Monitoring home temperatures for older people’s health

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Outline

Why monitor home temperatures for older people?

Case study to evaluate central heating installation for older, low-income households

Identifying criteria and obstacles for monitoring temperatures in relation to older people’s health
A vulnerable group

Older people are:

• vulnerable to health effects of cold living conditions
• often unable to afford sufficient heating
• most likely to live in hard-to-heat housing

Excess winter deaths:

• high numbers among over 65 year-olds in UK
• associated with low indoor temperatures and
• poor thermal efficiency of housing

Housing and Health: Challenges for UK Science and Policy

Janet Rudge, LEARN
**Related policies / instruments**

**Income supplements:** Winter Fuel / Cold Weather payments

**Health** inequalities - relate to cold housing & lack of affordable warmth

**Buildings:**
- Building Regulations Part L (energy efficiency)
- Housing Health & Safety Rating System
- Decent Homes Standard
- Fuel Poverty Strategy (Warm Front grants)

**Evidence needed for**
- scale of cold homes problem
- ‘what works’
Healthy temperatures?

Benchmark indoor temperatures to avoid health risk:

- 18°- 24°C - no risk to healthy, sedentary people
- 18°C - minimum for comfort
- <16°C - increased respiratory risk
- <12°C - cardiovascular risk

Fluctuating temperatures cause cold stress

- exacerbate circulatory disease (eg from warm- cold rooms)
- rapid change stressful for respiratory conditions (eg at bedtime)

‘Satisfactory’ heating standard

- 21 °C living rooms, 18 °C elsewhere
- 23 °C in living rooms + 18 °C for older / infirm households (Scotland)

Bathrooms: 22 °C recommended
Central heating evaluation

Hunt & Gidman (1978) found:

- CH homes 3°C warmer than non-CH homes
- between-room temperature range in high-income homes < half that in low-income homes
- coldest rooms in high-income homes same as warmest rooms in low-income homes

Central heating ownership:

- linked with declining excess winter deaths
- associated with higher indoor temperatures but......
- may not have benefited most vulnerable groups
- ownership no guarantee of use or affordability

How can health effects be measured?
Case study methods

Opportunistic sample:
- free central heating offered to Lambeth tenants aged 70+ (N=1181)
- response rate 64% - 45% agreed to research; final sample N = 210

Multi-disciplinary approach:
- external /room temperatures monitored hourly over 3 months (LEARN)
- interviews on quality of life and heating behaviour (King’s College)

Monitoring heating use and domestic temperature:
- cheap miniature dataloggers allowed continuous monitoring in several rooms

Data compared here for sample of 102 tenants, 70+ years old:
- with and without central heating
- monitored over same 3-day cold period (external average 7.1°C)
Before CH installation:

*Heating perceptions*

- felt the cold
- worried about heating costs
- reported more chronic illness / conditions affected by cold (e.g., arthritis)

*Rooms heated*

- Living room
- Kitchen
- Bedroom
- Bathroom

Among those who initially accepted CH offer, more

- felt the cold
- worried about heating costs
- reported more chronic illness / conditions affected by cold (e.g., arthritis)
Temperature profiles

Indoor temperatures analysed against thresholds for health:

**Typical home with CH**

**Typical home without CH**

Average *whole house* temperatures similar, before and after installation

_Housing and Health: Challenges for UK Science and Policy_  
_Janet Rudge, LEARN_
Effects of central heating

For CH homes data showed:

- mean whole house temps only slightly warmer (<0.5°C)
- mean living room temps slightly lower
- similar proportion of ‘warm’ living rooms during day
- similar proportion (but slightly fewer) of ‘cold’ bedrooms at night, but ..... 
- between-room contrasts smaller
- fewer ‘cold’ bathrooms
- smaller effect of cold weather on living - bedroom temperature difference
What is a ‘warm’ home?

Proposed definition

<table>
<thead>
<tr>
<th>Mean whole house temperature</th>
<th>Mean between-room temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>warm</td>
<td>warm, consistent</td>
</tr>
<tr>
<td>≥19°C</td>
<td>≥16.5&lt;19°C</td>
</tr>
<tr>
<td>intermediate</td>
<td>intermediate, consistent</td>
</tr>
<tr>
<td>&lt;16.5°C</td>
<td>&lt;3°C</td>
</tr>
<tr>
<td>cold</td>
<td>cold, consistent</td>
</tr>
<tr>
<td>&lt;3°C</td>
<td>≥3°C</td>
</tr>
<tr>
<td>variable</td>
<td></td>
</tr>
</tbody>
</table>

Comparative warmth of homes over cold period by CH status

<table>
<thead>
<tr>
<th>Central heating status</th>
<th>Warmth of homes - percentage</th>
<th>Total: %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>warm, consistent</td>
<td>warm, variable</td>
</tr>
<tr>
<td>No CH</td>
<td>12</td>
<td>35</td>
</tr>
<tr>
<td>CH</td>
<td>27</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>27</td>
</tr>
</tbody>
</table>

- by whole house mean temp, 47% “warm” homes in both groups, but
- between-room temp range significantly lower in homes with CH
Criteria for health

Actual experience:
- which rooms occupied and when
- range of temperatures rather than ‘whole house mean’

Vulnerable situations:
- bathroom temperatures should be warmer than others
- getting out of bed at night

Vulnerable times of day:
- rapid temperature change - at bedtime
- early morning (blood pressure changes)
Health assessment problems

Study design
- health effects of housing interventions prone to confounding
- necessary flexibility of methodology precluded RCT
- sample size, time scale

Responses
- impaired temperature perception can affect comfort responses
- self-reporting requires recalling health service use
- psychosocial factors may influence answers

Relating temperature to outcomes
- chronically ill may run warmer homes
- health service provision depends on availability rather than need
Uptake of interventions

Reasons for refusing CH installation

- upheaval
- reduced space
- prefer cooler temperatures / CH causes stuffiness
- CH is unhealthy - especially for respiratory conditions
- higher fuel bills / rent rise implications
- like look of real gas fire
- illness
- ‘too old to change now’ / fear of new system
- do those most in need refuse?
Further influences

Physical factors
• monitoring of occupation periods
• wide variation of building characteristics

Behavioural factors
• influence of expectations on responses / heating behaviour
• open windows, unheated bedrooms
• intermittent heating, thermostat as on/off switch
• levels of clothing
• difficulties using / understanding controls
• perception that ‘too warm’ homes are unhealthy
Conclusions

Central heating may benefit health
• *improved absolute temperatures* and *reduced thermal stress*

Advantages of continuous monitoring
• *highlights wide variation in domestic temperatures*
• *insights into links between indoor temperature and health*

New comparative measures required
• *to characterise thermal experience in relation to health*

Importance of energy efficient buildings
• *because of behavioural issues / resistance to change*

Need more housing / health research
Acknowledgements

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