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Holly Park: External Wall Insulation Evaluation

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Introduction

- This report presents the findings of an evaluation of External Wall Insulation (EWI) across the Holly Park estate in Islington.
- Before the EWI was installed, the 1950s solid-brick built properties were prone to damp and loss of heat.
- Camden and Islington Public Health Knowledge and Intelligence Team collected data before and after the installation of the EWI to evaluate the impact on residents' wellbeing.
- This includes the impact on thermal comfort; energy use and bills; condensation, damp and mould, as well as residents' health and wellbeing.

Housing and Health

- There are long established links between housing and health inequalities.
- Evidence suggests that cold and damp homes are linked to increased respiratory and heart disease as well as stress and depression[1].
- In Islington, evidence indicates that residents living in areas with a high level of social housing are more likely to have a long-term condition than areas with no social housing (22% prevalence in areas with more than 80% social housing compared to 9% prevalence in areas with no social housing)[2].
- Once age has been taken into account, in areas with the highest density of social housing (81% and above), prevalence of long-term conditions is still higher than expected[2]:
  - **24%** higher prevalence of **Chronic Obstructive Pulmonary Disease**
  - **15%** higher prevalence of **Asthma**
  - **42%** higher prevalence of **Depression**

About Holly Park

- Holly Park is situated in the Tollington ward in the north of the borough.
- The estate comprises of 269 properties across 10 blocks.
- 84% of the properties are occupied by council tenants (2013 data).
- The estate was built in 1952 using brick solid-wall construction. It is estimated that solid walls let through twice as much heat as cavity walls[3].

About External Wall Insulation (EWI)

- Solid-walled properties have historically been seen as difficult to insulate, as insulation has to be fitted to the interior or exterior of the walls.
- External Wall Insulation (EWI) is where insulating material (such as expandable polystyrene or mineral wool) is applied to the outside of a building and encased in render in order to reduce the amount of heat loss.
- EWI is generally considered less disruptive when compared to internal wall insulation, as it does not impact on internal decoration and fixings, or the internal size of rooms[4].
- EWI also has the advantage over internal wall insulation of reduced risk of moisture build up in external walls and condensation on internal walls[5].
- Limited evidence on the impact of EWI indicates fuel cost savings in the region of £145 per year for a gas-heated flat[4].

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External Wall Insulation at Holly Park

- Funding was secured to install External Wall Insulation (EWI) across the estate to alleviate fuel poverty and reduce instances of damp and mould.
- The total cost of the EWI at Holly Park was £2.1m. This was part funded through the Energy Company Obligation and Green Deal Cashback payments with the remainder funded by London Borough of Islington.
- Work began in September 2013 and was completed in May 2014.

Holly Park before the installation of EWI

Holly Park after the installation of EWI

Evaluation: Aims

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- EWI is a relatively new approach to insulating solid-walled properties, and while there is limited evidence on potential energy bill reductions, very little is known on the potential wider impact on wellbeing.
- This evaluation aims to improve our understanding of the impact of the EWI on residents' wellbeing by measuring a range of indicators before, during and after installation (table 1).

Table 1: Self-reported indicators measured during evaluation

Area	Self-reported indicators
Thermal comfort	• Perceived warmth of home during winter • Effectiveness of heating (speed at which property heats up after heating is switched on; length of time property stays warm after heating is switched on or off)
Energy use and bills	• Heating usage (average number of hours per day that heating is used) • Cost of bills (self-reported amount) • Ability to pay bills (extent to which heating is not switched on due to concern over cost; level of worry about paying heating bills).
Damp, mould and condensation	• Number of rooms in which residents report that they have problems with condensation damp or mould. • Knowledge of prevention (ability to pick out actions which can help reduce condensation, damp and mould from those which may exacerbate condensation, damp and mould).
Health and wellbeing	• Health and Wellbeing (perceived overall wellbeing) • Symptom severity (self-reported severity of health conditions associated with damp and cold homes) • Use of planned and emergency health services

Evaluation: Methods

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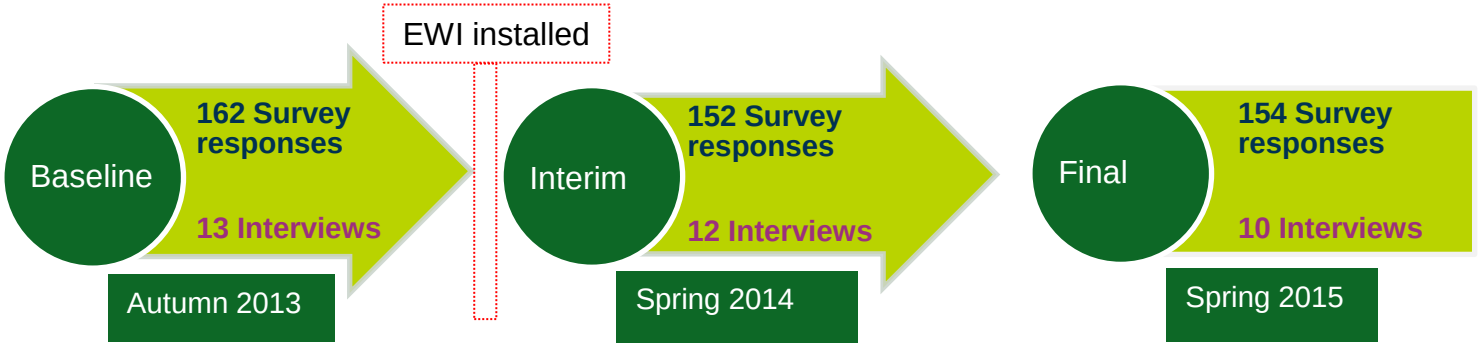
- The evaluation was conducted by the Camden and Islington Public Health Knowledge and Intelligence Team.
- Surveys and qualitative interviews have been completed at three separate time points. **Baseline data** was collected before the EWI was installed**. Interim data** was collected after the work to install EWI had been completed (May-June 2014) and a **final stage of data** was collected in (May 2015) after the EWI had been in place for one full winter.



- Surveys were sent to each household (269 in total) with stamped return envelopes. Follow–up door-to-door surveys were also conducted in each stage to increase the response rate, which was between **57 – 60%** in each of the three stages. Surveys were not just sent to the cohort of individuals who completed the baseline survey, in order to increase the sample size.
- Approximately one-third of the final survey sample were the same individuals who had completed a baseline survey (57 responses out of a total of 154).
- Interview participants were recruited through notices in a resident newsletter and through information included in the initial postal survey in Autumn 2013.
- The same group of residents took part in the interviews over the three stages (10-13 residents).
- Full details of the methods (including copies of the survey and interview guide used) are included in the interim report, available at: http://evidencehub.islington.gov.uk/housing/Councilsocialhousing/Pages/default.aspx

Findings: Survey respondents' representativeness (1)

Survey respondents were broadly representative of the Holly Park population in terms of gender, age ethnicity and tenancy type (figures 1-4).

