Living with Pennsylvania's Gas Boom: Voices from the Community

Ruth McDermott-Levy, PhD, MPH, MSN, RN
Associate Professor & Director, Center for Global and Public Health

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Background

- 7,788 active gas wells using fracking methods in Pennsylvania (StateImpact PA, n.d.)
- 60,000 new wells in the next twenty years (StateImpact PA, n.d.).
- Also gathering lines, pipelines, pig launchers, dehydration stations, compressor stations, metering stations, processing plants and silica transfer stations.

Rural areas & proximity to homes

Large fleet of trucks

Miles of pipeline

Compression Station

Dehydration Station

Silica Transfer Station

Drinking Water

- Methane migration into drinking water wells (Osborn et al., 2011).
- Contamination of drinking water from leaking fracking fluids (McKenzie et al., 2012).
- Higher concentrations of the hydrocarbons, methane (six times higher), ethane (23 times higher), and propane (traces) in their drinking water (Jackson et al., 2013).

Air Quality

- Ground level ozone, particulate matter, and aromatic volatile compounds such as BTEX: (benzene, toluene, ethylbenzene, and xylenes) (Wyoming Department of Environmental Quality Air Quality Division, 2009)

- Ambient polycyclic aromatic hydrocarbons (PAH), benzo(a)pyrene and phenanthrene, both known human carcinogens (Paulik et al., 2015)

Air Quality beyond the wells

- Compressor Stations: Benzene, formaldehyde, and methylene chloride (Southwest Pennsylvania Environmental Health Project, 2015).
- Increase in radon levels in Pennsylvania (Casey et al, 2015).
- Methane leaks, silica exposures, and the overall industrialization of rural communities (McKenzie et al., 2012).

Symptoms & Illness

- Fatigue, nasal and throat irritation, sinus problems, burning eyes, shortness of breath, joint and muscle pain, severe headaches, sleep disturbances, forgetfulness, irritation, nausea, skin irritation and rashes, depression, anxiety, and dizziness (Steinzor et al., 2013).

- The number and the density of wells (number of wells within a square mile) Increases hospitalizations (Jemielita et al., 2015).

Health Risks: The developing fetus

Increased congenital heart & neural tube defects (McKenzie, et al., 2014).

Low birth weight & low APGAR scores, unrelated to water source (Hill, 2013)

Pre-term birth, low APGAR scores, low birth weight and high risk pregnancy (Casey, et al. 2015)

