



# Housing and health

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[www.healthyhousing.org.nz](http://www.healthyhousing.org.nz)

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**H E K A I N G A O R A N G A**





# Housing & Health

RESEARCH, POLICY AND INNOVATION



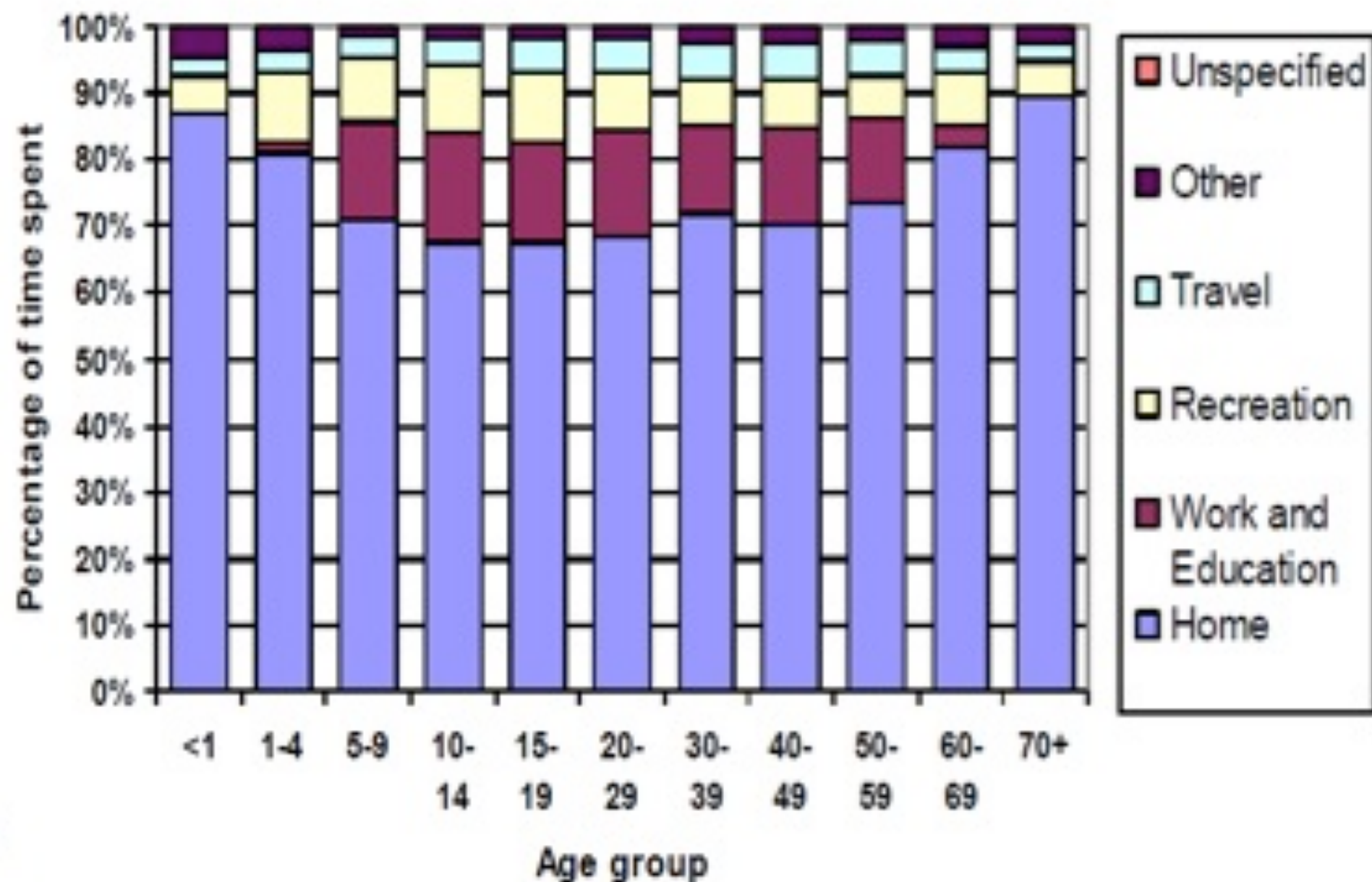
*edited by*

Philippa Howden-Chapman & Penelope Carroll

## Housing and Health

- 75% of our lives are spent in our homes
- NZ houses are relatively large, old, poorly constructed, usually with no insulation or systematic heating
- Wide range of communicable and non-communicable diseases related to housing conditions
- Improving housing is key material factor in health inequalities

Figure 1: Percentage of time spent at home and on other activities, by age



## Physical + biological pathways

- Cold indoor air is harder to heat
- Mould grows better in damp air
- Viruses survive for longer on cold surfaces
- Cold stresses immune system
- Blood (liquid) thickens when cold & more likely to form plaques
- When only 1 room heated in house, people crowd together







## Kiwis pay for their cold comfort

By **WENDY TONG**

**PEOPLE ARE** turning off heaters and jumping into bed to escape rising power bills after the coldest June in more than 50 years.

The average national temperature last month was a nippy 1.1°C, the lowest since 1913.

In the ball pit in Elmsie cranked up their heating and snuggled up in bed. Power usage was pushed to record highs – and power bills are now following suit.

Elaine and Fred Baker of Bawera were forced to turn off their heater and stay in bed after receiving a bill for \$100 when they usually pay about \$60 to \$80.

"We can't afford to have another power bill like that," Elaine said.

Wille Mitchell, 76, of Dunedin has been turning off her heating and going out during the day after receiving her biggest power bill ever of \$100 for last month.

A brisk walk, trip to the gym or back to the warmth of the central citizens' club is her tip for beating the chills and the bills.

Age Concern chief executive Ann Martin said: "We don't recommend staying in bed to save money. Activity is the key to keeping warm and healthy throughout winter."

