

## HealthFirstPA Website/Materials Source Notes

### Sources of data cited on this website and in the accompanying brochure:

**Rate of methane pollution from natural gas industry is estimated to be five times greater than what is reported to Pennsylvania's DEP.**

Alvarez, R.A., et al., "Assessment of methane emissions from the U.S. oil and gas supply chain," Science, July 13, 2018, Vol. 361, Issue 6398, pp. 186-188, <https://science.sciencemag.org/content/361/6398/186>

**Smog-causing VOC emissions are estimated to be nearly nine times higher than what the industry reports to the state.**

Omara, M., et al., "Methane emissions from conventional and unconventional natural gas production sites in the Marcellus Shale Basin," Environmental Science & Technology, 50.4, 2016, 2099-2107, <https://pubs.acs.org/doi/abs/10.1021/acs.est.5b05503>

**Nearly 311,000 children attend 1,118 schools within a half mile of oil and gas facilities.**

The Oil & Gas Threat Map, 2019, <https://oilandgasthreatmap.com/threatmap/pennsylvania/>

**Living within a half-mile radius of natural gas development leads to a 25% increase in low birth weight infants and significant reductions in infant health.**

Currie, J., et al., "Hydraulic fracturing and infant health: New evidence from Pennsylvania," Science Advances, December 13, 2017: Vol. 3, no. 12, <https://advances.sciencemag.org/content/3/12/e1603021> Stacy S.L., et al., "Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest Pennsylvania," PLoS ONE 10(6), 2015. <https://doi.org/10.1371/journal.pone.0126425> Hill, E., "Shale gas development and infant health: Evidence from Pennsylvania," Journal of Health Economics, 61, 134–150, 2018, <https://www.sciencedirect.com/science/article/abs/pii/S0167629617304174?via=ihub>

**Living within a half-mile radius of natural gas development leads to increased brain, spine, or spinal cord birth defects.**

Casey J.A., et al., "The association between natural gas well activity and specific congenital anomalies in Oklahoma, 1997-2009," Environment International, Volume 122, January 2019, 381-388, <https://www.sciencedirect.com/science/article/pii/S0160412018317999?via=ihub>

**Living within a half-mile radius of natural gas development leads to congenital heart defects**

McKenzie, L.M., et al., "Birth outcomes and maternal residential proximity to natural gas development in rural Colorado," Environmental Health Perspectives, April 2014,122(4):412-7, <https://ehp.niehs.nih.gov/doi/10.1289/ehp.1306722>

**Living within a half-mile radius of natural gas development leads to up to a 25% increase in children’s asthma**

Rasmussen S.G., et al., “Association Between Unconventional Natural Gas Development in the Marcellus Shale and Asthma Exacerbations,” *JAMA Internal Medicine*, 2016, 176(9), 1334–1343, <https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2534153> Willis, M. D., et al., “Unconventional natural gas development and pediatric asthma hospitalizations in Pennsylvania,” *Environmental Research*, 166, 402-408, October 2018, <https://www.ncbi.nlm.nih.gov/pubmed/29936288>

**People have up to 86 times greater exposure to known cancer-causing chemicals such as benzene and toluene if they live approximately 1 mile or less from unconventional drilling sites.**

McKenzie, L.M., et al., “Ambient Nonmethane Hydrocarbon Levels Along Colorado’s Northern Front Range: Acute and Chronic Health Risks,” *Environmental Science Technology*, April 17, 2018, 52(8):4514-4525, <https://pubs.acs.org/doi/10.1021/acs.est.7b05983>

**Living within a half-mile radius of natural gas development leads to increased anxiety and depression in pregnant women.**

Casey, J.A., et al., “Unconventional natural gas development and adverse birth outcomes in Pennsylvania: The potential mediating role of antenatal anxiety and depression,” *Environmental Research*, Volume 177, 2019, <https://doi.org/10.1016/j.envres.2019.108598>

**Air quality in the cities of Philadelphia, Pittsburgh, Johnstown, Lancaster, Harrisburg, and York ranks them among the 25 most polluted in the U.S.**

American Lung Association, “State of the Air 2019,” <https://www.lung.org/our-initiatives/healthy-air/sota/>

**A 2.7 degree (F) temperature increase will result in 800 deaths in Philadelphia alone.**

Eunice, Y.T., et al., “Increasing mitigation ambition to meet the Paris Agreement’s temperature goal avoids substantial heat-related mortality in U.S. cities,” *Science Advances*, June 5, 2019, Vol. 5, No. 6, <https://advances.sciencemag.org/content/5/6/eaau4373>

**Geographic distribution of Lyme disease has increased by over 320% in the Northeastern United States.**

Kugeler, K.J., et al., “Geographic Distribution and Expansion of Human Lyme Disease, United States,” *Emerging Infectious Diseases*, 2015, 21(8):1455-1457, [https://wwwnc.cdc.gov/eid/article/21/8/14-1878\\_article](https://wwwnc.cdc.gov/eid/article/21/8/14-1878_article)

**Reported cases of Lyme disease represent only 10% of the total infections.**

Dumic, I. and Severnini, E., “Ticking Bomb: The Impact of Climate Change on the Incidence of Lyme Disease,” *Canadian Journal of Infectious Diseases and Medical Microbiology*, Volume 2018, Article ID 5719081, <https://doi.org/10.1155/2018/5719081>