APPROVED
By Ian Weller at 1:32 pm, Dec 19, 2008

'Warmer Homes – Easier Breathing'

Project Evaluation Report

Sefton Council

NHS Sefton

SEFTON energy team

NRF
SEFTON NEIGHBOURHOOD RENEWAL FUND
Improving Public Services

‘My child suffers from frequent chest infections and constant colds and attends many clinics and GP appointments and has accessed emergency services a few times recently. The house is very cold.’

‘The teacher makes him rest during PE lessons as he becomes very breathless and hot. He’s only just been diagnosed and he’s had many chest infections recently.’

‘When her asthma is bad, she’s unable to take part in PE at school and unable to play out or in the house.’

‘He gets extremely breathless just walking the short distance to school each day. He attends many appointments and is frequently unable to take part in PE.’

‘Always coughs at night and first thing.’

‘He panics when he gets breathless and is very reluctant to take part in PE in school. He coughs frequently at night and this disturbs his sleep and leaves him feeling very tired during the day.’

Project Evaluation Report on Sefton's 'Warmer Homes – Easier Breathing' Project

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Acknowledgements

The project team would like to acknowledge the valuable feedback to this project by Chris Doyle, Respiratory Specialist Nurse at the Royal Liverpool Childrens' Hospital. We also thank her colleagues who gave some informal feedback.

We would also like to thank the families who joined the project and Dr Halstead, Seaforth Village Practice, Dr Choudhary, Netherton Health Centre and Dr Taylor, Litherland Town Hall Health Centre for their co-operation and assistance to help identify some of the families for the project.

We were also glad to receive funding from the Neighbourhood Renewal Fund and guidance and support from colleagues within Sefton Council, Liverpool City Council, NHS Sefton and neighbouring PCT's, and Stirling Howieson from the University of Strathclyde.

Contractors:

Envirovent

Property Care Services

Sounder Sleep Company

The Sonickleen Company

Puffa Pouch

A&M Insulations

CJK Heating Services

Anchor Staying Put

Grove Creative

EPPlus

Introduction

Asthma is a condition that affects the airways – the small tubes that carry air in and out of the lungs. When a person with asthma comes into contact with something that irritates their airways (an asthma trigger), the muscles around the walls of the airways become narrower and the lining of the airways becomes inflamed and starts to swell. Sometimes sticky mucus or phlegm builds up which can further narrow the airways. All of these reactions cause the airways to become narrower and irritated – making it difficult to breathe and leading to the symptoms of asthma which are related to coughing, shortness of breath, wheezing, tightness of the chest and difficulty breathing.

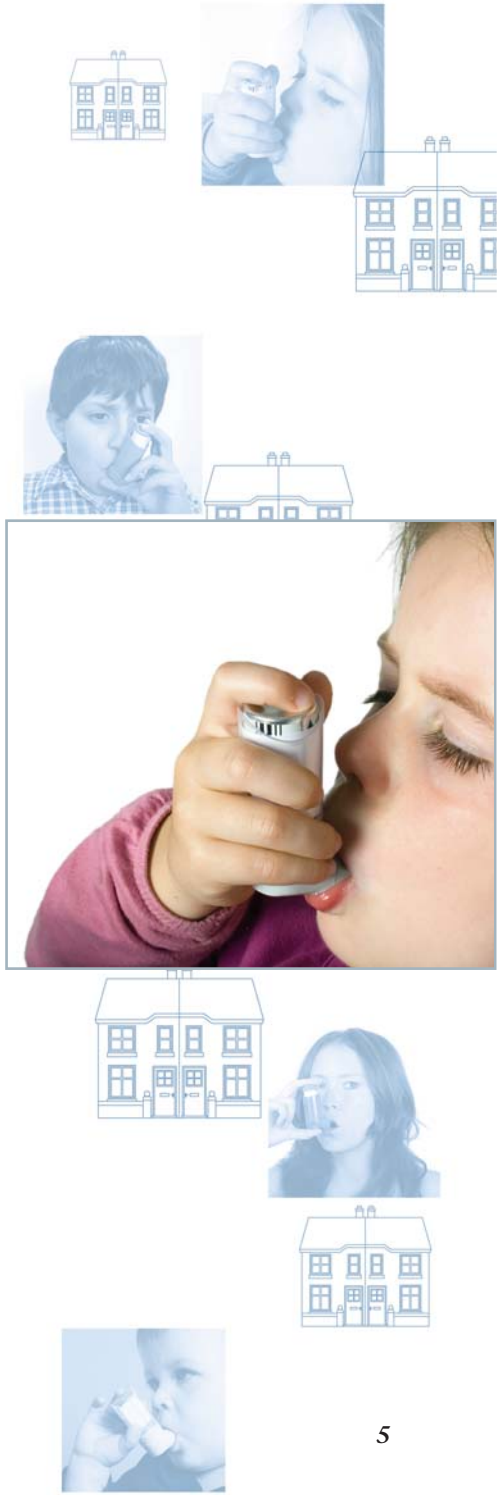
What is the impact of Asthma in the UK?

