



Gas Patch Roulette?

Investigating Links Between Shale Gas Development and Health Impacts through a Community Survey Project in Pennsylvania

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ABSTRACT

The race for new energy sources is intense and widespread. While the toxic qualities of substances used and produced in shale gas development and the general health effects of exposure are well established, evidence of causal links has been limited.

Survey research documenting the symptoms experienced by people living in proximity to gas facilities, coupled with environmental testing, can reveal links that warrant both policy response and further investigation. Research in Pennsylvania indicates the strong need for efforts to safeguard public health.

BACKGROUND

Investigation of the health impacts of shale gas development lags behind the expansion of the industry. Assertions that development is safe are often based on the absence of scientific studies showing otherwise. Yet:

- The toxicity of many of the substances used in hydraulic fracturing and the water and air pollutants resulting from gas production and processing have been documented.
- The health complaints reported by communities in the midst of the Marcellus Shale boom are similar to those reported in states with much longer histories of drilling (e.g., Colorado, Louisiana, Texas, Wyoming).

In response, Earthworks conducted a community-based health impacts project in Pennsylvania in 2011-2012.

A report and peer-reviewed article in *New Solutions Journal* detail the results of 34 air and water tests and 108 health symptom surveys—the largest set of information from the Marcellus Shale region to date.

METHODS

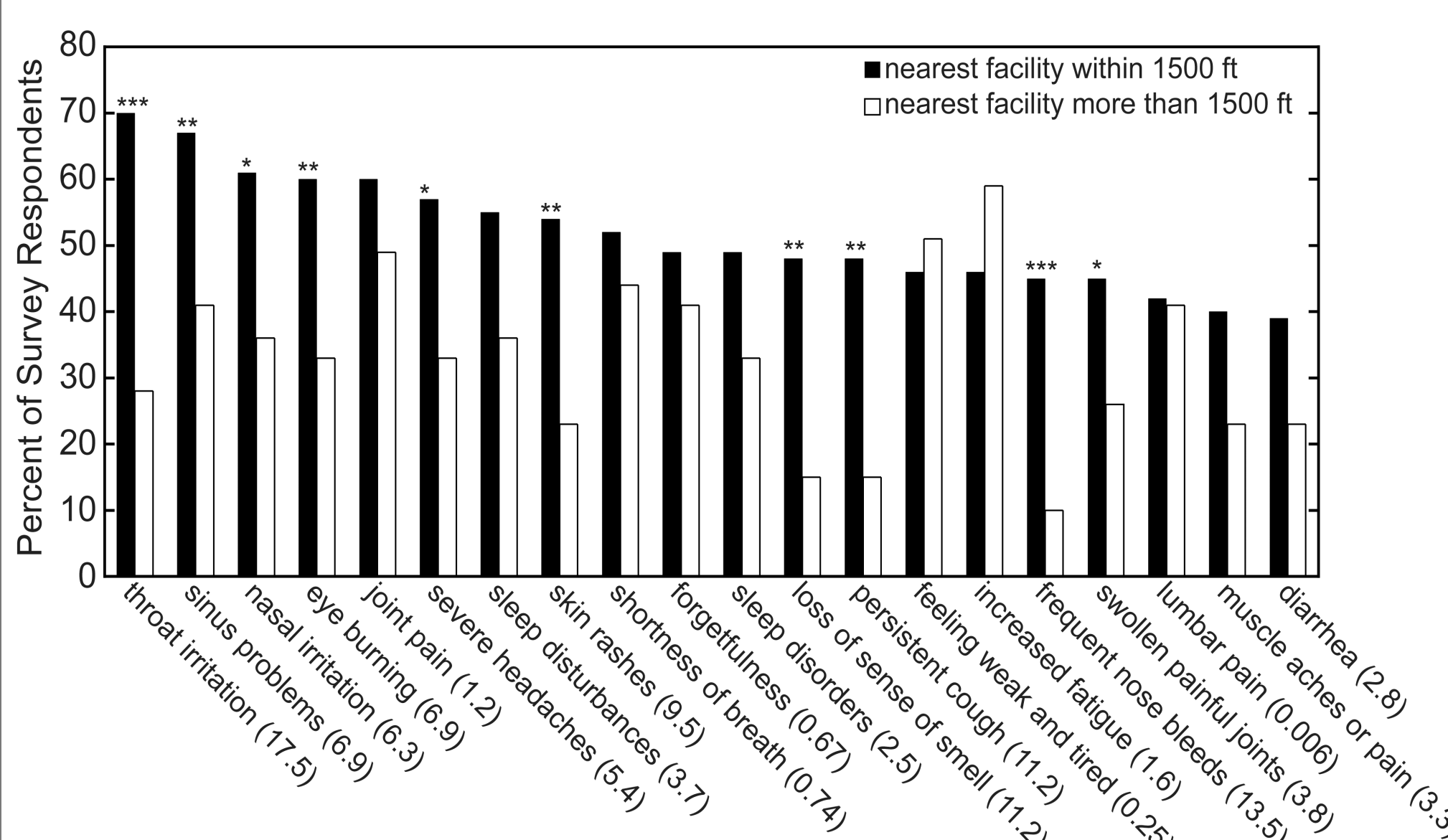
The project was conducted in rural and residential locations across Pennsylvania, primarily in five counties (Bedford, Bradford, Fayette, Greene, and Washington).

