Prof Gilliland’s team finds strong link between air pollution and adverse birth outcomes
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A new publication by researchers from Western’s Human Environments Analysis Lab provides evidence of a strong association between exposure to air pollution during pregnancy and adverse birth outcomes.

“This is the first study in Southwestern Ontario to investigate the association between air pollution and adverse outcomes, while also considering the other determinants of health, including socioeconomic, medical, psychosocial and behavioural-related factors,” explained Geography Professor and HEAL Director Jason Gilliland, who was senior author of the study. Study authors also included Jamie Seabrook (Associate Professor, Brescia University College), Andrew Clark (HEAL Project Coordinator), and Alexandra Smith (MSc Food & Nutrition Student, Brescia).

The findings of the study were recently discussed in a CTV News story featuring Gilliland and Seabrook, as well as multiple other media outlets (see below).

The objective of the study was to test the relative influence of environmental factors including exposure to air pollution, major roads, highways, industry, parks, greenspaces, and food retailers on low birthweight and preterm birth in Southwestern Ontario, while controlling for other factors.

The HEAL team were able to take advantage of a large neonatal and perinatal database, which included a sample of over 25,000 live births at London Health Sciences Centre (LHSC) between 2009 and 2014. “Through geographical mapping of maternal postal codes by our HEALab at Western, we tested the relative influence of the various factors,” noted Seabrook, lead author of the study.

This large-scale study provides evidence of a strong association between exposure to sulfur dioxide during pregnancy and adverse birth outcomes. Pregnant women in Southwestern Ontario were 3.4 times more likely to have a low birthweight baby and
two times more likely to have a preterm birth for every 1-parts per billion increase in sulfur dioxide, all other variables accounted for. This translates to a thirty percent increase in low birthweight and twenty percent increase in preterm birth when comparing a typical high exposure to sulfur dioxide to a typical low exposure to sulfur dioxide.

Gilliland notes that, “toxic air travels through pregnant women's lungs and are found in their placentas,” as indicated by evidence consistent with other research. While there were several key factors associated with birth outcomes in the study, the impact of sulfur dioxide exposure cannot be overstated.

About 66 percent of sulfur dioxide emissions come from smelters and utilities, and 26 percent from other industrial sources. Sulfur dioxide is also present in motor vehicle emissions. Previous preterm birth was also highly associated with both adverse birth outcomes, and was one of the many medical factors controlled for in the study. Sulfur dioxide was the only physical environment variable highly associated with low birth weight and preterm birth.

“While many factors contribute to a healthy pregnancy, the takeaway message is that the quality of air women breathe is also important,” noted Seabrook. Health care providers should be informed about the hazards of air pollution to developing fetuses so that adequate recommendations can be made to their pregnant patients. Such recommendations may include staying indoors with the windows closed, sticking to indoor exercise when pollution levels are high, and keeping windows closed when travelling by car. This information could also be incorporated when making public health warnings related to air quality.

Future studies could assess whether seasonal variation in exposure to air pollution acts as potential confounder or effect modifier in the association between air pollution and adverse birth outcomes. More research is needed for whether the timing of environmental exposures during pregnancy (i.e., by trimester) is associated with adverse birth outcomes. The team’s next steps will be to identify emerging geographical clusters or ‘hotspots’ of sulfur dioxide exposure and adverse birth outcomes in
Southwestern Ontario, which will inform where health promotion interventions need to be focused in the future.

“Geospatial analyses of adverse birth outcomes in Southwestern Ontario: examining the impact of environmental factors” was published in *Environmental Research*.


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