Kirklees Warm Zone: The Project and its health impacts: A Cost-Benefit Analysis

Liddell, C., Morris, C., & Lagdon, S. (2011). *Kirklees Warm Zone: The Project and its health impacts: A Cost-Benefit Analysis*. Ulster University.

Link to publication record in Ulster University Research Portal

Publication Status:
Published (in print/issue): 19/07/2011

Document Version
Publisher's PDF, also known as Version of record

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Download date: 16/04/2024

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Kirklees Warm Zone

The project and its impacts on well-being

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Acknowledgements

The Department For Social Development Northern Ireland commissioned and funded this report. The assistance of Kay Beagley, Sally Kelling, and Phil Webber (Environment Unit, Kirklees Council) is gratefully acknowledged.

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About this report

Kirklees – the legend. So much has been spoken and written about the original Kirklees Warm Zone Project (2007-2010) that it is hard to separate fact from fiction. Yet the Kirklees model is increasingly invoked as an example of best practice for local authorities to follow in tackling fuel poverty. The Kirklees Warm Zone Project team have written many accounts – technical, financial, and householder-focused – that offer valuable insights into how the Project was run. Keyworkers also have valuable collective memories, some of which remains undocumented.

In February 2011, having read many of the written accounts, researchers from the University of Ulster in Northern Ireland spent time with the 3 Key Officers who managed the Kirklees Project from its earliest inception. Sections 1 and 3 of this report distil some of their comments and reflections. Section 2 presents a formal cost-benefit analysis of the project and its estimated impacts on the well-being of Kirklees residents.

Whilst the 3 Key Officers corrected factual errors in the account, the views expressed are those of the authors.

SECTION 1 Origins

1.1. Early history of the Kirklees Project

Kirklees is a metropolitan borough of West Yorkshire, England. It has a population of about 401,000, and the borough is divided into 23 wards. Most of the area consists of old mill towns and country villages, interspersed with large areas or arable land. Huddersfield is the main urban conurbation. There is considerable hardship in some areas of Kirklees, and the local authority ranks among the 25% most deprived in England.

The Kirklees Project began life as a Warm Zone project. It was envisaged as a major initiative to systematically reduce fuel poverty on a local area basis. In 2006 it was estimated that there were around 35- 45,000 homes in Kirklees living in fuel poverty. Kirklees council had carried out regular campaigns to encourage people to take up home energy efficiency and heating grants, but the campaigns were limited by funding constraints, and were consequently confined to specific vulnerable groups, As a new initiative, the *".. Council developed its Affordable Warmth Strategy in 2006. This prioritised the need for a single point of contact for practical support and advice for householders. It also called for a simplification of multiple grant schemes. After a visit to another Warm Zone by the deputy-leader of the Council in late 2005, there was also clear political commitment*" (Kelling, 2009).

The Kirklees Project had four core goals to be addressed in partnership with relevant organizations. These were to:

1. Tackle fuel poverty
2. Deliver a low carbon Kirklees
3. Improve the uptake of state benefit support by residents
4. Create jobs (Kirklees Council, 2010).

In setting up the Kirklees Warm Zone, the Council aimed to put in place a one stop approach to achieve these goals.

The Project intended to offer households:

a. free cavity wall and loft insulation;

b. free low energy light bulbs;

c. free improvements to heating systems (only for householders fulfilling set criteria, for example households in fuel poverty, on benefits, or in hard to treat homes, and subject to funding);

d. competitive prices for replacement boilers and central heating for able to pay customers;

e. interest free loans for renewable technologies for able to pay customers.

In defining "suitable households" the Kirklees Project targeted houses in the private sector. This was because Council housing in the Kirklees area was of an already high SAP quality (average SAP 73). However, the team made contact with all residents in the Kirklees area, regardless of housing tenure, and ensured that all residents received at least something. For some Council tenants this might be a carbon monoxide monitor, free lightbulbs, energy efficiency advice or referral to a partner organisation. For owner-occupied homes, these were augmented with insulation and more occasionally heating and/or renewables. The carbon monoxide detectors were included in response to a local community campaign which had been triggered by a child's death, and proved to be extremely popular.

In addition to providing warmer, energy efficient homes, a range of other service providers worked in partnership to deliver support to the householders through:

- Benefits checks (through Citizens Advice, Benefits and Revenue Service, Department For Work and Pensions and Kirklees Benefits and Advice Service);
- Fire safety checks from West Yorkshire Fire Service;
- Support services for carers through Carers Gateway;
- Water conservation advice from Yorkshire Water.

(Adapted from Kirklees Warm Zone - Frequently asked questions, 2010)

The vision was that by 2010 all suitable households in Kirklees would have received some sort of thermal comfort and energy efficiency improvements in their home, in an effort to tackle fuel poverty and reduce district carbon emissions.

The Council's Affordable Warmth Strategy was adopted in 2007. At this initial stage, there was a political will to launch the Kirklees Project targeted towards fuel poor customers. Council anticipated bearing a cost of £1.6 M, with householders and CERT funding supplementing this to attain a £3.2M installation program.