Although Christchurch was the coldest main centre last month, Canterbury Storm and Dune Centre say they're reaping the benefits of their decision last winter to convert to coal because of rising power bills. They have three children and estimate that if they had stayed with electric heating their June power bill would have been \$200, instead of \$100.

Temperatures in Oamaru, North Otago, plummeted to a glacial all time low of -14°C last month. Loretta Lee and Jim Martin used a log burner with a workback to combat the cold but even so were surprised to find their power bill jumped \$80.

Even people in milder climates like Tauranga felt the pinch. Dawn Barber is in her seventies and lives alone in Bawera. Her June power bill was up \$10 from the usual \$100.

"It was quite a jump. It's probably the highest one I've ever had."

The warmest place to be in June was Kaitiaki – where they had a relatively below average temperature of 11.7°C.

As the cold snap continues, July's bills could follow a similar pattern, but National Climate Centre principal scientist Dr Jim Salinger said the country shouldn't be dreading by the end of the month.

"We are expecting a cool July, cooler than usual, but a warm start to spring with average to above average temperatures for August and September."

The World Health Organisation recommends living areas are heated to 20°C. Less than 20°C puts people at higher risk of respiratory problems and under 12°C increases the danger of a heart attack or stroke.

For information on how to keep your home warm and dry go to <http://www.ecwa.govt.nz>.

# Mums sob as joint inquest held

The Dominion Post Wed Dec 10 2008

BYRON HILL and ANNA ENGLISH

MOTHERS who filed accusations at Wellington District Court on Tuesday were told to look their babies dead in bed, possibly because of "unsafe sleeping environments", a judge has said.

In five of the seven cases the babies were sharing a bed with others. Three were in bassinets, but two were "which probably caused them to suffocate".

Wellington barrister Gerry Green, who has prosecuted bed sharing as a deadly practice in at least 11 other cases during the past eight years, insisted the findings.

He told the families yesterday that the inquests were not a witch hunt. "There is no suggestion there has been anything wrong under being run. We are simply here to see what contributed to baby deaths."

