

Community & Psychological Effects of Oil & Gas Development

February 29, March 7 & 14, 2016

Educational Webinar Series Proceedings

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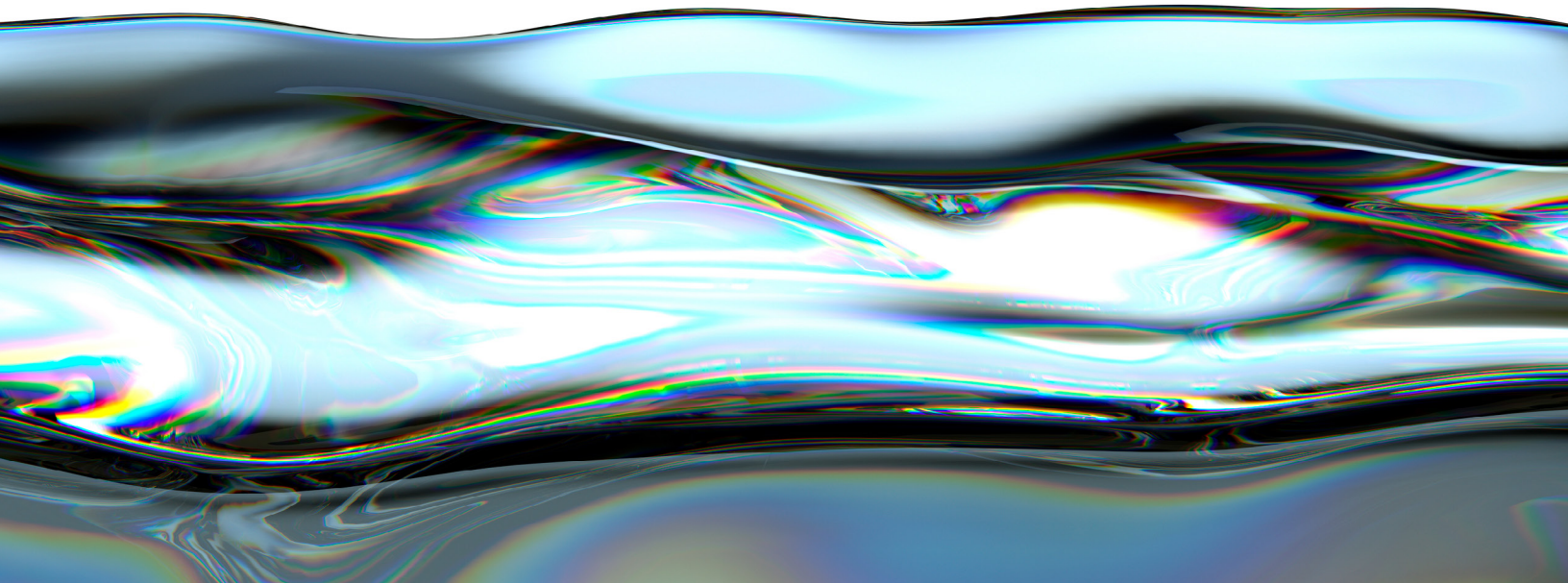


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OVERVIEW

On February 9th, March 7th, and March 14th, 2016, the Center for Environmental Health (CEH) and Southwest Pennsylvania Environmental Health Project (EHP) held three webinar sessions on the Community and Psychosocial Effects of Oil and Gas Development. The goal of these educational sessions was to provide an overview of the ways in which unconventional oil and gas development (UOGD) alter communities socially and economically, impact the mental health of residents, and generally influence the quality of life of community members in UOGD regions.

While researchers have primarily focused on the impacts of oil and gas extraction on the physical health of workers and individuals residing near wells and related industrial activity, there is a small body of research on the mental health of residents living in these communities. There are multiple ways in which UOGD can increase the environmental stressors experienced by community members. Some of these stressors include loud and persistent noise, light, and vibration from drilling activity, changes in the quality of water and air, and an increase in dust, road damage, emissions, and vehicle congestion, all of which can lead to apprehension over the health of the community.¹ These environmental stressors can be detrimental to mental health, creating prolonged stress and possibly contributing to anxiety, irritability, and depression. They may additionally have negative impacts at the community level in the form of social and economic conflicts.

This educational webinar series featured speakers from diverse professions—sociology, anthropology, public health nursing, pediatrics, social work, and mental health—for the purpose of providing a comprehensive account of the psychosocial and community effects of oil and gas extraction. The webinar sessions addressed community impacts of UOGD, mental health issues from a clinical perspective, and community-based research findings. Although most of these sessions were framed in the context of Pennsylvania and some of the resources discussed are being developed specifically for people residing there, many of the negative impacts discussed at the community level are the same across the United States regardless of the specific location or the type of oil & gas development method employed. Therefore, this educational resource can be used as a case study by clinicians, public health professionals, and mental health practitioners across the United States.

The webinar series took place in three sessions, each with three speakers. A summary of each presentation can be found in the section Presentations. Each session was followed by a participant-driven question and answer session. An overview of the question and answer sessions can be found in the section Summary of Q&A. Future research needs and policy recommendations were compiled together subsequent to the webinar series and can be found in the section entitled Policy Recommendations and Future Research. For more information on the speakers, see Appendix A. To learn more about the cosponsors of the educational webinar series, see Appendix B.

¹ SWPA-EHP; A Healthcare Provider's Guide to Mental Health Impacts of Unconventional Oil and Gas Development (UOGD)

Presentations

To view the presentations, please visit the CEH website at <http://www.ceh.org/webinar-psychosocial-community-effects-of-unconventional-energy-extraction-development/>

SESSION 1: COMMUNITY CHANGES: CHANGES TO THE FABRIC (SOCIAL, ECONOMIC, ETC.)

There are a number of ways that unconventional energy extraction and development can affect the health of families. For example, increased traffic volume could increase the likelihood of injuries and fatalities in a community. Other aspects such as increased levels of noise may cause stress, difficulty sleeping, and can exacerbate physical outcomes of existing health problems. This highly industrialized process can also change the social fabric of a community. Communities have reported changes in social norms and a perceived loss of social

An Overview of Community Impacts

Jeffrey Jacquet, PhD, Assistant Professor of Rural Sociology at Ohio State University

Dr. Jacquet studies the social and economic impacts of energy development in the U.S., focusing specifically on unconventional oil and gas development (UOGD). In this presentation, he provided an overview of the various impacts experienced by communities and individuals residing near areas of oil and gas extraction. Dr. Jacquet discussed how communities as a whole can be affected in terms of population changes, housing shortages, increased service demands, environmental issues, and the various problems associated with boom and bust growth such as unplanned and unstable development. Oil and gas extraction has further impacts at an individual level, affecting residents economically, psychologically, and socially. How one is impacted economically, for example, depends on the individual's role in society, their relationship with the energy industry, their income, and other job-related factors. In terms of psychological impacts, UOGD can influence the stress levels of a resident by leading to economic uncertainty, increasing both the risk of environmental contamination and health issues, prompting the perception of a community as "contaminated," and changing social relationships within the community.

