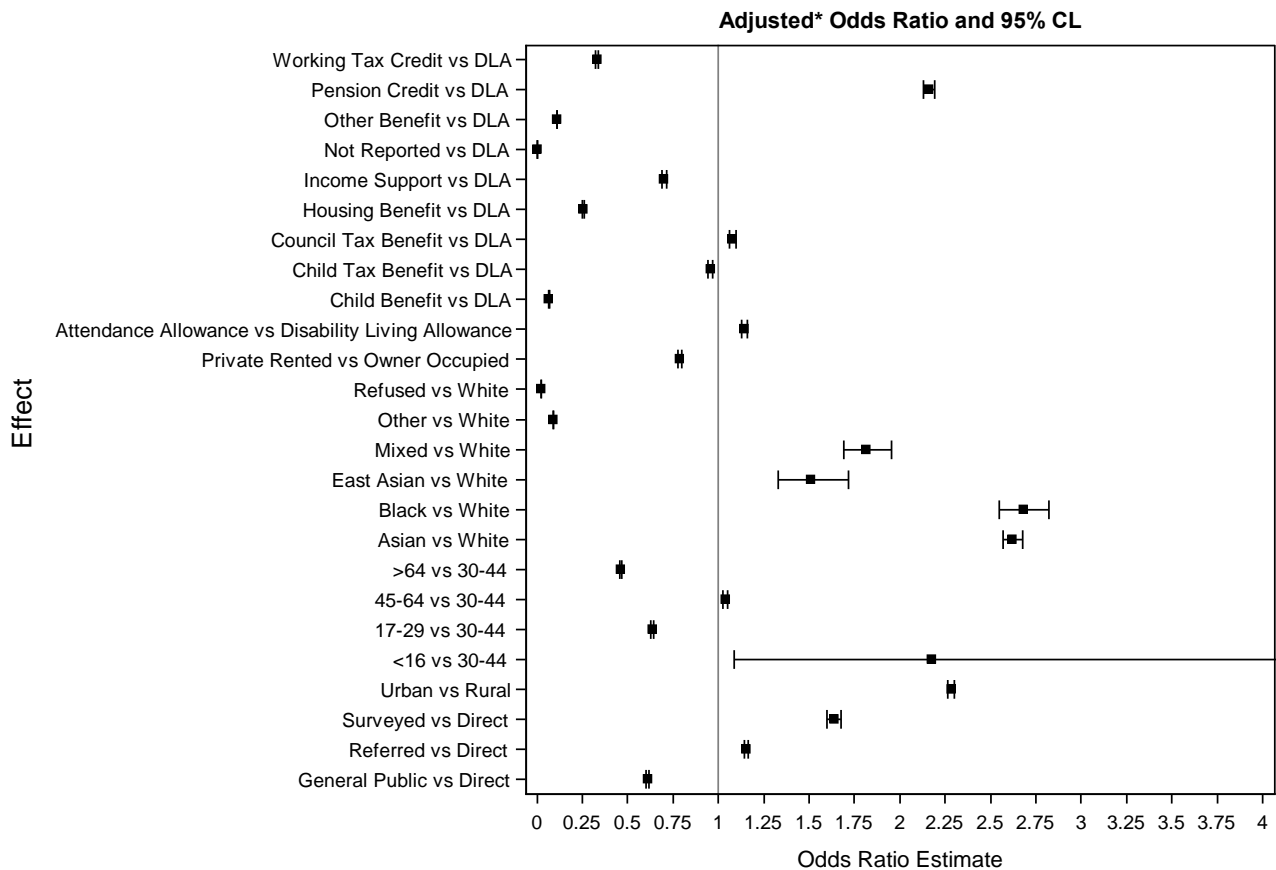


Figure 5. Measures Received by Qualifying Benefit Type

Application Success

The analysis of the scheme data also considered whether any particular household characteristics might affect acceptance to the scheme. Using household level data, Figure 6 shows the odds ratio of a household applying to Warm Front and subsequently having a measure installed compared to not having a measure and the effect of different household characteristics.

The analysis shows that referrals coming through the “general public” route (i.e. households directly applying) had lower odds of having a measure installed (vs. not) compared to applications from direct referrals. Dwellings occupied by older householders (aged 65+) were more likely to have a measure installed (vs. not) compared to households occupied by those aged 30-44. Households occupied by inhabitants of another ethnic origin than White British had a higher odds ratio of having a measures installed compared to White British households, although the latter made up the vast majority, more than 75%, of all households assisted. The success of households in receipt of benefits other than Disability Living Allowance (DLA) also varied, though this reflects that for the most part measures went to households in receipt of DLA. The exception are those in receipt of pension credits who were 2.25 times more likely to apply and subsequently receive a measure compared to DLA households.



Referred and subsequent measure=1

*ORs adjusted for referral channel, rurality, household age, ethnicity and tenure

Figure 6. Impact of Household Characteristics on Likelihood of Success in Applying to Warm Front

Discussion

Impact of Warm Front. Results from the interviews (not reported here) found that many Warm Front customers and stakeholders spoke of cold, damp, inadequately heated or unheated homes (DECC, 2014b). Some said Warm Front offered an opportunity to have adequate and safe heating installed in their home for the first time. Many customers described the trials of living without heating and hot water after boilers had broken and they had been unable to afford a replacement.

