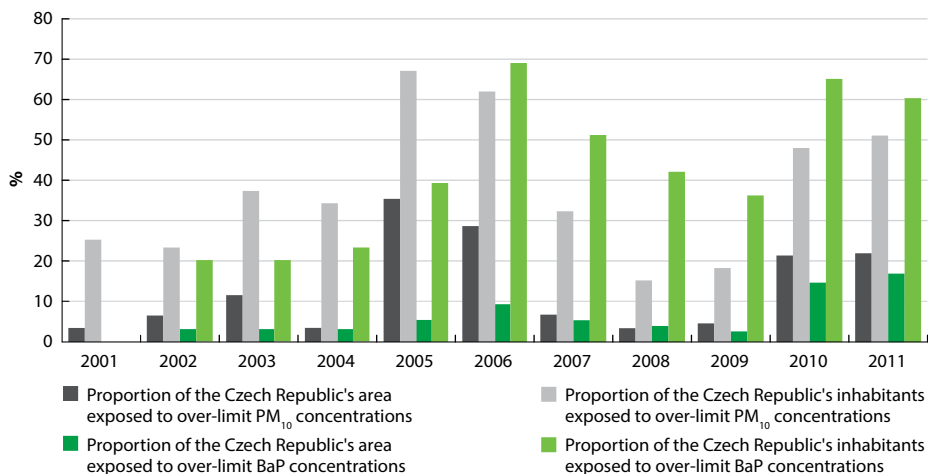# IV. ENVIRONMENTAL QUALITY OF LIFE

The environment plays a crucial role in people's physical, mental and social well--being. Environmental conditions affect quality of life in various ways: through air and water pollution, exposure to hazardous substances and noise, as well as through indirect effects from climate change, transformations in water cycles, biodiversity loss and natural disasters. Clean air and clean water are, inter alia, two important prerequisites for human wellbeing in the Czech Republic. Air pollution is considered over the long term a major environmental risk to health. By reducing air pollution levels, countries can reduce the burden of disease from respiratory infections, heart disease, and lung cancer. The lower the levels of air pollution in cities, the better respiratory (both long- and short-term) and cardiovascular health of citizens. The most significant relationships between water and quality of life appear to stem not from water quantity per se, but rather from variables related to water infrastructure – wells, pumping stations, pipes, and sewers that deliver water to residents and remove wastewater. The resulting good health then brings many benefits, including enhanced access to education and the job market, an increase in labour productivity and wealth, reduced health care costs, good social relations, and of course, longer life.

4.1. Health risks from air pollution: population exposed to PM$_{10}$ and PAH

Particulate matter refers to solid or liquid particles found in the air: The PM$_{10}$ standard includes very small particles – with a diameter of 10 micrometers or less. Polycyclic aromatic hydrocarbons (PAHs) are often generally hazardous by-products of petroleum processing or combustion. The air quality data is obtained from the national air quality network across the country. The indicators PM$_{10}$ and BaP have been developed gradually on the basis of SYMOS, EMEP and CAMx models.

Figure 24: The area and population exposed to over-the-limit 24 hour concentrations of PM$_{10}$ and over-the-limit annual concentrations of benzo(a)pyrene (% of the total territory of the Czech Republic; % of the total population)

- Proportion of the Czech Republic's area exposed to over-limit PM$_{10}$ concentrations
- Proportion of the Czech Republic's inhabitants exposed to over-limit PM$_{10}$ concentrations
- Proportion of the Czech Republic's area exposed to over-limit BaP concentrations
- Proportion of the Czech Republic's inhabitants exposed to over-limit BaP concentrations

Note: *In 2005, the mapping methodology's precision was improved and, for the first time, a model that combined the SYMOS model, the European EMEP model and altitude data with concentrations measured at rural background stations was used to construct maps of PM$_{10}$ concentration fields. In 2009, the methodology was redefined again by applying the CAMx model. The SYMOS model includes emissions from primary sources. Secondary particulate matter and re-suspended particulate matter that are not included in emissions from primary sources are taken into account within the EMEP and CAMx models. Between 2002 and 2007, the benzo(a)pyrene mapping methodology was gradually refined. In addition to an increase of the number of monitoring stations, the mapping methodology'sprecision was improved in 2006. In 2006, a number of towns and villages were subsequently included among those areas where the BaP target value was exceeded.*

Source: Czech Hydrometeorological Institute, Czech Information Agency for the Environment

Particulate matter and polycyclic aromatic hydrocarbons represented by benzo(a)pyrene (BaP) are, over the long-term, the most important air pollutants. There are serious risks to human health from exposure to PM$_{10}$ generated especially from transport and industry. The presence of PM$_{10}$ in the air

(depending on the length of exposure) contributes to a number of health problems – an increased incidence of coughing and breathing difficulty, bronchitis and reduced lung function. The effect of PAHs consists in their carcinogenic, mutagenic and toxic properties.

In spite of a continuing drop in emissions since 2000, air quality in the territory of the Czech Republic is not getting any better. There has been a significant increase of the number of people exposed to the over-the-limit value of PM_{10} (higher than 40 $\mu g.m^{-3}$) since 2008. In 2011, the air pollution limit value for the 24-mean PM_{10} concentration was exceeded in 22% of the country´s area with 51% of the population (The most affected areas were the Moravian-Silesian and Ústí nad Labem regions and the capital Prague).

In 2011 – likewise in 2010 – a number of towns and villages were classified as areas with excessive air pollution limits for BaP. This concerns about 17% of the country's area with 60% of the population. The population affected decreased from 65% to 61%, while the affected area increased from 15% to 17% between 2010 and 2011. As in the previous year, BaP values were exceeded more regularly in the Moravian-Silesian region (highest annual average concentrations are repeatedly recorded in the city of Ostrava) and in Kladno.