- ***5.2 million people in the UK are currently receiving treatment for asthma***
- ***1.1 million children in the UK are currently receiving treatment for asthma***
- ***There is a person with asthma in 1 in 5 households in the UK (Asthma UK, Asthma essentials, 2007, page 6)***
- ***NHS Sefton has an asthma A&E admission ratio 88% higher than the England average for children aged 0-14 (Wish You Were Here, Asthma UK, Asthma essentials, 2007, page 6)***
- ***Respiratory disease is the most common cause of emergency admission in Sefton for children and young people with 1,300 admissions per year (NHS Sefton, Public Health Annual Report 2008, page 32)***

Potential link between asthma and house dust mite

There is evidence to suggest that asthmatics can be sensitive to dust mite faecal droppings that act as an allergen. These can accumulate to very high levels in homes, particularly in bedding and soft furnishings. House dust mites thrive at higher relative humidity levels around 70-80%. It may be possible to control house dust mite numbers and remove the existing allergen reservoir. This can be achieved by steam cleaning bedding and soft furnishings, improving insulation and heating systems in the homes all combined with the installation of appropriate ventilation systems.

High humidity is very important to the survival of house dust mites as most of their water is gained from the atmosphere by osmosis (Howieson, S. 2005, Housing & Asthma, Edition 1, Taylor & Francis). Humidity is the amount of water vapour that is contained in the air. The warmer the air, the more vapour can be held. At higher levels of humidity, such as 80% some of this vapour can condense on cooler surfaces, often imperceptible (condensation on windows is the most obvious form because of the large quantities of water involved). As house dust mites rely on moisture to survive, controlling humidity levels in the home can control house dust mite populations thereby reducing the amount of allergen generated in the home.



Sefton issues and fuel poverty

Within Sefton there are a high number of older, solid walled or 'novel' building technique properties that are classed as hard to heat, estimated at approximately 50% of the stock. The 2007 Private Housing Stock Condition Report for Sefton showed that 53,925, or 51.3%, of non Housing Association households were built before 1945. These properties are difficult or expensive to heat (costing 18-32% more to heat on average than newer properties). Lack of adequate heating will lead to high humidity levels. In addition, high humidity levels may also be the result of certain styles of housing and living (i.e. indoor drying of clothes). Furthermore, these households are more likely to be affected by fuel poverty.

Fuel poverty is defined as a household needing to spend more than 10% of its income to adequately heat the home.

The causes are due to a combination of low household income, poor insulation standards, inefficient or expensive heating systems and high fuel prices.

The aim of this project was to provide an improved (indoor home) environment for the sufferers and families of asthmatic children living in 'Neighbourhood Renewal' areas, by providing physical adaptations to the homes to reduce conditions that encourage house dust mite populations. It also aimed to provide up to date, evidenced based information that could potentially improve health and well being.

Project eligibility criteria

- ***Families needed to have at least one child up to 11 years old who had asthma***
- ***Asthmatics needed to be currently using preventative medication***
- ***Live within the Neighbourhood Renewal Area***
- ***Smoke free home, not necessarily non smoking parents***
- ***No pets***

These children were initially identified by their GP Practice who wrote out to families who met the criteria to explain the project. The GP Practice also included the contact details of the Project Lead within the Local Authority. It was then left to parents to refer themselves into the project if they so wished. No contact details were passed from the NHS to the Local Authority to ensure data protection guidelines were not breached.

Families who 'opted in' to the project were then visited at home to have the project explained in more detail. If they still wished to be included in the project then an initial assessment of the home environment was undertaken to assess the measures needed.