The Warm Front scheme was shown to positively affect householders' perceptions of being comfortable and being able to better manage warmth, therefore meeting the aim of the policy to help make warmth more affordable. These positive reinforcements are a particularly important aspect of energy efficiency measures targeted at vulnerable households because it is very likely that the potential 'take-back' or 'rebound' among these households is high (Hong et al., 2009; Oreszczyn et al., 2006) but that the reduce energy savings are making a positive contribution.

Uptake of Retrofits and Targeting. One of the key questions being examined in this research was the degree to which the retrofits were being targeted towards vulnerable households. From the interviews, the scheme manager, and many of those generating referrals, said they believed that the referrals system reached some of the most vulnerable customers of Warm Front, and brought them to the scheme when they would otherwise not have found it. Some local authority reported having a very comprehensive and joined up approach to creating Warm Front referrals, operating through all front line services. However, according to stakeholders, the time and effort put into generating referrals for Warm Front varied between organisations, depending on their remit, capacity, and priorities. This variation was said to be particularly evident in the case of local authority, whose promotion of the scheme varied widely, leading to some stakeholders deeming the chance of being referred through a local authority as a 'postcode lottery'.

The MSOA mapping of the Warm Front recipients and the prevalence in risk of households being in fuel poverty suggest that the targeting of measures was generally aligned. There were several areas where the number of measures provided did not seem to match the fuel poverty risk, particularly in the South West regions. This region is a destination for retirees, who may have higher incomes than further north, and also has a high concentration of holiday homes. It is possible that the fuel poverty method does not account for these types of households and dwellings, compared to programmes that targeted actual benefit receipt. Alternatively, it could be that these Local Authorities were less effective at identifying at risk households or that those households did not self-identify and apply to the scheme.

Changes in Eligibility. Many interviewed stakeholders suggested that using benefit payments as a proxy for identifying the fuel poor was challenging and did not effectively identify those households at risk. Policy stakeholders explained that the changes in eligibility criteria during the lifetime of the scheme were an attempt to improve this targeting.

In the early years of the scheme, one of the qualifying benefits was Disability Living Allowance (DLA), or Attendance Allowance for those over pensionable age. However, many stakeholders considered DLA and Attendance Allowance criteria to be too broad and had the impression that these households may have been able to finance the measures themselves. This view was also shared by the NAO's 2009 assessment of Warm Front⁷. In 2011 and 2012 Pension Credit recipients became the major beneficiaries of the scheme. However, it is likely that many people claiming these other benefits were also claimants of DLA or Attendance Allowance. The more mixed profile shown for 2013 (Figure 3) is a result of the eligibility criteria being widened again during the final months of the scheme.

⁷<http://www.nao.org.uk/report/the-warm-front-scheme/>

However, some stakeholders, including the policy and management teams, felt the criteria became too strict. They observed an adverse effect of fewer households being supported by the scheme as it became difficult to identify those meeting the stricter eligibility criteria. A range of stakeholders felt the challenge of identifying eligible applicants was exacerbated by the disbanding of local networking and referral teams at a similar time as well as a halt on scheme marketing. Around this time underspend started to be reported for Warm Front for the first time. Many stakeholders, particularly from advisory groups, felt this demonstrated that the scheme's resources were not maximised or used to best effect.

Stakeholders reported that relatively sudden changes to the conditions of referrals meant demand lagged behind the 'availability' of the scheme. Some third party organisations said this left them in a position of having to explain to those they had encouraged to apply that they were no-longer eligible for the scheme. It also resulted in their having to scrap and re-produce promotional materials to reflect changes. The changes in the eligibility coincided with a substantial drop in funding and therefore the number of households assisted by the scheme (Figure 1). Up to that point, the preceding three years saw quarterly assistance rates of over 100,000 households. This suggests that whilst potentially broad, the eligibility criteria were effective at achieving a high uptake rate.

Application Success. Stakeholders described how the referral system meant that those with lower literacy, or those who were otherwise less able at completing paper work, could be guided through the application process. According to stakeholders, referrals provided on-the-ground experts on Warm Front, who operated face-to-face with potential customers, at a local level. This helped applicants navigate the potentially confusing landscape of different schemes, with different eligibility criteria, which were available at different times.

In looking at what factors affected the success of scheme applications, the results show that households who were in receipt of pension credits (i.e. elderly), non-white and living in owner-occupied housing had higher odds of applying and receiving a retrofit. This suggests that the evidence supports the above processes for reaching out and converting vulnerable and marginal communities.

Conclusions

Identifying vulnerability to fuel poverty through benefit entitlement checks is not straightforward. Nonetheless, the use of benefit eligibility criteria resulted in over 1.5 million households being assisted within the evaluation period and that the targeting of the measures broadly fit the prevalence of those at risk of living in fuel poverty. However, care is needed when using proxy measures to determine whether the actual target population (i.e. fuel poor households) are being identified and assisted.

Our study found that the uptake of vulnerable households was less than the expected target population size. Ethnic minority households made a smaller proportion of those who applied to the scheme, but were more likely to receive a measure if they did apply. Though not a focus of the scheme, we also found that the number of households who made a contribution was very small but that it comprised a reasonable large total value of the grant given. Ultimately, Warm Front was able to capture a significant proportion of the target population over the scheme period examined. However, higher uptake rates were affected by ethnicity, suggesting that engagement programmes may need to be more specifically tailored to those groups.

The UK government has used the results of the Warm Front programme evaluation in assessing the success of the targeting and delivering energy efficiency retrofits to vulnerable homes. The implication for policy development is that successful delivery of retrofits in vulnerable populations will require further effort to overcome language barriers to increase the total number of applicants for marginal communities and target elderly and rural populations.

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