Community Impact

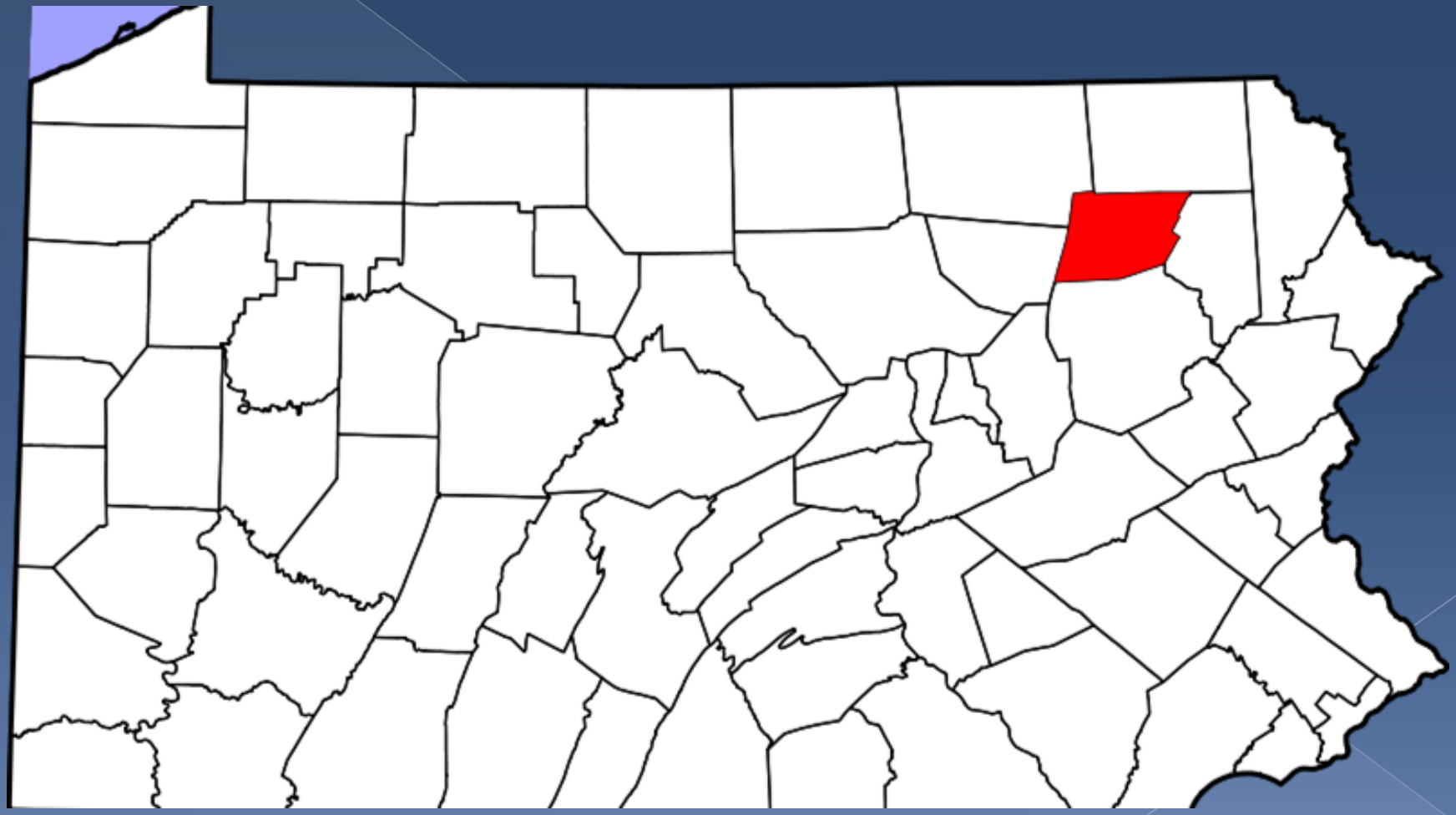
- Disrupting quality of life (Perry, 2013).
- More noises and dust, new odors, changes in appearance of water and new people in town (Perry, 2013).
- Feeling powerless and mistrust of the gas industry, local government, and regulatory agencies (Resick et al., 2013).
- Rising rents, increases in substance abuse, motor vehicle crashes, and sexually transmitted disease (Institute of Medicine, 2014).

Study Aims

1) Describe the environmental health concerns of residents of an UNGD community.

2) Identify methods that public health nurses can best disseminate accurate health information to the community residents.

Wyoming County, PA



Methods

- Qualitative descriptive approach
- 5 Focus groups
- Recruited through community leaders
- Content analysis of verbatim transcripts
- Summary of findings confirmed by participants

Participants: Wyoming County, PA Population 28,000

Gender	Highest Education	Annual Household Income $	Signed lease for UNG well	Distance from home to nearest well
97. 4% White	17.7% BS or higher	$48,626		
Female = 20	High school: 5	>25,000 = 3	Yes = 6	< 1 mile = 6
Male = 7	Associate degree: 5	25,000-49,999=7	No = 21	1-2 miles = 3
	Bachelors degree: 6	50,000-74,999=6		3-4 miles = 1
	Graduate degree: 11	75,000-99,999=4		5-6 miles = 5
		100,000-124,999= 3		12-13 miles=1
		125,000-149,999=1		35 miles = 1
		150,000-174,999=1		Don't know = 8
		No answer = 2		

Findings

- Two themes related to the environmental health concerns
  - Changing Community
  - Powerlessness
- Health information & Learning Needs