Method of treatment

This project aims to reduce house dust mite levels by;

- ***Altering the environment favourable to house dust mites,***
- ***Removing the existing reservoir of allergens and house dust mites,***
- ***Replacing bedding with house dust mite barrier bedding,***
- ***Providing an individual package of health advice and adaptations.***

Changing the environment favourable to house dust mites

House dust mites thrive at higher relative humidity levels of 70-80% so reducing humidity levels will diminish their capacity to live and breed. There are two key ways of affecting humidity:-

i. ***Increase the temperature and hence the carrying capacity of the air to hold water***

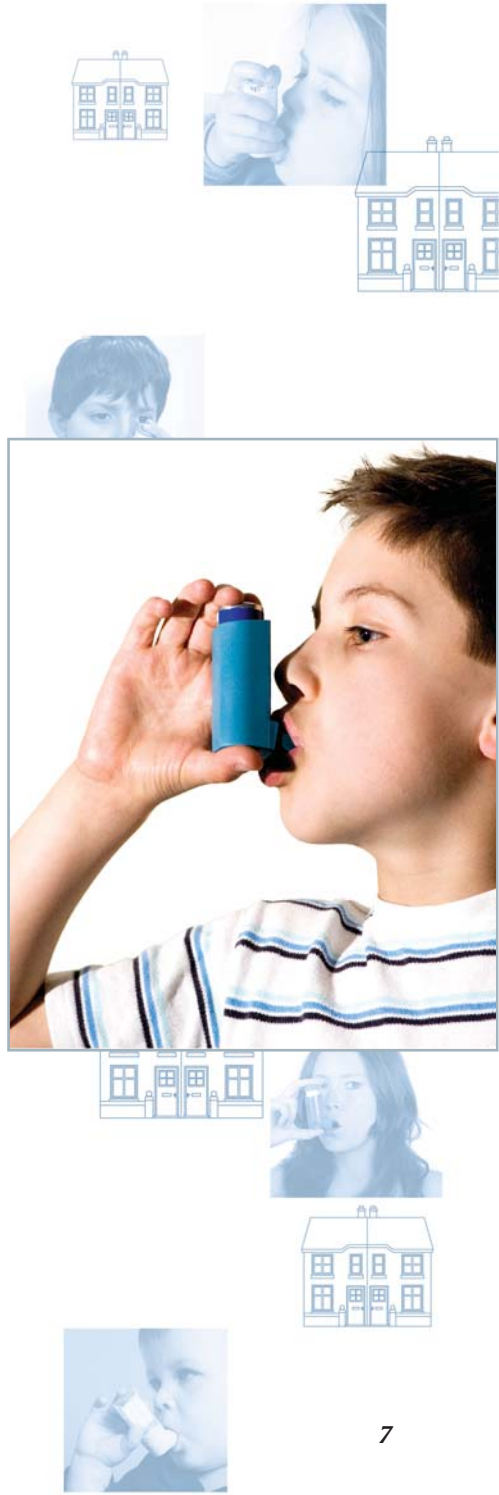
ii. ***Remove the existing moisture from the air and the causes of moisture***

The project addressed both of these techniques for maximum effect. Each home in the programme was assessed for 'energy efficiency' and where appropriate, insulation and heating added or improved to current standards. Thus making the home more economical and capable of attaining comfortable temperatures in order to hold more moisture.

Secondly, each home was fitted with ventilation to remove the moisture that builds up indoors to the outside. In order to reduce any financial impact on the home, heat recovery ventilation was utilised. This method offsets the costs of running the extraction fans by preheating incoming air with free heat sources for example the loft space of a home can accumulate significant amounts of heat which can be used to preheat the incoming fresh air.

In addition to this, families were issued with practical advice on how to keep the sources of moisture in the home to a minimum, for example;

- ***Keeping lids on saucepans when cooking***
- ***Drying clothes outside where possible***
- ***Keeping bathroom and kitchen doors closed to keep moisture out of the rest of the home***



Initial home assessments

At the start of the project an initial assessment was undertaken to ascertain the condition of the home environment prior to installing the improvement measures. This assessment included a review of:-

- ***Loft insulation***
- ***Cavity wall insulation***
- ***Central Heating***
- ***Flooring***
- ***Dust mite levels***
- ***Soft furnishings***
- ***Windows/existing ventilation***
- ***Smoking***

Evaluation methodology

An initial baseline questionnaire was completed by the parent (see appendix 1). Following this a monthly questionnaire was completed (see appendix 2) to observe/monitor any changes.

Method

Removing the existing reservoir of allergens and house dust mites

A professional steam clean was commissioned for each home after the ventilation, heating and insulation measures had been installed. Steam penetrates soft furnishings without damaging them and breaks down the allergen and dust mite source. This combination of improved ventilation, heating, insulation and cleaning should prevent dust mite levels rising significantly in the future.

The family was also provided with information on cleaning and washing bedding to minimise dust which the dust mite feeds on.

Replacing bedding with house dust mite barrier bedding

As soon as the steam clean was completed, new protective bedding was provided, which included a protective mattress cover, duvet and pillow.

