

# The Health Effects of Fracking

## *Fracking Harms Human Health*

### Rapidly Growing Evidence

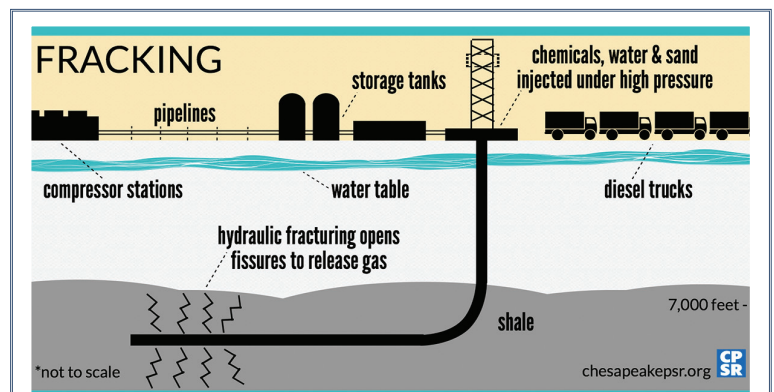
A growing body of scientific information suggests that unconventional gas development and production (UGDP), commonly referred to as “fracking,” has a broad array of negative impacts, ranging from adverse climate effects to earthquakes to community disruption to contamination of air, water and soil. These contaminants can then enter the human body through skin contact, respiration or ingestion, potentially leading to a wide range of health harms.

The peer-reviewed scientific literature now includes more than 700 studies on the impacts of unconventional gas development; most were published in just the last three years. **Of the studies looking specifically at health impacts, more than 80 percent document risks or actual harms.**<sup>1</sup>

### Fracking’s Adverse Impacts

Recent studies in the peer-reviewed literature are of vital importance, both from a clinician’s perspective and a policy perspective. These studies include:

- In October 2015, researchers at the Johns Hopkins Bloomberg School of Public Health and collaborating institutions analyzed data from roughly 10,000 birth records in Pennsylvania and found a statistically significant association between maternal proximity to active fracking operations and **premature births and high-risk pregnancies.**<sup>2</sup>
- In July 2016, researchers at the Johns Hopkins Bloomberg School of Public Health and collaborating institutions analyzed medical records of more than 35,000 asthma patients, ages five to 90 years old, and found a statistically significant association between proximity to active fracking operations and **mild to severe asthma exacerbations.**<sup>3</sup>
- In August 2016, researchers at the Johns Hopkins Bloomberg School of Public Health and collaborating institutions analyzed responses to questionnaires received from more than 7,000 adult primary care patients in central and northern Pennsylvania, and found statistically significant associations between proximity to active fracking operations and various combinations of **migraine headaches, chronic rhinosinusitis and fatigue symptoms.**<sup>4</sup>



*Hydraulic fracturing is a well-stimulation technique in which large volumes of water, sand and chemicals are injected under high pressures into deep rock layers to force open fissures to extract oil or gas. The term “fracking” refers to hydraulic fracturing, but it often is used more broadly as shorthand for the full life cycle of UGDP activities, including trucking, well pad construction, drilling, hydraulic fracturing, handling and disposal of chemicals and waste waters, processing and storage of gas, compressor stations, pipelines and more. All of these phases have significant negative effects on human health and the environment.*

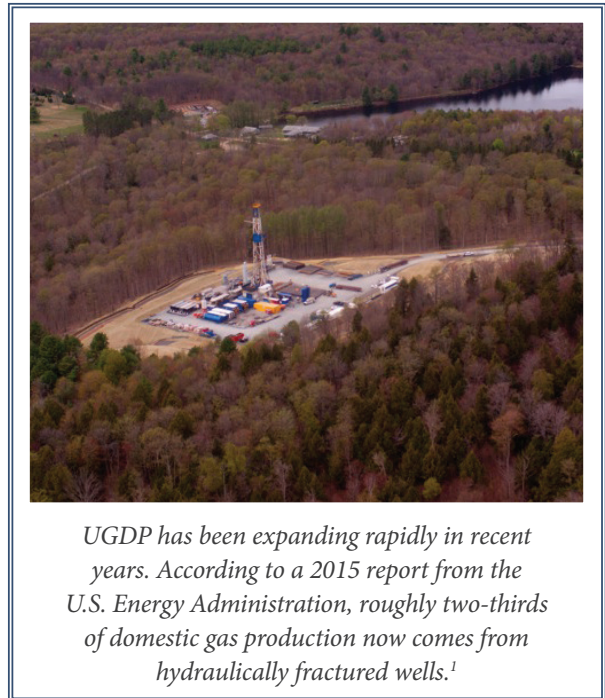
**Most reports about fracking in Maryland focus on the impacts in Western Maryland. However, natural gas deposits are located throughout Maryland, including in St. Mary’s, Calvert, Dorchester, Talbot, Caroline, Queen Anne’s, Wicomico, Somerset, Worcester, Frederick and Montgomery counties.**

