

Higher levels of organic pollutants found in homes located near natural gas wells, study finds

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A University of Toronto study has found that those living close to natural gas wells are exposed to higher levels of certain organic pollutants in

their homes.

The study looked at levels of volatile organic compounds (VOCs) found in the air and drinking water in homes of pregnant women living in a region of northeastern British Columbia.

"There's very little research about indoor air quality in regions with a lot of unconventional natural gas exploitation," says Élyse Caron-Beaudoin, an assistant professor in the department of health and society at U of T Scarborough and lead author of the study.

For the study, 85 pregnant women from the Peace River region were recruited and passive air samplers were placed in their homes. Water samples were also taken from their kitchen taps. Researchers found that 40 out of the 47 VOCs tested for were detected in air samples, while three out of 40 VOCs tested for were detected in water samples.

VOCs are organic chemicals, some of which have negative short- and long-term health effects. They are released by a variety of products and industrial processes.

The researchers also looked at how many natural gas wells were located near homes as well as the distances. They found that the amount and proximity of natural gas wells to a home were linked to higher levels of certain VOCs. They also accounted for other factors related to exposure levels, including whether a home had an attached garage, the tap water source and whether the study participant smokes or is exposed to second-hand smoke.

They also included each participant's Indigenous status. A previous pilot study done in the same region of B.C. by Caron-Beaudoin found higher levels of VOC metabolites in the urine samples of pregnant Indigenous women compared to pregnant non-Indigenous women.

In the current study, the levels of VOCs associated with the amount and proximity of natural gas wells were similarly higher in the homes of Indigenous participants. While the researchers are unsure why higher levels were found in the homes of Indigenous participants, they point to research that shows ethnicity, Indigeneity and socioeconomic status all being linked to heightened health risks from industrial activities.

The study, published in the journal *Science of the Total Environment*, also compared levels to the Canadian average. For a few of the VOCs—in particular acetone and [chloroform](#) in air samples, and trihalomethanes (THMs) in water samples—some participants recorded levels that placed them in the top 95th percentile in Canada. In other words, they had the highest exposure levels compared to the general Canadian population.

THMs in particular stood out. More than 60 percent of study participants were found to be above the 95th percentile of exposure levels compared to the Canadian average.

"These levels are really high," says Caron-Beaudoin. "For some of the participants, it was even over the guidelines for safe drinking water—so we had to contact them to let them know."

She adds that [acetone](#) and chloroform are used as solvents in fracking fluid, while THMs occur when [chlorine](#) used to disinfect water reacts with natural organic matter. THM levels tend to be higher in areas close to natural gas exploitation because greater amounts of wastewater are generated during the extraction process, she said.

Pregnant women were recruited for the study because of the potential negative birth outcomes linked to living close to natural gas operations. Caron-Beaudoin points to research finding higher rates of pre-term births, low birth weight and heart malformations, among others. There's also a link to higher cancer rates in children and increased levels of

chronic respiratory disease in adults—such as asthma and chronic obstructive pulmonary disease—and cancer in adults.

Caron-Beaudoin leads the only research group that is actively looking at the potential health impacts linked to natural gas exploitation in Canada. As one of the largest global producers of natural gas, she says more research needs to be done in Canada on its potential health effects.

The area of northeastern British Columbia where the research participants are located will also be home to a massive new gas plant that could increase the number of wells in the area to more than 100,000.

"This is happening with very little data on exposure levels—including air and water quality," Caron-Beaudoin says. "There's currently no monitoring program, and as a result, no way to check the health status of people living near these wells."

More information: Élyse Caron-Beaudoin et al, Volatile organic compounds (VOCs) in indoor air and tap water samples in residences of pregnant women living in an area of unconventional natural gas operations: Findings from the EXPERIVA study, *Science of The Total Environment* (2021). [DOI: 10.1016/j.scitotenv.2021.150242](https://doi.org/10.1016/j.scitotenv.2021.150242)

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