Reducing fuel poverty by improving housing

Evaluating the co-benefits of low-income weatherisation programmes

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Outline of talk

• Importance of reducing inequalities
• Market-solutions inadequate
• Structural problems of cold, damp houses
• Establishing causation of interventions
• Insulating houses has multiple benefits
• Installing sustainable heating gives multiple gains
• Multiple outcomes important for population health interventions
• Research-based public policy
Inequalities & the population approach

• Social gradient in the underlying structural determinants of disease, e.g. housing
• Social gradient in determinants leads to social gradient in health
• Underpinned by Rose (1985)

A large number of people at a small risk may give rise to more cases of disease than the small number who are at high risk
Approach to reducing inequalities

- Structural inequalities shape health
- Housing a practical approach
- Framing of solution-focused research
- Process as important as outcomes
- Involved communities and policy people from beginning
- Researchers can facilitate translation to policy

Market-solutions inadequate

New Zealand’s electricity market is one of the least regulated electricity markets in the OECD
Real electricity prices March years 1974-2007

Source Energy Data File, July 2008, Table J.1b
Figure 22: Change in incumbent retailer market TOU share in each network
Old New Zealand houses have an average 90 year lifetime
Cold

- NZ houses are mostly old, cold and damp
- 90% of time indoors, 75% in homes
- Average winter temperature is 16°C
  (WHO recommends 18 – 21°C)
Excess winter mortality

• 1600 excess winter deaths in NZ each year from respiratory and circulatory problems (16%) vs 900 deaths from air pollution
  400 direct road toll
• EWM unchanged for last 20 years in NZ
• Census-mortality linkage study, higher EWM among low-income people, living in rented accommodation & urban areas.

Excess winter hospitalisation (EWH)

A 2000-2006 study of EWH + housing factors found small significant effects:

- EWH was higher in villas and pre-war bungalows than in post-war bungalows, and lower in “quality” bungalows;
- EWH was higher in urban areas than in rural areas; and
- EWH increased with increasing SE deprivation

The poorer the condition of a dwelling (on a 3 point scale), the higher the proportion of rentals in the area.

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Fuel poverty in NZ

- Reluctant use of Boardman definition
- Social gradient in energy expenditure
- 2001 10-14% of households
- 2006 23% of households in fuel poverty
- Light regulation
  - Govt requires low user tariff (1/3 regular fixed daily charges) for those under 8000kWh/a annum or 9000kWh/annum in south of the South Island
- High disconnection (2%) & self-disconnection
- Pre-payment offered as a budgeting tool

Does insulation make a difference to health?

• Survey
  – Self-report, bias
  – Cross-sectional can’t show cause and effect

• Community trial
  – Gold standard design (Wanless, NICE)
  – Can show cause (“something that makes a difference” Susser) and effect
  – Independent measures
  – Staggered interventions possible & preferable
  – Can generalise from the results
Where does the heat go?

12% through unblocked chimneys and draughts around doors and windows

10% through the floor

42% through the ceiling

12% through windows

24% through walls

Winter heat savers

- Ceiling insulation
- Pelmet
- Well-fitting curtains
- Underfloor insulation
- Insulation also keeps the house cool in summer

Wall insulation
Enclosed energy-efficient burner
Draught-stopper
Housing, Insulation and Health Study

- 1400 households where one member had chronic respiratory symptoms
- Occupants of insulated houses exposed to significantly warmer and less damp houses
- Key energy result: Occupants in insulated houses used 23% less energy


Insulation study results

• Significant improvement in self-reported housing conditions (less cold and dampness)
• Significantly fewer days off school and work
• Significantly fewer symptoms of wheeze and colds
• Fewer hospital admissions
• Positive benefit to cost ratio almost 2:1
Simple steps toward a warmer, healthier home

The shivering season is here but help is at hand. Paul Easton reports.

Lloyd McGinty is scrambling around in the roof space of the Titahi Bay home of John Herps and Colleen Niwa.

But it's okay, he's been invited.

