Standards for securing adequate indoor air quality across Europe: setting the scene for health based ventilation guidelines proposed by the HealthVent project

Background: Inadequate IAQ causes a loss of 2 million healthy life years annually in the EU. Europeans spend typically over 85–90% of their time indoors and the main factors that affect negatively the characteristics of the air they breathe are outdoor air used to ventilate indoor spaces and indoor sources of pollution. Ventilation is one of many factors determining IAQ. The aim of DG SANCO funded HealthVent project was to assess how ventilation should be defined in terms of achieving conditions for securing health.

Methods: Review of the available literature was made so as to break down the health effects of IAQ into different components: exposures to indoor and outdoor air pollutants, association with different morbidities and the way ventilation based approaches could minimise their impact. Disability adjusted life years (DALYs), a common metric to allow comparability of impacts on various types of diseases and mortality was used in risk analysis. Ventilation rate was defined as volume of fresh air introduced into the space per person (L/sp).

Results: The data in the reviewed studies on ventilation and health were found inadequate to set the health-based ventilation rates mainly because the studies improperly characterised exposures and because of their inhomogeneity. Risk modelling simulations of different strategies resulting in reduction of DALYs suggested that health based ventilation requirements should be combined with source control strategies and if necessary cleaning of outdoor air in order to be efficient. As a consequence HealthVent proposed that source control is a key strategy for IAQ and that ventilation should be an ultimate measure. HealthVent defined the minimum reference ventilation rate to reduce risk of health to be set at 4 L/s per person. This rate is only to handle human bioeffluents and is determined mainly considering the metabolic CO2 production.

It is only applicable if all other pollutants meet WHO guidelines for ambient and indoor air quality. If they do not meet these guidelines after applying source control and when air used for ventilation is clean health-based ventilation rate should be a multiple of the minimum rate. Conclusions: Optimal strategy for ensuring adequate IAQ to ensure health conditions must include cleaning of ambient air (if necessary) and source control; only then health-based ventilation rate can be defined. Such approach is expected to half the BOD caused by indoor exposures.
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