Dr. Jacquet pointed out that the stressors of oil and gas development are experienced and perceived differently across varying types of populations. He identified the differences between the outcomes of a boom and bust UOGD economy on communities in North Dakota, Eastern U.S., and more urban areas. In North Dakota, for instance, the "boom" period is associated with an increase in the cost of living, wider availability of jobs and higher pay, rise in school enrollment, substandard living conditions, and cheap, short-term housing solutions, while the "bust" period sees leftover growth but diminishing demand. Such extreme "boomtown" effects are not as prevalent among UOGD areas in Eastern U.S., where larger populations from nearby hub cities absorb the influx of mobile workers and development is more contained to regional areas.

With regard to the detrimental transformations experienced by communities in UOGD areas, Dr. Jacquet introduced two descriptive terms: "Contaminated Communities" and "Corrosive Communities." Coined by Michael Edelstein, the term "Contaminated Communities" refers to the changing social fabric of UOGD communities and the "social-psychological disruption" that extraction engenders. Under the conditions of oil and gas development, residents may no longer be able to consider their community a "psychological refuge," as the community has been altered from what residents grew up in or chose to live in.

The term "Corrosive Communities," coined by William Freudenburg and Timothy Jones, refers to the detrimental impacts of UOGD on community relationships, including conflict between residents, feelings of distrust, confusion, and uncertainty, hindered decision-making, and a lack of productive communication, much of which stems from an unequal distribution of the costs and benefits of oil and gas development among residents.

Lastly, Dr. Jacquet considered the consequences of UOGD on community health. With an increase in population and thus health-related issues, healthcare services from ambulances to counseling become exceedingly limited. Communities furthermore see an increase in industrial and traffic-related accidents. One of the most prominent health effects of UOGD, however, is stress. As Dr. Jacquet discussed, both newcomers and permanent residents feel the effects of stress, which is the result of social disruption or isolation, an increased cost of living, and the possibility of health and environmental issues.

Changes to Social and Community Norms

Simona Perry, PhD, Anthropologist and Founder/Research Director at c.a.s.e. Consulting Services LLC

As a professional environmental scientist and applied ethnographer, Dr. Simona Perry works in rural and urban places across the U.S. to document and raise awareness of the interconnections between ecology, psychology, policy, culture, and history. She specializes in human-ecological risk assessment, asset based community development, local community-centric capacity building research, and transdisciplinary practices. In this presentation, Dr. Perry discussed her work in conducting place-based ethnographies within the communities of Bradford County, Pennsylvania. Bradford County is among several counties located in rural Pennsylvania's Marcellus shale gas fields that have experienced a recent increase in industrial activity related to UOGD. Dr. Perry's goal in conducting ethnographic work was to "systematically document how rural people and communities interpret their environment, the entire county, and their own lands, with a focus on individual and community experiences of change," specifically in relation to the Marcellus shale gas boom. Allowing community members to tell their stories in this way is both liberating for the individual and informative for researchers like Dr. Perry.

Dr. Perry found that the changes brought about by UOGD were a primary cause of psychosocial stress experienced by the county. Residents of Bradford County expressed feelings of stress due to awareness of the changes in their physical environment and community culture, as well as an increased sense of community conflict. Commonly, concerns revolved around increased traffic due to UOGD and the related dust, noise, diesel fumes, and road damage. Many residents often felt their sense of place (in terms of home, security, connection to history, and hope for the future) threatened as the previously rural community became industrialized. In terms of community conflict, residents conveyed their worries over the deep fractures they felt had developed between community members. Oil and gas development, Dr. Perry described, brought about social alienation, mistrust, and a cycle of abuse, with one side (supporters of the industry) blaming dissenting landowners for hindering progress, and the other side blaming the gas industry and local officials for threatening the wellbeing of the community and disregarding landowner rights.

Dr. Perry provided several suggestions for maintaining community health and resiliency in regions experiencing change due to oil and gas extraction. Based on her own findings and the opinions of community members, what UOGD communities like Bradford County need are non-affiliated, non-biased doctors and public health practitioners to conduct and distribute research on the health of the residents. Furthermore, Dr. Perry advocated for community health researchers to help residents recognize their assets and develop efforts to preserve rural livelihood. Lastly, Dr. Perry identified the need for regions of oil and gas development to employ social workers and community advocates, like EHP, to act as defenders of the residents.

Health Concerns from the Community Perspective

Ruth McDermott Levy, PhD, RN, Associate Professor and Director for the Center for Global and Public Health at Villanova University, College of Nursing

As a public health nursing expert with a concentration in global and environmental health, Dr. McDermott Levy currently focuses her research on the health risks of UOGD within rural communities of Pennsylvania. In this session, Dr. Ruth McDermott Levy described the findings of focus group interviews regarding health concerns of community members living in Wyoming County, a region in northeastern Pennsylvania that is undergoing the industrialization of UOGD. Her study aims were to identify the environmental health concerns of residents in regions of oil and gas development as well as to determine the most effective methods of distributing accurate information regarding environmental health to these residents.

Through focus group surveys, Dr. McDermott Levy produced a qualitative descriptive study on the major concerns of community members, from which she identified two main themes: first, a changing community, and second, a sense of powerlessness among community members regarding control over causes and solutions of problems associated with UOGD. In terms of the changing community, defined as having new people with different practices, more industrial activity, and alterations to rural life, residents expressed feelings of sorrow from watching the rural area they had grown up in or purposefully moved to become industrialized. Residents were particularly worried about changes in air quality as a product of industrialization, both within the home and outside. The growing sense of powerlessness in the community stemmed from uncertainty over the health impacts of UOGD and the high costs of finding out what chemicals they were possibly being exposed to in the air and water. Community members were uncertain where to obtain accurate information, or were acquiring misinformation and misinterpreting information from health professionals.