He is the Energy Doctor, and he is performing an energy audit, seeking ways to make the house more energy-efficient.

It's part of the Warm Homes Porirua project, run through the Energy Efficiency and Conservation Authority's Energy-Wise home grants programme and managed by Sustainability Trust, a Wellington-based charitable trust.

Homes qualifying for the project are given an "insulation retrofit" for $300, something that would usually cost about $2100. They receive ceiling and under-floor insulation, hot-water cylinder wraps and pipe lagging, energy-efficient lightbulbs, low-flow showerheads, underfloor polythene, and draught-proofing of doors.

In the roof Mr. McGinty finds some tatty looking Pink Batts, "probably from the 1970s", which are providing about as much insulation as wet cardboard, and some piping that is only partly lagged. The old batts will be swathed in new insulation, which lies like a layer of marshmallow over the existing Pink Batts.

Warm Homes Porirua has warmed up more than 700 homes in the Porirua area since February 2005.

"People that previously suffered from bad health and sick days off work and school have now seen the real benefits of what can be achieved in a warm, energy-efficient home," says ECCA marketing advisor Paul Halford.

Over the past three years, Warm Homes Porirua has received funding from ECCA, Hunt Mana Charitable Trust, the Social Development Ministry, Capital and Coast District Health Board, Mana Community Grants Foundation, Porirua PHO and trick to stop a chilly draft which whistles down their chimney — stuffing it with shopping bags full of crumpled newspapers.

"There are some really easy things you can do."

Mr. Herps and Ms. Niwa will reap the benefits of a warmer home — both have respiratory conditions.

Mr. McGinty, a former plumber, will also suggest heating options to replace the couple's rather inefficient fan heater.

Mr. Herps says he's keen to sign up. "It's been a lot more thorough than expected."

To find out about the Energy-Wise home grants programme, visit www.ecca.govt.nz or call 0800 398676.
Big gains: actions below the line save money

CO$_2$ savings - every bit helps

- Average 217 kilograms CO$_2$ per household per year
- Measured for electricity and mains gas savings
- Valued at $30 per tonne of CO$_2$
- Present value of savings: $100 per household – every bit helps
- UK residential sector generates 10-13% CO$_2$
Cost of insulation $1,800 per dwelling

Total estimated tangible benefit comprises health, energy and carbon savings: $3,374 per dwelling (present value, at 5% real discount rate, over 30 years)  Net benefits ~ 2:1

Conservative assumptions: no energy price increases, no wood and coal counted, mortality gain not counted

Housing, Heating & Health

- Even insulated houses colder than ideal
- NZ has Scottish pattern of spot heating one room
- Third of NZ households use unflued gas heaters (1 kg LPG = 1.6 kg H₂O)
- 30 NZ cities exceed air quality standards
Use fanbake, it heats the room quicker.

Yeah right.

Tui
Housing, Heating and Health Study

- 409 households in community trial
- Does non-polluting, more effective, home heating reduced children’s asthma symptoms over winter?
- Households had choice of sustainable heaters

Intervention

Previous:

X  electric heaters (2kW)
X  unflued gas heaters (4kW)

Replaced with:

√  320 heat pumps (4-7kW)
√  55 wood pellet burners (10kW)
√  11 flued gas heaters
Heating

Average living rooms 1.1°C warmer
People felt warmer
Condensation reduced
Less mould and mouldy smells reported
Levels of nitrogen dioxide halved
Levels of wheezing & coughing halved
Effects more marked in low-income families
Two more days at school during winter


Cost and installation cost of heaters over conservative 12 year life-span

Benefits
no visits to health professionals, time off work/school, care-giving, pharmaceutical use, changes in total household energy use and carbon emissions

Sensitivity analysis
Targeted approach (high rates of household asthma) benefit:cost ratio 1.09: 1
Untargeted approach (typical NZ asthma rates) benefit:cost ratio 0.31: 1

Influence of research on policy

• Framing of problem around co-benefits
  – Housing & health
  – Energy efficiency
  – Climate change
  – Employment creation
  – Regional development
  – Social capital
  – Fuel poverty
Reducing inequalities?

