

## Featured Research Review:

### Willis et al. (2021): Associations between residential proximity to oil and gas extraction and hypertensive conditions during pregnancy

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#### Terms to Know:

- [Gestational hypertension](#) – a form of high blood pressure in pregnancy found in roughly 6% of pregnancies. It can lead to complications such as pre-eclampsia. It is diagnosed when a pregnant individual has blood pressure above 140/90, had normal blood pressure prior to 20 weeks, and has no increase of protein in the urine.
- [Preeclampsia](#) – is diagnosed when a pregnant individual has gestational hypertension (increased blood pressure) and has increased protein in the urine. Eclampsia is a more severe form that can lead to complications such as seizures. Eclampsia usually develops towards the end of the pregnancy.
- [Odds ratio](#) – the odds of an event happening in one group versus another. In this case, it is the odds of gestational hypertension or preeclampsia happening to pregnant individuals living within 0-1 km (0-0.6 miles) from oil and gas development versus those living 1-10 km (0.6-6.2 miles) from oil and gas development.
- [Volatile organic compounds \(VOCs\)](#) – a group of various chemicals which have been found to have short- and long-term health effects. VOCs are one of the concerns of air pollution emissions with shale gas development.
- [Difference-in-difference \(DID\) model](#) – a quasi-experimental method that looks to compare the changes in an outcome over time between one population in question and another population.

A multitude of studies have examined the impact of air pollution from oil and gas development (OGD) and specifically the impact this has on pregnant individuals. Caron-Beaudoin et al. (2022) found in a recent study that more than 40 different volatile organic compounds (VOCs) were detected in air samples taken near shale gas facilities. VOCs have been linked to cancer, COPD, asthma, and various other conditions. Other studies have looked to see if there is a correlation between the proximity of a pregnant individual to OGD and low birth weight or small for gestational age (SGA). A separate Willis et al. study (2021) found that pregnant individuals within 1 km (0.6 mile) of OGD averaged 30 grams less for birth weight.

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With the growing knowledge around birth impacts in relation to OGD, a complementary Willis et al. study (2021) looked to determine if air pollution associated with OGD could lead to risks for increased cases of gestational hypertension or preeclampsia. Generally, upwards of 8% of pregnancies are impacted by hypertensive conditions, and 16% of maternal deaths are linked to conditions that lead to high blood pressure.

Researchers from Oregon State University, Boston University, and the University of Rochester looked at birth records comprising babies born in Texas between 1996 and 2009. They specifically looked at more than 2.8 million pregnant individuals living within 10 km (6.2 miles) of active or future drilling sites. Researchers then used the difference-in-difference model to examine maternal health with exposure to drilling and without.

The study found:

- Pregnant individuals living within 0-1 km (0-0.6 miles) from active oil and gas development have an estimated 5% increased odds of developing gestational hypertension.
- Pregnant individuals living within 0-1 km (0-0.6 miles) from active oil and gas development have an estimated 26% increased odds of developing eclampsia.
- Pregnant individuals who resided within 1-10 km (0.6-6.2 miles) of a gas drilling site experienced dissipating risk of gestational hypertension or preeclampsia.
- Individuals most sensitive to drilling exposures were under the age of 35, had not given birth prior, gained more than 30 pounds during pregnancy, were non-Hispanic White, and were educated beyond a high school level.

This study indicates that there are increased odds of developing gestational hypertension and eclampsia for those living within 1 km (0.6 miles) of an active oil or gas drilling site.

**To learn more about this study, explore these links:**

- Caron-Beaudoin, É., et al. (2022). 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*, 805, 150242. I to <https://doi.org/10.1016/j.scitotenv.2021.150242>
- Cushing, L. J., Vavra-Musser, K., Chau, K., Franklin, M., & Johnston, J. E. (2020). Flaring from unconventional oil and gas development and birth outcomes in the Eagle Ford Shale in South Texas. *Environmental Health Perspectives*, 128(7), 077003. <https://doi.org/10.1289/ehp6394>
- Tran, K. V., Casey, J. A., Cushing, L. J., & Morello-Frosch, R. (2020). Residential proximity to oil and gas development and birth outcomes in California: A retrospective cohort study of 2006–2015 births. *Environmental Health Perspectives*, 128(6), 067001. <https://doi.org/10.1289/ehp5842>

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- Willis, M. D., Hill, E. L., Kile, M. L., Carozza, S., & Hystad, P. (2021). Associations between residential proximity to oil and gas extraction and hypertensive conditions during pregnancy: A difference-in-differences analysis in Texas, 1996–2009. *International Journal of Epidemiology*. <https://doi.org/10.1093/ije/dyab246>
- Willis, M. D., Hill, E. L., Boslett, A., Kile, M. L., Carozza, S. E., & Hystad, P. (2021). Associations between residential proximity to oil and gas drilling and term birth weight and small-for-gestational-age infants in Texas: A difference-in-differences analysis. *Environmental Health Perspectives*, 129(7), 077002. <https://doi.org/10.1289/ehp7678>

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