Judge John Tye, who presided



Paul Ferguson brought his young son to the inquest.

## TINY TRAGEDIES - HOW SEVEN BABIES DIED IN BED

● **Irish mother, Jo Macklin**, died in hospital on September 8, 2007, aged 104 months. Her son died in her bed at her side. The doctor's report for her death said: "Found with child dead over her face."

● **British mother, Lynn Smith**, died on December 25, 2007, at home in Essex, Essex. She was found at her side in her bedroom. Found dead at

age, face down on the mattress.

● **English mother, Tina George**, died at home in Essex, Essex, on May 21, 2008, aged 102 weeks. She was found a single bed with her mother at home. Her mother was at 147cm to 150cm and her son was 102cm with head at 60cm.

● **English mother, Mary Jones**, died at home on July 16, 2008, aged 100

months. She is a disabled with her mother who was in hospital at the time with "heavy stuff" covering her up.

● **French mother, Françoise Mouton**, died in hospital on August 10, 2007, aged 102 weeks. Her mother was 160cm and her son was 102cm.

● **English mother, Pauline Jones**, died at home on August 10, 2008, aged 101

months. She was sharing a double bed with her father and older. Her son died at her feet on a pillow with a blanket over his face.

● **English mother, Angela Martin**, died on December 15, 2007, at home in Essex, Essex, aged 102 weeks. She was found at her side with her head in a soft adult pillow. The child was missing from the bed.

by questioned her son. She said she knew it was risky sleeping with her two boys, but it was the only way they would settle.

Barbara McKee told of her horror of waking up with baby PJ "suffocated" under her. She later found baby sitting when she woke and said her 8 it was possible she might have "suffocated" PJ in her

arms. "I think I did," she said.

The father, Frank McKee, said: "We have lost a child and I don't think we'll ever get over that."

Margaret Tappin, mother of baby Yvonne, said she was sure the baby would have been in her arms had "the car been not so cold they were better off sleeping together in my arms."

Barry Macklin is accused by "what is" over his son's death. "If I hadn't dragged her up, if I had let go with me."

The guidelines in all seven cases, Judge Tappin, said babies were especially vulnerable if they had a cold or were in their cot in a soft bed, which could obstruct their airways.

It was "extremely upsetting" for parents to share the bed or put babies to sleep in their cot, which if they slept better that way.

A joint death study by Wellington paediatrician David Elder found no parents of babies who died in their cot in 2008 were asked to be in bed. Of 20 cases between 2007 and 2008, 14 babies had

fallen while in an adult bed.

Dr Elder and Auckland City child health professor Dr Clark were against bed sharing.

The South Islands advise it is safe if the mother has smoked in pregnancy, avoids drugs, does not have intercourse while in bed and has the baby in bed and free of their bed.

## Research evidence from robust community trials

- Housing, Insulation & Health Study
- Housing, Heating & Health Study
- Housing, Crowding & Health Study
- Housing, Injury Prevention Intervention (HIPI)
- Warm Homes for Elderly New Zealanders (WHEZ)
- Social Housing Outcomes Worth Study (SHOW)

# 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

Wall insulation

Enclosed energy-efficient burner

Draught-stopper



Ceiling insulation

Pelmet

Well-fitting curtains

Underfloor insulation

Insulation also keeps the house cool in summer

## Housing, Insulation & Health Study

- 1400 households where one member had chronic respiratory symptoms
- Winter 2001 baseline measures taken
- Randomly assigned intervention houses insulated over summer
- Winter 2002 follow-up measures taken
- Control group houses insulated





