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Hydraulic Fracturing and Public Health

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The relationship between hydraulic fracturing and public health is controversial, particularly related to the health effects people associate with the fracking process. New York State has banded fracking, citing health concerns as a primary reason for the ban. Studies have investigated the relationship between fracking and reproductive health issues and fracking's effect on the health of children. One study claims people living near fracking sites are more likely to get sick.

People are primarily concerned with the health risks associated with air and water pollution from the fracking wells. A study conducted by the Pennsylvania Department of Environmental Protection and the Susquehanna River Basin Commission assessed 41 products used in the fracturing process (Law and Finkel 2011: 785). Of the products they studied, 73% had between 6 and 14 different adverse health effects including skin, eye, and sensory organ damage, respiratory distress, gastrointestinal and liver disease, brain and nervous system problems, cancers, and negative reproductive effects (Law and Finkel 2011:785). Researchers that conducted the study believe that air and water pollution from the fracturing process are contributing to these health problems.

Fracking has emerged as a controversial issue in society. Citizens find themselves concerned about potential health effects from the process of fracking. Many citizens in New York fought extremely hard to ban fracking for a number of reasons, with an important one being the potential harms to human health. The New York Department of Health claimed that there is too much uncertainty regarding the health effects (Planet Save 2015). For this reason fracking is banned in the state until science can determine the health risks (Planet Save 2015). Citizens across the country claim that they experience a variety of health problems from fracking. They fight the natural gas industry who claims that the fracking process is safe and does not pose a threat to public health. Increased research from both advocates and opponents of fracking is being done and beginning to provide people with a more concrete understanding of fracking's public health effects.

Proximity to Fracking Wells and Health Problems

This research indicates that residents living in closer proximity to fracking sites are more likely to get sick. One group of researchers from the University of Pennsylvania focused their study on fracking sites in Pennsylvania. They found that increased hospitalization rates related to heart problems and neurological disorders can be linked to fracking. They believe that those living near fracking wells are at an increased risk of hospitalization. The researchers compared hospitalization rates between Bradford and Susquehanna County to Wayne County. Fracking is increasing in Bradford and Susquehanna but is prohibited in Wayne. Residents of Bradford and Susquehanna are 27% more likely to be hospitalized for heart problems than those living in Wayne, according to this study. The researchers are unable to explain exactly why this is occurring. They believe that the toxicants, noise and social stressors that individuals living near fracking sites are exposed to may contribute to increased hospitalization rates.

For a definite link between the two to be confirmed further research is required. (Acre 2015)



Figure 1: This figure shows the effect that the chemicals in fracking fluid can have on the human body. (<https://pbs.twimg.com/media/CBYyk9IW8AANv7.jpg>)

Another study by scientists from Yale University looked at higher rates of skin and respiratory problems in residents living near fracking sites. This study focused on Washington County, Pennsylvania. It found that those living within a kilometer of a fracking well were four times more likely to have symptoms compared to those living over two kilometers away. Respiratory symptoms included coughing, itchy eyes, and nosebleeds, and skin problems included rashes, itching, and burning. The study found an

association rather than causation. An association means that there is a relationship between two variables and causation means that a change in one variable directly results in a change in the other variable. To establish a direct link between the two, more in-depth studies are required. (Stannard 2014)

Reproductive Health Issues

Recent studies evaluated the relationship between fracking and reproductive health issues. Studies conducted in 2015 by researchers associated with the Endocrine Society suggested that prenatal exposure to chemicals used in fracking can have long-term reproductive health problems. These researchers found that 23 of 24 fracking chemicals can disrupt the natural signaling of estrogens, androgens and other hormones in humans. These hormones can be crucial for the healthy development of sex organs and fertility. Exposure to small concentrations of these chemicals can negatively impact normal brain and sexual development. This can lower the immune system’s ability to fight disease and exposure to hormone disruptors is linked with obesity, diseases and breast cancer. (Peeples 2015)

