

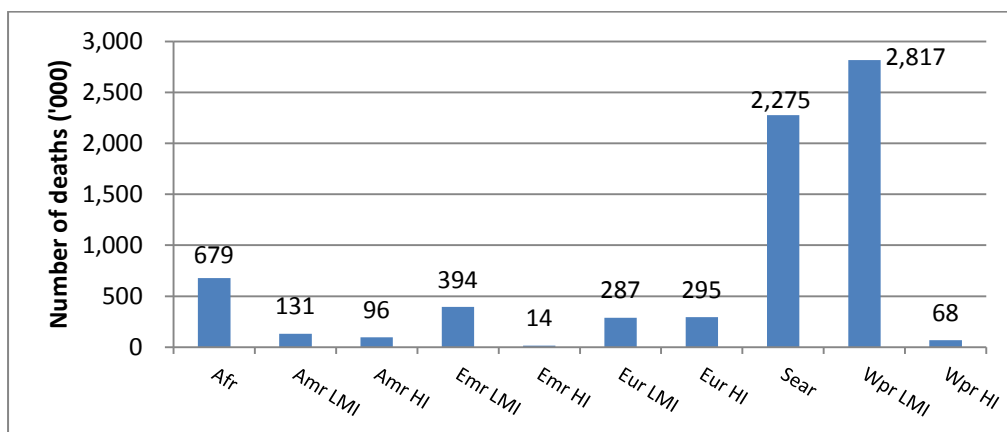
Burden of disease from the joint effects of Household and Ambient Air Pollution for 2012

Summary of results

Globally, 7 million deaths were attributable to the joint effects of household (HAP) and ambient air pollution (AAP) in 2012. The Western Pacific and South East Asian regions bear most of the burden with 2.8 and 2.3 million deaths, respectively. Almost 680'000 deaths occur in Africa, about 400'000 in the Eastern Mediterranean region, 287'000 in Europe and 131'000 in the Americas. The remaining deaths occur in high-income countries of Europe (295'000), Americas (96'000), Western Pacific (68'000), and Eastern Mediterranean (14'000).

Note of caution: An approximation of the combined effects of risk factors is possible if independence and little correlation between risk factors with impacts on the same diseases can be assumed¹. In the case of air pollution, however, there are some limitations to estimate the joint effects: limited knowledge on the distribution of the population exposed to both household and ambient air pollution, correlation of exposures at individual level as household air pollution is a contributor to ambient air pollution, and non-linear interactions^{2,3}. In several regions, however, household air pollution remains mainly a rural issue, while ambient air pollution is predominantly an urban problem. Also, in some continents, many countries are relatively unaffected by household air pollution, while ambient air pollution is a major concern. If assuming independence and little correlation, a rough estimate of the total impact can be calculated, which is less than the sum of the impact of the two risk factors. The joint effects of both ambient and household air pollution would result in the impacts shown in Figure 1-4. Given the limitations, however, the estimates presented below should be interpreted with caution, and provide indicative values only.

Figure 1. Total deaths attributable to the joint effects of HAP and AAP in 2012, by region



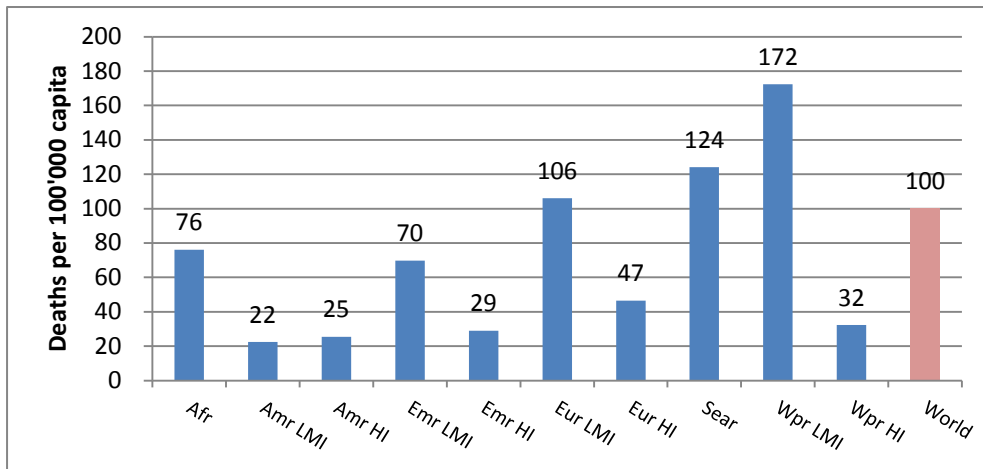
HAP: Household air pollution; AAP: Ambient air pollution; Amr: America, Afr: Africa; Emr: Eastern Mediterranean, Sear: South-East Asia, Wpr: Western Pacific; LMI: Low- and middle-income; HI: High-income.

¹ Ezzati et al (2003), *The Lancet*, 362:271-80.