The health survey:

- Was distributed by hand or through the mail.
- Included checklists of health symptoms grouped into categories (skin, sinus/respiratory, digestive/stomach, vision/eyes, ear/nose/mouth, neurological, urological, muscles/joints, cardiac/circulatory, reproductive, behavioral/mood/energy, lymphatic, immunological).
- Asked about occupational, smoking, disease, and toxic exposure history.
- Explored sources of exposure by asking about proximity to facilities (compressor and pipeline stations, gas-producing wells, and impoundment or waste pits) and the type and frequency of odors observed.

Environmental testing:

- Was conducted at the homes (e.g., in yards or on porches) of 70 survey participants.
- Used 24-hour Summa Canisters for air tests and certified laboratories for water tests.



The significance of the effect was tested using a two-way contingency table analysis; the chi-square value is in parenthesis after each symptom. Effects significant at p<0.001 are indicated by ***, those significant at p<0.01 by **, and those significant at p<0.05 by *.

RESULTS

Health surveys:

- Participants living closer than 1500 feet to gas facilities had higher rates of several symptoms than those living farther away; the difference in distance was statistically significant for 10 of the 20 symptoms.
- More than half of participants reported experiencing 20 or more symptoms and a quarter reported 50 or more.
- The top symptoms reported were consistent across locations (primarily sinus/respiratory, mood/energy, neurological, and muscle/joint pain).
- Top symptoms reported were similar regardless of age group or smoking history.
- The youngest respondents had health symptoms not usually associated with children (e.g., forgetfulness and joint pain).
- More than 80% of participants said they could smell odors and associated them with the onset of symptoms.

Environmental exposures:

- 19 Volatile Organic Compounds detected; most samples had 2-butanone, chloromethane, toluene, acetone, carbon tetrachloride.
- Concentrations of BTEX chemicals (known carcinogens) were the same or higher than in state air samples; in a few cases, they were as high as at an oil refinery site.
- More than half of water samples had methane; nearly all had substances that can be associated with oil & gas development (e.g., barium, strontium, chloride, TDS, sulfate).
- Symptoms reported at households and the scientifically known health impacts of chemicals detected at those households matched at an overall rate of 68%.

CONCLUSIONS

Our findings indicate **a strong likelihood that the health of people living in proximity to gas facilities is being affected** by pollutants from those facilities.

We believe these findings and an emerging body of research provide **sufficient evidence for decision-makers to take action to slow the rush to drill**, at least until the wide gaps in scientific knowledge, policies, and regulations are bridged.

The precautionary principle should be applied to decisions about shale gas development: take action even if some uncertainty exists and shift the burden of proof of harm to those proposing the action.

RECOMMENDATIONS

- **Elevate the role of public health** in gas development decisions; conduct health impact assessments.
- **Involve departments of health** in assessing gas development impacts; track, document, and respond to health concerns.
- **Increase monitoring**; require baseline water testing and continuous air testing.
- **Strengthen regulations that reduce air and water pollution**, e.g., setbacks and emissions controls.
- **Change testing parameters and “safe” levels** to account for low-level, chronic, and multiple chemical exposure; increase number of contaminants with safety standards.

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