

Health & Air Quality: A Work in Progress

A new report, entitled *Health & Air Quality 2002*, contains the latest research into the health effects of air pollution. The report, coordinated by the BC Lung Association, was funded through grants from the BC Ministry of Water, Land, and Air Protection, Environment Canada, the Greater Vancouver Regional District, and the Fraser Valley Regional District.



The report is a detailed summary and interpretation of Canadian and international air quality literature, and offers guidance on how this knowledge base can be applied in British Columbia and the Pacific Northwest (PNW). The study also calls for new and continued research into the health effects of air pollution, especially when new projects are being proposed.

The report, in summary, offers several conclusions and recommendations for improving the assessment and study of air quality in BC and the PNW region. They include:

1. Air quality studies indicate that two air pollutants — particulate matter (PM) and ozone (O₃) — are at harmful levels in some areas of BC and the PNW. Air quality can be improved, and health risks lessened, if strong measures are taken to decrease the amounts of PM and O₃. Stringent reviews should be undertaken for all projects that would increase public exposure to these two pollutants.
2. Studies carried out in the Lower Fraser Valley have shown that the risk of premature death increases with exposure to increased levels of air pollution. Communicating appropriate
3. The smaller population of communities outside of BC's Lower Mainland and the Puget Sound limit the feasibility of health and air quality studies. The report recommends overcoming this limitation by pooling health and monitoring data for similar communities.
4. When pooling air quality studies is not feasible, new community-specific health studies should be commissioned and carried out.
5. Traffic in urban areas leads to higher exposure risks; and people living near roadways are at greatest risk. A careful examination of traffic studies done elsewhere should be undertaken to gain a clearer understanding of the likely impacts in BC's major urban areas. The report also recommends expanded monitoring for particulate matter along roadways.
6. The direct and indirect costs of air pollution need to be continually estimated. Currently available databases, in conjunction with local monitoring data, should be used to determine the costs caused by air-pollution related diseases.
7. Critical health risk assessments are required for proposed facilities that will cause significant emissions of pollutants with known health effects. The report recommends that a health risk analysis be conducted in all major project assessments.

and timely information about exposure risk to these communities is essential.

We all have a role in combating air pollution. Whether it is choosing to travel by public transit or bicycle, or being energy efficient at home or work, we can take steps to reduce air pollution and find solutions for a cleaner, healthier environment.

For more information on protecting yourself against air pollution and to find out what you can do, contact the BC Lung Association.



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Health & Air Quality



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Clean air is a basic requirement for public health. But air pollution caused by urbanization and industrialization have had a severe impact on air quality in BC. Research has shown that air pollution has short- and long-term health effects on our personal health and on our public health system.

Poor air quality increases respiratory and cardiovascular problems, decreases our ability to ward off other illnesses, and is linked to premature death. Poor air quality also causes increased emergency room and physician visits, increased hospitalization and medication, and lost work or school days. The personal and financial costs of poor air quality are high.

Although air pollution controls have improved, air quality is still a public health concern in British Columbia. The province's rugged topography and weather conditions make us susceptible to temperature inversions. Inversions commonly occur over valleys when cold valley air becomes trapped by a higher layer of warm air. This inversion acts as a lid on the valley, temporarily sealing in air pollutants such as wood smoke and industrial emissions, and greatly reducing the quality of the air we breathe.

The two air pollutants that pose the greatest risk to BC communities are particulate matter and ground-level ozone. These two pollutants are the main components of smog, the haze that develops on warm, calm days.

Particulate matter consists of very fine solid or liquid particles that become suspended in the air. It is a serious health risk because it can be inhaled deeply into the lungs and damage lung

tissue. Ground-level ozone is not an emitted pollutant, but one produced in the atmosphere by the chemical reaction of other air pollutants on warm, sunny days. Ozone reduces lung function, and inflames and damages the cells that line the airspaces in the lungs. This can trigger more serious health problems such as asthma, bronchitis, coughing and chest pain.

Sources of air pollution

Air pollution is caused by a number of sources such as:

- the burning of fuels such as gas, oil, coal and wood for energy generation & home heating;
- emissions from cars, trucks and other motorized vehicles and machinery;
- emissions from industrial manufacturing and processing plants; and
- the burning of agricultural and forestry materials.

Health effects of air pollution

Current research has shown that even low levels of air pollution have health effects. Typically, air pollution inflames, aggravates or destroys lung tissue, weakening the lungs' defenses against contaminants. Air pollution can...

- irritate the eyes, nose and throat;
- cause wheezing, coughing and breathing difficulties;
- worsen existing lung and heart problems.
- increase the risk of heart attacks; and
- lead to premature mortality.

Who's at risk

Even healthy people may have difficulty breathing on days of high air pollution, but the following groups are at higher risk:

- people with lung and heart disease;
- children;
- elderly people; and
- people with suppressed immune systems.

Common air pollutants



Particulate Matter (PM)

- consists of minute solid or liquid particles that are blown into the air and become suspended, e.g. dust, dirt, soot, and smoke.
- two types of PM are defined by size: PM 2.5 and PM 10. PM 2.5 consists of particles 2.5 microns and smaller (1/20th the width of a human hair). PM 10 consists of particles 10 microns and smaller (1/8th the width of a human hair).
- is directly emitted into the air by vehicles, factories, power plants, construction activity, fires and naturally windblown dust.
- can travel long distances, contributing to smog and reducing visibility.
- other hazardous air pollutants may adhere to PM and increase its toxicity.
- can also be formed in the air by chemical reaction of gases such as sulphur dioxide, nitrogen oxides, and various hydrocarbons.

Health Effects

- PM 2.5 can penetrate deep into the lungs.
- damages lung tissue and reduces lung function.

Ground-level Ozone (O3)

- the main component of smog.
- produced in the atmosphere by the reaction of volatile organic compounds (VOCs) and nitrogen oxides (NOx) in the presence of sunlight and warm temperatures.
- occurs in the lower atmosphere called the troposphere.
- NOT to be confused with ozone in the upper atmosphere (stratosphere), which protects us from ultraviolet radiation.
- collects over urban and industrial areas that produce large amounts of VOCs and NOx.
- can migrate long distances (up to several hundred kilometres) downwind.
- periods of high ozone can last several days if a stagnant air mass traps pollutants over a region.

Health Effects

- low concentrations can irritate the eyes, nose and throat.
- increases susceptibility to respiratory infections.
- decreases lung function and physical performance.
- prolonged exposure can damage lung tissue, cause premature aging of the lungs, and contribute to chronic lung disease.

Carbon monoxide (CO)

- an odourless, tasteless, colourless gas.
- produced by the incomplete combustion engines of fuels (mainly from cars).

Health Effects

- interferes with the blood's ability to carry oxygen to the brain, heart and other tissues.
- depending on the amount inhaled, CO can slow reflexes and cause fatigue, headache, confusion, nausea, and dizziness.
- inhaling large amounts can cause death by suffocation.

Nitrogen oxides (NOx)

- produced by the burning of fuel.
- largest source of NOx emissions are vehicles, industry, electrical power plants and home heating.
- react with volatile organic compounds in the atmosphere to produce O3.

Health effects

- low concentrations can irritate the eyes, nose and throat.

Sulfur oxides (SOx)

- created when sulfur-containing fuel is burned.
- main sources include petroleum refineries, pulp and paper mills, electric generating plants, smelters and metal refineries.

Health effects

- can irritate the upper respiratory tract and lead to eye irritation and shortness of breath.