Figure 1: Gender of survey respondents, by research stage, compared with Holly Park population

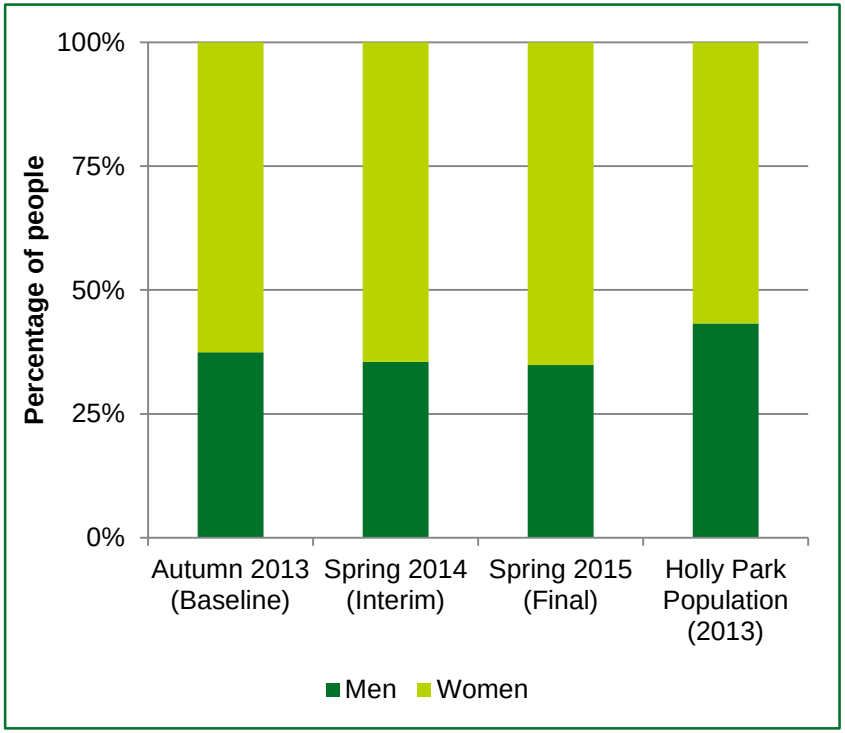
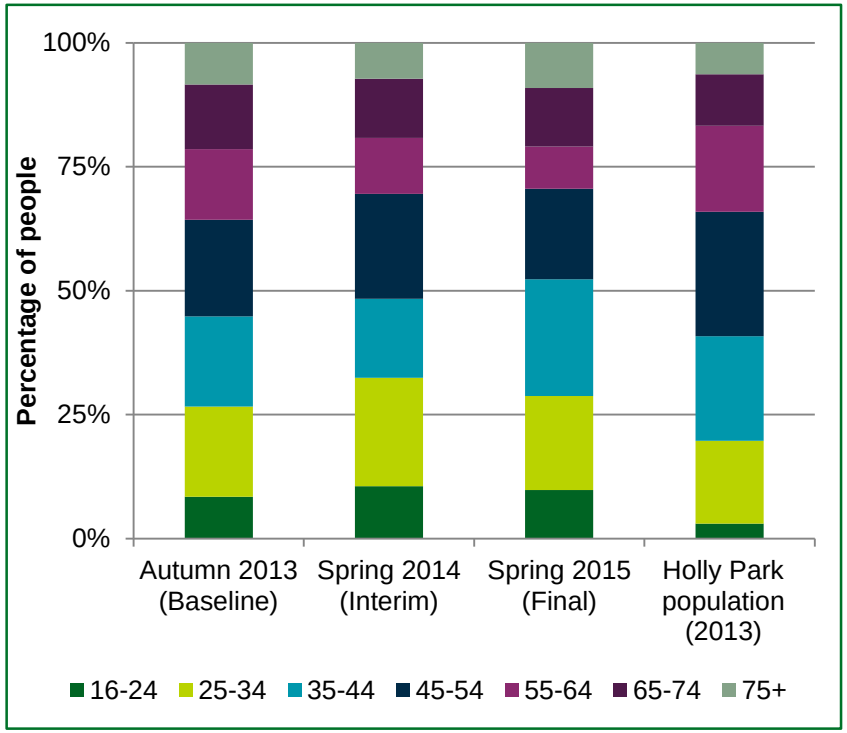


Figure 2: Age group of survey respondents, by research stage, compared with Holly Park population



Findings: Survey respondents' representativeness (2)

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Figure 3: Ethnicity of survey respondents, by research stage, compared with Holly Park population

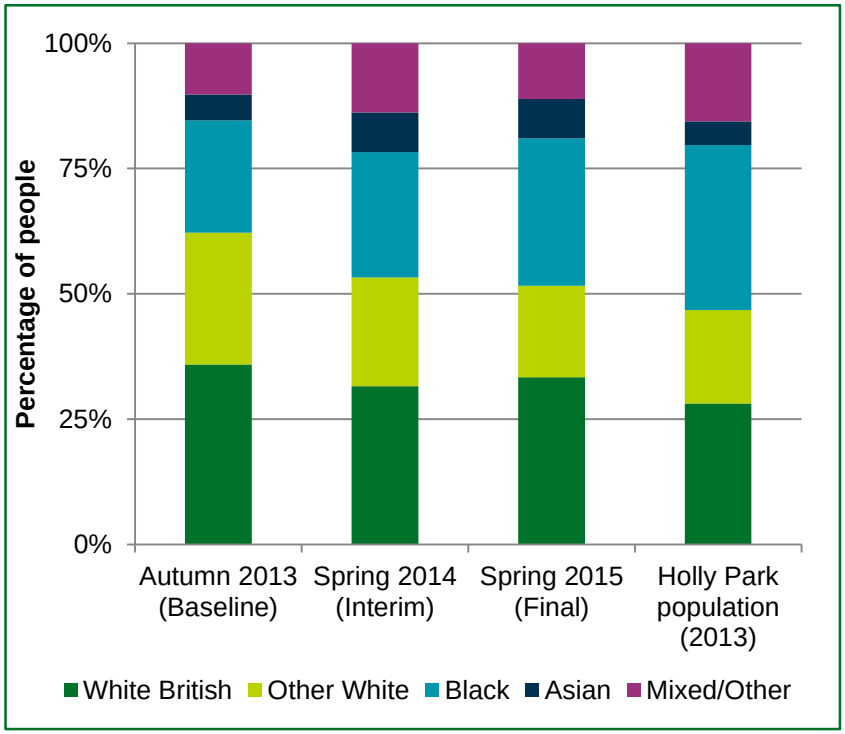
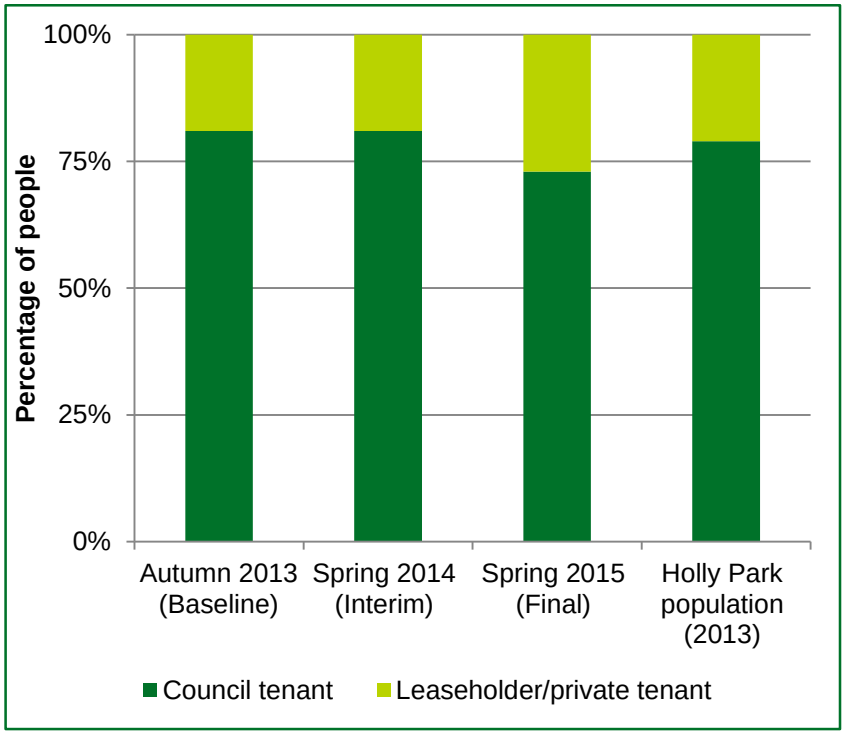


