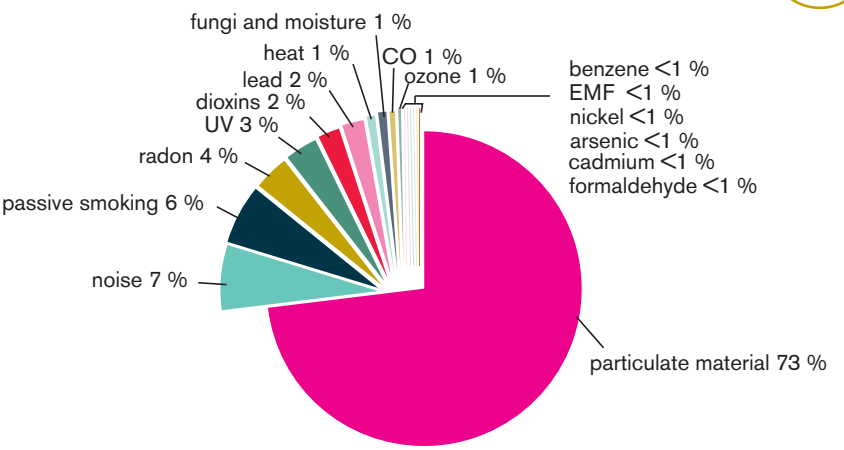
The effects of environmental pollutants on health (DALYs)

PACT 2020 DPSIR



based on the calculated years of disability adjusted life years (DALYs) as a result of the set of pollutants shown
The uncertainty differs per pollutant and per health effect; calculation based on the most recent exposure data.

Source: VITO (2012)

Disability adjusted life years (DALYs) as a measure of health effects

The effects of various environmental pollutants on health are difficult to compare with one another. By reducing them to a common denominator such as disability adjusted life years (DALYs), comparison is nevertheless possible. The number of DALYs reflects the number of years of healthy life that a population loses due to death or disease, taking into account the seriousness and duration of the disease. The combining of the various data, each with its own uncertainty, means that the result contains a fairly large amount of uncertainty. The uncertainty in the dose-response relationship appears to be the largest contributor to this.

Particulate matter, noise and passive smoking have the most serious health effects

The burden of disease due to various environmental pollutants together amounts to 108 863 DALYs annually for the Flemish population. This total is around 8 % of the total burden of disease in Flanders. Calculated for each inhabitant of Flanders, that is five disability adjusted life days per year or a bit more than a disability adjusted life year lost throughout life due to a lifelong exposure to current levels of exposure to the calculated set of environmental factors. What is important here is that these are average values. For sensitive persons (e.g. asthma patients), the real impact will be greater.

Particulate matter (see figure) is the most important pollutant for the burden of disease and is responsible for about three-quarters of all DALYs. Noise and atmospheric tobacco smoke are the second and third most important environmental factors in the calculation of the burden of disease.

Indoor air quality

People spend some 80 % of their time indoors. The indoor air quality therefore has a major effect on health. Key pollutants indoors are passive smoking, radon, fungi and moisture, volatile organic substances, combustion products, etc. The disability adjusted life years of indoor air pollutants (passive smoking, radon, fungi and moisture) amount to 11 200 DALYs for Flanders. This averages about six disability adjusted life weeks over a complete lifetime given lifelong exposure to current levels of exposure. The Flemish Government has proposed guidelines and intervention figures for different physical and biological factors and chemical substances in the indoor environment (Decision of the Flemish Government of 11 June 2004 on measures to combat the health risks from pollution of the indoor environment - BS 19 October 2004).

😐 Total exposure to lead

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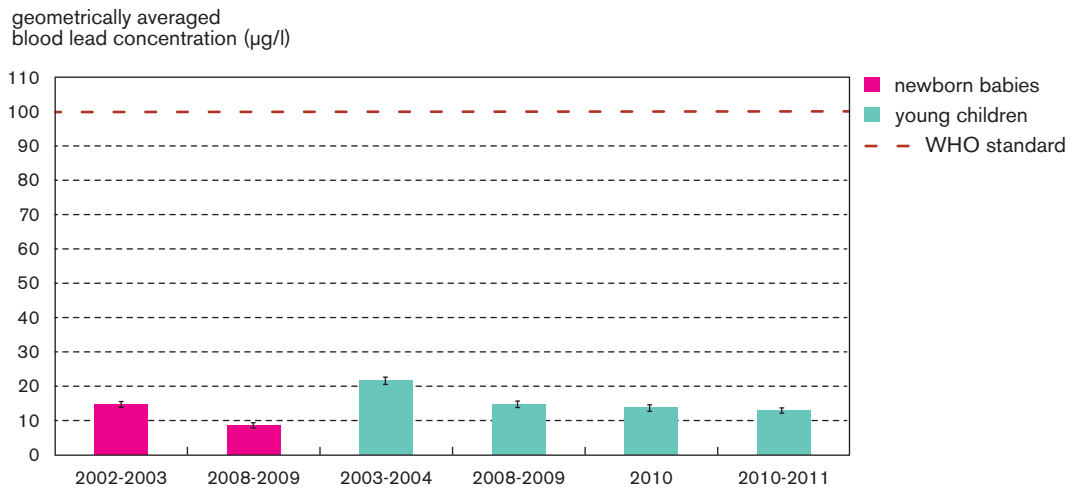

The measurements of newborns from 2002-2003 and young people from 2003-2004 use a comparable study design, as do the measurements from 2008-2009 in young people and newborns. A different study design was created for measurements between these groups and for other measurements. This should be taken into account when interpreting the graph. The error bars indicate the 95 % confidence interval.