Health Effects on Children

Health Problems Linked to Fracking in Early Pa. Studies

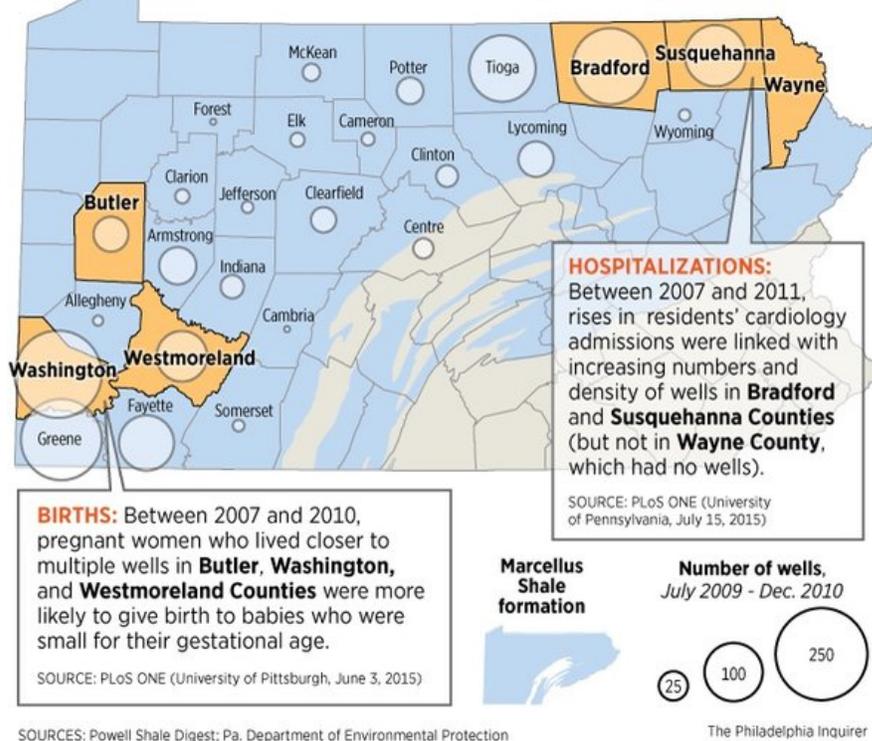


Figure 2: This figure shows fracking wells located in Butler, Washington, Westmoreland, Wayne, Susquehanna, and Bradford counties in Pennsylvania and approximately how many wells are in these specific locations. Washington and Bradford counties have approximately 250 wells, Susquehanna has about 100, Butler and Westmoreland have around 25, and Wayne has none. It also highlights specific counties referred to in the studies mentioned in this chapter. (http://www.philly.com/philly/health/20150116_Pa_studies_link_fracking_with_health_problems.html)

Fracking can have negative effects on the health of children. A recent study conducted in southwestern Pennsylvania by scientists at the University of Pittsburgh found a link between proximity to fracking wells and incidence of babies born small for their gestational age. Another study by researchers at the University of Pennsylvania in Butler, Washington, and Westmoreland County in Pennsylvania found that mothers who lived closest to fracking wells were 34% more likely to give birth to babies who were small for their gestational age. Later in life, there is a link between size for gestational age and other health issues. (Sapatkin 2015)

Women living in closer proximity to fracking wells are more likely to have premature babies and high-risk pregnancies. Women living near a large number of fracking wells were 40% more likely to give birth to premature babies than those living near low levels. And factors like high blood pressure or excessive weight gain, due from stress associated with proximity to fracking sites, made them 30% more likely to be classified as high-risk pregnancies. Researchers claim that both air pollution and stress from gas development are both valid, potential explanations but they still lack evidence to prove that. (Hurdle 2015)

Respiratory Problems in Texas

Kaden Bush is a seven-year old boy who lives in Denton, Texas. His mother and doctors believe that his respiratory problems are related to poor air quality related to fracking operations. Denton is located near the Barnett Shale where fracking occurs. There are more than 270 fracking wells within city limits (Free Denton). At the age of five he was diagnosed with respiratory syncytial virus, RSV. RSV is a respiratory virus that infects the lungs and respiratory tract (Centers for Disease Control and Prevention). Children who have this virus show symptoms of a common cold, including coughing, sneezing and a fever, and some can suffer from lung damage. (Heinkel-Wolfe 2015)