An individual package of health advice

This was undertaken in conjunction with a range of health education measures aimed at the child and their carers to improve concordance with medication, inhaler technique* and other self help measures aimed at controlling and improving asthma symptoms.

* The project lead, a non medical professional, was not qualified to provide medical advice and therefore referred all families to their respective GP practice. Only 2 of the 13 families felt the need to make contact with their GP practice.

Figure 1. Project control process

Home improvement measures

Loft insulation

Up to 20% of a typical energy bill can be saved by effective loft insulation. Of the 13 homes involved in the project only 4 homes had adequate levels of insulation within their lofts. Therefore 9 homes had their insulation increased from between 2-4" to 12" (270mm).

Average cost: £189

Cavity wall insulation

Cavity wall insulation is an ideal way to significantly reduce the amount of energy you need to heat your home. The average house could reduce heating costs by 15%. Of the 13 homes involved in this project 2 homes did not have cavity wall insulation, 5 homes already had it installed and 6 homes had solid walls, typical of many of the older houses within Sefton, so were unable to have this form of insulation. The 2 homes suitable for cavity wall insulation had it installed.

Average cost: £250

Gas central heating

12 homes already had gas central heating installed, although 1 central heating system was not working and needed replacing. Therefore 2 central heating systems were installed as part of the project.

Average cost: £3,000

Heat recovery room ventilation units

These units are similar to extractor fans but have a heat exchanger that recovers 60% of the heat from outgoing air. They also extract the moisture vapour from the air which results in a lower risk of condensation and damage to the fabric of a building and occupants' possessions from mould growth. Moulds release tiny seeds called spores into the air, which can trigger asthma symptoms in some people. Mould spores are found in any damp place such as bathrooms, kitchens and even piles of damp clothes. Lower levels of condensation also make it more difficult for the house dust mite to survive. All homes had a unit installed.

Average cost: £415 – £700

Steam cleaning

Many people with asthma are sensitive to the droppings of house-dust mites. These are tiny creatures that live in the dust that builds up around the house, in carpets, bedding, soft furnishings and soft toys. All the homes had a steam cleaning procedure undertaken at the start of the project which included steam cleaning of the child's bedroom, mattress and other soft furnishings and the living room. This was to reduce the dust mite load within the home.

Average cost: £200

Barrier bedding

As high levels of dust mite can be found in bedding, all asthmatic children's bedding was replaced with hypo allergenic bedding and mattress protectors after steam cleaning. Where siblings shared a room with an asthmatic sibling their bedding was replaced also.

Average cost: £200

Miscellaneous items

It was necessary to provide additional measures to assist some families to keep dust levels to a minimum following the professional cleaning session. Such items included:

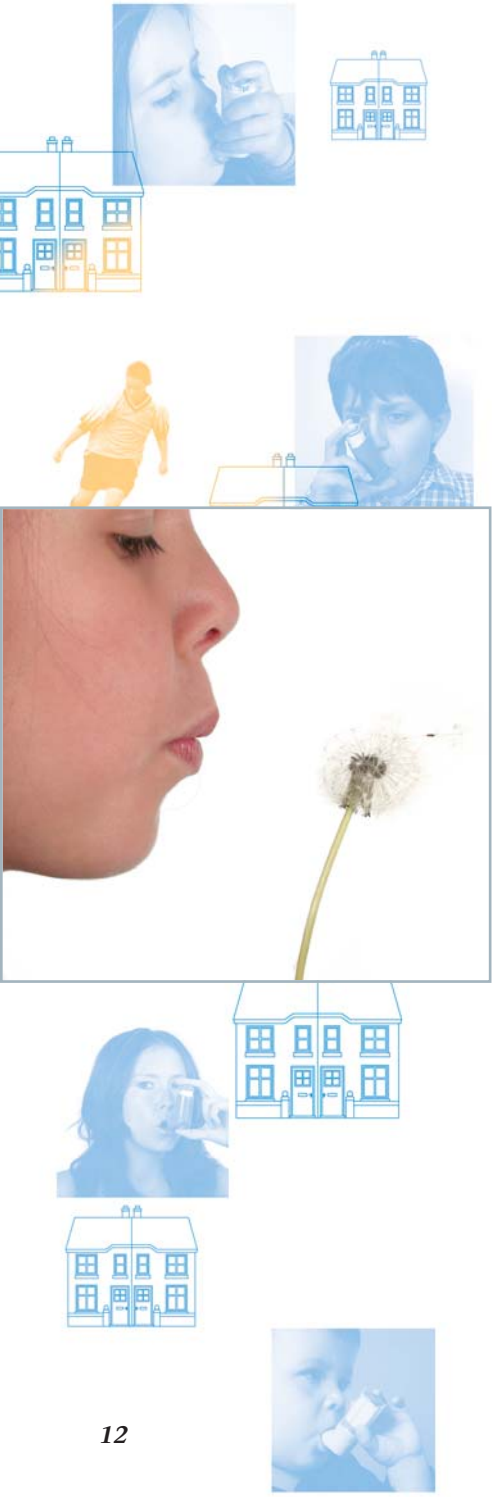
- ***Condensing tumble dryers***
- ***Bagless vacuum cleaners with HEPA filters***
- ***Laminate flooring in the child's bedroom***