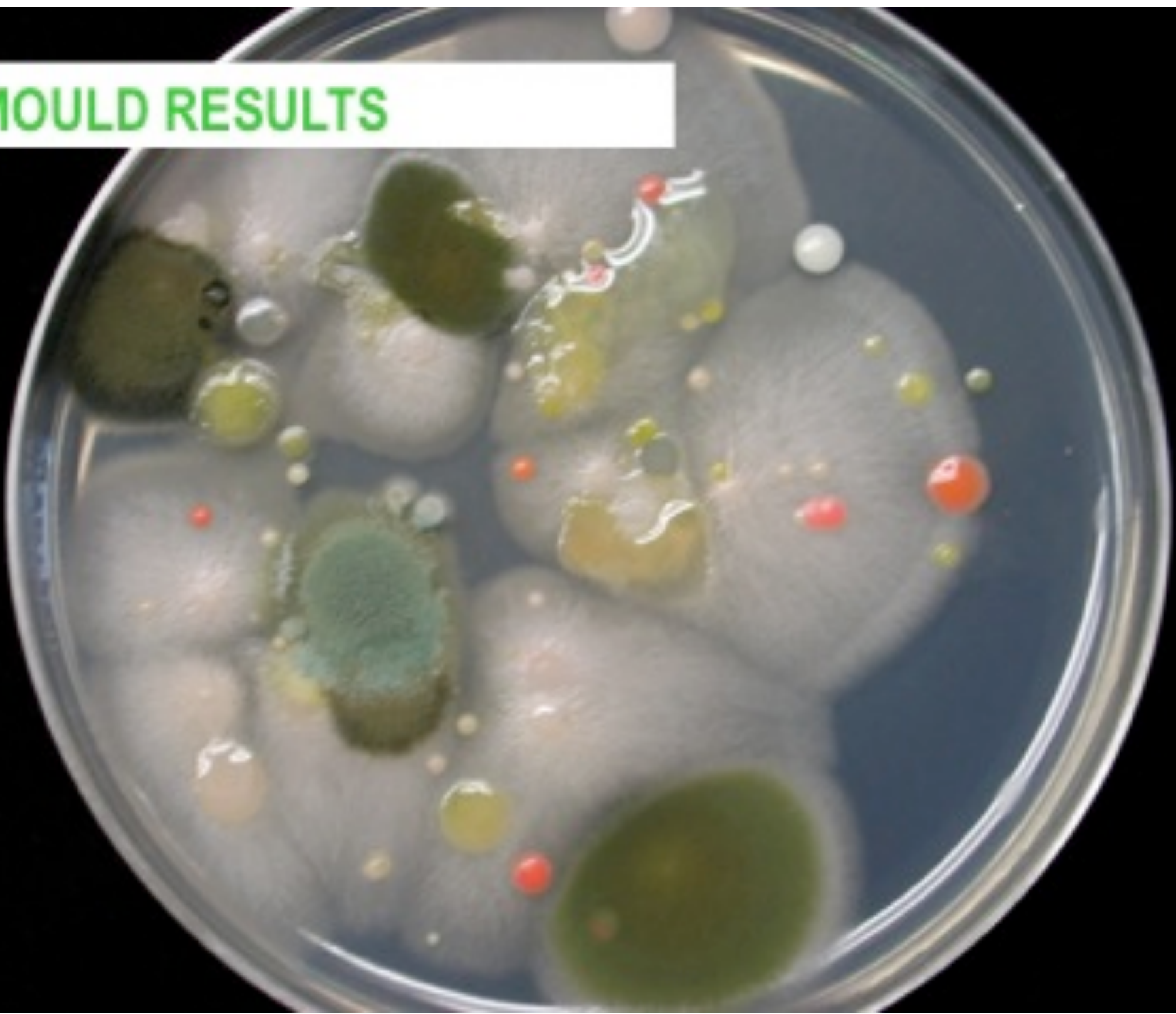
## Results

- Occupants in insulated houses used 23% less energy
- Occupants of insulated houses exposed to cold temperatures ( $< 10^{\circ}\text{C}$ ) for  $\frac{3}{4}$  hour /day less
- Occupants of insulated houses exposed to high humidities ( $> 75\%$ ) for almost 1.5 hours / day less





# MOULD RESULTS



## Better housing improves health

- 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 of 2:1

Howden-Chapman, P., 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: p. 2600-2610.