Dr. McDermott Levy provided several recommendations as to how community members can become more informed about the health impacts of oil and gas extraction. She argued that we must be thinking about how to effectively provide accurate, accessible information to community members in order to decrease their feelings of powerlessness and uncertainty. Residents suggested that information be available on the Internet, specifically in downloadable form so that it could be shared with fellow residents lacking Internet access. Such information should encompass environmental risks such as air quality, water quality, and radon levels, as well as social changes and the associated psychosocial risks. Dr. McDermott Levy additionally suggested that information be created for doctors and health professionals to increase their understanding of how to deal with these issues. Finally, she recommended that health professionals and community advocates alike come together to effectively advocate for policies that ensure the wellbeing of community members.

SESSION 2: CLINICIANS' PERSPECTIVES: SYMPTOMS AND APPROACHES TO DIAGNOSING AND TREATMENT

As knowledge increases about fossil fuel extraction and development, public health professionals and clinicians are developing best practice recommendations for physicians, community health centers and patients. One of the main recommendations for health professionals working in impacted areas is to incorporate questions and health concerns into patient intake forms and into doctor patient discussions. In this panel, social workers and clinicians discussed some of the problems seen in patients with stress, anxiety and mood, and talk about what is being seen in local impacted areas and what is being done to develop resources to help residents whose mental health has been affected by unconventional oil and gas development.

Patient Assessment from the Pediatric/Healthcare Provider Perspective

Larysa Dyrszka, MD, Board-certified Pediatrician and former Director of Pediatrics at Holy Name Hospital in Teaneck, New Jersey

Dr. Larysa Dyrszka, a pediatrician, founding member of Sullivan Area Citizens for Responsible Energy Development, vice-chair of the CME curriculum committee for Physicians, Scientists and Engineers for Healthy Energy, and board member of Physicians for Social Responsibility – New York, is an advocate for health on the issue of natural gas exploration and production. In her presentation, Dr. Dyrszka provided an overview on the mental health symptomatology that is frequently observed in patients, specifically children, impacted by oil and gas development. Dr. Dyrszka, in collaboration with EHP, is the first to conduct studies on the behavioral and emotional impacts of UOGD on children.

The EHP protocol is an example of a health program that can screen for mental health symptoms in children. Dr. Dyrszka discussed how mental health symptomatology can take the form of developmental delays due to prenatal exposure, behavioral difficulties, and poor academic performance from missing school due to sickness or from distraction due to the noise associated with UOGD sites. Mental health disorders may impact early learning, social confidence, and physical health in children. Various risk factors, including living in poverty or having parents with high stress levels, compound the chance that a child will develop mental health issues in UOGD areas.

Dr. Dyrszka lastly discussed several ways in which EHP seeks to measure the mental health of children living in regions of oil and gas development. The purpose of evaluating mental health is to be able to make an accurate diagnosis as well as propose an appropriate form of treatment. As Dr. Dyrszka explained, EHP has begun to distribute to patients the 36-Item Short Form Survey (SF-36v2)©, a form designed to measure mental health quality and overall quality of life. If the patient's answers on the form indicate that an issue is present, EHP provides the patient with referrals to mental health professionals.

Lessons Learned Regarding Emerging Health Issues Related to Unconventional Oil and Gas Development

Lenore Resick, PhD, CRNP, FNP-BC, FAANP, FAAN, Family Nurse Practitioner at Southwest Pennsylvania Environmental Health Project (EHP)

As a family nurse practitioner for EHP, Dr. Lenore Resick focuses much of her clinical practice and research on health and wellness and the meaning of health among vulnerable populations. In this webinar session, Dr. Resick discussed the most commonly reported symptoms and physical findings of individuals who are living in communities experiencing proliferation of unconventional oil and gas development and who seek the services offered by EHP. She furthermore examined the challenges encountered by health care providers. One of these challenges includes the lack of evidenced-based laboratory tests to monitor low levels of chronic exposure to the various chemicals associated with UOGD that are known to be harmful to human health of industrial workers, including xylene, formaldehyde, sulfur oxides, and particulate matter.

Dr. Resick reported that an analysis of reported health symptoms of clients who sought health services at EHP who: 1) lived within 1 kilometer of an oil or gas extraction site; and 2) whose symptoms could not likely have been caused by other exposures or previous medical conditions; were consistent with symptoms reported in the literature in other UOGD communities around the country. These reported health symptoms included headache, burning and itching of the eyes, throat irritation, coughing, nausea, vomiting, and sleep disturbances. Various populations are considered to be at higher risk for developing these symptoms.

These populations include individuals with pre-existing chronic disease and weakened immune systems, the elderly, pregnant women, children, and individuals who have been sensitized to multiple chemicals through exposure. The elderly, for example, are more likely to experience increased isolation due to fear of driving in industrial truck traffic. Recent studies suggest that pregnant women have an increased chance of experiencing high-risk pregnancies and pre-term births, while their infants are more likely to have congenital heart or neural tube defects and experience adverse developmental effects. Children are more likely to be negatively impacted by UOGD chemicals and stressors because they breathe at a faster rate than adults, are closer to the ground, and engage in more hand-to-mouth behaviors which increases the potential for inhaling and ingesting more toxins.

Dr. Resick compared the results of a qualitative study she had previously conducted on the meaning of health in relation to the environment among women from mid-Appalachia to findings she encounters repeatedly while working as a nurse practitioner at EHP. Two recurring themes expressed by the women in the study included a sense of connection to place and feelings of powerlessness. Concerns over the changing of place due to UOGD industrialization often centered on increased levels of noise, which disrupts the quality of sleep and can potentially lead to a cascade of negative health effects, including cardiovascular disease, hypertension, learning and cognition issues in children, and endocrine function disruption. Dr. Resick found that the women living a greater distance from industrial activity were not as worried about issues such as noise level as women living in close proximity to drilling sites. In terms of powerlessness, participants in the study as well as the clients who seek services at EHP expressed concerns over water and air quality, noise, light pollution, and community relations, all factors they felt were out of their control.

As health officials continue to have uncertainties regarding the effects of long-term exposure to oil and gas extraction, Dr. Resick argued that epidemiological research is necessary. In regard to toxicology testing for chemical exposure related to UOGD, Dr. Resick explained that EHP does not recommend biomonitoring, as no standardized tests for low levels of chronic exposure currently exist, the chemicals associated with UOGD can be rapidly cleared from the body, there can be various routes of exposure for the chemical, and the metabolites of the chemicals are not specific and may not be measurable. What EHP does recommend is periodic routine blood testing that includes the monitoring of liver and kidney function over time.

