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# CHEME

Centre for Health Economics and Medicines Evaluation



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## Warm Homes for Health End of study briefing 2016

### Warm Homes for Health: Exploring the costs and outcomes of improving population health through better housing

Results from Sunderland, England

Professor Rhiannon Tudor Edwards and Dr Nathan Bray from the Centre for Health Economics and Medicines Evaluation (CHEME) Public Health Economics Research Group, Bangor University, collaborated with Mr Paul Burns from Gentoo housing association and Dr Alice Jones from Nottingham City Homes to evaluate the costs and outcomes associated with social housing improvements delivered by Gentoo, such as new boilers and double-glazed windows. Gentoo build, retrofit and manage social housing in the North East of England. To date Gentoo have delivered core housing management services and maintenance to over 29,000 homes.

Almost 50,000 more deaths occur during the coldest months of the year compared to the rest of the year. There is a real need to improve housing in the UK. Avoidable illnesses, such as respiratory disease, can be exacerbated by cold and damp homes. This briefing will present and explain the main findings from the Warm Homes for Health project, with a scientific peer reviewed journal article to follow.

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## How does housing impact health?

Housing has a major impact on health and well-being. In 2014/15 there were an estimated 43,900 UK excess winter deaths in the coldest months of the year (December to March) compared to the rest of the year; the highest figure for 15 years (Office for National Statistics, 2015). Over 80% of these excess deaths occurred among people aged 75 and over.

Cold homes, particularly those below 16°C, cause a substantially increased risk of cardiovascular and respiratory illness (Mason and Roys, 2011). It is therefore relatively unsurprising that respiratory disease was the underlying cause for over a third of the excess winter deaths in 2014/15 (Office for National Statistics, 2015).

## How big is the UK housing problem?

Almost a quarter of homes (41.8million) in England are defined as being 'unhealthy' homes. The average cost of improving the most dangerous homes to an acceptable level is £3710, with a total national cost of £17.6 billion to improve all of these homes to an acceptable level (World Health Organization, 2011). The majority of these costs are related to improving the warmth of cold homes through insulation and heating system upgrades.

Many housing issues could feasibly be solved through better planning of new housing and modification to existing homes. A systematic review of over 100 years' worth of evidence found that housing improvements, particularly those aimed at improving warmth, can offer a range of health benefits (Thomson et al, 2009).

## What are the wider impacts of cold homes?

Improving housing has wider impacts on society as a whole: a



fifth of the National Health Service (NHS) clinical budget is spent on avoidable illness caused by poor housing, unemployment, poverty and pollution (World Health Organization, 2011). The NHS spends £2.5billion a year on conditions and illnesses whose main contributor is poor housing (Friedman, 2010).

In 2010 4million UK households were in fuel poverty, meaning that they could not afford to keep their home adequately warm. By the end of this year (2016) this figure will rise to over 7million (Bolton and Richards, 2012)

## Why was this research carried out?

The aim of this research project was to understand the impact that warmth-related housing improvements have on the health, well-being and quality of life of families living in social housing. Secondly, we sought to find out the costs and outcomes associated with new warmth-related housing improvements, compared to existing, unmodified social housing.

To date the use of robust economic evaluation methods in housing intervention studies has been limited (Fenwick et al, 2013).

## Who funded this research?

The Warm Homes for Health project was jointly funded by Gentoo and Nottingham City Homes.

## Who took part in the research project?

The project was approved by a Bangor University ethics committee. Between April and December 2014 families living in social housing in Sunderland were asked to take part in the research project by Gentoo. Households were eligible to take part if they had recently been assessed by Gentoo for housing improvements, and had subsequently scheduled to receive housing improvements to address warmth, heating, energy efficiency, and/or damp-proofing issues.

In total 228 households took part, which equated to 473 tenants participating in the study: 228 main tenants and 245 other tenants. Most households contained 2 tenants.

Data collected at baseline showed that in general participants were socioeconomically deprived and in poor health: 77% of households had an income of less than £15,000 per year, about half the average household income for the UK. Most households (87%) spent 10% or more of their household income on heating and energy bills, which is a key indicator of fuel poverty (Department for Energy and Climate Change, 2013).

