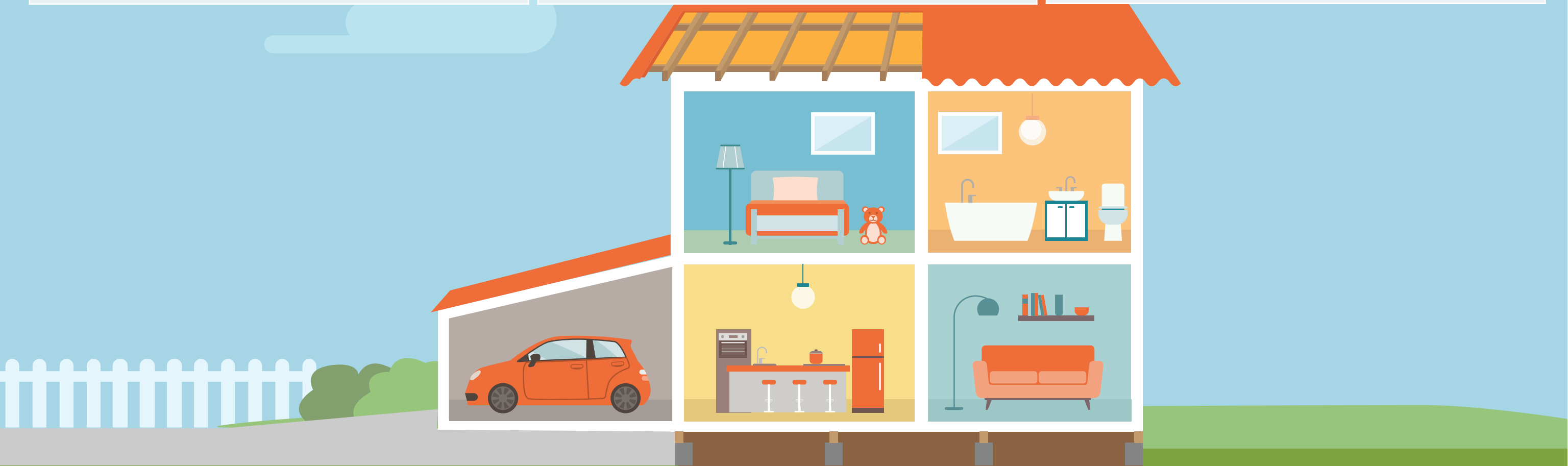
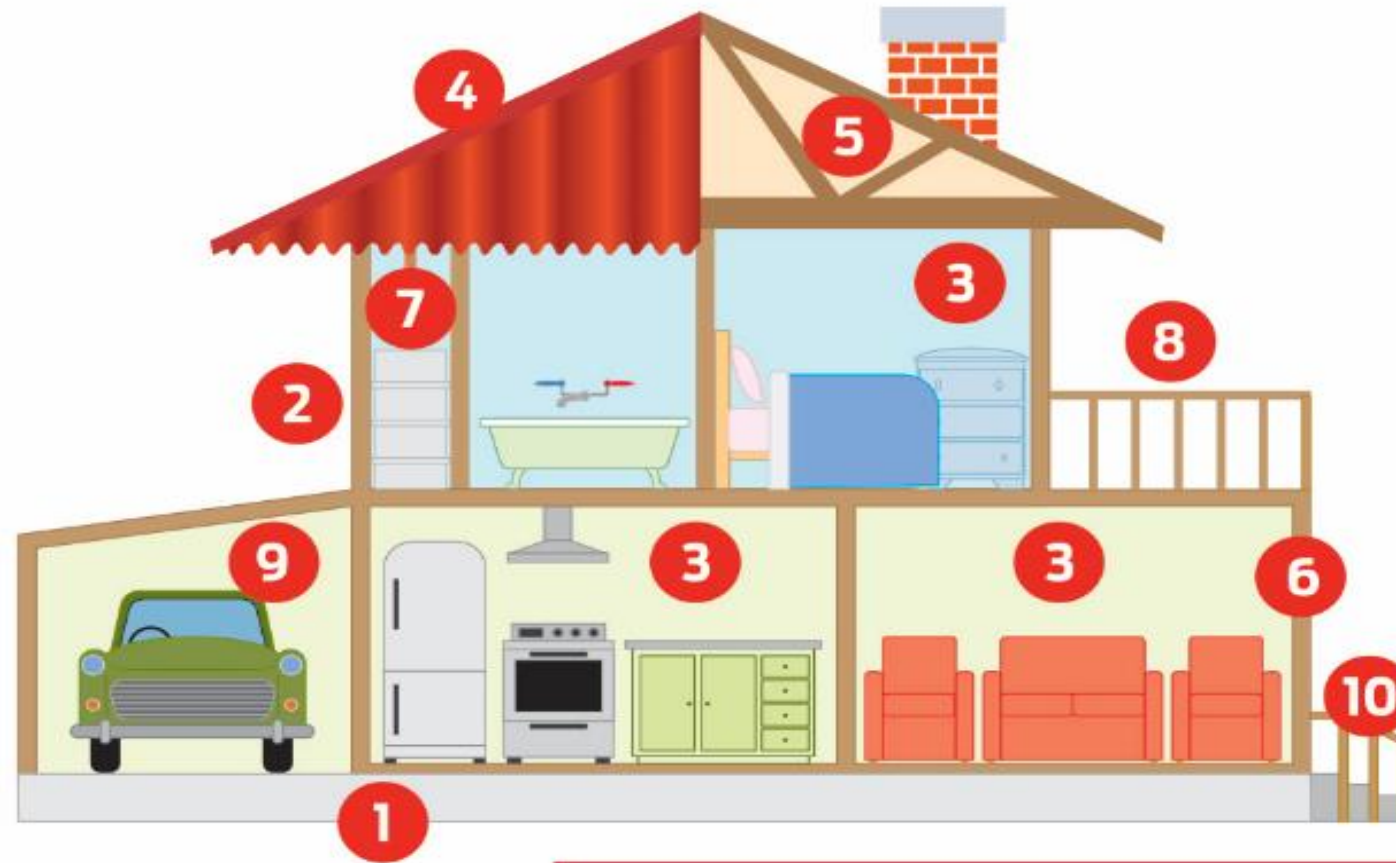


Condition of New Zealand Housing

5 th House Condition Survey (HCS)	Occupant ventilation behaviour	Occupant behaviour and fungal exposure
<p>Sept 2015 – June 2016</p> <p>N=560</p> <p>National coverage</p> <p>Owned & rented houses</p> <ul style="list-style-type: none"> • Telephone interview • Appliance-use questionnaire • Physical house assessment 	<p>Winter 2016</p> <p>N=64 (subset of HCS)</p> <p>4 areas of the country</p> <p>Owner-occupied houses</p> <ul style="list-style-type: none"> • Temperature and RH in bedrooms & bathrooms • Windows and door motion sensors 	<p>Winter-Spring 2017</p> <p>N=24</p> <p>Wellington region</p> <p>Owned and rented houses</p> <ul style="list-style-type: none"> • Temperature and RH in all rooms • Windows and doors motion sensors • Air and floor fungal spore sampling • In-home semi-structured interview



Condition and maintenance



House Condition Survey physical house assessment

1. Foundations and subfloor
2. Exterior (walls, windows, doors)
3. Interior (all room linings and fittings)
4. Roof
5. Roof space
6. Insulation
7. Hot water cylinder
8. Decks
9. Carports, garages, sleepouts
10. Paths, steps, ramps

49 features assessed on
condition and defects

CONDITION RATING DESCRIPTION

<input type="checkbox"/> Serious	Health and safety implications; needs immediate attention
<input type="checkbox"/> Poor	Needs attention within 3 months
<input type="checkbox"/> Moderate	Will need attention within the next 2 years
<input type="checkbox"/> Good	Very few defects; near-new condition
<input type="checkbox"/> Excellent	No defects; as-new condition