Source: Flemish Centre of Expertise on Environment & Health (2002-2011)

Lead exposure

Targets were formulated at the ministerial conference on environment and health in Parma (2010). The WHO-specified related indicators for the Member States to follow up, blood lead concentrations in children. Lead exposure causes health effects (e.g. impaired kidney function, cancer, etc.) depending on the concentration and duration of the exposure and individual susceptibility. In developed countries, drinking water is an important source due to older lead drinking water pipes. From 2013 the standard for lead in drinking water will be 10 µg/l. In 2009, this standard was still exceeded in 3.3 % of measurements in Flanders. In 2011, TOVO (Toezicht Volksgezondheid – Flemish Public Health Monitoring Department) and VMM initiated an action plan lead directed at water companies and citizens. There are areas in Flanders with lead contamination in the environment. In addition to addressing the lead contamination issue, measures have been formulated to reduce individual exposure.

Blood lead concentrations in Flanders

The total exposure of an individual can be determined by measuring the pollutant or a metabolite of that pollutant in blood, urine, etc. In Flanders, blood lead concentrations in children were determined in human biomonitoring programmes by the Flemish Centre of Expertise on Environment & Health, and in some known hotspots (e.g. Hoboken, Genk South, etc.) The WHO regards values lower than 100 µg/l in blood as not harmful to health. However scientists suspect lower concentrations affect the intelligence of children. There have been calls for this standard to be lowered.

The figure shows the blood lead concentrations of young people and newborns from the biomonitoring programmes in Flanders. The average values are all below the WHO standard. The measured values for 2008-2009 are low compared to values from the international scientific literature. Measured values from Genk-South hotspots (2010) are lower than those from the reference biomonitoring from 2008-2009. Measured values from the Menen hotspot area for 2010-2011 are lower than values from the reference biomonitoring from 2008-2009. In follow-up studies with newborns being contacted again at 7-8 years of age and asked about health effects, it appeared that lead exposure at birth was related to domestic animal allergies and behavioural parameters (hyperactivity, behaviour problems, etc.). Blood lead exposure was again included in the human biomonitoring programme from the new Flemish Centre of Expertise on Environment & Health.

☺ Total exposure to persistent substances

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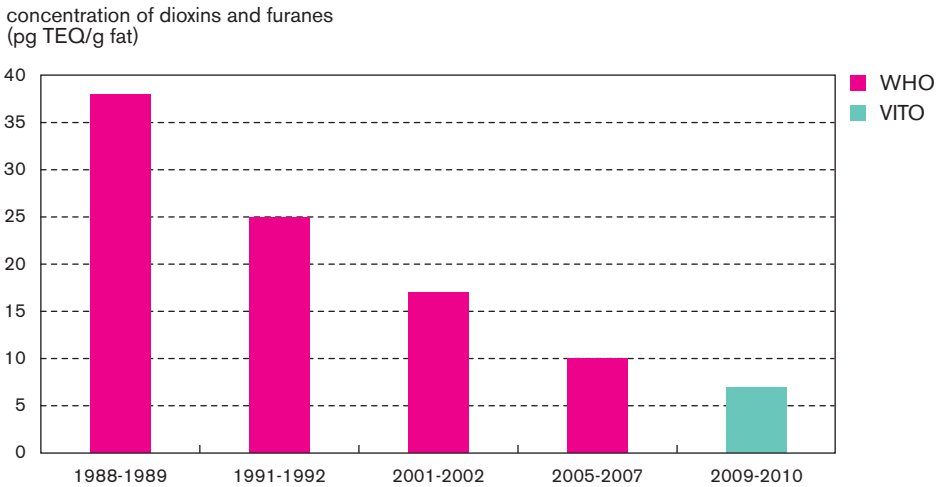

The measurements from 2009-2010 have a different study design from other recorded measurements. This should be taken into account when interpreting the figure.
detailed description of study design in Colles et al. (2008) and Colles et al. (2011)

Source: WHO, VITO

Persistent organic pollutants (POPs)

Persistent substances such as PCBs, dioxins and DDT accumulate in the environment and because these substances are also fat-soluble, occur in humans and animals. Many POPs cause health effects. PCBs especially are related to a lower birth weight and disrupt thyroid function and cognitive development. In addition, they are endocrine disruptive and affect the immune system. Dioxins are carcinogenic, endocrine-disruptive and affect the immune system. The health effects depend on the amount and duration of the exposure and on individual susceptibility.

A number of targets were formulated at the ministerial conference on environment and health in Parma (2010), as well as the objective 'to prevent illness linked to the chemical, physical and biological environment'. The WHO specified related indicators so the Member States could monitor the various objectives. One of the indicators is the concentration of dioxins and PCBs in breast milk.

Decrease of PCBs, dioxins and furanes in breast milk

Since the 1980s, the WHO has at regular intervals specified various POPs in breast milk for different countries, including Belgium. The last occasion was in 2007. Because of its high fat content, breast milk is the ideal matrix for determining these substances. In Flanders, the phase plan calls for additional research into increased concentrations of POPs in people in rural areas. POPs were also found in breast milk during 2009-2010.

The concentrations of dioxins and furanes (see figure) have shown a clear downward trend since the late 1980s. This is also the case for dioxin-like PCBs and marker-PCBs (see table). The figures for dioxins and furanes in 2009-2010 match the European average. The marker-PCBs for the same period in Belgium are lower than the values for Italy and Germany. The dioxin-like PCBs for 2009-2010 are comparable with the results for Germany.

	1988-1989	1991-1992	2001-2002	2005-2007	2009-2010
total 6 marker-PCBs (ng/g fat)	584	282	191	80	70
total dioxin-like PCBs (pg TEQ/g fat)	..	16.3	12.3	6.8	5.8
dioxins and furanes (pg TEQ/g fat)	38	25	17	10	6.9