Kaden also has asthma, which is triggered by vehicular and industrial air pollution. Kaden's doctors report that his lung capacity is at about 85% and that this may be his new normal. His mother restricts the time he spends playing outside because of the poor air quality and its negative effects on his health. There is no evidence to support that Kaden's health problems are caused by the fracking wells in Denton. However, previous studies mentioned in this chapter evaluating the relationship between fracking and health effects make one wonder if there is a link between Kaden's respiratory problems and the nearby fracking wells. Kaden is an example of many children in northern Texas who are suffering from respiratory problems (Heinkel-Wolfe 2015).



Figure 3: This figure shows where the Barnett Shale is located and its proximity to Dallas, Texas. (<http://www.sustainablebusiness.com/index.cfm/go/news.display/id/25538>)

Asthma is a serious problem in Northern Texas, where fracking takes place. In addition to the 270 plus wells in Denton there are over 12,000 wells that have been fracked in Fort Worth, Texas (Earth Justice). In Northern Texas, children between the ages 6 and 9 are three times more likely to have asthma and asthma attacks send thousands of children to the hospital. In 2013, there were 5,157 asthma-related emergency visits at Children’s Medical Center Dallas. That year they had to hospitalize 1,631 children for their asthma symptoms. In some cases, asthma has resulted in death. Denton County had eight people die from asthma between 2011 and 2013. Many citizens, researchers and health officials believe that these increased incidences of asthma are related to air pollution from fracking operations (Heinkel-Wolfe 2015).

Problems with Studies

One issue that continuously arises when evaluating fracking and human health is the lack of strong, definitive evidence supporting a direct link. Current research has only been able to find an association between fracking and human health. Research concerning this subject is relatively new and many studies are emerging. It can also be difficult to study health effects because fracking is a relatively new industry and long-term health effects may take more years to evaluate and reach conclusions. This makes it difficult to say with certainty that fracking poses a threat to the health of citizens (Sharpe 2012).

Industry further complicates the issue. People living near fracking wells often take fracking companies to court over health problems that they believe are caused by fracking operations. If they win the case against the fracking company, they often sign a non-disclosure agreement, preventing them from speaking out about their health issues.

This keeps them out of the conversation, preventing them from sharing their story and speaking out about the issue. People living near fracking wells often live in less affluent areas, which leaves them with fewer resources to fight industry. Industry produces its own research to counter research supporting a fracking ban. This research claims that fracking is done in a safe way and does not harm public health (Sharpe 2012).

Compelling research regarding fracking and human health effects is beginning to emerge. With many citizens and researchers claiming that there is a link between the two, it is easy to understand why many individuals and groups support a ban on fracking. It is important when reading and evaluating research that people keep in mind who is supporting and funding this research. Many groups and organizations have ulterior motives: industry may fund research that supports fracking and environmental advocacy groups may fund research supporting a ban on fracking. With such a controversial, new issue there is a need for more unbiased research.

Interview

I interviewed Dr. Reynold A. Panettieri, Jr., who is a professor at the University of Pennsylvania. He directs the Airways Biology Initiative at the University of Pennsylvania. He worked with a team of researchers that looked at how hydraulic fracturing is associated with increased hospital utilization rates that was included earlier on in the chapter.

Question: What initially drew you to the topic of hydraulic fracturing and public health?

Answer: I was Deputy Director for the Center of Excellence of Environmental Toxicology, and we had an interest since we're Pennsylvanians in the consequences of fracking on healthcare. As deputy director managing the human studies, it was natural for me to get involved in the exposure question. Also there were numerous complaints by Pennsylvanians that the fracking was causing negative health effects.

Q: How did you hone in on increased hospitalization rates as an indicator?

A: Hospitalization rates are going to be clearly related to severity of illness; not everybody gets hospitalized with a medical problem. We figured in order to understand the severity of illness that hospitalizations would be a better indicator of severity of disease.

Q: What could be other reasons for these health problems besides fracking?