Defects

- ☐ Decay
- ☐ Rot
- ☐ Chipped paint
- ☐ Surface cracks
- ☐ Borer

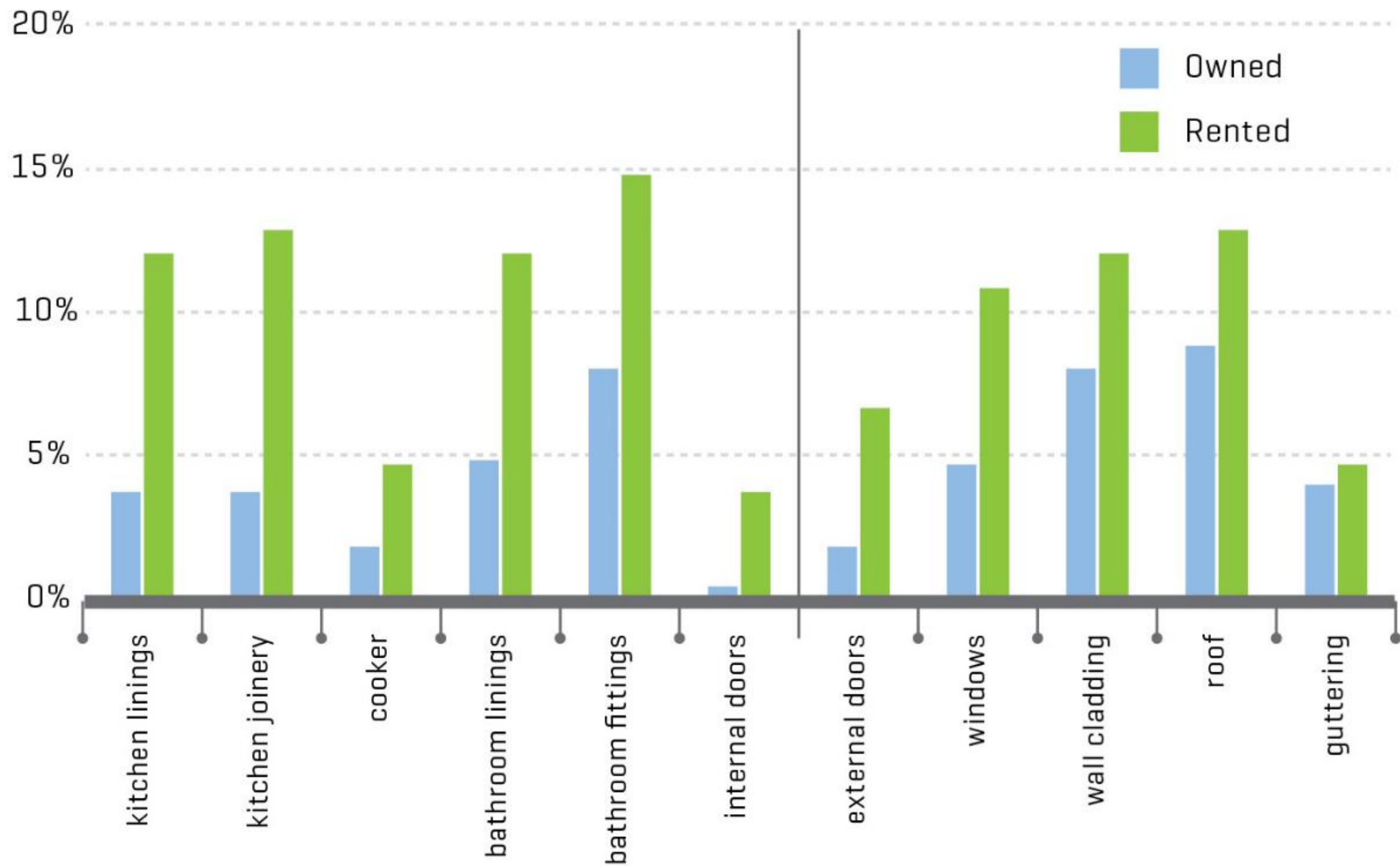
Defects - examples



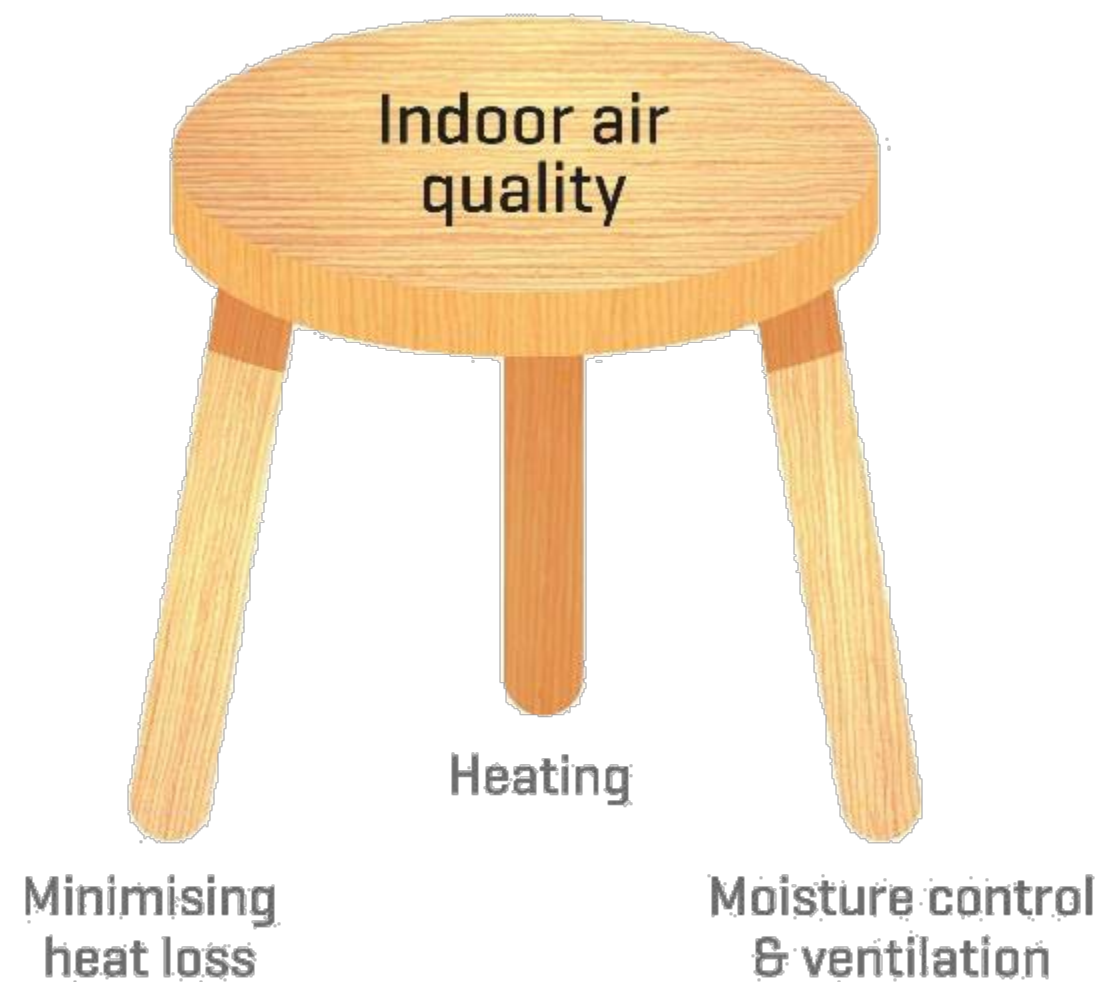
Houses with components in poor or serious condition