1.2. The double windfall

Around the time that preparations were being made for a £3.2M project, the Council sold its stake in a local airport. For this, and many other reasons, the Council became relatively capital "rich", and decided that the Council's stake in the project would be increased from £1.6M to £5M, later increased to £9M. At the same time, CERT obligations meant that energy suppliers were actively seeking opportunities to invest in carbon-saving projects. As part of its original business plan, Kirklees had wisely factored in an opportunity to raise the budget still further by putting their project out to tender, presenting it to energy suppliers as a means of meeting a supplier's CERT obligations. In response, Scottish Power agreed to invest £11M in the Kirklees Project.

The double funding streams took the available budget for the Kirklees Project from an anticipated £3.2M to £20M, an increase of more than six-fold within about 8 months, just as the project was preparing to launch. Ultimately the Kirklees Project operated with a budget of £21M, and levered in an additional £3M from other sources. In summary, Kirklees Council's capital investment was £13.3M, (over £3 million spent on measures other than insulation). By completion, the total Kirklees Warm Zone budget was £24M.

1.3. Coping with the cash

Although this was a scrupulously planned Project *before* the budget was increased so dramatically, it became even more-so after it. The business case for the Project had been started in November 2005, but had to be reviewed in the light of income changes. The Project began assessments in February 2007.

It was decided that no householder contribution to the insulation programme would be needed, which meant that the Kirklees Project could be delivered to all owner-occupiers free of charge. The remit of the Project was widened to include measures for all owner-occupiers regardless of their risk of being in fuel poverty. A major reason for this was that councilors wanted the greatest take-up and wanted to minimize administrative overheads.

However, the original 3-year time-frame (which had been set for the £3.2M project) was left in place, straining the Project significantly in the early days. In particular, at the time of the double windfall, there were only 5 key staff in the three main partner organisations. It soon became obvious that strategic planning post-windfall would have to be honed to near perfection in order to cope with the scale of what lay ahead. A unique delivery method was adopted, which the team subsequently named the Zip-Up Method.

1.4. The Zip-Up Method

This involved :

1. Dividing up the Council residents by Ward (n = 23) and classifying Wards according to 6 weighted multiple deprivation indicators (MDI's). These were:

- MDI rating
- No of Council homes
- No of Sure Start Centres

- Neighbourhood Renewal Areas
- Insulation measures already done on private homes in Ward
- Income, employment, health and education index for Ward.

2. Installing insulation measures into homes on a Ward by Ward basis, saturating one Ward before moving onto another

3. Alternating Wards that were targeted, so that work in most-deprived Wards alternated with work in least deprived Wards, until all Wards were completed

4. Wards were further divided into "patches" so that single streets or neighbourhoods were saturated at one time. Officers describe this process as looking like the Cavalry coming into community towns and villages each morning for a week or two.

This approach meant that the Council was able to satisfy recipients of all types and backgrounds at more or less the same time. It also meant that the requirements of more deprived Wards (which needed most intervention) did not overwhelm the project in the early stages.

A special protocol was agreed for vulnerable customers, who were helped through an express-referral route, even if they were not in the Ward being worked on at the time their referral came through. Warm Zone prioritised

- residents with exceptional health problems
- residents over 60-70yrs who were on an income less then £20,000 per year
- residents who were eligible for Warm Front

By the end of the Project, the Zip-Up Method of delivery was estimated to have delivered 30-50% higher efficiency than a more conventional approach would have done.

Ultimately, the £24M three year Project became the largest local authority home insulation scheme in the UK to offer free loft and cavity wall insulation to every suitable household.

1.5. Who was involved?

Kirklees Council: Several key personnel in the Kirklees Council's Environment Unit including the head of service director, programme manager and energy efficiency officer. They developed the scope and detail of the programme. The programme manager leading on the development was seconded to become the director of the Warm Zone at Kirklees Energy Services.

Kirklees Energy Services: the local energy efficiency advice centre was chosen as the managing agent for the programme.

Scottish Power: A partner early on in the programme, also co-funder with the Council of the capital insulation measures. Scottish Power were very involved throughout the project, participating in contractor selection, planning, and operational delivery particularly for the first 18 months. The Kirklees Project ultimately delivered CERT targets for Scottish Power in excess of the original estimation.

National Grid : Appointed and funded the accountant to put together the business case, later becoming the finance manager of the programme.

Four benefits agencies came together –Citizens' Advice, the Pensions Service, and two council agencies (Kirklees Benefits Advice Service and Revenue and Benefits) to deliver on benefits referrals from the Warm Zone.

Warm Zone Ltd: provided consultancy support, methodology, case studies, contact with other Warm Zones and networking opportunities with potential partners.

Miller Pattison: If the home would benefit from loft and cavity wall insulation, Miller Pattison carried out a survey of the property and completed the work. The Kirklees Project decided to appoint only one Contractor, who was chosen on criteria such as value for money, quality assurance criteria, customer service, capacity and management processes. The company also offered to build a local depot in Kirklees, which could

maximize training and employment opportunities for local people. Whilst this worked well from the point of view of creating work and training, it led to problems of another kind during the early stages. The Contractor was initially unable to work at the speed and with the efficiency that the Kirklees Project needed in order to complete the Project in the 3 year time-frame. This difficulty was further exacerbated by constraints imposed by capacity issues amongst both surveyors and installers.

West Yorkshire Fire Service: Provided home fire safety checks.

Carers Gateway: Provided households with support services for carers.

Yorkshire Water: Provided advice on water conservation.

Commissioned assessors : These were the people who knocked on every door in the Council area. They were paid £4 a visit, and came from all walks of life and backgrounds. Most worked in their local area, at least at first.