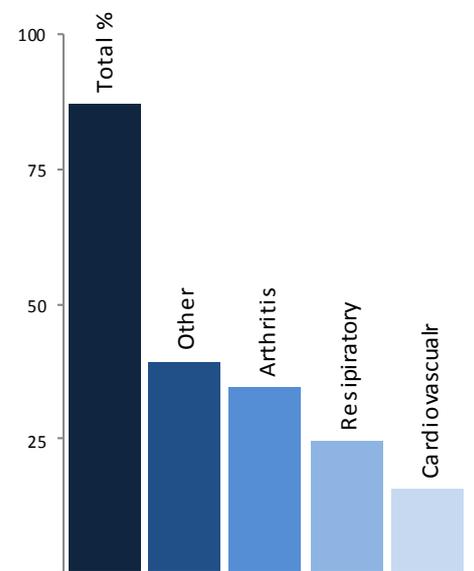


Fig.1: Proportion of households containing at least one tenant with a chronic illness

# Warm Homes for Health: Gentoo results

Table 1: Health and well-being outcomes before and after the intervention

	Household health status	Main tenant health status	Health-related quality of life	Rooms unheated	Mental well-being	Life satisfaction	Happiness	Anxiety	Financial satisfaction
Baseline score	68.39	64.89	0.69	0.82	28.15	7.58	7.47	3.05	5.28
Follow-up score	71.64	69.74	0.68	0.08	28.60	7.67	7.72	2.65	5.64
<b>Mean change</b>	<b>3.25</b>	<b>4.85</b>	<b>-0.01</b>	<b>-0.73</b>	<b>0.46</b>	<b>0.09</b>	<b>0.25</b>	<b>-0.39</b>	<b>0.36</b>

Over half of main tenants were retired and almost a quarter were either unemployed or on long-term sickness absence. High prevalence of chronic illness was observed in the cohort: 86% of households had at least one tenant with a long-term illness or disability (see figure 1).

## What happened during the research project?

As part of the final assessment for Gentoo housing improvements main tenants from eligible households were given a study pack containing a covering letter, information sheet and consent form. A Gentoo housing officer was present to answer any questions about the study. Once a participant agreed to take part the housing officer administered either an online or paper questionnaire, depending on local internet signal. The questionnaire was repeated again 12 months after the housing improvements had been completed by Gentoo.

## How was health service use measured?

In each household the main tenant acted as a representative for the whole household. They were asked to complete demographic questions and provide household NHS service use estimates for the previous six months on behalf of the household. Service use was divided into GP visits, outpatient appointments, inpatient appointments and accident/emergency attendance,

and was costed using relevant NHS unit costs (PSSRU unit costs, Curtis 2014; and the National schedule of NHS reference costs, Department of Health 2014).

## How was health and well-being measured?

Where possible, all members of the household completed a *visual analogue scale (VAS)* health status measure, which asks respondents to rate their health today from 0 ('worst imaginable health') to 100 ('best imaginable health') on a thermometer-like scale. Main tenants reported on behalf of children under the age of 11. Main tenants also completed a number of other health and well-being measures, including:

- ◆ *EuroQoL 5 Dimension 3 Level (EQ-5D-3L)*: A validated health-related quality of life questionnaire scored from 0 to 1 ('death' to 'perfect health') (EuroQoL Group, 1990)

- ◆ *Short Warwick-Edinburgh Well-being Scale (SWEMWBS)*: A validated mental well-being questionnaire scored between 7 and 35 ('worst mental well-being' to 'best mental well-being') (Stewart-Brown and Janmohamed, 2008).

- ◆ *Office for National Statistics personal*

*well-being questions*: These personal well-being questions ask respondents to rate their life satisfaction, happiness, anxiety and financial satisfaction respectively on a scale from 0 to 10 ('not at all' to 'completely'; reversed for anxiety question) (Office for National Statistics, 2013).

- ◆ *Fuel poverty indicators*: Main tenants were asked to estimate how many rooms were left unheated in their homes due to energy costs, and what percentage (more or less than 10%) of their household income was spent on energy bills, an indication of fuel poverty (Department for Energy and Climate Change, 2013).