Internal features

External features



**What is needed for warm,
dry, healthy homes?**



Minimising heat loss



Heating



Moisture control & Ventilation



Heat loss in an uninsulated house

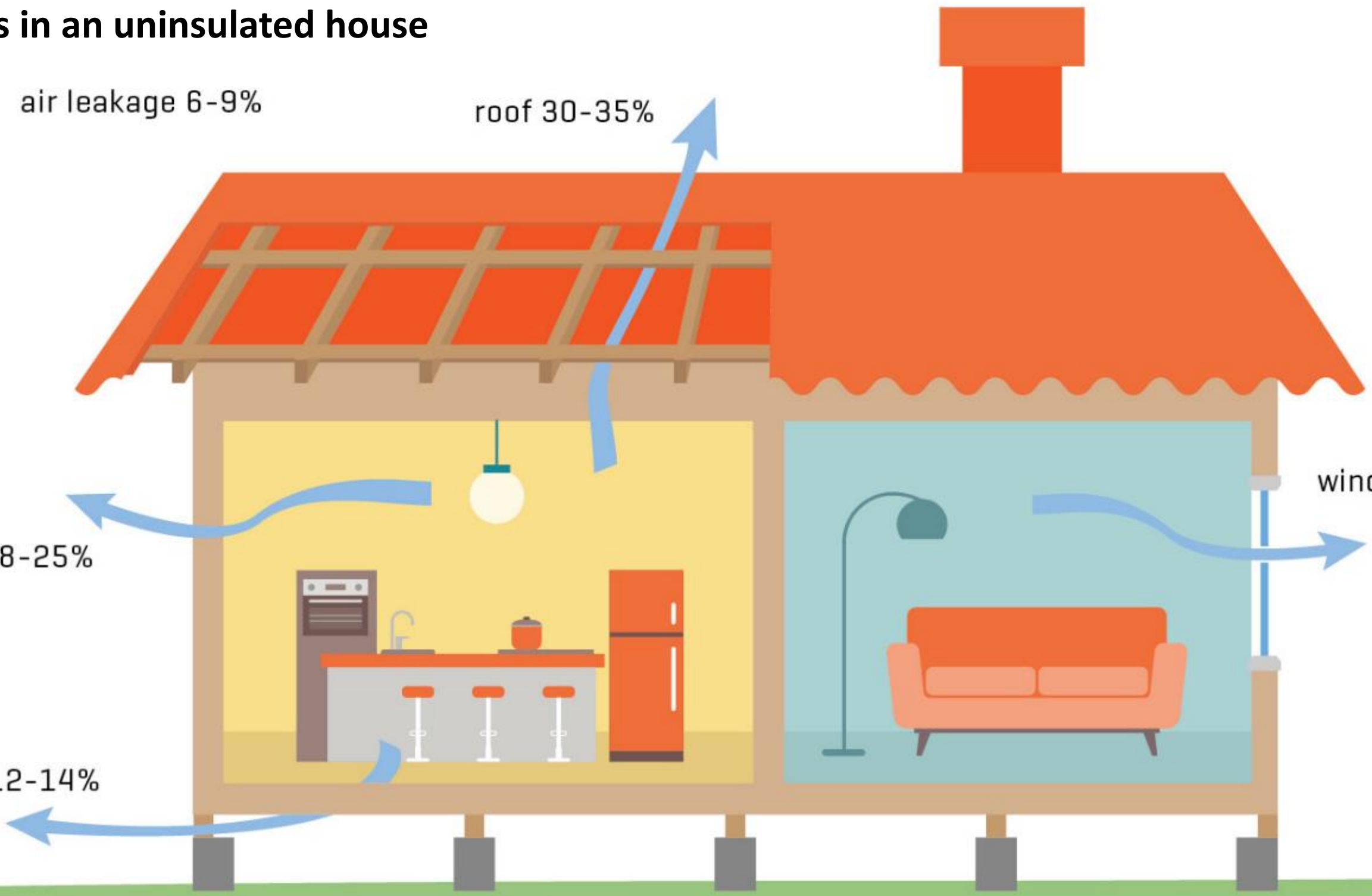
air leakage 6-9%

roof 30-35%

walls 18-25%

windows 21-31%

floor 12-14%



Sources of moisture in the home



Cooking



Clothes washing



Unvented clothes drying



Unflued gas heating



Showers/baths



Washing dishes

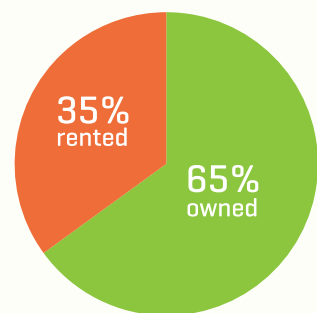




560

NZ HOUSES

assessed from September 2015
to June 2016



HEATING HABITS



46%^{of households} did not
heat bedrooms
in winter



51%<sup>of children's
bedrooms</sup> were not
heated in winter

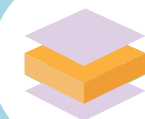


INSULATION

53% could benefit from retrofitted insulation
in the roof space and/or subfloor

47% had less than 120mm or insufficient
coverage of insulation in the roof space

19% had insufficient coverage of
insulation in the subfloor



VENTILATION



Only around
HALF

had an extractor fan
in the bathroom
venting to outside

Only around
HALF

had an extractor fan
in the kitchen
extracting to outside

HEATING APPLIANCES



Heat pumps



40%<sup>of owner-occupied
houses</sup> > 25%^{of rentals}



Wood burners

39%<sup>of owner-occupied
houses</sup> > 23%^{of rentals}



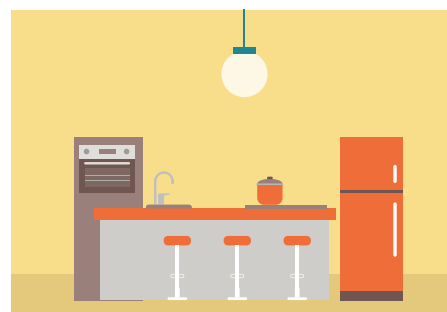
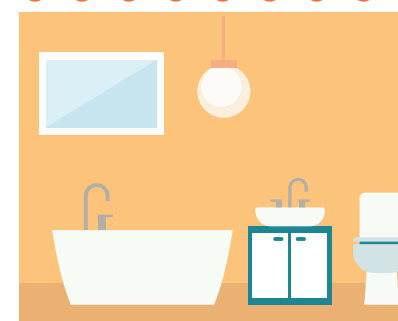
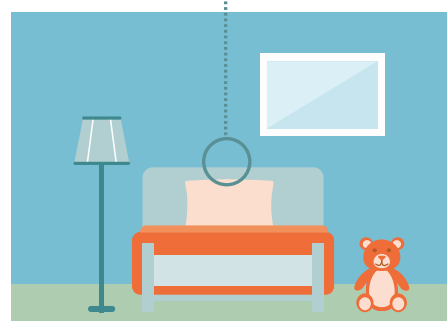
Electric heaters