1.6. Getting households to sign up for the Project

There was considerable distrust of the Project early on. People did not believe that their loft and cavity walls would be insulated for free. This was exacerbated by the arrival of several unauthorized Contractors into the Kirklees areas, who cast doubt among residents as to whether the Project was free at all. Many complaints were made to the Council about the number of unauthorized contractors gate-crashing the scheme. The problem was made worse by the fact that the Kirklees Project team had initially decided to launch the Project in a low-key manner, so that they would not be inundated with requests to visit householders and have their work done, particularly in areas not being served until the end of the programme.

To tackle these problems, a variety of solutions were found. A marketing programme

was developed which had 3 main aims:

- Brand recognition
- Counteract unauthorized contractors
- Get the message “free for all” out

A large Bill Board was set up in each Ward ahead of works, and radio and TV became the main route for spreading the word about the scheme. The original team of 3 key officers spent more time in radio and TV studios during the early days than they did almost anywhere else. This backfired slightly, since word spread to neighbouring Councils, to the Department of the Environment in Westminster, and beyond. The team coped with this burgeoning interest in their model by organizing a 2-day Conference, attended by several hundred delegates. In addition, assessor and contractor staff were given a “uniform” to wear, namely a distinctive red jacket, that gave the Kirklees Project a brand image which people came to recognize and trust. All assessors also carried photographic identification. Local police were informed of which Ward/s the Kirklees Project would be in during a particular time, so that vigilance could be exercised when other Contractor vans were seen in that Ward. Community organizers and other lead people were contacted before a Ward was targeted to make sure they would be able to spread the word about the forthcoming work being carried out. Local events and prize draws were also held to raise awareness.

If householders remained reluctant after a home assessment visit, they were returned to near the end of their street’s installation program. Many agreed at that point. Those remaining were contacted again by letter near the end of the 3-year Project, and offered the package once more. By that time, the recession and fuel prices (and probably word of mouth concerning the benefits) meant that more households joined the Project.

Ultimately, there proved to be 3 key waves of adoption:

- Early adopters
- Those persuaded by word of mouth
- Last chance adopters informed of a cut off date.

SECTION 2 Cost-Benefit Analysis of Health and Well-being Impacts

Given a £21M direct capital spend on the Kirklees Warm Zone Project, and £3M plus levered in, how much of the cost might be recovered in health and well-being? To address this question, this Section contains a cost-benefit analysis, drawing on recent cost-benefit models that have been applied to tackling fuel poverty.

2.1. Rationale for cost-benefit estimates used in this report

It is seldom acknowledged that protecting human health was the original rationale for developing the UK-wide Fuel Poverty Strategy in 2001 (Liddell, Morris, McKenzie & Rae, 2011). Since the Strategy was launched, more than a dozen sentinel studies investigating this issue have been published (see Liddell & Morris, 2010). Taken together, these provide a moderately-sized evidence base from which to summarise the health impacts of cold and damp housing, and the potential effects of heating and insulation programmes.

Key findings of these studies relevant to the Kirklees Project include :

- An epidemiological study reporting that rates of emergency hospital admission for respiratory illnesses among adults are significantly correlated with fuel poverty indicators (Rudge & Gilchrist, 2005).
- Amongst children with a history of asthma, parental reports post-refurbishment suggest improvements under randomised controlled trial conditions. Children whose housing received heating and insulation upgrades also had 15% fewer days off school than did controls (Free, et al., 2010). However, improvements in lung function did not emerge from clinical tests measuring peak expiratory flow rate and peak expiratory volume at one-year follow-up (Howden-Chapman et al, 2008).
- Amongst adults, improvements in heating and insulation yield few signs of improvements to physical health at one-year follow-up (e.g. Thomson et al., 2009, Howden-Chapman et al., 2007). Whilst most studies suggest improvements in *self-*

reported physical health, there have been few differences in GP consultation and prescribing rates. Reviewers of these studies have frequently pointed out that the interval between pre- and post-retrofit surveys (usually a year or less) may be too short for any health impacts to materialise (e.g. Liddell & Morris, 2010; Grimsley, Gilbertson & Green, in press).

- Impacts on adult mental health are significant and consistent across almost all studies (Liddell & Morris, 2010). After refurbishment respondents report immediate impacts on their mood and quality of life, with these effects being sustained at one-year follow-up.
- Mental health impacts may also be found among adolescents. In a major longitudinal investigation of housing quality and the health of English adolescents, cold and damp housing emerged as a strong correlate of multiple well-being risks after other more obvious variables had been accounted for (Barnes et al., 2008).

The Marmot Review Team (2011) collated studies concerning the health impacts of cold homes, and concluded that the evidence "*shows the dramatic impact that cold housing has on the population in terms of cardio-vascular and respiratory morbidity and on the elderly in terms of winter mortality. It also highlights the stark effect that fuel poverty has on mental health across many different groups, while also having an impact on children and young people's well-being and opportunities…once the trade-off issues for at-risk households are addressed, energy efficiency interventions always bring multiple health and environmental gains"*.