## Did the intervention make tenants healthier?

On almost all measures main tenants reported improvements in health and well-being 12 months after the installation of housing improvements (see table 1). Using a statistical analysis method known as a paired samples 'T' test, we found statistically significant improvements (meaning they did not happen by chance) in main tenant self-reported health status (improved by 5%) and satisfaction with financial circumstances (improved by 3%). We also found a significant improvement in household reported health status (improved by 3%).

Other non-significant main tenant effects were also found, including a 4% decrease in anxiety, a 2%

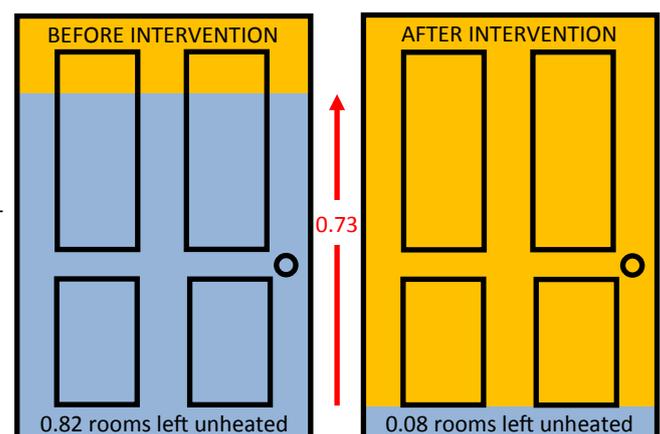


Fig.2: Number of additional rooms heated per household

increase in happiness and overall well-being, and a 1% increase in life satisfaction. Only main tenant reported health-related quality of life decreased after the intervention (by 1%), but this was non-significant and potentially caused by insensitivity of the EQ-5D-3L in this setting. Overall, the results indicate that the housing modifications improved the health and well-being of tenants.

### Did tenant's energy bills come down?

Direct data about tenant's bills was not available, however 12 months after the installation of housing improvements by Gentoo only 50% of households were still spending 10% or more of their income on heating and energy bills, compared to 86% at baseline: a 36% reduction in fuel poverty in this cohort. Main tenants reported significant improvements in financial satisfaction and the number of rooms left unheated per household significantly reduced by 0.7 (see figure 2); this equated to 23% of households being able to heat rooms they were previously unable to heat due to fuel costs. These results indicate that households were better able to afford their heating costs after installation of a new boiler and double-glazing.

### Did the housing improvements save the NHS money?

Use of NHS services reduced in all health service sub-categories after installation of housing improvements: across the cohort the number of GP visits in six months reduced by 10%; hospital visits reduced by 67%; accident and emergency department attendance reduced by 45%; and inpatient stays reduced by 4%.

Before the housing improvements were installed, each household accessed on average £598 worth of NHS health services over the previous six months before baseline. Twelve months after installation this fell by 16% to £504, resulting in a £94 cost reduction per household, or a £45 reduction per tenant. Across the relatively small cohort, this equated to an NHS six month cost saving of £20,854 with NHS service use costs reducing from £131,690 at baseline to £110,836 at follow-up.

### How much did the housing improvements cost?

The average cost of improving each house was £3725. This comprised a new combi boiler (£2500 per boiler) and double-glazing (£240 per window).

### Conclusions

Retrofitting of new energy efficient combi boilers and double-glazed windows in social housing seems to be

an effective means of reducing fuel poverty, improving health status, improving personal well-being and increasing tenants' ability to heat their homes. Over the twelve month follow-up period more than £50,000 worth of NHS cost savings were observed in this relatively small cohort due to reduced health service use. If the 4.8million 'unhealthy' UK homes were to receive similar housing improvements the NHS could potentially save £1billion a year in health service use costs. At approximately £3725 per intervention, increasing the warmth of UK homes could be a relatively inexpensive means of improving population health, especially as all members of the household can benefit. The results demonstrate the need to conduct more economic evaluations of housing improvements, and promote the prioritisation of housing in public health.

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