25%<sup>of owner-occupied
houses</sup> < 33%^{of rentals}



Portable unflued gas heaters

4%<sup>of owner-occupied
houses</sup> < 15%^{of rentals}

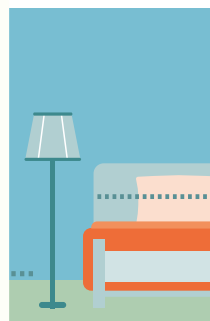




HEATING HABITS

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HEATING APPLIANCES



Heat pumps



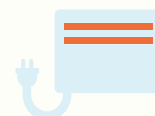
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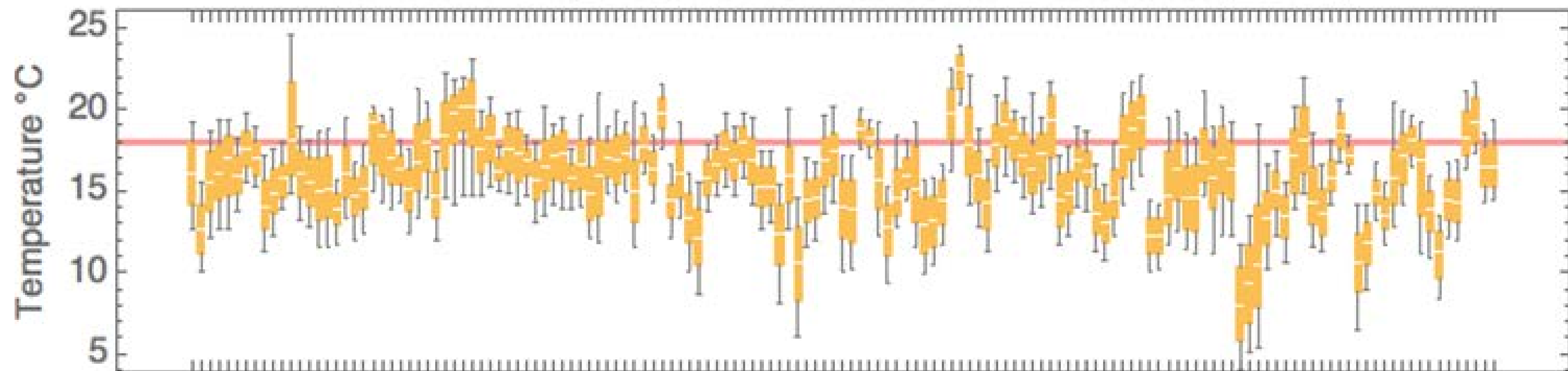
Portable unflued gas heaters



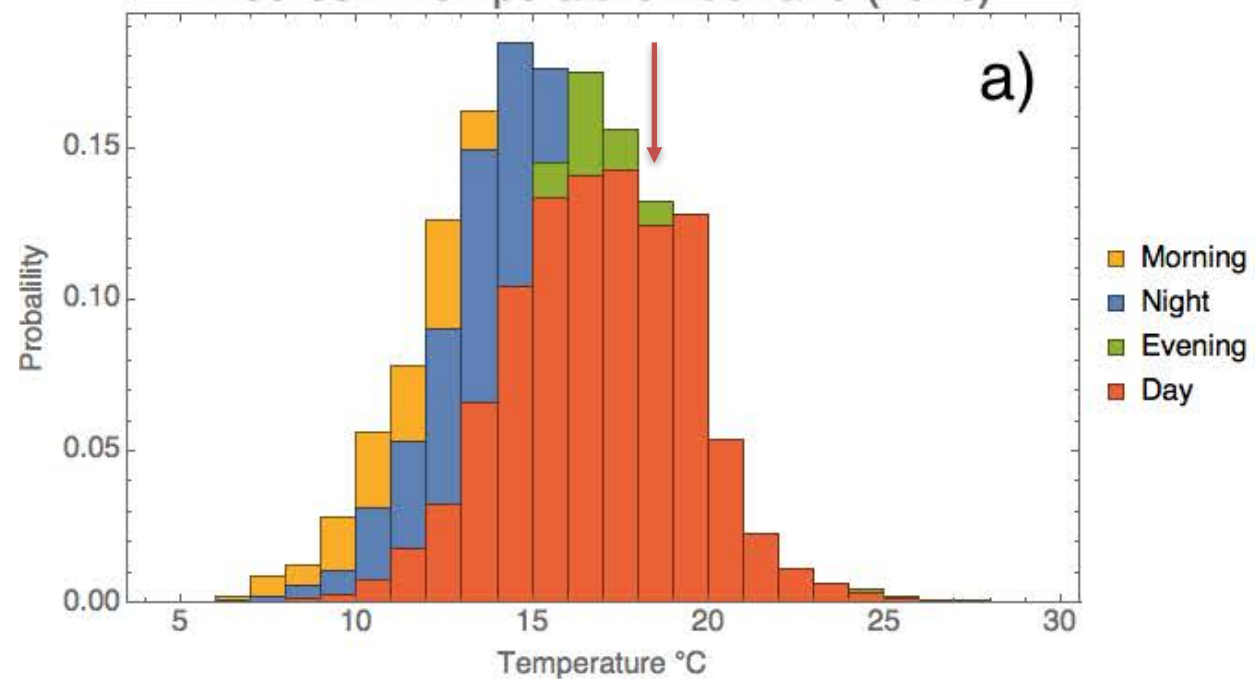
4% of owner-occupied houses < **15%** of rentals



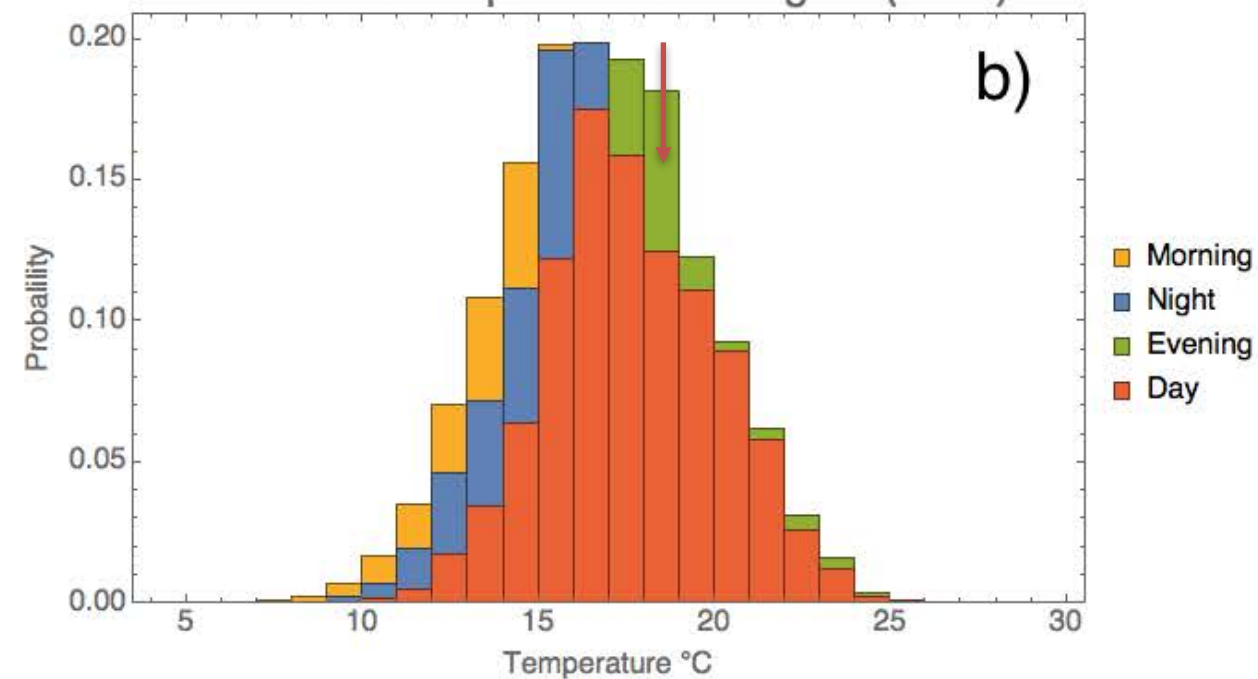
Overall Temperature Distribution in Bedrooms (2016)



