

What role are emissions playing in the COVID-19 pandemic? U of T researcher examines the evidence

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Greg Evans, a researcher with U of T's Faculty of Applied Science & Engineering, says air quality may play a role in determining the severity of COVID-19 outbreaks in different regions. Credit: Roberta Baker

With countries shutting down large sections of the economy during the COVID-19 pandemic, many regions have seen dramatic improvements in air quality. As cities decongest, Greg Evans, a researcher in the University of Toronto's Faculty of Applied Science & Engineering, is using what some have dubbed an unprecedented global "experiment" to study the effects of air quality on the spread of COVID-19.

Evans and his team at the Southern Ontario Centre for Atmospheric Aerosol Research (SOCAAR) study the impact of air [pollution](#) on [human health](#). They have been monitoring the concentrations of a wide range of air pollutants in downtown Toronto for over a decade, and have continued to remotely monitor air quality since the city-wide closure of most businesses and services in recent weeks.

Together with partners at Environment and Climate Change Canada and the Ontario Ministry of the Environment, Conservation and Parks, the team is also exploring air pollution trends provincially and nationally. "Our goal is to assess the data we are collecting and use public health modelling to support public health management of infectious disease outbreaks," says Evans, a professor in the department of chemical engineering and applied chemistry.

Writer Fahad Pinto recently spoke with Evans about the links between air pollution, infectious disease outbreaks and how to prevent a resurgence of COVID-19.

Do higher air pollution levels have an impact on COVID-19 cases?

In 2003, the SARS-CoV-1 virus (SARS) outbreak was making news in Toronto and the world. Evidence from that outbreak suggests that wind increased its propagation while high air pollution doubled mortality.

Based on this evidence, the provinces of British Columbia and Nova Scotia have announced restrictions on open burning to combat the spread of COVID-19.

Authors from the Harvard T.H. Chan School of Public Health recently released a pre-print of a paper examining exposure to air pollution and COVID-19 mortality in the United States. The authors showed that death from COVID-19 was substantially higher in counties that had poorer air quality over the previous 16 years. These preliminary findings suggest that living in areas with worse air quality may make people more vulnerable once infected by this virus, and the large magnitude of this effect reported by these authors is dramatic. Moreover, the finding is consistent with a wide range of chronic diseases, and, hence, potential vulnerability, associated with exposure to poor air quality. However, additional evidence is needed.

This study only examined the impact of the virus on those with prior long-term exposure to air pollution. What we still do not know is whether air quality during the pandemic may influence its impact on those who become infected. We need to collect data to find out if this is the case. The knowledge we gain now will help [public health](#) officials identify and take appropriate actions during any subsequent waves of the pandemic.

What does air quality data for Toronto reveal?

Our preliminary data indicates that air quality has improved dramatically in Toronto since the pandemic shutdown started. For example, the concentrations of two traffic-related air pollutants, nitrogen oxides and ultra-fine particles, have decreased in downtown Toronto to almost half their concentrations prior to the shutdown.

Emissions have decreased in an unprecedented way across Canada and

the U.S., which has provided an opportunity to better understand the many sources of air pollution and how these sources influence air quality.

Fortunately, Canada in general has very good air quality, which may work to our advantage during this pandemic. The reduction in emissions due to the shutdown will further improve this advantage.

While it's much too early to know if this improvement in air quality is helping to reduce hospitalization, people may still want to err on the side of caution and do what they can to further reduce emissions and their own exposure. This might include limiting their use of gas-powered cars, barbecues, leaf blowers and lawn mowers.

Do you think that once people see how much better things are with reduced emissions, there will be a renewed push to introduce more regulations?

Longer term, capturing the change in air pollution during this shutdown will help us understand the many factors that influence air quality, which, in turn, will help to further reduce the related health impacts. This may also help Canadians be more resilient against future pandemics.

If we can better identify the key sources contributing to different pollutants then governments at different levels can target these sources. For example, our research at SOCAAR on near-road traffic pollution identified the disproportionate contribution of older, higher-emitting trucks. A co-ordinated national campaign to phase these highly polluting vehicles out would be effective in alleviating pollution levels.

This shutdown has shown us how quickly [air quality](#) can improve. It is

also encouraging to see how people and our government are working with—and valuing—the guidance of our pandemic experts.

My hope is that once we get through this pandemic and Canada invests heavily to reignite our economy, our country will also work with and follow the guidance of Canada's experts in climate change and sustainability. By investing strategically, we could take a giant step along a path towards sustainability and create a "new normal" that is also more resilient to future pandemics.

Provided by University of Toronto

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