It should be noted that the health and well-being improvements which are associated with what Marmot describes as "energy efficiency interventions" are primarily brought about as a result of large-scale retrofitting of homes, which usually includes loft insulation, cavity wall insulation (where appropriate), and the installation of central heating - in some cases where none had been in place before. Where more modest interventions are completed, especially in homes which already have central heating, fewer of what Marmot describes as "dramatic impacts" can be expected. For such

interventions, studies such as Grimsley et al. (in press) and Howden Chapman et al (2007) suggest that most health impacts are on mental well-being rather than physical health.

In the context of the Kirklees Project, most of the interventions consisted of loft insulation either with or without cavity wall insulation. Given the evidence base cited above, it is unlikely that the bulk of installations will have yielded clinical impacts on the physical health of residents; instead impacts were likely to have been largely confined to improvements in *mental well-being* as a result of:

- better thermal comfort
- reduced utility bills
- improved home safety following fire checks and the installation of smoke alarms and carbon monoxide detectors.

Consequently, in calculating health impacts focus is primarily on the benefits associated with mental well-being.

2.2. Methods

2.2.1. Defining mental well-being

Mental well-being is defined as:

"…a dynamic state that refers to individuals' ability to develop their potential, work productively and creatively, build strong and positive relationships with others and contribute to their community" (RCP, 2011, p. 1057).

The Department of Health's most recent strategic document dealing with mental well-being was published in February 2011 (*No Health Without Mental Health : A Cross-Government Mental Health Outcomes Strategy for People of All Ages).* It indicated that:

- aggregate costs of mental health problems in England were estimated at £105 billion in 2009/10
- treatment costs are expected to double in the next 20 years.

The report identified housing in general, and fuel poverty in particular, among the areas which are believed to make significant contributions to mental health problems, both as causes of mental ill health and as exacerbating factors.

This is corroborated by a 2011 Position Statement from the Royal College of Psychiatrists:

"*Risk factors for poor mental health in adulthood include unemployment, lower income, debt, violence, stressful life events, inadequate housing, fuel poverty, and other adversity" (*p. 13*),*

who go on to nominate housing intervention as an area in which:

"*robust evidence exists for ...interventions which prevent mental disorder, promote well-being and help strengthen resilience against adversity*" (p. 24).

Other recent reports support this view, most notably the Marmot Review (2011) and the Foresight Mental Health and Well-being Project (Beddington et al., 2008). The latter is noteworthy because it conceptualised mental health and well-being as a generic resource which can enhance all aspects of health and social functioning. Rather than poor mental health being construed as a common consequence of illness and other adversities, the Foresight Project argued that mental health and well-being can both prevent the untimely emergence of physical illnesses, and provide resources for coping with illness and other adversities when these arise.

2.3. Establishing odds ratios for mental impacts from the Kirklees Project

The mental health impacts of tackling fuel poverty through providing better insulation and heating are well documented in a wide range of studies (see Liddell & Morris, 2010 for a summary). These studies provide a rationale for the odds ratios used in this cost-benefit analysis:

Strand 1 : Studies which examined house quality in general and therefore included a full spectrum of housing conditions (from warmest and driest to coldest and dampest).
Strand 2 : Studies which examined the impacts of tackling fuel poverty. These focused on a narrower range of conditions, selecting houses at the colder and damper end of the spectrum for retrofit, but seldom attaining optimal conditions post-retrofit.

Table 1 present results for Strand 1 i.e. variations in house quality and odds ratios for associations with mental well-being. An odds ratio is the ratio of the odds of an event occurring in one group to the odds of it occurring in another group. In the first cell of Table 1, for example, the odds of people having a common mental disorder if they live in a house with NO MOULD are set at 1. A ratio of 1.5 means that people who live in a house WITH MOULD are 50% more likely to have a common mental disorder.

In addition, a study by Braubach and colleagues (2008) indicates the relative weight of association between mental well-being and damp homes (see Table 2). A large sample size meant that rather low correlations were highly significant. Nevertheless, the correlation between mental well-being and damp is notably stronger than that reported for 6 of the 7 other environmental quality variables. (The published study does not contain OR's).

Table 3 presents results from Strand 2 studies.

Table 1: Strand 1: Variations in house quality and associations with mental well-being

Self-reported condition	Self-reported outcome	OR**	Source
Mould	Common mental disorder	1.5	10
Damp and mould	Depression in mothers of young children	1.4	4
Cold indoors	Depression in mothers of young children	1.6	4
Cold indoors	Common mental disorder	1.9	10
Cut down on fuel	Common mental disorder	1.8	10
Inadequate heating*	Repeat truancy among children (5-15 years)	1.9	1

**Information from younger children was obtained from their primary caregiver*
***Odds ratios for increased risk if self-reported condition is present*

TABLE 2: Pearson correlations between environmental quality and outcomes

Environmental quality variable	Mental well-being score
Light	.07**
View	.06**
Air quality	.08**
Dust	.07**
Damp	.12**
Traffic noise	-.01
Visual appearance	.05**
Green area nearby	.12**

