

# Time spent in car drives up air pollution exposure

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The daily commute may be taking more of a toll than people realize. A new study by researchers at the University of Southern California (USC) and the California Air Resources Board found that up to half of Los Angeles residents' total exposure to harmful air pollutants occurs while people are traveling in their vehicles.

Although the average Los Angeles driver spends about six percent (1.5 hours) of his or her day on the road, that period of time accounts for 33 to 45 percent of total exposure to diesel and ultrafine particles (UFP), according to the study published this month in the journal *Atmospheric Environment*. On freeways, diesel-fueled trucks are the source of the highest concentrations of harmful pollutants.

“If you have otherwise healthy habits and don’t smoke, driving to work is probably the most unhealthy part of your day,” says Scott Fruin, D.Env., assistant professor of environmental health at the Keck School of Medicine of USC. “Urban dwellers with long commutes are probably getting most of their UFP exposure while driving.”

High air exchange rates that occur when a vehicle is moving make roadways a major source of exposure. Ultrafine particles are of particular concern because, unlike larger particles, they can penetrate cell walls and disperse throughout the body, Fruin says. Particulate matter has been linked to cardiovascular disease, but the ultrafine fraction on roadways appears to be more toxic than larger sizes.

Researchers measured exposure by outfitting an electric vehicle with nine, fast-response air pollution instruments. A video recorded surrounding traffic and driving conditions on freeways and arterial roads throughout the Los Angeles region. Measurements were collected during a three-month period from February to April 2003, and four typical days were selected for a second-by-second video and statistical analysis.

Results showed that the two main sources of pollution were diesel-fueled trucks on freeways and hard accelerations on surface streets. Surprisingly, overall congestion was only a factor on arterial roads and, even then, the highest concentrations of pollutants occurred only when vehicles were accelerating from a stop, Fruin says.

“This study was the first to look at the effect of driving and traffic conditions at this level of detail and to demonstrate the specific factors leading to the highest pollutant exposures for drivers,” Fruin says. “The extent that a specific type of vehicle—diesel trucks—dominated the highest concentration conditions on freeways was unexpected.”

Driving with the windows closed and recirculating air settings can modestly reduce the particle pollution exposures but does not reduce most gaseous pollutants. Driving at speeds lower than 20 miles-per-hour can also reduce exposure, but none of these measures are as effective as simply cutting back on driving time, he says.

“Shortening your commute and spending less time in the car will significantly reduce your total body burden of harmful pollutants,” Fruin says.

Off-road transportation such as taking the train will have a significant impact. Biking or walking are alternatives that also provide valuable health benefits from exercise, he says.

Source: University of Southern California

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