

Risk of air pollution higher inside the car than on the road outside

People are spending more time on the road, traveling to and from work, school and other activities. On average, people spend 10 hours a week traveling inside vehicles. Although commuting during peak hours does not take most of our day, it accounts for a significant proportion of people's exposure to air pollution. Why does this matter? Because exposure to traffic-related air pollutants puts people at higher risk of developing adverse health effects – from asthma, allergies and autism to heart and lung disease, diabetes, dementia and other ailments.¹

Air pollution up to 15 times higher inside cars than outside

Most of our time is spent indoors breathing air that is up to five times more polluted than the air outdoors. But did you know that traveling in a car does not protect you from pollution? Researchers at King's College London found that the air inside your car can be up to 15 times more polluted than the ambient air outside.² Vehicles stopped in heavy traffic contained pollutants that were up to 40 percent higher than when moving in traffic, another study shows.³

Toxic gases from the vehicle directly ahead of and around your vehicle flow freely into the passenger cabin. While air pollution exposure is initially higher for those in the driver and front passenger seats, it does not really matter where you sit because the pollutants are trapped inside the small space of the vehicle passenger cabin.⁴ The greater the exposure to air pollutants, the higher the risk of developing health problems.

Sources of in-vehicle air pollution

Air pollution is a mixture of solid particles, gases and other airborne substances such as pollen, mold spores, dust and microplastics such as tire particles. There are two primary sources of pollutants inside vehicles: gaseous and particle pollution from the air outdoors and volatile organic compounds (VOCs), which are chemicals released into the air from materials used in the vehicle interior.⁵

Outdoor air pollutants include gases and particulate matter, which mainly come from vehicle exhaust. Among the gaseous pollutants are nitrogen oxides, sulphur oxides, carbon monoxide and ground level ozone. Particle pollution includes black carbon, particles that are 10 micrometers or less (PM10) and 2.5 micrometers or less (PM2.5), and ultrafine particles. Ground level ozone is another gaseous pollutant caused by chemical reactions between nitrogen oxides and VOCs in the presence of sunlight. Airborne microplastics, such as tiny wear particles from vehicle tires, is yet another harmful pollutant.

Materials used in the vehicle interior are another source of in-vehicle air pollution. These man-made and natural materials release chemicals, such as benzene, toluene, xylene and formaldehyde, into the air inside the passenger cabin. The leather, plastics, fabrics, carpets, foam cushions, sealants and other materials inside a new car release these pollutants into the air at a higher rate—up to 35 times the maximum health limits. Pollutant levels may still exceed the maximum health limits in an older car during summer months when the high temperatures release more chemicals from the material. Other items brought into cars, like child seats, car fresheners or cleaning products, also contribute to in-vehicle air pollution.⁶

Practical tips to avoid breathing polluted air on the road

1. Change your cabin air filter under the hood of your car on a regular basis – every year or every 12,000 miles (20,000 km), whichever comes first. More frequent replacement may be warranted.
2. Clean the interior of your car often, wiping down the interior surfaces with a damp cloth and vacuuming upholstery and carpets. Use vinegar diluted with water as a cleaning agent, if needed.
3. Whenever possible, avoid parking your car in direct sunlight. Heat releases VOCs from the materials used in your car, increasing pollution levels.
4. Don't use air fresheners or deodorizers in your car. These add VOCs to the air.
5. Don't smoke or let other people smoke in the car.
6. Consider buying an in-vehicle air purifier that can clean the air inside the vehicle of more than 95% of all airborne pollutants, including PM 2.5, pollen, dust, yellow dust, and vehicle and industrial emissions.
7. Don't drive. Bike or walk. Studies show pollution levels in vehicles are higher than biking on the same route.⁹

What are the risks to human health?

The health risks of air pollution are well known. However, because in-vehicle air contains higher concentrations of ultrafine particles, vehicle exhaust and VOCs in a confined space, exposure may have a greater impact on human health than pollutants in either indoor and outdoor air. Particulate pollution, PM2.5 and ultrafine particles, present the most risk as particles can enter the lungs and pass into the bloodstream, compounding the health effects.⁷

Short-term health effects: Coughing, headaches, dizziness, fatigue, irregular heartbeat and eye, nose and throat irritation.

Long-term health effects: Cardiovascular disease, heart attack, stroke, respiratory diseases such as asthma, neurological diseases, cancer, damage to nerves, brains, kidneys, livers and other organs, and other ailments including low-birth weight, autism, diabetes, obesity, Parkinson's disease and Alzheimer's disease.

Children and the elderly are especially at risk. Children are more vulnerable to the health effects of air pollution because they breathe more rapidly and are more active than adults, taking in more air in relation to their body weights. Elderly people and those with heart and lung disease are also at higher risk for health effects from air pollution.

Reducing in-vehicle pollution exposure

Various factors influence air pollution levels in vehicles, including ventilation mode, airflow rate, vehicle age and airtightness, driving speed, traffic congestion, interior materials, number of passengers, temperature in the passenger cabin (the higher it is, the more hazardous the VOC pollutant exposure), vehicles operating directly ahead, weather and the outdoor pollution levels.⁸

To minimize air pollution inside your vehicle, consider choosing a less congested route—even if it takes longer to get to your destination. Another is to close the windows and set the ventilation system on recirculation mode; however, over long periods of time, this may increase CO2 levels in the cabin, which causes adverse health effects. Maintaining a safe distance from the vehicle ahead reduces the amount of exhaust that ends up in your airspace.

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Did you know?

- Exposure to air pollution can be up to 40% higher while sitting in traffic jams or at traffic lights compared to free-flowing traffic conditions.⁵
- In-vehicle pollution is up to 15 times higher than the air pollution outside the car. Walking or cycling by the side of the road or less trafficked routes decreases exposure.²
- Nine out of 10 people worldwide breathe polluted air, the World Health Organization reports. All airborne pollutants are not visible, and there are even higher pollutant concentrations inside the passenger cabins of vehicles.