Health advice

All families were advised to have a check up with their practice nurse for an asthma review, if their child had not had one in the last 6 months. Although only 2 of the 13 families sought GP advice to improve inhaler technique, the majority of the families indicated that they would make arrangements to organise an asthma review.

Families where a member of the household smoked were referred to the Smoke Free Homes project and to the Smoking Cessation Service.

An information leaflet on asthma was given to all families. (see appendix 3)



Results

Sampling issues

Individuals were not assessed for sensitivity to house dust mites as there were issues around ethical approval to undertake sensitivity testing. Moreover it is suggested that sensitivity to house dust mites among asthma suffers is as high as 80%, therefore it was decided to proceed and assume 100% sensitivity. In addition, the scheme relied on self referrals from sufferers' parents, so no sampling methodology was applied to ensure a good baseline.

Furthermore the small pilot only dealt with a small number of cases (13 families – 16 children) and the results need to be viewed in that context. As the scheme had no dummy interventions it is not possible to assess any placebo effect. However, the interventions are broadly considered worthwhile from a fuel poverty and energy efficiency perspective, irrespective of their impact on asthma management.

Parent's baseline questionnaire

The vast majority completed their baseline questionnaires in August and September, prior to having any improvements made to their home environment.

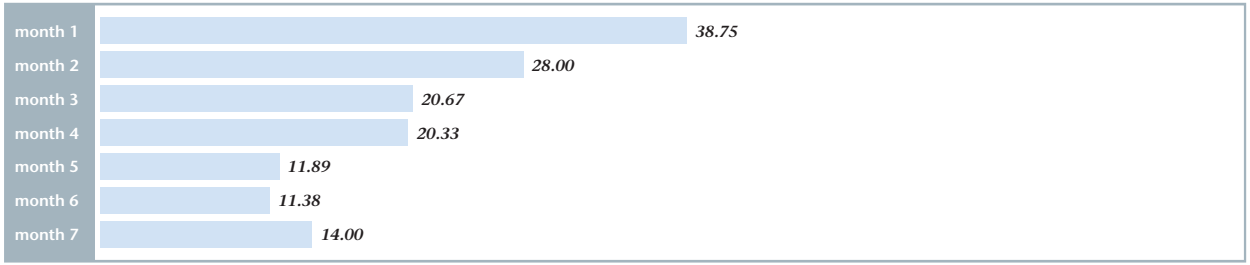
Figure 2. Parental assessment of severity of asthma

Assessment at start of project			Assessment at end of project		
MILD	MODERATE	SEVERE	MILD	MODERATE	SEVERE
4	7	5	7	5	4

Over the course of the intervention it was observed that self assessed perception showed a small shift away from severe towards mild (more parents reporting their child's asthma as less severe by month 6 of the programme).

Figure 3. Mean "blue" inhaler frequency per child per month

Parents reported the frequency that children used their ***'blue'*** inhaler in the month prior to the start of the project. This figure shows the reduction in inhaler usage over the course of the project.

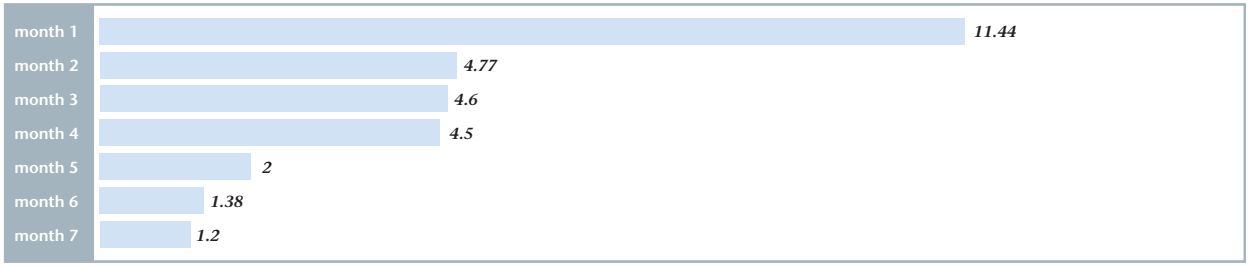


This mean use of the blue inhaler reported by parents was reported at 38.75 times per month in the first month of the programme. This fell to 11.38 in the month 6 at its lowest but was 14 by the end of the programme in month 7. This increase in the latter stages could be attributed to two reasons;