Figure 4: Tenancy type of survey respondents, by research stage, compared with Holly Park population



Interview participants' representativeness

- Eight women and five men took part in the first stage of interviews
- They included a range of ages, extending from participants in their 30s to their 80s
- Three participants were living with children and young people.

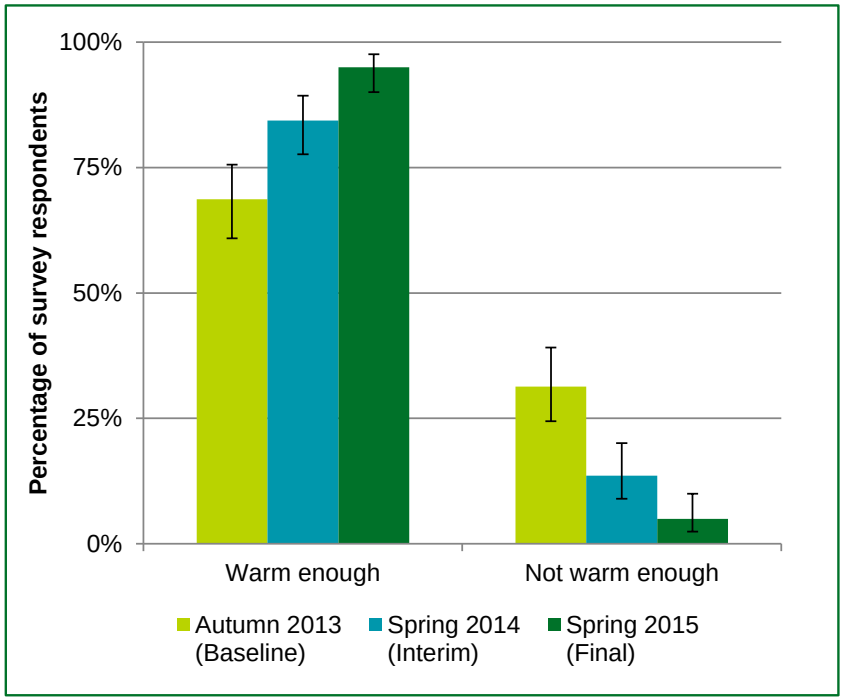
Findings: Thermal comfort (1)

- Following the installation of the EWI – 95% of respondents (133 out of 140 people) said their property was warm enough with the heating on compared with 69% (103 out of 150 people) before the insulation was fitted (figure 5).

- When asked to rate the overall temperature of their homes, 51% of respondents (or 76 out of 150 people) said their property was a bit or a lot colder than they would like before the insulation was fitted. After the EWI had been fitted, this fell to 5% (7 out of 140 people).

- It should be noted that thermal comfort is a subjective measure. Measurement of internal temperatures (using thermometers) was outside the scope of the evaluation.

Figure 5: Perceived warmth with the heating on before and after EWI fitted



See appendix 1 for guidance on interpreting the graphs in this report.

Unless otherwise stated, findings are statistically significant (95% confidence intervals).

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Findings: Thermal comfort (2)

Of the 56 people who completed both the baseline survey (Autumn 2013) **and** the final survey (Spring 2015):

- **Just over one-quarter (16 out of 54)** said their property was too cold with the heating on in 2013 but warm enough with the heating on in 2015*****.
- **Just over two-thirds of people (38 out of 54)** said their property was warm enough with the heating on before the insulation in 2013, and warm enough after.
- **Less than 5 people** said in 2013 their property was too cold with the heating on before the insulation was fitted in and is still not warm enough following the installation of the EWI.

*****The average temperatures in winter for 2013 and 2015 were comparable (3.3 and 3.9 degrees Celsius respectively), according to the Met Office Climate Summaries for these years.

Understanding differences in thermal comfort experience

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- The survey results recorded a dramatic drop in the number of people reporting that their property was too cold (from 51% or 76 out of 150 people in Autumn 2013, down to 5% or 7 out of 140 people in Spring 2015). The qualitative interviews provide helpful insight in understanding the survey findings.
- It was clear from interviews that the position of properties within the block and the extent to which respondents "feel the cold" created very different starting points in relation to thermal comfort; emphasising the subjective nature of this measure.

  "It was warm [my property this most recent winter], but it was warm before. It's a third floor in the middle, so it' was never cold".

  "I have got no complaints, the house was fine, it was warm but then again all my family are the same, we don't really feel the cold so I've got nothing to complain about".

- Over the course of the research, it also became apparent that four residents interviewed felt that the full impact of the EWI in improving thermal comfort had not been fully realised. Two participants felt that the gains in improved heat efficiency from the EWI were being lost through draughty windows. A further two felt that they were not feeling the full benefits of the EWI because of (perceived) inefficiencies in their heating system:

  "[I've had] new central heating, that [radiator] is thermostatically controlled. Where the heater I had before would keep at the maximum temperature the whole time unless I turned it off, this one now regulates itself, for whatever reason, so probably again I'm using the [electric fan] heater more often".

  "It's only [in] his room, that if you go close to the window you can feel it's cool. There's no wind, but you can feel it's cooler, and if you've got insulation it should work properly".

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Case study: Thermal comfort

Judith* has lived in her three bedroomed property in Holly Park as a Council tenant since the early 1980s. Now in her 60s and retired, she lives with her grown up daughter.

Before the insulation was fitted, Judith described the overall temperature of her property with the heating on as comfortable, but she reported this as inconsistent across the property, with some cold spots:

"This room is quite cold [the living room]. I think it's because it's [an external] wall that it seems the coldest".

At the outset, Judith described the impact that she hoped the External Wall Insulation would have:

"I'm hoping it's going to make the house warmer and we might not have to have the heating on as much".

Eighteen months on Judith reported a considerable improvement in the temperature of the property:

"It makes a hell of a difference this [the External Wall Insulation], my gosh it does. It's definitely warmer".