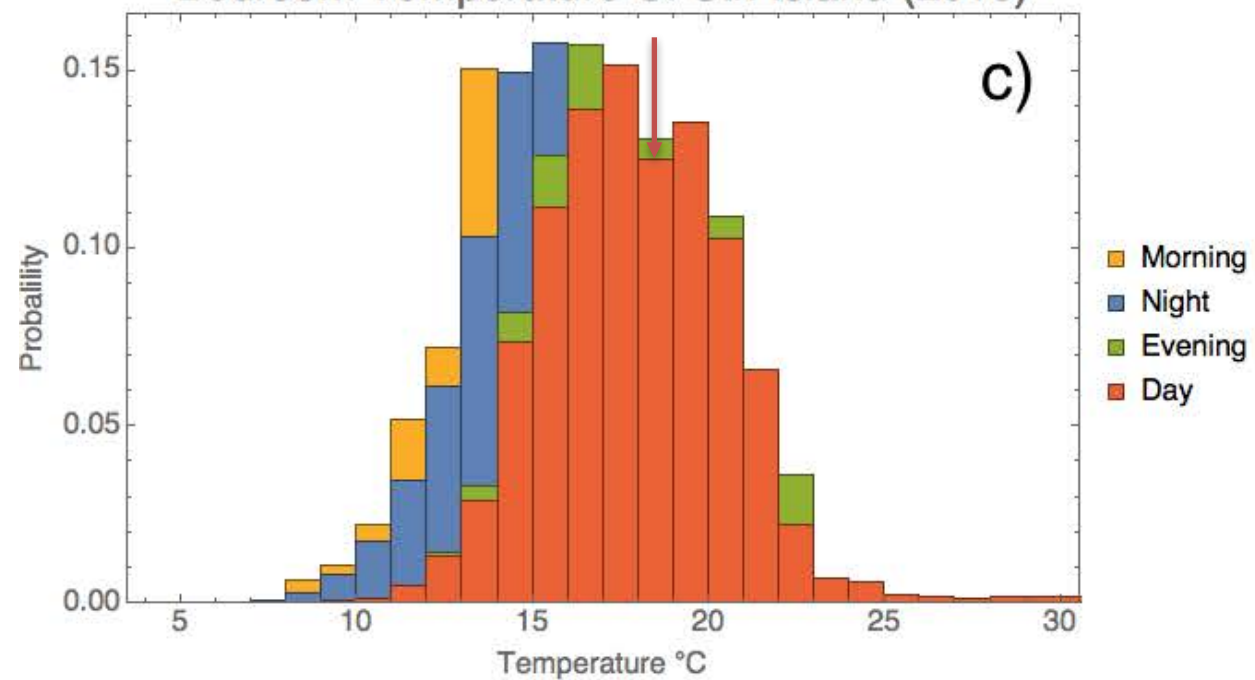
Bedroom Temperature Auckland (2016)



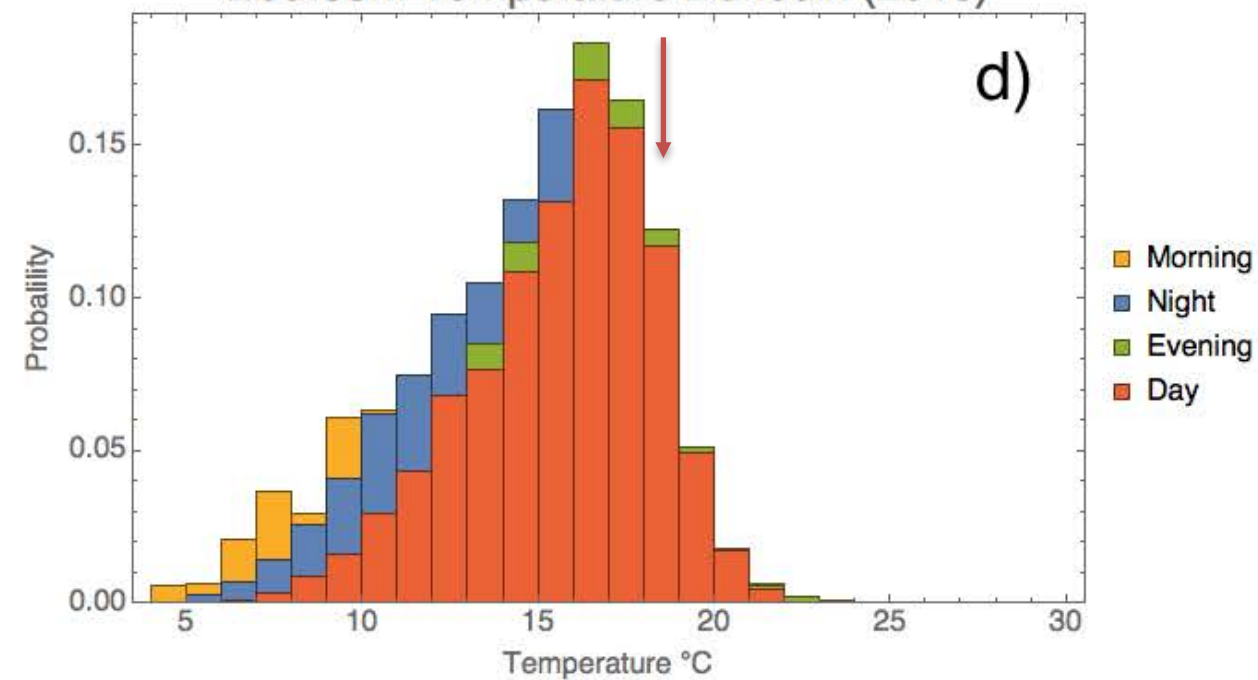
Bedroom Temperature Wellington (2016)



Bedroom Temperature U. Sth Island (2016)



Bedroom Temperature Dunedin (2016)