1. Some children were only on the programme for a limited period and hence have a more disproportionate impact on the results (particularly as this includes only mild sufferers)
2. One parent was impressed with the results of the programme and tried removing the preventive medication (without knowledge or consultation with the scheme). This caused the child's blue inhaler use to rise as a result.

Figure 4. Frequency of night time coughing per child per month

Figure 5. Frequency of sleep disturbances due to asthma per child per month



The intervention showed dramatic improvements in night time comfort with the average child (and subsequently parent) benefiting by at least a 50% improvement in reduced night time disturbance. Whilst the figures above show the progression throughout the programme as an average per child per month, individual analysis shows baseline to end of programme improvements are 8 nights less for coughing and 6 nights less for sleep disturbance.

Figure 6. Average school absences per child

Figure 7. Average visits to unplanned care per child per month

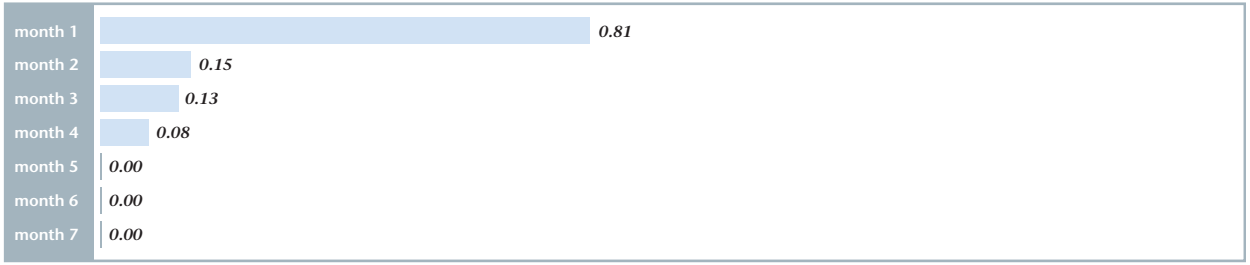


Figure 8. Dust mite load

All homes were assessed for levels of dust within their home at the start of the project. Dust sample tests were carried out in 12 homes during the initial assessment stage and again when all work was complete. The results are as follows:

Dust mite levels BEFORE work completed			Dust mite levels AFTER work completed		
HIGH	MEDIUM	LOW	HIGH	MEDIUM	LOW
8	4	0	0	2	10

Figure 8 Dust Mite Load shows that the sample population of households had either a 'High' or 'Medium' level of House dust mite presence detected prior to the interventions. After completed works and steam cleaning, repeat tests showed that no homes had high levels and most, 83%, had low levels. This supports the programme of works as being effective at removing the existing population of house dust mites.

Smoking

Only 2 homes had parents who smoked although both parents said they smoked outside the home or smoked by an open window.

Overview of results

The initial pilot scheme had a budget of £25,000, yet in practice to deliver for 13 families the final cost of the pilot were only £22,000 (costs have now been reduced to an average of £1,100 per household).

From a medical/pharmaceutical perspective the interventions demonstrated very positive 'self reported' results.

40% reduction in 'blue' inhaler use

NHS Sefton spent £329,472 in 2007/08 on salbutamol (blue inhalers). The cost per inhaler is £2.88 per 100mcg containing 200 doses (200 puffs).

92% drop in unplanned attendances in A&E / Walk in centres

The average cost per visit to the Royal Liverpool Children's Hospital (Alder Hey) is £78.51 per child. Therefore, the potential cost saving to NHS Sefton is £1021 per month for this group of children.

Furthermore from a sleep and hence educational basis, improvements were also significant.

59% reduction in night time coughing

53% reduction in sleep disturbance

60% reduction in school absences

Some of the unexpected outcomes of the pilot were anecdotal observations regarding improvements among both participants and siblings in eczema conditions. There were also a significant number of families who reported less, or less severe respiratory illness, and hence use of medication. Whilst the heat recovery ventilation unit was selected to have minimal burden on households most families reported a reduced need to heat homes as a result of the unit, although one did report the opposite.