"I didn't have to put the heating on in the morning I found [last winter]. No, I felt warm enough, and I thought 'well I'm not going to put it on, I don't feel cold".

*** Names have been changed to preserve anonymity.**

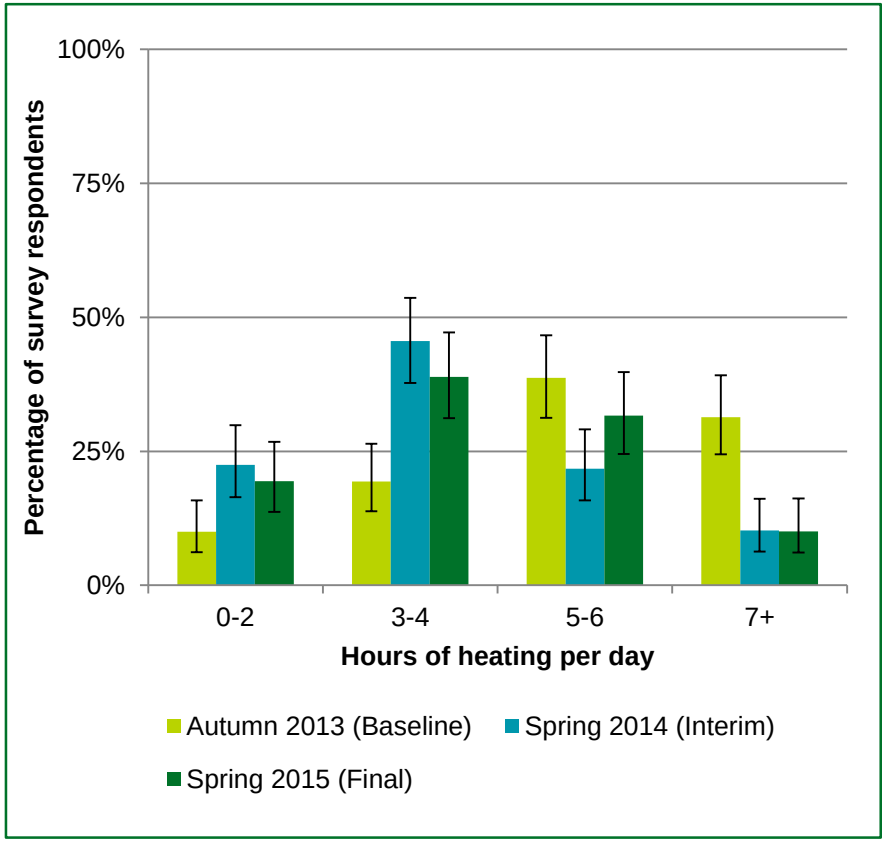
Findings: Energy use and bills (1)

- The average number of hours that people used their heating decreased after the insulation was installed: 31% of respondents (47 out of 150 people) in Autumn 2013 said they used their heating for more than 6 hours a day which dropped to 10% (14 out of 139 people) in Spring 2015 (figure 6).

- The median monthly bill amount **over winter** decreased by £10 from before the insulation was installed to the final survey: from £70 per month to £60 per month.

- This is likely to be a conservative estimate, as those paying by Direct Debit will accrue these savings throughout the year and not just during the winter months.

Figure 6: Number of hours per day heating is on, before and after EWI fitted

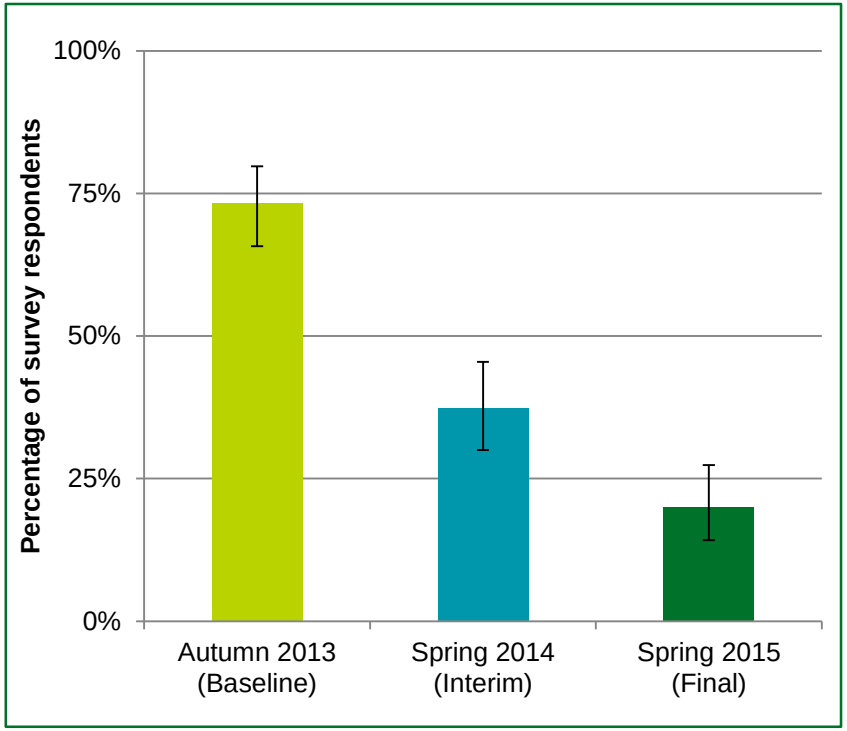


Findings: Energy use and bills (2)

- The proportion of people who restricted their heating due to concern over the bills decreased from 73% (110 out of 150 people) before the insulation was installed to 20% (28 out of 140 people) in the final survey (figure 7).

- This drop in the proportion of people who restricted their heating due to concerns over the bills was present among all age groups (16-34 year olds; 35-54 year olds and 55 and above).

Figure 7: Proportion of people who restrict the hours they have their heating on due to concern about cost, before and after EWI fitted



Findings: Energy use and bills (3)

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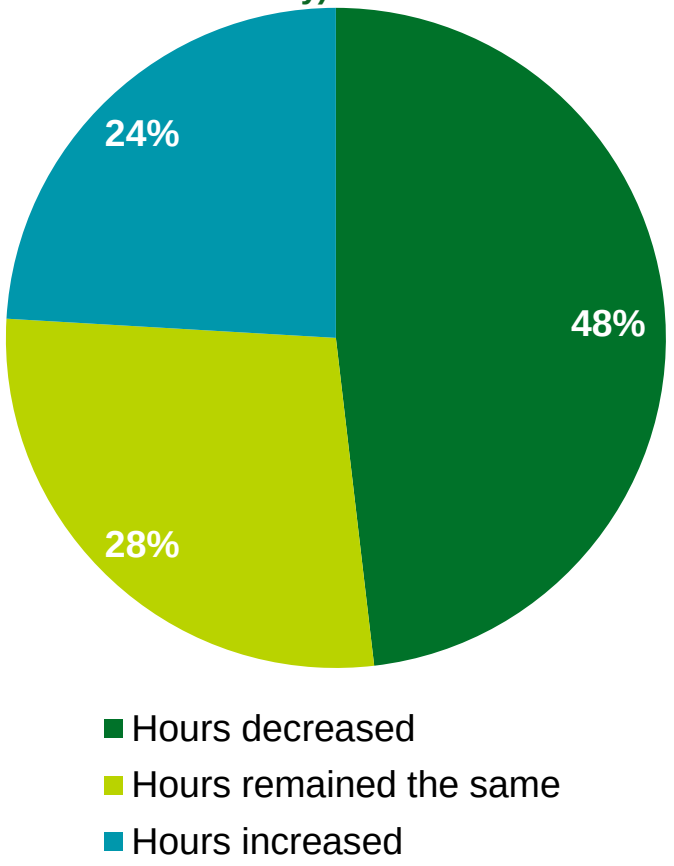
Of the 54 people who completed both the baseline (Autumn 2013) and the final survey (Spring 2015):

- **48%** (or 26 out of 54 people) had reduced the average number of hours per day that they used their heating after the insulation was fitted.
- **28%** (15 out of 54 people) showed no change in the number of hours that they used their heating when comparing before and after insulation heating use.
- **24%** (or 13 out of 54 people) showed an increase in the number of hours that they were using their heating after the insulation was fitted.

