



World Health  
Organization  
REGIONAL OFFICE FOR  
Europe



EUROPEAN ENVIRONMENT  
AND HEALTH PROCESS

# Update on relevant regional and global activities

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# BaP and wood burning

- (a) What are the trends in benzo(a)pyrene emissions, concentrations and depositions?**
- (b) What are the major sources of uncertainties?**
- (c) What are the consequences for health?**
- (d) How can wood-burning emission estimates be improved?**



# Health impacts of ambient BaP - REVIHAAP

**Is there any new evidence on health effects due to air emissions of polycyclic aromatic hydrocarbons that would impact upon current target values?**

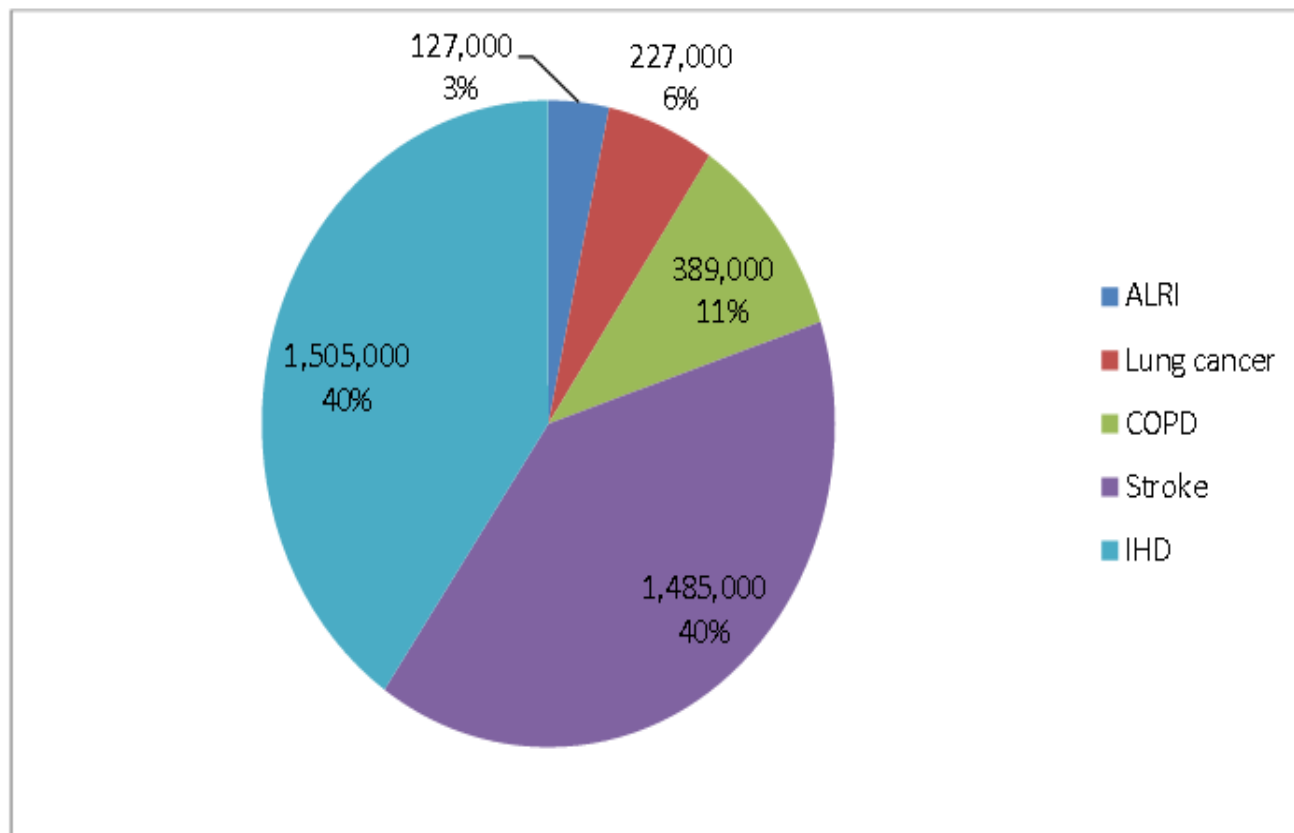
## *Answer*

Some polycyclic aromatic hydrocarbons (PAHs) are potent carcinogens, and they are often attached to airborne particles, which may also play a role in their carcinogenicity. As PAHs are carcinogenic by a genotoxic mode of action, their levels in air should be kept as low as possible. There is new evidence linking PAH exposure to cardiovascular end-points, but at present these effects of PAH exposure cannot be separated from the effects of particles and therefore cannot impact on the target values. Studies on early biological effects of PAH exposure based on biomarkers, including PAH-DNA adducts, in general populations of children and adults also suggest a range of potential non-carcinogenic effects. Overall, there is no new evidence from which to propose a new target value. However, it should be noted that, based on previous literature, the existing target value of  $1 \text{ ng/m}^3$  of benzo[*a*]pyrene is associated with the lifetime cancer risk of approximately  $1 \times 10^{-4}$ .



