Energy, Thermal Discomfort and Health

Workshop

“Energy and Justice”

Paris - 26 September 2014

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Service des Etudes Médicales (SEM)
1. From Fuel Poverty to Thermal Discomfort

2. From Thermal Discomfort to Health effects

3. Improving Energy Efficiency of dwellings: a cost effective challenge with multiple benefits
   - Energy saving
     - climate change
     - household expenses
   - Improved Comfort and Health
   - Improved Social attainments
     - Reduced cost to society
From Fuel Poverty to Thermal Discomfort

• The UK 10% Fuel Poverty definition
  ✓ Where a household needs to spend more than 10% of its available income on energy to maintain reasonable indoor temperatures

• Questions
  1. Although useful, can this definition apply everywhere?
  2. Does it identify the most vulnerable households?
  3. What are ‘reasonable indoor temperatures’?
Does the 10% FP definition apply anywhere?

WHO LARES project (2002-2003)

- 8 European cities
- 3,382 dwellings
- 8,519 individuals

<table>
<thead>
<tr>
<th>Income % spent on heating</th>
<th>Eastern Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vilnius</td>
</tr>
<tr>
<td>&gt;20%</td>
<td>46%</td>
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</table>
Does the 10% FP definition identify the most vulnerable households? (1/2)

“Queen Elizabeth close to joining millions of her subjects in becoming a victim of ‘fuel poverty’”
Does the 10% FP definition identify the most vulnerable households? (2/2)

- Low income + High energy costs + Thermally inefficient housing = Fuel Poverty and this has an impact on Health

- Based on the Hills review, Fuel Poverty has been redefined focusing on:
  - those on low income occupying energy inefficient dwellings (Low Income High Cost)
  - the extent (depth) of the fuel poverty
What are ‘reasonable’ temperatures?

• **WHO Guidance**
  ✓ ‘No demonstrable risk to health of healthy sedentary people living in air temperatures between $18^\circ C$ and $24^\circ C$’ (WHO-EURO, 1987)

• **Thermal Comfort**
  • covered by WHO definition of Health: ‘A state of complete physical, social and mental well-being’
  • depends on: air temperature, radiant temperature, relative humidity, air velocity, clothing, level of activity
  • its assessment is linked to surveys’ methodology (eg, measurements and/or nature of questions)
WHO LARES study

‘Is there a problem with temperature in your dwelling during winter, transient seasons or summer? If yes, do you feel too cold, too hot or both?’

<table>
<thead>
<tr>
<th>Problem with temperature</th>
<th>Vilnius</th>
<th>Bratislava</th>
<th>Budapest</th>
<th>Ferreira</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transient season</td>
<td>55%</td>
<td>33%</td>
<td>16%</td>
<td>50%</td>
</tr>
<tr>
<td>Of these, %age feeling too cold</td>
<td>90%</td>
<td>69%</td>
<td>63%</td>
<td>20%</td>
</tr>
<tr>
<td>During winter</td>
<td>60%</td>
<td>32%</td>
<td>28%</td>
<td>75%</td>
</tr>
<tr>
<td>Of these, %age feeling too cold</td>
<td>92%</td>
<td>76%</td>
<td>85%</td>
<td>98%</td>
</tr>
</tbody>
</table>
Some options for coping with Fuel Poverty

• Decrease energy consumption by using less energy than really needed for ~
  • heating
  • cooking
  • lighting, etc.

• Use other means for heating, cooking and lighting
with different consequences

- **Direct**
  - Insufficient appropriate energy for heating (air and water), lighting, food storage (refrigeration) and cooking

- **Indirect**
  - Inappropriate forms of ~
    - heating (eg. flueless gas or oil heaters)
    - lighting (candles, oil lamps)
  - Inadequate or no ventilation (blocking ventilators...)
  - Food spoilage and contamination
  - Low quality meals (avoiding cooking...)
...and effects on health and safety

- Low indoor temperature: Death; Cardiovasc. Resp. Mental health
- Poor indoor air quality:
  - Dampness, mould growth: Asthma and allergies
  - CO poisoning (acute and chronic)
  - Biomass smoke: lung cancer; chronic bronchitis (COPD)
- Fire (and burn injuries)
- Accidental injury (falls, collisions)
- Poor personal and domestic hygiene
- Food poisoning
- Unbalanced diet (poor nutrition/obesity)
Health effects of low indoor temperatures

- **24 °C**: Comfortable and healthy
- **21 °C**: Possible discomfort. No risk except for the vulnerable (e.g., elderly)
- **18 °C**: Uncomfortable. Risk of respiratory conditions, and to mental health
- **16 °C**: Cardiovascular risk
- **12 °C**: Beyond 2 hours, risk of hypothermia

SEM - V. Ezratty - 26/09/14
Excess Winter Mortality (EWM)

✓ The number of deaths from December to March compared to the average number of deaths during the preceding August-November and following April-July (Northern Hemisphere)

