

The background of the entire page is a photograph of the rear of a car, specifically the bumper and exhaust pipe. The car is dark-colored, and the bumper is black. The exhaust pipe is visible, and a thick plume of white smoke or steam is being emitted from it, filling the right side of the frame. The ground is dark asphalt with some yellow markings and a layer of white snow or ice. The overall lighting is dramatic, with strong highlights on the car's bumper and the smoke.

VOLUME ONE

THE HEALTH IMPACTS OF
URBAN SPRAWL

AIR POLLUTION

AN INFORMATION SERIES FROM
ONTARIO COLLEGE OF FAMILY PHYSICIANS

www.ocfp.on.ca

1. The air we breathe

Many people move to the suburbs to escape the “ills of the city.” They move out of the city to get closer to the country air, to have a bigger yard for their kids to play in, or to get away from the noise and bustle of the city. While suburban life has some benefits, a growing body of evidence suggests there are significant public health costs of spread-out urban development, often called “urban sprawl”. One particularly harmful impact of urban sprawl is the negative effect that car-dependent communities have on the air we breathe.



Spread-out, sprawling developments make car travel the most convenient way to get around. Driving creates more smog, which has been linked to:

- respiratory conditions such as asthma
- cardiovascular disease
- lung cancer
- delayed lung development
- negative effects on pregnancy
- birth defects

Smog kills.

The Ontario Medical Association estimates that over 5,800 people in Ontario will die prematurely in 2005 because of air pollution.

In 2005, *The Ontario College of Family Physicians* published a review of recent research on urban sprawl and human health. In this report, the College summarized the effects of sprawl on

- AIR QUALITY
- ROAD ACCIDENTS (injuries & fatalities)
- LACK OF PHYSICAL ACTIVITY (obesity, diabetes & cardiovascular disease) and
- MENTAL AND SOCIAL HEALTH

AIR POLLUTION outlines how urban sprawl contributes to air pollution, how poor air quality endangers our health, and how to build communities where we can all breathe more easily.



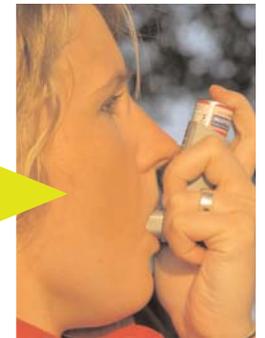
SPRAWL



CARS



SMOG



HEALTH PROBLEMS

2. Urban sprawl drives more car use

URBAN SPRAWL refers to low-density, car-dependent development on the outskirts of an urban area. In these spread-out suburbs, population densities are too low to support an effective public transportation system. Homes are too far away from stores, restaurants, schools and workplaces for people to walk or ride a bike. Car-dependent development promotes car-dependent behaviour.

Results from several studies in Canada and the United States have shown the connection between sprawl and car use. They found that people in low density sprawl developments:

- Spend more time in cars
- Drive greater distances
- Own more cars
- Ride public transit less^{1, 2, 3}

Neighbourhoods in the Greater Toronto Area (GTA) reflect the same pattern. Every day, residents of York, Peel, and Durham take more car trips and drive longer distances than residents of Toronto. In the GTA, as you move farther away from Toronto, each household on average owns more cars, travels farther in their car every day, and spends more on transportation costs.⁴

Vehicle Use in Toronto, York, Durham, and Peel (Joint Program in Transportation 2001)			
	Average number of vehicles per household	Average number of daily trips per household	Median trip length (km)
Toronto	1.1 vehicles 	5.1 trips/day	5 km
York	1.9 vehicles 	7.2 trips/day	6.4 km
Durham	1.7 vehicles 	6.5 trips/day	5.7 km
Peel	1.7 vehicles 	6.6 trips/day	6.4 km

More cars on the road cause more vehicle emissions and more smog.

3. More roads, more cars, more air pollution

WHEN SMOG ADVISORIES ARE ISSUED, WE KNOW TO CAREFULLY MONITOR CHILDREN WITH ASTHMA AND TO LIMIT OUTDOOR ACTIVITY. **BUT WHAT IS SMOG?**

SMOG is a combination of the airborne pollutants, ground-level ozone and fine particulate matter. It is hazardous to your health. Each year 64,000 emergency room visits in Ontario are because of exposure to smog.⁵

Ground-level ozone is formed when nitrogen oxides and volatile organic compounds (VOCs) react in the presence of sunlight. There is no safe level of exposure to ground-level ozone.

Fine particulate matter can be formed by reactions of other primary pollutants in the air, or by direct emissions from vehicles. Smaller particulate matter is more dangerous because it becomes lodged in your lungs more easily. Most particulate matter is produced from the burning of fossil fuels.

Vehicles emit various air pollutants including volatile organic compounds (VOCs), nitrogen oxides (NO_x), particulate matter (PM), carbon monoxide (CO) and sulphur oxides (SO_x). Both nitrogen oxides and volatile organic compounds are involved in a series of complex reactions that result in the formation of ground-level ozone, which is one of the major components of smog.

TRANSPORTATION EMISSIONS IN ONTARIO, 2001

OXIDES OF NITROGEN > 33% from on-road vehicles, and another 30% from other transportation.

PARTICULATES > 20% of particulate matter less than 2.5 microns (PM_{2.5}) from transportation.

CARBON MONOXIDE > 58% derived from vehicular travel and another 27% from transportation.

VOCs > 18% of volatile organic compounds from transportation.