Developing Community and Clinical Resources: Integrating Varying Perspectives

Jessa Chabeau, MSW, Case Manager at Southwest Pennsylvania Environmental Health Project (EHP)

As Case Manager, member of the Health and Wellness Team, and convener of the Stress Team and the Outreach Team at EHP, Jessa Chabeau is focused on community organization and social administration in relation to UOGD. Ms. Chabeau explained EHP's work with Washington County residents whose mental health has been impacted by UOGD. As the number of drilling sites increased from 54 to 1103 between 2008 and 2014, the population at risk of these health impacts, which includes anyone residing in a township with UOGD activity, increased to over 56% from 17% in Washington County during this time. Common issues identified by EHP include mental health impacts such as anxiety, stress, and depression. Stressors include traffic congestion, industrialization of the rural area, changes in community structure, and feelings of abandonment by local and state government officials.

As Ms. Chabeau outlined, EHP has taken various steps to try to mitigate the stress levels of patients. The first approach was to distribute stress management handouts and offer clients a health program created by Pro-Change Behavior Systems, Inc. The program included modules on exercising, healthy eating, stress management, and weight management, along with one-on-one coaching via telephone. EHP recruited participants by sending letters to clients of EHP and to other healthcare providers as well as holding information sessions at healthcare clinics.

Because this program proved unsuccessful, EHP took a second approach involving a community-based participatory research pilot project. To gather input from the community, EHP formed five focus groups made up of community members of differing demographics. Each focus group was posed the same set of questions, including 1) How does living in a community with oil and gas development make you feel? 2) What can be done to help you or your community? And 3) what are the best methods to help? Most commonly, the focus groups expressed feelings of stress, worry, helplessness, depression, and anger towards the changes brought about by UOGD. The focus groups suggested that effective solutions could include organizing grassroots groups efficiently and effectively as well as educating community members, healthcare providers, health departments, school boards, and township supervisors about UOGD-related legal issues, air and water monitoring strategies, and health impacts.

In response to sentiments expressed by community members in the focus groups, EHP drafted a set of resource materials that provide community members with answers to questions regarding UOGD activity. These materials were reviewed by community-based organization leaders from three Pennsylvania counties and included handouts on topics such as how to talk to healthcare providers about UOGD issues, protecting health, stress management, and emergency planning. As Ms. Chabeau explained, EHP is currently working on a "Where to Turn" resource guide that covers where to access information about UOGD (including contact information for relevant regulatory agencies), how to protect your family's health, and what to do to track and understand chemical exposures from UOGD. EHP expects that having answers to these questions will help community members to reduce stress.

SESSION 3: RESEARCHERS' PERSPECTIVES: COMMUNITY RESEARCH AND DATA TO INFORM POLICY OUTCOMES

There is limited academic research on mental health associated with unconventional oil and gas development. However, the widely reported mental health impacts described in earlier presentations are consistent with emerging reports in peer-reviewed literature. The mental health impacts described in these studies are consistent across multiple studies demonstrating the relationship between mental health outcomes and industrial extraction of fossil fuel, which document higher prevalence of depression, anxiety, and other mental health disorders in communities exposed to releases of hazardous materials compared to those who are

Self-Reported Health, Function, and Sense of Control: A Descriptive Study from One County in Southwestern PA

Lydia Greiner, MSN, APRN, PMHNP-BC, Psychiatric Nurse Practitioner at Southwest Pennsylvania Environmental Health Project (EHP)

Lydia Greiner is a Psychiatric Mental Health Nurse Practitioner whose current research interest is in the relationship between mental health and the environment in communities impacted by unconventional oil and gas development. She works as a consultant to the EHP and collaborates with community environmental groups in California. Ms. Greiner discussed research she and her colleagues conducted in southwestern Pennsylvania, an area of the U.S. that has experienced rapid growth in unconventional natural gas extraction activities. The purpose of their descriptive study was to explore the relationships among mental health, physical health, and unconventional natural gas extraction activities. The study was conducted at a community health center serving residents of one county in southwestern PA. Participants completed the SF-36v2© health survey, which measures eight domains of overall health and function, four of which are related to mental health. These domains—Vitality, Social Function, Mental Health, and Role Emotional—are derived from questions that assess such aspects as energy and fatigue, social relationships, anxiety, mood, and social role. A summary Mental Component Score is also calculated; it can be interpreted as if it were a depression screening score.

Participants, who were not told that this was a study investigating UOGD and health, were also asked to complete the Mirowsky-Ross Index of the Sense of Control, which measures a person's sense of control over good and bad things that happen in life, and to provide general demographics.

Of the 239 participants in this study sample, 221 lived within 5 kilometers of a well. The sample was largely female (74%) with an average age of 48 years. More than half (57%) did not work outside the home. On average, 25% of participants achieved a score indicating impairment in each of the four domains of mental health. The largest percentage was seen in Role Emotional, with 29% having scores indicating impairment. Role Emotional reflects the impact of mental health on ability to carry out one's role in work or home activities. A total of 31% of participants met the criteria for a positive depression screen based on the Mental Component Score, higher than the expected percentage of 19. The Index of the Sense of Control was directly related to all four of the mental health domains and the Mental Component Score ($p < 0.05$ for each relationship).

Though Ms. Greiner acknowledged the limitations of the study—its cross-sectional design, the lack of variability in the sample, and the fact that it was a convenience sample—the study does provide a description of the mental health of a sample of residents from a community undergoing intense unconventional natural gas extraction. The results suggest a higher rate of depression in this population than would be expected. In addition, the results show that a lower sense of control was associated with poorer mental health in the sample. Further research is needed to better understand this relationship and to explore possible interventions to increase sense of control. Primary care providers and residents alike may benefit from education about the possible mental health outcomes of UOGD.

Mental Health Effects in Mobile Workers in Wake of Canada's Oil Crisis

Angela C. Angel, Corporate Consultant and Sociologist in Calgary, Alberta, Canada

Angela C. Angel is a health impact assessment practitioner and former program manager of Mobile Worker Wellness with Habitat Health Impact Consulting. Based in Calgary, Alberta, she provides expertise to industry, government and communities on how to maximize mobile workforce wellness and, in turn, boost worker morale, productivity, retention, safety and overall worker and community wellbeing. In this presentation, Ms. Angel discussed the higher prevalence of depression, anxiety, and other mental health disorders in communities and industry workers of UOGD areas. She also examined the relationship between mobile work communities and permanent residents. The mobile workforce, she stated, is under-researched, but often blamed for the broad range of problems that occur in communities with transitory occupation opportunities such as UOGD. These workers are perceived as outsiders and are thought to have a negative impact on the permanent community. Ms. Angel works to overturn these stereotypes by conducting sociological research among the mobile workforce in Alberta, Canada and giving a voice to this "shadow population."