# The Health Impacts of Air pollution

Figure 3. Deaths attributable to AAP in 2012, by disease



## Global Burden of disease from Ambient Air Pollution (2012)

Percentage represents percent of total AAP burden (add up to 100%).

AAP: Ambient air pollution; ALRI: Acute lower respiratory disease; COPD: Chronic obstructive pulmonary disease; IHD: Ischaemic heart disease.

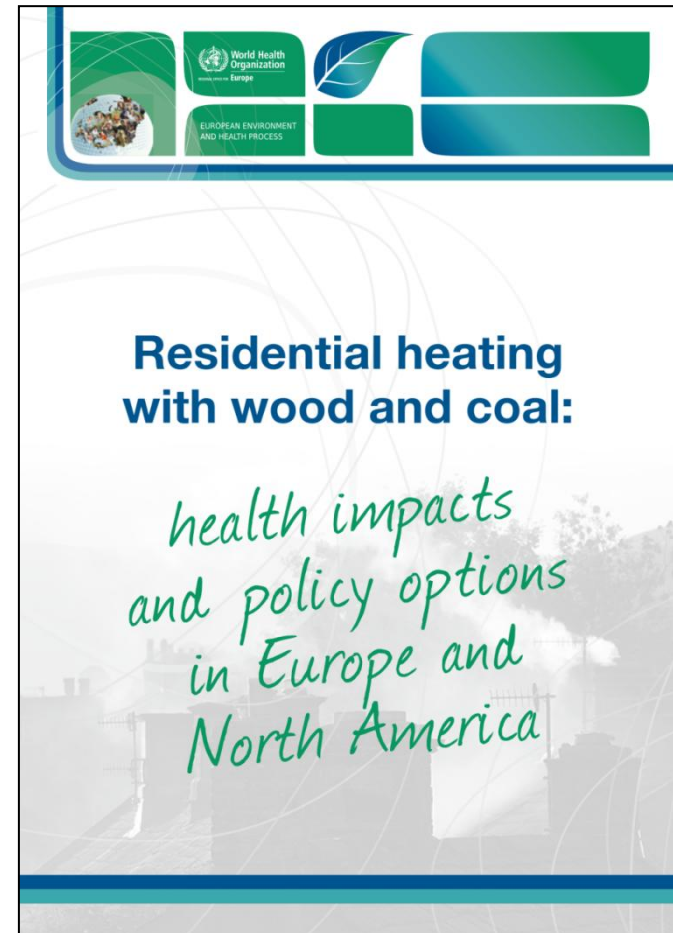


# WHO Publication on residential heating

- **Publication available on the WHO website at:**  
**<http://www.euro.who.int/residential-heating>**
- **Available in English and Russian**

**\*Co-authors acknowledged:**

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- *Zoe Chafe*
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- *Timo Lanki*
- *Raimo Salonen*
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# Wood burning, PM and health

- **No reason to consider PM from biomass combustion less harmful than particles from other urban sources**
  - **Some short-term exposure, few long-term exposure studies**
  - **Evidence on respiratory effects (asthma, COPD), limited on cardiovascular effects**
  - **Household combustion of coal and use of solid fuels, BaP, ambient air pollution, including PM, carcinogenic according to IARC**
- **Learning from other types of biomass burning**



# Residential heating contribution to outdoor PM<sub>2.5</sub> and burden of disease, 1990 and 2010

Region	PM <sub>2.5</sub> from residential heating (%)		PM <sub>2.5</sub> from residential heating (µg/m <sup>3</sup> )		Premature deaths/year		Disability-adjusted life-years (DALYs)/year	
	1990	2010	1990	2010	1990	2010	1990	2010
Central Europe	11.1	21.1	3.5	3.4	18 000	20 000	370 000	340 000
Eastern Europe	9.6	13.1	2.0	1.4	24 000	21 000	480 000	410 000
Western Europe	5.4	11.8	1.3	1.7	17 000	20 000	280 000	290 000
High-income North America	4.6	8.3	0.9	1.1	7 500	9 200	140 000	160 000
Central Asia	9.9	8.3	2.4	1.6	5 500	4 200	180 000	110 000
Global	3.0	3.1	0.9	0.7	120 000	110 000	2 800 000	2 200 000



# Ozone issues

- (a) What is the current scientific knowledge and understanding about ozone trends?**
- (b) What are the contributions to ozone levels of the hemispheric transport of air pollution as well as local air pollution peaks, especially in the Mediterranean area?**
- (c) What are the impacts on health and ecosystems?**



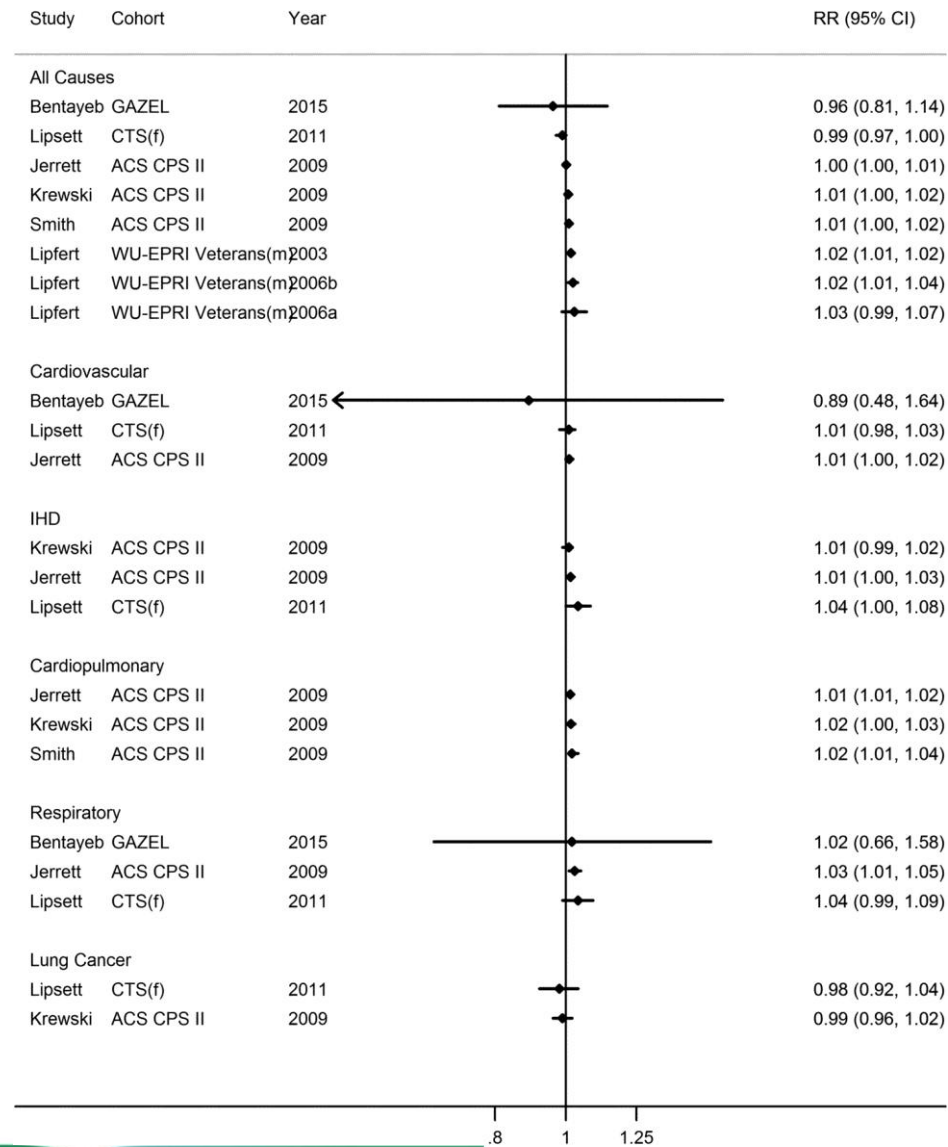


# Impacts of ozone on health – main messages

- **Recent evidence on long-term (summer months) ozone and respiratory mortality**
  - **Is it capturing a different signal than peak ozone measures?**
- **Health effects and temporal trends independent of PM**
- **Health studies at levels lower than WHO guidelines**
- **Need to rethink SOMO35/SOMO10?**
  - **In light of long-term health effects?**
  - **If modelling has improved?**



# RR (95% CI) of death per 10 ppb increase in long-term 'warm-season' ozone exposure.



R W Atkinson et al. *BMJ Open* 2016;6:e009493



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BMJ Open

# Strengths and limitations

- This is the first quantitative review and meta-analysis of cohort evidence for long-term exposure to ozone and a range of causes of death.
- Fourteen publications from eight cohorts were identified. The majority of cohorts were from the USA and most of these focused on selected population subgroups.
- Results: no evidence of associations between long-term annual O<sub>3</sub> concentrations and the risk of death. Studies that used O<sub>3</sub> concentrations measured during the warmer months as the exposure metric generally reported positive associations, especially with respiratory mortality.
- *New study by Turner et al. (2016) reports conflicting findings*
- Climate change and increasing anthropogenic emissions of ozone precursors on ozone levels worldwide is likely to increase the population exposure to ozone. For the impact of these changes on mortality to be estimated further, cohort studies in representative populations utilising comparable ozone metrics are required.