In these studies, the researchers developed metrics that could provide reasonable estimates of patient exposures based on proximity to active wells, phase and duration of various stages of fracking-related operations, depth of wells and volume of gas produced. Researchers obtained patient information from electronic medical records maintained by Geisinger Health Systems, which serves a large population in 40 Pennsylvania counties, many of which have seen a rapid expansion of fracking operations in the Marcellus Shale in the last decade.

Other research teams have documented associations with serious illnesses, as well as pathways for disease development that may take many years or decades to become clinically apparent.

**For example:**

- In 2015, researchers at the University of Pennsylvania and Columbia University reported an increase in **cardiac and neurologic hospitalizations** in two Pennsylvania counties with active fracking operations, compared with a neighboring county where such operations had been banned.<sup>5</sup>
- In 2016, researchers working collaboratively with local residents near oil and gas operations in Wyoming reported combined results from environmental sampling and biomonitoring in one of the first studies of its kind. Toxicants and their metabolites, including **BTEX<sup>6</sup> chemicals** known to damage multiple organ systems, were detected in air samples and in the urine of residents.<sup>7</sup> Although most of the wells in this region are conventional vertical wells, the human health hazards from volatile organic compounds are present in all types of oil and gas development and production.
- In 2016, researchers documented **endocrine-disrupting chemicals** in surface waters near fracking wastewater disposal sites in West Virginia. Such chemicals can have potent effects on human development at exceedingly low concentrations during critical developmental windows.<sup>8</sup> As part of their ongoing work, researchers now also have documented adverse effects on development and reproductive capacities of both male and female mice at concentrations that are relevant to real-life human environmental exposures.<sup>9,10</sup>



*UGDP has been expanding rapidly in recent years. According to a 2015 report from the U.S. Energy Administration, roughly two-thirds of domestic gas production now comes from hydraulically fractured wells.<sup>1</sup>*

**Under a law passed in 2015, the Maryland Department of the Environment can begin issuing fracking permits in October 2017. A coalition of groups in Maryland is urging the General Assembly to enact a fracking ban.**

**See [dontfrackmd.org](http://dontfrackmd.org) for more information.**

## Natural Gas is Bad News for Climate Change

Fracking also affects human health through its negative impacts on climate change. Natural gas is largely methane, a greenhouse gas 86 times more potent than CO<sub>2</sub> in the 20-year timeframe. Recent studies show that large amounts of methane leak into the atmosphere throughout the lifecycle of gas development and production. As a result, UGDP is likely as bad or worse for climate change than coal or oil.<sup>12</sup>

Climate disruption is a public health emergency. It affects human health and safety directly through extreme weather events, spread of infectious disease and exacerbation of underlying illnesses. It also threatens food production, access to potable water, social stability and global security. Slowing climate change requires all sectors of society to transition rapidly to clean, renewable energy and to adopt land use practices that help stabilize the climate. UGDP impedes both goals and commits society to additional decades of fossil fuel dependence.

## Health, Environment and Veterinary Science

To better understand the environmental impacts that have direct implications for public health, research that is currently divided into distinct silos must be integrated. The time lag before connections become clear will be shortened if public health researchers and practitioners are aware of work done in the environmental arena and vice versa. Similarly, veterinary research may be vitally important to human health, as pets, production animals and wildlife are often the “canaries in the coal mine.”