In contrast to the conception that mobile workers consist of young, single men, Ms. Angel found the demographics of workers in Alberta to be 17% female, mostly older (over 35), and more than 50% married. Various factors affect the wellbeing of mobile workers, including rigid shift work schedules of high demand and low control, the institutional-like settings of work camps, an emphasis on oil production and consequent lack of self-value and respect, masculine work cultures, and high pay that can lead to consumerist addictions.

Furthermore, mobile workers can struggle with disrupted lifestyles including having to shift between entirely separate work and home lives. Because mobile workers are stigmatized by the community and not provided with the resources to cope with the factors listed above, it is often only a matter of time before they "snap," engaging in unhealthy coping mechanisms such as drug and alcohol abuse, fast driving, and fights. Healthier work camp design and on-site mental health education and supports are key to improving the quality of life in work camps.

Policy Implications of Unconventional Shale Gas Development on Quality of Life

David Casagrande, PhD, Associate Professor of Anthropology and Research Coordinator for the Environmental Initiative at Lehigh University

As an anthropologist, Dr. David Casagrande currently leads an interdisciplinary research team for the purpose of studying the impacts of gas and oil development on human quality of life. In this presentation, Dr. Casagrande discussed results from interviews, focus groups, and survey research on how unconventional shale gas development is impacting life satisfaction and perceived stress in Pennsylvania's Northern Tier. His ongoing research specifically focuses on questions of psychological stress, life satisfaction, and the economic costs and benefits of UOGD at a household level. In studying these factors, Dr. Casagrande considers where the psychological stress originates from, how economic development and stress interact to impact life satisfaction, and why some communities may experience more benefits from UOGD than others. He has determined, for example, that communities with certain socioeconomic assets, such as proximity to highways and housing, are better able to capture the benefits of UOGD. Dr. Casagrande's ultimate goal in conducting this research is to create a structural equation model, combining factors such as proximity to drilling activity, socioeconomic assets, quality of life indicators, and perceived stress to produce a Life Satisfaction Scale.

The structural equation model is constructed by using various research methods, including focus groups and interviews, media analysis, structured surveys, and socioeconomic and geospatial data aggregation. As an anthropologist, Dr. Casagrande specifically discussed the ethnographic sphere of research. Looking for the sources of stress and the socioeconomic assets that help communities capture the benefits of UOGD more successfully than others, Dr. Casagrande held two focus groups and conducted 31 interviews of residents from five different Pennsylvania counties. After digitally recording, transcribing, and thematically coding the interviews and focus groups, Dr. Casagrande's research team generated a structured survey including a life satisfaction scale and a perceived stress scale.

Dr. Casagrande ultimately found that community members feel their quality of life has been negatively impacted by noise levels, increased traffic and accidents, vibrations, increased cost of living, fear of health impacts, social conflict, and loss of control over personal property and public decision-making related to UOGD. In the survey, those who benefited from the industry economically reported lower stress levels than those who did not. Significant predictors of stress included a sense of belonging to community, personal finance, relationships with neighbors, and concerns over household water. Social conflict could be attributed to polarization between individuals with pro-UOGD and anti-UOGD sentiments, stigmatization of those questioning development, income disparities, and conflicting landscape ideals. Feelings of powerlessness and loss of control stemmed from perceived lack of local government supervision, unpredictable commute times due to increased traffic, the feeling that mobile workers were "taking over," a lack of communication to residents about drilling activity, and a loss of control over one's own property because of vague lease agreements or social pressure to lease. Responses to stress were manifested in various ways, from substance abuse and self-isolation to political engagement, organizing, and information sharing. From this research, Dr. Casagrande concluded that psychological impacts vary greatly between those who benefit economically and those who do not, and that these divergent impacts can be improved with public policy.

Summary of Q&A

Session 1:

Has research been done in the United States connecting extraction-based development and increases in gender-based and sexual violence?

Dr. Jacquet states that he is aware of research that has looked at registered sex offenders and energy development and seen a strong correlation. He also knows of more anecdotal evidence of human trafficking that are seeing UOGD. In North Dakota, for example, human trafficking was a major focus of law enforcement. Part of the issue in North Dakota is that with the increase in population, it is difficult to pick out cause and effect. We don't know whether it's particular to the energy industry or the fact that there are simply more people than there used to be.

Explain 'corrosive' communities?

Dr. Jacquet explained that this term was coined by environmental sociologist, William Freudenberg. Freudenberg is describing communities with a large degree of community conflict – people in disagreement with each other over environmental causes such as who caused the contamination, who is at fault, and who is benefiting? The 'corrosiveness' comes from the discourse of the community, likened to a community divorce. Unfortunately, there is not a lot of longitudinal data about the long-term impacts.

How can nurses get involved? Are there suggested organizations looking to employ nurses for this kind of work?

Dr. McDermott Levy suggested the Alliance of Nurses for Healthy Environments (ANHE). ANHE has a sub-committee looking at health impacts of fracking. Also, nurses can get involved with their state nurses association and sharing thoughts with policy-makers.

Can you talk a little bit more about the community participatory research methods that you use in your research? Are there particular methods that you think are really important to be able to gather and collect community perspectives and data?

Dr. Perry stated that the most valuable method for her has been group-work but that interviews are important too. Getting interviews from the same family and over different generations is very important too.

Any suggestions to convince the energy decision-makers that there can be psychosocial and health problems as well as damage to the environment?

Dr. Perry recommended educating landowners about how this will affect them financially and what they should do to monitor for impacts, such as water, air, and health. Also, get people who can speak to large social impacts and who can speak to the community, politicians, and decision-makers about this issue.

When will the results/publication be available for the NSF funded project [Dr. Jacquet]?

Dr. Jacquet stated that the purpose of the project, grant-funded by National Science Foundation, is to link researchers and create a forum for people to share social science research on energy development. The website is www.energyimpacts.org. It is also creating a researcher directory for social science and public health researchers so people can search based on geography, academic discipline, etc.

How do we move these very significant issues of your work and others out of the esoteric realm to social media and practical applications? How can we make this all real to 7 billion people in the world?

Dr. McDermott Levy stated that academics and healthcare providers must use language that people understand. Then, we need to get it into popular media and social media as opposed to peer-reviewed literature.

Dr. Perry believes that it is important that we turn this into a moral issue to reach people and motivate them to act.

Wow, powerful work you are doing here Simona, how do you see it tying in with the human rights tribunal work you are doing?