² Lim et al (2012), *The Lancet*, 380:2224-2260.

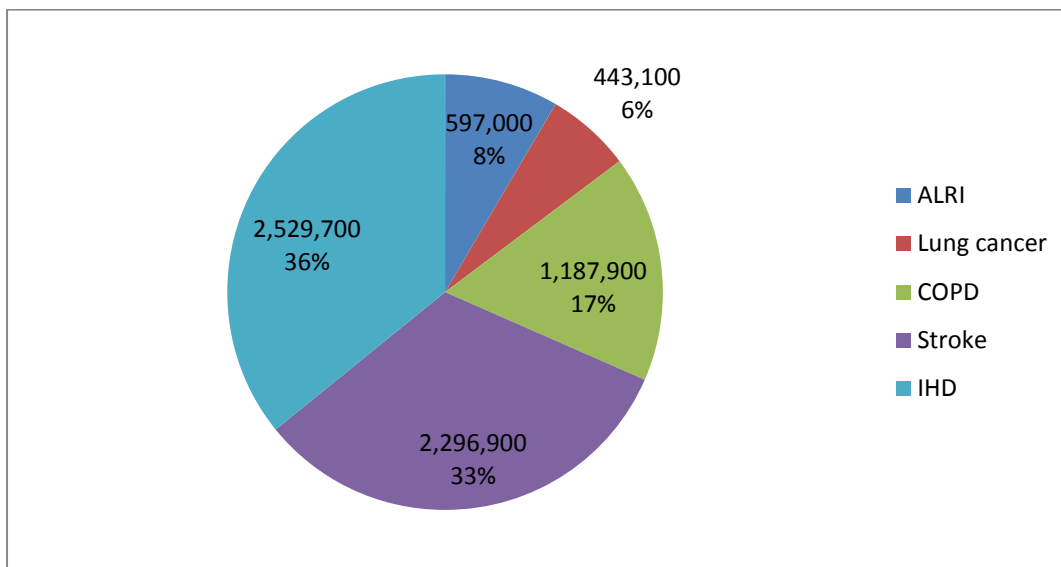
³ Smith, Bruce, Balakrishnan et al (2014), *Annual Review of Public Health*, in press.

Figure 2. Deaths per capita attributable to the joint effects of HAP and AAP in 2012, by region



HAP: Household air pollution; AAP: Ambient air pollution; Amr: America, Afr: Africa; Emr: Eastern Mediterranean, Sear: South-East Asia, Wpr: Western Pacific; LMI: Low- and middle-income; HI: High-income.

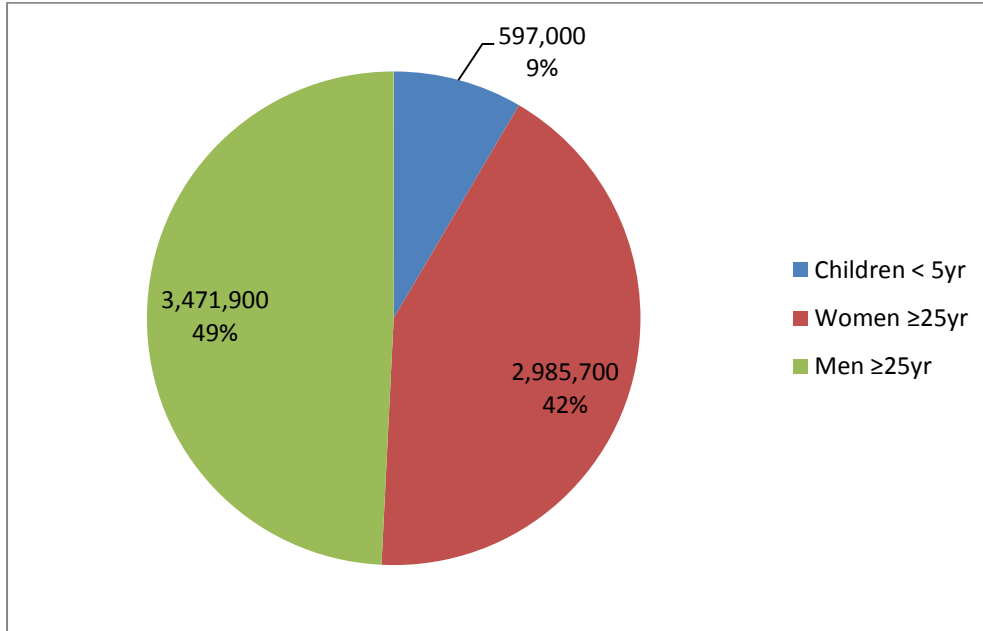
Figure 3. Deaths attributable to the joint effects of HAP and AAP in 2012, by disease



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

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

Figure 4. Deaths attributable to the joint effects of HAP and AAP in 2012, by age and sex



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

HAP: Household air pollution; AAP: Ambient air pollution; yr: year.

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