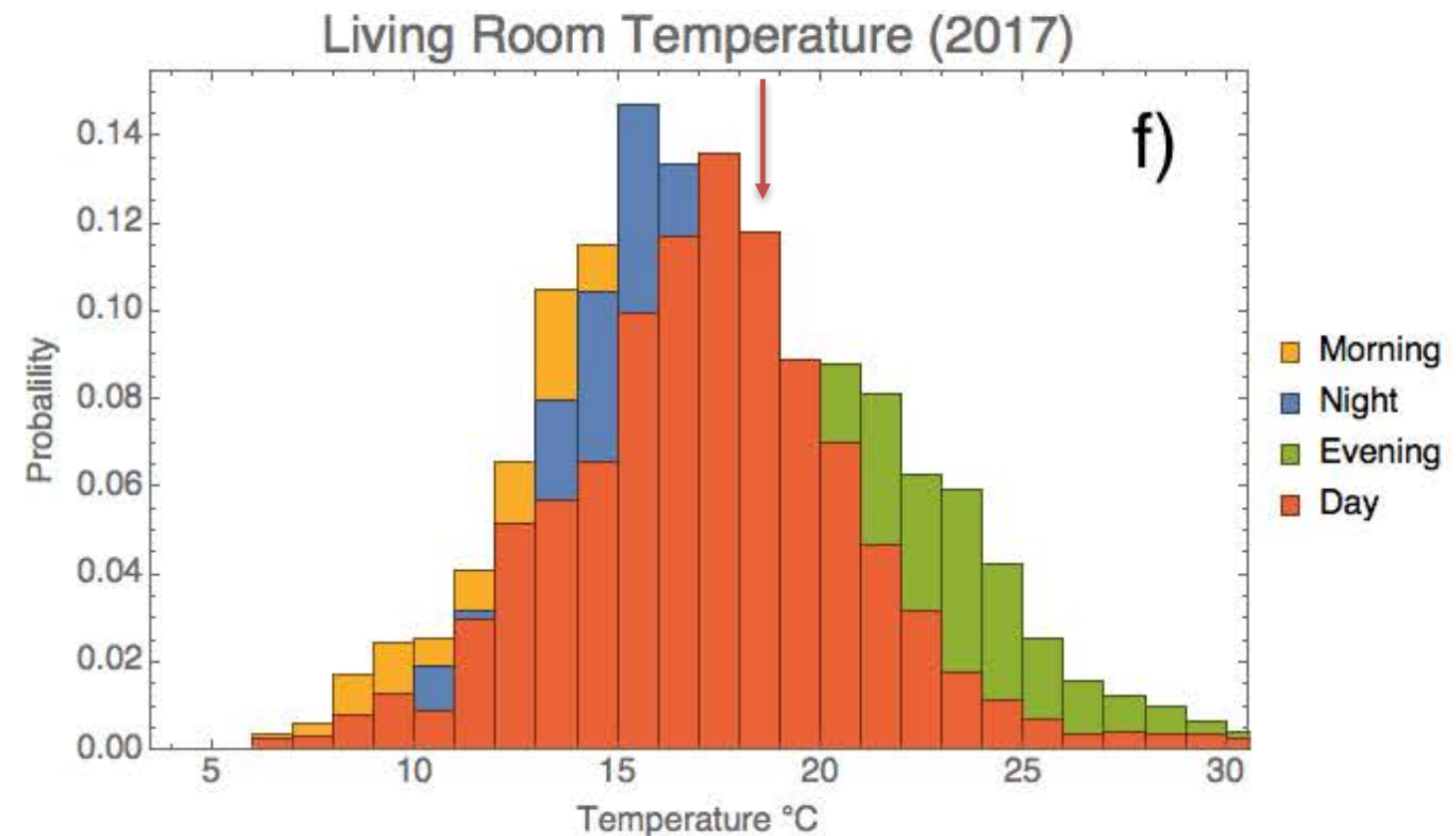
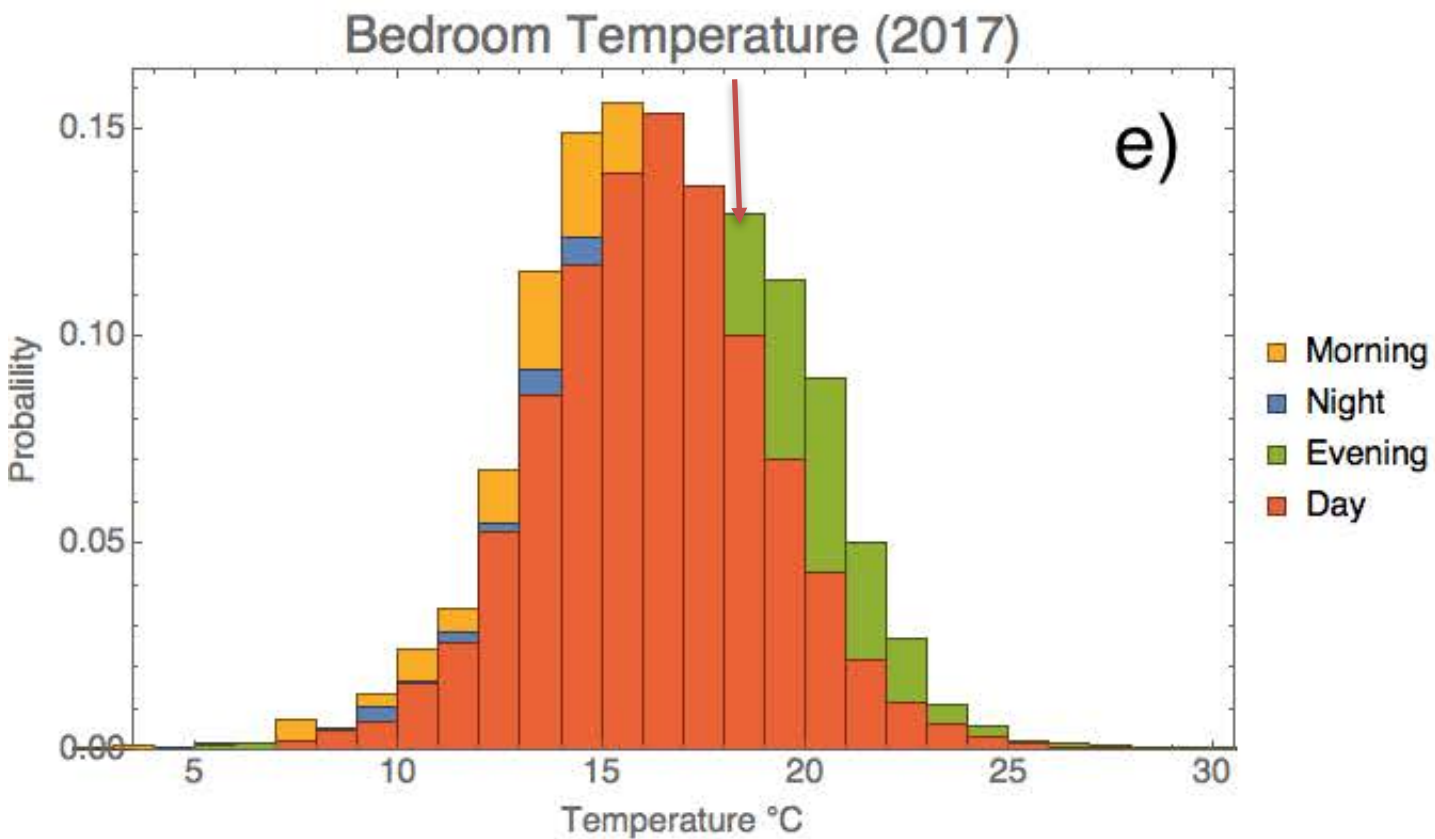


Temperature readings for all bedroom from the 2016 study

Readings	Proportion of time	Percentage of bedrooms
Less than 10°C	3%	54%
Less than 12°C	8%	84%
Less than 14°C	21%	96%
Less than 16°C	43%	98%
Less than 18 °C	71%	100%
Less than 21 °C	95%	100%

Occupant heating habits and coping strategies (2017 study)

- Heat the living area and rely on heat flow to bedrooms



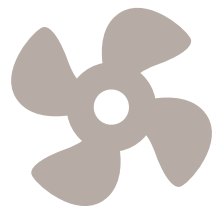
Occupant heating habits and coping strategies

- Heat the living area and rely on heat flow to bedrooms
- Sleep in one room, electric blankets, hot water bottles, extra blankets

"It heats up in here, we get it hot enough for us, so we can't bear it, then open all the doors so then the heat goes out."

"Nah, I've got an electric blanket, that's my heater! It's nice with my electric blanket on...but it does get really... what do you call it, when it gets cold...real damp, musty."

"It's cold as. We actually had a column heater in there quite a bit, cos at the back of the section there are retaining walls, when the cold comes down and rain and wet, it just sits in that area. It doesn't get dry."



