

Testimony to Pennsylvania Senate Democratic Caucus Policy Committee

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Unconventional Natural Gas Development and Health

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Who am I?

- Thank you for the opportunity to speak here today.
- **My name is Brian S. Schwartz, MD, MS**
- I am a professor in the Johns Hopkins Bloomberg School of Public Health
- Geisinger, Department of Population Health Sciences, Danville, PA
- Founding Director, Geisinger Environmental Health Institute, founded 2007, and I have spent regular time there
- I am a physician and environmental epidemiologist
- I have led many studies of UNGD and health at Geisinger
- These studies have been funded by the National Institutes of Health, which requires RIGOR in its funded science
- I have read the Environmental Health Project's report. I find it an excellent analysis and I agree with its findings and conclusions.

What do we know about UNGD and health?

- UNGD is a large-scale industrial engineering project that involves a number of impacts on the community and environment
- It involves many steps over time: clearing land, building roads, preparing the surface, bringing in chemicals and large volumes of water, bringing in large and heavy equipment (e.g., drilling engines, compressor engines), drilling, hydraulic fracturing, receiving returned liquids and processing them at the surface, receiving and processing gas at the surface, sending the gas through pipelines, and requires monitoring of the safety of these steps
- Over 10,000 shale gas wells are operating in the state, a huge SCALE of impact
- Communities experience
 - Truck traffic and their diesel exhaust emissions
 - Transient workforces
 - Air pollution: VOCs, particulate matter, ozone, NOx; fugitive emissions
 - Surface water: large withdrawals
 - Ground water: examples of methane and ethane in ground water; anecdotal stories of visible impacts on well water
 - Odors, vibration, light, noise

- Stress from many of these features
- **A MIX of exposures that can affect health that can be CUMULATIVE and affect health over time for CHRONIC health effects**
- A number of important health outcomes have been studied
 - My group now has nine peer-reviewed publications on fracking and health in top scientific and medical journals
 - We evaluate the number, size, distance to (total depth, gas production), and phase of well development in relation to health; it is not just about proximity
 - We have studied a range of common, severe, and impactful health outcomes across the lifespan at virtually all ages
 - EHR studies
 - Asthma exacerbations
 - Hospitalizations for congestive heart failure
 - Adverse birth outcomes (preterm birth, high risk pregnancy, birthweight)
 - Mental health in pregnant women
 - Mental health diagnosis and treatment in adolescents
 - Questionnaires: nasal, sinus, headache, and depression symptoms
- Many of the findings of our studies have been found before us, or replicated by other investigators in Pennsylvania and other states
- Fugitive emissions, the burning of gas, and the use of gas byproducts (e.g., ethane) for plastics production has huge impacts on CLIMATE CHANGE; climate change affects the health of Pennsylvanians too
- This industry thus has LOCAL, REGIONAL, and GLOBAL impacts on human health

Should we believe the findings?

- YES, WE SHOULD
 - It is about the BODY OF EVIDENCE
 - The body of evidence is large, growing, and consistent
- Epidemiologic studies cannot PROVE causation
- Remember that, for many decades, when study after study showed links between cigarette smoking and lung cancer, tobacco companies claimed that the link was not proven because epidemiologic studies cannot prove causation
 - This is a common strategy used by industrial interests
 - It is a way to DELAY action
- Why is the existing evidence COMPELLING?
 - Studies from many groups of independent investigators.
 - Studies using different study designs, including some that more formally evaluate CAUSALITY using specific causal frameworks
 - Studies from many parts of the U.S., but the MOST evidence from Pennsylvania
 - Studies selected BIOLOGICALLY PLAUSIBLE health outcomes

- Studies reveal that as a person's UNGD activity metric goes up, the risk or severity of the health outcome goes up, a dose-response relation that is important to find
- Many steps have been taken by studies to evaluate the ROBUSTNESS of findings
 - We only believe our findings if we cannot make them go away in these additional analysis steps
 - We try to figure out whether there are other explanations for our findings
 - We do not find this; our findings are **ROBUST**
- What else could it be?
 - Nothing else has changed in the region as rapidly as UNGD, in the same time and places
 - Opponents of these findings have not offered any plausible alternative explanations, they just claim "no proof of causation"
 - We should be **PROTECTING PUBLIC HEALTH**
 - The best studies on health impacts have been from Pennsylvania
 - There is **SUFFICIENT EVIDENCE** to act **NOW**