(Ontario Ministry of the Environment, Air Quality in Ontario, 2002)

4. Our health depends on the air we breathe

Exposure to air pollutants can harm our health on many fronts:

Respiratory effects >

Air pollution exacerbates asthma and other respiratory diseases. Smog days are correlated with an increase in visits to physicians, and ER and hospital admissions for breathing problems. Children, people with chronic diseases such as chronic obstructive pulmonary disease (COPD), and people who work or exercise outdoors are particularly vulnerable.^{6, 7, 8, 9, 10, 11}

Cardiovascular effects >

Exposure to particulate matter has been shown to contribute to cardiovascular illness, hospitalization, and mortality.^{12, 13, 14, 15} Elderly patients, people with underlying heart or lung disease, lower socioeconomic populations, and diabetics may be at increased risk.¹⁶

Cancer >

A study by *the American Cancer Society* found a link between fine particulate pollution and lung cancer.¹⁷ Exposure to vehicle-exhaust has also been linked to ovarian cancer.¹⁸

Reproductive effects >

Exposure to carbon monoxide and ozone during the second month of pregnancy has been linked to cardiac and orofacial birth defects. Long term exposure to air pollution is associated with low birth weight, preterm birth, intrauterine growth retardation, and negative pregnancy outcomes such as miscarriages, stillbirths, and deaths in early infancy.^{19, 20}

Long term exposure >

Important recent research has shown that children living in communities with higher pollution exhibit delayed lung development. This developmental delay could contribute to chronic obstructive airway disease in adulthood. Recent research has also shown that exposure to air pollution can both exacerbate asthma in children who are already asthmatic, and cause new cases of asthma.^{21, 22} These new findings of delayed lung development and new cases of asthma are particularly worrying.

Exposure to air pollution has been linked to delayed lung development in children.

5. The hazards of a busy road

Levels of fine particulate matter and other traffic-related pollutants emitted are highest near busy roadways.

- > A recent California study found higher levels of air pollution in schools downwind from and near major roads. **The researchers also noted a five to eight per cent increase in asthma and bronchitis symptoms with exposure to these traffic-related pollutants.**²³ The results of this study helped support the passage of a law that requires new school sites to be at least 500 feet from busy traffic corridors.²⁴
- > A similar study undertaken in southeast Toronto showed **an association between exposure to fine particulate matter from motor vehicle emissions from living near a busy road, and hospital admissions for certain respiratory diseases, including asthma.**²⁵
- > Another study in Hamilton found that **living close to a major road could take 2.5 years off a person's life.** In comparison, chronic ischemic heart disease can decrease your life span by an average of 3.1 years and diabetes can take 4.4 years off your life.²⁶



- > *Living close to a major road can take 2.5 years off your life.*
- > *Researchers found a 5-8% increase in asthma and bronchitis symptoms among children exposed to traffic-related pollutants.*

6. The burden of illness from air pollution

The Ontario Medical Association (OMA) uses an “**Illness Cost of Air Pollution**” model to estimate the impact of smog and air pollution on the incidence of disease and mortality. For 2005 in Ontario, the OMA estimates that the following numbers are attributable to air pollution:

- **5,829 premature deaths**
- **59,696 emergency room visits**
- **\$506,612,700 million in health care costs**
- **\$374,342,400 million in lost productivity costs²⁷**

ASTHMA: <i>The staggering statistics in Canada</i>	
<i>in 1978:</i>	<i>today:</i>
2.5% of children 0-14 years of age had asthma ²⁸	an estimate of up to 20% of children have asthma ²⁹

In Toronto alone, the *Toronto Public Health Unit* estimates approximately 1,700 premature deaths each year and 3,000 to 6,000 hospital admissions are associated with inhaling air pollutants.

CLIMATE CHANGE IS A GREAT THREAT TO OUR HEALTH. Burning gasoline in cars, trucks and other motorized vehicles releases carbon dioxide, a greenhouse gas that contributes to climate change. The health effects of climate change can be direct, such as the impacts of heat stress as seen in Paris in 2003 when thousands of elderly people died of heat exhaustion.³⁰ Health effects can also be indirect, such as increased precipitation leading to flooding and run-off contamination of wells, rivers and streams, as well as an increase in extreme weather events such as hurricanes and tornadoes.

7. What Can We Do?

Air pollution from cars is bad for everyone’s health. One way to improve the air quality in our neighbourhoods is to build communities where residents have more options than just driving to their destination. The interests of public health require interventions in urban planning and public transportation.

➤ **WALKABLE, COMPACT, TRANSIT-FRIENDLY COMMUNITIES.** Well-designed, compact communities where people can walk to school and work, to stores, parks and restaurants can significantly reduce the need to drive.

➤ **SAFE PEDESTRIAN PATHS AND BIKE LANES.** Safe routes to bike and walk along make healthier communities by encouraging daily physical activity.

➤ **EFFICIENT PUBLIC TRANSPORTATION SYSTEMS.** Buses, subways, and trains that run frequently and on time, reach more communities and are affordable offer more alternatives to driving.

➤ **PRESERVE GREENSPACE.** Parks and wildlife refuges can help clean and cool the air and offer a fresh air refuge for residents.

The Ontario government is now working on the second step of its work to curb urban sprawl through the new *Places to Grow* Plan.

The health of EVERYONE in southern Ontario will be affected by how well the plan encourages healthy urban planning and public transportation policies.

In 2005, smog will cause over 5,800 premature deaths in Ontario.

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