VENTILATION

Only around

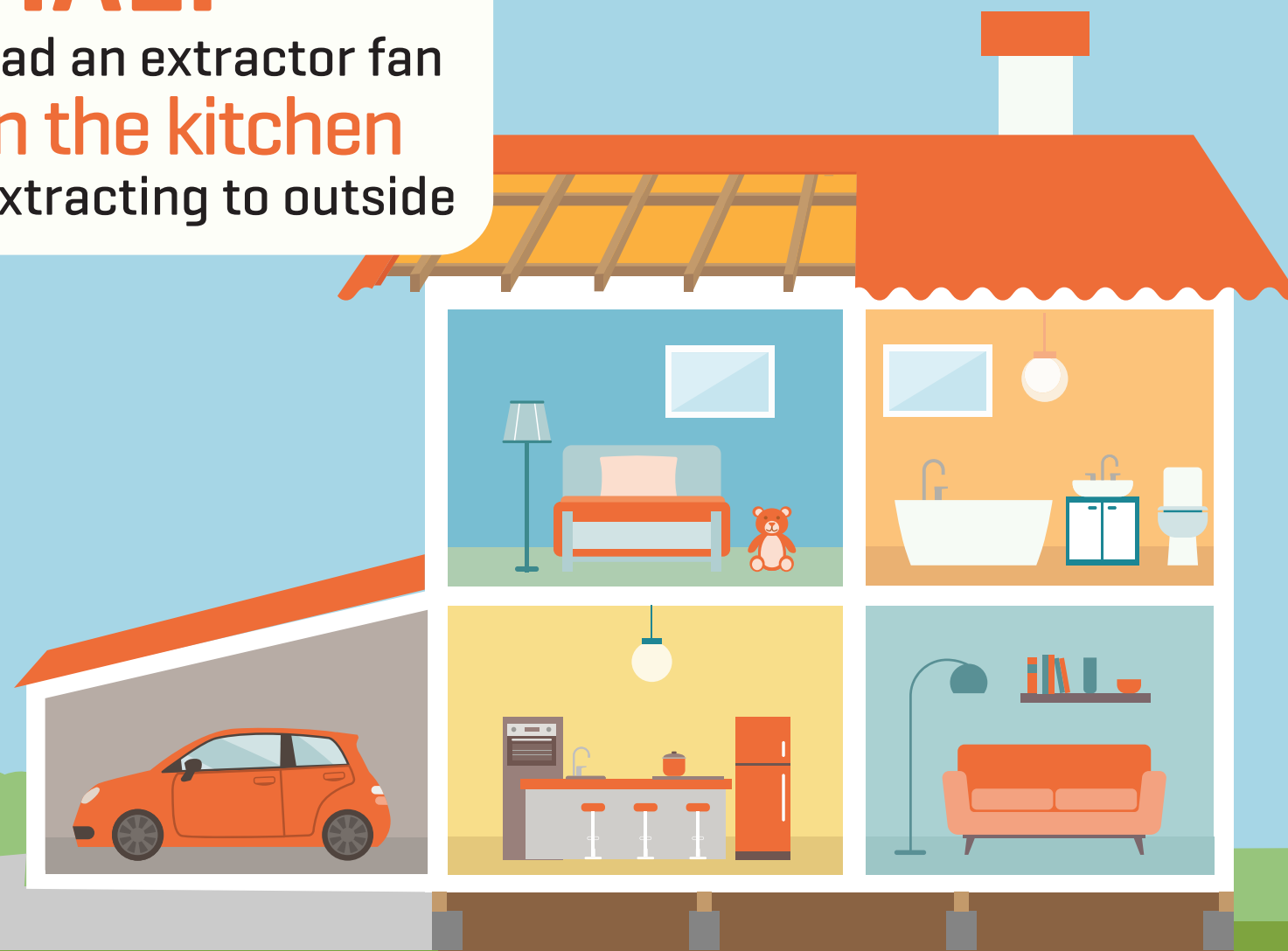
HALF

had an extractor fan
in the bathroom
venting to outside

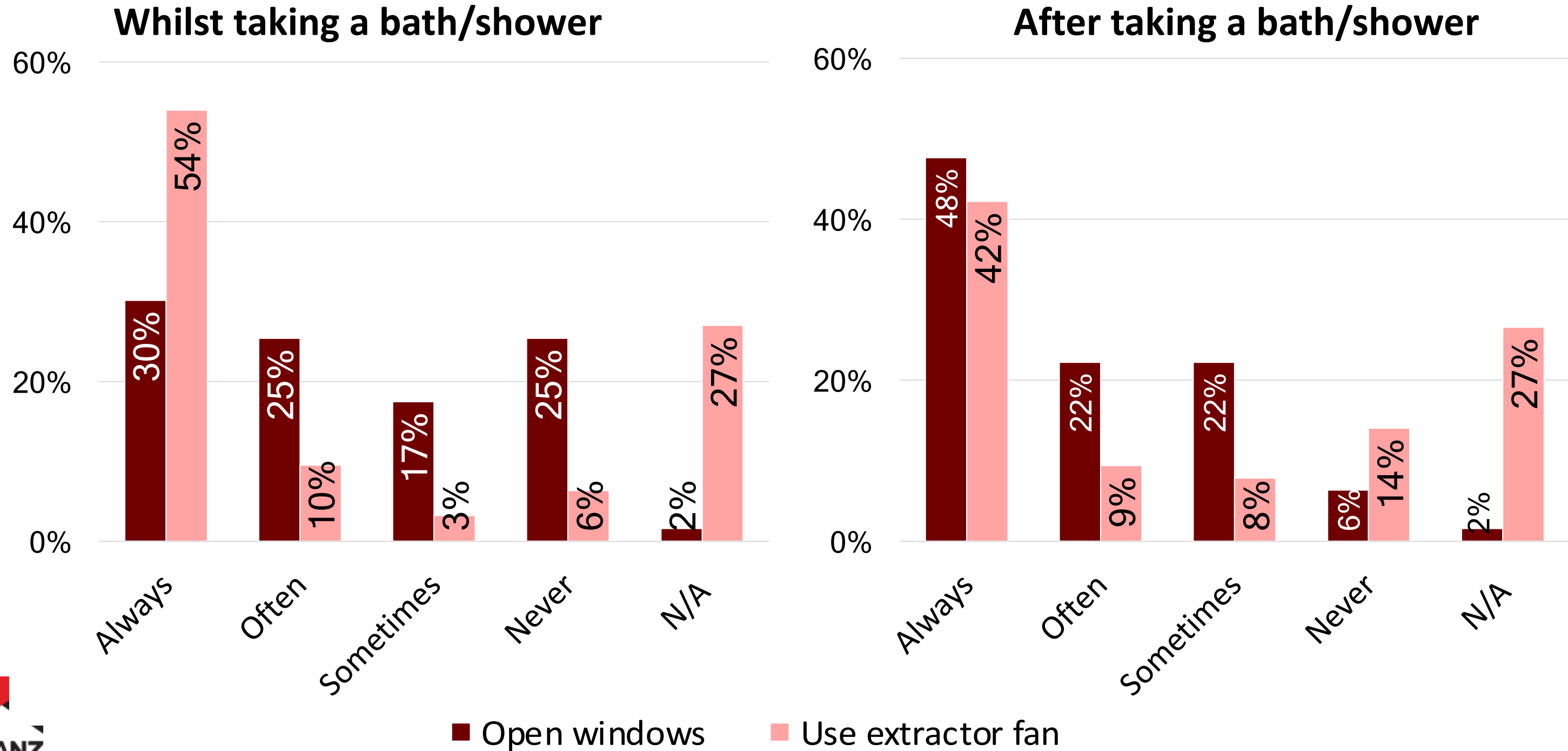
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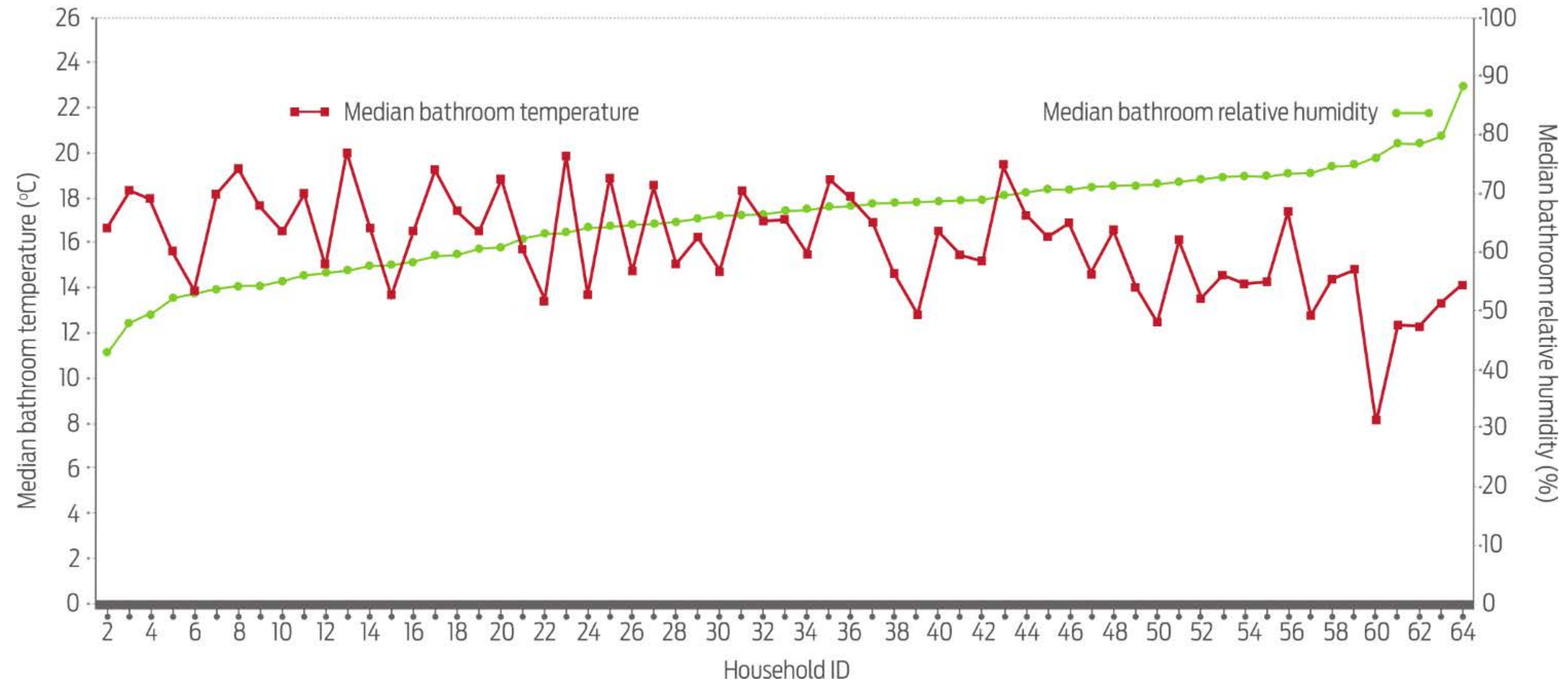
had an extractor fan
in the kitchen
extracting to outside