** $p < .01$

TABLE 3: Strand 2: Retrofit studies and associations with mental well-being

Condition	Self-reported Outcome	OR*	Source**
Before insulation	Low happiness score	1.4	14
Before insulation	Moderate to high stress	1.3	9
Before heating	Low social functioning Low role-emotional Low mental well-being	n.s. n.s. n.s.	26
Before heating	Moderate to high stress	1.4	9
Before heating & insulation	Poor mental well-being	1.4	3
Before heating and insulation	Moderate to high stress	n.s.	9
Draughty	Anxiety and depression Low mental well-being score Moderate to high stress	1.6 1.7 1.5	9
Condensation	Anxiety and depression Low mental well-being score Moderate to high stress	1.2 n.s. 1.5	9
Lowest thermal comfort from self-report	Anxiety and depression Low mental well-being score Moderate to high stress	1.8 1.8 1.9	9
Very/fairly dissatisfied with Heating	Anxiety and depression Low mental well-being score Moderate to high stress	2.0/1.5 1.8/n.s 2.1/1.4	9
Very/fairly difficult to pay fuel Bills	Anxiety and depression Low mental well-being score Moderate to high stress	4.3/2.5 4.5/2.1 2.5/2.3	9

**Odds ratios for increased risk if self-reported condition is present*
***Reference number in the reference section of this report*

2.4. Limitations of the evidence base for odds ratios

These include:

i. All studies cited relied on self-report measures of mental health. None of the studies provide corroborative evidence from medical reports, prescription data, or independent psychological assessment.

ii. Whilst mental well-being effects tend to be clustered around subscales related to anxiety, depression, and stress, this is more likely to be a consequence of the limited range of mental well-being measures deployed so far in published studies.

iii. The majority of published studies in this area opted for measures of well-being which combined mental and physical health items. Although most of these measures had a capacity for disaggregation into separate mental health and physical health subscales, authors seldom quote disaggregated odds ratios. Many studies are excluded from the tables as a result.

iv. Studies examining impacts of cold and damp housing on mental well-being have been confined to adults. Evidence for children is unavailable, and ethical constraints will continue to make this line of enquiry difficult. Indirect evidence (e.g. higher truancy) is suggestive, as are qualitative studies of children's experiences of fuel poverty, e.g.

"*Lack of warmth and freezing conditions in winter mean that children got cold, and had difficulties in sleeping and experienced poor health. Friends were reluctant to come and stay in poor quality and cold conditions, and lack of space…affected the nature of friendships, restricting opportunities for participation and inhibiting the everyday reciprocal exchanges of …favours between families that make up a key part of childhood*." (Ridge, 2011).

v. Studies considered here identify as statistically significant those effects which are large enough to satisfy statistical theory, given the sample size used. This tends to produce a convergence in the size of the effects that can be identified as statistically

significant. Although there may well be smaller but real effects occurring, these will not be statistically discernable from random variation. The cumulative impact of such statistically non-discernable but real effects may or may not be greater than the sum of the statistically significant effects identified by the studies.

vi. The obverse may also be true. With the exception of the Warm Front suite of studies, few published papers cite their full range of non-significant results. Mental well-being impacts may be more modest than the published data imply.

2.5. Interventions assessed.

Based on the full range on interventions which the Kirklees Project installed, there are direct and indirect elements of intervention included in the cost-benefit analysis.

A. Direct interventions

i. Installation of loft insulation in 42,999 households

ii. Installation of cavity wall insulation in 21,473 households

iii. Fire safety checks (n = 5,838), installation of smoke detectors (n = 9,896 installed in 5,838 homes i.e. some homes had more than one smoke detector installed) and CO monitors n = 129,986)

iv. Installation of heating systems through local heating grants funded through local and regional money (602 households). Kirklees Warm Zone was used to screen households for these grants, and re-contacted householders to confirm eligibility.

B. Indirect interventions

i. Installation of heating systems through funds levered in by referrals to Warm Front. There were 2,033 referrals, which matched Warm Front eligibility criteria. (This is not a guarantee of a Warm Front grant. A household may have already received grant maxima; client contribution may be required which cannot be met; existing heating may be deemed adequate). It is assumed that there was a 20% success rate from these referrals (407 households), since Warm Front were unable to track referrals to monitor conversions.

2.6. Assigning monetary costs to the benefits of interventions

a) In order to have an opportunity to impact on *mental health*, the installation of insulation and/or heating should result in improvements in thermal comfort and/or a reduction in the burden of energy bills. Mental health impacts can therefore be assumed to have been experienced by householders who received the following interventions :

Ai. Aii. Aiv. Bi.

b) In order to have an opportunity to impact on the *physical* health of householders, the installation of insulation and/or heating should result in raised indoor temperatures that attain WHO-specified thresholds. For England these are at least 21^0C in living rooms and 18^0C in all other occupied rooms. Before retrofit, Warm Front studies indicated relatively low baseline temperatures in English homes, requiring significant increases in temperature in order to attain these thresholds, approximating a requirement for a 10-20% increase in temperatures throughout the home (Hong, Ridley & Oreszczyn, 2004; Oreszczyn et al., 2006). This can be more readily attained when combined heating and insulation measures are installed, but are less likely to be attained when loft insulation and/or cavity wall insulation is installed. Hence, physical health impacts are only imputed for the two scenarios where heating *and* insulation measures were installed. (Aiv. and Bi.).

c) For installations which could impact on both physical and mental health, the cost-benefit analysis undertaken for Northern Ireland (NICBA) is used to estimate savings from health and well-being benefits (Liddell, 2009). The NICBA model assessed the impacts of the Northern Ireland Warm Homes scheme and related interventions, and is therefore based on similar retrofits as Aiv. and Bi.