• **Fuel poverty** has been associated with EWM but other factors have an impact

• The majority of fatalities are linked to *respiratory* and *cardiovascular* conditions (*heart attacks and strokes*)

• Paradoxically, countries with *colder winter climates* have lower EWM rates
Fuel poverty and infectious diseases
An increased level of colds and flu

• NIH Scientists Offer Explanation for Winter Flu Season (2008)
  'Stability of Virus' Membrane at Cold Temperatures May Ease Winter Spread
• When only one room is heated, people crowd together and it may lead to an increased rate of infectious diseases

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

Michael G Baker, Lucy Telfar Barnard, Amanda Kvalsvig, Ayesha Verral, Jane Zhang, Michael Keall, Nick Wilson, Teresa 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.
Fuel poverty and mental health (1/3)

• Mental health is negatively affected by fuel poverty and cold housing for any age group

• More than 1 in 4 teenagers living in cold housing are at risk of multiple mental health problems

• Educational attainment and well-being of children are also negatively affected by cold housing

Source: Marmot review team report, 2011
Fuel poverty and mental health (2/3)

A circle of risk which starts with FP

Fuel Poverty

Less disposable income

Health-risk behaviours
Smoking/alcohol/overeating

Increased stress

Poorer physical health status

Stress

Anxiety

Mood distortion

Impaired immune, cardiovascular and hormonal functions

Source: C. Liddell - IEA conference Copenhagen 2013
Fuel poverty and mental health (3/3)

Stress is the center of the circle of risk

**A circle of risk which starts with FP**

**Fuel Poverty**

- Less disposable income
- Health-risk behaviours: Smoking/alcohol/overeating
- Increased stress
- Poorer physical health status
- Impaired immune, cardiovascular, and hormonal functions

**Stress sources**

- Income
- Cost of energy
- Cold home
- Mould & damp
- Stigma
- Damage to health
- No personal control
- Permanence

Source: C. Liddell and Jan Gilbertson - IEA conference Copenhagen 2013
These negative health effects mean

- Suffering for the individual and household
- Losses to the individual, and household ~
  - Working days lost
  - School days lost (under-achievement)
- Cost to society, including ~
  - Economic losses ~ 60%
  - Increased demand on the health sector ~ 40%

*Source:* “The Real Cost of Poor Housing”, BRE 2009-2010
Mechanisms to tackle the problem

1. Short term:

✓ Subsidies/social tariffs towards the cost of energy needed to maintain thermal comfort

✓ Prohibiting disconnection during cold weather
  • Should be targeted to those more susceptible to the health impacts: the elderly, infants, the disabled, and those with long-term sickness

2. Long term: improve the energy efficiency of dwellings

Benefits of Energy Efficiency measures (1/2)

• Positive range of impacts on health and wellbeing

1. Better self-reported *general health*

2. Improved *respiratory health* (adults and children)
   - Decreased school absence due to asthma

3. Improvement in *mental health* of adults (30%-60%)

*Source:* H. Thomson *et al.*, Cochrane database of Systematic Reviews 2013
Benefits of Energy Efficiency measures (2/2)

• Harmful effects are rare and usually avoided (through better communication with residents and ventilation assessment) and outweighed by health benefits

• There are greater improvements in health in recipients on low incomes

➢ This supports the inclusion of energy efficiency measures in strategies to tackle social issues like fuel poverty and health inequity

Insulation improves Energy Efficiency and can protect against Excess Heat

Mean daily mortality in France

- Energy inefficiency = risk factor for death (2003, France)

Source: Vandentorren et al., Eur J Public Health 2006
Case study: the cost-benefit of energy improvements (1/2)

Before:
- solid, un-insulated stone walls
- off peak storage radiators
- electric immersion heater
- little roof insulation
- partial double glazing

Occupied by pensioner

After:
- condensing gas boiler for hot water and radiators for space heating
- top-up loft insulation
- full double glazing

Same occupant

bre: Building Research Establishment
Case study: the cost-benefit of energy improvements (2/2)

✓ Upgrading this 100+ year old house

1. Cost of energy upgrade - £3,528

2. Estimated annual energy cost saving - £504

3. Estimated annual cost saving to health sector - £528

4. Period for savings to health sector to cover cost of upgrade (ie. 1 divided by 3) - 6.7 years

Source: BRE, 2011
To improve all the cold homes in England to what is now considered to be a reasonable level of energy efficiency would give a cost saving to the health sector of £750 million per year.

Source: “Quantifying the Cost of Poor Housing”, Nicol et al, BRE 2010
Conclusions

• "Too often health is equated only with health care

• ...there is enough cost benefit evidence to show that many interventions are efficient, equitable, and effective when designed and delivered in the right way

• ...public health and the medical workforce have critical roles to play in social and political advocacy at all levels, helping lead more equitable health, and social and economic, systems"

Thank you

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"Charlie and the chocolate factory". Roald Dahl
Illustration: Michel Siméon