For example, cattle and dairy operations and even organic vegetable farms are often located in close proximity to fracking operations. Yet there is no screening of the food supply for toxic chemicals that may be stored in soils, vegetation or animal products.

Examples of environmental and veterinary literature relevant to human health include:

- In 2012, Drs. Bamberger and Oswald reported on numerous case studies involving **animals potentially harmed by exposures to fracking chemicals**. One accidental “experiment” resulted when a herd of beef cattle was divided into separate pastures: “...a creek into which wastewater was allegedly dumped was the source of water for 60 head, with the remaining 36 head in the herd kept in other pastures without access to the creek. Of the 60 head that were exposed to the creek water, 21 died and 16 failed to produce calves the following spring. Of the 36 that were not exposed, no health problems were observed, and only one cow failed to breed.”<sup>13</sup>
- In 2015, researchers at the University of Maryland documented an increase in ethane levels in Maryland, attributable to increased fracking operations in the neighboring states of West Virginia and Pennsylvania. This suggests significant amounts of uncombusted natural gas were escaping and traveling long distances into neighboring states, with potential negative impacts both on air quality and climate.<sup>14</sup>
- In 2016, researchers at Duke University reported evidence of **widespread and persistent contamination of water and soils** with salts, heavy metals, radioactive elements and other toxic materials associated with unconventional oil drilling in North Dakota. More than 3,900 spills of fracking wastewater were documented, more than one for every three wells drilled.<sup>15</sup>

Further, UGDP affects human health and well-being not only through direct exposures to toxic chemicals in air, water and soil, but also through many stressors introduced into communities. These include **excessive noise and light pollution, increases in traffic accidents and fatalities, increases in domestic violence, alcohol and drug use, crime and disruptions of family and community relationships**.<sup>16</sup>

UGDP usually occurs most intensively in rural areas that are economically vulnerable. Those most affected by adverse health impacts are often the least able to afford additional medical care and may lack the means to move out of their homes to a less polluted region. Living near fracking operations means spending more on medicines for ailments like asthma, headaches and sinusitis, and for medical office visits, hospitalizations and lost days of work. These costs are rarely if ever considered in standard cost/benefit analyses of UGDP. Additionally, these costs can be long-term, persisting well beyond the boom phase of this industry.



**Often policymakers seek simple connections between an exposure to a particular substance and the development of a particular illness, but in reality, human health is far more complex. People often are exposed to numerous chemicals that may interact, the exposures may be acute or chronic, and there may be cumulative effects.**



## Want to Learn More?

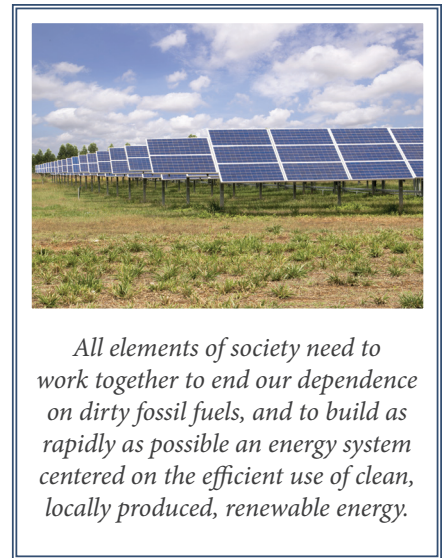
Interested in learning more about the science of health and fracking? We recommend that you explore the PSE Study Citation Database on Shale and Tight Gas Development.<sup>17</sup> This citation database provides an exhaustive and evolving list of bibliographic information, abstracts and links to vetted scientific papers and peer-reviewed journal articles. It is divided into 12 different categories, including air quality, water quality, climate, public health and regulations.

## What is the Answer?

The science is increasingly clear. The health risks posed by fracking are real, significant and unacceptable. No regulatory framework has been shown to adequately protect public health or the environment. That is why **Chesapeake PSR opposes any expansions of fracking or related infrastructure, and is actively working to ban fracking in Maryland** before it begins.

This paper was authored by Gina Angiola, MD. Assistance and review was provided by Larysa Dyrszka, MD, Annie Bristow, PhD, Tim Whitehouse, JD, Lydia Sullivan and Emily Rosenberg.

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