Dr. Perry states that the human rights tribunal is "all about stories" and as an ethnographer, she collects stories. The Permanent People's Tribunal will take place in the spring of 2017. They will be judicial hearings in the United States and in the United Kingdom where cases collected by experts, communities, and ethnographers will be heard in front of an international panel of human rights judges.

Comment:

Government seems to be absent from the table and should be more involved in conversation as mediator, etc.

Session 2:

What kind of biomonitoring would you recommend around natural gas compressor stations?

Dr. Resick suggested metabolic panels that include monitoring liver and kidney function over time would be important since the liver and kidneys are, two organs that eliminate waste products from the body. Also, monitoring lung and thyroid function over a period of time would be important to follow for any changes. There are specific tests that can be done for bio-monitoring, but those tests were created specifically for people working in the industry, who have been exposed to doses of a toxic substance within a given time such as an 8-hour work period. Typically, in the community, individuals could be exposed to low levels of chronic exposure so this is harder to monitor.

When is the resource directory going to be available?

Ms. Chabeau stated that they were still waiting on funding for this project so she did not have an exact timeframe yet.

Update: Enhancing Health in Pennsylvania, funded by the Staunton Farm Foundation, is a 12-month pilot project which began June 2016 and will continue through May 2017 in four counties in southwest Pennsylvania: Washington, where EHP is located, and the surrounding counties of Beaver, Greene, and Westmoreland. Throughout this project, EHP will establish and/or expand community partnerships in each of these counties, creating project teams including community leaders, mental health providers, primary care providers, and EHP staff. Consistent with the community-based participatory (CBP) process, the first meetings of project teams will define project goals and the proposed intervention, with teams sharing information about the specific circumstances and needs relative to UOGD that will be incorporated into the resource guide prepared for each county. Draft versions of the resource guides will be shared with residents, mental health providers, and primary care providers at focus groups. Their feedback and suggestions will be incorporated into the final versions and plans for dissemination. EHP anticipates that this process will result in important additions and modifications to existing resources, available through EHP and/or community groups and governmental organizations, with a goal of meeting the specific needs of each county. The primary deliverable for this project is a resource guide for each county, available in hard copy and electronic format. Additionally, EHP staff will develop guidelines for replication of this project in other communities. At the conclusion of the project, community members of the project team will continue to disseminate the resource guides and will be able to use the CBP process to address other issues in the future.

Are there particular studies that you [Dr. Dyrszka] would point someone towards to be able to understand the vulnerable populations including the children's perspective as it relates to mental health and stress?

Dr. Dyrszka has references from Harvard that she can make available.

Speck monitoring and pregnant women

Dr. Resick stated that EHP's Speck monitors are lent to clients to measure particulate matter (PM) in the air over period of time. One monitor is placed inside the home and one is placed outside the home. Dr. Resick stated that these monitors can be used by anyone not just pregnant women.

What particular methods did you use [for Dr. Resick's qualitative study]? What were your qualitative methods? Were they focus group discussions or based on a participatory research model?

Dr. Resick stated that recruitment-fliers were posted in public places in 3 counties. These fliers invited women to participate in a study about the meaning of health in context of the environment. Women were invited to contact the researcher if they were interested in participating and an appointment would be set up in their home or a place of their choice. They were told that as part of the study, they would be interviewed twice. The question they were asked at the first interview was, "what does health mean to you in the context of environment?" The interviewers never mentioned fracking or gas but it was frequently brought up by the interviewees. Once a thematic analysis of themes of the first interview was completed, the researchers contacted the study participant for a second interview to verify the analysis of the themes was correct.

How would you [EHP] circulate the healthcare providers guide to mental health providers where the hospital was built by industry or if the industry makes huge contributions to the facility?

Dr. Resick and Ms. Chabeau stated that we would make it available through professional organizations, internet, and distribute through clients to take to their primary care providers. Dr. Resick stressed that it is important to consider the power of the client, they can educate their provider on what's important to them.

Session 3:

Was the sense of control correlated with well density or distance to wells and homes? Could there be a relationship between the type of industry activity (well-pad compressor station, and pipeline) and feeling of control?

Ms. Greiner stated that there could be a correlation. However, the difficulty with the sample in the study is that there was no variation in terms of geographic distribution. In order to see an association between proximity/density of wells, there would need to be more geographic variation. Ms. Greiner stated that we would need additional research – participants who lived farther from wells than current sample – to be able to tell.

Dr. Casagrande added that in his study he constructed a stratified sample to capture a high variability of well density. He is the process of analyzing spatial correlations, and after a crude analysis found that there is less of an effect than they thought there might be with the exception of people who benefited economically. He suggested that well density may not be as important of a variable because you could be in a place that doesn't have as many wells, but still has traffic and noise from a compressor station. This gets to the point that most of these factors are regulated by different entities such as Federal Energy Regulatory Commission (FERC) on pipelines and Department of Environmental Protection (DEP) on compressor stations. This idea shows the policy landscape is extremely fragmented, which leads to more psychological stress.

Angela, did you have trouble at all accessing the mobile workers? What type of responses did you get within the oil and gas industry to your research and consultation? Did you get push back or did people welcome you in?

Ms. Angel stated that she was welcomed by workers. The male mobile workers were willing and open to participate in interviews for several hours.

Can you go over the assessment tool [for mobile workers] and how that works?

Ms. Angel stated that the assessment tool was born out of experience from health-impact assessments. Based on the human performance model (used for people training for athletic events), which involves getting the player ready, for game time – found that industry excels at game time, but the part involving getting the player ready is undeveloped. We really need to focus on when workers are not at work and how to design camp so that mental well-being is enhanced. Also, workers need activities to enrich their lives and social connections so they can lead balanced lives. Based on these ideas, the tool looks at guidance documents and best practices within work camps. It measures each specific camp space against those documents. It is comprised of different areas of camps and different rating tools. At the end of day, there are recommendations on how to improve camp spaces. The tool is really focusing on the mental welfare of workers.

Have you [Ms. Angel] thought of taking the same work you've been doing in Canada around oil extraction/production and use that also in a different scenario and see what you find in a different environment?

Ms. Angel said that more research and investigation needs to be done in Canada, the United States, and overseas. She has done health impact assessments in different parts of Canada and the United States and there are strong themes emerging across them. However, research on mobile work camps is quite scarce.

David, when will the results from your study be available?

Dr. Casagrande stated that in peer-reviewed format it is hard to tell when the results will be ready. However, in a month or two the white paper will be ready.

How amenable do you find clinical practitioners to talking about environment and its effects with their patients?