The NICBA model was a QALY-based assessment, in line with NICE Guidelines and the HHSRS (2006) system of estimating impacts of housing intervention. A QALY is a quality adjusted life year and is a measure of disease burden, including both the quality and the quantity of life lived. **The model estimated a return of 42p in the £ for Warm Homes**

and other heating interventions in Northern Ireland, using a 15-year lifespan for the retrofits. The same estimate of return is applied here. In line with NICE guidelines a QALY is valued at £30,000.

d) For installations which were likely to affect mental health only (i.e. Ai. and Aii.), the cost-benefit analysis assumes additive gains from each, since it is likely that each contributed independently to improvements in thermal comfort. Hence, where households received both loft and cavity insulation, it is assumed that each had an independent effect on mental health. Tables 1 and 3 are used to estimate the odds ratios of likely mental well-being impacts. A 5 year lifespan of mental health impacts is assumed, for mental health impacts. This relatively short lifespan of impacts is used because common mental disorders (CMD's) such as depression and anxiety are known to recur periodically for many people, even if improved environmental circumstances remain in place. As yet, there is no evidence of impacts exceeding 1 year (since studies have not used a long enough follow-up window), but **a 5 year lifespan is deemed a reasonable estimate of length of potential impact.**

In line with the mental health impacts imputed for the NICBA model, 1 QALY is set at improvements in the mental well-being of 238 people experiencing a common mental disorder. A baseline prevalence of common mental disorders is set at 16.2% in line with NICE (2011).

For all the above calculations it is assumed that there are 1.3 adults living in households (substantiated odds ratios do not exist for mental health impacts on children and so cannot be reliably calculated). Where required for other estimations, it is assumed there are 2.4 (i.e. Kirklees average) people living in a home (adults, adolescents, children, and infants)

e) Impact assessment for home safety measures (i.e. smoke detectors, fire hazard checks and CO monitors) is more difficult to impute. No body of evidence from studies that were sufficiently similar to the Kirklees Project could be found. Without these, odds-ratios cannot be established. Estimates of impact are, therefore, much more speculative.

In line with Mulvaney et al. (2008), an annual average of 300 deaths and 7,000 injuries are assumed to be associated with indoor house fires in England. In line with DCLG (2009), the lifespan of a smoke detector and a CO monitor is assumed to be 6 years.

For CO monitors an average of 30 non-accidental deaths and 600 injuries per annum are assumed to occur as a result of CO poisoning in homes in England and Wales (DCLG, 2009).

For calculations related to smoke detectors, fire hazard checks and CO monitors, the value of preventing a statistical fatality (VPF) is estimated at £1.42M in accordance with the estimate used by the Department for Transport, the Rail Industry and the Health and Safety Executive (Mason et al., 2009). It is assumed that the devices only prevent incidents in 50% of cases over the 6 year period (batteries might not always be replaced timeously, devices may be removed after time, etc.). Similarly, recommendations made to householders after fire safety checks may not always be adhered to over time.

For injuries prevented as a result of the 3 home safety measures, a QALY-based estimate has been used, based on the HHSRS model of costing injuries by severity (this is the same model as was used in the NICBA analysis).

2.7. Results for home safety measures

The calculations for impacts of 9,896 smoke alarms, in 5838 homes (at January 2011) are shown in a) and b) below, followed by calculations for all the other interventions:

a) Risk of death per person over a six year period in English population

= (300 deaths *6 years)/50M UK population = 0.000036.

For Kirklees 9,896 alarms in 5,838 homes equates to (5,838 * 2.4 adults) 14,011 people * 0.000036 = 0.50.

Assuming 50% efficacy of the alarm =. **0.25**

b) Risk of injury per person over a six year period in English population

= (7,000*6)/50M population = 0.00084.

For Kirklees, 14,011* 0.00084 = 11.77.

Assuming 50% efficacy of alarm = **5.88**.

Hence in the Kirklees project, 9,896 smoke alarms in 5,838 homes are estimated to have prevented 0.25 deaths and 5.88 injuries.

c) Similar calculations for 129,986 CO monitors impute **0.56 deaths and 11.23 injuries.**

d) Fire safety checks. It was impossible to impute the deaths and injuries that may have been prevented from fire safety checks. These are imputed arbitrarily as **0 deaths and 5 injuries.**

In total, ALL home safety measures (smoke detectors, carbon monoxide monitors, and fire safety) are collectively estimated to have prevented 0.81 deaths and 22.11 injuries. This is summarized on Table 4.

Table 4: Summary of estimates for deaths and injuries prevented by all home safety checks

Intervention	Estimated deaths prevented	Estimated injuries prevented
Fire safety checks	0	5
Smoke detectors	0.25	5.88
Carbon monoxide detectors	0.56	11.23
TOTAL	**0.81**	**22.11**

2.7.1. Monetary values assigned to these estimates

0.81 deaths = 0.81 X the value of preventing a statistical fatality i.e.

VPF = 0.81* £1,420,000 = **£ 1,150,200**

Of 22.11 injuries (via HHSRS, 2006) 7% will be severe, 22% moderate and 70% mild. These percentages generate 5.01 QALYs. (5.01*£30,000) = **£150,300.**

2.8. Combined results for home safety, heating and insulation measures

Tables 5a summarises the interventions that comprised the Kirklees Project and the capital investment for each of them. Table 5bi to 5biii present estimates of the benefits likely to have accrued from these. Table 6 summarises the benefits.