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4.2. Health risks from air pollution: patients treated for allergy

The indicator measures the total number of people treated for a specific type of allergic disease (asthma) every year. Allergic diagnosis data was collated within the System of Public Health Monitoring of the Czech Republic by using the annual statistical report on medical organization activities.

Poor air quality, inter alia, tends to be associated with an increased incidence of asthma (a form of allergic lung disease) and allergies. Long term increased concentrations can cause a deterioration in pulmonary function in children as well as adults, increased pulmonary tract morbidity, reduced life expectancy due to increased cardiovascular mortality, especially in the elderly and sick, and probably lung cancer. Recent epidemiological studies suggest that asthma symptoms can be made worse by increases in concentration of very small particulate matters ($PM_{2,5}$). Other studies indicate a link between exposure to polycyclic aromatic hydrocarbons (PAHs) and environmentally-induced asthma. Prevalence of asthma differs geographically.

Figure 25: Number of patients treated for an allergy
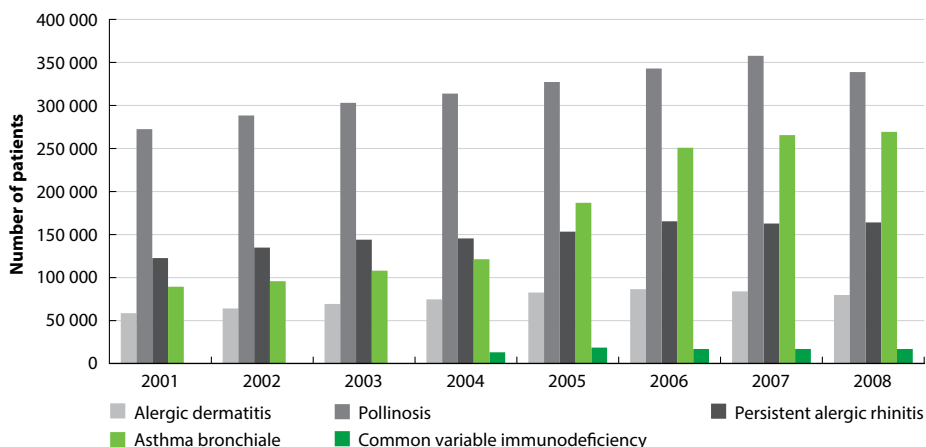
Source: Czech Health Institute

According to the Global Burden Asthma methodology developed by GINA[1], the prevalence of asthma was estimated at about 8% in the Czech Republic in 2008 (higher than in Germany –6.9%, France –6.8% or Austria –5.8%). The number of patients treated for asthma has continuously increased since 2001. The current estimate of asthma prevalence is about 10%, which is similar to the five largest West European countries: Germany, Great Britain, Spain, France and Italy.
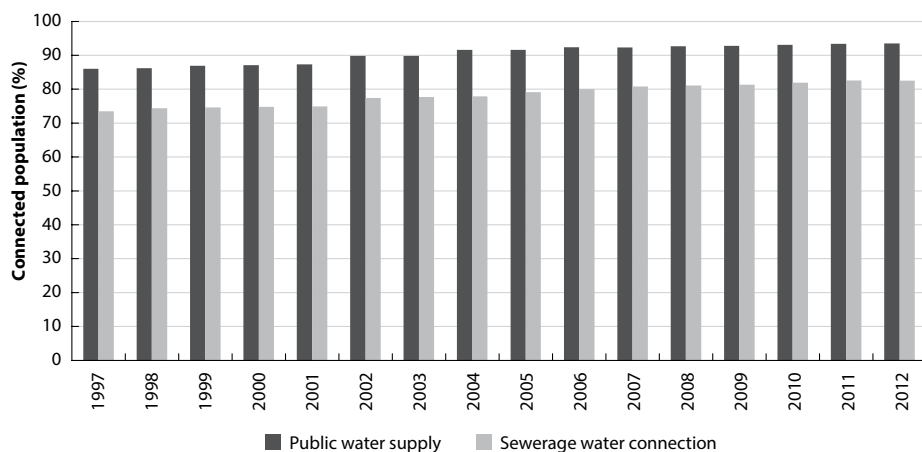
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[1]   http://www.ginasthma.org/Global-Burden-of-Asthma

4.3. Population connected to sewerage treatment and public water supply

The indicators are constructed as proportions of the total population connected to sewerage systems, and to the public water supply network, respectively.

Waste water treatment reduces the amount of discharged pollution and is therefore an essential tool for improving surface and ground water quality. According to the State Environmental Policy of the Czech Republic, this desirable trend includes increasing the proportion of the population connected to public sewerage systems and to sewerage systems ending in waste water treatment plants. In many OECD countries the main concern is still the quality of the water supply – leakages in the distribution network, pipe breakages, and quality of water at the tap (the OECD has been working with the UN's Joint Monitoring Programme to identify and test such indicators).

Figure 26: Population connected to sewage treatment and public water supply (%).

Source: Czech Statistical Office

The proportion of the population connected to a waste water sewerage system increased from 74 to 83% in the last 15 years. Sewerage water treatment was expanded more in larger municipalities; recently, attention has focused on the development of waste water treatment plants in municipalities with populations of 2 000 to 10 000.

According to the latest international data, the share of the population connected to urban waste water treatment is above 80% in approximately half of the EU Member States for which data are available, peaking at 99% in the Netherlands, 97% in England and Wales, and 95% in Germany and Luxembourg. Since 1997, the Czech Republic has also improved access to the public water supply from 86 to 94% of the total population.

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