Ms. Greiner said that she thinks it's variable. As Dr. Casagrande pointed out, there are both people who benefit from this activity and people who don't. Their experiences are very different. Ms. Greiner lives in California where nurses and healthcare providers are very amenable to becoming engaged in a dialogue about the environment. In Pennsylvania, EHP is developing strong collaborations with healthcare providers, in terms of educating them about the relationship between health and the environment.

Where and how can we access the 'Healthcare Provider's handout'?

Ms. Greiner stated that EHP's website is currently under construction. Ms. Greiner was going to send it to Ellen Webb to send to registrants.

What kind of opportunities are out there generally to educate primary care providers and other health professionals?

Ms. Greiner stated that EHP is having a workshop for healthcare providers. EHP also has a toolkit for healthcare providers. In addition, there are various organizations such as Alliance of Nurses for Healthy Environments (ANHE) provides educational opportunities for nurses and healthcare providers related to this issue.

Next steps? What can we do with the information that we've been presenting in these webinars? How can we make this information more useful for the audience and others?

Ms. Webb, the facilitator, stated that recordings from the series will be available on CEH's website. Also, CEH and EHP will be compiling all the information from the series and putting it into a summary document.

Policy Recommendations & Future Research

Dr. Casagrande closed the webinar series by briefly outlining the processes by which public policy is created and implemented. He additionally discussed potential strategies for researchers and clinicians to influence policy. An effective strategy for researchers and practitioners to affect public policy is to prioritize partnerships based on types of data, research methods and expertise. Much public policy, especially at the federal level, is dominated by de-humanizing, mostly economic evidence that supports cost-benefit analyses or calculation of actuarial risk (i.e., the homo economicus mindset). However, alternative metrics of well-being are becoming more widely accepted among policy-makers. Different types of data (case studies, anecdotal evidence, large-scale statistical studies) differ in their effectiveness and interpretation at different policy levels (local, state, national). For example, Governor Cuomo's ban on fracking in New York State was based primarily on statistically informed health studies conducted in other parts of the country. A state or federal legislator may be compelled by a moral argument based on case studies or anecdotal evidence of individual health impacts, but legislative debate will focus on statistical evidence and more easily accessible data about employment and energy production. Local governments may be more compelled by individualized case studies with national energy statistics forming a backdrop to the conversation. The challenge for researchers and practitioners is to identify both the proper scale of public decision-making and specific individuals that would respond to their types of expertise.

Policy is ultimately based on social values. Data, science, and statistics are the currencies of discussion used in the political negotiation of values. Although good research is fundamental to good policy, outcomes tend to be based on moral persuasion and how the debate has been framed. In other words, even the most compelling evidence might not be influential, while information not regarded as legitimate by researchers and practitioners is.

What do we know based on the research that has already been done?

Anthropologists, ethnographers, social workers, nurses and other health professionals that have conducted research looking at mental, community and social effects of UOGD have established a number of key predictors of stress: 1) sense of belonging to community, 2) personal finance and economics, 3) relationships with community members, and 4) concern over air, water and health risks.

The following were also found to be key components of the mental health landscape:

Cognitive dissonance

- Creates stress
- Reduced through psychological coherence with a cultural narrative
- Those who benefited economically said that their inconvenience to other people was "serving a greater good"

Social conflict

- Division of communities – pro-gas vs. anti-fracking
- Stigmatization of anyone questioning development
- Income disparities between leaseholders and those without leases
- Conflicting ideals of changing landscapes

Loss of control

- Control over personal property (vague lease agreements, social pressure to lease)
- Changes in commute times, landscape, noise, and light
- Poor communication about drilling activity
- Lack of local government planning or oversight
- Out-of-state gas workers "taking over"

Responses to stress

Negative:

- Substance abuse
- Self-isolation

Positive:

- Sharing information through support groups
- Community-level organizing
- Political engagement
- Promoting local control

Policy Recommendations

The following public policy recommendations address individual health and community well-being. They are intended to stimulate discussion about broader public support for many of the specific recommendations made above by the webinar speakers. The recommendations are derived from this webinar and other sources.

Health and Well-Being

- Require by legislation or executive mandate that the Pennsylvania Department of Health monitor the health impacts before and after UOGD, including mental health, with an appointed external advisory panel of health experts, and paid for by a dedicated commonwealth revenue source such as a severance tax on UOGD. Research should be integrated with the creation of an Unconventional Natural Gas Development Health Registry. The procedural guidelines should specify not only that children be included in all health studies, but as a vulnerable population, they should be given specific attention as President Clinton directed in his Executive Order 13045 to reduce environmental health risks and safety risks to children.
- Develop regulations requiring county-wide Health Impact Assessments (HIAs) that include participation of local planning and zoning officials as a condition for granting well permits.
- Develop regulations requiring as a condition for a well permit that the applicant must grant access to their employees for health interviews. Conduct Social and Health Impact Assessments (HIAs) on mobile workforce populations as a way to improve mobile work conditions.
- Research should be encouraged to address health needs, but also designed in a way that will have policy outcomes. This latter goal is often overlooked. Strategic partnering in this case could include private foundations that might fund research and state agencies like departments of health that would be interested in results.
- Strategic partnering with clear goals, like introduction of legislation or research budgeting by public or private sources that specifically address respiratory, birth, or mental health effects of UOGD.
- Enact legislation requiring all oil and gas corporations, and their subsidiaries and contractors who conduct unconventional oil and gas exploration, development, transportation, and disposal activities to carry full environmental and medical liability insurance, including financial assurance in the case of bankruptcy, equal to 10% of that corporation's total assets.
- Require "green completions" that significantly reduce airborne toxins on all wells and transportation

Education and Dissemination of Information

- Develop a state-wide database of local health experts willing to participate in planning and zoning deliberations.
- Increase public access to information, especially private drinking water well contamination data, and including a listing of properties in which non-disclosure agreements have been made as a condition of legal settlements between home-owners and gas companies.
- Educate healthcare providers, elected officials, and government on UOGD.
- Enact legislation requiring the Pennsylvania Department of Transportation to assemble and disseminate traffic accident statistics for areas experiencing UOGD.

Setback Distances

- Immediately increase state-mandated setback distances of all UOGD infrastructure from homes and schools.

Financial Gains and Taxes

- Enact legislation creating an UOGD severance tax with designated minimum allocations for: 1) creating an improved revenue mechanism that encourages counties and municipalities experiencing UOGD to invest in public infrastructure upgrades and capacity expansion (esp., municipal water supplies); 2) state-wide studies of the health impacts of UOGD; and 3) supporting local planning and zoning efforts.
- Create a new and sustainable revenue source to support increased local planning in townships and counties in which UOGD is occurring.
- Implement a statewide minimum \$1000/acre lease price and increase landowner education about potential lease conditions.

