

Exposures and Health Risks from Congestion: Impacts on Commuters and Near-Road Communities

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ABSTRACT

Traffic congestion has increased significantly in the U.S. and elsewhere over the past 20 years and has led to detrimental impacts on air quality and health. Congestion increases vehicular emissions, already the most significant urban source of many air pollutants, and also increases the time individuals spend in traffic. Thus, traffic and congestion increases exposures of drivers and commuters as well as individuals living near major roads. Many studies have shown that that exposures to vehicle-related air pollutants, including a growing number of “near-road” studies, are associated with a wide range of health impacts, including respiratory, cardiovascular, and adverse birth outcomes. Despite its importance, the understanding of the relationships between congestion, exposure and human health remains poorly understood. As examples, exposures associated with traffic and congestion have not been adequately quantified, widely used vehicle emission models (e.g., EPA MOBILE6.2) do not account for the stop-and-go transients typical of congestion, and time activity pattern (TAP) analyses do not represent time spent in congestion or heavy traffic.

This proposal has the objective of understanding exposures and health risks due to air pollutants that are caused by traffic and congestion. In the summer period covered by this proposal, my aim is to (1) estimate exposures attributable to congestion, using a time allocation shift model and an integrated traffic simulation model (both developed in the past year), and (2) estimate the health risks attributable to traffic and congestion by linking the estimated exposures to dose-response relationships. This research will help to address important knowledge gaps, including the differential exposures associated with congestion and the magnitude of risks associated with traffic and congestion. The research methodologies are novel, and the research findings have applications to exposure estimation, health risk evaluation, and transportation planning.