Figure 8: Reported Energy use before and after EWI fitted (among respondents to both the baseline and final survey)



Understanding differences in reductions in energy use and bills

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- The survey findings showed a £10 decrease in the monthly median bill over winter. However, it was apparent from the interviews that it was difficult for residents to recall the amount they paid for the energy bills. This was particularly the case where bills were paid by Direct Debit.
- With the insulation work not fully completed until May 2014, not all residents have had two full winters with the insulation in place. It is possible that Direct Debits over winter 2014/15 were forecast from pre-insulation energy consumption over winter 2013/14. Further reductions in residents' energy bills may therefore be seen next winter (2015/16).
- Two interview participants also reported inefficiencies in their current heating system which they felt limited the energy cost savings arising from the EWI:

> *"I had a boiler done before all this started [the installation of the EWI], because it had a fault. The only thing I haven't had changed is my radiators... If I had the new heating in I don't think I'd be using as much [energy] as I'm using now. I know I'm using less than what I was using two years ago, but I believe I would be using much less [with new radiators]".*

> *"The boiler is lovely and new and works, but as far as energy use goes, for me personally and for the climate, it is not a good system. As a single person, I don't know where I'm going and what jobs I will be doing. So I don't use [the timer] part of it I just flick it on. But if I then get myself side-tracked it can be an afternoon, quarter of a day, possibly a couple of days if I forget [that the immersion heater has been on constant]".*

- It is possible that similar experiences to those highlighted in these quotes may help to understand the increased heating use reported by a quarter of respondents who completed both baseline and final survey (slide 15).

Case study: energy use and bills

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Julie* lives in a two bedroom property in Holly Park with her son. She is a council tenant and has lived in the property for over 25 years. She is in full time employment.

Before the EWI was fitted, Julie used her central heating for long periods of the day:

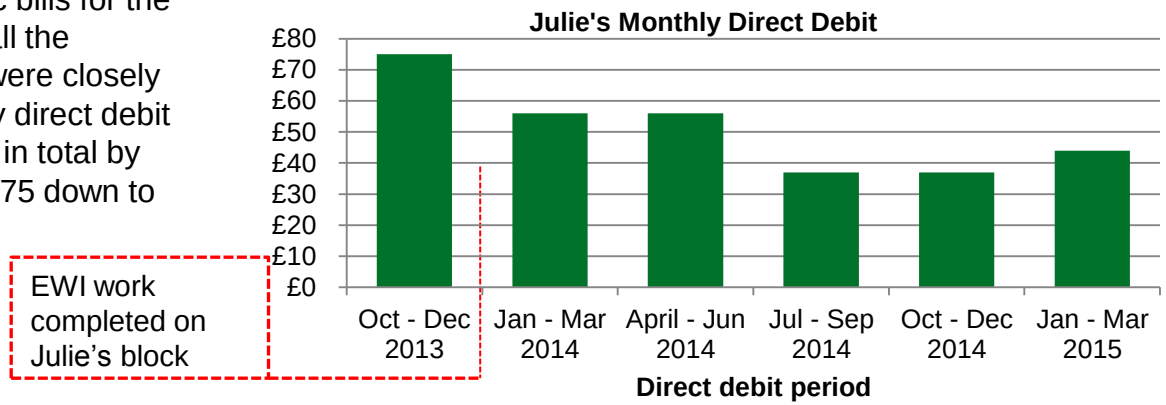
"I usually have it on the timer in the morning for about two hours then it comes on the timer again about 4 o'clock, it goes off about 10. So probably about 6-8 hours a day but if my son's in, he'll probably put it on intermittently throughout the day".

"I think I'm paying about £75 a month which I think is quite expensive and that's throughout the whole year. I wouldn't say I am worried but if I can keep it off, thinking that I'm saving some gas, I will".

On completion of the EWI, Julie reported a considerable reduction in heating use:

"I've found this flat to be warmer once the insulation was installed, so yes I felt the immediate benefits of it. I used to have it [the heating] on a timer so it was coming on just before I go to work about 6 o'clock and it would be on for two hours but there was no need for that all through the winter, I just put it on when I needed it and more often than not, I didn't need it".

Julie was able to provide gas and electric bills for the 18 month period from when work to install the insulation began. It was not until these were closely examined, that Julie realised her monthly direct debit had gradually reduced over this period – in total by 40% from Oct 2013 to Mar 2015 (from £75 down to £44 per month by March 2015).



*** Names have been changed to preserve anonymity.**

Findings: Condensation, Damp and Mould (1)

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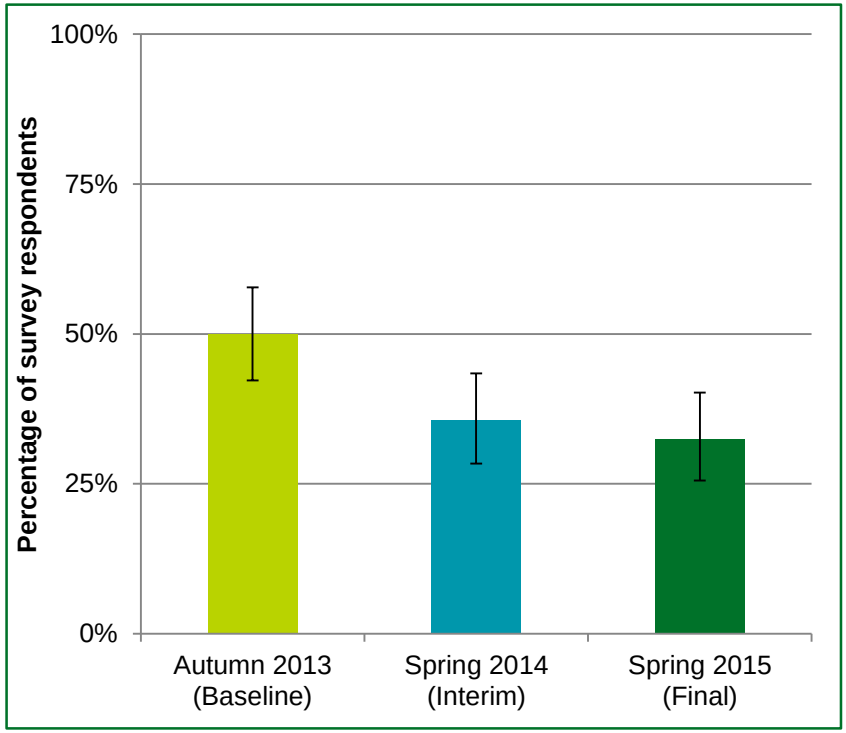
- There was a reduction in the number of people self-reporting problems with damp and mould from 50% (78 out of 156 people) before the insulation was fitted to 32% (50 out of 154 people) after (figure 9).