Two families were referred for a welfare benefit check – one of the families was awarded the low rate care component of Disability Living Allowance and Disabled Child Premium, resulting in an additional £66.72 per week.

Lessons learned/recommendations

Observations	Recommendations
The families joined the project on a staggered basis due to problems and delays encountered at the beginning of the scheme. Some were assessed during the summer with some assessed during the winter. This meant that the baseline information was inconsistent due to a number of factors including term time, seasons and length of time involved with the project.	At least 3-6 months planning time should be allocated to any similar project to ensure recruitment of families to the project and initial assessments to be carried out within a short time scale in order that a co-ordinated programme of work can be organised with installers and contractors.
Assumptions were made at the beginning of the project that health professionals could refer eligible families to the scheme. It took time to establish the strict governance and data protection procedures to which the NHS is bound and would prevent direct referrals from health professionals.	Ideally, any similar scheme should be co-ordinated within the health sector to overcome governance and data protection issues.
The project lead, as a local authority employee and with no technical expertise, was somewhat restricted with regard to drawing up schedules of work for each property, liaising with installers and contractors as well as inspecting the work carried out. At times, the work involved in organising the project accounted for most of the project lead's working day.	A home improvement agency would be ideally placed to co-ordinate the schedule of works on any similar scheme as they have the administrative and technical expertise to oversee the whole process.
The eligibility criteria set out to involve severe asthma sufferers on the project. However, some of the children had siblings who were mild sufferers and were subsequently included on the programme accounting for a significant proportion of mild sufferers.	As there was minimal improvement in mild sufferers, a decision needs to be taken whether to include the results for mild sufferers on the final evaluation.

Easier breathing pilot – case study

Master W, aged 10 was referred to the pilot by his GP. At the initial assessment, his asthma was self reported to be severe, he was absent from school for approximately 3-5 days per term and in the twelve months prior to the pilot project had accessed A&E on more than one occasion. His parents said they had tried a number of different strategies over the years to try to improve his condition but to no avail. He was described by his parents as a sensitive child who was reluctant to take part in peer group activities, particularly PE lessons at school. He suffered night time coughing bouts that frequently kept him awake and he was therefore usually very tired and lethargic during the day. The family home was well maintained but it was noted that condensation was present on the windows on a daily basis.

A heat recovery ventilation unit was installed to reduce humidity levels and ensure a constant supply of fresh air in the home and the insulation in the loft was topped up from 4" to 12" (270mm). When all of the measures were completed, a specialist cleaning firm carried out steam cleaning to the mattress and a general damp dust throughout the home to remove the allergen reservoir. The existing bedding was removed and replaced by a new mattress cover and bedding.

Within days, the family had noticed a dramatic improvement. There was no condensation and they had to turn the thermostat down by a couple of degrees due to the property being much warmer. Master W did not suffer any further bouts of coughing and was reported to be sleeping much better. His parents noticed that he had more energy and was not as tired in the mornings. During an open evening at school, Master W's teacher explained that she had noticed he seemed much more alert in class whereas he would usually look tired and uninterested. She said that he had taken part in PE and seemed to be enjoying the lessons. She also commented that he had potential to be a good long distance runner.

Over the course of the pilot project, Master W's condition continued to improve. His parents explained that usually during the winter period his health would deteriorate and he would need to visit the GP to be given antibiotics or additional steroid medication, during the winter period 2007/08 he had no asthma attacks and his condition remained stable. He was continuing to improve and his parents were delighted to be told that his attainment levels had improved having been assessed in Spring 07 at just level 3 to a high level 4 in Spring 08. His attendance levels had also improved significantly with only 1 day absent from school during the 8 month period the family were involved with the project. It was also noted that he was interacting more with his peers and felt more able to join in without fear of an asthma attack.

In addition to the improvement in the quality of life experienced by Master W, one of his siblings had also noticed a reduction in the amount of steroid cream required for her skin condition (eczema).

Appendices

Appendix 1

Parents baseline questionnaire

To be completed by Parent/ Guardian

Date:……..

Name……

Address……

How would you describe your child's asthma?

Mild——————————————————Moderate——-——————————————-Severe

How many times has your child needed to use their inhaler in the last month?

……

In the last month, how many times has your child been bothered by night time coughing?

……

In the last month, how many times has your child's sleep been disturbed because of their asthma?

……

How many days has your child been absent from school in the last school year because of their asthma?

……

Apart from any planned visits to the doctor or practice nurse, how many times has your child had any unplanned attendance at A& E or the local walk in centre in the last month because of their asthma?

……

Appendix 2

Parents monthly questionnaire

To be completed by Parent/ Guardian

Date:……..

