

Vehicle idling can compound local pollution on bad air days

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Credit: Unsplash/CC0 Public Domain

You may not even realize you're doing it, but if your car engine is idling while waiting in a drive-through line, especially on days that already have bad air quality, you may be contributing to a hyper-local hotspot of

air pollution.

A new study by University of Utah researchers published in the journal *Environmental Research: Health* monitored the air quality at drive-through COVID-19 testing sites to assess the impact of idling on air quality and found that during temperature inversions, emissions from idling vehicles caused a local pollution hotspot in the testing area, potentially exposing workers providing COVID tests to elevated levels of air pollution.

"The reality is that COVID changed people's behavior substantially and drive throughs have gained popularity and use," said study lead author Daniel Mendoza, a research assistant professor in the University of Utah's Department of Atmospheric Sciences and visiting assistant professor in the Department of City & Metropolitan Planning. "It is seen as a way to minimize exposure and increase convenience but there are [negative side effects](#)."

Impacts to air quality

Air quality is a big deal along Utah's Wasatch Front, where a bowl-like valley geography creates conditions that typically lead to episodes of unhealthy air quality in winter. When the air at the floor of the Salt Lake Valley is cold and the air overlying it is warm, then the cold air, and the soup of emissions generated by cars and buildings, is trapped near the surface. These episodes are called temperature inversions.

Within that atmospheric soup are not only the particles and chemicals that come out of tailpipes and smokestacks, but also the products of chemical reactions that happen in the atmosphere. Some of these reactions produce particulate matter smaller than 2.5 microns in diameter, or PM_{2.5}—particles small enough to reach the deepest part of the lungs and potentially the bloodstream. Our understanding of the

health effects of $PM_{2.5}$ is still evolving—but it's not a good thing to be breathing.

Among the actions taken by Utahns to improve air quality is a campaign to decrease idling, which is anytime a car is not moving but is still producing emissions. Salt Lake City has banned unnecessary idling of more than two minutes.

"This study demonstrates the importance of weighing the potential negative impacts to health and safety that an event utilizing drive throughs may have on participants, event workers, and the local, micro-environment air quality," said Corbin Anderson, manager at the Air Quality Bureau for Salt Lake County Health Department. "Air quality impact should be a primary criterion for deciding how to conduct the event.

Previous studies at Salt Lake County elementary schools by Mendoza, who is also an adjunct assistant professor in the Pulmonary Division of the School of Medicine and colleagues, including Tabitha Benney, an associate professor of political science, showed measurable rises in air pollution levels following school pick-up and drop-off times.

Readings at COVID testing sites

Drive-through COVID-19 testing sites provided an opportunity to study the air pollution impacts of idling in a line, since at some points drivers found themselves waiting in car lines for hours waiting to be tested. Also, three of the testing sites were located near Utah Division of Air Quality (UDAQ) air monitoring stations, allowing for comparison between the mobile monitoring equipment deployed at the COVID testing sites and the high-quality measurements at the monitoring stations.

The researchers monitored PM_{2.5} concentrations at three sites: Highland High School in Salt Lake City, the Utah Department of Workforce Services in Midvale, and the State Fairgrounds in Salt Lake City. Compared to the UDAQ monitoring stations, the COVID testing sites were farther from roads and other pollution sources. The study extended from January to April 2022.

"Admittedly, we wished we had been able to deploy in early to mid-January when people would wait up to four hours to test," Mendoza said. The number of visitors dropped very quickly during the study period, he said, from more than 100 tests per day in January to around a dozen per day in April. Testing site operators reported peaks in traffic at the beginning and ending of each testing day—a drive-through pattern probably more similar to that of a bank than a fast-food restaurant.

Inversion and non-inversion days

On days without an inversion, the COVID test sites displayed less PM_{2.5} concentrations than at the UDAQ monitoring sites, even with the idling cars in line. This, again, is likely due to the testing sites being farther from pollution sources than the UDAQ sensors.

But on days with inversions, the PM_{2.5} concentrations at testing sites were comparable to, or even higher than, those measured at the UDAQ monitoring stations.

"During inversions, because the air is stagnant, the hyper-local pollution (the cars idling at the testing site) remains in situ and sometimes enhances the pollution readings compared to the UDAQ sites," Mendoza said.

The drop in car traffic over the study period, to only a few cars per hour, enhances the significance of the effect of even a little idling on hyper-

local air quality, Mendoza said.

The [health care workers](#) conducting tests took measures to protect themselves from exposure to the virus that causes COVID-19. But they may still have been exposed to the accumulated air pollution on inversion days.

"Although the first car in line—the one with occupants being tested—was asked to turn off their engine, the cars behind it may not have done that," Mendoza said. "While workers wore masks which could have protected them from some pollution, it is likely they were vulnerable, particularly during the inversion periods."

Next steps

Mendoza says that the next step is to measure air quality in areas with many drive-throughs, or even in a busy drive-through, to further explore the effect of drive-through idling on local [air quality](#).

But in the meantime—next time you find yourself waiting in a drive-through line, whether on inversion or non-inversion days, simply shut off the engine, doing yourself, your car and drive-through workers a favor.

More information: Daniel L Mendoza et al, Pollution hot spots and the impact of drive-through COVID-19 testing sites on urban air quality, *Environmental Research: Health* (2023). [DOI: 10.1088/2752-5309/ace5cb](#)

Provided by University of Utah

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