

Featured Research Review:

Li et al. (2022): Exposure to shale gas development and all-cause mortality in Medicare beneficiaries

February 28, 2022

There has been limited research examining the impact of exposures from shale gas development (SGD) on mortality risks; however, previous research has concluded that air contaminants such as [volatile organic compounds](#) (VOCs), which are released during shale gas operations, have been linked to a variety of health concerns. Health concerns linked to VOCs include asthma and respiratory issues (Rasmussen et al., 2016). Other health studies have found links to birth impacts, hospitalizations, cancer, dermal issues, and problems with cardiovascular, respiratory, and neurological systems (EHP, 2020).

A group of researchers from Harvard T.H. Chan School of Public Health studied the possible correlation between higher [all-cause mortality](#) risks in the elderly and proximity to SGD. The study utilized a cohort of more than 15 million Medicare beneficiaries who all lived in major SGD areas, nationwide, from 2001 to 2015. The researchers then gathered information on the location and records of production for more than 2.5 million oil and gas wells in these same areas. Lastly, they calculated both upwind and [downwind-based exposure](#) (DE) and [proximity-based exposure](#) (PE) to examine how wind direction and directional [dispersal](#) of air pollutants affected mortality risk.

The study findings were as follows:

- For people who lived in proximity to SGD (there was a high PE), the risk of all-cause mortality was significantly higher.
- The risk of mortality increased steadily when the PE level increased from low to high.
- Living downwind of SGD was found to have a higher risk of death in comparison to individuals living upwind of SGD. This was seen even more clearly when the individuals living downwind of SGD also experienced high PE.
- Mortality risk declined the further individuals lived from SGD (PE), both upwind and downwind. However, the decline in risk was slower downwind.
- The associations between higher mortality and high PE or DE were seen across the board in all regions, races, and age groups.

This study indicates that the continued expansion of SGD over the past decade has directly impacted the health of Medicare beneficiaries living in proximity to SGD regardless of demographics, environment, or [socioeconomic factors](#). The study also strongly suggests that airborne pollutants from SGD are contributing to increased mortality risk as the population downwind from facilities exhibited the greatest mortality risk.

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To learn more about this study, explore these links:

- Environmental Health Project. (2020, February). *Health Outcomes Associated with Exposure to Shale Gas Development from Peer-Reviewed Epidemiological Literature*. https://www.environmentalhealthproject.org/files/ugd/a9ce25_4b70c65d66ae4d9381beb97c1122a803.pdf?index=true
- Hendryx, M., & Luo, J. (2020). Natural gas pipeline compressor stations: VOC emissions and mortality rates. *The Extractive Industries and Society*, 7(3), 864–869. <https://doi.org/10.1016/j.exis.2020.04.011>
- Li, L., Dominici, F., Blomberg, A. J., Schwartz, J. D., Coull, B. A., Spengler, J. D., Wei, Y., Lawrence, J., & Koutrakis, P. (2022). Exposure to Unconventional Oil and Gas Development and All-cause Mortality in Medicare Beneficiaries. *ISEE Conference Abstracts*, 2022(1). <https://doi.org/10.1289/isee.2021.o-lt-108>
- McKenzie, L. M., Blair, B., Hughes, J., Allshouse, W. B., Blake, N. J., Helmig, D., Milmoie, P., Halliday, H., Blake, D. R., & Adgate, J. L. (2018). Ambient Nonmethane Hydrocarbon Levels Along Colorado’s Northern Front Range: Acute and Chronic Health Risks. *Environmental Science & Technology*, 52(8), 4514–4525. <https://doi.org/10.1021/acs.est.7b05983>
- Rasmussen, S. G., Ogburn, E. L., McCormack, M., Casey, J. A., Bandeen-Roche, K., Mercer, D. G., & Schwartz, B. S. (2016). Association Between Unconventional Natural Gas Development in the Marcellus Shale and Asthma Exacerbations. *JAMA Internal Medicine*, 176(9), 1334. <https://doi.org/10.1001/jamainternmed.2016.2436>
- Willis, M. D., Jusko, T. A., Halterman, J. S., & Hill, E. L. (2018). Unconventional natural gas development and pediatric asthma hospitalizations in Pennsylvania. *Environmental Research*, 166, 402–408. <https://doi.org/10.1016/j.envres.2018.06.022>

Terms to know:

- **All-cause mortality:** the death rate from all causes of death for a population during a specific time
- **Dispersal:** the process or result of the spreading of organisms from one place to another
- **Socioeconomic factors:** demographic qualities such as education level, employment, and income, which can impact the ability to make health-focused choices
- **PE:** proximity-based exposure, examines exposure pathways in relation those in close proximity to the facility/structure of question
- **DE:** downwind-based exposure, exposure that is created through the movement of particles in the average direction of the wind over the course of a given month
- **Volatile Organic Compounds (VOCs):** compounds that have a high vapor pressure and low water solubility, many of which are manufactured

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