

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

v2.0 November 2016

Description of method

The burden of disease attributable to the joint effects of household and ambient air pollution for the year 2012 was estimated based on the calculation of the joint population attributable fractions assuming independently distributed exposures and independent hazards as described in (1). The joint population attributable fractions (PAF) were calculated using the following formula:

$$PAF = 1 - \prod_{i=1}^n (1 - PAF_i)$$

where PAF_i is PAF of individual risk factors.

Detailed method descriptions of the separate burden of disease attributable to household and ambient air pollution are described elsewhere (2,3).

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 assumed (1). 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 (4, 5). 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 the document “Burden of disease from the joint effects of Household and Ambient Air Pollution for 2012” from November 2016. Given the limitations, however, the estimates presented should be interpreted with caution, and provide indicative values only.

References

1. Ezzati M, Vander Hoorn S, Rodgers A, Lopez AD, Mathers CD et al. Estimates of global and regional potential health gains from reducing multiple major risk factors. *Lancet*. 2003;362:271-80.
2. WHO. Public Health, Environmental and Social Determinants of Health (PHE). Geneva, World Health Organization. http://www.who.int/phe/health_topics/outdoorair/databases
3. WHO. Ambient air pollution : a global assessment of exposure and burden of disease. WHO Geneva, 2016. <http://www.who.int/phe/publications/air-pollution-global-assessment/en/>
4. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet*. 2012;380(9859):2224-60. doi: 10.1016/S0140-6736(12)61766-8.

5. Smith KR, Bruce N, Balakrishnan K, Adair-Rohani H, Balmes J, Chafe Z et al. Millions dead: how do we know and what does it mean? Methods used in the Comparative risk assessment of household air pollution. *Annu. Rev. Public Health.* 2014; Vol 35 (<http://www.annualreviews.org/doi/abs/10.1146/annurev-publhealth-032013-182356>).

For further information, please contact:
Public Health, Social and Environmental Determinants of Health Department,
World Health Organization, 1211 Geneva 27, Switzerland
Website: www.who.int/phe; email: ambientair@who.int

© World Health Organization 2016

All rights reserved.