Changing Community: Legacy

Changing Community: Industry

Changing Community: Stress

Changing Community: Air

Changing Community: Air

Changing Community: Children

Powerlessness

Powerlessness

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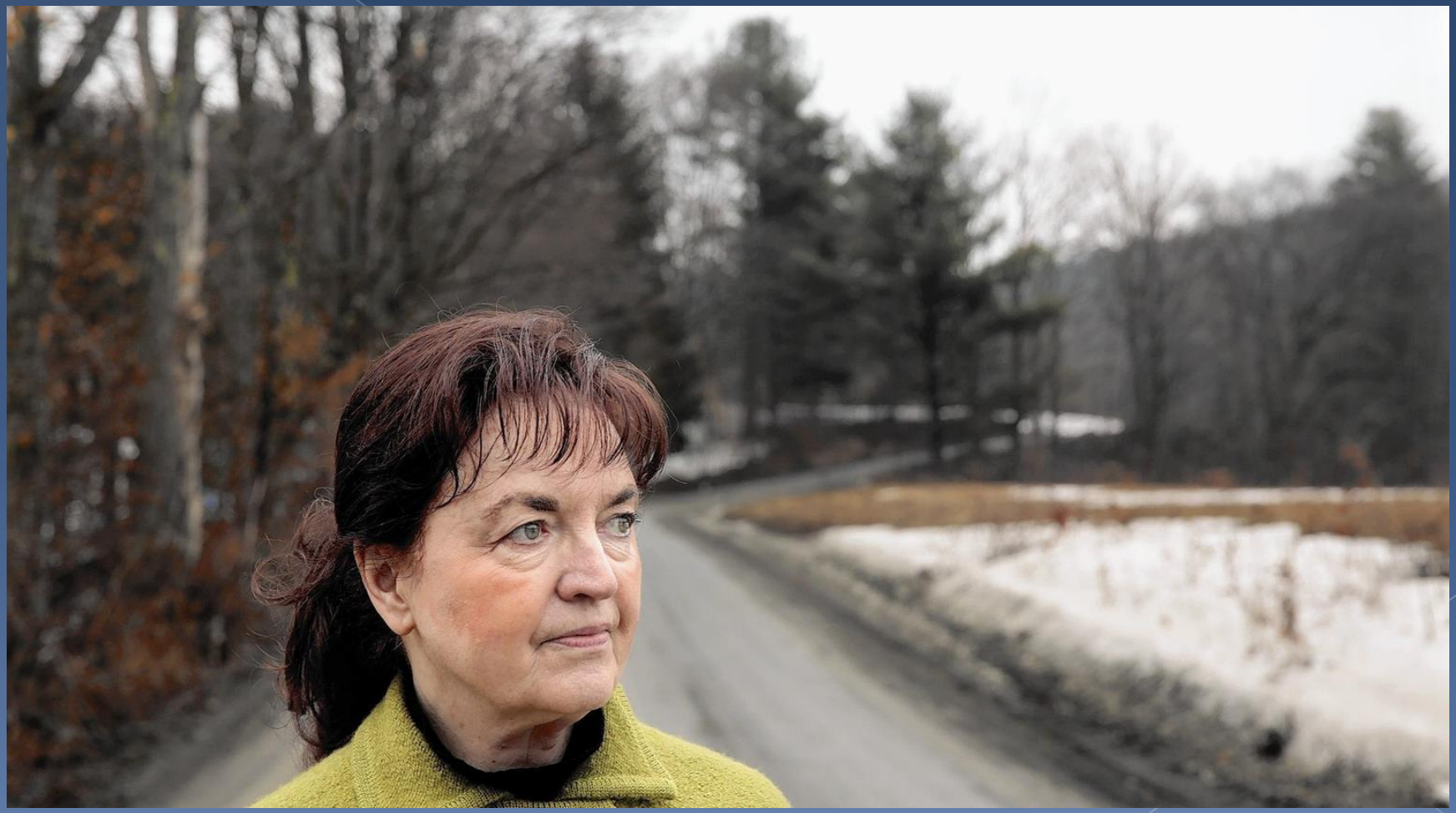
Powerlessness

Powerlessness



Physiologic Impacts of Chronic Stress

- **Elevated cortisol levels**
  - Atherosclerotic changes (Troxler et al, 1977)
  - Cognitive impairment & dementia (Lara et al., 2013)
  - Susceptibility to infections & osteoporosis (Schoorlemmer et al., 2009)
- **Increases in cytokines** (pro inflammatory cytokines)
  - CVD, Type 2 DM, Alzheimer's Disease (Tabas & Glass. 2013)
- **Epigenetic Changes**
  - Maternal nutrition and disease in child later in life (Jang & Serra, 2014). – CVD, metabolic disorders & Breast CA

Health Information & Learning Needs

Health Information & Learning Needs

Recommendations

- Education of environmental risks
  - Water quality
  - Air quality
  - Radon
  - Social Changes
  - Strategies to address stress & anxiety
- Promote dissemination of accurate information
  - Websites for public & health professionals
- Public Health professionals at the policy table
- Community advocates partnering with advocacy organizations and PH professionals

Resources

- Alliance of Nurses for Healthy Environments
- Southwest Pennsylvania Environmental Health Project
- Physicians for Social Responsibility
- Pennsylvania Health Professionals for a Livable Future
- Physicians Scientist & ENgineers for Healthy Energy

Questions?

ruth.mcdermott.levy@villanova.edu

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