

The Housing, Insulation and Health Study

This Housing, Insulation and Health study aimed to see if retrofitting insulation increased the indoor temperature and improved the occupants' health and well-being. During 2001 and 2002 the study collected information on the standard of 1350 houses across New Zealand and the health of the occupants. It evaluated the effectiveness of the (then) standard EECA insulation package retrofitted into existing dwellings.

Insulation

The insulation package installed included ceiling insulation, sisalated foil under the floor, draft stopping around doors and windows and, in some areas, a polythene moisture barrier on the ground beneath the house.

The package was fitted to half the houses in the study during the summer of 2001/2002 after the baseline data had been collected over the winter of 2001. The control group houses had the package fitted in the summer of 2002/2003 after the follow-up data had been collected. An independent statistician randomised the houses to be in either the control or the intervention group.

Indoor Environment.

Cold

The odds of feeling cold always or most of the time decreased significantly in the insulated houses compared with the uninsulated houses (adjusted Odds Ratio 0.06, 95%CI 0.04-0.09, $p < 0.0001$). The odds of reporting ineffective heating after the intervention was also lower for the insulated houses (0.38, 0.25-0.57; $p < 0.0001$)

Temperature and Humidity

In a subsample of the houses the temperature and humidity was monitored over the winters. In the insulated houses the mean bedroom temperature increased from 13.6°C in the first winter to 14.2°C in the second winter, this was larger than the change in the control group houses (which increased from 13.2°C to 13.4°C)

Mould

At baseline two-thirds of the households reported damp and three-quarters mould but after insulation this declined dramatically. The odds of an insulated household reporting damp compared to an uninsulated one were 0.18 (CI 0.13-0.24; $p < 0.0001$) and mould were 0.24 (CI 0.18-0.32) .

Health and Wellbeing.

Self reported wellbeing

Self reported health improved significantly for people living in insulated houses. On a five-point general health scale people living in insulated houses were less likely to report their health as 'fair' or 'poor' (the two lowest points of the scale) (0.59; 0.38-0.68 $p < 0.0001$). This was the difference that the study was sized to pick up.

People living in insulated houses had about half the odds of reporting respiratory symptoms as those in uninsulated houses (0.57, 0.47-0.70, $p < 0.0001$). They also had reduced odds of reporting colds or flu (0.54, 0.43-0.66, $p < 0.0001$). Children in these houses also had lower odds of reporting asthma symptoms such as wheeze disturbing speech (0.51, 0.31-0.86, $p = 0.012$) or sleep (0.57, 0.40-0.81, $p = 0.0019$).

Days off school and work

Children living in insulated houses had half the odds of their parents reporting that they had had a day off school compared to control group children (0.49, 0.31-0.80, $p = 0.004$). Fewer adults in insulated houses reported having had a day off work (0.62, 0.46-0.83, $p = 0.0017$)

General Practitioner Visits

Self reports suggested that people in insulated houses were less likely to visit a GP during winter (0.73, 0.62-0.87, $p = 0.0002$). However when GP records were consulted (we accessed records for 82% of participants) the difference was not statistically significant (0.95, 0.81-1.13, $p = 0.58$).

Hospital admissions.

We were able to access the NHI number (and therefore any public hospital admissions) for 80% of participants. There was little overall difference in the number of people admitted for all causes between the control and intervention groups (4.4% vs 4.7%). However there were fewer admissions for respiratory conditions in the insulated group although this difference was not statistically significant (0.8% vs 1.3%, 0.53, 0.22-1.29, $p = 0.16$)

Cost-Benefit

The benefits of the intervention exceeded the costs by almost two to one.

Further Reading.

- Howden-Chapman P, Viggers H, Chapman R, O'Dea D, Free S, O'Sullivan K. Warm homes: drivers of the demand for heating in the residential sector in New Zealand. *Energy Policy* 2009; <http://dx.doi.org/10.1016/j.enpol.2008.12.023>.
- Chapman R, Howden-Chapman P, Viggers H, O'Dea D, Kennedy M. Retrofitting housing with insulation: a cost-benefit analysis of a randomised community trial. *Journal of Epidemiology and Community Health* 2009;63:271– 277.
- Howden-Chapman P, Pierse N, Nicholls S, Gillespie-Bennett J, Viggers H, Cunningham M, et al. Effects of improved home heating on asthma in community dwelling children: randomised community study. *British Medical Journal* 2008;337(a1411doi:10.1136.a1411).
- Howden-Chapman P, Matheson A, Viggers H, Crane J, Cunningham M, Blakely T, et al. Retrofitting houses with insulation to reduce health inequalities: results of a clustered, randomised trial in a community setting. *British Medical Journal* 2007;334:460-464.
- Howden-Chapman P, Crane J, Matheson A, Viggers H, Cunningham M, Blakely T, et al. Retrofitting houses with insulation to reduce health inequalities: aims and methods of a clustered, randomised trial in community settings. *Social Science and Medicine* 2005;61:2600-2610.