- Among those reporting problems with condensation, damp and mould in the final stage of research, half (25 out of 50 people) felt that the extent of the problem was the same as before the insulation was fitted; less than five people felt the problem had increased and about one-third (17 out of 50 people) reported an improvement since the insulation has been fitted.

- In all three stages of the evaluation, over half of those who said they had problems with condensation, damp and mould listed bathrooms/toilet among the problem rooms

Figure 9: Proportion of people self-reporting damp present in at least one room, before and after EWI fitted



Findings: Condensation, damp and mould (2)

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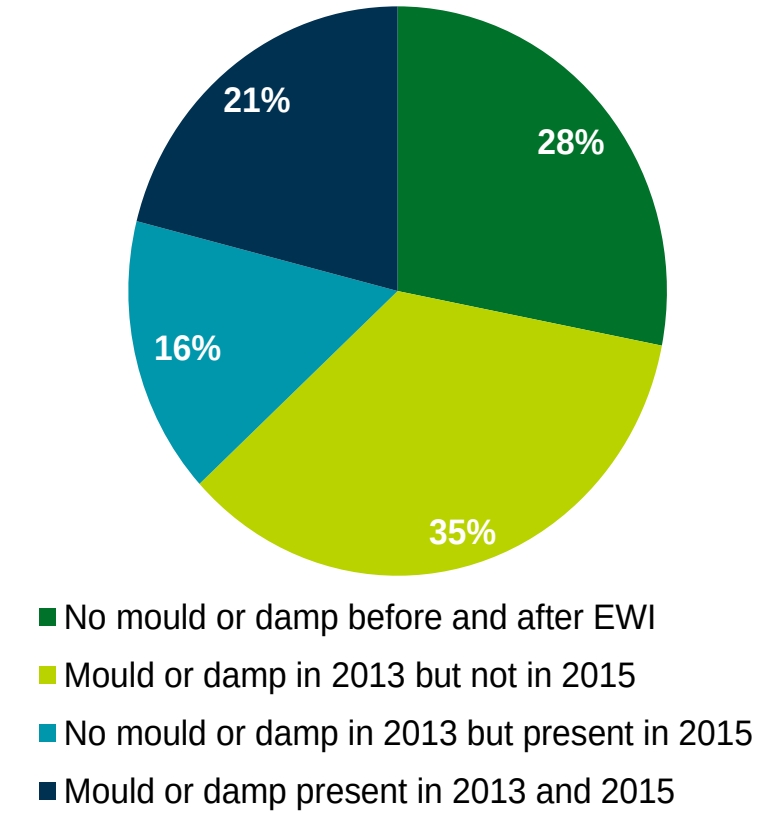
Of the 57 people who completed both the baseline (Autumn 2013) and final survey (Spring 2015):

- **35%** (20 out of 57 people) said they had a problem with condensation, damp or mould before the insulation was fitted, but reported no problems with condensation, damp and mould after the insulation was fitted.
- **28%** (16 out of 57 people) reported no problems with condensation, damp and mould before the insulation and no problems after.
- **16%** (9 out of 57 people) reported no problems with condensation, damp and mould before the insulation was fitted in 2013, but would appear to have since developed a problem.

Figure 10: Self-reported damp, mould and condensation before and after EWI fitted (among respondents to both the baseline and final survey)



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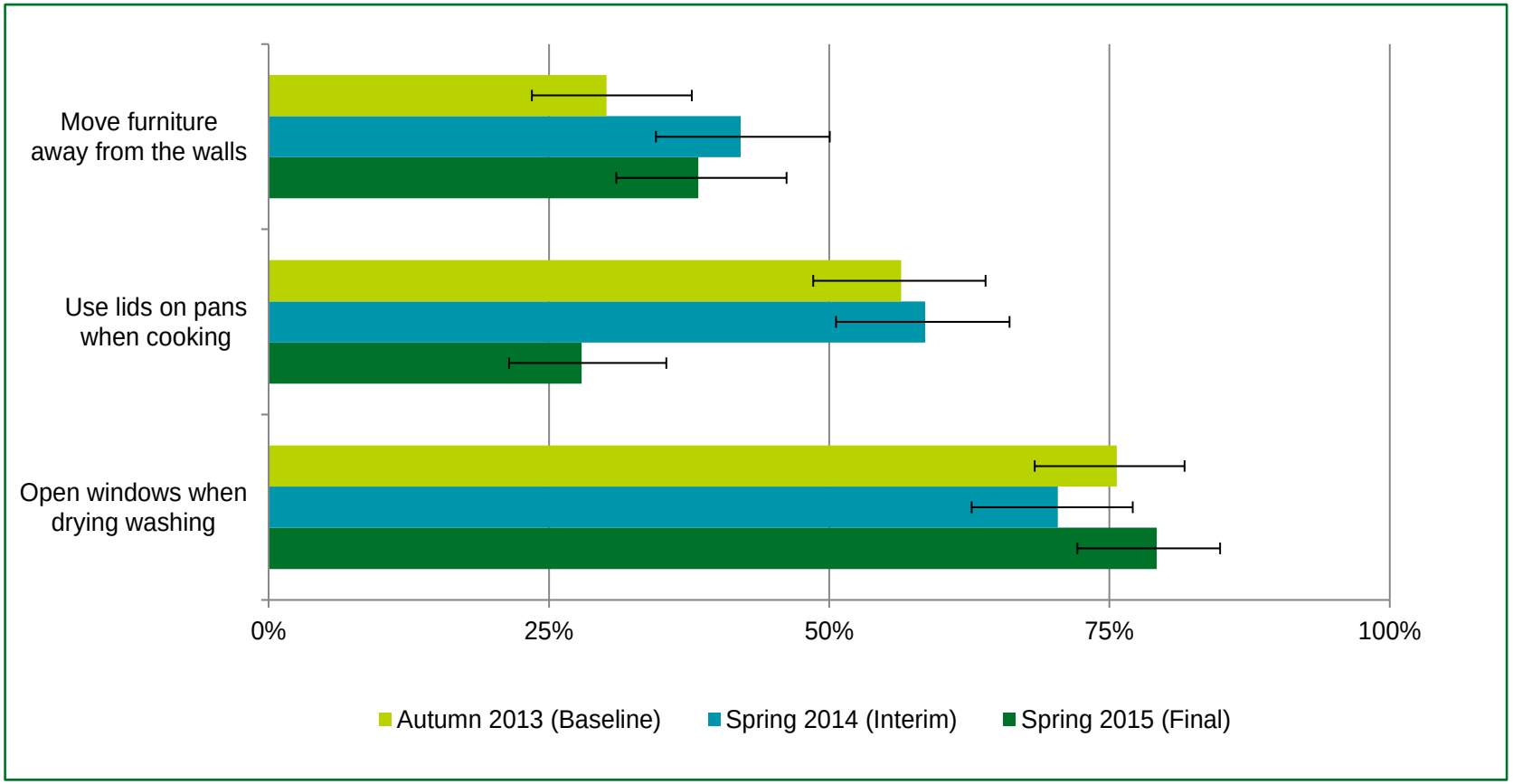
Findings: Condensation, damp and mould (3)