Development and Infrastructure

- Require by legislation or executive mandate that county and municipal planning and zoning be an a priori condition for permitting wells.
- Address the inevitable future "orphaned well" scenario (which currently plagues Pennsylvania from past development) by creating a Natural Gas Remediation Trust Fund to remediate future abandoned wells, funded by a dedicated revenue source such as a severance tax on produced gas.
- Enact legislation and develop regulations to require permitting, encasement, grouting, and sealing of private water wells in accordance with Act 220 and the State Water Plan for the protection of private water wells from contamination by natural gas production fluids and methane.
- Maintain the existing legal structure that precludes "forced pooling" of landowner leasing.

Developing Best Practices

Public health professionals and clinicians are developing best practice recommendations for physicians, community health centers and patients.

Clinical Measurement & Recording Tools

Patient Assessment Forms

One of the main recommendations for health professionals working in impacted areas is to be able to collect patient information, concerns, and questions by using patient intake forms and enter into doctor-patient discussions. The intake process allows for a clinician to document the visit and various identifying data about the patient as well as basic health history and previous sources of care. This information can be useful for clinicians wanting to gather research data and/or to refer to for purposes of follow-up and/or reference.

Mental Health Assessment Tools

Dr. Dyrszka discussed several ways in which EHP seeks to measure the mental health of children living in regions of oil and gas development. The purpose of evaluating mental health is to be able to make an accurate diagnosis as well as propose an appropriate form of treatment. As Dr. Dyrszka explained, EHP has begun to distribute to patients the SF-36v2© healthy survey, a form designed to measure mental health quality and overall quality of life. If the patient's answers on the form indicate that an issue is present, EHP provides the patient with referrals to mental health professionals.

One of the solutions that Ms. Angel proposed for improving mobile worker wellbeing and increasing understanding of mobile workers within permanent communities is the Mobile Worker Wellbeing Assessment Tool. This assessment, which is currently being experimented with by Mobile Worker Wellness with Habitat Health Impact Consulting where Ms. Angel works, allows researchers to systematically analyze the mobile workforce and work to improve the social and environmental factors of workforce camps.

Educational Resources (fact sheets, reading materials, etc.):

Benefits of Educating the Community

Experts have also made a number of recommendations as to how community members can become more informed about the health impacts of oil and gas extraction. Education is a powerful tool that can be used by clinicians to decrease general feelings of powerlessness and uncertainty. Information such as fact sheets that practitioners can keep handy in their offices and/or direct their patients to and that is easily downloadable from the web, can be useful for some community members. Information detailing the environmental risks such as air quality, water quality, and radon levels, as well as social changes and the associated psychosocial risks can be helpful too. Lastly, information for healthcare providers and professionals to increase their understanding of how to approach and handle clinical cases is also beneficial.

“Where to Turn” Resource Guide

In response to sentiments expressed by community members in focus groups, EHP drafted a set of resource materials that provide community members with answers to questions regarding UOGD activity. These materials were reviewed by community-based organization leaders from three Pennsylvania counties and included handouts on topics such as how to talk to healthcare providers about UOGD issues, protecting health, stress management, and emergency planning. As Ms. Chabeau explained, EHP is currently working on a “Where to Turn” resource guide that covers where to turn for answers about UOGD (including contact information for relevant regulatory agencies), how to protect your family’s health, and what to do to track and understand chemical exposures from UOGD. EHP hopes that by having answers to these questions, this will help community members feel less stressed.

Areas for Future Research

What has been suggested for areas of focus:

Based on Dr. Perry’s own findings and the opinions of community members, what UOGD communities like Bradford County need are non-affiliated, non-biased doctors and public health practitioners to conduct and distribute research on the health of the residents. Furthermore, Dr. Perry advocated for community health researchers to help residents recognize their assets and develop efforts to preserve rural livelihood. Lastly, Dr. Perry identified the need for regions of oil and gas development to employ social workers and community advocates, like EHP, to act as defenders of the residents.

Research to help inform future policy building

Although there is limited research on mental health impacts associated with unconventional oil and gas development, there is evidence of those being affected by this issue. Widespread mental health impacts are consistent with emerging reports in peer-reviewed literature. These mental health impacts described in these studies are consistent with multiple studies demonstrating the relationship between mental health outcomes and industrial releases of fossil fuel, which document higher prevalence of depression, anxiety, and other mental health disorders in communities exposed to releases of hazardous materials compared to those who are unexposed. Ideally dissemination of existing literature and use of the most recent research findings will be used to create informed public policy.

Appendix A: Speakers and Contact Information

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Appendix B: Cosponsors

Center for Environmental Health (CEH)

The Center for Environmental Health (CEH) protects people from toxic chemicals by working with communities, consumers, workers, government, and the private sector to demand and support business practices that are safe for public health and the environment.

CEH gives tools to protect your family, supports communities fighting for clean air and water, and also takes legal action – all to protect you from toxic chemicals in air, water, food, and in products you and your children use every day.

For more information on CEH and to get access to educational resources and the series recordings: www.ceh.org

www.ceh.org/campaigns/fracking/resources

www.ceh.org/webinar-psychosocial-community-effects-of-unconventional-energy-extraction-development/

Southwest Pennsylvania Environmental Health Project (EHP)

The Southwest Pennsylvania Environmental Health Project (EHP) is a nonprofit public health organization that assists and supports residents of Southwestern Pennsylvania and beyond who believe their health has been, or could be, impacted by unconventional oil and gas development (UOGD, or “fracking”). Our mission is to respond to individuals’ and communities’ need for access to accurate, timely and trusted public health information and health services associated with natural gas extraction.

EHP’s team includes medical professionals, community service professionals, and public health scientists who are available to assist individuals and communities in many ways:

EHP’s onsite Nurse Practitioner is available for exams and consultations with people who think their health may be compromised by nearby UOGD activities. Clients can be seen by appointment in our local office or in their homes. Our Nurse Practitioner also provides referrals, helps clients navigate the health care system, and consults with environmental health specialists. EHP is also a resource center for information related to UOGD activities. Our staff is available by appointment in the office and by phone to address concerns residents have about their environmental conditions. We will answer questions, provide guidance, and steer people toward other resources when possible. EHP also provides air and water quality monitoring devices to qualified residents.

For more information on EHP: www.environmentalhealthproject.org