Number of Dwellings insulated using EECA

Houses

NZDep
Policy Impact

- Policy piloted locally before implemented nationally
- Products regulated, process audited
- Previous labour Govt allocated 1 billion dollars Household Fund
- Current National Govt $383m
  - research evaluation of roll-out to 70,000 houses
  - E savings, hospitalisation, drugs & employment
- Inter-sectoral policy with major impact on central, regional and local government, NGOs
Is your home one of the 900,000 houses with sub-standard insulation? You could get 1/3 off the cost to upgrade.

THE POLITICIAN

I WANT EVERY HOUSE IN THE COUNTRY FULLY INSULATED!

THEN I WON'T BE ABLE TO HEAR THE PEOPLE COMPLAINING ABOUT THE WAY I'M HANDLING THE FINANCIAL CRISIS!!!
Contrast with policy development & implementation in Australia

- Lack of piloting
- Lack of development of infrastructure
- Federal policy lacking state operational planning
- Large injection of $$
- Lack of regulation re standards
- Lack of policy development
- No risk management strategy
- Major political implications
- Fall of PM Rudd
Warm Homes for Elder NZers

- 600 people over 55 with COPD
- Intervention $500 electricity voucher
- Framed as “Heat as medicine”
- Whanganui, Palmerston North, Wellington & Christchurch
- Community partnerships with asthma societies, outpatient respiratory clinics
- Enrolments underway
Qualitative pilot study of pre-payment meters

“I’ve done it 3 times now… turning it off on a Tuesday morning… because I’ve only had say four or five dollars in there, and I turn it on at four o’clock… do a barbeque for the kids when I come home, so they got dinner, and then turn it on at night… we had a dollar fifty left in the morning, it would last until nine o’clock and I’d go down and buy some.” [Howard]


O’Sullivan K, Howden-Chapman, P. Fougere, G. Death by disconnection: the missing public health voice in newspaper coverage of a fuel poverty-related death, Submitted for publication.
Housing Outcome Mould Study (HOME)

• Third of NZ houses have mould
• Leaky buildings major problem (~80,000 houses); estimated health costs $474m
• **Case-control study** linking public health and mycology
• Replicating Finnish study, first and only study to show asthma caused by mould


Social Housing Outcome Worth (SHOW)

• Social housing in NZ ~5% of population (1/4m people)
• **Cohort study** of health impacts of moving people from waiting list to HNZC tenancies
• Applicant & tenant data linked to hospital records via encrypted National Health Index number.
• Housing Sensitive Health Outcomes Hospitalisation
Social Housing Outcome Worth (SHOW)

- Rates significantly lower in HNZC tenants compared with housing applicants and pre-tenant applicants
- Decline in hospitalisations increases with duration of tenancy + plateaus after about 4 years, particularly for respiratory diseases; injuries and poisonings; and infectious diseases
- Can cohort study demonstrate causality?
- Is social housing an effective intervention for reducing health inequalities?
Further applied research

• Developed Housing Quality Index
• Built prototype energy-efficient extended family Pacific house for HNZC

Summary (1)

- Different research methods for different purposes
- Community RCTs possible & policy influential
- RCTs expensive & complex to manage
- Trials deliberately framed positively as housing & health research not low-income & health research or fuel poverty
- Solution-focused research makes policy engagement easier
- Research targeted to providing material benefits to low-income communities
- Results generalisable to “NZ Inc”
Summary (2)

• Important to insulate and heat our homes where we spend most of our time
• Good for health, energy efficiency, climate change and employment
• Buffers households from residential electricity price increases and flow-on from ETS & necessary carbon charges
Summary (3)

- Research has led to important policies that survived change of government
- National policy being evaluated
- Healthy Housing Initiative addressing demand-side energy problems
- Multiple benefits add up to significant population approach
- Demonstrated important private and public benefits