Howden-Chapman, P., 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.

## LPG heaters –poor person's heater

- Third of NZ households have UFGHs
- Releases multiple combustion products indoors
- Exposure to  $\text{NO}_2$  can reduce immunity to lung infections & increase the severity and duration of a flu episode
- $\text{NO}_2$  inflames the lining of the lungs, which can cause problems such as wheezing, coughing, colds, flu and bronchitis.
- $\text{NO}_2$  increases health risks from particulates
- 1 kg LPG = 1.6 kg  $\text{H}_2\text{O}$

# Housing Heating and Health Study

- Randomised community trial
- Retrofitted insulation & sustainable heating in 409 households where children with asthma
- Aims
  - Increase temperature to WHO minimum 18°C
  - Lower relative humidity
  - Reduce NO<sub>2</sub>
  - Reduce symptoms of children with asthma

UNIVERSITY OF OTAGO  
WELLINGTON



SCHOOL OF MEDICINE



## Intervention in 409 households

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







## Results

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 <sup>25</sup>



## Summary of heating results

- More effective heaters increased the indoor temperature
- Improved children's asthma symptoms
- Fewer days off school and fewer visits to GPs.

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;337:852-5.

Free S, Howden-Chapman P, Pierse N, Viggers H, Housing Heating and Health Study Research Team. Does more effective home heating reduce school absences for children with asthma? *Journal of Epidemiology and Community Health*. 2009;doi:10.1136/jach.2008.086520

## Warm Up NZ: Heat Smart Programme

- 100,000 houses in first 2 years of programme
- \$320 million, **not** targeted to low income
- Quasi-experimental study, detailed anonymised matching of first 46,655 houses
- Small but significant drop in metered energy
- Significant health outcomes in pharmaceutical usage, length of hospitalisation, avoidable mortality for over 65s
- Benefit/cost ratio 3.9:1; for children 6:1

**Is your home one of the 900,000 houses  
with sub-standard insulation?**

**You could get 1/3 off the cost to upgrade.**



New Zealand Government

EECA

## 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!!!



# Home Injury Prevention Intervention (HIPI)

- 1,000 hslds recruited in Taranaki (95% response)
- Partnership with Accident Compensation Corporation
- Aim to see if remediating common housing hazards reduces injury rates and ACC claims
- Baseline funded by ACC
- Rating tool Healthy Housing Index: links Health and Building Science

Keall M, Baker M, Howden-Chapman P, Cunningham C. Association between the number of home injury hazards and home injury. *Accident Analysis and Prevention* 2008;40 (3):887-893.

Keall M, Baker M, Howden-Chapman P, Cunningham M, Ormandy D. Assessing health-related aspects of housing quality. *Journal of Epidemiology and Community Health* in press.

Solutions to  
**Child Poverty**  
in New Zealand  
evidence for  
action



Expert Advisory Group on  
Solutions to Child Poverty





Institution: [Wellington School Of Med](#)

## Article

### Heat or Eat: The Low Income Home Energy Assistance Program and Nutritional and Health Risks Among Children Less Than 3 Years of Age

Deborah A. Frank, MD<sup>1</sup>, Nicole B. Neault, MPH<sup>2</sup>, Anne Skalicky, MPH<sup>3</sup>, John T. Cook, PhD<sup>4</sup>, Jacqueline D. Wilson, BA<sup>5</sup>, Suzette Levenson, MPH, MEd<sup>6</sup>, Alan F. Meyers, MD, MPH<sup>7</sup>, Timothy Heeren, PhD<sup>8</sup>, Diana B. Cutts, MD<sup>9</sup>, Patrick H. Casey, M<sup>10</sup>, Maureen M. Black, PhD<sup>11</sup>, Carol Berkowitz, MD<sup>12</sup>

**CONCLUSIONS.** Even within a low-income renter sample, Low Income Home Energy Assistance Program benefits seem to reach families at the highest social and medical risk with more food insecurity and higher rates of low birth-weight children. Nevertheless, after adjustment for differences in background risk, living in a household receiving the Low Income Home Energy Assistance Program is associated with less anthropometric evidence of undernutrition, no evidence of increased overweight, and lower odds of acute hospitalization from an emergency department visit among young children in low-income renter households compared with children in comparable households not receiving the Program.