Occupant ventilation behaviour (reported)







Increasing temperature

17.9–20.1°C

16.3–17.7°C

14.4–16.2°C

8.1–14.3°C

- **Windows not open for long enough/wide enough**
- **Extractor fans used too little**
- **Poor installation, fitting, ductwork**
- **Lack of heating**

43.0–59.6%

59.7–67.1%

67.4–71.3%

71.7–88.3%

Increasing relative humidity



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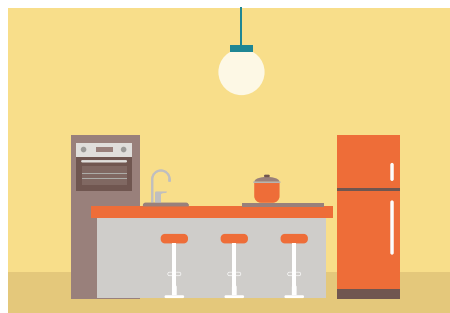
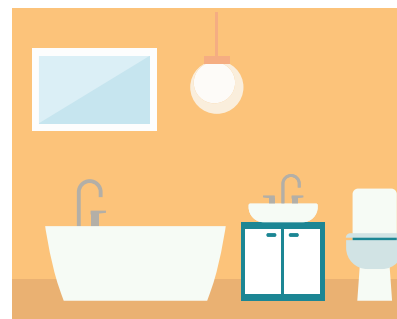
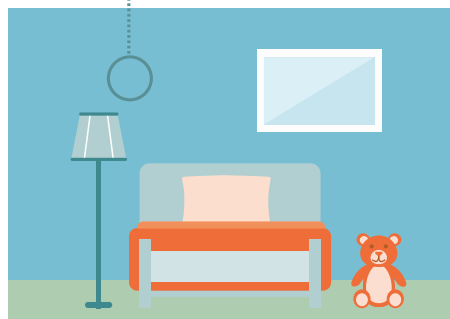
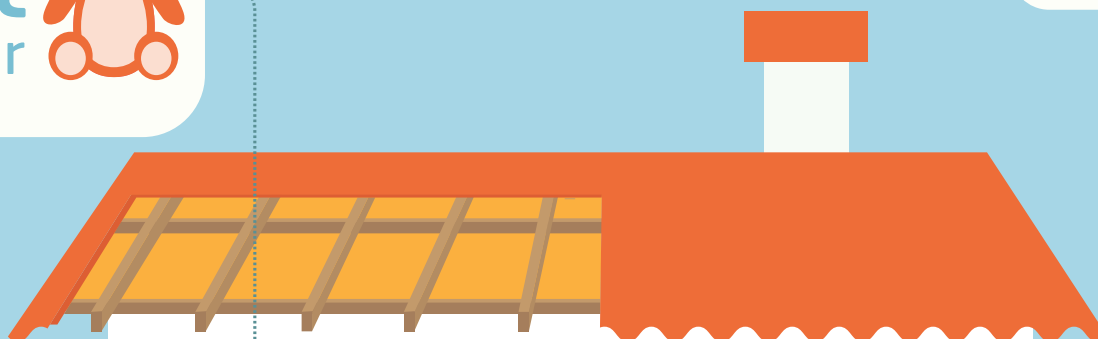
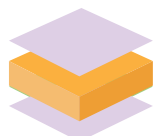
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Portable unflued gas heaters
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8% “musty” smell

18% felt damp

Rentals twice as likely to smell damp

Rentals three times as likely to feel damp

MOULD was visible in **49%** of all houses

44% owned > **56%** rented



Mould was most commonly found in bathrooms.

mould in bedrooms

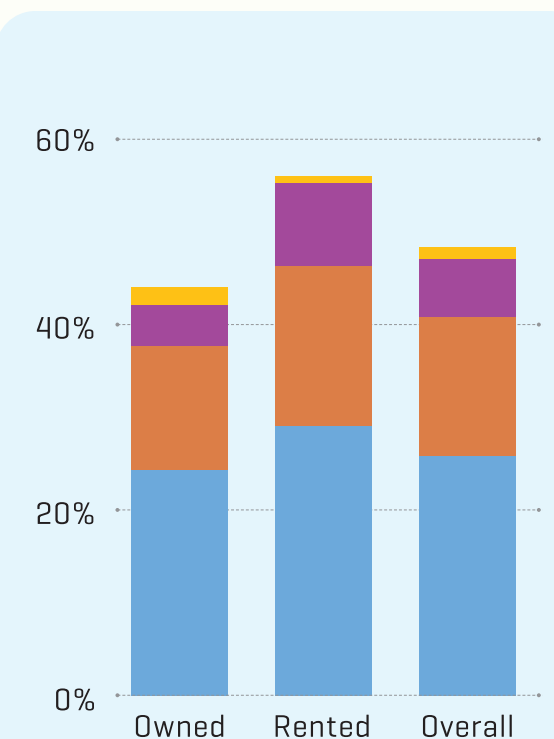


almost

30% > **18%**
of rentals owner-occupied

Managing mould

Mould was more commonly observed in houses lacking **effective heating, ventilation and insulation**



- Extensive blackened areas
- Large patches of mould
- Moderate patches of mould
- Specks of mould

‘people shouldn’t have to live in houses contaminated by methamphetamine – but they shouldn’t have to live in houses that are damp and mouldy either’

David Rutherford,

**Chief Commissioner,
Human Rights Commission**