

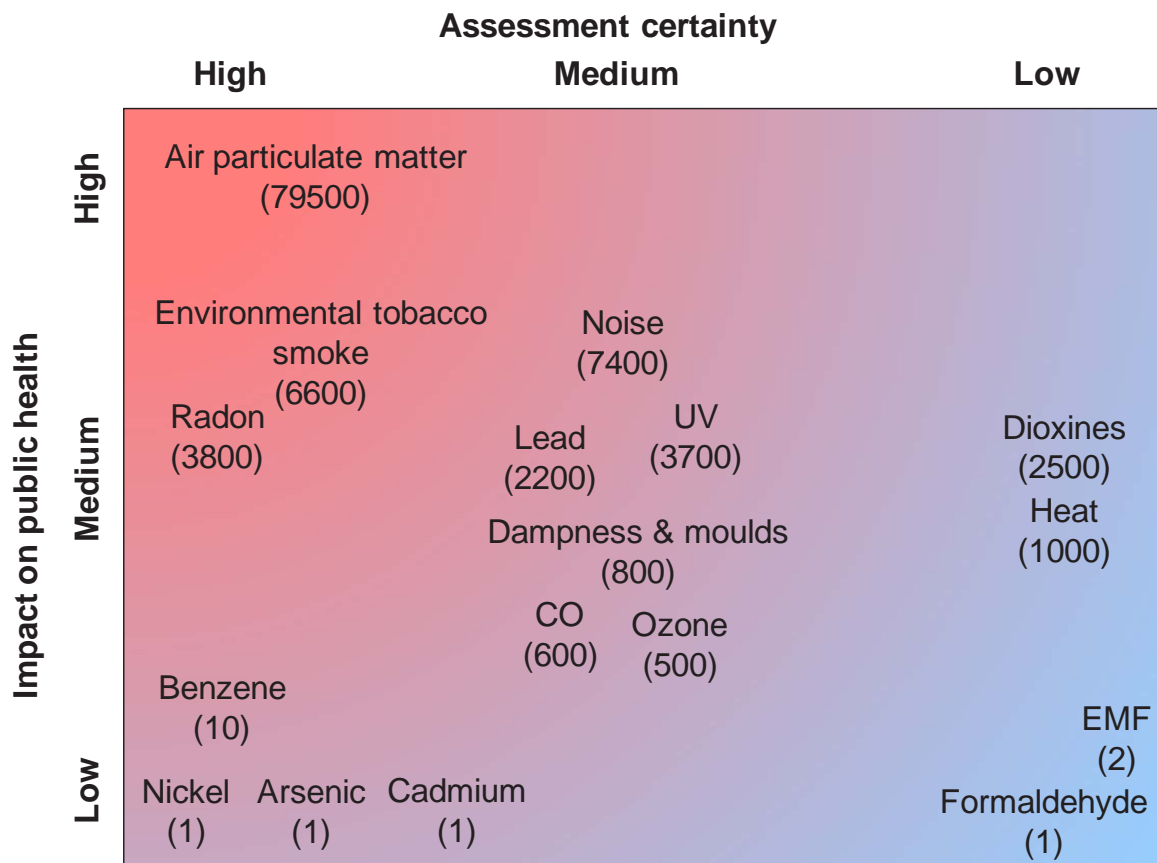
Summary

Environmental stressors or pollutants have an influence on human health. Burden of disease (BoD) studies give an indication of the total burden including mortality and morbidity. The impact of environmental stressors on the disease burden is calculated in environmental burden of disease studies (EBD). An indicator that estimates the burden is the DALY or disability adjusted life year. DALYs are a measure for the potential loss of healthy life years caused by morbidity or premature mortality. In this study DALYs were calculated for exposure to 18 stressors: benzene, carbon monoxide, dioxins in food, air elemental carbon (EC), electromagnetic fields, air particulate matter (PM), ozone, formaldehyde, noise, heat, lead, atmospheric nickel, atmospheric arsenic, atmospheric cadmium, environmental tobacco smoke, radon, mould and dampness and ultraviolet radiation.

The results give a crude estimate of the impact of the different pollutants on the burden of disease in Flanders and should be interpreted with care. The contribution is attributive. Background pollutant exposure levels of natural origin and the influence of individual (e.g. genetic predisposition) and social-economic factors on health, lead to the fact that the attributive burden may not be interpreted as potentially totally reducible. However, recent studies show that a decrease in exposure to particulate matter (PM_{2.5}) is associated with an increase in life expectancy (Laden et al., 2006; Pope et al., 2009).

The total burden of the considered environmental stressors, without EC, presents 100000 DALYs on a yearly basis. The impact of EC was separately reported and not taken up here to avoid double counting with PM. This number is approximately 8% of the total burden in Flanders. The environmental burden is dominated by cardiovascular effects and cancers. Particulate matter (PM) is associated with the largest disease burden (79500 DALYs on a yearly basis in Flanders or 13000 DALYs per one million inhabitants). Exposure to particulate matter is followed by exposure to passive smoking and noise when an arrangement is made by the amount of DALYs. According to the World Health Organisation particulate matter concentrations can only be reduced when all possible emission reduction measures are accomplished (WHO, 2010b). This is a challenge for the current government and involves the implementation of new technologies (e.g. low emission vehicles), but also the development of a context in which a change in individual behaviour is possible (e.g. increase the use of public transport & carpooling).

Another indicator which takes into account the monetary evaluation of the use/emission of pollutants is the external cost. In this case costs are defined as health related external costs. For the different pollutants the total cost was equal to € 6.4 billion, which is around 3.6% of the total gross domestic product of Flanders. The order of external costs is *grosso modo* the same as the order of DALYs. This study does not take into account the costs necessary to reduce the EBD. The results (DALYs & external costs) show for which pollutants it is fair to start a detailed analysis for which current output acts as input for a total health impact assessment study with as goal developing cost effective measures to reduce the environmental burden (Briggs, 2008).



Central estimate of the amount of Disability Adjusted Life Years (DALYs) per year in Flanders caused by different environmental stressors. Most recent exposure estimates were used. Presentation methodology is based on the study of Hänninen and Knol (2011). Only the most important sources for noise were taken into account (see 2002/49/EC, END Directive).