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OUTDOOR AIR DOMINATES BURDEN OF DISEASE FROM INDOOR EXPOSURES

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Summary

Both indoor and outdoor sources of air pollution have significant public health impacts in Europe. Based on quantitative modelling of the burden of disease the outdoor sources dominate the impacts by a clear margin.

Introduction

Ambient air pollution has been suggested to be the dominating source of environmental burden of diseases in Europe (Hänninen & Knol, 2011, 2013). However, indoor sources can generate extremely high exposure levels in poorly ventilated conditions. Globally it has been estimated that indoor PM exposures, especially due to combustion of solid fuels, dominate the burden of disease caused by air pollution (Lim et al., 2012). The aim of this work is to compare the magnitude of indoor and outdoor air pollution in European countries and further to evaluate their control potentials using ventilation, filtration and source elimination.

Methods

Burden of disease model developed in the IAIAQ-study (Jantunen et al., 2011) was complemented with a mass-balance component (Hänninen et al., 2004). Exposure data for PM_{2.5}, VOCs, radon, CO, second hand smoke and dampness and mould were collected for 26 European countries (EU27 except Malta). Burden of disease for the baseline at 2010 and for alternative control scenarios were evaluated.

Results and discussion

Total burden of disease from indoor exposures is estimated to be 2.1 million DALY in EU26. The burden is dominated by outdoor PM_{2.5} (62%) followed by indoor PM_{2.5}, radon (8%) and dampness and mould (5%). PM_{2.5} burden is further dominated by cardiovascular diseases followed by respiratory diseases.

Outdoor air burden can be controlled by either limiting ventilation or by filtration. However, the former approach increases the burden from indoor sources if they are not specifically controlled first. Most efficient reduction can be achieved by combining these strategies, providing an almost 50% reduction. As the energy efficiency demands are shaping the future building stocks strongly, it is essential to account for also for the indoor source control to protect public health.

Conclusions

Outdoor air remains the dominating source of burden of disease from indoor exposures. Improvement of outdoor air quality has the largest potential for public health improvements.

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