Domestic heating and its impact on health

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Thematic session on solid fuel residential heating as a source of air pollution and short-lived climate forcers

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Burden of disease from joint effects of household and ambient air pollution - new WHO estimates

7 million premature deaths globally attributable to the joint effects of household (HAP) and ambient air pollution (AAP) in 2016

- 348 000 in Europe (LMIC)
- 208 000 in Europe (HIC)

- 233 000 in the Americas (LMIC)
- 96 000 in the Americas (HIC)

Air pollution causes non-communicable diseases (NCD), mainly stroke, ischaemic heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer
# Burden of disease from ambient and household air pollution - new WHO estimates

## Burden of disease from ambient air pollution, 2016

- **4.2 million premature deaths** globally
- **82%** of these deaths **due to NCDs**

By WHO region:

- **304 000** in Europe (LMIC)
- **205 000** in Europe (HIC)
- **164 000** in the Americas (LMIC)
- **95 000** in Americas (HIC)

## Burden of disease from household air pollution, 2016

- **3.8 million premature deaths** globally
- **73%** of these deaths **due to NCDs**

By WHO region:

- **52 000** in Europe (LMIC)
- **82 000** in the Americas (LMIC)
Residential heating with wood and coal – a significant source of air pollution

• A significant source of ambient air pollution; contributes also to indoor air pollution, through direct exposure or infiltration from outside

• Affects local- and regional-scale air quality, quantified as PM10, PM2.5, OC and EC/BC

• Contributions from residential wood combustion to PM10 and PM2.5 concentrations during the winter (heating) period range from < 5 % to 40 % of daily means

• The magnitude of the problem varies greatly by geography, prevalence of solid fuel use and the combustion technologies used
The report prepared by the Joint WHO/UNECE Long range Transboundary Air Pollution Convention Task Force on Health Aspects of Air Pollution
Impact of residential wood combustion on PM2.5 in ambient air

Europe has the highest proportion of outdoor PM2.5 emissions attributable to household heating with solid fuels (data for 2010):

- 21% of total PM2.5 in central Europe
- 12% in western Europe
- 13% in eastern Europe

This corresponds to average population-weighted PM2.5 concentrations of 1.7, 3.4 and 1.4 μg/m3, respectively.

In North America, 8% of the total ambient PM2.5 comes from household heating with solid fuels (1.1 μg/m3).

WHO, 2015
Emissions of PM2.5 from residential sources in the EU-28, 1990–2030

Notes: EU-28 is countries belonging to the EU after July 2013; current legislation scenario as in Amann et al. (2014), using the Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) model (Amann et al., 2011).

Source: reproduced with permission from the International Institute for Applied Systems Analysis (IIASA).

WHO, 2015
Health effects of solid fuel heating emissions

- Both short-term and long-term exposures to wood and coal smoke are harmful to health.
- Emissions contain a range of particulate and gaseous pollutants, including products of incomplete combustion:
  - PM2.5, BC, OC
  - CO, NOx, PAHs, SO2, VOCs
- Respiratory problems are a common concern associated with exposure to wood smoke.
- Studies suggest that exposure to wood and coal smoke may also harm cardiovascular health.
Residential heating contribution to outdoor PM2.5 and burden of disease, selected regions, 1990 and 2010

<table>
<thead>
<tr>
<th>Region</th>
<th>PM$_{2.5}$ from residential heating (%)</th>
<th>PM$_{2.5}$ from residential heating (µg/m$^3$)</th>
<th>Premature deaths/year</th>
<th>Disability-adjusted life-years (DALYs)/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Europe</td>
<td>11.1</td>
<td>3.5</td>
<td>18 000</td>
<td>370 000</td>
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<tr>
<td></td>
<td>21.1</td>
<td>3.4</td>
<td>20 000</td>
<td>340 000</td>
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<tr>
<td>Eastern Europe</td>
<td>9.6</td>
<td>2.0</td>
<td>24 000</td>
<td>480 000</td>
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<tr>
<td></td>
<td>13.1</td>
<td>1.4</td>
<td>21 000</td>
<td>410 000</td>
</tr>
<tr>
<td>Western Europe</td>
<td>5.4</td>
<td>1.3</td>
<td>17 000</td>
<td>280 000</td>
</tr>
<tr>
<td></td>
<td>11.8</td>
<td>1.7</td>
<td>20 000</td>
<td>290 000</td>
</tr>
<tr>
<td>High-income North America</td>
<td>4.6</td>
<td>0.9</td>
<td>7 500</td>
<td>140 000</td>
</tr>
<tr>
<td></td>
<td>8.3</td>
<td>1.1</td>
<td>9 200</td>
<td>160 000</td>
</tr>
<tr>
<td>Central Asia</td>
<td>9.9</td>
<td>2.4</td>
<td>5 500</td>
<td>180 000</td>
</tr>
<tr>
<td></td>
<td>8.3</td>
<td>1.6</td>
<td>4 200</td>
<td>110 000</td>
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<tr>
<td>Global</td>
<td>3.0</td>
<td>0.9</td>
<td>120 000</td>
<td>2 800 000</td>
</tr>
<tr>
<td></td>
<td>3.1</td>
<td>0.7</td>
<td>110 000</td>
<td>2 200 000</td>
</tr>
</tbody>
</table>

WHO, 2015
Interventions to decrease emissions and improve air quality

- Fuel switching (away from coal and other solid fuels)
- Use of more efficient heating technologies (such as certified fireplaces or pellet stoves)
- Heater and wood stove exchanges
- District heating
- Filters to reduce health effects from indoor air pollution
- Educational campaigns as a tool to reduce emissions from residential solid fuel heaters
Regulatory and voluntary measures to reduce emissions and health impacts of household combustion

- Regulatory emissions limits
- “No burn” days (regulatory and voluntary)
- Heater exchange regulations
- Information campaigns, especially to increase knowledge about the energy efficiency of heating options

- Better coherence between climate, energy and air quality policies
Thank you for your attention

http://www.euro.who.int/en/health-topics/environment-and-health