

Air Pollution – Health Consequences and Structural Prevention Measures at the National Level

The Danish Council for Health Promotion and Disease Prevention has reviewed the research on air pollution in Denmark, including its health consequences and the structural measures that can help reduce exposure and prevent disease. The main findings from the report “Air Pollution: Health Consequences and Structural Prevention Opportunities” are presented here.

Almost all Danes are exposed to air pollution at levels considered harmful to health. Air pollution is associated with an increased risk of a wide range of serious diseases, and certain groups are particularly vulnerable. These include children, pregnant women and their unborn children, older adults, people with pre-existing health conditions, and individuals with fewer social and economic resources.

Levels of Air Pollution in Denmark

Despite improvements over time, air pollution levels in Denmark still exceed the latest Air Quality Guidelines from the World Health Organization (WHO) issued in 2021. This applies to fine particulate matter ($PM_{2.5}$), coarse particles (PM_{10}), and nitrogen dioxide (NO_2). Exposure is highest in larger cities, but virtually everyone in Denmark is exposed to harmful levels of air pollution.

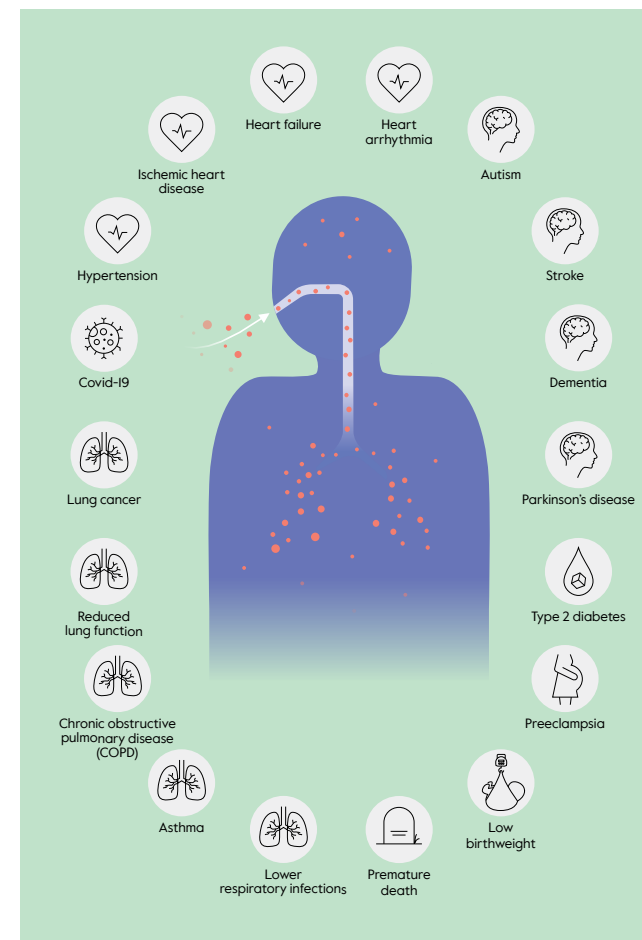
Sources from outside Denmark, particularly from Eastern and Central Europe, contribute significantly to air pollution in Denmark, but there are also substantial domestic sources. The six largest Danish sources of fine particles ($PM_{2.5}$) and nitrogen oxides (NO_x), including nitrogen dioxide (NO_2), are:

- Small-scale combustion, e.g., wood burning in private homes such as wood stoves, boilers, and pellet heaters
- Road traffic, including exhaust emissions and wear from roads, tires, and brakes
- Other mobile sources, such as ships, planes and railways
- Agriculture, for example ammonia emissions
- Industry, including combustion in manufacturing, refineries, and energy use for oil and gas extraction
- Electricity and district heating production, including the burning of coal, oil, natural gas, or biomass

Health Consequences of Air Pollution

There is strong evidence that air pollution is associated with an increased risk of numerous serious diseases and premature death. Premature mortality is particularly linked to chronic obstructive pulmonary disease (COPD), hypertension, ischemic heart disease, stroke, type 2 diabetes, and lung cancer.

The figure to the right summarizes the health consequences of air pollution for both children and adults.



Action Guidelines for Structural Measures Targeting Air Pollution

Air pollution is widespread. Exposure to air pollution is therefore only to a limited extent an individual choice, which means there is significant potential to strengthen structural prevention that regulates the overall conditions under which we all live. Structural prevention does not depend directly on individual choices or health literacy, and its effects are often greater among individuals and communities with fewer social and economic resources. Another advantage is that many structural measures targeting air pollution also bring co-benefits—for example, reducing the use of fossil fuels can both decrease air pollution and help mitigate climate change. Structural prevention efforts targeting air pollution can be implemented at several organizational levels.

At the national level, the working group highlights the following six key structural measures:

1. Phase out fossil fuels such as coal, oil, and natural gas
2. Increase the use of green energy sources such as solar, wind, hydropower, and geothermal
3. Improve energy efficiency in buildings to reduce pollution from energy production
4. Ban the use of wood-burning
5. Reduce ammonia emissions from agriculture
6. Expand the electrification of vehicles as a replacement for fossil fuel vehicles

Structural prevention measures can usefully be combined with non-structural interventions, such as information campaigns targeting citizens, health professionals, and patient groups, as well as individual-level prevention efforts—for example, official campaigns or nudging activities that promote behaviors reducing indoor air pollution. These may include improved ventilation, use of kitchen exhaust hoods, and less polluting practices among both citizens and businesses.

Different types of prevention reinforce one another and therefore tend to be more effective when combined.

The full report in Danish is available on the website of the Danish Council on Prevention:
vidensraad.dk/luftforurening

