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Study Shows Strong Associations Between Asthma Exacerbations and Shale Gas Development

Buchanich, J., Talbott, E., Arena, V., Bear, T., Fabisiak, J, Wenzel, S., Youk, A., Yuan, J. (2023): Final Report for Pennsylvania Department of Health, Bureau of Epidemiology: Hydraulic Fracturing Epidemiology Research Studies: Asthma Outcomes

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Terms to know:

- Asthma/asthma exacerbation: a disease of the lungs characterized by repeated episodes of wheezing, breathlessness, chest tightness, and nighttime or early morning coughing. Asthma is a chronic condition that is most common among children but can also affect adults. Environmental factors like air pollution and exposure to chemicals can activate symptoms and episodes of asthma.
- Case-control study: a type of observational study that compares individuals with a certain condition (the cases) to those without the condition (the controls). Researchers look at the similarities and differences in exposures to cases and controls to understand what might ultimately be causing a condition to occur. Case-control studies are almost always retrospective, meaning they look at historical data and outcomes to make predictions and determinations for future development of the studied condition.

According to the Pennsylvania Department of Health, operators have drilled more than 13,000 wells classified as shale gas wells in the state to date. Hydraulic fracturing, also known as fracking, is a process that is part of shale gas extraction and involves the injection of high-pressure fluids and chemicals into deep fissures in the earth to free up and ultimately collect shale gas. This technique has witnessed rapid growth in not only Pennsylvania but the entire country – 32.5 trillion cubic feet of gas was produced from shale gas wells in 2022 alone, up from 1.9 trillion cubic feet in 2007 when data is first available.

A previous study conducted by Rasmussen et al. looked at asthma events in health record data for patients residing in Eastern Pennsylvania from 2005 to 2012 and considered how close residents live to shale gas operations. The study found increased asthma exacerbations during the well pad preparation and production phases of these gas operations.

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The University of Pittsburgh School of Public Health, authors of the "*Final Report for Pennsylvania Department of Health, Bureau of Epidemiology Hydraulic Fracturing Epidemiology Research Studies: Asthma Outcomes*," modeled its investigation closely on the methodology of the Rasmussen et al. study to replicate the results and add further evidence to gas operations' role in aggravating asthma responses in patients. The Pitt Study (peer review pending) is an observational epidemiological study that examines the association between proximity to shale gas activities and the severity and incidence of asthma. The study aimed to better identify the environmental risk factors that may be contributing to increased asthma exacerbations in the eight-county study area of Southwestern Pennsylvania.

In the study, researchers collected data on medical visits, specifically for asthma exacerbations or prescriptions. They then examined the distance of each patient's residence to shale gas development activities, as well as how many wells were active nearby. Patients who lived within 10 miles of any shale gas activity were considered exposed.

The researchers also stratified the study data by the phase of development of each well, in addition to the severity of the asthma episode for which the patient received medical care. The phases of shale gas production considered were well preparation, drilling, hydraulic fracturing, and production. Asthma-related medical visits were stratified into severe exacerbation, emergency department visits, and hospitalizations. Using these delineations, researchers analyzed the association between each phase of gas development and asthma exacerbations, including any relation to the severity of asthma episodes. This data was also matched to controls, in this case asthma patients whose medical records did not indicate asthma exacerbations, which allowed the researchers to further control for any confounding factors.

The results suggest a strong association between asthma exacerbations and the production phase of shale gas development.

- During the production phase, patients in the "low" exposure group had 3.53, 3.50, and 3.13 times the odds of a severe asthma exacerbation, emergency room visit, and hospitalization, respectively, at a buffer zone of 10 miles.
- During the production phase, patients in the "high" exposure group had a 4.72, 4.81, and 4.64 times odds of severe asthma exacerbation, emergency room visit, and hospitalization, respectively, at a buffer zone of 10 miles.
- During the well pad preparation, drilling, or hydraulic fracturing phases, there was not a significantly increased risk in asthma exacerbations in any of the exposure group levels at a 10-mile buffer distance.

The findings of this study add to the already substantial body of evidence that shale gas extraction operations constitute a risk to asthma patients and to human health overall.

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To learn more about this study, explore these links:

Buchanich, J., Talbott, E., Arena, V., Bear, T., Fabisiak, J., Wenzel, S., Youk, A., Yuan, J. (2023, July 31). Final Report for Pennsylvania Department of Health, Bureau of Epidemiology Hydraulic Fracturing Epidemiology Research Studies: Asthma Outcomes. University of Pittsburgh School of Public Health. Unpublished as of 8/28/2023. https://www.health.pa.gov/topics/Documents/Environmental%20Health/Report_Asthma_outcomes_2023.pdf

Bushong, A., McKeon, T., Regina Boland, M., Field, J. (2022). Publicly available data reveals association between asthma hospitalizations and unconventional natural gas development in Pennsylvania. PLoS ONE 17(3): e0265513. https://doi.org/10.1371/journal.pone.0265513

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Pennsylvania Department of Health, Division of Environmental Health Epidemiology. (N.D.). Oil and Natural Gas Production Health (ONGP) Concerns. https://www.health.pa.gov/topics/envirohealth/Pages/OilGas.aspx

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