Figure 11: Knowledge of condensation, damp and mould prevention measures before and after EWI fitted



Understanding differences in experiences of condensation, damp and mould

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- While the survey findings showed a reduction in the number of people reporting problems with condensation, damp and mould, one-third (50 out of 154 people) said they were still experiencing problems after the EWI had been fitted. The qualitative interviews highlighted some possible explanations.
- Interview participants who were still experiencing problems with condensation, damp and mould a year after the insulation was fitted described difficulties in ventilating the bathroom to keep this at bay.

  "There's still damp in the toilet,…there's no extractor, so we have to have the window open, but there's still water dripping and it makes the whole pipe damp and black".

- Over the three phases of research, interview participants were on the whole unable to recall receiving any information from the EWI contractor on preventing condensation, damp and mould. Where interview participants had picked up information, it had come from a variety of sources (including Islington Council; on-line materials from other Councils; and a information session held in the community centre next to Holly Park).
- There was no increase in knowledge of damp prevention measures before and after the insulation was fitted (figure 11).
- Even where residents were aware of damp prevention mentions, the interviews highlighted difficulties in implementing these. These included reluctance to open widows during winter when they were struggling to keep their properties warm as well as difficulties moving furniture away from walls when properties were reported as already being cramped.

Case study: Condensation, Damp and mould

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Stephanie* lives in a two bedroom property in Holly Park with her partner and two young children, aged 5 and 7. They have lived in the property as council tenants since 2011.

They have experienced problems with damp and mould since moving in to the property, affecting both bedrooms; the kitchen and the bathroom.

"We noticed very soon after we moved that it was damp and there was mould. It's worst in the children's bedroom, they have a cupboard in the corner against an outside wall. It's completely black, it's completely mouldy".

Stephanie worried about the how the damp might impact on the health of the family:

"I don't believe damp is good for you, it must affect us even if we can carry on functioning. [My partner] didn't have asthma as a child, he developed it as an adult quite late, where we lived before. We don't know what triggered it, we're not sure why he started to have asthma, whether the conditions of the home contributed".

In research completed shortly after the completion of the EWI (interim stage) Stephanie expressed concerns that the EWI was not impacting on the presence of damp and mould, with an exposed glass panel believed to be cause of the problem. However, twelve months on from the completion of the EWI, Stephanie reported a considerable improvement in the presence of damp and mould in her property.

"*After the [insulation] work, someone came and treated the mould and it hasn't returned. Because you can treat it but then after a while it returns so the fact that it's not, well, it hasn't returned, I'm hoping that the insulation has got something to do with it".*

"We repainted our bedroom so it looks really nice now. The toilet had mould as well but that's been repainted recently and at the moment there isn't any sign of mould. In the children's room, you can still see, more hasn't grown again, but you can see where there's been mould at some point".

*** Names have been changed to preserve anonymity.**

Findings: Health and Wellbeing (1)

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- About one quarter of survey respondents (in both the baseline and final survey, 36 out of 156 and 37 out of 154 people respectively) reported having a limiting long-term illness, higher than the borough average of 16%.
- In the final evaluation survey, 82% of respondents (127 out of 154 people) rated their health as good or better than good. There was no statistically significant improvement in overall perceptions of health among survey respondents.
- The vast majority of respondents (86% or 120 out of 140 people) in the final evaluation survey rated their overall health the same as it was two years ago. Nine percent felt that their health had deteriorated; while 5% felt it had improved from two years ago.
- There was a decline in the frequency of coughs and colds reported among survey respondents; 16% of respondents (24 out of 154 people) having experienced these within the three months before the final survey (March, April and May 2015) compared with 37% (or 57 out of 156 people) in the three months before the baseline survey (September, October and November 2013). Some of this reduction may also be seasonal as the time periods considered were not directly comparable. There was no difference in before and after insulation levels of Asthma; Eczema; allergies or Depression/Anxiety (figure 12).
- It has not been possible to analyse change in severity of these conditions due to the relatively small number of people reporting these conditions in the survey.
- With the exception of fixed GP appointments, there was no statistically significant difference in self-reported health service use before and after the insulation was fitted (figure 13). It is not possible to determine the cause of the fall in GP fixed appointments which could be related to other external factors.

Findings: Health and wellbeing (2)

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Figure 12: Prevalence of health conditions before and after EWI fitted

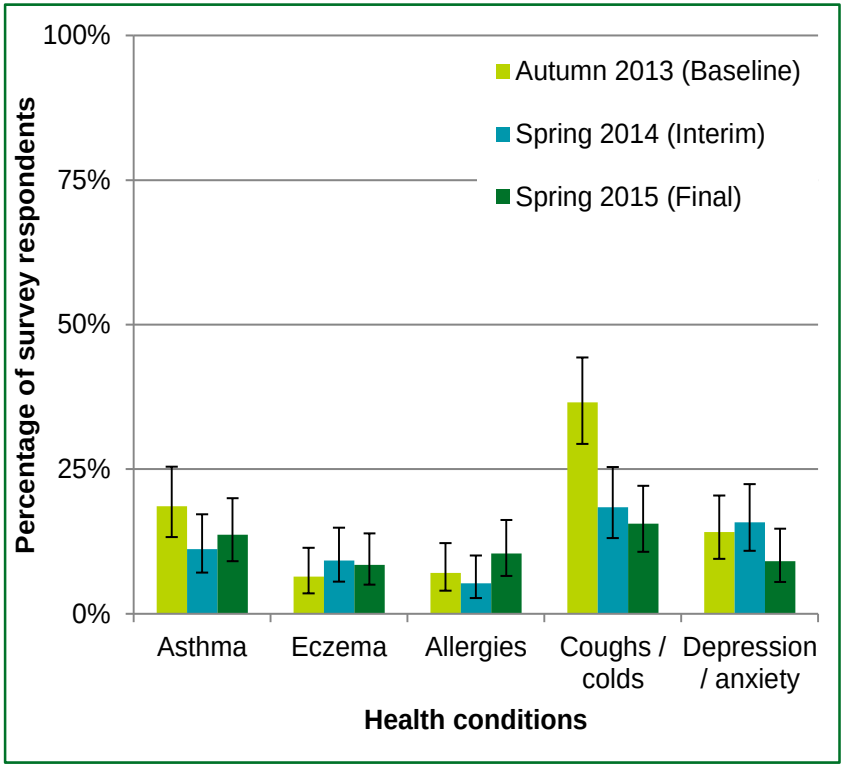
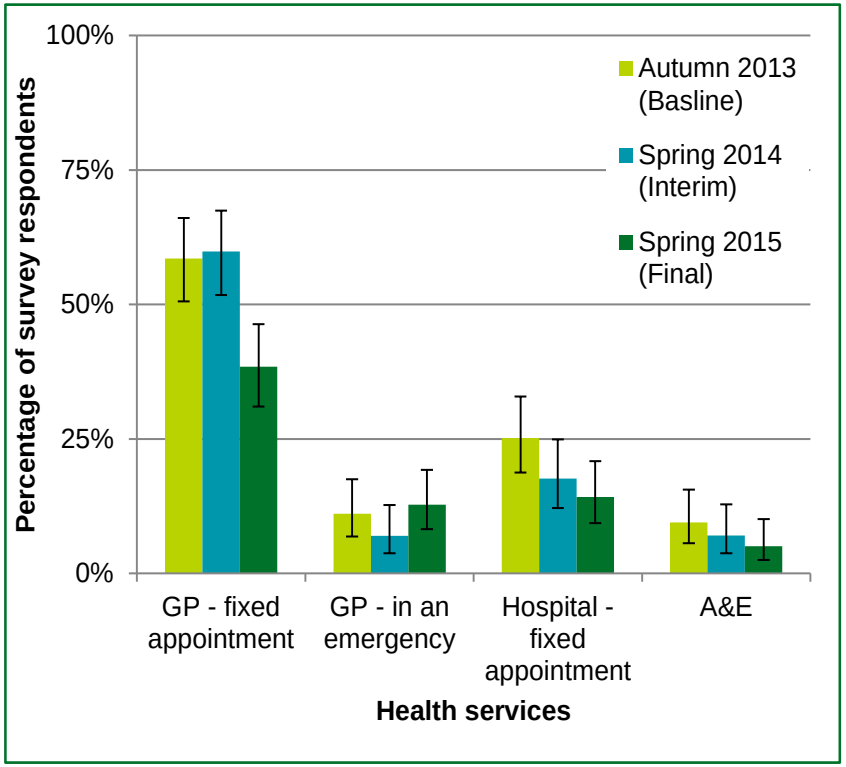