Table 5a: Kirklees cost-benefit analysis – summary of interventions

Interventions	Number	Capital Investment
Total households assessed	133,746 households (HH's)	
A. Direct Interventions		
Ai. Loft insulation	42,999	£19,068,097[1]
Aii. Cavity wall insulation	21,473	
Aiii. Home safety measures		
Fire safety checks	5,838	
Smoke alarms	9,896 in 5,838 HH's	£70,855
CO Monitors	129,986	£1,668,195
Aiv. Central heating via local and regional grant funding.	602 HH's	£1,640,638[2]
B. Indirect Interventions		
Bi. Central heating via Warm Front	2,033 referrals estimated to return 20% successful applicants (407 HH'ss)	Estimate £1,424,500[3]

1 Kirklees insulation capital (including management fee and all extras such as hatches and scaffolding, excludes lightbulbs and monitors) and ScottishPower CERT match fund

2 Heating grant funding includes Kirklees housing capital, regional funding from West Yorkshire Housing Partnership and Regional Housing Board, and Scottish Power Energy People Trust

3 Assumed 407 successful applicants receiving £3,500 grant from Warm Front

Table 5bi. Direct Interventions: Loft and Cavity Wall Insulation installed as part of the Kirklees Project

Intervention	Impact	How impact was estimated	Details of estimate	Estimated saving
Loft insulation (LI) 42,999 HH's	Improved mental well-being	Evidence-based odds ratio reduced by 50% since some lofts already had insulation and required topping up, rather than a new installation where no insulation had been in place before.	20% reduction in incidence of CMD for 5 years *after* LI. Adults in 42,999 HH's (42,999 * 1.3) = 55,899. 16.2% baseline prevalence of common mental disorder (CMD) = 9,056 people. Reduced by 20% = 1,811 fewer. 1 QALY per 238 people = 7.61 QALY (7.61 QALY * 5 years) * £30,000 = £1,141,500	**£1,141,500**
Cavity Wall insulation (CWI) 21,473 HH's	Improved mental well-being	Odds ratio of 40% not reduced	40% reduction in incidence for 5 years *after* CWI. Adults in 21,473 HH's (21,401* 1.3) =27,915. 16.2% baseline prevalence of common mental disorder (CMD) = 4,522 people. Reduced by 40% = 1,808 fewer. 1 QALY per 238 people = 7.60 QALY (7.60 QALY * 5 years) * £30,000 = £1,140,000	**£1,140,000**
SUB-TOTAL				**£2,281,500**

Table 5b.ii. Direct Interventions: Fire safety checks, smoke alarms, and CO monitors

Intervention	Impact	How impact was estimated	Details of estimate	Estimated saving
5,838 Fire safety checks Smoke Alarms in 5,838 HH's 129,986 CO monitors	Physical injury/death	See text for calculations	0.81 statistical fatality prevented and 22.11 injuries prevented	**£1,150,200** **£ 150,300**
SUB-TOTAL				**£1,300,500**

Table 5b.iii. Insulation and heating installations through local/regional funding and Warm Front (Aiv. And Bi.)

Intervention	Impact	How impact was estimated	Details of estimate	Estimated saving
Central Heating via local funding (CHLF) 602 HH's	Improved mental well-being and physical health	NICBA model	Assume: 1. Cost of CH installation = £3,000 Return of 42p in the £ (£3,000 * 602) * .42 = £758,520	***£758,520***
Central Heating via Warm Front funding (CHWF) 407 estimated installations	Improved mental well-being and physical health	NICBA model	Assume: 1. 20% success rate from 2,033 referrals (407 installations) 2. Cost of CH installation = £3,000 (£3,000 *407) * .42 = £512,820	**£512, 820**
SUB-TOTAL				**£1,271,340**

Table 6. Summary Table

Intervention	Impact	Details of estimate	Estimated saving
SUB-TOTALS	Mental well-being, physical health, & lives saved	Loft and cavity wall installations Home safety measures - Deaths - Injuries Heating and insulation measures	**£2,281,500** **£1,150,200** **£ 150,300** **£1,271,340**
TOTAL			**£4,853,340**

2.9. Conclusions regarding costs and benefits

Of a Kirklees council capital investment of £13.3M, benefits to mental well-being and physical health are estimated to recoup 36p in the £ over a lifespan of likely impacts.

Of the Kirklees Warm Zone total capital investment of circa £24M[4], a health benefit return of 20p in the £ investment is estimated.

Estimates are based on conservative modelling.

Health and well-being impacts from insulation and heating are more evidence-based than are estimates of impacts from smoke alarms, CO monitors, and fire safety checks.

4 Total Kirklees Warm Zone capital includes Council capital spend, ScottishPower EEC/CERT funding, and estimated values of lightbulbs delivered by Scottish Power, smoke detectors installed by West Yorkshire Fire and Rescue Service, regional Housing funding and Warm Front central heating installations.

SECTION 3 After the Kirklees Project

3.1. Further development

Ongoing development and delivery issues are still the subject of refinement and include :

1. New ways of providing advice to people who may not speak English
2. Setting up links with Primary Care Trusts for a more health-based approach
3. Identifying ways of funding energy efficiency improvements which are not grant-aided
4. Raising awareness and information on utility tariffs
5. Encouraging greater financial inclusion for homes with no savings
6. Support to 'hard to treat homes' though CESP and European funding
7. Providing more targeted support to vulnerable households.