A: There is also air pollution as ascribed to the use of diesel engine trucking in and out. Also, stress could be an inducer of increasing severity of disease. Stress itself could trigger more hospitalization. Those were the things we contemplated apart from toxicant exposure in the water.

Q: Of the toxicants, noise, and social stressors that you and your colleagues think may be contributing to increased rates of hospitalization in hotspot areas, which do you think are the most significant and why?

A: We don't really know at this point. All we can say is that there is an increase in some reasons to be hospitalized but not all. All we have at this point are

hypotheses or best guesses as to cause. We think that it is likely a combination of all three that induces the health consequences. Our research is agnostic to the specific toxicants, meaning that we did not distinctively look into each toxicant. All we did was associate active well drinking with increased hospitalization. The precise cause of those remains to be proven.

Q: What type of research would you like to see done to confirm an association between fracking and public health issues?

A: We're doing tons of research to understand the exact diagnoses that causes hospitalization. We had in broad strokes cardiovascular illness, but we don't know exactly what within the cardiovascular group were the ones that led to people being hospitalized, so that's one aspect. I think as other parts of the country are exposed to fracking, specifically Texas and Denver, we would like to see confirmation of our findings be generalized to these other sites where there's huge increase in hydraulic fracturing. I think science needs to be repeated and in different populations to validate our findings.

Short Profiles

America's Natural Gas Alliance is a non-profit organization and consists of the leading independent natural gas exploration and production companies in North America. They are a pro-fracking group that works with industry, government, and stakeholders to grow the demand for natural gas. Their goal is to provide cleaner and more secure energy for the future. They believe that natural gas is a clean, reliable, and abundant energy resource.

They claim that as natural gas production is increasing, methane emissions are going down, with a 35% decrease since 2005. Reduced emissions, better control devices and state-of-the-art monitoring technology have both been used to help reduce methane emissions. This can have the effect of reducing health problems related to air pollution. To reach them you can email them at info@anga.us, call them at (201) 789-2642, or write to them at 701 8th Street NW, Suite 800, Washington, D.C. 20001.

The Delaware River Basin Commission includes the New York, New Jersey, Pennsylvania, and Delaware governors along with the Division Engineer, North Atlantic Division, and U.S. Army Corps of Engineers who serve as the federal representative. They are a regional body that oversees a joint approach to monitor the Delaware River Basin without acknowledging political borders. Each commissioner appoints an alternate commissioner, all whom have equal say. The meetings they hold are open to the public.

They have a variety of projects including, water quality, water supply and conservation, project review/permitting, flood loss reduction, natural gas drilling, etc. They have three major areas of concern with fracking: its effect on water supply, groundwater and surface water pollution, and treatment and disposal of "frac" water. They can be contacted by telephone at (609) 883-9500 or mail at Delaware River Basin Commission, 25 State Police Drive, P.O. Box 7360, West Trenton, NJ, 08628-0360.

The Center for Sustainable Shale Development is an independent nonprofit organization claiming that fracking is safe as long as the natural gas industry follows their performance standards. It provides a place for stakeholders to share their knowledge with the goal of developing solutions for any problems there may be with the fracking process. They have developed 15 different performance standards that can be divided into air and climate standards and surface and groundwater performance standards. These include reduced engine emissions, groundwater monitoring, wastewater disposal, and emissions controls on storage tanks.

They are partnered with environmental organizations, philanthropic foundations, and other stakeholders. Since they are a pro-fracking group, others accuse them of greenwashing and question the effectiveness of their recommendations. Still, they represent a potentially helpful group in managing and regulating the fracking process. They can be contacted by mail at 625 Liberty Avenue, Suite 395, Pittsburgh, PA, 15222 or by phone at (412) 804-4170.

The Pennsylvania Environmental Council, a nonprofit organization, plays a role in the state regulation of the shale gas industry. They recognize the economic benefits of natural gas while acknowledging the negative effects it can have on the environment. They believe in proactive oversight, pushing for mandatory setbacks, greater planning, public disclosure, groundwater protections, controls for waste and wastewater, public health research, stronger bonding and fines, and greater enforcement.