Figure 13: Self-reported health service use before and after EWI is fitted



Summary (1)

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The findings show that the installation of EWI across the Holly Park estate has had a positive impact on improving residents' thermal comfort and reducing their energy usage and bills. They also show some respite in problems with condensation, damp and mould.

Thermal comfort:

- Living in a cold home (under 16 degrees centigrade) impacts detrimentally on physical and mental wellbeing[7]. It is estimated that at least 1 in 10 excess winter deaths are caused by fuel poverty[8].
- EWI at Holly Park had a positive impact improving thermal comfort. The number of people who said their property was warm enough with the heating on rose considerably after the EWI was fitted: from 69% (103 out of 150 people) before the insulation was fitted to 95% after (133 out of 140 people).
- The evaluation compares thermal comfort over three winters. The external air temperature is a key influencing factor on thermal comfort. The 2013/14 (interim) winter was relatively warmer than both the 2012/13 (baseline) and 2014/15 (final) winters. However, the average temperature of the baseline and final winters were similar, suggesting this is a valid comparison.

Energy use and bills:

- Between 2004 and 2013 national average domestic energy bills doubled [9].
- It is estimated that around 20% of the population in Islington spend more than 10% of their income after housing costs on energy bills and reducing energy bills is a priority in Islington's current corporate plan.
- In line with the findings on improved thermal comfort, survey respondents reported a considerable reduction in the amount of time they used their heating.
- The proportion of people who used their heating for more than six hours per day decreased from 31% (47 out of 150 people) before the EWI was fitted to 10% after (14 out of 139).
- Survey findings record a £10 monthly saving in the median bill amount over winter, from Autumn 2013 to Spring 2015. This is likely to be an underestimate as those paying by Direct Debit would accrue these savings through every month of the year and not just during winter months.

Summary (2)

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Condensation, Damp and Mould

- Survey findings recorded a reduction in the number of people reporting problems with condensation, damp and mould from 50% (or 78 out of 156 people) in the baseline survey, to 32% (50 out of 154 people) in the final survey. One-third of respondents in the final survey (17 out of 50) experiencing issues with condensation, damp and mould felt that that this was not as severe as it had been before the insulation was fitted.
- There was no evidence of an increase in knowledge of damp prevention measures among residents, with the vast majority of those interviewed unable to recall receiving any information on this from the EWI contractor.
- The findings indicate that bathrooms and bedrooms are the rooms most commonly affected rooms. Interview participants with persistent mould problems described difficulties ventilating bathrooms.

Health and Wellbeing

- The survey and interviews indicated that the EWI had an impact on wellbeing; for example, there was a dramatic fall in the number of people who said they restricted their heating due to concern over heating bills; 73% of respondents (110 out of 120 people) said this was sometimes or always a concern before the insulation was fitted which fell to 20% after (28 out of 140 people).
- The survey findings revealed a marked improvement in the frequency of coughs and colds among respondents – with 37% (57 out of 156 people) reporting to have had a cough or cold within the three months before completing the pre-insulation survey, compared with 16% (24 out of 154 people) in the final post-insulation survey.
- Prevalence levels of asthma; allergies; eczema and anxiety or depression remained unchanged over the research stages. This is to be expected given the chronic and long-term nature of these conditions. Unfortunately, due to relatively small numbers of survey respondents reporting these conditions it was not possible to conduct analysis to understand whether there was any difference in the self-reported severity of these conditions.

Conclusion and recommendations

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- This evaluation found that the EWI has positively impacted on residents in Holly Park – significantly improving the warmth and comfort of their homes and reducing the amount of money they spend on their bills. Interview participants also highlighted the improved appearance of the estate following the installations of the external cladding.
- For some, there was also an improvement in problems with condensation, damp and mould but this was not reported across the board.
- Understanding the full impact of the EWI on health and wellbeing has proved more difficult. While the research indicates there may have been some improvements in wider wellbeing, such as a reduction in the level of concern over heating bills from the baseline to final surveys, the impact on physical health conditions has been harder to track. The number of people self-reporting conditions which can be associated with living in cold and damp homes was too small to identify whether or not there had been any changes in the severity of these long term conditions.
- The findings of this evaluation should be viewed in the context of wider evidence considering the efficiency of external wall insulation. It has not been possible within this evaluation to undertake a cost-benefit analysis and wider evidence in this area is limited. The relatively expensive installation costs of external wall insulation when compared with other energy efficacy interventions means that it can be a long period of time before cost savings offset installation costs.

Further information

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Appendix 1: understanding the graphs in this report

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- The black bars on the graphs are confidence intervals.
- Confidence intervals are used to quantify the imprecision in the calculation of a particular value – if we repeated the survey 100 times the results would fall in this range 95% of the time.
- This reflects the uncertainty in survey responses – for example we know that not all Holly Park residents completed the survey.
- The wider the confidence interval, the greater the uncertainty in the estimate.
- By comparing confidence intervals around estimates we can talk more definitely about differences:
  - Where confidence intervals do not overlap we can be sure that differences are real, whereas with confidence intervals that do overlap it may be that the difference would disappear if more, or different, people completed the questionnaire.