New schemes continue to come onstream. For example, the Council funded a renewable energy programme (RE-Charge). It is estimated that 20% of the people taking up the renewable energy offers were living in fuel poverty even though (for a variety of reasons) this group is not commonly known for their engagement with renewables. The Council has provided up to £2.7M in interest-free loans for this scheme.

3.2. What was distinctive about the Kirklees Project?

The sheer scale and volume of delivery, which had to be achieved in 3 years and from a standing start, make Kirklees unique. At the time it was launched there were no best-practice models, and no "Handbook" for how to deliver a project of this nature. Whilst many other organizations tackling Fuel Poverty at that time were following a similar template to the one Kirklees adopted (and so also followed a model of best practice), none of these other organizations had the added pressures of delivery on a local-authority-wide scale.

The Zip-Up Method of delivery by Wards was certainly unique. It indicates that the simple generic decision to roll out an "areas-based approach" (which in 2011 many agencies tackling fuel poverty are contemplating) takes any Council or agency only a short distance down the complete road of actually delivering an areas-based approach. Kirklees' Zip-Up Method took 18 months to refine, and even then did not launch as smoothly as they would have liked. Any decision to adopt an areas-based approach probably requires at least 12 months of intensive planning.

3.3. What would the Kirklees Key Workers do differently next time?

1. Start from the premise that a Project of this scale is the equivalent of a big corporation (£24M expenditure over three years qualifies it as the equivalent of one).

2. Focus on three sectors from the start : technical, management, and business sectors. Build capacity in all 3 sectors, and do not launch until this is in place.

3. A corporation should be a joined-up workforce. Hence ensuring that staff are properly trained, supported, and rewarded is as vital in a scheme like this one, as it would be in a corporation. Teamwork is vital to success.

4. Ensure that support agencies have the capacity to keep up with the pace of such a large implementation program. The capacity of local BEC's agencies, assessors, etc. should have been boosted through direct financial subsidy from the Project. Without it, a significant backlog in the delivery of auxiliary services was inevitable. However, the project might never have got underway if activity had been stalled until everything was sufficiently resourced before launching.

5. Allow 18 months or more to develop a data management system. Ensure it is a single data management system from the start, which is adopted by all stakeholders. The Kirklees Project had 4 different data management systems in place (the Council's, the Contractor's, Scottish Power's and the managing agent).

These seldom yielded exactly the same answers to a question about numbers reached, or installations awaiting completion.

6. Find a way of working with Warm Front and other schemes so that these other schemes are able to deliver a value-added service that includes heating. Often, the installations which the Kirklees Project could provide did not reach the level of warmth and insulation that inclusion of a Warm Front subsidy would have allowed. It could be argued that the effort to include ALL owner-occupiers in the Kirklees scheme meant that some residents received less than they would have done if they had opted for Warm Front instead (although there were, of course, no guarantees of assistance from Warm Front, compared with a cast-iron guarantee of assistance from the Kirklees Project). Among the problems never fully ironed out is a modus vivendi for working with other insulation projects which run in parallel to a Project such as this one.

SECTION 4 Conclusions

The Kirklees Project has earned its status as a best practice model of home insulation projects. However, in fairness to many other similar schemes which now exist across the whole of the UK, they are now one amongst many delivering best practice on the ground. What Kirklees did then was sometimes what other Councils were also doing then, but others were operating on a much more modest scale because they were not funded to the same degree. Kirklees championed an approach, had the funding to roll it out efficiently, and the foresight to gather meticulous data. Furthermore, the Kirklees team has been generous in disseminating their approach, which has given other teams the confidence and evidence-base to secure funding for their own projects.

Of a Kirklees council capital investment of £13.3M, benefits to mental well-being and physical health are estimated to recoup 36p in the £ over a lifespan of likely impacts. Of the Kirklees Warm Zone total capital investment of circa £24M[5], a health benefit return of 20p in the £ investment is estimated. Health and well-being impacts from insulation and heating are more evidence-based than are estimates of impacts from smoke alarms, CO monitors, and fire safety checks, but all estimates are based on conservative modelling.

This narrative account was commissioned by DSDNI, with a view to Northern Ireland's fuel poverty lobby exploring in more depth whether the Kirklees Project can inform our own Fuel Poverty Strategy. What emerges most vividly from the exercise are 3 conclusions :

1. The Northern Ireland models that are currently being implemented through approaches such as the DARD rural fuel poverty project, Northern Exposure, and

5 Total Kirklees Warm Zone capital includes council capital spend, ScottishPower EEC/CERT funding, and estimated values of lightbulbs delivered by Scottish Power, smoke detectors installed by West Yorkshire Fire and Rescue Service, regional Housing funding and Warm Front central heating installations.

Warmer Ways to Better Health (in alphabetical order) carry almost all of the elements of best practice that the Kirklees project endorsed.

2. However, the Zip-Up and the intense patch (street by street) method for delivering an areas-based approach is one we have not considered for local implementation before, and it may be worth investing in at the Business Plan level.

3. Most importantly, agreeing that an areas-based approach is the model for Northern Ireland in the near future is only one step on a mile-long journey from idea to implementation. Kirklees offers lessons on the need for care, caution, and specificity in developing an areas-based approach.

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