Name……

Address……

Compared to last month how would you describe your child's asthma?

Mild——————————————————Moderate——————————————————Severe

In the last month how many times has your child needed to use their blue inhaler?

……

In the last month, how many times has your child been bothered by night time coughing?

……

In the last month, how many times has your child's sleep been disturbed because of their asthma?

……

In the last month how many days has your child been absent from school because of their asthma?

……

Apart from any planned visits to the doctor or practice nurse, how many times has your child had any unplanned attendance at A& E or the local walk in centre in the last month because of their asthma?

……

Please use this space for any additional information you feel may be useful

Appendix 3

Asthma information leaflet

THE INDOOR ENVIRONMENT AND ASTHMA

There are lots of triggers for asthma and many people with asthma can be sensitive to the droppings of house dust mites which are found in every home, however clean it is! These are tiny creatures that live in the dust that builds up around the house in carpets, soft furnishings, soft toys and bedding.

Dust mites need moisture to survive. They live by absorbing moisture and oxygen from the atmosphere

Good ventilation benefits people with asthma. It reduces humidity which reduces the number of house dust mites and moulds.

TIPS TO REDUCE ASTHMA SYMPTOMS

Bedding – vacuum the entire mattress and under the bed regularly. This will help to remove any surface dust, skin flakes and allergen particles. Open the windows when vacuuming to generate a good flow of air.

Duvets and pillows – Check washing instructions first, but if possible wash duvets and pillows at 60°C. This kills off the dust mites.

Soft furnishings – Sofas and other soft furnishings can be an ideal environment for dust mites. These should be vacuumed frequently.

Around the home – dust around the home regularly using a clean, damp cloth. This removes surface dust without making it airborne.

Soft toys – these should be washed weekly and dried thoroughly. Putting them in a freezer bag for a minimum of 6 hours per week helps to reduce house dust mite levels

TOP TIPS TO TAKE CONTROL OF ASTHMA

* Make sure your child attends an asthma review at least once a year at your local GP practice.

* The doctor or asthma nurse will help you to:

* Get the right treatment and advise your child how to use it properly

* Understand and avoid your child's asthma triggers

* Recognise when your child's asthma is getting out of control

* Know what to do if your child has an asthma attack

COMMON ASTHMA TRIGGERS

Colds and viral infections – these are almost impossible to avoid!

Smoking/passive smoking – try to ensure your child's environment is kept smoke free.

House dust mites – the droppings from these tiny creatures that live in dust around the house are a known trigger for some asthma sufferers. Vacuum your home and dust surfaces with a clean, damp cloth frequently

Pets – furry and feathery animals are a common trigger of asthma symptoms.

Mould – mould spores are found in any damp place. Keeping your home well ventilated will help to reduce damp and mould growth

USEFUL INFORMATION

Encourage your child to take their asthma medication as directed by your Doctor or Asthma Nurse

If your child's asthma does not seem to be well controlled, contact your Doctor or Asthma Nurse for advice

Ask your GP whether your child would benefit from a 'flu jab'

Make sure you know what to do if your child has an asthma attack

For advice about giving up smoking call: 0800 195 2131

Useful Websites

www.kickasthma.org.uk
www.asthma.org.uk
www.sefton.nhs.uk

SEFTON ASTHMA PILOT PROJECT Advice leaflet

Contact: Debbie Phillips
Affordable Warmth Co-ordinator
Sefton MBC
4th Floor Magdalen House
Trinity Road
Bootle
L20 3NJ
0151 934 4734
Debbie.phillips@technical.sefton.gov.uk

NRF

'She feels better and is sleeping much better since the unit was fitted'

'My child is now sleeping through the night and no more bouts of coughing'

'He is sleeping much better'

'He has not needed his inhaler as much since the work was done'

'I've got a much better understanding now about potential asthma triggers and how to keep the home environment as dust free as possible'

'Since the work was carried out, I've been putting £2 per week less in the meter because the house is warmer'

'He still gets breathless but is much better compared to the last couple of years'

'She seems more alert and not as wheezy'

'He has not had a chest infection since the windows have been dry [no condensation]'

‘My child feels more able to join in and play with the other kids’

‘He hasn’t been off school this term’

‘We have usually been to the doctor at this time of the year for antibiotics but so far my child has not had any chest infections’

‘His teacher said that he seems much more alert in class recently’

‘I can’t believe the improvement in her condition’

Work undertaken during 2007/08 funded by Neighbourhood Renewal.

For more information please contact
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SEFTON energy team

‘Warmer Homes – Easier Breathing’ Project Evaluation Report