# Crowding link to infectious diseases

- When only one room heated, people crowd together
- Probable link to increasing rate of infectious diseases in New Zealand

D-11-02603R2 linked to SSR29

50140-6736(11)61780-7

Embargo: February 20, 2012—00:01 (GMT)

Articles   
ZN

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## Increasing incidence of serious infectious diseases and inequalities in New Zealand: a national epidemiological study

Michael Clarke, Lucy Taylor Barrett, Amanda Kooling, Apurba Ghoshal, Jane Zhang, Michael Keel, Nick Wilson, Trevor Wall, Philippa Howden-Chapman

### Summary

**Background** Although the burden of infectious diseases seems to be decreasing in developed countries, few national studies have measured the total incidence of these diseases. We aimed to develop and apply a robust systematic method for monitoring the epidemiology of serious infectious diseases.

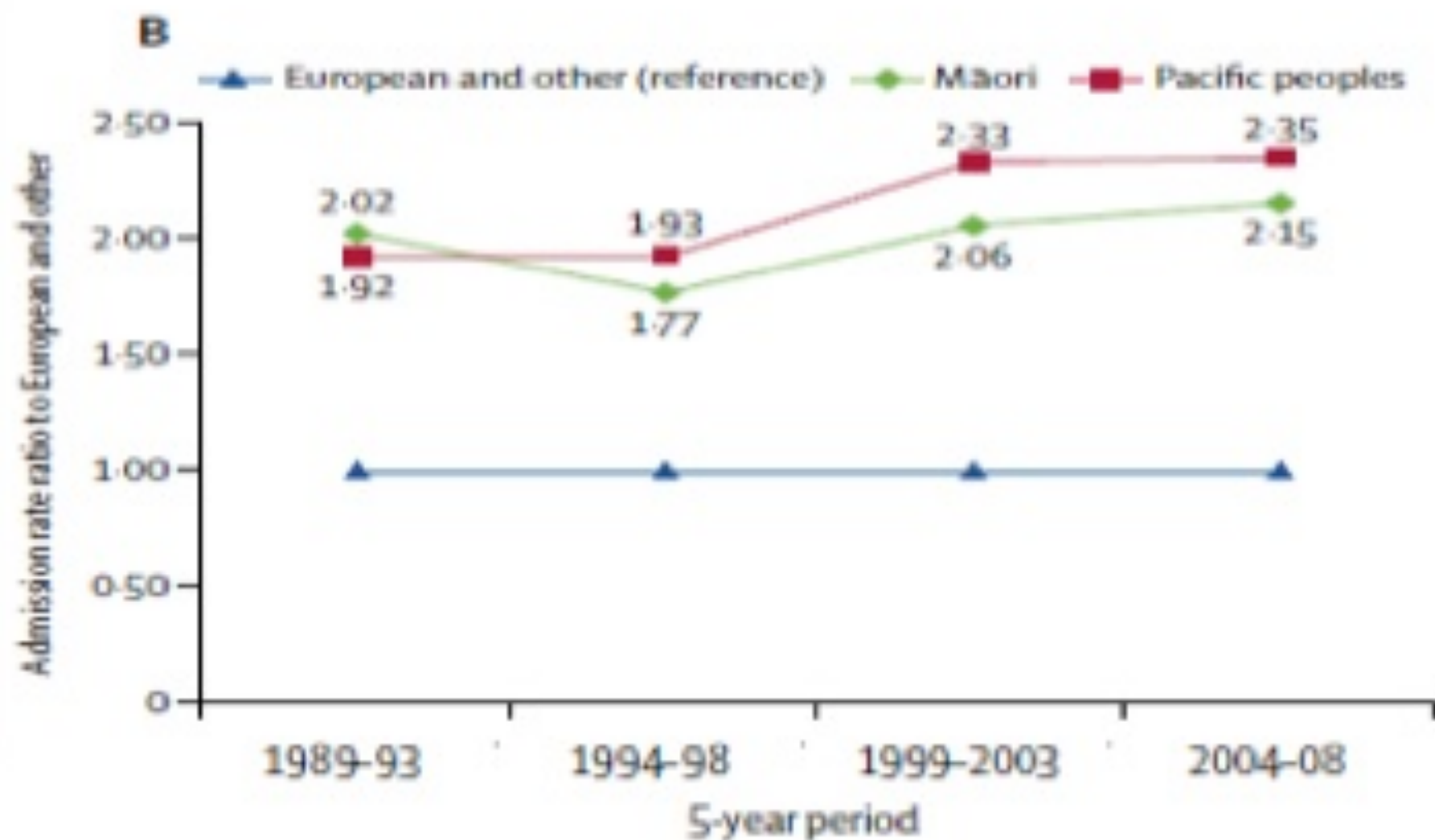
Published Online  
March 2012  
DOI: 10.1186/1745-2758-11-61780-7

