INTEGRATED ENVIRONMENTAL HEALTH IMPACT ASSESSMENT BASED ON PERSONAL EXPOSURE TO PM2.5

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Background and Aims: When drafting regulations for enhancing environmental quality or public health, it is useful to assess their health effects in advance as policies might have interrelated but opposing effects. Currently, in integrated impact assessments of air pollutants the estimation of health effects is based on concentration response functions that are applied to outdoor air concentration. In contrast, this study aims to assess the health effects of exposure to PM2.5 using modelled personal exposure.
Methods: Personal exposure to fine particles as time-weighted concentration in different micro-environments was derived for various policy measures (e.g. increased insulation and simultaneously decreased emissions) using the tooL for Air pollution exposure Modelling and Assessment (LAMA). Based on this personal exposure, health effects, DALYs and damage costs were estimated.
To derive health effects, concentration response functions were scaled and converted into exposure response functions based on the relationship between background concentrations and personal exposure experienced indoors from outdoor sources.
Results: Results show that the mean exposure due to insulation of residential buildings increases: For insulation scenarios for the years 2020, 2030 and 2050 about 10 to 500 thousand DALYs are caused due to accumulation of PM from indoor and outdoor sources in residential dwellings in the EU30 (corresponding to about 800 to 40,000 million EUR_{2010}). However, due to a simultaneous decrease in the outdoor air concentration the total impact of the modelled measure ranges from -20 thousand to 100 thousand DALYs. When only considering outdoor air sources 100 to 300 thousand DALYs can be avoided due to the measure.
Conclusions: Personal exposure modelling as a basis for integrated environmental health impact assessment provides a means of better assessing mitigation measures with direct effects on exposure. However, there remains the need for further enhancement of the input data and assumptions, including the exposure response functions
References: