

# PENNSYLVANIA'S SHALE GAS BOOM:

## How Policy Decisions Failed to Protect Public Health and What We Can Do to Correct It



**ENVIRONMENTAL  
HEALTH PROJECT**  
DEFENDING PUBLIC HEALTH 2012-2022

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## CREDITS & ACKNOWLEDGEMENTS

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Sources are cited in the main body of the white paper. For access to an electronic copy of the full paper, scan this QR code or visit:

<https://www.environmentalhealthproject.org/white-paper>



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# EXECUTIVE SUMMARY

## PURPOSE OF THIS PAPER

Any new technology brings with it an aura of excitement and possibility, fueled by innovation. Unfortunately, in some cases, that excitement can overshadow valid questions and concerns about public health and safety, to the detriment of many. This paper recounts the events that set the stage for the shale gas boom in Pennsylvania, with a particular focus on the actions (and, in many cases, inactions) of governmental bodies that negatively impacted public health across the Commonwealth. While this account is not exhaustive by any means, it does illustrate trends across three policymaking bodies of state government, specifically the General Assembly, the Office of the Governor, and the Pennsylvania Department of Health (DOH).

The various sections of this paper will illustrate how the stage was set for Pennsylvania’s fracking boom and the resulting public health crisis. Actions taken by various governmental bodies demonstrate how the promise of economic benefits outweighed any sense of caution about potential health impacts from shale gas development, how the insistence on irrefutable evidence of health harms became the enemy of reasonable protective measures, and consequently how the burden of proof fell to the communities experiencing the health impacts. The paper closes with a view of what can be done differently to ensure that public health considerations are included in the decision-making process.

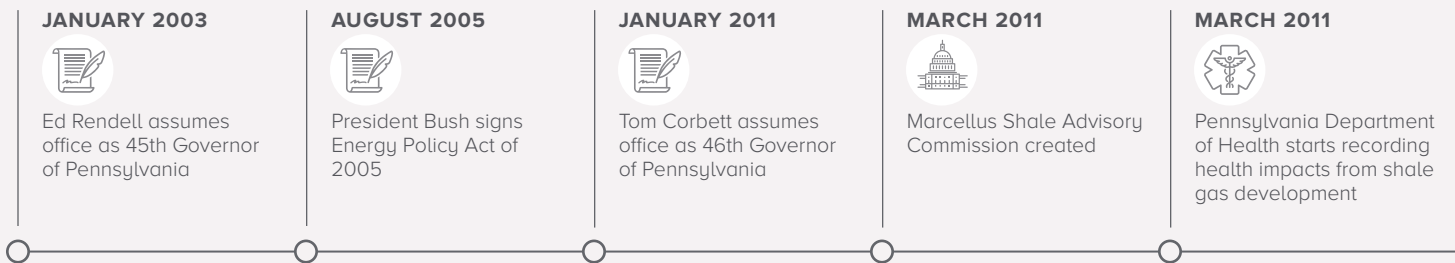
## What “Shale Gas Development” Is

Shale gas development (also known as “unconventional gas development,” “hydraulic fracturing,” or “fracking”) is a method of removing and processing fossil gas from shale formations. This relatively new technology introduces horizontal drilling to the process and features high-pressure water mixed with chemicals and fine sand to fracture the rock and unlock previously inaccessible gas (largely methane). Shale gas development comprises other operational stages, including flaring gases, eliminating wastewater,

## NARRATIVE AND RESEARCH TIMELINE

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transporting gas through pipelines dotted with compressor stations, and separating out usable components at processing plants.

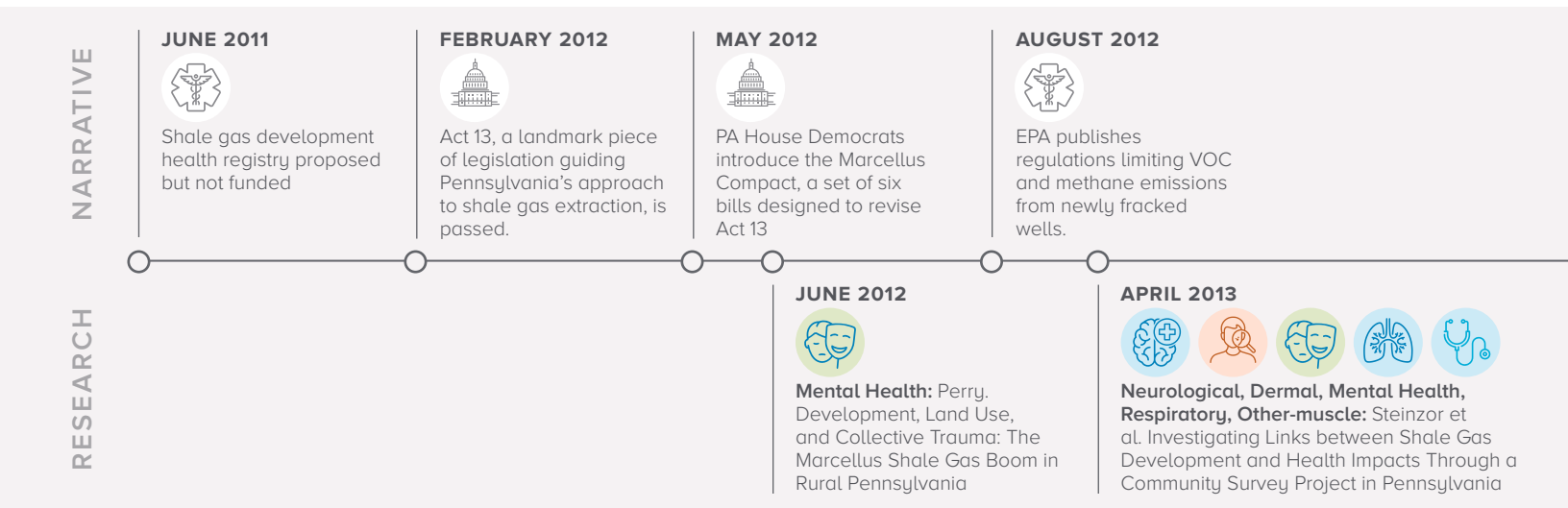
The Marcellus and Utica shale formations in Pennsylvania held the promise of vast economic impacts in the form of jobs and extraction revenue. State politicians, wanting to attract gas companies to the state, made conditions very favorable for operators, from enacting low drilling fees to protecting proprietary formulas in the fracking fluid.

This friendly environment for industry led to a quick escalation of shale gas operations across the state, with more than 13,000 unconventional wells drilled as of the writing of this paper. The ramp-up continued despite a growing body of research that pointed to a higher risk of adverse health outcomes for people living in proximity to shale gas infrastructure, including cardiac, respiratory, reproductive, and neurological disorders, as well as cancer. Research has continued during the years of the shale boom, much of it focused on Pennsylvania-based data because of the prevalence of shale gas wells in the state and the frequency of related symptoms in residents of shale gas communities. Confronted with this same body of evidence, other states and countries have placed an indefinite moratorium on shale gas drilling.

Peer-reviewed studies indicate a range of adverse health impacts that increase with proximity to shale gas facilities. The studied impacts include:

- Asthma and upper and lower respiratory complaints
- Hospitalizations for heart failure and mortality from heart attacks
- Low birth weights, intellectual and developmental disabilities, and infant mortality
- Congenital heart defects and neural tube defects
- Headaches, fatigue, and skin rashes
- Stress, anxiety, depression, and other mental health symptoms

Vulnerable populations—children, the elderly, pregnant individuals, those with chronic health conditions—are likely to experience increased symptoms.





### Why Public Health Matters

The role of public health as a field is to promote and protect the health of individuals and communities, focusing first on prevention or mitigation over treatment. Public health agencies have seen wins over the years in areas like sanitation, nutrition, and the spread of disease. Likewise, when the adoption of new technologies raises the question of health impacts, it is incumbent upon public health institutions to gather information and mount a response based on the best information available at the time, modifying the approach as more information becomes available. This paper will demonstrate that, while the structures were in place for state agencies—such as the DOH—to respond effectively to other public health crises in the past, they did not, or could not, do so in the face of rising concerns about shale gas development.

The lack of such a comprehensive response on the part of the state led to the creation of the Environmental Health Project (EHP) in 2012. In the decade our team has examined this issue, we have consistently documented concerning symptoms in residents that may be explained by exposure to the various chemicals used and released in the shale gas process. Evidence now exists that the risk of exposures through air, water, and soil is higher as a result of both standard shale gas operations and accidental releases. Years of compiling findings from academic studies, data from individual residents and community science projects, and input from experts and advocacy groups alike have informed EHP’s data-based approach in advocating for public health protections.

EHP’s efforts in the face of the shale gas boom represent only part of a vast, complex issue. Swift, protective action is the role of public health agencies in a public health crisis, but it is also the role of elected officials to act in the interest of their constituents. Communities hosting shale gas infrastructure often experience conflicting priorities, largely stemming from the promise of economic benefit weighed against the threat of health harms. The state legislature and governor’s office have the power to support health protections for Pennsylvanians by supporting regulatory, investigative, and enforcement actions on the part of government agencies designed with that purpose.

**JUNE 2013**



**Mental Health:** Ferrar et al. Assessment and longitudinal analysis of health impacts and stressors perceived to result from unconventional shale gas development in the Marcellus Shale region

**DECEMBER 2013**



**Cancer, Cardiology, Respiratory:** Villeneuve et al. A cohort study of intra-urban variations in volatile organic compounds and mortality, Toronto, Canada

**FEBRUARY 2013**



**Mental Health, Mortality:** Adgate et al. Potential Public Health Hazards, Exposures and Health Effects from Unconventional Natural Gas Development

**APRIL 2014**



**Maternal & Child Health:** McKenzie et al. Birth outcomes and maternal residential proximity to natural gas development in rural Colorado

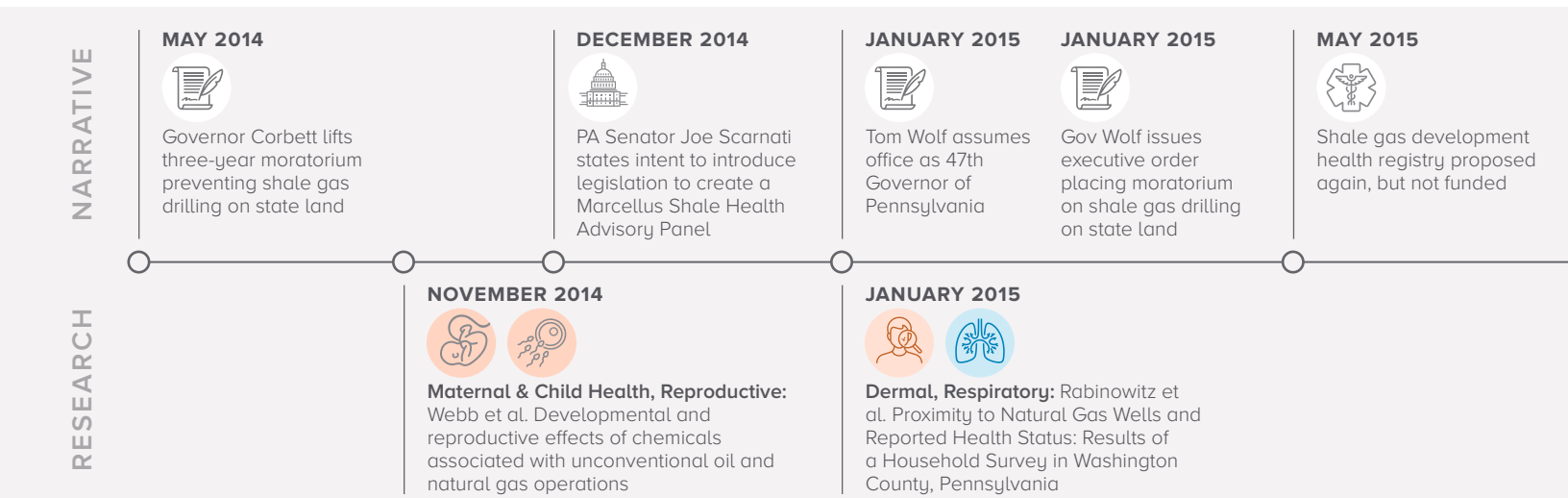
These governing bodies can also demand greater transparency from shale gas operators and can ensure more robust support mechanisms for communities that have traditionally been host to extractive industries. As this paper demonstrates, Pennsylvania’s state government failed to take these protective actions.

**INSIGHTS FROM EHP’S RESEARCH**

While the research compiled for this paper is not exhaustive, the events and decisions examined in greater depth later are representative of broader trends within the Pennsylvania government. There are, no doubt, individuals throughout the General Assembly, the Governor’s Office, and the Department of Health who are committed to serving the interests of their constituents. Similarly, there are some government actions that were no doubt undertaken with good intentions. Nonetheless, as this decade-plus survey of state-level decision-making shows, government officials demonstrated a lack of awareness of the available science, paid far more attention to accommodating the industry than to considering public health, and overestimated the protective nature of regulations. Major trends we identified are as follows:

**1** *A chasm exists between the reliable public health research that has been conducted and the policies or initiatives that Pennsylvania’s leading public health agency and other government policymakers have promoted. Public health actions are meant to be based on strong evidence, not irrefutable evidence. Yet, policymakers have consistently justified inaction by citing a lack of sufficient knowledge about health impacts.*

Epidemiological studies are at the core of public health research. They are based on observable trends in a given population and examine how those trends correlate with external factors, such as the presence of shale gas infrastructure. Epidemiological studies cannot establish a cause-and-effect relationship between two variables because, when dealing with humans, it is not possible to control all potential external variables (socioeconomic status, education, etc.), nor is it possible—or ethical—to





assign individuals to receive exposures or not receive them. Risks associated with large-scale environmental exposures can only be assessed by observing disease distribution across different times, populations, or exposure scenarios. Epidemiological studies can provide sound, actionable conclusions in their own right and must not be rejected out of hand, especially when multiple studies converge on the same findings.

An extensive and growing number of peer-reviewed studies demonstrate a statistically significant increase of health harms to people living or working in proximity to shale gas development. This research, occurring over the years of the shale gas boom, is characterized by the timeline that continues along the bottom of these pages.

Despite the volume of studies demonstrating a relationship between the presence of shale gas infrastructure and adverse health outcomes—respiratory, cardiovascular, neurological, child development, and mental health issues, as well as increased cancer risk—Pennsylvania’s public health policies have not caught up. Time and again in our review of decisions made at the state level, government officials used the lack of perfect knowledge on the subject as an excuse for delayed action. In other words, government officials have regularly called for irrefutable evidence of harm before taking decisive steps, indicating that the subject warrants further study and effectively pushing off any policy response indefinitely.

The standard public health approach, however, does not require perfect knowledge before action is warranted. Public health protections require a swift response based on reliable (not complete) information, with the understanding that protective actions will be modified as more information becomes available. A good example of this approach is what would happen in the case of a suspected disease outbreak in a restaurant: the restaurant would be shut down while the situation could be investigated further. The issue that emerges in this paper is that government officials regularly used the lack of irrefutable evidence of health harms as an argument to say that shale gas development posed no risk at all. We now know that lead and tobacco are hazardous to human health, but for years these substances were treated with a presumption of

**JUNE 2015**



**Maternal & Child Health:**  
Stacy et al. Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest Pennsylvania

**JULY 2015**



**Dermal, Neurological, Cancer, Cardiology, Reproductive:**  
Jemielita et al. Unconventional Gas and Oil Drilling Is Associated with Increased Hospital Utilization Rates

**JANUARY 2016**



Agency for Toxic Substances and Disease Registry releases Brighich report

**JANUARY 2016**



**Mortality, Cardiology:** Harrison et al. Sudden Deaths Among Oil and Gas Extraction Workers Resulting from Oxygen Deficiency and Inhalation of Hydrocarbon Gases and Vapors - United States, January 2010 - March 2015

safety that allowed industries to continue selling products without regard to health impacts. The shale gas industry currently operates under a similar presumption.

**2** *Regulations provide a degree of safety, but there is a common misconception that they are data-based, health-protective standards; they are not. The widespread presumption of safety means that the burden of proof that emissions are causing harm often falls to the affected individuals and communities.*

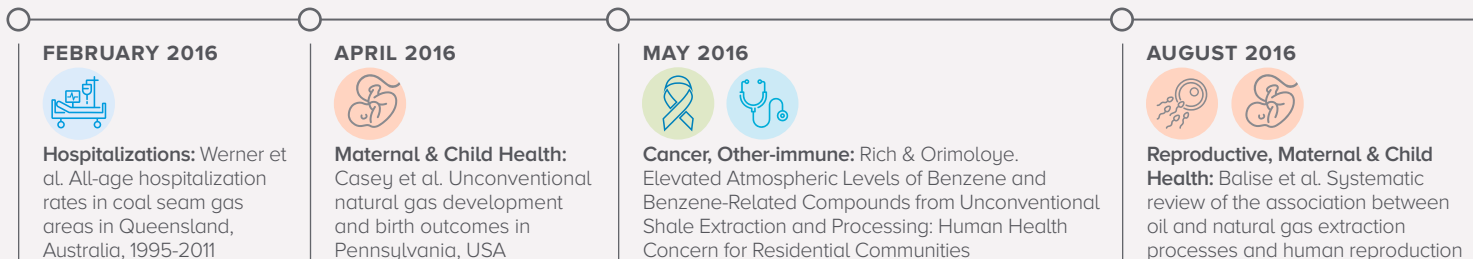
The skeptical call for irrefutable proof has been detrimental to efforts of those trying to raise awareness of safety concerns about industry operations, as though lack of such evidence implies lack of harm. This unfounded argument is compounded by a common misconception that regulations governing the shale gas industry represent safety levels of exposure and that, as long as shale gas operators adhere to regulations, their operations pose no risk. While the presence and enforcement of existing regulations do help to protect the health of those who may be exposed to emissions, regulations do not represent a threshold of safety regarding the various compounds with which humans may interact. These levels are instead based on something called “acceptable risk.”

Regulations frequently incorporate the concept of acceptable risk into the final decision-making process. Acceptable risk recognizes that the regulated activities are not completely safe but balances that recognition with an understanding that the known risks are small or unlikely. In the case of shale gas development, Pennsylvania’s regulations do assume a level of acceptable risk. It is clear, however, that in deciding what level of risk the state was willing to accept, the industry understated the risks and government officials failed to investigate unknown risks, of which there are many whenever a new technology is introduced.

When public health policies are ineffective at preventing public health harms, those feeling the effects often turn to their elected officials to take action. It is rare that a

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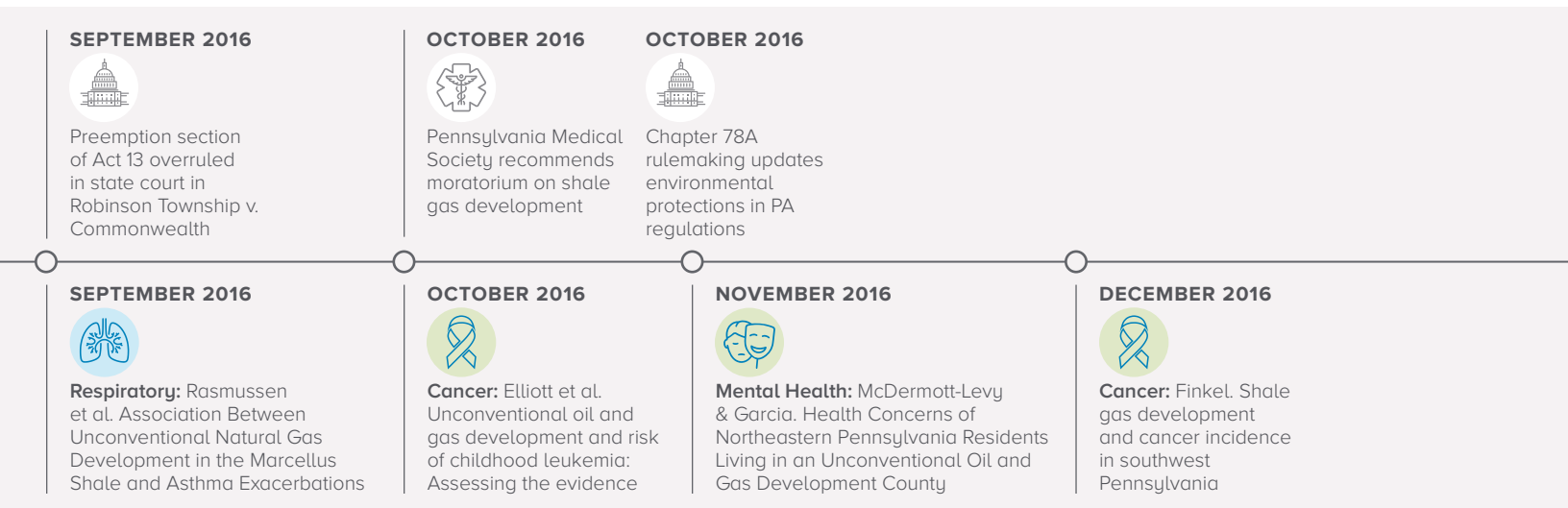
community has the clout to push back effectively against a well-financed industry or corporation. Successful advocacy requires time, education, and money, and many residents of communities that have historically been host to extractive industries are lacking in one or more of those resources. This situation represents an equity issue: the burden of proof often falls to individuals or communities being impacted, and they are commonly the least equipped to advocate for themselves.

**3** *With respect to shale gas development in Pennsylvania, the promise of economic benefits overshadowed the caution over health impacts. In an attempt to attract more economic benefits, policies were created to be exceptionally accommodating to the industry.*

In addition to government bodies not effectively enforcing regulations, the policies governing these regulations were largely ineffective in the first place. Based on comments and actions by elected officials in the early years of the shale boom, it is clear that the state hoped to attract shale gas corporations through the promise of wide latitude to operate. Examples of these benefits included the institution of a small impact fee, rather than a healthy severance tax, and intellectual property protections that enabled companies to keep confidential any information about chemical compounds they deemed to be a trade secret.

Leaders in government failed to take health concerns into account in any significant way when constructing the policies that would govern the actions of shale gas operators in Pennsylvania. Lawmakers committed insufficient dollars to support investigations of resident complaints or enforcement of regulations. Further, the move to allow the industry to keep proprietary compounds confidential has hampered the efforts of health care providers to respond to patients' needs and of researchers to know what chemicals to study.

Economic research in recent years has examined counties across the state that have hosted shale gas development. Overall, the resulting economic benefit has been small,



with few local jobs created and much of the work going to out-of-state laborers who move with the industry. Meanwhile, a significant amount of the health research on the subject is based in Pennsylvania, as there are so many communities in proximity to shale gas development experiencing adverse health impacts. Some of the specific actions of the various government bodies that contributed to the current situation are described in more detail in the next section.

**GOVERNMENT ACTIONS (OR LACK THEREOF)**

The federal Energy Policy Act of 2005 opened the door for swift shale gas investment in states that could capitalize on it, such as Pennsylvania. This act offered federal subsidies, tax benefits, and regulatory preferences for many energy sources, with particular emphasis on the oil and gas sectors, and it effectively removed the Environmental Protection Agency (EPA) from meaningful rulemaking over shale gas development and related operations. Further, the Energy Policy Act of 2005 excluded fracking wastewater from the “hazardous” waste category, regardless of its harmful components, allowing for the disposal of hazardous wastewater in regular sanitary landfills. From this point forward, states were given wide latitude in determining their own approaches to managing this new technology. Pennsylvania’s approach indicated a preference for supporting industry growth over evaluating and responding to mounting concerns over health impacts.






The Pennsylvania General Assembly, the Governor’s Office, and the Department of Health (DOH) all failed to respond meaningfully to this health crisis in the making. The failings of the Pennsylvania Department of Environmental Protection (DEP), which contributed significantly to this public health crisis, were well-documented in the findings of the Pennsylvania Grand Jury report investigating the state’s oversight of shale gas development. For that reason, this paper does not address the DEP in depth.

**General Assembly**

Legislators are elected to represent the interests of their constituents. Many members of Pennsylvania’s General Assembly serve on behalf of districts that host shale gas

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			<p><b>MARCH 2017</b></p>  <p>Pennsylvania Department of Health creates shale gas health registry</p>
<p><b>JANUARY 2017</b></p>  <p><b>Respiratory, Maternal &amp; Child Health:</b> Stacy. A Review of the Human Health Impacts of Unconventional Natural Gas Development</p>	<p><b>FEBRUARY 2017</b></p>  <p><b>Neurological, Respiratory:</b> Tustin et al. Associations between Unconventional Natural Gas Development and Nasal and Sinus, Migraine Headache, and Fatigue Symptoms in Pennsylvania</p>	<p><b>FEBRUARY 2017</b></p>  <p><b>Cancer:</b> McKenzie et al. Childhood hematologic cancer and residential proximity to oil and gas development</p>	<p><b>MARCH 2017</b></p>  <p><b>Mental Health:</b> Maguire &amp; Winters. Energy Boom and Gloom? Local Effects of Oil and Natural Gas Drilling on Subjective Well-Being</p>

infrastructure and therefore should especially understand the complexity of this issue. However, the General Assembly’s actions (and inactions) have typically favored the shale gas industry over public health protections. Most notably, the General Assembly demonstrated support for industry-friendly legislation, failed to provide sufficient funding for health-protective research and initiatives, and exhibited a preference for symbolic, over meaningful, action.

**Act 13**, Pennsylvania’s landmark oil and gas law enacted in 2012, was the cornerstone of shale gas policy in the state. It generated a relatively small amount of revenue for the state through an impact fee rather than a severance tax, and we could find no evidence that any of this revenue was allocated to support the DOH in evaluating residents’ complaints or concerns about local shale gas infrastructure. Act 13 also allowed the state to preempt local ordinances and overrule limitations local municipalities placed on shale gas activities. Finally, it permitted companies to designate certain chemicals used in their operations a “trade secret,” preventing public disclosure of compounds that would help healthcare providers better treat their patients and researchers better examine impacts on human health. Pennsylvania’s courts eventually declared some aspects of this legislation to be unconstitutional, but the foundation of Act 13 remains.

**Budget authority** in the General Assembly determines the resources—and therefore the bandwidth—of agencies tasked with protecting public health. Over the years examined in this paper, the General Assembly consistently underfunded efforts that could have shed light on public health risk. As early as 2011, Tom Corbett’s Marcellus Shale Advisory Commission recommended \$2 million to fund a health registry for monitoring public health in drilling areas. The General Assembly continually refused to fund such an effort until 2017, when the DOH received a fraction of the money necessary to create an effective registry. Agencies tasked with protecting public health and the environment, such as the DOH and the DEP, have pointed to the lack of adequate resources to evaluate complaints residents have logged and, in the case of the DEP, exercise enforcement powers over regulatory violations.

APRIL 2017



**Maternal & Child Health, Mortality:** Busby & Mangano. There’s a World Going on Underground—Infant Mortality and Fracking in Pennsylvania

APRIL 2017



**Mental Health:** Boyle et al. A pilot study to assess residential noise exposure near natural gas compressor stations

JULY 2017



**Maternal & Child Health, Mortality:** Whitworth et al. Maternal residential proximity to unconventional gas development and perinatal outcomes among a diverse urban population in Texas

JULY 2017



**Mental Health:** Davidson. Evaluating the effects of living with contamination from the lens of trauma: a case study of fracking development in Alberta, Canada

**Political theater** is made up of largely symbolic action that results in little impact and is sometimes used as a stalling tactic. At face value, investigative initiatives like advisory bodies seem like positive steps, but even when created with good intentions, they are not always set up for success or action. The Marcellus Shale Advisory Commission, formed in 2011, was considered by many to be political theater: the 30-person panel contained no public health agency representatives and was imbalanced in favor of shale gas industry supporters. Even though the commission did make some reasonable health recommendations, the General Assembly did not enact any significant health-protective steps.

The General Assembly had the opportunity to take a number of positive actions to ensure public health was protected from the harms posed by shale gas development. The General Assembly could have:

- Permitted all municipalities the power to enact ordinances and zoning that protect public health and allowed them to decide whether or not to host shale gas development at all.
- Required industry transparency of chemical information so doctors and patients could have had productive conversations about exposure, risk, and health outcomes.
- Allocated sufficient funding and clear directives to state agencies tasked with protecting public health.
- Discontinued the creation of unproductive committees or commissions used primarily as a stalling tactic and instead acted immediately on the available science.

**Governor’s Office**

All three governors who held office during Pennsylvania’s shale boom have demonstrated strong commitments to the shale gas industry, hailing it as an economic opportunity for the state. Governors have unique power in setting priorities for executive agencies, which have significant regulatory or programmatic impacts. Even if their party does not hold power in the legislature, they can still work to steer policy conversations

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SEPTEMBER 2017



Pennsylvania Department of Health conducts Elk Lake assessment

RESEARCH

SEPTEMBER 2017



**Neurological, Respiratory, Mental Health, Other-gastrointestinal:** Weinberger et al. Health symptoms in residents living near shale gas activity: A retrospective record review from the Environmental Health Project

OCTOBER 2017



**Neurological, Maternal & Child Health:** Webb et al. Neurodevelopmental and neurological effects of chemicals associated with unconventional oil and natural gas operations and their potential effects on infants and children

NOVEMBER 2017



**Reproductive:** Komarek & Cseh. Fracking and public health: Evidence from gonorrhea incidence in the Marcellus Shale region



and impact public opinion. Pennsylvania’s governors had the chance to support a moderated approach to shale gas development and largely chose not to.

**Ed Rendell** ushered in the beginning of the shale boom when the first unconventional well was drilled in Washington County in 2004, followed by the first surge of drilling in 2008. It was during his time in office that industry watchdogs identified instances of well water contamination, toxic chemical spills, air pollution, and explosions, for which industry operators were responsible. Governor Rendell and the DEP did issue a fine to at least one operator in regulatory violation, barred it from drilling in the affected county, and demanded that it provide clean water to the impacted residents, but penalties for violations have been arguably light across the board.

**Tom Corbett** campaigned on aggressive pursuit of shale gas development and fulfilled that promise during his time in office (2011 to 2015). He worked to minimize governmental interference in the industry and adamantly opposed severance taxation, despite its use in every other shale gas-producing state. He established the 30-member Marcellus Shale Advisory Commission, which was heavy on representatives from industry (11 members) and devoid of medical or public health professionals or researchers. Ultimately the commission developed some proactive, health-protective recommendations, but the large majority of them were not executed. Also, during his time in office, Governor Corbett signed into law industry-friendly Act 13 of 2012 and lifted Governor Rendell’s three-year moratorium for unconventional drilling on state land.

**Tom Wolf** entered office with a stated optimism that shale gas development could be done safely and provide revenue to support social programs. He opposed a statewide ban but did support a moratorium on shale gas drilling in the Delaware River Basin and on new gas leasing in state parks and forests. He also supported the public health registry, which had yet to find sufficient funding, and authorized funding for two health studies in communities in Southwestern Pennsylvania concerned with health impacts from shale gas development and a rise of rare cancers. Despite these promising steps,

DECEMBER 2017



**Maternal & Child Health:** Currie et al. Hydraulic fracturing and infant health: New evidence from Pennsylvania

DECEMBER 2017



**Mental Health, Neurological, Respiratory, Dermal:** Fisher et al. Psychosocial implications of unconventional natural gas development: Quality of life in Ohio’s Guernsey and Noble Counties

JANUARY 2018



**Maternal & Child Health:** Caron-Beaudoin et al. Gestational exposure to volatile organic compounds (VOCs) in Northeastern British Columbia, Canada: A pilot study

FEBRUARY 2018



**Mental Health:** Hirsh et al. Psychosocial Impact of Fracking: A Review of the Literature on the Mental Health Consequences of Hydraulic Fracturing

Governor Wolf’s actions were still insufficient to make public health central to the conversation. The severance tax has not become a reality, the health registry is too underfunded to be effective, and there are already concerns that the approach and focus of the health studies may be insufficient to provide any new information.

The shale gas development narrative could have played out differently if Pennsylvania’s governors had taken more decisive steps toward protecting public health. Governors could have:

- Taken more direct action in demanding health protections for Pennsylvania residents, relying on the constitutional guarantee of clean air and pure water.
- Worked with the General Assembly to pass legislation that would have halted or slowed the growth of shale gas development until health impacts were more fully researched.
- Directed the agencies they oversee to include health protections in policies regulating the industry.
- Successfully lobbied for more funding from the General Assembly to support the specific shale gas-related work of these agencies.
- Used their bully pulpits to advocate for health-protective legislation and to inform the public about associated health risks.

### Department of Health

Pennsylvania’s chief public health agency bears much of the responsibility for protecting frontline residents and, consequently, much of the public’s ire when it fails to do so. While the other governmental bodies examined here must weigh various concerns that impact their constituents, such as economic and environmental factors, the DOH’s concern is solitary: public health. Nevertheless, it is also important to highlight the limitations of the DOH’s own ability to act, much of which has been determined by the General Assembly and Governor’s Office during the time period in question.

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RESEARCH

**MARCH 2018**



**Endocrine:** Bolden et al. Exploring the endocrine activity of air pollutants associated with unconventional oil and gas extraction

**MARCH 2018**



**Respiratory, Maternal & Child Health, Neurological:** McKenzie et al. Ambient Nonmethane Hydrocarbon Levels Along Colorado’s Northern Front Range: Acute and Chronic Health Risks

**MARCH 2018**



**Hospitalizations, Respiratory:** Peng et al. The health implications of unconventional natural gas development in Pennsylvania

**MARCH 2018**



**Reproductive:** Deziel et al. Shale gas activity and increased rates of sexually transmitted infections in Ohio, 2000-2016

**The DOH's role** and authority are fairly limited in the state of Pennsylvania. The DOH secretary is appointed by the governor, and the agency takes the governor's lead in setting its agenda. The DOH does not have regulatory authority or enforcement capacity related to oil and gas but, rather, serves in an advisory capacity. Like most state health departments, the DOH can provide public health information and guidance, conduct health surveillance, and evaluate public health outbreaks or threats. The DOH does operate a division of epidemiology where residents can report their environmental health concerns, and DOH can provide guidance to those residents. While largely absent in the past, there now appears to be a nascent effort to communicate more directly and frequently with the DEP regarding complaints and health concerns around shale gas development.

**The DOH's shale gas health registry** has been problematic. It was not funded until 2017, and the funding the DOH received for it was not sufficient to build a robust tool or market it effectively. The DOH has taken the complaints logged from 2011 up to the creation of the registry and combined those records with the data gathered through the registry. Taken together, this data shows that residents are experiencing a range of respiratory, neurological, dermatological, gastro-intestinal, and psychological impacts, not to mention other issues. However, the total number of records still represents a relatively small number of concerned residents. Anecdotal evidence from EHP's work with frontline communities indicates that residents lack awareness that the registry exists, that those who try to use it have difficulties with finding or accessing it, and that impacted individuals exhibit a widespread reluctance to reach out at all based on a common perception that the DOH does not care or will not act.

**The DOH's response to concerned residents** was insufficient, according to reports in some media outlets as well as information gathered in the 2020 Grand Jury's investigation into the state's oversight of shale gas development. Particularly of note were assertions that the DOH had mishandled conversations with residents specific to shale gas development and had purposely limited staff knowledge of the issue. While the DOH has occasionally collaborated with the U.S. Agency of Toxic Substances

**MARCH 2018**



**Maternal & Child Health:** Whitworth et al. Drilling and Production Activity Related to Unconventional Gas Development and Severity of Preterm Birth

**JUNE 2018**



**Respiratory, Hospitalizations:** Willis et al. Unconventional natural gas development and pediatric asthma hospitalizations in Pennsylvania

**JULY 2018**



Pennsylvania Department of Health performs public health evaluation on long-term air sampling

**JULY 2018**



**Mental Health:** Casey et al. Associations of unconventional natural gas development with depression symptoms and disordered sleep in Pennsylvania

**AUGUST 2018**



**Maternal & Child Health:** Hill. Shale Gas Development and Infant Health: Evidence from Pennsylvania

and Disease Registry (ATSDR) to investigate community level environmental health concerns, funding for these efforts is limited, and neither agency has any enforcement power when it comes to shale gas operations. Consequently, when the DOH and ATSDR do conduct community investigations and find clear health dangers, there is little they can do outside of making recommendations. More commonly, when the DOH calls for additional data collection in impacted communities as opposed to taking direct action, they are continuing to foster the flawed position that lack of incontrovertible evidence demonstrates lack of harm.

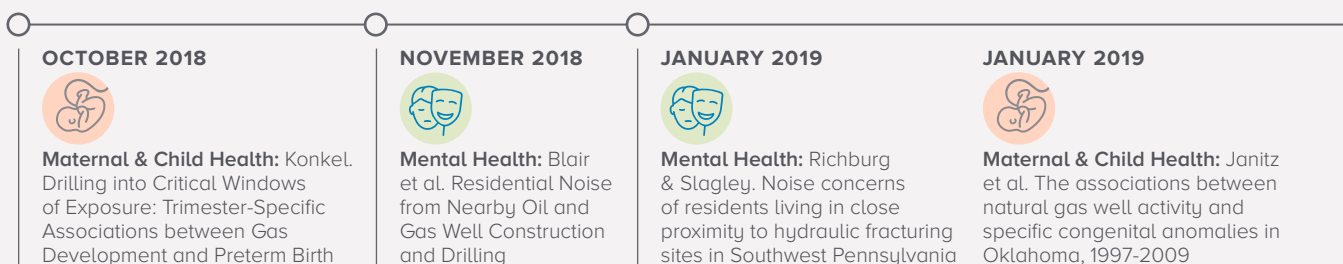
**Research and education** on factors that impact public health are areas where the DOH has an opportunity to shine, even in the absence of budgetary support. Under past DOH secretaries, the agency was reluctant to recognize and articulate to the public the risks posed by shale gas development. Most notably, in 2019, the state health departments of Pennsylvania and Colorado jointly released a literature review of existing epidemiological studies of populations living near shale gas development. In this paper, the joint departments of health called for research that showed direct causal links between shale gas emissions and health symptoms, referencing standards that are inconsistent with environmental health research and limiting the value of the preponderance of existing observational research. This stance, taken by DOH Secretary Dr. Rachel Levine under Governor Wolf’s administration, was counter to generally accepted public health principles. It set the stage for the DOH and other government officials to further deny health impacts or—at best—to fail to comment on the subject at all. Frontline communities and the health care providers that treat them still wait for the DOH to issue formal guidance on how to best protect residents’ health from shale gas exposures.

The DOH, with the right leadership and funding, could provide an invaluable service to the residents of Pennsylvania. Even without support from above, the DOH could have:

- Assumed a more important presence in the wider shale gas and health discussion, proactively seeking out information and advice from a broad spectrum of experts, researchers, community leaders, and others.

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- Provided communities with more guidance and information to help them protect themselves and their families from harmful shale gas emissions. If funding was an issue, the DOH could have distributed guidance and information developed by other agencies or non-governmental organizations (NGOs) who had studied the issue.
- Lobbied the governor or regulatory agencies for more caution in the face of existing research, promoting health-protective policies and raising a warning flag that shale gas development might not be as safe as the industry led the public to believe. It is unclear whether this ever happened behind closed doors.

**FRAMEWORK FOR A BETTER APPROACH**

Recognizing that past actions do not dictate future decisions, this paper concludes with a framework that can support a more health-protective approach for Pennsylvania. Applying *good governance* principles, which support individual human rights, EHP has identified the following opportunities to correct the chosen course of the past, one that has contributed to health harms for over a decade of the shale gas boom (and over generations of extractive industry operations) across the state.

Four key areas represent opportunities to close the gap between the status quo and a more health-protective approach to shale gas development:

**Equity:**

**Protect people in areas that bear the burden of all aspects of this extractive industry; create more meaningful approaches to ensuring equity**

It must be recognized that there is no strong evidence that demonstrates shale gas development can be conducted in a way that keeps people safe. However, for as long as shale gas extraction is going to continue in Pennsylvania, community groups and local or county governments must have a say in what happens in their own regions.

**FEBRUARY 2019**



**Mental Health, Respiratory, Cardiology, Maternal & Child Health, Cancer:** Gorski & Schwartz. Environmental Health Concerns from Unconventional Natural Gas Development

**MARCH 2019**



**Hospitalizations:** Denham et al. Unconventional natural gas development and hospitalizations: evidence from Pennsylvania, United States, 2003-2014

**MARCH 2019**



**Cardiology:** McKenzie et al. Relationships between indicators of cardiovascular disease and intensity of oil and natural gas activity in Northeastern Colorado

**MAY 2019**



**Maternal & Child Health:** Caron-Beaudoin et al. Urinary and hair concentrations of trace metals in pregnant women from Northeastern British Columbia, Canada: a pilot study

There must also be a meaningful mechanism to incorporate the feedback of frontline communities into the decision-making process.

Such a shift to a more equitable approach would require the government to balance, on the one hand, the benefits and costs of shale gas extraction for industry and landowners who benefit financially and, on the other, the costs for people who bear the burdens of health impacts, including the premature mortality for which industry-generated pollution is responsible. Further, because pollution does not follow political boundaries, a state-level approach with broad protections would be more effective and safeguard more people than steps enacted by individual counties or municipalities.

Because its first commitment is to its own residents, a responsive government is generally obligated to assume the side of a community over that of a well-resourced company. As it has played out in Pennsylvania, a municipality might restrict industry from developing shale gas sites in certain zones, but the industry operator can, and sometimes does, threaten to sue the municipality if any restrictive action is taken to limit extraction. Defending against that threat is nearly always beyond the municipality's financial capabilities, and so the municipality must usually acquiesce—that is, unless the state seeks remedies to equitably protect the health and welfare of the residents. At the very least, Pennsylvania state government must work to establish a more level playing field, one that recognizes historically disadvantaged communities.

**Transparency:**

**Allow individuals, community groups, and other organizations access to important health information that they can understand and act on; compel the industry to make public all chemicals it uses**

Over the past ten-plus years, government efforts to look at problems posed by shale gas development have not always been transparent. While it ought not be the responsibility of frontline residents to defend their own health, it is essential that they be given the tools to understand the exposures and potential health impacts they could be facing.

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**OCTOBER 2019**



Pennsylvania Department of Health holds community meeting to discuss cancer concerns

**AUGUST 2019**



**Maternal & Child Health:** Stacy et al. Maternal Obesity, Birth Size, and Risk of Childhood Cancer Development

**OCTOBER 2019**



**Maternal & Child Health, Mental Health:** Casey et al. Unconventional natural gas development and adverse birth outcomes in Pennsylvania: the potential mediating role of antenatal anxiety and depression

**OCTOBER 2019**



**Cancer:** Holder et al. Evaluating potential human health risks from modeled inhalation exposures to volatile organic compounds emitted from oil and gas operations

**OCTOBER 2019**



**Maternal & Child Health:** Apergis et al. Fracking and infant mortality: fresh evidence from Oklahoma



Regional air quality monitors now cast a loose net, often missing emission peaks from localized sources. If monitoring is conducted, it must be done with an eye toward understanding human exposures and their potential impact on health at the local and hyper-local levels. Monitoring data must then be shared with the public, and residents must be provided information to help them understand how emissions impact their health. Allowing impartial, third-party evaluators access to emissions and health data will provide a clearer picture of exactly what is happening in local air and watersheds.

The industry must be compelled to make public the complete range of chemicals used in shale gas operations. Drilling waste streams must be monitored and tested for toxic and carcinogenic substances, and communities must be informed when dangerous levels of contaminants enter the environment. Ultimately, industry can be compelled to manage a public warning system when excessive releases of contaminants occur, as has been adopted in at least one other state.

Transparency on the side of state government includes access to the political decision-making process, particularly as it relates to how public sector decisions are made and what the alternatives to those decisions are. Pennsylvanians need to understand what factors influenced the decisions that affect them at home, at work, and at school.

**Authority:**

**Provide funding for government agencies to do their jobs effectively; authorize them to take action through a strong mandate to protect public health**

Appropriate government officials, starting at the top, need to provide a clear mandate that government agencies are tasked with protecting the health of the environment and the people in it. When examining the existing body of knowledge on the subject, as well as the myriad complaints from Pennsylvania residents, it is clear that, to date, many members of the General Assembly, the Governor’s Office, and the DOH have failed to make a good faith effort to understand and address the health risks and resulting health impacts of shale gas development. The current approach is not

**NOVEMBER 2019**



Governor Wolf announces \$3 million shale gas development health study

**NOVEMBER 2019**



**Maternal & Child Health, Cardiology:** McKenzie et al. Congenital heart defects and intensity of oil and gas well site activities in early pregnancy

**MARCH 2020**



**Endocrine:** Nagel et al. Developmental exposure to a mixture of unconventional oil and gas chemicals: A review of experimental effects on adult health, behavior, and disease

**MARCH 2020**



**Mental Health:** Mayer et al. Understanding Self-Rated Health and Unconventional Oil and Gas Development in Three Colorado Communities

**APRIL 2020**



**Reproductive:** Johnson et al. A Multiregion Analysis of Shale Drilling Activity and Rates of Sexually Transmitted Infections in the United States

sufficient. The Pennsylvania government, at all levels, can use its authority to fulfill its commitment to public safety and wellbeing, setting more health-protective priorities for the future.

Government agencies, such as the DOH, could be far better equipped to fulfill their missions if they were allocated sufficient funding. Given adequate resources, agency field staff could analyze air and water samples where people live and at emission sources, and they could collect health data to get a better picture of the risks of living in proximity to shale gas development. Additionally, government agencies could better engage with individuals and communities to more fully understand their circumstances, experiences, and concerns. Armed with this knowledge, agencies could then provide better education and guidance on what impacted residents need to know and how they can take action to mitigate exposures. They could also provide information to health care providers on the front lines of this public health threat, who need to know how to respond.

**Accountability:**

**Strengthen health assessment programs at the state level to be more responsive to residents’ needs; follow up on reports of adverse health outcomes and risk near shale gas sites**

Pennsylvania state government must establish and maintain a structured process to hold shale gas industry actors accountable for their actions or inactions. There also must be a robust mechanism in place for residents to log their health concerns or flag violations committed by industrial operators and for state agencies, such as the DOH, to respond meaningfully and in a timely manner to community members. In the shale gas arena, the federal government has stepped back from its commitments to protect environment and health. Taking its cue from U.S. presidents and Congress, Pennsylvania’s governors and legislators eschewed their responsibility to protect the health of the Commonwealth’s residents. Meanwhile, those same residents have no way to hold their government responsible except through the occasional court case or,

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**JUNE 2020**



Pennsylvania’s 43rd Statewide Investigating Grand Jury report on the unconventional oil and gas industry released

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**JUNE 2020**



**Maternal & Child Health:** Tran et al. Residential Proximity to Oil and Gas Development and Birth Outcomes in California: A Retrospective Cohort Study of 2006-2015 Births

**JULY 2020**



**Maternal & Child Health:** Cushing et al. Flaring from Unconventional Oil and Gas Development and Birth Outcomes in the Eagle Ford Shale in South Texas

**JULY 2020**



**Mortality:** Hendryx & Luo. Natural gas pipeline compressor stations: VOC emissions and mortality rates

**AUGUST 2020**



**Maternal & Child Health:** Gonzalez et al. Oil and gas production and spontaneous preterm birth in the San Joaquin Valley, CA

in very dilute fashion, at the ballot box. Both of these remedies are slow, unpredictable, and lack meaningful resolution for residents being harmed.

Armed with the proper resources and a firm mandate, the DOH could fulfill its mission to help ensure that the health of Pennsylvanians is sufficiently protected. Over the years, the DOH has cultivated a working relationship with ATSDR, including joint investigations of community concerns related to shale gas sites. While the agencies have completed few investigations overall, the collaboration between state and federal agencies is promising. And while neither agency has any enforcement power, the framework is in place for a more effective approach to investigating environmental health concerns, including one where findings are not downplayed or diminished. While Pennsylvania has no control over the bandwidth or latitude federal regulators afford ATSDR, the state could enable its own public health agency to be more responsive to the needs of residents while providing the necessary resources for the agency to follow up on its own recommendations.

**NEXT STEPS**

When looking at the first decade or so of shale gas development and political decisions in Pennsylvania, it is clear that the government’s response regularly favored creating an accommodating environment for the shale gas industry rather than establishing a cautious approach that would protect the health of Pennsylvanians. Leaders at multiple levels of government frequently justified a lack of caution by arguing that there was a lack of incontrovertible evidence, something an effective public health response does not require.

Those who debate the merits of shale gas development argue that pursuing economic benefits is at odds with promoting caution in the face of health risks, but economics and health are not opposed. The reality is that Pennsylvania’s leaders could have better addressed both of these priorities in reaching reasonable, health-protective policy decisions.

**NOVEMBER 2020**



**Endocrine:** Singam et al. Structure-based virtual screening of perfluoroalkyl and polyfluoroalkyl substances (PFASs) as endocrine disruptors of androgen receptor activity using molecular docking and machine learning

**DECEMBER 2020**



**Mental Health:** Soyer et al. Socio-Psychological Impacts of Hydraulic Fracturing on Community Health and Well-Being

**DECEMBER 2020**



**Cardiology, Hospitalizations:** McAlexander et al. Unconventional Natural Gas Development and Hospitalization for Heart Failure in Pennsylvania

**APRIL 2021**



**Cardiology, Hospitalizations, Mortality:** Denham et al. Acute myocardial infarction associated with unconventional natural gas development: A natural experiment

This paper has provided insights into decisions made by the Commonwealth’s legislators, governors, and DOH leadership. The path to a healthier Pennsylvania rests on government equity, transparency, authority, and accountability. Government actions that could move us closer to that goal include the following:

- **Legislators** are in a position to craft and enact legislation that addresses the oversights of earlier actions. In addition to pushing forward more health-protective laws, they can also choose to allocate funding to the DOH and other agencies so these health protectors can fulfill their missions more effectively.
- **Governors** have the opportunity to set the tone from the top to ensure more robust regulations and enforcement by providing clear mandates and resources to agencies under their control.
- **The Department of Health**, while limited by resources granted by governors and the General Assembly, has the opportunity to be a more vocal advocate of public health protections, based on what is known from the existing science.
- **All public officials** have the opportunity—and the obligation—to listen and respond to the communities they represent, particularly the ones experiencing adverse health impacts from the shale gas industry.

From the beginning, Pennsylvania’s public officials did not have the foresight, or perhaps the discipline, to approach the shale gas boom in a health-protective way. Meanwhile, the next energy revolution—away from fossil fuels—is already occurring. As this transition happens, we believe it is imperative that leaders in Pennsylvania government recognize the legions of research findings and testimonies from constituents demonstrating health harms related to shale gas development. Further, we call on these leaders to introduce policy and support decisions that protect the public’s health in the face of this emission-intensive extractive industry. There is much to be done.

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**JULY 2021**



**Maternal & Child Health:** Willis et al. Associations between Residential Proximity to Oil and Gas Drilling and Term Birth Weight and Small-for-Gestational-Age Infants in Texas: A Difference-in-Difference Analysis



**DECEMBER 2021**



**Maternal & Child Health:** Willis et al. Associations between residential proximity to oil and gas extraction and hypertensive conditions during pregnancy: a difference-in-differences analysis in Texas, 1996-2009



**JANUARY 2022**



**Mortality:** Li et al. Exposure to unconventional oil and gas development and all-cause mortality in Medicare beneficiaries



# INTRODUCTION

*“History indicates that when energy technologies emerge rapidly, their risks and governance are often contentious. This history indicates the value of efforts at an early stage of technological development to understand the potential concerns of affected populations, to examine the risk concerns carefully, and to assess the capacity of the industry and the regulatory system to assess and manage the risks.”*

– Risks and Risk Governance in Unconventional Shale Gas Development<sup>1</sup>

This paper is, at its core, a defense of public health, which requires both objective science and wise judgment to know how to work with and protect communities from the health impacts of extractive industries. Free markets, critical as they are in so many realms, do not of their own accord adjust themselves to protect the health of people impacted by commercial activities—this is the special role of government. The exploration of government actions in Pennsylvania during the shale gas boom reveals that political decision-making can fail to safeguard public health, but it can also, with political effort, take steps to protect it.

## OUR OBJECTIVE

The aim of this paper is to unpack the factors that contributed to a lack of consideration for public health in decision-making about shale gas development in Pennsylvania, specifically where the system failed and how it can be improved for the future. There remains a mounting health threat posed by the growing number of shale gas development sites, such as well pads, compressor stations, impoundment pits, waste facilities, and ethane cracker plants. Research into the health impacts of shale gas development continues, but enough reliable evidence already exists to warrant a serious reconsideration of how this extractive industry has been allowed to conduct its business and harm residents of its host communities. Despite available avenues for public health protections, this paper will demonstrate that Pennsylvania policymakers largely ignored facts and expertise, creating an environment where shale gas operators could extract and pollute without consideration of public health.

More specifically, this paper examines key decisions and actions taken by the Pennsylvania General Assembly, three Governor’s Offices, and the Department of Health. It will look at ways the government deflected and sidelined concerns about the health of Pennsylvanians through regulatory and funding decisions, moved goalposts for what constitutes sufficient evidence of health harms, and took symbolic—rather than meaningful—actions. The failings of the Pennsylvania Department of Environmental Protection (DEP), which contributed significantly to this public health crisis, were well-documented in the findings of the Pennsylvania Attorney General’s Report on the

<sup>1</sup> Small, M.J., Stern, P.C., Bomberg, E., Christopherson, S.M., Goldstein, B.D., Israel, A.L., Jackson R.B., Krupnick, A., Mauter, M.S., Nash, J., North, D.W., Olmstead, S.M., Prakash, A., Rabe, B., Richardson, N., Tierney, S., Webler, T., Wong-Parodi, G., Zielinska, B. (2014). Risks and risk governance in unconventional shale gas development. *Environmental Science and Technology* 48(15). 8289-8297. <https://doi.org/10.1021/es502111u>

Grand Jury's investigation into the state's oversight of shale gas development.<sup>2</sup> For that reason, this paper will not address the DEP in depth, instead focusing on the policymaking bodies of state government mentioned above.

In coming to the conclusions reached in this paper, the Environmental Health Project (EHP) interviewed dozens of experts and reviewed hundreds of documents and online sources of information. We also drew on a decade of active experience, during which we analyzed the problem by gathering data from over 800 air monitor deployments and health surveys from more than two hundred Pennsylvania residents, as well as immersing ourselves in peer-reviewed research from institutions across the country. Additionally, we have heard first-hand accounts from many more who have suffered the ill effects of living in the shadow of shale gas development. Further, we met (often multiple times) with numerous government bodies, including representatives of the Pennsylvania Department of Health (DOH), Pennsylvania DEP, Pennsylvania Office of the Attorney General, U.S. Agency for Toxic Substances and Disease Registry (ATSDR), the U.S. Environmental Protection Agency (EPA), and many senators and representatives in the Pennsylvania General Assembly.

While a paper such as this requires taking a hard look at the decision-making process and the players involved, our concurrent objective is to use the findings of our research to develop a framework for action to demonstrate how government bodies can make more health-informed decisions regarding shale gas extraction in Pennsylvania. In this way, policymakers may better prevent health harms to residents in the future. We welcome the opportunity to discuss these recommendations with any policymakers who value public health in Pennsylvania or anywhere else.

Before we detail the deficiencies Pennsylvania government demonstrated with respect to public health throughout the shale gas boom, and before we offer steps forward to correct these deficiencies, it is necessary to lay out some groundwork. What follows is a summary of: (a) what constitutes Pennsylvania's shale gas boom, (b) why shale gas emissions represent a public health crisis, (c) why public health needs to be part of any conversation about shale gas development and safety, and (d) how government policy in general, especially at the federal level, has served as a backdrop to Pennsylvania's own policy shortcomings.

## **A. PENNSYLVANIA'S SHALE GAS BOOM**

Shale gas development (also called "unconventional gas development," "hydraulic fracturing," or "fracking") is a process by which the rock of shale formations is fractured to extract the fossil gas (largely methane) trapped there. Shale is drilled and then fractured with high-pressured water mixed with chemicals and silica (fine sand). Shale gas development comprises other operational stages, including flaring gases, eliminating wastewater, transporting gas through pipelines dotted with compressor

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<sup>2</sup> Pennsylvania Office of the Attorney General (2021), *43rd Statewide Grand Jury Finds Pennsylvania Failed To Protect Citizens During Fracking Boom*. <https://www.attorneygeneral.gov/taking-action/press-releases/43rd-statewide-grand-jury-finds-pennsylvania-failed-to-protect-citizens-during-fracking-boom/>



stations, and separating out usable components at processing plants. What sets this activity apart from the gas drilling that came before is the length of the horizontal drilling (up to three miles or more), the wide array of chemical constituents of the fracturing fluid, and the increased quantity of emissions that occur at every stage of development.

In Pennsylvania, shale gas development began in the early 2000s and ramped up sharply in the subsequent decade. As of this writing, Pennsylvania has permitted more than 13,000 shale gas wells,<sup>3</sup> which are extracting more than 7 trillion tons of shale gas each year, a number that continues to rise.<sup>4</sup> These wells are accompanied by a sprawling network of compressor stations, pipelines, processing plants, and diesel truck traffic. Additionally, to take advantage of excess shale gas production, petrochemical plants—like the immense Shell plastics cracker complex in Beaver County—are being planned or built at sites across the region.

The industry has promised residents living in areas rich with shale gas sizeable economic benefits, both for themselves and for the communities in which they live. The industry has not, however, promised that it will preserve the public's health, largely because industrial operators claim that there are no adverse health impacts associated with their activities.

### **Shouldering the Costs**

Looking back at the history of Pennsylvania's shale gas boom, it becomes evident that not only have residents and communities realized far fewer benefits than they were assured, but they have had to shoulder considerable costs—economic, environmental, and health-related. As the shale gas industry formed and rapidly grew, neither industry leaders nor many public officials gave public health concerns the attention they deserved. Neither the private nor public sectors undertook steps to ascertain whether the drilling, transportation, and waste processes associated with shale gas extraction were, in fact, safe, as operators claimed.

Meanwhile, releases of emissions from shale gas infrastructure—some accidental, some planned—have continued to pour into the surrounding air, water, and soil. Recognizing this, researchers began almost immediately to study the issue from a public health angle. What they have found is demonstrably alarming. A growing body of research has shown associations between shale gas development and a variety of health impacts including those of the cardiac, respiratory, reproductive, and neurological systems, as well as increased risk of cancer. (For more on these health impacts, see “A Public Health Crisis in the Making” below.) This research, however, has gone largely unheeded. In fact, the industry and its public mouthpieces, such as the Marcellus Shale Coalition, have gone to great lengths to try to discredit or underplay this highly reliable, peer-reviewed research.

3 FracTracker Alliance. (2022). [Map]. Accessed 1/12/22 at <https://www.fractracker.org/map/us/pennsylvania/>

4 U.S. Energy Information Administration. (2022). *Pennsylvania State Energy Profile*. [Website]. Accessed 1/12/22 at <https://www.eia.gov/state/print.php?sid=PA>

## Government Response

As the shale gas industry expanded, federal and state governments across the country *could have* made decisions in the service of protecting public health. But time and again, they did not. Public health protection is built into laws and regulations at the federal, state, and local levels, waiting for leaders to employ them. However, in numerous instances—both large and small—these leaders did not include public health in the decision-making process when setting policy regarding shale gas extraction. This was the case in Pennsylvania as the state pursued the financial and employment opportunities offered by shale gas drilling.

At the onset of the shale gas boom and in the years since, Pennsylvania's state government has afforded the industry nearly unfettered access to the vast supply of shale gas underlying the state in the Marcellus and Utica shale formations. While health impacts from shale gas development have proved extensive, Pennsylvania's state government—notably the General Assembly, the Governor's Office, and state-level agencies—has failed to protect the public's health. On multiple occasions, these governmental bodies, at best, neglected the issue and, at worst, actively took steps intended to block the examination and understanding of health risks posed by the shale gas industry's air emissions and water contamination. Rather than training a steady eye on Pennsylvanians' growing health problems, many leaders deliberately looked away from them.

## B. A PUBLIC HEALTH CRISIS IN THE MAKING

The field of public health is focused on promoting and protecting the health of people and their communities. The American Public Health Association says, “[T]hose of us working in public health try to prevent people from getting sick or injured in the first place.”<sup>5</sup> Because public health efforts are generally geared toward preventing harm or trying to mitigate a threat's impact, public health officials rely on scientific information, which comes in the form of virology, toxicology, epidemiology, and more.

There is a growing body of emissions data that the shale gas industry has submitted to state regulatory agencies and that researchers have been collecting and analyzing. Researchers have studied much of what is emitted at most points in the shale gas cycle. The drilling, hydraulic fracturing, compressing, and processing steps all pose risks to human health and are occurring very close to places where people live, work, and learn. Protective restrictions on emissions vary from locality to locality but are generally inadequate across the board.

Sometimes, when harm is evident or risk for harm is very high, a public health institution or official will have to act with *imperfect information*. In environmental health, for example, if neighbors of an industrial site begin experiencing acute health impacts following a strange odor coming from the site, public officials could require that the

<sup>5</sup> American Public Health Association. *What is Public Health?* <https://www.apha.org/what-is-public-health>

site refrain from emitting until health symptoms and their immediate cause can be clarified. Waiting for a new set of research studies—which will not be ready for months or years—can put community members at unnecessary risk if, instead, the exposure can be blocked long enough for public health officials to understand the problem and develop a possible remedy. Pennsylvania’s governmental bodies largely ignored this precautionary approach in the face of known and unknown exposures to shale gas development.

### **Health Impacts from Shale Gas Exposures**

Research performed during Pennsylvania’s shale gas boom, along with emissions data gathered from shale sites and documented health symptoms (gathered from both self-reports and in formal healthcare systems), reveal that Pennsylvania has been experiencing a serious and ongoing public health crisis with respect to shale gas extraction. Dozens of peer-reviewed, epidemiological studies<sup>6</sup> and hundreds of other investigations and first-hand accounts have shown that shale gas development correlates with poor health outcomes in people living in proximity to such infrastructure.<sup>7</sup> The Repository for Oil and Gas Energy Research (ROGER) database—created by Physicians, Scientists, and Engineers for Healthy Energy—has catalogued more than 2,000 studies, including investigations into water contamination, air pollutant emissions, and original research studies on human health risks and conditions.<sup>8</sup>

It has been established that air emissions from shale gas sites contain levels of particulate matter high enough to create health hazards. Emissions also may contain toxic substances, including formaldehyde, per- and polyfluoroalkyl substances (PFAS), and volatile organic compounds (VOCs), such as benzene and toluene. More recent studies have shown that the radioactivity of airborne particles increases significantly downwind of shale gas sites, raising the possibility of elevated cancer risk.<sup>9</sup> Radioactive particles and hazardous chemicals have also been documented in water sources used by residents.

As shale gas development increases, so do reports of illness. Researchers are regularly making progress in cataloguing the range of health conditions associated with shale gas operations and are investigating the mechanisms by which these effects may be produced.

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- 6 Southwest Pennsylvania Environmental Health Project (2020). *Health Outcomes Associated with Exposure to Shale Gas Development from Peer-Reviewed Epidemiological Literature* [PDF] <https://www.environmentalhealthproject.org/sites/default/files/assets/resources/health-outcomes-associated-with-exposure-to-shale-gas-development.pdf>
  - 7 Concerned Health Professionals of New York (2020). *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction) Seventh Edition, December 14, 2020*. <https://concernedhealthny.org/compendium/>
  - 8 Physicians, Scientists, and Engineers for Healthy Energy (2021). *The ROGER Citation Database*. <https://www.psehealthyenergy.org/our-work/shale-gas-research-library/>
  - 9 Li, L., Blomberg, A.J., Spengler, J.D. et al. Unconventional oil and gas development and ambient particle radioactivity. *Nat Commun* 11, 5002 (2020). <https://doi.org/10.1038/s41467-020-18226-w>

Researchers have identified four primary types of health outcomes in areas of shale gas development:

- Immediate acute effects, which appear in the nervous, respiratory, cardiac, and dermal systems.
- Delayed effects, which occur after an accumulation of toxics in the body or after a chemical interacts with an existing health condition.
- Protracted effects, occurring from the body's inability to completely expel a toxic before another exposure intensifies it.
- Chronic effects from neurotoxins, carcinogens, particulate matter, and sensitization to chemicals. These effects typically result from longer-term exposures, but for some substances, a single significant dose can precipitate the onset of disease.

More specifically, peer-reviewed studies indicate that health impacts increase the closer one lives to shale gas facilities. These studies show concerning evidence of health harms:

- Worsening asthma symptoms are linked to nearness of shale gas facilities.<sup>10</sup>
- Symptoms that include headaches, fatigue, upper and lower respiratory complaints, and skin rashes have been reported near well pads.<sup>11,12</sup>
- Babies born to mothers living less than a mile from wells were 25% more likely to be born with low birth weights,<sup>13</sup> which may lead to serious future consequences in growth and development, including asthma, intellectual and developmental disabilities, obesity, and infant mortality.
- An increasing number of babies have been born with congenital heart defects and possibly neural tube defects, impacts dependent on both the number of wells in the vicinity and the distance from the wells to mothers' homes.<sup>14</sup>
- Hospitalizations for heart failure are significantly higher in areas impacted by shale gas development.<sup>15</sup>

10 Rasmussen, S.G., Ogburn, E.L., McCormack, M., Casey, J.A., Bandeen-Roche, K., Merceer, D.G., & Schwartz, B.S. (2016). Association between unconventional natural gas development in the Marcellus Shale and asthma exacerbations. *JAMA Internal Medicine*, 176(9), 1334-1343. <https://doi.org/10.1001/jamainternmed.2016.2436>

11 Weinberger, B., Greiner, L., Walleigh, L., Brown, D. (2017). Health symptoms in residents living near shale gas activity: A retrospective record review from the Environmental Health Project. *Preventive Medicine Reports*, Volume 8, December 2017, pages 112-115. <https://doi.org/10.1016/j.pmedr.2017.09.002>

12 Rabinowitz, P.M., Slizovskiy, I.B., Lamers, V., Trufan, S.J., Holford, T.R., Dziura, J.D.,...Stowe, M.H. (2015). Proximity to natural gas wells and reported health status: results of a household survey in Washington County, Pennsylvania. *Environmental Health Perspectives*, 123(1), 21-26. <https://ehp.niehs.nih.gov/doi/10.1289/ehp.1307732>

13 Currie, J., Greenstone, M., Meckel, K. (2017). Hydraulic fracturing and infant health: New evidence from Pennsylvania. *Science Advances*, 3, e1603021. <https://advances.sciencemag.org/content/advances/3/12/e1603021.full.pdf>

14 McKenzie, L.M., Allshouse, W., & Daniels, S., (2019a). Congenital heart defects and intensity of oil and gas well site activities in early pregnancy. *Environment International*, 132, 104949. <https://doi.org/10.1016/j.envint.2019.104949>

15 McAlexander, T.P., Bandeen-Roche, K. et al. (2020). Unconventional Natural Gas Development and Hospitalization for Heart Failure in Pennsylvania. *Journal of the American College of Cardiology*. 2020 Dec, 76 (24) 2862–2874, <https://www.jacc.org/doi/10.1016/j.jacc.2020.10.023>

- Mortality from acute myocardial infarction (heart attack) is higher in residents living closer to shale gas development.<sup>16</sup>
- Stress, anxiety, depression, and other mental health symptoms increase the closer one is to shale gas development.<sup>17</sup>

Vulnerable populations—children, the elderly, those with chronic health conditions—are likely to suffer the most from these dangerous emissions. Healthy adults, however, are found to be harmed as well. Evidence also points to the fact that people who are exposed to pollution on a prolonged or persistent basis are more likely to be hospitalized and to die from infectious respiratory diseases like COVID-19.<sup>18</sup>

There can be no mistaking that an enormous health burden is falling squarely on residents living in proximity to shale gas development.

### C. THINKING CAREFULLY ABOUT PUBLIC HEALTH

To date, much of Pennsylvania’s public policy around shale gas development has centered on economic opportunities from which the industry and the state—and, to a lesser extent, residents—might benefit. But state government also has a responsibility to protect public health. Unfortunately, public health was not a significant part of any policy calculation at the beginning of the shale gas boom or in the years since. By widening the policy focus to consider public health, policymakers have an opportunity to address community or public interests, including health-related economic impacts, more comprehensively. The point of reference moves to weigh both economic gain and burdens carried.

Viewing society through a public health lens reveals that there have been negative externalities that must be weighed against individual, community, and corporate gains. Those externalities include the acute and chronic health impacts discussed above. Health impacts affect quality of life but also productivity, premature mortality, and child development. For those interested in the bottom line, these all have financial implications both for individuals and for the state of Pennsylvania as a whole.

16 Denham, A., Willis, M.D., Croft, D.P., Liu, L., Hill, E.L. (2021) Acute myocardial infarction associated with unconventional natural gas development: A natural experiment. *Environmental Research*, 195:2021 <https://doi.org/10.1016/j.envres.2021.110872>

17 Ferrar, K. J., Kriesky, J., Christen, C. L., Marshall, L. P., Malone, S. L., Sharma, R. K., Goldstein, B. D. (2013b). Assessment and longitudinal analysis of health impacts and stressors perceived to result from unconventional shale gas development in the Marcellus Shale region. *International Journal of Occupational and Environmental Health*, 19(2), 104–112. <https://doi.org/10.1179/2049396713Y.0000000024>

18 Wu, X., Nethery, R.C., Sabath, B., Braun, D., & Dominici, F. (2020). *Exposure to air pollution and COVID-19 mortality in the United States: A nationwide cross-sectional study*. Harvard University [website]. <https://projects.iq.harvard.edu/covid-pm>

For policymakers focused on full health costs of the shale gas industry, here are some financial impacts:

- Current research indicates that air pollution from shale gas development in Pennsylvania, Ohio, and West Virginia from 2004 to 2016 resulted in 1,200 to 4,600 premature deaths in the region.
- Those premature deaths cost \$23 billion.<sup>19</sup>
- According to the March of Dimes, the total and per capita cost of preterm birth in Pennsylvania is \$842,706,797 and \$65,014 (USD 2016) per capita.
- Pre-term/low-birth weight births incur hospital costs that are on average \$20,932 higher than routine births.
- At less than 28 weeks gestation, a preterm birth total costs \$324,191 (USD 2016) in Pennsylvania compared to \$182,720 at 28-31 weeks and \$27,687 between 32-36 weeks.
- Medical costs contribute 69 percent of total lifetime costs, but this value increases inversely to gestational age.
- The average birth hospitalization cost for preterm births is \$43,858 (USD 2019) for Medicaid recipients.<sup>20</sup>

### Public Health Politics

Public health actions are always, to greater or lesser degrees, political, and regulating the shale gas industry to protect health is an especially political problem. Nevertheless, federal and state decision makers have made great strides in other areas over the years, as science has permitted. Historically, public institutions have worked to enhance nutrition, reduce poor sanitation, and minimize incidence of chronic disease. Policymakers have established and improved upon air and water standards and, over decades, have conducted and reviewed studies on risks posed by chemicals in the environment and in the home. Shale gas development should have, at a minimum, been covered by existing safeguards and evaluative protocols. The public's health should have been a significant factor in the analysis, but it was not.

Instead, state-level decisions, institutions, and relationships between public and private enterprise paved the way, for example, for schools to be flanked on several sides by shale gas wells or for communities to be exposed to emissions from multiple shale gas sites all at once. The 2020 Grand Jury Investigation called by Attorney General Josh Shapiro provided a reckoning of sorts for government and industry, illuminating years of irresponsibility towards Pennsylvania communities. The challenge now is how the state can move forward, making up for its years of public health neglect.

To be clear, prioritizing public health would, no doubt, have limited the short-term financial boost to state and local coffers, to some residents who leased their land,

<sup>19</sup> Mayfield, E.N., Cohon, J.L., Muller, N.Z., Azevedo, I.M., & Robinson, A.L. (2019). Cumulative environmental and employment impacts of the shale boom. *Nature Sustainability*, 2,1122-1131. <https://doi.org/10.1038/s41893-019-0420-1>

<sup>20</sup> Waitzman, N., Jalali, A. (2019). *Updating National Preterm Birth Costs to 2016 with Separate Estimates for Individual States*. March of Dimes. [https://www.marchofdimes.org/peristats/documents/Cost\\_of\\_Prematurity\\_2019.pdf](https://www.marchofdimes.org/peristats/documents/Cost_of_Prematurity_2019.pdf)



and to those who directly or indirectly benefitted from the industry locally through employment or revenue. But a full assessment has yet to be made on the toll shale gas development takes on human health. Some analyses, including that conducted by Mayfield et al., indicate that the health costs outweigh the gas revenue.<sup>21</sup>

#### **D. GOVERNMENTAL POLICY APPROACHES**

This paper begins its examination in 2010. By this point, the George W. Bush administration had established regulatory exemptions for the industry on the federal level, and operators had already drilled about 1,600 unconventional wells in Pennsylvania.<sup>22</sup> Ed Rendell was Pennsylvania's Governor then, and he ushered in the state's shale gas boom. He was followed in the Governor's Office by Tom Corbett from 2011 through 2014 and, in 2015, by Tom Wolf, who remains there as of the writing of this paper, although by law he cannot run for another consecutive term. Both federal and state governments, regardless of which political party happened to be in control, made it easy for industry to sidestep existing health protections and quickly ramp up and maintain shale gas extraction volumes in Pennsylvania.

#### **Federal Government Backdrop**

Speaking about the then-recently passed Energy Policy Act of 2005, President George W. Bush said in August of that year, "I'm confident that one day Americans will look back on this bill as a vital step toward a more secure and more prosperous nation that is less dependent on foreign sources of energy."<sup>23</sup> The Energy Policy Act of 2005 was best known for offering hundreds of pages of expensive and complex federal subsidies, tax benefits, and regulatory preferences for many energy sources, with particular emphasis on the nuclear and oil and gas sectors. In addition, the legislation exempts various aspects of shale gas development from a range of federal laws that have generally been delegated to state governments for implementation.<sup>24</sup>

The Bush administration contributed to the meteoric rise of the shale gas industry, writ large, by supporting transport and market infrastructure, industry research and development, tax preferences, and regulatory exemptions.<sup>25</sup> The act also built on earlier work performed by the National Energy Policy Development Group, an energy policy task force chaired by Vice President Dick Cheney, which set forth a national energy policy.<sup>26</sup> In supporting passage of this act, the Bush administration was walking back decades of protections to the environment and human health.

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- 21 Mayfield, E.N., Cohon, J.L., Muller, N.Z., Azevedo, I.M., & Robinson, A.L. (2019). Cumulative environmental and employment impacts of the shale boom. *Nature Sustainability*, 2,1122-1131. <https://doi.org/10.1038/s41893-019-0420-1>
- 22 Kelso, M. (December 31, 2012). *Drilled unconventional wells by county and year*. Fracktracker. <https://www.fracktracker.org/2012/12/drilled-unconventional-wells-in-pa-by-county-and-year/>
- 23 EHei, J.V. & Blum, J. (2005, August 9). Bush signs energy bill, cheers steps toward self-sufficiency. *Washington Post*. <https://www.washingtonpost.com/archive/politics/2005/08/09/bush-signs-energy-bill-cheers-steps-toward-self-sufficiency/6f10e309-9026-4dab-8d68-cd8783170389/>
- 24 Rabe, B. (2007). Environmental policy and the Bush Era: The collision between the administrative presidency and state experimentation. *Publius: The Journal of Federalism*, 37(3). 413-431. <https://doi.org/10.1093/publius/pjm007>
- 25 Golden, J.M. & Wiseman, H. (2015). The Fracking Revolution: Shale gas as a case study in innovation policy. *Emory Law Journal*, 64(4). 955-1040. <https://scholarlycommons.law.emory.edu/elj/vol64/iss4/1>
- 26 U.S. General Accounting Office. (2003). *Energy Task Force Process Used to Develop the National Energy Policy*, GAO-03-894 [PDF]. <https://www.gao.gov/assets/gao-03-894.pdf>

It has been said that the Energy Policy Act of 2005 promoted a federal expansion of domestic energy development that eclipsed any environmental or state governance concerns. The Act effectively removed the U.S. Environmental Protection Agency (EPA) from a meaningful regulation of shale gas development and related operations, not only with respect to drinking water but also with regard to the terms of the Clean Water Act (CWA); the Clean Air Act (CAA); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Emergency Planning and Community Right-to-Know Act; and the National Environmental Policy Act (NEPA). Additionally, the act removed states' responsibilities to implement these environmental and health-protective regulations, and it signaled to states that they need not invoke their own state protections. The Bush administration used its executive powers to drive its own interpretation of existing statutes, often in the face of considerable state opposition.<sup>27</sup>

### EPA Involvement

Prior to the Energy Policy Act of 2005, the EPA had undertaken a multi-year study of the potential impact of fracturing fluid (a mixture of water, chemicals, and silica—fine sand typically called “proppant”). The use of this fluid would normally have fallen under the jurisdiction of the Safe Drinking Water Act, but the Energy Policy Act of 2005 excluded hydraulic fracturing wastewater from the “hazardous” category regardless of its hazardous components. Five of the seven members of the panel charged with studying the fracturing fluid were industry representatives, including a representative from Halliburton, the oil corporation credited with the development of horizontal drilling.<sup>28</sup> The panel's findings, published in 2005, unsurprisingly concluded that hydraulic fracturing “poses little or no threat” to drinking water and that no further study of the question was necessary.<sup>29</sup>

In the EPA's investigation, the panel ignored or concealed well-documented evidence that hydraulic fracturing presented a significant threat to drinking water. Weston Wilson, a 37-year veteran of the EPA, blew the whistle on the panel, claiming that the panel's findings were “scientifically unsound” and a violation of scientific principles and available evidence. He also called out the agency's refusal to regulate what is clearly a hazard to public health.<sup>30</sup> The weight of evidence in Wilson's charge and the public outcry that followed forced EPA Inspector General Nikki Tinsley to conclude, in March 2005, that there was sufficient evidence to justify a review of the panel's work.<sup>31</sup> However, the soon-to-be-passed Energy Policy Act of 2005 made this a moot point

27 Rabe, B. (2007). Environmental policy and the Bush Era: The collision between the administrative presidency and state experimentation. *Publius: The Journal of Federalism*, 37(3). 413-431. <https://doi.org/10.1093/publius/pjm007>

28 Russo, P. & Carpenter, D. (2017). Health effects associated with stack chemical emissions from NYS natural gas compressor stations: 2008-2014. Unpublished manuscript. [https://7bd2bc49-dce3-4599-9d04-024007410045.filesusr.com/ugd/a9ce25\\_7dd627439425472e8c78eaf0c5f0fce4.pdf](https://7bd2bc49-dce3-4599-9d04-024007410045.filesusr.com/ugd/a9ce25_7dd627439425472e8c78eaf0c5f0fce4.pdf)

29 Wiseman, H. (2009). Untested waters: The rise of hydraulic fracturing in oil and gas production and the need to revisit regulation. *Fordham Environmental Law Review*, 115. <https://ir.lawnet.fordham.edu/elr/vol20/iss1/3>

30 Wilson, W. (2011, October 11). *EPA whistle-blower warns EPA must not buckle to industry pressure and greenwash fracking yet again*. ThinkProgress. <https://archive.thinkprogress.org/exclusive-epa-whistle-blower-warns-epa-must-not-buckle-to-industry-pressure-and-greenwash-fracking-b392e6306e4/>

31 Earthworks. *The Halliburton Loophole*. [https://earthworks.org/issues/inadequate\\_regulation\\_of\\_hydraulic\\_fracturing/](https://earthworks.org/issues/inadequate_regulation_of_hydraulic_fracturing/)

because it excluded fracturing fluid (except for any diesel compounds that might be used) from hazardous regulation.

### **Subsequent Administrations**

While President Bush and Vice President Cheney can be credited with taking the federal lead in clearing the way for shale gas development to proceed, President Obama's administration did not significantly improve public health protections. Obama's EPA, however, did manage to curb methane releases during all phases of the shale gas process. When methane in ambient air is reduced, so are other toxic air pollutants. It was an important, though very limited, contribution to the public's health in communities in the various shale plays across the country.

President Trump pledged to support the shale gas and oil industry and made good on this promise by further loosening the existing limited regulations. During the Trump administration, protections for the health of community members were nowhere to be seen at the federal level.

While there were important differences among these presidential administrations, they all failed to create public policies that protected frontline communities. In so doing, these federal leaders tacitly gave a green light to state governors and legislatures to disregard any of the health-protective policies previously in place there.

### **Pennsylvania Government**

By actively supporting shale gas development and by removing federal regulatory control, the shale gas industry grew within a decentralized system (not uncommon for the energy sector), leaving states a vast canvas on which to create or adapt their own regulations, incentives, and state-local governing relationships. There was an earlier time when states were laboratories of policy innovation on environmental issues. A state might be an "early mover," setting the environmental standard for other states and luring economic development with high quality-of-life marks.<sup>32</sup>

In contrast, regulatory scholars have characterized the current shale gas era as a "race-to-the-bottom," whereby state governments have worked to maximize industry interests in exchange for near-term economic benefits while putting short- and long-term health consequences at risk.<sup>33</sup> States, of course, had the choice: they could aggressively pursue shale gas development or they could balance shale gas development with obligations to environmental protection and public health. Most states went the former route; a few, the latter. States like New York and Maryland (not to mention several foreign countries) have placed a moratorium on shale gas drilling.

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32 Rabe, B.G., Borick, C. (2013). Conventional politics for unconventional drilling? Lessons from Pennsylvania's early move into fracking policy development. *Review of Policy Research* 30(1), 321-340. <https://doi.org/10.1111/ropr.12018>

33 Rabe, B.G. (2014). Shale Play Politics: The Intergovernmental Odyssey of American Shale Governance. *Environmental Science and Technology* 48. 8369-8375. <https://doi.org/10.1021/es4051132>

The emergence of the shale gas industry tested Pennsylvania’s commitments to environmental and public health protection in the face of economic and political gain. To date, leaders in state government have allowed energy commitments to override attention to public health. Despite the constitutional guarantee that grants Pennsylvanians the right to clean air and pure water, state leaders took early, decisive action and have created an extremely hospitable environment for shale gas companies, putting minimal effort into environmental and public health concerns.<sup>34</sup> In fact, on a number of occasions, state government created task forces or commissions that were weighted heavily toward the industry’s perspective, rarely acknowledging risks to public health.

*“The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania’s public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.”*

– Article 1, Section 27 of the Pennsylvania Constitution

## WHAT FOLLOWS

The sections that follow demonstrate how legislators in the Pennsylvania General Assembly favored industry growth and resisted evaluating health impacts borne by communities; how Pennsylvania governors paid mostly lip service to public health concerns; and how government agencies, specifically the Pennsylvania Department of Health, were fundamentally unsupported, leaving them unable to fulfill their missions to protect public interests. All areas of Pennsylvania’s government had health-protective tools and authority that went untapped.

It is clear, from the vantage of more than a decade, that protecting public health from shale gas emissions required a different governmental response than what it received in Pennsylvania. Technological innovation, especially on the large scale demonstrated by hydraulic fracturing, necessitates reciprocal governance innovation. At the very least, to better protect public health, leaders in government should have made adjustments in rules and budgets to accommodate this new, and largely unknown, innovation. But a robust response required more significant adjustments, including new regulations and oversight, new public health leadership, in-depth research, and an open and honest public conversation. What follows demonstrates how state government failed to protect its residents from harm and offers a way forward that can, if pursued seriously, make Pennsylvania a healthier place for all.

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<sup>34</sup> Rabe, B.G., Borick, C. (2013). Conventional politics for unconventional drilling” Lessons from Pennsylvania’s early move into fracking policy development. *Review of Policy Research* 30(1), 321-340. <https://doi.org/10.1111/ropr.12018>



# GENERAL ASSEMBLY

Since the beginning of shale gas development in the state, the Pennsylvania General Assembly (comprised of the Senate and House of Representatives) has neglected to protect the health of residents from this industry’s harmful emissions. It has done so both passively and actively, and Act 13, Pennsylvania’s landmark oil and gas law enacted in 2012, was the cornerstone of this neglect. The legislature further risked the public’s health by exercising its power over the state budget in such a way that indicated a trend—a pervasive unwillingness to make a good-faith effort to evaluate the danger of the shale gas industry’s emissions and to mitigate the resulting health impacts. During this time, majorities in the legislature chose symbolic acts over practicable action, giving only the appearance that they were responding to serious public health concerns.

## INDUSTRY-FRIENDLY LEGISLATION: ACT 13

The foundational legislation with respect to shale gas development in Pennsylvania was Act 13 of 2012.<sup>35</sup> As passed, the measure sidelined public health almost completely. It enacted an *impact fee* on operators, generating revenue for the state (more than \$204 million in 2011 alone), but we could find no evidence that any of this revenue was ultimately allocated to the Pennsylvania Department of Health (DOH) or toward any other public health initiatives where it could have supported efforts to identify and mitigate risks associated with gas extraction.<sup>36</sup> Additionally, Act 13 allowed state law to preempt local ordinances, denying municipal governments the authority to better protect their communities should they desire to do so and making it clear that the state prioritized shale gas development over public health. Lastly, Act 13, as passed, stymied the public’s ability to learn the health risks associated with “trade secret” chemicals used in fracking fluid. The law allowed companies to keep certain chemicals a secret and gave doctors access to needed proprietary information only if they signed nondisclosure agreements (legally binding contracts) that prohibited those doctors from sharing what they had learned.<sup>37</sup> Some facets of Act 13 were later undone by the courts, but the legislature’s unresponsiveness to health concerns continued.

Act 13 passed in 2012 with a House vote of 101-90 (with 99 Republicans and 2 Democrats voting yes, 10 Republicans and 80 Democrats voting no). The Senate then adopted it by a 31-19 vote (with 26 Reps and 5 Democrats voting yes and 4 Republicans and 15 Democrats opposed).<sup>38</sup> This piece of legislation laid bare the deference the Pennsylvania state government was willing to afford the shale gas industry at the expense of protecting residents exposed to the industry’s pollution. The specific aspects of Act 13 that limited a more comprehensive public health response are described in more detail below.

<sup>35</sup> Act 13 of 2012, HB 1950, 58 Pa.C.S. (Oil and Gas) <https://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2012&sessInd=0&act=13>

<sup>36</sup> Pennsylvania Public Utility Commission. (n.d.). *Act 13 Impact Fee Distribution* [2011]. <https://www.act13-reporting.puc.pa.gov/Modules/Reports/ReportViewer.aspx?rptPath=/Act%2013/DisbursementsReport>

<sup>37</sup> Freilich, R.H. (2012). Oil and gas fracking: State and federal regulation does not preempt needed local government regulation: Examining the Santa Fe County oil and gas plan and ordinance as a model. *The Urban Lawyer*, 44, 533-575. <https://www.jstor.org/stable/24392314>

<sup>38</sup> Conservation Advocate. (n.d.). *Act 13 of 2012*. Pennsylvania Land Trust Association. <https://conservationadvocate.org/act-13-of-2012/>

## Impact fee

In all, 34 states across the nation produce oil or natural gas, but Pennsylvania is the only one that doesn't tax the extracted resources.<sup>39</sup> Every other state producing shale gas has established a *severance tax*, which compels companies to pay based on how much gas is produced. Governor Tom Corbett, who served in office from 2011 to 2015 when the shale gas industry was nascent in Pennsylvania, pushed instead for *impact fees*, where gas corporations pay an annual fee for each well they drill. This idea was made part of Act 13. Pennsylvania's impact fees vary based on the price of gas each year and the age of each well. They are collected by counties but sent to the state to distribute, as it sees fit, to municipalities or public programs.

The promise of funds coming back to municipalities, combined with the lure of jobs and associated revenue, made Act 13 desirable to legislators. In addition, several state agencies and programs were set to receive funding to support environmental and outdoor recreational purposes.<sup>40</sup> Consequently, the act, including the impact fee, passed with some bipartisan support. To appreciate the scale of the available money, in 2011 (at the beginning of the shale gas boom) the impact fee brought in more than \$204 million. In 2020, it was quite a bit lower at roughly \$146 million but was still a significant sum of money for the state to be able to distribute.

While in the short term such an arrangement may seem lucrative, in the long term impact fees actually supply less money to the state than other potential sources of shale gas revenue. It has been estimated that a severance tax, either instead of or in addition to an impact fee, would have provided the state with billions of dollars in revenue over the first decade of the shale boom,<sup>41</sup> which could have been used to bolster the state's finances, provide social services, and rebuild infrastructure like highways and bridges—many of which have deteriorated from shale gas extraction and the associated heavy truck traffic. To save the public from future tax burdens, dollars could also have been set aside to cover the cost of capping abandoned wells and reclaiming land when shale gas corporations pull out or go bankrupt.

Of particular interest from a public health practice and oversight standpoint is that Act 13 designated no funding for the Pennsylvania DOH. With different leadership in the General Assembly and Governor's Office, such funding could have opened the door to public health education, surveillance, and intervention. But the General Assembly was not looking to the DOH to keep other governmental bodies apprised of patterns of

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39 Kolesnikoff, A., Brown, C. (2018, September 6). *State oil and gas severance taxes*. National Conference of State Legislatures. <https://www.ncsl.org/research/energy/oil-and-gas-severance-taxes.aspx>

40 Pennsylvania Public Utility Commission. (n.d.) *Act 13 Impact Fee*. <https://www.puc.pa.gov/filing-resources/issues-laws-regulations/act-13-impact-fee/>

41 Polson, D. (2018, June 19). *Governor Wolf's 2018 severance tax proposal could bring in \$1.7 billion of revenue over the next five years*. Pennsylvania Budget and Policy Center. <https://www.pennbpc.org/governor-wolf's-2018-severance-tax-proposal-could-bring-17-billion-revenue-over-next-five-years>

health risks and illness, nor was it facilitating the DOH to create programs to address this new industrial development and the health risks it posed. (There is more detail on the lack of the support directed toward the DOH in the following chapters.)

### **Preemption**

The preemption section of Act 13 prohibited any local regulation of oil and gas operations, requiring statewide uniformity among local zoning ordinances with respect to the development of oil and gas resources. What this meant in practice was that Act 13 essentially gave the power of eminent domain to private corporations. Municipalities now had no power to enact zoning that might have protected public safety or welfare, even if there was sufficient political will to do so within the community. With this step, the General Assembly paved the way for the industry to streamline its operations, making it easier to circumvent any local attempts to prevent drilling or to regulate where it was done.

Act 13's preemption section also had the consequence of allowing the industry to turn a blind eye to concerns residents or communities might have with respect to local health impacts. It denied municipal governments the authority to better protect their communities should they have desired to do so. It prevented them from establishing common-sense setback distances from residences and from vulnerable populations in schools, nursing homes, and day care centers. Health impact assessments became a moot point, as municipalities could no longer use them to justify arguments on the siting of shale gas facilities.

Fortunately for communities, the preemption section of the Act was overruled in Pennsylvania's highest state court in *Robinson Township v. Commonwealth* (September 2016), which found that private corporations that do not sell gas directly to the public are not public utilities and so are not allowed to exercise the powers of eminent domain.<sup>42</sup> However, for a number of key years, while shale gas development ramped up and then boomed, municipalities were hamstrung by the preemption section of Act 13.

### **Nondisclosure**

The third significant goal codified in Act 13 stifled the public's ability to learn the health risks associated with "trade secret" chemicals used in fracking fluid. The law allowed companies to keep certain chemicals a secret and only permitted doctors access to needed proprietary information if they believed those chemicals could be directly related to an illness they were treating or trying to diagnose, and then only if they were willing to sign a nondisclosure agreement.

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<sup>42</sup> Pennsylvania Land Use Library. *Robinson Twp. v. Commonwealth*, 623 Pa. 564 (Pa 2013). <https://www.landuselawinpa.com/court-rulings/robinson-twp-v-commonwealth/>



The nondisclosure agreement portion of Act 13 was roundly criticized by the medical community. Governor Corbett’s own Secretary of Health, Eli Avila, a physician himself, was an outspoken critic. He told the Pennsylvania Medical Society that he believed a confidentiality agreement should not, and would not, prevent doctors from sharing information with other medical professionals. He wrote, “inherent in [physicians’] right to receive this [proprietary] information is the ability to share the information with the patient, with other physicians, and [with] providers including specialists assisting and involved with the care of the patient. Further, reporting and information sharing with public health and regulatory agencies such as the Department of Health is necessary and permitted.”<sup>43</sup>

It is evident that those who crafted or supported Act 13 put the interests of the industry ahead of the public health considerations. Potential health protections would be, and routinely are, safeguarded by doctors’ ability to quickly and efficiently share important medical and toxicological information to patients, fellow practitioners, and public health officials.

The nondisclosure provisions were challenged in the courts. And, in 2016, the Pennsylvania Supreme Court “ruled that the medical gag rule constituted special legislation which violated the Pennsylvania Constitution.”<sup>44</sup> The court wrote that no other industry in the state had been “statutorily shielded in this manner.” While no longer an active provision, the “gag order,” as its detractors called it, shines a harsh light on the state’s priorities at the time. It was a bewildering departure from what the state had granted to any other industry up to then.

## **BUDGET ROADBLOCKS TO IDENTIFYING RISK**

Act 13 dealt a cruel blow to public health protections in Pennsylvania, but so did the power of the purse. Through its budget authority, the General Assembly was able to indirectly restrict access to information about health risks and impacts from shale gas emissions.

State agencies have often been criticized for prioritizing economic gains ahead of public health and for not seeking answers to questions about risk. In Pennsylvania, it is important to recognize that, rather than seeking answers to questions about evidence of health impacts on people living near shale gas development, the General Assembly had a central role in deflecting these very questions for the benefit of industry. From the beginning, legislators used the General Assembly’s budgeting power to withhold funding from initiatives that could have collected and analyzed data, as well as provided health information to residents—initiatives that could have been used to better protect public health.

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43 Detrow, S. (2012, April 19). *What you need to know about Act 13’s confidentiality requirements*. StateImpact Pennsylvania. <https://stateimpact.npr.org/pennsylvania/2012/04/19/what-you-need-to-know-about-act-13s-confidentiality-requirements/>

44 Siget, M.D.I. (2016, May 16). *Pennsylvania Supreme Court declares medical gag rule unconstitutional*. Pennsylvania Medical Society. <https://www.pamedsoc.org/list/articles/Cap-Update-Blog-Oct-5-16>



## Health Registry

As early as 2011, Governor Tom Corbett’s Marcellus Shale Advisory Commission recommended that the state monitor public health impacts from drilling.<sup>45</sup> In fact, when Act 13 was being crafted, it was proposed that \$2 million in state funding be set aside to track and monitor public health in drilling areas through creation of a health registry—a system that would collect information about health complaints. Such a registry could inform public officials and researchers of potential health impacts near shale gas infrastructure. However, that \$2 million was cut from the final legislation the General Assembly passed.<sup>46</sup> During the following years, the registry idea continued to be floated but was never funded.<sup>47</sup> Systematically recording the impact of emissions on Pennsylvania’s community members was not an option until it was funded under the Wolf administration in 2017, albeit at a fraction of what was needed for a fully functioning registry initiative.

The creation of a health registry in the early days of the boom would have been useful in understanding impacts from shale gas development because emissions from the shale gas supply chain included compounds deemed dangerous by the U.S. Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Protection (DEP), as well as compounds with unknown health impacts. Further, many of the industrial pollutants that researchers have examined have only been evaluated for risks related to workplace exposure, not exposures in homes or to vulnerable groups, such as children or people who are pregnant. Quick action in creating a health registry could have provided useful data in determining health impacts on a broader population early on and informed more proactive safeguards, but such was not the case.

From the outset of the shale gas boom, many public health officials were concerned that they did not have sufficient information on the health risks posed to those living near shale gas sites, making it difficult to treat or advocate for their patients. Dr. Marilyn Heine, then president of the Pennsylvania Medical Society, made the case for funding the collection of unbiased, baseline health data. “We’re hamstrung by the fact that we don’t have the data we need,” she said in 2012.<sup>48</sup>

45 Pennsylvania Department of Environmental Protection. (2011). *Governor’s Marcellus Shale Advisory Committee Report*. [https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC\\_Final\\_Report.pdf](https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC_Final_Report.pdf)

46 StateImpact Pennsylvania (2014, July 30). *Pa. health department reaches out to doctors amid controversy over drilling complaints*. <https://stateimpact.npr.org/pennsylvania/2014/07/30/pa-health-department-reaches-out-to-doctors-amid-controversy-over-drilling-complaints/>

47 StateImpact Pennsylvania (2015, February 25). *Senate committee approves shale gas health bill*. <https://stateimpact.npr.org/pennsylvania/2015/02/25/senate-committee-approves-shale-gas-health-bill/>

48 StateImpact Pennsylvania (2012, February 24). *Public health research funds cut from impact fee*. <https://stateimpact.npr.org/pennsylvania/2012/02/24/public-health-research-funds-cut-from-impact-fee/>

In an editorial published that same year, Dr. Heine also said, “Nothing frustrates me more than having my medical expertise hand-cuffed by lack of research. I support the elected leaders in Harrisburg seeking money to collect health data and conduct unbiased, comprehensive studies of the health of communities within our Marcellus Shale regions and to help educate patients about their health.”<sup>49</sup>

Over the following years, multiple attempts were made to create and fund a health registry, but they frequently went nowhere. Proponents of a registry continued to argue the benefits. Dr. Ralph Schmeltz, an endocrinologist and former president of the Pennsylvania Medical Society, said that a health registry “is a critical issue that needs to be addressed.”<sup>50</sup> At the same time, the DOH continued to examine how to create a registry without appropriations from the General Assembly. Aimee Tysarczyk, a spokeswoman for DOH, said in 2014 that the agency is still “exploring” a registry but was trying to determine how such a project would be funded.<sup>51</sup>

Opponents, meanwhile, slowed or stalled the process of instituting a registry. In late 2012, state senators Stewart Greenleaf (R) and John Yudickak (D, I) proposed an Act 13 amendment that would have provided an annual \$2 million for the DOH to create and support a health registry, funded by the state’s impact fee,<sup>52</sup> but the amendment never made it into law.

For the most part, majority leaders seemed overly cautious of the idea of a registry, characterizing data gathering as something that would introduce fear. In 2012, Drew Crompton, then chief of staff to Senate President Pro Tem Joe Scarnati (R), argued that funding any research would have to be handled “very carefully.” He said that doing research in shale gas areas could cause unnecessary panic among local residents. Said Crompton: “Imagine living near a well, and everything’s fine, and you get a letter in the mail asking to take part in medical tests. And then those people are like: ‘Why do I have to get tests? What could be wrong with me?’”<sup>53</sup>

Governor Tom Wolf said in 2015 that creating a health registry to monitor impacts of shale drilling was a priority for him. He proposed \$100,000 be given to the DOH in his

49 Heine, M.J. (2012, February 5). Public health impacts of Marcellus Shale drilling still unknown. *PennLive/The Patriot-News*. [https://www.pennlive.com/editorials/2012/02/public\\_health\\_impacts\\_of\\_marce.html](https://www.pennlive.com/editorials/2012/02/public_health_impacts_of_marce.html)

50 Vicens, N. (2014, April 30). *With no health registry, PA doesn’t know the impact of fracking on health*. Public Source. <https://www.publicsource.org/with-no-health-registry-pa-doesnt-know-the-impact-of-fracking-on-health/#.U2EcBMfldph>

51 Vicens, N. (2014, April 30). *With no health registry, PA doesn’t know the impact of fracking on health*. Public Source. <https://www.publicsource.org/with-no-health-registry-pa-doesnt-know-the-impact-of-fracking-on-health/#.U2EcBMfldph>

52 StateImpact Pennsylvania (2014, July 7). *Pa. health department reaches out to doctors amid controversy over drilling complaints*. <https://stateimpact.npr.org/pennsylvania/2014/07/30/pa-health-department-reaches-out-to-doctors-amid-controversy-over-drilling-complaints/>

53 StateImpact Pennsylvania (2012, February 24). *Public health research funds cut from impact fee*. <https://stateimpact.npr.org/pennsylvania/2012/02/24/public-health-research-funds-cut-from-impact-fee/>

budget plan.<sup>54</sup> Many public health advocates were encouraged by this step, but even if the General Assembly were to allocate those funds, they believed that \$100,000 was not enough to fully fund a registry.<sup>55</sup> The General Assembly did not fund the DOH the \$100,000 in 2015, nor again in 2016.<sup>56</sup>

By 2016, the DOH had been getting phone calls from residents with health complaints for several years, but there was no established structure, systematic protocol, or sustainability plan for the collection of reliable information. Lacking the funding for a registry, the DOH attempted to respond to residents as best they could. According to Wes Culp, a spokesman for the DOH at the time: “In response to increased citizen concerns and the emerging shale industry, the DOH began collecting more detailed information, and beginning [in 2016] a standardized questionnaire has been used to collect this information.”<sup>57</sup> (For more on the evolution in the DOH’s approach to health risks posed by shale gas activity, see the “Department of Health” section.)

In an attempt to place pressure on the General Assembly from the outside, the Pennsylvania Medical Society overwhelmingly approved a 2016 resolution, Resolution 12-206, supporting a “Moratorium on Fracking” and urging “the Commonwealth of Pennsylvania to fund an independent health registry and commission research studies on the health effects of fracking.”<sup>58</sup> The vote to approve the resolution among the society’s 300-member House of Delegates was unanimous in support of the resolution.<sup>59</sup> It came at a time when few physicians were speaking out about health risks from shale gas development.

“RESOLVED, That the Pennsylvania Medical Society urge and support a moratorium on new natural gas extraction using high-volume hydraulic fracturing in Pennsylvania; and be it further RESOLVED, That the Pennsylvania Medical Society urge the state legislature Commonwealth of Pennsylvania to fund an independent health registry and commission research studies on the health effects of fracking.”

54 StateImpact Pennsylvania (2015, March 3). *Wolf budget includes \$100K for Marcellus Shale health registry*. <https://stateimpact.npr.org/pennsylvania/2015/03/03/wolf-budget-includes-100k-for-marcellus-shale-health-registry/>

55 StateImpact Pennsylvania (2014, December 18). *Wolf: New York’s ban is “unfortunate.”* <https://stateimpact.npr.org/pennsylvania/2014/12/18/wolf-new-yorks-fracking-ban-is-unfortunate/>

56 StateImpact Pennsylvania (2016, April 6). *Public health campaigners renew call for fracking health registry*. <https://stateimpact.npr.org/pennsylvania/2016/04/06/public-health-campaigners-renew-call-for-fracking-health-registry/>

57 StateImpact Pennsylvania (2016, April 6). *Public health campaigners renew call for fracking health registry*. <https://stateimpact.npr.org/pennsylvania/2016/04/06/public-health-campaigners-renew-call-for-fracking-health-registry/>

58 Pennsylvania Medical Society. (n.d.) *Pennsylvania Medical Society Support for a Moratorium on Fracking*. <https://www.pamedsoc.org/docs/librariesprovider2/pamed-documents/pamed-downloads/HODAEC/16-206.pdf>

59 Hopey, D. (2016, October 27). *Doctors call for state ban on drilling and fracking*. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/local/region/2016/10/27/Doctors-group-calls-for-moratorium-on-fracking-in-Pennsylvania/stories/201610270226>

Finally, in March 2017, Governor Wolf’s promised registry was officially launched. In January 2018, the name of the program area and the health complaints registry was changed to Oil and Natural Gas Production (ONGP) Health Registry to cover potential health impacts of both unconventional and conventional drilling.<sup>60</sup> It is possible that this move is still too little, too late to have a significant impact on the state of health research in frontline communities. Having been slow out of the gate, the DOH lost valuable years in understanding health impacts and protecting public health. Many knowledgeable public health experts argue that the hard-won registry is still underfunded, underpublicized, and underutilized. (For more on the health registry, see the “Governor’s Office” and “Department of Health” sections.)

### **Underfunding Agencies**

On the basis of its budget authority, the General Assembly has the power to support state agencies’ work to make good on their commitments to taxpayers. By underfunding these agencies, the General Assembly can constrain agency activity and curb their prospects for establishing new programs. This was the case for the health registry and, some argue, for the DOH overall.

In addition to underfunding the DOH, the General Assembly underfunded other agency work as well. The Pennsylvania Department of Environmental Protection (DEP) has been more of a central player in the shale gas arena than DOH over the years, and its rules and regulations impact the public’s air and water. So, although DEP actions are not a central focus of this paper, its budget limitations are at least as relevant to protecting public health. In 2016, for example, then DEP Secretary John Quigley complained that he did not have adequate resources or staff to regulate the shale gas industry. Quigley said nearly 40 percent of the 2,592 permit applications it received between 2013 and 2015 were technically deficient in some way. “Inadequate staff and technology hamper the agency’s ability to handle the volume of permits,” Quigley said, indicating that the DEP was not adequately funded to address these permits. Said Quigley, “The regulated community—which is not getting its money’s worth from its consultants—must do better. DEP must do better too.” Quigley advocated for stronger regulations, which he did not think would negatively affect the state’s economic development.<sup>61</sup>

Two years later, in 2018, DEP Secretary Patrick McDonnell said, “We’ve had 10 years of budget cuts in the department.” He reportedly went on to say that the oil and gas program in particular is losing approximately half a million dollars per month between

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60 Pennsylvania Department of Health (n.d.) *Oil and natural gas production health concerns*. <https://www.health.pa.gov/topics/envirohealth/Pages/OilGas.aspx>

61 StateImpact Pennsylvania. (2016). *Senate panel weighs permitting process and economic growth*. <https://stateimpact.npr.org/pennsylvania/2016/04/11/senate-panel-weighs-permitting-process-and-economic-growth/>

the fees it receives to regulate the sector and the expenses it incurs doing so.<sup>62</sup> These budget cuts have limited spending on training and equipment, with the oil and gas programs especially in need of support.

The General Assembly's control of budgets is, of course, only one part of the problem. Increased resources do not, in and of themselves, result in activities that could protect communities. Health-protective actions require clear directives prioritizing public health as well as the resources to achieve them. At this writing, DEP and DOH have been given neither strong health-protective directives nor funding toward public health goals. Leaders within these agencies have acknowledged that they are not doing as much as they would like.

### **COMMITTEES, COMMISSIONS, AND POLITICAL THEATER**

While the General Assembly showed little support for a statewide registry to better evaluate health risks and impacts from shale gas development, it also failed to take advantage of DOH experience on questions of environmental health. Instead, legislators were interested in other, less-consequential efforts, such as creating advisory committees or commissions. At face value, such advisory bodies seem like positive steps. However, committees and commissions such as these are not often set up for success or action. They epitomize what might be called symbolic politics—political activities meant primarily as symbols of action that never really address the issues or effectuate meaningful change.

Forming commissions and committees has long been a strategy to deflect criticism for inaction aimed at elected officials. At best, advisory bodies can represent a good-faith effort to gather information that takes into account a range of perspectives and informs future actions. But, at worst, they can stall meaningful government action while giving the appearance of moving forward. Rather than looking for ways to intervene in the face of risk, public officials sometimes set up oversight and advisory groups to simply talk about the problem. Beginning in 2011, the General Assembly has consistently employed these measures in relation to shale gas development.

Formed in March of 2011, the Marcellus Shale Advisory Commission is one example of symbolic but inconsequential action. Many consider this body to have been largely theater on the study of health risks. The 30-person panel contained no public health agency representatives, and the General Assembly never enacted any of the health-related recommendations the commission made. (For more on this commission, see the “Governor’s Office” section.)

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<sup>62</sup> Bagenstose, K. (2018, May 7). DEP head talks water contamination, fracking, and funding during sit down with newspaper. *Bucks County Courier Times*. <https://www.buckscountycouriertimes.com/story/news/environment/2018/05/07/dep-head-talks-water-contamination/12295613007/>

Then, in 2013, Senate President Pro Tempore Joe Scarnati, a Republican, proposed the creation of a 13-member advisory panel to examine the health impacts of shale gas drilling. Scarnati had not been an advocate for the public's health in this arena. Instead, he was—and is—a staunch supporter of the shale gas industry.

Scarnati had drafted the Impact Fee proposal for Governor Corbett and was a strong supporter of Act 13. In the early shale boom year of 2010, Scarnati had taken in \$117,575 in campaign donations from energy companies, although he was not running again for two years.<sup>63</sup> In fact, The Philadelphia Inquirer reported that Scarnati received a free trip to the Super Bowl, compliments of Consol Energy.<sup>64</sup> He scored zero percent on PennEnvironment's Environmental Scorecard.<sup>65</sup> Between 2006 and 2012, according to Oil Change International, Scarnati had "accepted over \$200,00 from fossil fuel industry interests during each of the last two election cycles [2012 and 2008]. He has accepted a total of \$563,321 since 2006—the largest amount taken by any [Pennsylvania] state Representative or Senator."<sup>66,67</sup>

Scarnati's plan to create an advisory group was tabled and introduced again in early 2015 as a nine-member panel. "There has been much discussion regarding the potential effects of Marcellus Shale drilling on public health and safety," Scarnati wrote then in a co-sponsorship memo. "The creation of an advisory panel will provide Pennsylvania with a critical asset in addressing any current or future impacts arising from the development of the Marcellus Shale."<sup>68</sup> The board would be chaired by the state's DOH secretary, would include the head of the DEP, and would meet at least twice per year. The General Assembly was to appoint seven advisors, who would be required to have expertise in either public health, earth and mineral sciences, environmental studies, shale gas extraction, or the use of natural gas. All members of the bipartisan Senate Public Health and Welfare Committee voted in favor of the bill. However, the panel was never established.<sup>69</sup>

63 Barnes, T. (2010, October 20). Energy companies make big donations to Scarnati. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/news/state/2010/10/20/Energy-companies-make-big-donations-to-Scarnati/stories/201010200191>

64 Penn Live/Patriot-News. (2011, February 14). *Gas driller pays Pennsylvania state Senator Joe Scarnati's way for trip, ticket to Super Bowl*. [https://www.pennlive.com/midstate/2011/02/gas\\_driller\\_pays\\_pennsylvania.html](https://www.pennlive.com/midstate/2011/02/gas_driller_pays_pennsylvania.html)

65 PennEnvironment. (2020). *Pennsylvania Environmental Scorecard 2019-2020*. [https://pennenvironment.org/sites/environment/files/resources/2019-2020\\_PA\\_Environmental\\_Scorecard.pdf](https://pennenvironment.org/sites/environment/files/resources/2019-2020_PA_Environmental_Scorecard.pdf)

66 Oil Change International. (n.d.) <http://priceofoil.org/campaigns/separate-oil-and-state/dirty-energy-money/pennsylvania-analysis>

67 Barnes, T. (2010, October 20). Energy companies make big donations to Scarnati. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/news/state/2010/10/20/Energy-companies-make-big-donations-to-Scarnati/stories/201010200191>

68 StateImpact Pennsylvania. (2015, February 2). *Bill to monitor Marcellus Shale health effects reintroduced in state senate*. <https://stateimpact.npr.org/pennsylvania/2015/02/02/bill-to-monitor-marcellus-shale-health-effects-reintroduced-in-state-senate/>

69 StateImpact Pennsylvania. (2015, February 25). *Senate committee approves shale gas health bill*. <https://stateimpact.npr.org/pennsylvania/2015/02/25/senate-committee-approves-shale-gas-health-bill/>

Had the advisory panel been created, it may have given the appearance that something was being done, especially given the growing body of research finding associations between shale gas emissions and health impacts. However, since the panel could have met as infrequently as twice per year, it is unclear how much progress it could have accomplished in addressing “current or future impacts” from shale gas development. A panel with such a mandate, even if it had been created, would have been of limited utility for those making time-sensitive decisions at the municipal and state levels, let alone for those actually exposed to shale gas emissions.

### **WHAT COULD HAVE HAPPENED...**

The Commonwealth of Pennsylvania’s public health response to shale gas development could look very different today if not for decisions the General Assembly made that blocked health-protective measures in favor of industry-friendly ones. Had the General Assembly chosen to act in response to health risks already occurring, fewer Pennsylvanians may have suffered as they did, and continue to do.

There are a number of positive steps the General Assembly could have taken to ensure public health was protected from the harms posed by shale gas development. The General Assembly could have:

- Permitted all municipalities the power to enact ordinances and zoning that protect public health and allowed them to decide whether or not to host shale gas development at all.
- Required industry transparency of chemical information so doctors and patients could have had productive conversations about exposure, risk, and health outcomes.
- Allocated sufficient funding and clear directives to state agencies tasked with protecting public health.
- Discontinued the creation of unproductive committees or commissions used primarily as a stalling tactic.

Additionally, lawmakers have introduced specific pieces of shale gas legislation in the General Assembly that have focused on important health-protective measures, including tracing the use and disposal of frack fluids, closing waste loopholes, increasing setback distances between shale gas sites and residences, and more. Some of these bills have come on the heels of the Pennsylvania Grand Jury investigation

into shale gas development and the recommendations made there. (For more on the Grand Jury report, see the “Governor’s Office” and “Department of Health” sections.) Public health ought to be a nonpartisan issue. More members of the General Assembly could have considered the health of Pennsylvanians, moved these measures out of committees, and voted them into law.

The General Assembly is responsible for responding to the concerns of its constituents. A poll conducted in 2021 by the Ohio River Valley Institute found that 78% of Pennsylvania voters—of all political affiliations—are concerned about how pollution affects their community’s health, and 79% say they support requiring the shale gas industry to respond comprehensively to the health issues experienced by people living near drill sites.<sup>70</sup> Pennsylvanians want their health to be protected. Every member of the Senate and every member of the House of Representatives can help to do that today.

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<sup>70</sup> De Place, E. (2021, July 29). *Pennsylvania voters support a serious crackdown on fracking operations*. Ohio River Valley Institute. <https://ohiorivervalleyinstitute.org/dfp-poll/>





## GOVERNOR'S OFFICE

Three Pennsylvania governors—Ed Rendell, Tom Corbett, and Tom Wolf—governed during the first 18 years of shale gas drilling. All three demonstrated strong commitments to the shale gas industry and hailed it as a source of revenue for the state and an economic opportunity for Pennsylvanians. However, none of the three prioritized the protection of public health with respect to shale gas extraction.

Governor Rendell led the state throughout the beginning of the shale gas expansion, including early and unknown threats to public health that largely went ignored. Governor Corbett came into office eager to capitalize on Pennsylvania's extraordinary shale gas reserves. He established the Marcellus Shale Advisory Committee, eliminated the moratorium on drilling on state land, and was instrumental in the passage of Act 13 of 2012 in the General Assembly. Governor Wolf saw the creation of a health registry, reinstated a moratorium on drilling on state land, and authorized funding for research studies on childhood cancers and other health impacts associated with shale gas exposures—all generally positive steps—but none of these limited residents' exposure to toxic substances in their air and water, which continued to increase.

Governors have many tools at their disposal. If their party has majorities in the state Senate and House of Representative, they can have considerable power over lawmaking and budget-setting. Yet, even if their party does not have majorities, governors can still wield power there. Governors can also direct departments of the executive branch, such as the Department of Health (DOH) and the Department of Environmental Protection (DEP), which have significant regulatory or programmatic impacts. Finally, as heads of state, governors have a bully pulpit they can use to steer policy conversations and impact public opinion.

Each of Pennsylvania's governors could have pushed agency leadership and those in the General Assembly to look directly at the public health problem generated by shale gas operations. Each could have called on the public to support a moderated approach to shale gas drilling, one that took public health into consideration. In large part, none of them did these things.

### **ED RENDELL**

Governor Ed Rendell served as Governor of Pennsylvania from 2003 to 2011. Shale gas development in Pennsylvania began during his governorship, with the first unconventional well drilled in Washington County in 2004, followed by a great upsurge in 2008. In many ways, Governor Rendell set the stage for how subsequent governors' administrations would deal with shale gas development.

When shale gas development was in its infancy, Governor Rendell could have taken a more cautious, health-protective approach. Little was known about the potential health impacts from shale gas development, and many of the chemicals shale gas operators

used had not yet been identified or studied. Governor Rendell could have allowed time for independent researchers to determine whether the processes industry wanted to use in Pennsylvania were safe for residents. Instead, he took at face value the industry's claims that shale gas development was harmless. He allowed the industry to proceed unabated, without considering the immense risks to public health.

### **Early Violators Risk Public Health**

It was during the Rendell administration that industry watchdogs found shale gas operators to be responsible for large-scale well water contamination, spills of toxic chemicals, air pollution, and explosions.<sup>71</sup> One of the more well-known incidents occurred in Dimock Township in 2009. Cabot Oil and Gas was drilling shale gas wells in the community when several dozen families discovered that their water had been contaminated with large amounts of methane and toxic substances, including hazardous levels of barium, arsenic, and manganese. In one case, a resident's water well actually exploded.<sup>72</sup>

In response, Governor Rendell and the DEP fined Cabot \$120,000, barred it from drilling in Susquehanna County, and required that it provide clean water to the impacted residents in the form of water filters. In 2011, the DEP ruled that Cabot could halt providing replacement water to the families, saying the operator had met all its requirements.<sup>73</sup> However, residents continued to question the effectiveness of the water filters in protecting their families from harm.

The problems in Dimock highlight the inadequate regulatory approach Pennsylvania took to this new extractive technology from the start. The DEP had not yet developed adequate regulations targeting directional shale drilling, and the agency employed protective measures only after problems occurred. The state was left to mitigate damage and punish operators. Despite documenting more than 17,968 violations at shale gas well sites to date in Pennsylvania alone, the state's penalties and fines have been arguably light, often little more than a slap on the wrist.<sup>74</sup>

### **A Change of Heart?**

Governor Rendell, like the governors to come, saw shale gas development as a vital part of Pennsylvania's future. As late as 2013, he said, "If we choose to embrace natural gas, it will help us get past a number of significant economic and environmental

71 Litvak, A. (2016, August 3). Rendell would revisit drilling rules, but still supports fracking. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/business/powersource/2016/08/09/Rendell-would-revisit-how-early-drilling-was-regulated/stories/201608090004>

72 StateImpact Pennsylvania. (n.d.). *Dimock, PA: "Ground Zero" in the fight over fracking*. <https://stateimpact.npr.org/pennsylvania/tag/dimock/>

73 StateImpact Pennsylvania. (n.d.). *Dimock, PA: "Ground Zero" in the fight over fracking*. <https://stateimpact.npr.org/pennsylvania/tag/dimock/>

74 FracTracker Alliance (2021, November). *Pennsylvania Oil and Gas Data*. <https://www.fractracker.org/map/us/pennsylvania/>

challenges. On the other hand, if we let fear carry the day, we will squander another key moment to move forward together.”<sup>75</sup> Public health was never part of this equation.

During the Rendell Administration, drillers with little environmental concern were working in an industrial frontier with limited public policies to constrain their actions. Governor Rendell did push through modest regulatory reforms,<sup>76</sup> including two regulations that strengthened rules for how operators encased their wells and limited the discharge of fluids.<sup>77</sup> While these measures were intended to help to protect well water from contamination, they did nothing for other toxic emissions the industry continued to release.

In 2016, Governor Rendell admitted a shift in perspective, saying, “Natural gas fracking was a gold mine at the time. The rush to get the liquid gold out of the ground caused companies to essentially get cowboy drillers from the South, from Texas, who came in and drilled with very little concern for the environment. That’s where most of the methane that got into the groundwater came from.”<sup>78</sup>

### **TOM CORBETT**

Tom Corbett was elected in 2010 and served as Pennsylvania’s governor from 2011 to 2015. During his 2010 gubernatorial campaign, he was outspoken on his plan to aggressively pursue shale gas and advance legislation to minimize any potential governmental interference in this intensive and rapidly expanding resource extraction technology. He was also adamantly opposed to any form of severance taxation for shale gas extractors working in Pennsylvania, deriding this measure—which had long been in place in all other gas-producing states—as “un-American.” Governor Corbett was widely seen as being aligned with the emerging shale gas industry, a viewpoint bolstered by the large campaign donations he received from those with an interest in seeing the industry thrive at all costs.<sup>79</sup>

### **Marcellus Shale Advisory Commission**

As mentioned in the General Assembly section, in March of 2011, Governor Corbett established the Governor’s Marcellus Shale Advisory Commission. The stated goal for forming this group was to bring together a diverse set of experts to generate perspective and recommendations around the development of shale gas drilling in Pennsylvania. Governor Corbett’s executive order charged the commission first

<sup>75</sup> Litvak, A. (2016, August 3). Rendell would revisit drilling rules, but still supports fracking. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/business/powersource/2016/08/09/Rendell-would-revisit-how-early-drilling-was-regulated/stories/201608090004>

<sup>76</sup> Davis, C. (2014, March 3). Substate Federalism and Fracking Policies: Does state regulatory authority trump local land use autonomy? *Environmental Science & Technology*, 48, 8397-8403. [dx.doi.org/10.1021/es405095y](https://doi.org/10.1021/es405095y)

<sup>77</sup> Davis, C. (2014, March 3). Substate Federalism and Fracking Policies: Does state regulatory authority trump local land use autonomy? *Environmental Science & Technology*, 48, 8397-8403. [dx.doi.org/10.1021/es405095y](https://doi.org/10.1021/es405095y)

<sup>78</sup> Litvak, A. (2016, August 3). Rendell would revisit drilling rules, but still supports fracking. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/business/powersource/2016/08/09/Rendell-would-revisit-how-early-drilling-was-regulated/stories/201608090004>

<sup>79</sup> Rabe, B. (2013). Conventional politics for unconventional drilling? Lessons from Pennsylvania’s early move into fracking policy development. *Review of Policy Research* 30(3), 321-340. <https://doi.org/10.1111/ropr.12018>

with the duty of conducting a “complete review of existing and proposed statutes, legislation, regulation, and policies that either regulate or otherwise affect shale gas development.”<sup>80</sup> Second, the commission was to provide recommendations on a variety of issues, including steps needed to protect and conserve the environment, workforce development needs and opportunities, and policies designed to promote uses of methane gas and byproducts.<sup>81</sup> Despite some significant public health recommendations that the commission offered, Governor Corbett and the General Assembly chose to turn away from that guidance and largely ignored questions of public health risks.

Governor Corbett appointed 30 members to the Marcellus Shale Advisory Commission, led by Lieutenant Governor Jim Cawley. The breakdown of the group consisted of ten representatives from government (many acting secretaries and directors of agencies, but none from DOH), one representative from academia (a geoscience professor), four representatives from environmental groups, five representatives from “civil society” groups, and eleven representatives from industry.<sup>82</sup> Not only did the commission have more representation from the industry’s perspective than from public health or environmental positions, but there was not one medical or public health professional included in the group and not one public health researcher from the state’s own universities.<sup>83</sup> Instead, public health participation was limited to experts who were given an opportunity to provide feedback to the workgroups, including the Public Health, Safety, and Environmental Protection Workgroup.<sup>84</sup>

Despite its paucity of public health expertise, the Marcellus Shale Advisory Commission formulated one category of recommendations that would have provided public oversight of the fast-growing industry and would have empowered the DOH to play an important role in the shale gas arena. One notable recommendation was for Governor Corbett to create a permanent public health advisory panel, which would include the secretaries of the DOH and DEP. The panel would monitor the impacts of shale gas development by examining scientific advancements and public health data and technology.<sup>85</sup> The advisory panel would then be able to provide pertinent information to elected officials and agency policymakers.

80 Pennsylvania Department of Environmental Protection. (2011). Governor’s Marcellus Shale Advisory Committee Report. [https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC\\_Final\\_Report.pdf](https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC_Final_Report.pdf)

81 Pennsylvania Department of Environmental Protection. (2011). Governor’s Marcellus Shale Advisory Committee Report. [https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC\\_Final\\_Report.pdf](https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC_Final_Report.pdf)

82 Pennsylvania Department of Environmental Protection. (2011). Governor’s Marcellus Shale Advisory Committee Report. [https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC\\_Final\\_Report.pdf](https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC_Final_Report.pdf)

83 Rabe, B. (2013). Conventional politics for unconventional drilling? Lessons from Pennsylvania’s early move into fracking policy development. *Review of Policy Research* 30(3), 321-340. <https://doi.org/10.1111/ropr.12018>

84 Pennsylvania Department of Environmental Protection. (2011). Governor’s Marcellus Shale Advisory Committee Report. [https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC\\_Final\\_Report.pdf](https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC_Final_Report.pdf)

85 Pennsylvania Department of Environmental Protection. (2011). Governor’s Marcellus Shale Advisory Committee Report. [https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC\\_Final\\_Report.pdf](https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC_Final_Report.pdf)

Other recommendations from the commission were targeted directly at the DOH. These recommendations urged that the DOH should, in part:

- Work in partnership with graduate schools and other appropriate medical institutions to better protect and enhance the public health interests of citizens.
- Collect and evaluate clinical data provided by health care providers.
- Routinely evaluate and assess Marcellus shale-related environmental data.
- Create, or oversee the creation of, a population-based health registry with the purpose of characterizing and following over time individuals who live in proximity (i.e., one-mile radius) to gas drilling and production sites.
- Establish a system to provide for the timely and thorough investigation of and response to concerns and complaints raised by citizens, health care providers, or public officials.
- Educate health care providers on the presentation and assessment of human illness that may be caused by material in drilling constituents.
- Establish public education programs regarding the constituents used in the drilling process, potential pathways to humans, and at what level, if any, they have the potential to cause human illness.<sup>86</sup>

The DOH, likely at the behest of Governor Corbett, did not implement the vast majority of these recommendations, and the ones they did attempt to execute were so inadequate as to be nonexistent. It is worth noting that a commission handpicked by the Corbett Administration would recommend these proactive steps and that the Governor would follow through with so little in response.

In many ways, the Marcellus Shale Advisory Commission achieved an important goal with the depth and breadth of the public health recommendations it developed. Governor Corbett could have been at the forefront, nationally, for trying to manage the development of the industry alongside obligations to the health and safety of communities. Instead, he failed to champion these important public health recommendations.

### **Act 13**

As discussed in the General Assembly section, the most consequential legislative effort to date regarding shale gas development was Act 13, which Governor Corbett signed into law in 2012. Governor Corbett was a powerful and committed supporter of Act 13.

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<sup>86</sup> Pennsylvania Department of Environmental Protection. (2011). Governor's Marcellus Shale Advisory Committee Report. [https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC\\_Final\\_Report.pdf](https://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC_Final_Report.pdf)

Said Governor Corbett, “We are building a stronger Pennsylvania by harnessing our abundant resources to create jobs for working families, reinvest in our local communities, and protect our environment for generations to come. Through Act 13, we are protecting public health and safety, safeguarding our environment, and making sure our world-class energy industry grows in a responsible way.”<sup>87</sup>

While Governor Corbett’s claims about jobs and community investment have not lived up to the boosterism, the claim that Act 13 was going to protect public health completely missed the mark, even after the courts struck down some of Act 13’s unconstitutional and potentially health-harming provisions.<sup>88</sup>

### Drilling on State Land

In 2014, Governor Corbett lifted the three-year moratorium for drilling on state land, which his predecessor, Ed Rendell, had set. Through Executive Order 2014-3, “Leasing of State Forest and State Park Land for Oil and Gas Development,” Governor Corbett permitted limited leasing of shale gas extraction but only when the gas is extracted horizontally through wells located on adjacent private lands or done on previously leased areas of the state forest. According to the order, this move would, in part, enable the state to prioritize and acquire privately owned oil, shale gas, and other mineral rights underlying high-value surface lands owned by the Pennsylvania Department of Conservation and Natural Resources.<sup>89,90</sup>

Democratic lawmakers spoke out in opposition to Order 2014-3, and eight environmental groups issued the following statement: “Governor Tom Corbett’s decision to lift a three-year-old moratorium to expand leasing of public lands for gas development underscores the short-sighted nature of his stewardship of our natural resources.”<sup>91</sup> By reversing the moratorium, Governor Corbett allowed for more air pollution, more truck traffic, more water withdrawals, more toxic wastewater, and a higher chance for accidents on state lands—all of which placed public health at higher risk.

87 Pennsylvania Office of the Governor (2014, April 4). Pennsylvania Governor Corbett Announces Act 13 Impact Fee Revenues To Surpass \$630 Million; Majority of Funds Directed Toward Community Investments [Press release]. <https://www.prnewswire.com/news-releases/pennsylvania-governor-corbett-announces-act-13-impact-fee-revenues-to-surpass-630-million-majority-of-funds-directed-toward-community-investments-253903701.html>

88 Mayfield, E.N., Cohon, J.L., Muller, N.Z., Azevedo, I.M., & Robinson, A.L. (2019). Cumulative environmental and employment impacts of the shale boom. *Nature Sustainability*, 2,1122-1131. <https://doi.org/10.1038/s41893-019-0420-1>

89 Leasing of State Forest and State Park Land for Oil and Gas Development, 2014-03 (2014, May 23). Commonwealth of Pennsylvania Office of the Governor [Executive Order]. [https://www.pedf.org/uploads/1/9/0/7/19078501/corbett\\_executive\\_order\\_2014\\_03.pdf](https://www.pedf.org/uploads/1/9/0/7/19078501/corbett_executive_order_2014_03.pdf)

90 Pennsylvania Department of Conservation and Natural Resources (2014, May 23). Gov. Corbett issues executive order protecting state forests, parks from gas leasing that involves surface disturbance. *Resource* [newsletter]. <http://www.apps.dcnr.state.pa.us/news/resource/res2014/14-0528-execorder.aspx>

91 PA Environment Digest. (n.d.). *Corbett order outlines ground rules for leasing additional DCNR land for drilling*. <http://www.paenvironmentdigest.com/newsletter/default.asp?NewsletterArticleID=28847>

After leaving office, Tom Corbett wrote of the private sector jobs his administration had created by backing shale gas development.<sup>92</sup> While he may have fashioned a more business-friendly climate, it is clear from his actions in office that he invested no political or financial capital in balancing shale gas development with public health—including the health of frontline workers whose jobs he helped to create.

### **TOM WOLF**

Even before taking office, Tom Wolf summed up his views on shale gas development by saying he believed it was possible to ensure that industry operations were done “right from an environmental point of view, from a health point of view.”<sup>93</sup>

Indeed, Tom Wolf entered office with a public health handicap his predecessor had created. Neil Shader, a spokesperson for the DEP under Governor Wolf, said (in a later statement made on behalf of DEP, DOH, and Governor Wolf), “The Wolf Administration inherited a flawed ideological approach to regulation of unconventional oil and gas development that was forced on the Departments of Environmental Protection (DEP) and Health (DOH) by the Corbett Administration, which promoted the rapid expansion of natural gas development and profit above these other priorities.”<sup>94</sup>

Although he opposed a statewide ban on shale gas development in Pennsylvania, Governor-elect Wolf did support a moratorium in the Delaware River basin and on new leasing in state parks and forests. He also said that one of his priorities was to create a health registry that would monitor impacts in heavy drilling areas.<sup>95</sup> As noted previously, the Corbett Administration’s commission also proposed the idea of a health registry, in 2011, but the General Assembly never funded it.

Governor-elect Wolf said his administration would be “open and transparent about what our health challenges are,” and he directed some members of his transition team to review New York’s health report, which outlined the risks posed by shale gas development and resulted in a statewide ban in New York. He said, “What we’ll find is in the absence of good regulations, in the absence of a strong concern for health, you have problems. I think we ought to do this right.”<sup>96</sup>

Governor Wolf did go further than his predecessors in saying that health consequences of shale gas development need to be examined, but a look at his agencies’ practices (DEP and DOH, in particular) reveals that industry operators were still able to conduct business in a way that did not protect Pennsylvania residents from harm. While

92 Lord, R. (2015, July 27). How Pennsylvania gas industry gained Corbett influence. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/news/state/2015/07/27/How-gas-industry-gained-Corbett-influence/stories/201507270009>

93 StateImpact Pennsylvania. (2014, December 18). *Wolf: New York’s fracking ban is “unfortunate.”* <https://stateimpact.npr.org/pennsylvania/2014/12/18/wolf-new-yorks-fracking-ban-is-unfortunate/>

94 Environmental Health News (2021, April 27). PA Gov. *Wolf administration responds to EHN’s ‘Fractured’ reporting.* <https://www.ehn.org/fracking-pa-gov-tom-wolf-2652636016.html>

95 StateImpact Pennsylvania (2014, December 18). *Wolf: New York’s fracking ban is “unfortunate.”* <https://stateimpact.npr.org/pennsylvania/2014/12/18/wolf-new-yorks-fracking-ban-is-unfortunate/>

96 StateImpact Pennsylvania (2014, December 18). *Wolf: New York’s fracking ban is “unfortunate.”* <https://stateimpact.npr.org/pennsylvania/2014/12/18/wolf-new-yorks-fracking-ban-is-unfortunate/>



Governor Wolf introduced the topic of residents' health into the public conversation on shale gas development, the actions he took were insufficient to make public health a policy imperative that would truly protect Pennsylvanians from health harms.

### **Impact Fee & Severance Tax**

Early in his term, Governor Wolf made clear his intention to advocate for a transition from the Act 13 impact fee to a severance tax on shale gas production.

In comparison to the severance taxes levied in all other gas-producing states, the impact fee is a set annual fee that producers must pay based on each well drilled during the year and the average price of natural gas. It brings the state a relatively small proportion of the value of shale gas produced in Pennsylvania. A severance tax, on the other hand, is closely tied to actual gas production amounts and would have generated far more revenue for the state than impact fees.

Governor Wolf advocated for a severance tax on drilling to pay for social services, education, and health programs, among other state priorities.<sup>97</sup> The added funds might also have funded the shale gas health registry he seemed eager to establish. For much of his tenure, Governor Wolf has pushed for the severance tax in legislative sessions but has failed to get the majority support needed in the General Assembly to make the severance tax a reality in Pennsylvania.

### **Health Registry**

As Governor Corbett's Marcellus Shale Advisory Commission had unsuccessfully recommended several years before, Governor Wolf advocated for the creation of a health registry to track potential health impacts residents were reporting in areas near shale gas development. In March 2015, Governor Wolf allocated \$100,000 in his proposed fiscal budget to set up the long-discussed registry, but this line item failed to make it through the legislature.<sup>98</sup>

At times, the DEP and DOH had reportedly talked about how to work together on the health registry issue. Former DEP Secretary John Quigley, who served from 2015 to 2016, said he took the need for a health registry seriously. In reference to the previous failed attempts at funding a registry, he said, "If that doesn't pass, we'll have to look for plan B. This is an issue that's not going away. There are questions. They need to be dealt with in a transparent way."<sup>99</sup>

Prior to the creation of a shale gas health registry, the DOH was collecting information—in a less systematic manner—by logging calls to the department from concerned residents. Finally, in 2017, the state created Pennsylvania's public health

97 Chalfant, B.A., Corrigan, C.C. (2018). Governing Unconventional Oil and Gas Extraction: The case of Pennsylvania. *Review of Policy Research*. <https://doi.org/10.1111/ropr.12319>

98 StateImpact Pennsylvania (2015, May 20). *Public health advocates push for Marcellus shale registry*. <https://stateimpact.npr.org/pennsylvania/2015/05/20/public-health-advocates-push-for-marcellus-shale-registry/>

99 StateImpact Pennsylvania (2015, May 20). *Public health advocates push for Marcellus shale registry*. <https://stateimpact.npr.org/pennsylvania/2015/05/20/public-health-advocates-push-for-marcellus-shale-registry/>



registry to log complaints from residents who report negative health impacts from shale gas development.<sup>100</sup> By the end of 2021, the registry had recorded 140 complaints, encompassing impacts on 219 people.<sup>101</sup> Getting the registry established was an important accomplishment for Governor Wolf. (See the “Department of Health” section for more detail on the registry’s effectiveness.)

### **Drilling on State Land**

After Governor Corbett had rescinded the moratorium on drilling on state land, Governor Wolf reinstated it. In 2015, Governor Wolf enacted Executive Order 2015-03, which again called for a drilling moratorium on state land, renewing the policy observed under Governor Rendell. The new order specified that “no state park or state forest lands owned and or managed by the Department of Conservation and Natural Resources (DCNR) can be leased for oil and gas development.” The reasoning behind this decision was that “leasing of State Forest land or State Park land for oil and gas development would jeopardize DCNR’s ability to fulfill its legislative duty to conserve and maintain these public natural resources, and to sustain its FSC [Forest Stewardship Council] forest certification.”<sup>102</sup>

This executive order was an important one for protecting against forest and habitat loss, soil erosion, increased fragmentation, and movement of invasive species, including plants and insects, and Governor Wolf should be commended for that. It is important to note, however, that while Governor Wolf sought and achieved protections for Pennsylvania’s land and ecosystems, the moratorium did very little to protect residents exposed to pollution from shale gas development.

### **Chapter 78a**

Outside of Act 13 and the lawsuits that followed, the most significant state rulemaking governing shale gas and oil was the Chapter 78a regulations placed in the Pennsylvania Code in 2016. Titled “Environmental Protection Performance Standards at Oil and Gas Well Sites,” Chapter 78a was a critical (although not timely) update of the earlier Chapter 78, which was approved in 1989, before the emergence of shale gas drilling.<sup>103</sup> From the earliest days of shale gas drilling up until 2016, the shale gas industry was conducting its drilling, fracturing, and processing activities under regulations that were not written for the new industrial enterprise and the new risks it posed to communities and the environment. Chapter 78a was an important but insufficient development in the state’s approach to shale gas.

100 Pennsylvania Department of Health Oil and Natural Gas Production Health Concerns, ONGP Health Registry. Accessed 1/25/22 at: <https://www.health.pa.gov/topics/envirohealth/Pages/OilGas.aspx - registry>

101 Pennsylvania Department of Health (2021). *ONGP Quarterly Report Quarter 1. Oil and natural gas production (ONGP) health concerns*. [https://www.health.pa.gov/topics/Documents/Environmental Health/January-March 2021.pdf](https://www.health.pa.gov/topics/Documents/Environmental%20Health/January-March%202021.pdf)

102 Governor Tom Wolf (2015, January 29). *Executive Order: 2015-03, Leasing of state forest and state park land for oil and gas development* [Press release]. <https://www.governor.pa.gov/newsroom/executive-order-2015-03-leasing-of-state-forest-and-state-park-land-for-oil-and-gas-development/>

103 Chalfant, B.A., Corrigan, C.C. (2018). *Governing Unconventional Oil and Gas Extraction: The case of Pennsylvania*. Review of Policy Research. <https://doi.org/10.1111/ropr.12319>

Chapter 78a reflected a long-fought, highly contentious process that began in 2011. It spanned three gubernatorial administrations, involved 12 public hearings and 20 advisory group meetings, and generated more than 28,000 public comments. In October 2016, Pennsylvania's Environmental Quality Board published the final Chapter 78a rulemaking.<sup>104</sup>

Major areas of the rulemaking provided regulations that were—and are—relevant to the public's health. Included in the Chapter 78a regulations are guidelines and standards for public resource impact screening, water supply replacement, waste management and disposal, and identification and monitoring of select shale gas wells. Other new regulations include standards or practices for well development impoundments, the closure or permitting for wastewater impoundments, onsite wastewater processing, site restoration, borrow pits, and the reporting and remediation of spills and releases.<sup>105</sup>

The final negotiations and passage of Chapter 78a were a significant step in recognizing the distinctions between earlier, conventional gas development and the new drilling, which integrated novel fracturing fluid that could produce known and unknown health risks. Further, the volumes of flowback and produced water from the Marcellus and Utica shales, which have high levels of salts and radioactive elements, are greater than with conventional wells.

Many of the regulations are designed to curb air pollution and exposure to air toxics as well as reduce the risk of contaminated household water. In DEP's news release, then DEP Secretary John Quigley explained: "We want to make sure we are doing everything we can to protect health and the environment and, given the time frame it takes to get regulations enacted, it's clear to us that we need to begin immediately on the next set of regulatory proposals."<sup>106</sup>

Despite this pivotal change in regulations, residents were still left largely unprotected. When looking at multiple data streams on health risk and impacts collected since 2016, and considering the new regulations through a public health lens, residents living in the midst of shale gas development continue to experience a wide array of health issues and are exposed to a higher-than-normal risk of future health problems. Exposures to air and water contaminants still endanger residents, especially vulnerable populations. Shale gas sites have continued to be constructed too close to homes, schools, and other places where people work and play. Consequently, respiratory, cardiovascular, developmental, and other health impacts have continued to rise.

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<sup>104</sup> Pennsylvania Department of Environmental Protection (n.d.). Oil and gas surface regulations. <https://www.dep.pa.gov/Business/Energy/OilandGasPrograms/OilandGasMgmt/Public-Resources/pages/oil-and-gas-surface-regulations.aspx>

<sup>105</sup> StateImpact Pennsylvania (2016, February 3). *Board approves states new oil and gas regulations*. <https://stateimpact.npr.org/pennsylvania/2016/02/03/board-approves-states-new-oil-and-gas-regulations/>

<sup>106</sup> National Law Review (2016, January 7). *Pennsylvania DEP moves forward with oil and gas rulemaking despite legal and political challenges*. 12(37). <https://www.natlawreview.com/article/pennsylvania-dep-moves-forward-oil-and-gas-rulemaking-despite-legal-and-political>

## Cancer Concerns

Under Governor Wolf, the risk and incidence of cancer—particularly Ewing’s sarcoma—near shale gas sites captured public attention. In early 2019, the Pittsburgh Post-Gazette reported at least 27 cases of Ewing sarcoma, a rare bone cancer occurring in children, diagnosed from 2008 to 2018 in Southwestern Pennsylvania.<sup>107</sup> In the spring of 2019, a letter signed by more than 100 organizations and 800 individuals asked Governor Wolf to “order the state Health Department to conduct a comprehensive investigation into cancers diagnosed in all counties where shale gas drilling, fracking and infrastructure buildout has occurred.”<sup>108</sup> The letter also called on Governor Wolf to pause new drilling until more is known about the health risks.

Governor Wolf responded to these concerns by defending the shale gas industry. He said in a written statement that the industry “is providing economic benefits to the commonwealth” and that the DEP is thoroughly regulating it. He also said, “Despite powerful opposition, we have put in place new protections to more rigorously protect the air we breathe, the water we drink and the land where we live.”<sup>109</sup>

The concern over cancer cases in Fayette, Greene, Washington, and Westmoreland counties, however, was rising, along with the call for direct action. In June 2019, the Environmental Health Project hosted a community meeting where experts in cancer research were on hand to provide information and answer questions from more than 200 residents concerned about the cancer risk to their families.<sup>110</sup> Soon after, in October 2019, the Pennsylvania DOH presented a statistical analysis to residents at a community meeting purporting to show, from an epidemiological standpoint, why it believed a Ewing sarcoma cluster did not, at this time, exist in the region. This despite what seemed to many in the community to be an alarming number of cases.<sup>111</sup> Families of children and young adults who had died from Ewing sarcoma were not convinced that there was no relationship among these cases. Some of them drove to Harrisburg to petition Governor Wolf directly. (For more on the DOH response to the Ewing sarcoma cancer risks, see the “Department of Health” section.)

107 Templeton, D., Hopey, D. (2019, May 14). Are the 27 cases of Ewing sarcoma near Pittsburgh a cluster? *Pittsburgh Post-Gazette*. <https://newsinteractive.post-gazette.com/ewing-sarcoma-cancer-cluster-pittsburgh-washington-westmoreland/>

108 Frazier, R. (2019, June 28). ‘Something’s wrong here’: Washington County parents want pa. to look deeper at whether fracking could be related to cancer cases. StateImpact Pennsylvania. <https://stateimpact.npr.org/pennsylvania/2019/06/28/somethings-wrong-here-washington-county-parents-want-pa-to-look-deeper-at-whether-fracking-could-be-related-to-cancer-cases/>

109 Frazier, R. (2019, June 28). ‘Something’s wrong here’: Washington County parents want pa. to look deeper at whether fracking could be related to cancer cases. StateImpact Pennsylvania. <https://stateimpact.npr.org/pennsylvania/2019/06/28/somethings-wrong-here-washington-county-parents-want-pa-to-look-deeper-at-whether-fracking-could-be-related-to-cancer-cases/>

110 WTAE-TV. (2019, June 19). Community meeting held to discuss childhood cancers in southwestern, Pennsylvania. <https://www.wtae.com/article/community-meeting-held-to-discuss-childhood-cancers-in-southwestern-pennsylvania/28092481>

111 Erdley, D. (2019, October 12). Southwestern Pennsylvania residents renew calls for research on possible health impact of fracking. *Pittsburgh Tribune-Review*. <https://triblive.com/local/regional/southwestern-pennsylvania-residents-renew-calls-for-research-on-possible-health-impact-of-fracking/>

Only after this last show of community fear and outrage did Governor Wolf decide to act. In November 2019, the Governor announced that his administration planned to spend \$3.9 million on two studies to explore health effects associated with shale gas development—one study focused on rare childhood cancers, the second investigating other health impacts documented by researchers.<sup>112</sup> In December 2020, that pledge was lowered to \$2.5 million, and it was announced that the funding for the studies would go to researchers at the University of Pittsburgh.<sup>113</sup> Begun in 2021, the studies were expected to take at least two years to complete.

## THE GRAND JURY REPORT

Looking back over the history of the shale gas boom, it becomes clear that none of Pennsylvania’s governors did much to protect public health in the face of shale gas development. Nowhere was this made more clear than in the 2020 Pennsylvania 43rd Statewide Investigating Grand Jury Report, which took a hard look at the state’s oversight of shale gas development.<sup>114</sup> The Grand Jury Report was, in places, scathing in its review of the state’s handling of shale gas emissions, its deference to the industry, and its failure to consider the health of Pennsylvanians.

The Grand Jury Report did not hold Pennsylvania’s governors directly responsible but rather called out the agencies under control of each governor, specifically DEP and DOH, for failing to protect the public from harm or to provide community health guidance and other public health interventions and surveillance. In announcing the Grand Jury report, Pennsylvania Attorney General Josh Shapiro said: “It’s the government’s job to set and enforce the ground rules that protect the public interest. Through multiple administrations, they failed.”<sup>115</sup>

This failure, however, was not simply the result of inaction. According to the Grand Jury Report, elected officials worked together with industry to send one clear message: “Leave fracking alone.” Attorney General Shapiro said, “Sadly, too many DEP employees listened.” The agency’s leadership, he added, is “too cozy” with the industry.<sup>116</sup>

112 Frazier, R. (2019, November 22). *State to fund studies on fracking and cancers, other health effects*. StateImpact Pennsylvania. <https://stateimpact.npr.org/pennsylvania/2019/11/22/state-to-fund-studies-on-fracking-and-cancers-other-health-effects/>

113 McDevitt, R. (2020, December 23). *State gives \$2.5 million to Pitt to study health impacts of fracking*. StateImpact Pennsylvania. <https://stateimpact.npr.org/pennsylvania/2020/12/23/state-gives-2-5-million-to-pitt-to-study-health-impacts-of-fracking/>

114 Commonwealth of Pennsylvania Office of the Attorney General. (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

115 Frazier, R., Phillips, S. (2020, June 25). *Pa. grand jury report on fracking: DEP failed to protect public health*. State Impact Pennsylvania. <https://stateimpact.npr.org/pennsylvania/2020/06/25/pa-grand-jury-report-on-fracking-dep-failed-to-protect-peoples-health/>

116 Frazier, R., Phillips, S. (2020, June 25). *Pa. grand jury report on fracking: DEP failed to protect public health*. State Impact Pennsylvania. <https://stateimpact.npr.org/pennsylvania/2020/06/25/pa-grand-jury-report-on-fracking-dep-failed-to-protect-peoples-health/>

With respect to the DOH, the Grand Jury Report stated that this agency “is still in a state of denial about the potential effects of fracking-generated substances on human beings.” The report goes on to say that the “DOH continued to ignore the public health effects of fracking. The absence of any meaningful public health response from our government to the fracking phenomenon continued for years.” The Grand Jury, however, did not lay all the blame for inaction on the DOH, saying, “Despite DOH’s capacity to address a wide variety of public health problems, nothing was developed to address the health effects of fracking. There were simply no resources or policies implemented to do so.”<sup>117</sup>

Governor Wolf and the state agencies have disputed parts of the Grand Jury Report, which leaves some to speculate whether these officials, whose jobs are to protect the interests of the public, have yet to understand just how greatly they have placed the health of Pennsylvanians at risk.

### WHAT COULD HAVE HAPPENED

The public health failures Pennsylvania’s governors have demonstrated with respect to shale gas development were not inevitable; they were choices. The only constraints were political. Article I, Section 27, of the Pennsylvania Constitution guarantees its citizens the right to clean air and pure water.<sup>118</sup> In the rush to extract as much gas from the ground as quickly as possible, Pennsylvania’s most powerful public servants failed to abide by the state’s most basic and fundamental laws:

“The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania’s public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.” Article 1, Section 27 of the Constitution of the Commonwealth of Pennsylvania

In the past, Pennsylvania governors and the agencies they direct have taken successful steps to protect public health in the face of other health crises. DOH Secretary Calvin Johnson (during the Rendell administration) spearheaded an effort to institute HIV/AIDS testing and early detection. Under the aegis of DOH Secretary Rachel Levine (during the Wolf administration), rules were changed allowing police

<sup>117</sup> Commonwealth of Pennsylvania Office of the Attorney General. (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

<sup>118</sup> Constitution of the Commonwealth of Pennsylvania, Joint Resolution No. 3. (1971, May 18). <https://www.legis.state.pa.us/cfdocs/legis/LI/consCheck.cfm?txtType=HTM&ttl=00&div=0&chpt=1&sctn=27&subsctn=0>

officers to carry naloxone to save countless lives from opioid overdoses. The Rendell and Wolf administrations respectively set these policy priorities with or without the concurrence of the General Assembly.

It is easy to imagine how the shale gas development narrative could have played out differently if Pennsylvania's governors would have taken decisive steps toward protecting public health. Governors could have:

- Taken more direct action in demanding health protections for Pennsylvania residents, relying on the constitutional guarantee to clean air and pure water.
- Worked with the General Assembly to pass legislation that would have halted or slowed the growth of shale gas development until health impacts were more fully researched.
- Directed the agencies they oversee to include health protections in policies regulating the industry.
- Successfully lobbied for more funding from the General Assembly to support the specific shale gas-related work of these agencies.
- Used their bully pulpits to advocate for health-protective legislation and to inform the public about associated health risks.

If Pennsylvania's governors had committed to protecting public health with regard to shale gas development, far fewer residents would have suffered the kinds of health impacts they have experienced under health-negligent policies. Sadly, this is still the case today.



# THE PENNSYLVANIA DEPARTMENT OF HEALTH

As Pennsylvania's chief public health agency, the Department of Health (DOH) bears an outsized responsibility for failing to protect frontline residents in the face of shale gas development, though it is also fair to say that both the General Assembly and the three Governors' Administrations, to a significant degree, set the stage for DOH inaction.

The DOH leadership has authority and responsibility over many public health programs and initiatives, but its work is controlled in important ways by the Governor's choice of the DOH Secretary and by the agenda each Governor promotes. Further, the DOH's work can be constrained by the General Assembly's decisions on budget allocations that, when insufficient, can prevent the DOH from pursuing projects or initiatives it would undertake if funding was readily available. It is within this context that state government set health policies that hampered systematic data collection, ignored assessments of community health, and prevented a purposeful public health response to risks posed by shale gas emissions.

While the lack of clear policy directives and legislative constraints have impeded the DOH's work with respect to shale gas development, the agency nevertheless has failed in its own right to protect public health. It has not yet publicly acknowledged the shale gas risks that warrant better investigations and increased protection measures. Instead, the DOH has focused its attention on trying to argue the limitations in epidemiologic (the study of incidence and distribution of diseases) and other forms of research. It has overlooked the strengths of such research, which can reveal robust biologic plausibility, withstand statistical challenges, and be measured against other epidemiologic research. In doing so, the DOH has failed to give enough weight to the argument that exposures to shale gas operations are associated with an array of health outcomes. It has refrained from providing insight and guidance to Pennsylvania communities, industry operators, and other government officials. As a result, the DOH's reluctance over the years to search for evidence of shale gas health impacts has caused many Pennsylvania residents to become skeptical that the DOH has their best health interests in mind.

In the past, the DOH has often failed to take significant actions to protect communities and been too restrained when it did. However, the DOH has the institutional tools and structure in place to better address the issue, assuming it has the support of the Governor's Office and the General Assembly. The DOH, in particular, should be guided by the precautionary principle—an ideal for environmental decision-making that has four components: taking preventative action in the face of uncertainty, shifting the burden of proof to the proponents of an activity, exploring a wide range of alternatives to possibly harmful actions, and increasing public participation in decision making.<sup>119</sup>

119 Kriebel, D., Tickner, J., Epstein, P., Lemons, J., Levins, R., Loechler, E. L., Quinn, M., Rudel, R., Schettler, T., & Stoto, M. (2001). The precautionary principle in environmental science. *Environmental health perspectives*, 109(9), 871–876. <https://doi.org/10.1289/ehp.01109871>

Rigorous adherence to the precautionary principle would allow the DOH to act more forcefully in protecting the health of Pennsylvanians exposed to shale gas emissions. To date, however, the DOH has not measured up.

## **DOH ROLE IN GOVERNMENT**

The DOH has a public responsibility to protect Pennsylvanians from harmful pollution. This responsibility is embedded in its mission and reflected in its programs and staffing. However, the DOH's historical response to shale gas development, whether intentional or not, reveals an avoidance of this responsibility.

### **Role of DOH**

The DOH's mission is stated broadly: "The mission of the Pennsylvania Department of Health is to promote healthy behaviors, [to] prevent injury and disease, and to assure the safe delivery of quality health care for all people in Pennsylvania."<sup>120</sup>

As in most states, the Pennsylvania DOH is an arm of the Executive Branch and can be either tightly or loosely influenced by the Governor, who chooses the DOH Secretary. Many of DOH's duties are long-standing and rarely get politicized, although there are often debates in the legislature about budgets, including the DOH's. The agency is comprised of twelve bureaus, including bureaus for communicable disease, emergency medical services, epidemiology, facility licensure and certification, health promotion and risk reduction, health statistics and registries, and managed care, among others. Unlike some agencies, such as the Department of Environmental Protection (DEP), the DOH does not create and implement regulations related to oil and gas development. The DOH can, however, take action in certain areas of policy or oversight. For instance, the DOH conducts inspections of nursing homes, which can result in sanctions if a facility is found to be out of compliance.

On its website, the DOH lists more than 50 programs it administers across many public health areas, including chronic renal disease, vaccines, newborn screening, and oral health. The environmental health area includes programs and initiatives that address health assessments, per- and polyfluoroalkyl substances (PFAS),<sup>121</sup> occupational safety and health, and oil and gas, just to name a few. In recent years, the DOH has been in the spotlight for its effective handling of two major public health crises: opioid addiction and COVID-19.

The DOH can protect the public's health from environmental threats by preventing harm in the first place or by thwarting additional harm by detecting disease early and halting or slowing it. While it may not be fully funded and staffed for it, the DOH has tools it can use to protect the public against environmental threats like shale gas development. Like most state health departments, the DOH can provide public health

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<sup>120</sup> Pennsylvania Department of Health. (n.d.). *About the Department of Health*. <https://www.health.pa.gov/About/Pages/About.aspx>

<sup>121</sup> Per- and polyfluoroalkyl substances (PFAS) are widely used, long-lasting chemicals found in air, water, soil, and even everyday items and food. They may be linked to many harmful health effects.



information and guidance, conduct health surveillance, and evaluate public health outbreaks or threats, among other interventions.

More specifically with respect to the health impacts of shale gas development, the DOH includes a Division of Environmental Health Epidemiology. Residents can report their environmental health concerns, and this division will evaluate the concern and refer the resident to an appropriate program for follow-up, if needed. Staff can look at sampling data, work with the DEP, and provide advice to individuals and their health care providers when deemed appropriate. Under some circumstances, a DOH environmental health staff member will collaborate with federal, state, county, and local officials, as well as with healthcare providers and the public, to address environmental health issues.<sup>122</sup> The DOH's relationship with the federal Agency for Toxic Substances and Disease Registry (ATSDR) is one such example of how the DOH works with the federal government to address environmental health issues.

### **Underlying Themes of DOH's Shale Gas Response**

The DOH does acknowledge the potential for health impacts from shale gas development. As recently as February 2022, the DOH stated on its website:

UONGD [Unconventional Oil and Natural Gas Development] may negatively impact water, air and soil quality. It may also involve excessive noise, light and vibrations from seismic testing and cause vehicular injuries from increased truck traffic or other injuries or emergencies from well explosions or flooding. What is more are the mainly mental health impacts related to the disruption of rural communities and the influx of young male workers. Together these factors may directly impact health or indirectly impact health through increased stress, anxiety and reduced sleep. For workers and their families and sensitive populations (e.g., pregnant women, children and elderly), the health consequences of UONGD may be more severe.<sup>123</sup>

Yet, this is an ambiguous statement that minimizes the public health problems caused by shale gas development. The harms the DOH stresses here are vehicular injuries from truck traffic and other injuries or emergencies, as well as mental health impacts. It places these as the precursors to other (unnamed) health impacts, as though chemicals, radioactivity, and combustion emissions are not the sources of any significant problems. As discussed earlier in this paper, shale gas infrastructure does negatively impact water and air quality (soil is less well studied). That is no longer an open question. In fact, almost all shale gas activity results in air contamination, some of which definitively results in health impacts—associations with respiratory, cardiac, neurologic, developmental, and other poor health outcomes.

<sup>122</sup> *Reporting an environmental health concern.* (n.d.). Pennsylvania Department of Health. <https://www.health.pa.gov/topics/envirohealth/Pages/Contact-Environmental-Health.aspx>

<sup>123</sup> *Oil and natural gas production health concerns.* (n.d.). Pennsylvania Department of Health. <https://www.health.pa.gov/topics/envirohealth/Pages/OilGas.aspx>

When Pennsylvania Attorney General Josh Shapiro called a grand jury to investigate environmental and health impacts, as well as wrongdoing by shale gas companies and the Pennsylvania government, he identified numerous shortcomings in the DOH's response to shale gas activity. Report 1 of the Forty-Third Statewide Investigating Grand Jury, released in June 2020, focused closely on the harms residents experienced and the failures of the government to provide proper oversight of the industry. When the DOH was asked for its view on whether shale gas operations harm public health, the DOH expressed its skepticism, saying, "[T]he science in this area is developing, and it is fair to say that it has not been proven that fracking harms public health." The DOH further noted that "'association' is not the equivalent to 'causation,'" and that further research was required to substantiate a causal connection between fracking and harms to public health.<sup>124</sup>

Time and time again, the DOH has insisted that not enough is yet known about the health harms of shale gas emissions. As a result, the DOH has stopped short of any meaningful action that might have interrupted exposures to toxic chemicals and prevented health issues. This reluctance to take action can be seen in many specific aspects of the DOH's response.

## HEALTH REGISTRY

The creation and funding of the shale gas health registry was discussed earlier in this paper because it was an action that never gained any real traction in the legislature, even after it was recommended by Governor Corbett's Marcellus Shale Advisory Commission as early as 2011. According to the DOH website, a statewide shale gas registry was launched in 2017, although it was built on a process of information-recording already happening at the DOH prior to that.<sup>125</sup>

The DOH explains the rationale behind the health registry on its website:

Both unconventional and conventional wells are often located near residential areas, and there are growing concerns among the public, media and researchers about environmental contamination of water, air and soil from drilling and associated operations (e.g., pipelines, compressor stations, wastewater storage). These concerns have raised numerous questions about adverse health impacts associated with ONGP and especially with unconventional oil and natural gas development (UONGD) in light of the recent increase in UONGD activities. In response to these concerns, the Division of Environmental Health Epidemiology created a separate program area dedicated to UONGD.<sup>126</sup>

124 Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

125 *Oil and natural gas production health concerns*. (n.d.). Pennsylvania Department of Health. <https://www.health.pa.gov/topics/envirohealth/Pages/OilGas.aspx>

126 *Oil and natural gas production health concerns*. (n.d.). Pennsylvania Department of Health. <https://www.health.pa.gov/topics/envirohealth/Pages/OilGas.aspx>

Curiously, the rationale the DOH provided for the health registry seems to raise significantly more unease over health impacts related to shale gas development than the DOH’s oil and gas health concerns page (see above). Even more curious, in February 2018, House Representative Karen Boback introduced House Bill 2055 (co-sponsored by 11 other House members) “to create a population-based health registry,” with the purpose being “to elevate the potential public health impacts associated with drilling in the Marcellus Shale for those individuals who live in close proximity to production sites.”<sup>127</sup> The bill was sent to the Health Committee of the House but never made it to a vote. There was an assumption on the part of these House members, perhaps, that the DOH’s then current health registry was either nonexistent or inadequate.

### **Development of the Registry**

The establishment and development of an operational health registry appears to have been an evolving process. According to the Grand Jury Report, the development of the existing shale health registry began in 2015 under Governor Wolf, with his administration “devoting \$100,000 to address the public health effects of fracking, which ultimately went to the enhanced registry.”<sup>128</sup>

The DOH had been documenting some resident health complaints related to shale development since March 2011, but without the formal intake process a reliable health registry would include. Simply enhancing such a process would not have created an effective registry; it required a more comprehensive overhaul. As the Grand Jury Report noted, “[F]rom 2011 on, the Department logged citizen complaints involving shale gas activity on a Microsoft Word document. When the [Wolf] administration assumed office in 2015, this Word document log was the totality of what [Governor Wolf’s] DOH received in terms of fracking-related data or programs from prior administrations.”<sup>129</sup>

As the health registry assumed more structure, it became a program of the DOH’s Division of Environmental Health Epidemiology. The information collected was to be used by the DOH “to better track and respond to health complaints from citizens and may be used for future epidemiological studies.”<sup>130</sup> Dr. Rachel Levine, then DOH Secretary, was tasked with developing a proposal for how \$100,000 from the Governor’s funds could be spent to run a registry or to use as seed money for a more comprehensive health study. However, that budget was seen as too small, even by others in the administration. The Grand Jury reported that John Quigley, then

<sup>127</sup> *Bill information*. (n.d.). Pennsylvania General Assembly. <https://www.legis.state.pa.us/cfdocs/billInfo/billInfo.cfm?sYear=2017&slnd=0&body=H&type=B&bn=2055>

<sup>128</sup> Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

<sup>129</sup> Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

<sup>130</sup> *Oil and natural gas production health concerns*. (n.d.). Pennsylvania Department of Health. <https://www.health.pa.gov/topics/envirohealth/Pages/OilGas.aspx>

Secretary of the DEP, said that “the \$100,000 a year budgeted for such a registry was inadequate, and it would cost millions of dollars to build a sufficient registry.” The Grand Jury concluded, “We find it self-evident that this level of funding was inadequate and did not rise to the level of importance of the problem at hand.”<sup>131</sup> Underfunding the effort negatively impacted the design and implementation of the registry and lowered its potential to help people and communities impacted by shale gas emissions.

No matter the level of funding, a health registry is only meaningful if people use it. Once the registry was established and enhanced, the DOH appeared to put little effort into publicizing its availability or making it easy to use. In order to register, someone with a health issue would call the phone number on the DOH website, and a designated staff person would collect demographic and health symptom information. Residents and advocates complained, however, that the registry information and phone number were, in the registry’s early years, difficult to find on the DOH website. It is important to note that the line was staffed only during normal business hours, adding an obstacle for working residents. Many residents had no idea there even was a registry. This may account for the somewhat small number of registrants reporting issues to date (see “Results of the Registry” below). It also points to a DOH that has not done what it needed to do to understand the public health impacts of shale gas emissions through engagement with frontline residents.

Today, the phone number to report issues to the DOH health registry is easier to find. While a critical improvement, this alone does not reduce the public’s barriers to communication. Because the shale gas issue is so contentious within communities, many people are reluctant to call in personally and, even if they do, often have to wait for a call back. This barrier could be problematic if, for instance, the resident is hard to reach or doesn’t want other household members or work colleagues to know that they made a call to the DOH. An option to access the registry online would help to reduce this barrier and increase usage.

### **Results of the Registry**

Since 2011, the DOH has included calls it received concerning shale gas operations in its health registry. The DOH now provides quarterly reports of data collected from its registry (available on the website). From 2018 to 2020, fifteen or fewer residents reported health symptoms to the registry each year. When totaling all calls from 2011 to September 2021, the DOH recorded the following shale gas-related health complaints from residents:<sup>132</sup>

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131 Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

132 *ONGP Quarterly Report*. (2020). Pennsylvania Department of Health. <https://www.health.pa.gov/topics/Documents/EnvironmentalHealth/October-December2020.pdf>

Respiratory	148
Neurological	126
Dermatological	114
Gastro-intestinal	108
General systemic*	102
Psychological	65
Eye	59
Ear	36
Urogenital	33

*\*fever, chills, fatigue, sleep disturbance, night sweats, etc.*

It would be easy to assume that the relatively low number of DOH registry complaints and the modestly reported health symptoms reveal that the health impacts from shale gas development are fairly minor. However, this would be an incorrect assumption. A health registry the Environmental Health Project (EHP) developed, along with hundreds of health intake questionnaires, shows a different story. As the Grand Jury Report stated, “We further find it remarkable that a newly created organization like EHP swiftly gathered data and provided guidance to Pennsylvanians on how they could protect themselves from the effects of industry operations, while a long-established government entity, DOH, did not.”<sup>133</sup> The EHP registry, combined with emissions data and anecdotal evidence culled over the past 10 years, points to the fact that residents have underused the current DOH health registry. As discussed in the Introduction, researchers are finding elevated risks of a number of health impacts across a spectrum of people living in proximity to shale gas development. Expectations are that many residents, for a variety of reasons, are not reporting health impacts to the state.

After residents join the health registry, the DOH may provide them with information in return. If, for instance, elevated levels of contaminants are found in a registrant’s water, which may constitute a health risk, the manager of the health registry theoretically informs the caller and describes the risks associated with the chemicals in question. A toxicologist is available to assist the manager on such questions. As with other callers, the registry manager might refer the registrant to another member of the DOH staff, but the DOH does not follow-up with registrants or doctors as part of the registry process.<sup>134</sup> The DOH has stated that they do respond when residents call directly with concerns, even if the resident does not wish to be a part of the formal registry. That said, the DOH has experienced several underfunded years during which the registry has fallen short of its potential. Communities tend to see the DOH’s lack of action with respect to shale gas development as indifference to their circumstances and concerns.

<sup>133</sup> Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

<sup>134</sup> Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

The value of the current DOH health registry and what should happen going forward can be debated. On the one hand, the registry might be improved. One way to do so would be to invest more resources into it, including a budget for advertising and/or a public education campaign to let impacted residents know about the registry and its benefits. Another way to improve the registry would be to add an online option. Additionally, if the registry were to be expanded, it would be important for the DOH to be clear on the role of the registry data and how it can guide future health-protective action. On the other hand, however, it is entirely possible that, at this late date and with public confidence already undermined, a health registry may never play an important role in understanding shale gas health impacts.

### **APPROACH TO FIELDING HEALTH CONCERNS**

While the shale gas health registry lagged, the DOH’s approach to fielding health concerns from impacted residents was also called into question. This approach—which may sometimes be viewed as negligent—is evident in a number of unusual protocols.

#### **Calls From Concerned Residents**

In 2014, NPR’s StateImpact reported that DOH staff had been “instructed not to return phone calls from residents who expressed health concerns about natural gas development.”<sup>135</sup> In fact, a past DOH staff member said that they were given a list of words related to gas operations and told not to engage in conversations with residents who called about any of the words on the list. They were told to refer these residents directly to a supervisor. This was highly unusual protocol for the DOH. The DOH has since confirmed that there was indeed such a list of words but insisted that staff could still talk with people who called.

The trigger-word practice was coupled with a new protocol that required staff to get permission to attend meetings about shale gas. This was not usual protocol either.<sup>136</sup> As a rule, when DOH staff members receive calls for reasons other than the registry, such as concerns around air or water contamination and health symptoms, they are often expected to provide information, guidance, or referrals. Staff reported, however, that they had not been educated about possible exposure pathways or related health consequences from shale gas and that they were directed, in essence, to “leave fracking-related complaints alone.”<sup>137</sup>

#### **Collaboration With ATSDR**

Fielding health-related questions is one function of the DOH. Another function is to serve as “boots on the ground” in communities suffering a public health crisis. It is not

135 StateImpact Pennsylvania. (2014, June 19). *Former state health employees say they were silenced on drilling*. <https://stateimpact.npr.org/pennsylvania/2014/06/19/former-state-health-employees-say-they-were-silenced-on-drilling/>

136 StateImpact Pennsylvania. (2014, July 2). *Pa. confirms drilling “buzzword” list; says it’s meant to guide, not silence employees*. <https://stateimpact.npr.org/pennsylvania/2014/07/02/pa-health-department-policies-on-drilling-meant-to-guide-not-silence-employees/>

137 Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

uncommon for the DOH's public health nurses to go into communities with an emergent health problem and explore what has happened so that the DOH can provide health support. However, this was not the case in communities faced with shale gas development and the resulting emissions.<sup>138</sup>

In responding to community health concerns, the DOH has an established working relationship with the Agency of Toxic Substances and Disease Registry (ATSDR), a federal public health agency under the umbrella of the U.S. Department of Human Services. Since 1989, the ATSDR has funded the DOH's Health Assessment Program to publish reports on toxic waste sites and other environmental health hazards in Pennsylvania. Collaboration under this partnership should result in "public health assessments and health consultation documents to help community members, health care professionals, private organizations and other government agencies understand the public health impact of an environmental health issue."<sup>139</sup>

The collaboration between the DOH and the ATSDR occasionally takes the form of investigating community-level, shale-related environmental health concerns. This partnership, while promising, has produced mixed results. The agencies have performed few investigations of shale gas sites over more than a decade of increasing industry development. Insufficient funding and direction, along with a general unwillingness to elevate prevailing research, have discouraged such investigations. Further hampering an effective response, the agencies use standard methodologies that do not take into account the full spectrum of exposures and they employ monitoring strategies that can miss health-relevant emissions. While investigations performed do often reveal risks to community members, little action follows. Neither DOH nor ATSDR has any enforcement power, so these agencies can do nothing more than make recommendations to enforcement agencies, such as the Pennsylvania DEP or the U.S. Environmental Protection Agency (EPA).

Several DOH-ATSDR assessment reports (which were typically called "Health Consultations") on shale sites are available on the DOH website, some of which show clear health dangers that went unchecked. Here are two examples:

### ***Brigich Compressor Station (Washington County, PA)***

Community members in Chartiers Township, which surrounds the Brigich compressor station in Washington County, Pennsylvania, contacted the ATSDR about air emissions and reported health symptoms. In conjunction with the EPA, ATSDR evaluated whether residents living near a particular shale gas compressor station were being exposed to concentrations of carbonyls/aldehydes, reduced sulfur compounds, particulate matter (PM<sub>2.5</sub>), or volatile organic compounds (VOCs) in air that might cause health effects.

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138 Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

139 *Health Assessment Program*. (n.d.). Pennsylvania Department of Health. <https://www.health.pa.gov/topics/envirohealth/Pages/Assessment.aspx>



ATSDR concluded that there were indeed levels of exposure around the compressor station that raised health concerns.<sup>140</sup> The report suggested that sensitive populations, in particular, might be in danger. ATSDR reached this conclusion even without considering aggregate emissions from other pollution sources, and without considering many serious health outcomes, such as birth defects.

Yet, despite these conclusions, the ATSDR could not require that Pennsylvania or the corporation operating the site do anything to mitigate the risk of health impacts. Without enforcement power, neither the DOH nor the ATSDR was able to compel any action. The DOH included the Brigich compressor station in a later study of long-term air data collected by the DEP.<sup>141</sup>

### ***Elk Lake School (Susquehanna County, PA)***

In September 2016, the DEP asked the DOH and the ATSDR to review air data collected between 2013 and 2015 in Susquehanna County, Pennsylvania—including in the area of the Elk Lake School in Dimock Township—where several compressor stations were operational. According to the DOH’s Health Consultation report made after the investigation, the DOH was unable to “conclude whether airborne chemicals near the compressor stations could harm people’s health.”<sup>142</sup> At the school site in particular, air monitors were placed in a position where the wind direction and the location were not favorable enough to collect reliable data from the source of the emissions.

That said, DOH’s Health Consultation report did find benzene detected at a level higher than ATSDR’s safety threshold at all three monitoring locations. Additionally, n-octane, nitrogen dioxide, and nitric acid detected at the school exceeded each of their respective acute levels. The DOH report says, “Although we were unable to make a conclusive statement based on OPFTIR data, there may be a potential acute health risk based on contaminants detected (benzene, methylamine, methyl mercaptan, NO<sub>2</sub>, nitric acid, and n-octane) that exceeded acute health-based [comparison values].”<sup>143</sup>

Given that the data showed chemicals at an elementary school—which exceeded threshold levels meant to apply to healthy, working adults—the DOH could have made a more health-protective statement, even recommending that operations cease until further data could be obtained. Instead, the DOH advised that more rigorous

140 Agency for Toxic Substances and Disease Registry. (2016, January 29). *Exposure Investigation: Brigich Compressor Station*. U.S. Department of Health and Human Services. [https://www.atsdr.cdc.gov/HAC/pha/Brigich\\_Compressor\\_Station/Brigich\\_Compressor\\_Station\\_EI\\_HC\\_01-29-2016\\_508.pdf](https://www.atsdr.cdc.gov/HAC/pha/Brigich_Compressor_Station/Brigich_Compressor_Station_EI_HC_01-29-2016_508.pdf)

141 Pennsylvania Department of Public Health. (2018, July 18). *Public Health Evaluation of Long-Term Air Sampling Data Collected in the Vicinity of Natural Gas Operations*. U.S. Department of Health and Human Services. [https://www.atsdr.cdc.gov/HAC/pha/marcellusShale/Air\\_Marcellus\\_Shale\\_HC-508.pdf](https://www.atsdr.cdc.gov/HAC/pha/marcellusShale/Air_Marcellus_Shale_HC-508.pdf)

142 Pennsylvania Department of Health. (2017, September 22). *Review of the Pennsylvania Department of Environmental Protection’s Open-Path Fourier Transform Infrared Sampling Data Collected between 2013 and 2015 from Locations near Natural Gas Compressor Stations in Susquehanna County, Pennsylvania*. [https://www.health.pa.gov/topics/Documents/EnvironmentalHealth/Elk\\_Lake\\_LHC\\_09-22-17.pdf](https://www.health.pa.gov/topics/Documents/EnvironmentalHealth/Elk_Lake_LHC_09-22-17.pdf)

143 Pennsylvania Department of Health. (2017, September 22). *Review of the Pennsylvania Department of Environmental Protection’s Open-Path Fourier Transform Infrared Sampling Data Collected between 2013 and 2015 from Locations near Natural Gas Compressor Stations in Susquehanna County, Pennsylvania*. [https://www.health.pa.gov/topics/Documents/EnvironmentalHealth/Elk\\_Lake\\_LHC\\_09-22-17.pdf](https://www.health.pa.gov/topics/Documents/EnvironmentalHealth/Elk_Lake_LHC_09-22-17.pdf)



environmental sampling and analytical methods be used to identify and quantify the specific chemical emissions in the community’s ambient air. No follow-up study was ever posted to the DOH website. Rather than prioritizing the health of residents, including the children attending Elk Lake School, the DOH took the stance that, because the data was insufficient, industry activity could be allowed to continue until further monitoring and data analysis might ascertain whether the practice is unsafe.

**Trends in Responses**

EHP’s review of DOH investigations into communities impacted by shale gas development—some of which the DOH conducted in tandem with the ATSDR—produced several important findings:

- Channels are already in place for coordination between the DOH and the ATSDR (and, to a lesser extent, between these agencies and the DEP) on performing community health evaluations and assessments. Leaders in government could bolster collaborations for a more effective response to health concerns.
- Assessments often end with conclusions like: “Data were insufficient to determine whether air contaminants could cause damage.” This use of such inconclusive statements raises two concerns:
  - › Often in studies where data was said to be insufficient, the data did, in fact, exceed safety levels.
  - › Use of such statements might lull residents into thinking that conditions are safe, when they may very well not be.
- Use of the term “sensitive populations” also can be misleading as it seems to minimize the impact of emissions on the population as a whole. In fact, children and the elderly make up a substantial part of the population: statewide, nearly 20% of the population is elderly, and about 25% of the population is under the age of 18.<sup>144</sup>
- DOH recommendations generally point to the need for more sensitive monitoring. While this would certainly help to provide a clearer picture of health risks, it is important that monitoring not rely on short, intermittent monitoring, such as testing air quality for 24 hours every six days. Such monitoring can miss peaks in emissions, which can have significant health consequences for residents living nearby. Blowdowns from compressor stations, for example, are major releases that could increase health risks but that can be completely missed if sample collections are not timed to coincide with the event. Continuous, or frequent monitoring with values reported at least every 15 minutes, would provide more accurate data on which to base health risks.

Better monitoring protocols and data interpretation are important for protecting public health. However, if a neighborhood or school continues to be at risk of exposure while further study happens, if it happens at all, then residents bear the brunt of the cost through elevated health impacts they experience in the meantime. Pennsylvania would be better served by a DOH that takes a precautionary approach to shale gas

<sup>144</sup> U.S. Census. (n.d.). QuickFacts Pennsylvania. <https://www.census.gov/quickfacts/PA>

development. In taking a precautionary approach, the DOH would determine that more and better data collection needs to happen and then take action to protect communities as soon as such an assessment is made.

The Grand Jury Report concluded that both the ATSDR and the DOH had a “disengaged, hands-off response” to exposed communities facing shale gas health impacts.<sup>145</sup> As of this writing, the DOH’s Division of Environmental Health Epidemiology appears to be working out a systematic way to respond to community requests for information and investigation. Given additional resources and authority, the DOH (with or without the ATSDR or the DEP) could conduct more—and more useful—investigations into health impacts around shale gas development.

### **GATHERING AND SHARING RESEARCH**

The DOH currently may not have the resources to mount a publicity campaign for the health registry or to investigate every complaint call it receives. However, where the DOH really can make a difference, with little drain on resources, is in its stance as to what constitutes an appropriately protective approach to public health harms. In multiple instances during the shale gas boom, the DOH’s words and actions have demonstrated a reluctance to draw a connection between proximity to shale gas development and adverse health outcomes, despite the available evidence. Too often, the DOH has claimed that further study is needed before it can take appropriate public health action.

#### **Weighing Peer-Reviewed Studies**

One of the most salient examples of the DOH’s reluctance to recognize, and therefore articulate to the public, the risks posed by air and water contaminants from shale gas development was revealed in its 2019 review paper titled “A systematic review of the epidemiologic literature assessing health outcomes in populations living near oil and natural gas operations: Study quality and future recommendations.”<sup>146</sup> Published in the *International Journal of Environmental Research & Public Health*, this review was jointly written by members of the Pennsylvania and Colorado state health departments (during Dr. Rachel Levine’s tenure as DOH Secretary under Governor Wolf). The authors evaluated 20 studies on health impacts and shale gas exposures, which were written by researchers at major universities and published in peer-reviewed journals.

Scores of researchers across the country have now identified associations between exposures to shale gas pollution and health outcomes, such as pregnancy and birth anomalies, cardiac hospitalizations, respiratory disease, and increased cancer risk.

<sup>145</sup> Commonwealth of Pennsylvania Office of the Attorney General (2020, June 22). *Report 1 of the Forty-Third Statewide Investigating Grand Jury*. <https://www.attorneygeneral.gov/wp-content/uploads/2020/06/FINAL-fracking-report-w-responses-with-page-number-V2.pdf>

<sup>146</sup> Bamber, A.M., Hasanali, S.H., Nair, Watkins, S.M., Vigil, D.I., Van Dyke, M., McMullin, T.S., Richardson, K. (2019, June 15). A systematic review of the epidemiologic literature assessing health outcomes in populations living near oil and natural gas operations: Study quality and future recommendations. *International Journal of Environmental Research and Public Health* 16(12). <https://doi.org/10.3390/ijerph16122123>

(For more on these studies and health impacts, see the “Introduction” to this paper). In fact, because emissions are so pervasive in parts of Pennsylvania and reach so many people, researchers from around the country, and even from around the world, use emissions and health data from Pennsylvania for their research. However, in its review paper, the DOH demonstrated a rejection of valid information.

The DOH review paper unnecessarily discounted epidemiologic research. The paper relied on research standards that, by and large, are not consistent with environmental health research. When it comes to environmental health issues, commonly accepted scientific principle is to accept a preponderance of years of evidence as sufficient to prove a correlation between causes and health impacts. Epidemiologic research has been called “the fundamental science of public health policy.”<sup>147</sup>

More specifically, the authors gave limited credence to observational research, which is often at the core of public health investigations, and instead gave undue weight to experimental research. Experimental research, which has strengths that environmental epidemiologic research does not, generally relies on the researcher deciding who is exposed to what substance or intervention. While this method of research may be possible in a controlled setting (like a laboratory or in a drug trial), it is not a method that can be applied to communities exposed to pollution, such as air contaminants. The DOH review would seem to disregard commonly accepted scientific convention.

The authors’ very narrow approach to the now extensive body of research led Secretary Levine to say, “As a pediatrician and a public health advocate, the public can rest assured that if I knew that we were inadequately protecting public health, I would make that case clear to Governor Wolf. But I believe that we do not have enough information to make such a determination in this case.”<sup>148</sup> The consequence of Dr. Levine’s interpretation of the prevailing research allowed shale gas operators to continue polluting without any responsibility to establish that it is safe to live, work, or go to school near their facilities.

A larger epidemiological literature review, also published in 2019, came to a very different conclusion than the DOH. Titled “Environmental health concerns from unconventional natural gas development” and authored by two Johns Hopkins University researchers, Irena Gorski and Brian S. Schwartz, this newer review looks at fourteen original epidemiological studies completed as of 2017. Gorski and Schwartz wrote, “The body of research to date on UNGD and health would allow several conclusions. UNGD activity metrics have been found to be associated with preterm birth, high-risk pregnancy, and possibly low birth weight; three types of asthma exacerbations; and nasal and sinus, migraine headache, fatigue, dermatologic, and

147 Calderon R. L. (2000). Measuring risks in humans: the promise and practice of epidemiology. *Food and chemical toxicology*, 38(1 Suppl), S59–S63. [https://doi.org/10.1016/s0278-6915\(99\)00134-9](https://doi.org/10.1016/s0278-6915(99)00134-9)

148 Hopey, D., Templeton, D. (2019, June 19). Gov. Wolf wants more data about how gas drilling impacts citizens’ health. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/news/health/2019/06/19/Pennsylvania-Tom-Wolf-data-gas-drilling-fracking-impacts-citizens-health-cancer/stories/201906190140?cid=search>

other symptoms.”<sup>149</sup> All of these conclusions were biologically plausible, meaning they were possible when considered with what is known about the produced contaminants and the systems of the human body. What’s more, the researchers note that these robust findings occur despite the relative newness of the research area and the limitations on funding. “Other health outcomes [with longer latency periods] such as cancer and neurodegenerative disease await future studies.”<sup>150</sup>

The DOH could have focused on the Gorski and Schwartz study (or any number of other studies, as shown in the timeline at the bottom of the Executive Summary) to better understand the potential public health impacts of the shale gas industry. If the goal of evaluating the research was to decide whether there is a plausible connection between shale gas emissions and public health, it would be prudent to give sufficient weight to the preponderance of evidence, which strongly suggests that known toxics emitted by shale gas operations are associated with higher risks of human health effects.

### **Public Education**

As Pennsylvania’s foremost health agency, the DOH provides health information and guidance to the public. In an ideal scenario, the DOH would be a trusted place where people, organizations, and businesses could go for health facts on shale gas development and potential risks and health impacts. The DOH would also take on a larger role in visiting communities and providing information and guidance to residents on the risks associated with shale gas development and how they can better protect themselves from harmful emissions.

The DOH acknowledges the concerns and questions about adverse health impacts associated with oil and gas production on its website. The Frequently Asked Questions page provides links to more comprehensive background information, but the answers to the FAQs on the page skirt the issue of toxic chemical exposures. Furthermore, the mitigation steps it recommends are out of reach for many residents.<sup>151</sup> Here are some examples of FAQs and why, as of the writing of this paper, the DOH answers are inadequate:

***Q: Where can I learn about the health effects of different contaminants I may be exposed to in my drinking water or air?***

In answer to this question, the reader is pointed to fact sheets on common environmental contaminants on the DOH website. The answer also notes that the ATSDR publishes fact sheets for a wider range of chemicals. Neither of these sites

149 Gorski, I., Schwartz, B.S. (2019, February 25). Environmental health concerns from unconventional natural gas development. In *Oxford Research Encyclopedias*. <https://doi.org/10.1093/acrefore/9780190632366.013.44>

150 Gorski, I., Schwartz, B.S. (2019, February 25). Environmental health concerns from unconventional natural gas development. In *Oxford Research Encyclopedias*. <https://doi.org/10.1093/acrefore/9780190632366.013.44>

151 *Oil and natural gas production (ONGP)*. (2021, June). Pennsylvania Department of Public Health. [https://www.health.pa.gov/topics/Documents/Environmental%20Health/FAQs\\_ONGP.PDF](https://www.health.pa.gov/topics/Documents/Environmental%20Health/FAQs_ONGP.PDF)

addresses what contaminants are produced by shale gas activities, but there is a link to an EPA report on hydraulic fracturing chemicals and impacts on drinking water. The last is the most informative.

**Q: *What research has been done on the health effects of ONGP?***

In answer to this question, the DOH acknowledges that the research on health effects has been growing and provides links to the DOH review paper discussed above, which minimizes the usefulness of much of the research on health impacts. The DOH does provide a link to the Concerned Health Professionals of NY Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking, which “identifies articles from peer-reviewed medical or scientific journals; investigative reports by journalists; and reports from, or commissioned by, government agencies.”<sup>152</sup>

**Q: *What can I do if my drinking water or air is contaminated?***

In answer to this question, the DOH suggests alternative water sources, such as using bottled water, installing a home water treatment system, or connecting to a public water system. Residents are likely to find that the first two are expensive, and the third may not be accessible to them. That said, the reality for those with contaminated water is that there are no good, affordable alternatives.

If air is contaminated, the DOH recommends residents keep windows closed and use air conditioning or central heat with a high-efficiency air filter, if possible. These are acceptable suggestions if one has air conditioning and/or central heat with that type of filter or can afford to buy them. Many lower-income residents may not be able to afford to take this measure without cutting back elsewhere—another case where the burden of preventing exposure falls on the residents and not on the polluting industry or on governmental agencies whose mission is to protect Pennsylvanians’ health.

Lastly, in response to this question, the DOH encourages impacted people to contact the DEP, county or local officials, the oil and gas drilling companies, emergency services, and the DOH if their air or water is contaminated. However, residents have reported widespread mistrust of both the industry and governmental agencies. They have been vocal in telling EHP and other advocacy organizations that calls they have made in the past have not resulted in anything useful being done. They also say that they do not think it is possible to clean their air of industrial pollutants. They have largely given up on the DOH or have taken matters into their own hands, turning their attention to understanding their air quality and working, as best they can, to change policies that permit such emissions in the first place.

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<sup>152</sup> Concerned Health Professionals of NY. (2020, December). *The Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Oil & Gas Extraction) (7th Compendium)*. <https://concernedhealthny.org/compendium/>

Overall, the DOH bears the responsibility of providing health information and guidance to residents facing risks from shale gas development. To date, the DOH's actions in this regard have fallen short. DOH information and guidance has been insufficient and sometimes mixed. Further, the DOH has spent very little time actually visiting impacted residents and communities. Such inattention to frontline communities has left many residents feeling skeptical, confused, and disheartened.

### CANCER IN SOUTHWESTERN PENNSYLVANIA

In October 2019, the Pittsburgh Post-Gazette reported that, since 2008, at least six cases of a rare childhood cancer, Ewing sarcoma, had been diagnosed in a Washington County school district, while twelve cases of the same rare cancers were diagnosed in Westmoreland County since 2011. Together, Greene, Washington, and Fayette counties had at least 27 reported Ewing sarcoma cases since 2008, including three since 2015 in West Greene County.<sup>153</sup> Further, the Canon-McMillan School District in Washington County has reported ten preschoolers and students who were diagnosed with other rare childhood cancers.<sup>154</sup> In December 2019, The Wall Street Journal wrote that 31 people had been diagnosed with rare cancers in four Southwestern Pennsylvania counties.<sup>155</sup>

In Southwestern Pennsylvania, one environmental factor has changed dramatically since 2008—this region is now heavily impacted by the shale gas industry. With nearly 2,000 wells reported in 2019, Washington County had more wells than any other Pennsylvania county. Greene County, home to the third most wells in the state, had almost 1,500 wells in 2019.<sup>156</sup> These numbers are climbing annually. The region also includes a web of other shale gas infrastructure, such as processing plants, compressor stations, pigging operations, and pipelines. In addition, due to exemptions in the Resource Conservation and Recovery Act (RCRA) for classifying shale gas development waste as toxic, local landfills accept and process the waste generated by shale gas extraction.

Ewing sarcoma is a bone and soft tissue cancer. Only about 250 cases are reported in the U.S. each year.<sup>157</sup> It should be noted that researchers have not yet proved a causal link between environmental pollution and Ewing sarcoma. However, researchers have

153 Young lives at stake: Rural areas deserve answers on child cancers. (2019, May 22). *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/opinion/editorials/2019/05/22/childhood-cancer-pittsburgh-pennsylvania-canon-mcmillan-pollution-rural-areas-greene-fayette-washington-westmoreland/stories/201905220064>

154 Finding the link: More Ewing sarcoma research is needed. (2019, September 20). *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/opinion/editorials/2019/09/20/Ewing-sarcoma-link-research-Pennsylvania-cancer/stories/201909230003?cid=search>

155 Maher, K. (2019, December 20). After string of rare cancer cases, Pennsylvania investigates potential link to fracking. *The Wall Street Journal*. <https://www.wsj.com/articles/after-string-of-rare-cancer-cases-pennsylvania-investigates-potential-link-to-fracking-11576837802>

156 Beveridge, S. (2020, June 18). Washington County to receive largest share of gas impact fees. *Observer-Reporter*. [https://observer-reporter.com/news/localnews/washington-county-to-receive-largest-share-of-gas-impact-fees/article\\_e53edb7a-b0c5-11ea-a790-876bd7f2e3d7.html](https://observer-reporter.com/news/localnews/washington-county-to-receive-largest-share-of-gas-impact-fees/article_e53edb7a-b0c5-11ea-a790-876bd7f2e3d7.html)

157 Finding the link: More Ewing sarcoma research is needed. (2019, September 20). *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/opinion/editorials/2019/09/20/Ewing-sarcoma-link-research-Pennsylvania-cancer/stories/201909230003?cid=search>

established that pollution can be a triggering mechanism in other forms of cancer, such as breast, lung, liver, and pancreatic cancer.<sup>158</sup> Research may, in time, prove a similar association with Ewing sarcoma.

In the meantime, research does provide some leading indicators of an association between shale gas pollution and cancer. The wastewater from shale gas extraction contains radioactive materials, including radium-226. Scientists have shown that the body can substitute radium for calcium in bones, where it can “bioaccumulate,” or concentrate. People who consume radium in drinking water are at higher risk of lymphoma, bone cancer, and leukemias.<sup>159</sup>

In response to the high numbers of Ewing sarcoma cases, then DOH Secretary Levine said, “We want to do a study to see if there is a link. The biggest challenge is that correlation doesn’t necessarily prove causation.”<sup>160</sup> The problem with this argument is that if public health agencies always waited for incontrovertible proof of cancer causation, they would never take action to protect people from likely cancer-causing sources. In the case of shale gas development, the DOH has had an opportunity to protect public health—even without adequate resources from the General Assembly and the political will of the Governor’s Office to do so—but has been slow to act.

### **Public Outcry**

After reporters broke the Ewing sarcoma story, and the Environmental Health Project hosted a community forum in June 2019 to discuss the issue with more than 200 residents who attended, the DOH was finally influenced to do something. It conducted a formal study to determine whether standards established by the Center for Disease Control & Prevention (CDC) would consider the seemingly high number of Ewing sarcoma cases to be a “cancer cluster.” The CDC’s “cancer cluster” standards are extremely high, which means the methodology is more likely to rule out a cluster, even if there exists a strong possibility that cancers have some common origin or trigger. The DOH concluded that incidence rates of Ewing sarcoma were not “consistently and statistically significantly higher than the rest of the state over the time periods reviewed” and reported “no conclusive findings” of a cancer cluster.<sup>161</sup>

The DOH cancer cluster report raised questions in the community, especially about the cases that the DOH did not count. Because DOH staff were following CDC’s extremely conservative protocol, they did not include cases where a child had moved out of the

158 American Association for Cancer Research. (n.d.). *Air Pollution May be Associated With Many Kinds of Cancer* [Website]. Retrieved 2/17/22 at: <https://www.aacr.org/patients-caregivers/progress-against-cancer/air-pollution-associated-cancer/>

159 Brown, V. (2014, February 1). Radionuclides in Fracking Wastewater: Managing a Toxic Blend. *Environmental Health Perspectives*, 122(2). <https://doi.org/10.1289/ehp.122-A50>

160 Maher, K. (2019, December 20). After string of rare cancer cases, Pennsylvania investigates potential link to fracking. *The Wall Street Journal*. <https://www.wsj.com/articles/after-string-of-rare-cancer-cases-pennsylvania-investigates-potential-link-to-fracking-11576837802>

161 Mansfield, K. (2020, November 11). Department of Health explains cancer cluster results; parents, concerned groups call on Gov. Wolf, DOH to investigate cancers. *Observer-Reporter*. <https://observer-reporter.com/news/localnews/department-of-health-explains-cancer-cluster-results-parents-concerned-groups-call-on-gov-wolf-doh/article-f8aea092-e932-11e9-ace0-1f7ba421c309.html>



area but whose cancer had begun there. Additionally, the DOH did not include cases that had been diagnosed but not yet entered into the state's cancer registry. (There is about a two-year lag time between diagnosis and registry entry.) Finally, the DOH report did not call out the fact that the rate of bone cancers in the Canon-McMillan School District in the 2005-2017 time period was markedly higher than would be expected in the average community.

In October 2019, the DOH held a community meeting to talk about the cancer cluster report, an important step in informing the public about its findings. This open meeting included a panel of speakers—Wendy Aldinger, manager of the Pennsylvania Cancer Registry Program; Dr. Sharon Watkins, director of the DOH's Bureau of Epidemiology; and Dr. Kelly Bailey, pediatric oncologist at UPMC. The panelists tried to reassure residents that cancer risks were not elevated in their communities, but the effort fell flat, primarily because of the excluded cases and because most community members did not feel the DOH was taking seriously the emissions exposure they were experiencing. Further, many in attendance understood that just because a cancer cluster was not identified, it didn't mean that the risk of getting cancer was any lower. While the DOH said that it will reassess the cancer data again when more people diagnosed with cancer are entered into the registry, many residents in attendance at the meeting thought the DOH could be doing more in the interim to help protect their family's health.<sup>162</sup>

The DOH's inaction with respect to cancer risks in Southwestern Pennsylvania reflects a greater tendency to discount environmental triggers to cancer across the commonwealth. In fact, the DOH's 2019-2023 Pennsylvania Cancer Control Plan discusses the risk factors for cancer in the state. The risk factors the DOH includes are: age, income, nutrition, physical activity, alcohol use, and tobacco use. Air pollution, well known to be associated with cancer, is not mentioned, with the sole exception of radon. While the document lays out prevention paths, like providing better access to health care, increasing health literacy, and changing behavior, it says nothing about decreasing pollution or preventing exposures to emissions as ways to reduce cancer risk.<sup>163</sup>

### **Investment in Studies at the University of Pittsburgh**

Some parents of children who had been sickened or died of Ewing sarcoma, along with other impacted residents, were so frustrated by the DOH response to the growing number of childhood cancers in Southwest Pennsylvania that they drove to Harrisburg in November of 2019 and confronted Governor Wolf directly. To his credit, Governor Wolf spoke with the residents and listened to their appeals. Three days later, Governor

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162 Templeton, D., Hohey, D. (2019, October 7). Health officials' claim of no cancer cluster angers Canon-McMillan crowd. *Pittsburgh Post-Gazette*. <https://www.post-gazette.com/local/washington/2019/10/07/Canon-mcmillan-ewing-sarcoma-cluster-cancer-meeting-UPMC/stories/201910070110>

163 Pennsylvania Cancer Control, Prevention and Research Advisory Board. (2019, June). *2019-2023 Pennsylvania Cancer Control Plan*. Pennsylvania Department of Health. [https://www.health.pa.gov/topics/Documents/Diseases\\_and\\_Conditions/Cancer/2019-2023\\_Pennsylvania\\_Cancer\\_Control\\_Plan.pdf](https://www.health.pa.gov/topics/Documents/Diseases_and_Conditions/Cancer/2019-2023_Pennsylvania_Cancer_Control_Plan.pdf)



Wolf announced that he had approved \$3.9 million to research potential health effects of shale gas development in Pennsylvania, including childhood cancers.<sup>164</sup>

In December 2020, the Wolf Administration announced that it had awarded the University of Pittsburgh School of Public Health \$2.5 million of the original pledge to perform two studies over three years. Then Secretary of Health Dr. Rachel Levine said, “We have heard the concerns from families and community members impacted by cancer and other health issues in the southwestern part of the state, and we are dedicated to taking the proper steps to keep our residents healthy. We are committed to a healthy Pennsylvania for all and efforts that prevent injury and disease in the state. This essential research project is a testament to that.”<sup>165</sup>

Governor Wolf took an important step in funding research on the health impacts of shale gas development. It should, however, be seen in context. This publicly funded research comes after more than a decade of extracting, processing, and transporting shale gas from more than 13,000 wells across the state.<sup>166</sup> The studies, now reduced in scope, will take two years to fully complete and may or may not present conclusive results, depending on the scope and execution of the studies and the analysis of the data. If further study is needed, residents will have an even longer wait for answers. Meanwhile, residents continue to be exposed to shale gas pollution without meaningful intervention from the DOH.

## WHAT COULD HAVE HAPPENED

Throughout history, industrial development has gotten out ahead of public health protections. The shale gas industry, in particular, developed rapidly, as legislative actions eased the way and public health agencies put up few roadblocks. The public health question before the Commonwealth of Pennsylvania is this: “When is there enough evidence to regulate shale gas development on the basis of health?”

It is worth looking at the historical examples of asbestos and tobacco. In each case, an abundance of early evidence pointed toward harm, but policymakers, under pressure from industry, waited decades for what they deemed irrefutable layers of epidemiological evidence before taking action. In the meantime, countless lives were lost or harmed.

Today, Pennsylvania allows the shale gas industry to pollute the air, water, and land without adequate consideration to public health. The DOH downplayed observational science for more than a decade before finally turning to it to tease out exposure data

<sup>164</sup> Frazier, R. (2019, November 22). *State to fund studies on fracking and cancers, other health effects*. StateImpact Pennsylvania. <https://stateimpact.npr.org/pennsylvania/2019/11/22/state-to-fund-studies-on-fracking-and-cancers-other-health-effects/>

<sup>165</sup> State of Pennsylvania. (2020, December 22). *Wolf administration awards \$2.5 million contract to University of Pittsburgh to research health effects of hydraulic fracturing in Pennsylvania*. [Press release]. <https://www.media.pa.gov/pages/health-details.aspx?newsid=1215>

<sup>166</sup> FracTracker Alliance. (2022). [Map]. Accessed 1/12/22 at <https://www.fractracker.org/map/us/pennsylvania/>

and show, in statistically significant numbers, that people have been harmed. The agency has done little else to mitigate harms and keep people safe.

Johns Hopkins researchers Gorski and Schwartz have said that “what has been reported to date offers no reassurance that UNGD is likely to be safe for public health.”<sup>167</sup> As public policy currently operates in Pennsylvania, the onus of demonstrating that shale gas development is causing health impacts has been placed squarely on the shoulders of residents. That approach seems to run counter to the DOH’s mission to protect Pennsylvanians from harm. If a state truly cares about environmental justice, the responsibility of demonstrating that shale gas development can be conducted safely should lie first and foremost, not with residents, but with the industry and the government.

The DOH could have taken a number of clear actions to help protect Pennsylvanians from shale gas emissions over the years. All DOH initiatives depend on funding from the General Assembly and support from the Governor, which could have enabled the creation of a more robust health registry early in the process or the ability to undertake more active field investigations of community or individual complaints. That being said, even without increases in funding, the DOH could have:

- Assumed a more important presence in the wider shale gas and health discussion, proactively seeking out information and advice from a broad spectrum of experts, researchers, community leaders, and others.
- Provided communities with more guidance and information to help them protect themselves and their families from harmful shale gas emissions; if funding was an issue, the DOH could have distributed guidance and information developed by other agencies or non-governmental organizations (NGOs) who had studied the issue.
- Lobbied the governor or regulatory agencies for more caution in the face of existing research, promoting health-protective policies and raising a warning flag that shale gas development might not be as safe as the industry led the public to believe. It is unclear whether this ever happened behind closed doors.

It should be noted that a Secretary of Health could face political repercussions if taking a stance in opposition to a pro-shale gas governor or legislature. That alone could prevent the DOH from taking sensible health-protective measures. However, there comes a time when every health care professional—including those who work at the Pennsylvania Department of Health—must stand up and work to protect the health of residents who lack the power to do so themselves. That time is now.

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<sup>167</sup> Gorski, I., Schwartz, B.S. (2019, February 25). Environmental health concerns from unconventional natural gas development. In *Oxford Research Encyclopedias*. <https://doi.org/10.1093/acrefore/9780190632366.013.44>



## LOOKING AHEAD:

### WHAT WE HAVE LEARNED AND WHERE WE CAN GO

This paper has been an exploration of government action and inaction in Pennsylvania during the shale gas boom, primarily with respect to public health. It demonstrates how state policymakers turned their backs on the health of Pennsylvanians, looking away from the problem rather than at it. The decisions they made were likely influenced by many things, including (a) the lure of public and private economic gain and the pressure to take advantage of it, (b) a free-market ideology that generally favored deregulation, and (c) for some decision-makers, an indifference to (or outright denial of) health risk.

Some government officials have been accused of acting in their own self-interest (see more about this in the Grand Jury Report).<sup>168</sup> However, many officials were working on behalf of their constituents as well, likely believing that jobs numbers were the most important (or only) factor they should consider when setting policy around shale gas development. To be fair, some government officials in the Executive Branch and General Assembly undoubtedly believed that protecting the public's health was the government's job and would have welcomed the opportunity to work towards that. However, these well-meaning individuals were hamstrung either by insufficient financial resources or a lack of political will at the top.

Pennsylvania's actions were not inevitable—they were a series of choices. There are other states where public leaders chose to look at the evidence and protect the public's health as a top priority. For example, New York and Maryland officials, looking at the available information on health impacts, each placed a moratorium on drilling for shale gas. Meanwhile, public officials in Pennsylvania looked at that same evidence and instead allowed shale gas extraction to flourish.

### INSIGHTS FROM EHP'S RESEARCH

In Pennsylvania, government agencies have accepted and promulgated presumptions regarding the safety and economic benefit of shale gas extraction. Most of these presumptions—many of which have proven patently false—are still being used to justify action or inaction with respect to the industry. At the center of the presumptions are the mistaken ideas that existing regulations protect the public's health and that shale gas emissions pose levels of risk low enough to be deemed acceptable.

Throughout the shale gas boom, consistent public health themes have emerged. These themes reveal the state's reliance on misleading presumptions and demonstrate its deference to shale gas interests while ignoring public health concerns. Three of these themes are described in detail below.

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<sup>168</sup> Pennsylvania Office of the Attorney General (2021), *43rd Statewide Grand Jury Finds Pennsylvania Failed To Protect Citizens During Fracking Boom*. <https://www.attorneygeneral.gov/taking-action/press-releases/43rd-statewide-grand-jury-finds-pennsylvania-failed-to-protect-citizens-during-fracking-boom/>

1 *A chasm exists between the reliable public health research that has been conducted and the policies or initiatives that Pennsylvania’s leading public health agency and other government policymakers have promoted. Public health actions are meant to be based on strong evidence, not perfect evidence. Yet, policymakers have consistently justified inaction by citing a lack of sufficient knowledge about health impacts.*

One tool policymakers often used to make their case for leniency with the shale gas industry was imperfect knowledge. They claimed that the research on health risks or impacts was just not good enough, the data not complete enough. For years, state government hesitated to take seriously its capacity to collect and act on its own shale gas emissions data or to contract with those who could. There seemed to be an intentional desire to cultivate ignorance, with a trend toward minimizing knowledge and transparency.

But protecting public health can require looking at information broadly, incorporating intelligence from multiple data streams. It also means taking stock of gaps in the research and thinking about the importance of those gaps when considering whether residents might be at risk. While researchers know a great deal about the health impacts of countless shale gas exposures, sometimes they may not understand particular exposures or impacts in full. State officials have, at times, chosen to interpret these gaps in understanding to mean that the public is not at risk of consequential health effects when, in fact, they very well may be.

Said another way, just because we do not yet know and fully understand an exposure or its effects does not mean it is safe. Researchers sometimes express this concept by saying, “absence of evidence of toxicity does not mean evidence of absence of toxicity.” Ideally, public health policymakers would realize this concept and take steps to protect residents not just from known harms but from expected ones. In practice, however, Pennsylvania policymakers have used the absence of absolute certainty to allow the shale gas industry to continue operating without concern for public health—potentially causing unexamined risks from the industry’s negative externalities.

As shown in previous sections, public officials, most clearly at the Pennsylvania Department of Health (DOH), stated that there was insufficient evidence with respect to health risks and impacts—beyond what is standard in the field of public health—before they would take action to protect the public. The DOH did not act on the weight of evidence in the research of highly reputable researchers, many of whom used emissions and health data collected in Pennsylvania. A DOH review of those studies prompted no increase in health surveillance, public education, or pressure to legislators or regulators to do more to prevent disease outcomes. It appeared, to some, to be a deliberate looking away from the problem.

To put this approach in perspective, when a pizzeria in southeastern Pennsylvania appeared to be the source of a hepatitis outbreak, the Montgomery County Department of Health closed the restaurant while it carried out an investigation. As The Times Herald reported, “Per standard public health protocols, the county health department coordinated with the Pennsylvania Department of Health to issue a health advisory.... As a result, the health department continues to receive additional information to support its investigation and identify additional potential cases.”<sup>169</sup> In that case, without all the facts—that is, with imperfect information—the Montgomery County Department of Health, in conjunction with the DOH, took the standard next public health-based step of closing the restaurant, thereby stopping additional potential exposures and preventing further illnesses from occurring. These health agencies did so even when they did not know exactly how the illness was transmitted, if this business was actually to blame for the outbreak, or whether it was perhaps a mere coincidence.

In the case of Pennsylvanians being exposed to substantial, toxic shale gas emissions, however, the DOH has typically waited for irrefutable information before taking action.

**2** *Regulations provide a degree of safety, but there is a common misconception that they are data-based, health-protective standards; they are not. The widespread presumption of safety means that the burden of proof that emissions are causing harm often falls to the affected individuals and communities.*

Residents generally perceive regulations dealing with any industry operation to be health-protective, and to a certain extent they can limit risk. However, since regulations are intended to be achievable by the regulated industry, they are not based solely on health indicators. Regulatory decisions also incorporate decisions about “acceptable risk” to exposed populations. Regulators allow industries to pollute at certain levels, knowing that the activity may pose health risks to people living nearby but accepting that risk as the price the public must pay in order to accommodate the industry. In severe cases, these areas are termed “sacrifice zones.”

Regulations also tend to deal inadequately with unknown health impacts, impacts from mixtures of chemicals that may be individually regulated, and effects of multiple sources of pollution sharing the same area, which again may each be individually regulated. Also, not all emissions components are regulated, and not all types of impacts are considered when regulations are enacted. Nevertheless, there is a common public perception that, as long as an operator complies with the regulations it is required to follow, the activities it undertakes are safe, and state agencies need not act further.

<sup>169</sup> MediaNews Group. (2022, January 7). Health Dept. closes West Norriton restaurant amid hepatitis outbreak. *The Times Herald*. <https://www.timesherald.com/2022/01/07/health-dept-closes-west-norriton-restaurant-amid-hepatitis-outbreak/>

However, this regulatory approach, even when industries are in compliance, can—and does—impact the health of local populations, sometimes with dire consequences. When communities understand that their health is being impacted by an industry, they look to government agencies to provide relief through tighter regulations and public health interventions. When government agencies fail to act, community members must take it upon themselves to urge the state or local governments to step in and protect their health. These efforts take time, money, and education. Thus, the burden of proof often falls to those least equipped to effect change.

Additionally, residents in frontline shale gas communities may even disagree with each other on whether to call attention to their health concerns and ask for help. On the one hand, they must consider the perception—often exaggerated—that the industry will spur job growth, economic development, and increased tax revenue. On the other hand, they must also consider health risks posed by air, water, and soil pollution, as well as health concerns around noise, vibrations, increased truck traffic, and explosions or fires.<sup>170</sup> Throughout the beginning of the shale gas boom, many residents supported the expansion of the shale gas industry and either supplanted concerns about health risks or were not convinced that such risks existed in the first place. Many believed—and still do—that government regulations were sufficient to protect their health.

Some residents and decision-makers also came to trust corporate self-regulation. There is evidence that, as corporations gain increasing power and influence in our society, the public hopes to see them as providers of the protections and safety nets that government no longer offers.<sup>171</sup> When shale gas corporations supply jobs (albeit many of them temporary and taken by out-of-state workers) and gifts (often in the form of community parks and recreation facilities), and when the state further allocates revenue from impact fees, communities feel pressure to accept the presence of industry, even as some residents experience health impacts associated with those operations.

The perception that the shale gas industry is improving the welfare of Pennsylvanians makes it easier for the state to minimize public health concerns by pointing to the presence of regulations, which are neither health-protective, nor effectively enforced. When Pennsylvania state government stepped back from its role of protecting public health from shale gas development, corporations did not pick up the slack. Rather, those protections fell on the shoulders of community members and advocacy groups, which have neither the resources nor the responsibility to adequately fill in for the state.

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170 Malin, S.A., Mayer, A., Shreeve, K., Olson-Hazboun, S.K., & Adgate, J. (2017). Free market ideology and deregulation in Colorado's oil fields: Evidence for triple movement activism? *Environmental Politics*, 26, 521-545. <https://doi.org/10.1080/09644016.2017.1287627>

171 Malin, S.A., Mayer, A., Shreeve, K., Olson-Hazboun, S.K., & Adgate, J. (2017). Free market ideology and deregulation in Colorado's oil fields: Evidence for triple movement activism? *Environmental Politics*, 26, 521-545. <https://doi.org/10.1080/09644016.2017.1287627>

**3** *With respect to shale gas development in Pennsylvania, the promise of economic benefits overshadowed the caution over health impacts. In an attempt to attract more economic benefits, policies were created to be exceptionally accommodating.*

In recent decades, many governors across the country have taken an entrepreneurial approach to energy development that often trumped environmental and health protections. In Pennsylvania, the shale gas market was the dominant force behind early decision-making, and the industry was touted as an economic boon to individuals and communities in areas of shale gas development and to the state as a whole. Some argued that deference to, and encouragement of, shale gas operators was necessary to nurture the industry. In fact, it has been shown that community profits were much less than what was promised and harms were much more than what was warned.<sup>172</sup>

By way of example, Pennsylvania government chose a relatively small impact fee over a more lucrative severance tax in order to make the state more attractive as a base of operations for the booming shale industry. It has been argued that such incentives were unnecessary, as the Marcellus and Utica shale formations lie solidly beneath more than half of Pennsylvania, and that shale gas operators would need to come to Pennsylvania regardless to access those resources. Nevertheless, while revenue from the impact fee has been applied to some conservation efforts throughout the state, it does not support investigation, cleanup, or other protective efforts associated with the health concern, and none of it is distributed to the DOH. The state also opted not to provide meaningful incentives to operators to take accountability for environmental damages or public health impacts. It appears that negative externalities were never seriously part of the policy and regulatory calculation.

For residents and communities to apply the necessary pressure to effect change, there must be transparency in the process and broad access to information. Because corporations hold greater power than most communities, and certainly more than any individual citizen, the government has an obligation to provide a rigorous public response, much like it provides public goods. Public goods are, simply put, those services necessary for a smooth functioning society, such as fire and police protection, education, and public health assistance. These public goods benefit our societies economically, politically, and culturally; they meet needs that free markets cannot readily address.<sup>173</sup>

Regulation of polluters is a type of public good because a market-based approach is not designed to protect communities. According to Dr. Dan Lindheim of UC Berkeley's Goldman School of Public Policy and former City Administrator for the City of Oakland, "You must have substantial regulation in public health because it is not any private

172 Ohio River Valley Institute. (2021, February 12). *The Natural Gas Fracking Boom and Appalachia's Lost Economic Decade*. [https://ohiorivervalleyinstitute.org/wp-content/uploads/2021/02/Frackalachia-Report-update-2\\_12\\_01.pdf](https://ohiorivervalleyinstitute.org/wp-content/uploads/2021/02/Frackalachia-Report-update-2_12_01.pdf)  
 173 Reiss, J. (2021). Public goods. The Stanford Encyclopedia of Philosophy. <https://plato.stanford.edu/archives/fall2021/entries/public-goods>



company's interests to care about public health unless given a reason to."<sup>174</sup> In Pennsylvania, with the absence of government intervention, shale gas corporations focusing on short-term economic gains are allowed significant latitude to operate in ways that benefit their own interests. Meanwhile, residents are left on their own to deal with often serious health impacts.

## **ACTION (AND INACTION) FROM THE STATE**

Actions were taken (or not taken) by various government bodies that gave life to the themes discussed above, resulting in an approach to shale gas development that sidelined public health. More detail on the examples of these entities' actions can be found in the sections discussing the General Assembly, the Governor's Office, and the DOH. Below, however, is a review of what could have been done differently to honor the Pennsylvania government's obligation to protect its residents from health harms associated with shale gas development.

### **General Assembly**

Since the beginning of the shale gas boom, the General Assembly has consistently declined to allocate sufficient funds to government agencies that would enable them to address shale gas concerns as they arise. Funds are needed to investigate operator violations (of which there have been nearly 18,000 since shale gas drilling began<sup>175</sup>), establish and enforce regulations, and assist communities impacted by shale gas development. Representatives from both the DOH and the Department of Environmental Protection (DEP) have said, in no uncertain terms, that they do not have sufficient resources to investigate health-related issues around shale gas emissions or to support frontline communities to the extent they would like. Furthermore, the shale gas impact fee is not used to fund any programs or initiatives that directly address health impacts from shale gas exposures.

In addition to inadequately funding agencies, the General Assembly has passed legislation that provides a wide berth for shale gas industry activity and little discernable consideration for public health. Although some of the worst parts of Act 13 of 2012 were repealed, some public health professionals argue that the general lack of public health protections and regulations, particularly where industry waste is concerned, has ultimately bolstered industry profits. Well-meaning, health-conscious members of the General Assembly have introduced a variety of bills that were designed to protect the health of residents by constraining shale gas activities, increasing transparency of waste contents and disposal of fracking fluid contents, or directing (and funding) the DOH to better monitor impacts on health. Such bills typically die in committees, not even making it to a vote. A commitment from more legislators to protect the health of Pennsylvania's citizens is an ongoing opportunity for improvement.

174 Sahoo, M. (2018, December 6). *The effects of neoliberal practices on public health*. The Public Health Advocate. <https://pha.berkeley.edu/2018/12/06/the-effects-of-neoliberal-practices-on-public-health/>

175 FracTracker Alliance. (2021, November). *Pennsylvania Oil & Gas Data*. Accessed 3/11/22 at <https://www.fractracker.org/map/us/pennsylvania/>



**Governor's Office**

During three different administrations governing Pennsylvania since the first shale gas well was drilled in 2004, the Governor's Office has given no clear signal that a health-protective approach is warranted in the face of exposures to hazardous substances resulting from shale gas extraction. Each governor gave explicit instruction and set priorities for agencies under his control, and each had the ability to enable and empower agency leadership to take any necessary action to enforce regulations and protect the public's health with existing or innovative programs. Each governor also held some measure of influence over the legislature and set the tone and priorities for his term(s) in office. His public support of health protections could have served as a catalyst for growing political will. In nearly every case, however, Pennsylvania's governors failed to use their office to protect public health from shale gas emissions.

To his credit, Governor Wolf set in motion two studies looking at health impacts from shale gas emissions in the state. While hardly making up for the years of neglect, the idea of looking at health impacts is an important one, so long as the interpretation of its conclusions by the executive branch reflects a genuine desire to find the truth amidst the inherent limits of epidemiologic research. While the results of these studies are not yet available as of this writing, it should be acknowledged that research, whether conclusive or not, is only part of the public health response the state can prioritize when addressing reported health symptoms in areas where shale gas development exists. Governor Wolf and the next governor (whoever he or she might be) have the opportunity to focus squarely on the problem and potential solutions.

**Department of Health**

In many ways, the Pennsylvania Department of Health (DOH) receives the brunt of the public's ire for lack of action with respect to the public health impacts from shale gas development. In truth, though, the DOH has had limited ability to act on the issue. The DOH has no regulatory authority over the shale gas industry, and its power on the subject is limited to serving in an advisory capacity. For example, the DOH retains one seat on the state's 20-member Environmental Quality Board.

Additionally, the DOH does not have the budget to properly investigate or address many of the health concerns related to shale gas development, even if it had a gubernatorial mandate to do so. Representatives from the DOH have stated to EHP that, without funding appropriations from the General Assembly, they are unable to manage the volume of concerns from residents or promote public resources, such as the DOH's health registry. It has been clear in the research that DOH does not have the support to conduct effective investigations on shale gas health impacts within the limitations of its current staffing and budget.

That said, the DOH does not need a mandate from the governor or funding from the General Assembly to take a more definitive stance on the issue of shale gas health impacts. The Secretary of the DOH has the standing and the ability to address,

educate, and influence the state's residents with respect to shale gas emissions and risks. Further, regardless of the political implications, the DOH has an explicit obligation to prevent injury and disease to the citizens of Pennsylvania.

There is now a formidable body of evidence pointing to health harms that arise from shale gas development. That evidence, in conjunction with the DOH's stated mission, should justify taking stronger action. The barrier to doing so appears to be a political one. It is understandable that DOH secretaries may not want to be viewed as being out-of-step with the governors who appointed them, especially on issues as sensitive as shale gas development. However, there comes a time when public health officials must have the integrity and moral resolve to act. In the case of shale gas development, now is the time to do that.

### **A BETTER APPROACH**

Many of the wrongs of the past cannot be righted. For more than a decade, residents of frontline shale gas communities have been exposed to contaminants that are associated with respiratory, cardiac, dermal, neurological, reproductive impacts, as well as with child development impacts and cancer. But that does not have to be the end of the story.

In this final section, we turn to the broader principles of good governance, specifically calling for the State of Pennsylvania to make a good faith effort to prioritize health rather than deflect attention from it. Pennsylvania's governmental sectors can commit to practicing good governance to prevent a future that looks just like the past. It can reclaim its obligation to regulate shale gas companies' practices, which often harm the health of residents, and hold them to serious account when they fail. It can reclaim its obligation to protect public health by investing in the DOH and regulatory agencies like the DEP. The deficiencies identified by this paper can be recast as signals of opportunity that wait for political will to catch up.

We see four key areas that represent opportunities to close the gap between the status quo and a more health-protective approach to shale gas development:

#### ***Equity: Protect people in areas that bear the burden of all aspects of this extractive industry; create more meaningful approaches to ensuring equity***

It must be recognized that there is no strong evidence that demonstrates shale gas development can be conducted in a way that keeps people safe. However, for as long as shale gas extraction is going to continue in Pennsylvania, community groups and local or county governments must have a say in what happens in their own regions. There must also be a meaningful mechanism to incorporate the feedback of frontline communities.

Ideally, governments would balance, on the one hand, the benefits and costs of shale gas extraction for industry and landowners who benefit financially and, on

the other, the costs for people who bear the burdens of health impacts. The system cannot rest on certain individuals bearing the cost while other people, communities, or commercial operations gain the benefits. This shift in priorities would require that the state recognize the costs of current and expected health impacts, including the premature mortality for which industry-generated pollution is responsible. Further, because pollution does not follow political boundaries, state-level protections will be more effective and safeguard more people than protections enacted by counties or municipalities.

When it comes to the power of large industries, states often serve as intermediaries between influential companies and local governments or community groups. Because its first commitment is to its own residents, a responsive government is generally obligated to assume the side of the locality over that of a well-resourced company. As it has played out in Pennsylvania, a municipality might restrict industry from developing certain shale gas sites in certain zones. Meanwhile, the industry operator can—and sometimes does—threaten to sue the municipality if any restrictive action is taken to limit extraction. Defending against that threat is nearly always beyond the municipality's financial abilities, and so the municipality must usually acquiesce. Unable to turn to its state government for support against resource-rich gas corporations, residents are left disempowered.

Depending on the circumstances, the state could, if it did not continue to favor industry interests, seek out remedies that equitably protect the health and welfare of residents. At the very least, Pennsylvania state government must work to establish a more level playing field, one that takes into consideration the health and welfare of all its residents.

***Transparency: Allow individuals, community groups, and other organizations access to important health information that they can understand and act on; compel the industry to make public all chemicals it uses***

Over the past ten plus years, government efforts to look at problems posed by shale gas development have not always been transparent. While it should not be the responsibility of frontline residents to defend their own health, it is essential that they be given the tools to understand the exposures and potential health impacts they could be facing. There are many ways to achieve this goal of transparency.

Regional air quality monitors now cast a loose net, often missing emission peaks from localized sources.<sup>176</sup> If monitoring is conducted, it must be done with an eye toward understanding human exposures and their potential impact on health at the local and hyper-local levels. Monitoring data must then be shared with the public. Allowing impartial, third-party evaluators access to emissions and health data will provide a clearer picture of exactly what is happening in local air and watersheds. Also important

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<sup>176</sup> Environmental Health Project. (2020, March 31). *Why Do Spikes or Peaks in Emissions Matter?* [blog] <https://www.environmentalhealthproject.org/post/why-do-spikes-or-peaks-in-emissions-matter>

is providing analysis to help residents understand how emissions impact their health. Additionally, the industry must be compelled to make public the complete range of chemicals used in shale gas operations. Further, drilling waste streams must be monitored and tested for toxic and carcinogenic substances, and communities must be informed when dangerous levels of contaminants enter the environment. Ultimately, industry can be compelled to manage a public warning system when excessive releases of contaminants occur, as has been adopted in at least one other state.

Transparency on the side of state government also includes access to the political decision-making process, particularly as it relates to how public sector decisions are made and what the alternatives to those decisions were. Pennsylvanians need to understand what factors influenced the decisions that affect residents at home, at work, or at school.

***Authority: Provide funding for government agencies to do their jobs effectively; authorize them to take action through a strong mandate to protect public health***

Appropriate government officials, starting at the top, need to provide a clear mandate that government agencies are tasked with protecting the health of the environment and the people in it. When examining the existing body of knowledge on the subject, as well as the myriad complaints from Pennsylvania residents, it is clear that the DOH, many members of the General Assembly, and the Governor’s Office have so far failed to make a good faith effort to understand and address the health risks and resulting health impacts of shale gas development. The current approach is not sufficient. The Pennsylvania government, at all levels, can use its authority to fulfill its commitment to public safety and wellbeing, setting more health-protective priorities for the future.

Government agencies, such as the DOH, could be far better equipped to fulfill their missions if they were allocated sufficient funding. Given adequate resources, agency staff could analyze air and water samples where people live and at emission sources; they could collect health data to get a better picture of the risks of living in proximity to shale gas development. Additionally, government agencies could better engage with individuals and communities to more fully understand their circumstances, experiences, and concerns. Armed with this knowledge, agencies could then provide better education and guidance on what impacted residents need to know and how they can take action to mitigate exposures; they could also provide information to health care providers on the front lines of this public health threat, who need to know how to respond.

***Accountability: Strengthen health assessment programs at the state level to be more responsive to residents’ needs; follow up on reports of adverse health outcomes and risk near shale gas sites***

Pennsylvania state government must establish and maintain a structured process to hold shale gas industry actors accountable for their actions or inactions. There also

must be a robust mechanism in place for residents to log their health concerns or flag violations committed by industrial operators and for state agencies, such as the DOH, to respond meaningfully and in a timely manner to community members.

In the shale gas arena, the federal government has stepped back from its commitments to protect environment and health. Consequential federal regulations or directives have been largely absent from shale gas policy. With that prevailing standard as a guide, Pennsylvania state government has done the same. Taking its cue from U.S. presidents and Congress, Pennsylvania's governors and legislators neglected their responsibility to protect the health of the Commonwealth's residents. Meanwhile, those same residents had no way to hold their government responsible except through the occasional court case or, in a very dilute fashion, at the ballot box. Both of these remedies are slow and unpredictable, and neither provides residents a meaningful way to hold public officials accountable while residents continue to be harmed.

As an example, armed with the proper resources and a firm mandate, the DOH could fulfill its mission to help ensure that the health of Pennsylvanians is sufficiently protected, including in the environmental health sphere. Over the years, the DOH has cultivated a working relationship with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR), including joint investigations of community concerns related to shale gas sites. While the agencies have completed few investigations overall, the collaboration between state and federal agencies is promising. Admittedly, neither DOH nor ATSDR has any enforcement power, and each serves only in an advisory capacity. However, the framework is in place for a more effective approach to investigating environmental health concerns, including one where findings are not downplayed or diminished. While Pennsylvania has no control over the bandwidth or latitude federal regulators afford ATSDR, Pennsylvania governors and the General Assembly could enable their own public health agency to be more responsive to the needs of residents and to be better placed to follow up on its own recommendations.

## **A NEW BEGINNING**

This paper explores what has been during the first decade of the shale gas boom in Pennsylvania, but it also illustrates what could be in the future. Public Health, as a field, is both forward-looking (preventing illness or injury in the first place) and responsive (detecting and treating disease as early as possible to halt or minimize damage). It is an iterative, not a static, process that needs to be continuously informed by new research findings, community interviews and assessments, and learning from other public health efforts. It is comprised of epidemiology, biostatistics, toxicology, health behavior science, and other sub-disciplines. A public health approach may have long-term goals (banning indoor smoking) or shorter-term goals (reducing asthma incidence by cleaning indoor air). Either way, it starts with an immediate problem, aims to block the routes of exposure, and contributes to the larger effort of keeping exposures at bay going forward.

Because it is often focused on an immediate problem, public health practice relies on a preponderance of evidence in order to gauge harms. While its subfields depend on very conservative statistical approaches that may not uncover associations, public health generally analyzes populations at risk, identifies how they may suffer harms, and takes action to reduce that risk. Understanding an outbreak or environmental event at 100% certainty is exceedingly rare. Consequently, public health officials seek to stop the chain of exposure first, while investigators and researchers then try to discover what is being emitted and what damage it may be causing in the population. It is not a perfect process, but it places protecting residents at the forefront of public health decision-making.

In order to achieve the goal of preventing health impacts, public health officials often act more conservatively and err on the side of caution. As alluded to above, environmental public health practice draws on toxicology, epidemiology, case studies, randomized controlled experimental research, and other sources of information, but decisions are made based on strong evidence, not perfect evidence. The world has become a safer and healthier place because of this public health framework, which health officials have repeated time and time again.

When looking at the first decade or so of shale gas development and political decisions in Pennsylvania, it appears that the governmental response regularly favored a pro-business stance over a pro-health stance. Leaders in government often justified decisions by saying there was insufficient evidence to take action or that the air and water contaminants were probably not that harmful. It seems clear that Pennsylvania's leadership feared curbing potential economic gain more than it feared health harms to its residents. The unfortunate reality is that Pennsylvania's leaders could have better addressed both of these fears in reaching reasonable, health-protective policy decisions.

This paper provided insights into decisions made by the legislators, governors, and DOH leadership. The path to a healthier Pennsylvania relies on government equity, transparency, authority, and accountability. Government actions that could move us closer to that goal include the following:

- **Legislators** in the General Assembly could seriously examine the harm caused by shale gas development and respond accordingly with bills that address the oversights of earlier legislation. They could use their immense power to craft laws that place health at the forefront of policy decisions, ensuring access to critical information and protections for historically marginalized communities. They could also provide funding to DOH and other agencies, enabling them to do their work more effectively. Legislators have a responsibility to represent the concerns of their constituents, particularly those who are at risk.

- **Governors** could make a vocal commitment throughout their terms to protect the health of Pennsylvanians from shale gas emissions. They could follow through on this commitment by directing state agencies to do the same and by setting a new agenda that prioritizes residents' health needs, particularly those of vulnerable populations, such as children, the elderly, pregnant individuals, and those with existing health conditions. Governors making this kind of commitment would demonstrate that they are concerned not just about the shale resources beneath their feet but about the health of Pennsylvania's residents as well.
- **The Department of Health** and other executive branch agencies could remain true to their missions of protecting human life and the environment, the latter of which also supports human health. While agencies' policy and programmatic latitude is only as elastic as the Governor's Office and the General Assembly allow, the DOH needs to do everything within its power to examine health risks and harms, with an eye toward prevention and without regard to industry influence.
- **All public officials**, whatever their station, could redouble their efforts to listen and respond to communities on the front line of shale gas development.

**We began this paper with the following idea:**

*History indicates that when energy technologies emerge rapidly, their risks and governance are often contentious. This history indicates the value of efforts at an early stage of technological development to understand the potential concerns of affected populations, to examine the risk concerns carefully, and to assess the capacity of the industry and the regulatory system to assess and manage the risks.<sup>177</sup>*

From the beginning, public officials in Pennsylvania did not have the foresight, or perhaps the discipline, to approach the shale gas boom in this way. Meanwhile, the next energy revolution—away from fossil fuels—is already occurring. As this transition happens, we believe it is imperative that leaders in Pennsylvania government recognize the legions of research findings and testimonies from constituents showing health harms related to shale gas development. Further, we call on them to introduce policy and support decisions that protect the public's health in the face of this emission-intensive extractive industry. There is much to be done.

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<sup>177</sup> Small, M. J., Stern, P. C., Bomberg, E., Christopherson, S. M., Goldstein, B. D., Israel, A. L., Jackson R.B., Krupnick, A., Mauter, M.S., Nash, J., North, D.W., Olmstead, S.M., Prakash, A., Rabe, B., Richardson, N., Tierney, S., Webler, T., Wong-Parodi, G., & ... & Zielinska, B. (2014). Risks and risk governance in unconventional shale gas development. *Environmental Science and Technology* 48(15). 8289-8297. <https://doi.org/10.1021/es502111u>



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