## **Increasing Incidence of Disease**

Rising rates of communicable diseases especially in children

- Meningococcal meningitis
- Rheumatic fever
- Childhood pneumonia
- Bronchiolectesis
- Tuberculosis

## Ratio of hospital admission rates for infectious diseases in New Zealand (1989-2008)



Baker, M., et al., Increasing incidence of serious infectious diseases and inequalities in New Zealand: a national epidemiological study. *The Lancet*, 2012

## Improving social housing & linking with primary health services: Healthy Housing Programme (HHP)

- Cohort (SHOW) study links tenants to hospitalisations, 2004-2008
- After HHP, acute and arranged hospitalisations fell (27%) year after
- Fall in hospitalisations more marked (61%) for most intensive intervention

GET YOUR  
HEAD OUT  
OF THE  
SAND



THERE IS A  
HOUSING  
CRISIS!



## Severe Housing Deprivation



Kate Amore, Helen Viggers, Michael G Baker,  
Philippa Howden-Chapman, 2013

- People on low income living in sub-standard housing, without privacy or security in 2006
- 34,000 people in severe housing deprivation
- 1 in 120 people
- Half were children and young adults, ethnic minorities, and part of sole-parent families or not accompanied by family.
- Most with friends or family in severely crowded houses
- Half of all adults working and/or studying
- Shortage of 12,900–21,100 houses

# Social and affordable housing

- Good-quality low-cost housing, with a vegetable garden
- Recognised secure rental housing for life





## Extended-Family Housing for Pacific People



## Community-action housing project with Pacific Peoples

- Results of focus groups and survey of Wellington Tokelau community discussed with community
- Local builders, Pacific apprenticeship
- Design process and new houses evaluated





**HEALTHY**  
H O M E I N D E X

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Rating tool links health and building science  
Measures respiratory and injury hazards, energy efficiency & earthquake resilience



# Rental Warrant of Fitness

- Combined effort of *He Kainga Oranga*, NZGBC & 5 councils:
  - Auckland
  - Tauranga
  - Wellington
  - Christchurch
  - Dunedin
- Pre-test of rental properties by trained assessors
- Interviews with tenants, landlords & assessors

## Conclusions

- Warmer, safer houses improves health & well-being & lowers hospitalisation
- Housing & health a significant public health issues
- Rental WOF is a science-based rating scheme
- Housing can lead the way on green economy

# Conclusion