This group offers an unbiased perspective of fracking, recognizing both the pros and cons associated with the process. This is crucial in moving forward, as the fracking controversy is not black and white. They appear to want to push for fracking to be done in a safe and manageable manner. You can contact their southeast region by phone at (215) 545-4570 or by mail at 1315 Walnut Street, Suite 532, Philadelphia, Pennsylvania, 19107.

The New York State Department of Health played an instrumental role in passing the NY ban on fracking. They conducted a study on the health effects of fracking in New York, which contributed to Governor Cuomo's decision to ban fracking in the state. Cuomo took the emotions involved with the decision out of the equation and listened to the information provided by experts. Experts agreed that the health and environmental effects were too great to proceed with the fracking process in NY. (Gerken 2014)

NYS health officials also stated that there is too much uncertainty and the effects are too widespread to allow for fracking to occur. Governor Cuomo agreed that the risks were too high and NY became the first state to ban fracking, causing debate surrounding the issue in other states. The Department of Health can be contacted by phone at (866) 881-2809, by email at dohweb@health.ny.gov, or by mail at New York State Department of Health, Corning Tower, Empire State Plaza, Albany, NY, 12237. (Kaplan 2014)

Go-To Websites

One website is especially good because of its use of visuals. This website is an anti-fracking website called dangers of fracking, <http://www.dangersoffracking.com>. As you scroll down the page it visually takes you through the process of fracking. It begins with an explanation of what fracking is and takes you through the whole process, offering important facts and information. This site provides a relatively basic overview of the process and its health effects but is useful in educating those who may have difficulty understanding the issue. It provides links to local officials and local organizations to join or support the anti-fracking movement, encouraging mobilization of citizens. There are a total of 3 links in addition to links to their Facebook and twitter pages.

Frack Action is a great website for the anti-fracking movement, <http://www.frackaction.com>. It is an easy to use website offering a variety of resources including research, news articles, blogs, videos, and factsheets. One page on the website is devoted to the health effects of fracking on the population, discussing the issues using easy to understand language. At the end, it includes 10 links to more research for advanced readers looking for more information on the issue and links to its Facebook and twitter pages.

The Marcellus Shale Coalition offers plenty of information on fracking, <http://marcelluscoalition.org/marcellus-shale/production-processes/water/>. It offers another perspective from those who support fracking. There are sections devoted to water and how industry prevents groundwater pollution. The frequently asked question section is helpful in answering common concerns citizens have surrounding fracking. It is easy to navigate but there is a lot of information to dig through. It provides countless news articles totaling up to 38 pages worth of news article and 24 links to other resources.

The fracking section on Food and Water Watch's website is useful, <https://www.foodandwaterwatch.org/problems/fracking>. They provide reports, links, and videos concerning the issue. It is easy to use but you can get lost in all of the information it provides on various subjects. They believe fracking to be a problem that threatens the environment and population. What I find most compelling is they link fracking to other issues going on, making it more relatable. They offer a link to their page on broken democracy explaining how corporation are controlling the public debate over fracking and other major issues in America. The site also provides information concerning experts in the field and their contact information. Other links include links to their Facebook and twitter pages and a policy and research library that provides 324 pages of links to articles.

Another good website is the Groundwater Protection Council's website on fracking, <http://fracfocus.org>. It is also regulated by the Interstate Oil and Gas Compact Commission. You can search for information about the chemicals used in fracking and put this information into perspective through their educational materials. It goes through how the fracturing process works, groundwater protection, chemical use, state regulations, and you can find a well by state. The missions of both the organizations that run it are conservation and environmental protection. The information here is intended to be unbiased and revolves around facts, which is extremely useful in learning more about

the topic of fracking and its health effects. Their website is easy to use and provides 20 links to other resources and research.

Energy Action Coalition's website, <http://www.wearepowershift.org/about>, provides useful information concerning fracking and how to get involved. They are an anti-fracking, grassroots driven online community. Their goal is to strengthen the youth climate movement. They provide blogs on fracking and offer a forum for people to share resources, exchange stories, and form relationships. This easy to navigate website provides links to their Facebook and twitter page and the Energy Action Coalition's main website. It lists their 18 partners with links to their websites and provides links to numerous media hits.

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