

Environmental Impacts on Rural Health

By Deanna Oliveri, BS Environmental Science, SUNY Oneonta
for Otsego County Conservation Association, Inc.

When one thinks about human impacts on the environment, the image of urban sprawl, industrialization, and large-scale pollution often come to mind. However, rural areas are not exempt from human impacts on the environment, and these areas face unique problems regarding environmental impacts on human health.

There are several ways that human impacts on the environment can affect rural health. The improper disposal of waste, impacts from agriculture, and the extraction of natural resources can all pose a threat to the health of rural communities. The geographic isolation, combined with the unique socio-economic circumstances found in many rural areas, creates an even greater divide between the challenges faced by urban areas and rural ones.

Threats to Rural Health

Water Pollution

Water pollution is one of the most pervasive environmental problems impacting rural health. The lack of a municipal water supply in rural areas creates a reliance on groundwater wells for household use. Unlike municipal water, well water is not tested or treated regularly for toxic contaminants. People dependent on well water are especially vulnerable to the dangers associated with water pollution.¹

There are numerous ways in which the pollution of water can occur. The improper disposal of waste is a common cause of water pollution in rural areas. This includes the dumping of trash into roadside ditches or streambeds, or the burial of

waste beneath the ground. Waste can be carried by runoff into streams, rivers, or ponds, or may create a toxic leachate that can travel through soil into above- and below-ground water sources. The regulation of roadside dumping is largely the responsibility of states and local governments which may lack the necessary means to enforce such laws.²

Fertilizers and pesticides are also common sources of water pollution in rural areas. These chemicals use nitrogen and phosphoric compounds to increase yields and prevent insect damage to crops. In industrial agriculture, large quantities of these chemicals are sprayed over fields by tractors or small “crop-duster” airplanes. It is estimated that over one billion tons of pesticides are used in the United States each year, 80 percent of which is used for agricultural purposes. Erosion and runoff from fields are the primary ways by which pesticides and fertilizers may contaminate water. The leaching of chemicals through the soil and into underground water tables is also a concern, as groundwater pollution can exist for long periods of time. Nitrogen-based fertilizers can leach into the soil in the form of nitrate, where it can remain for longer than three decades in significant quantities.³

Water pollution from agriculture is not exclusively due to large-scale cultivation of crops. Pollution from animal feeding operations, or AFOs, is a common source of water contamination in rural areas. These operations keep animals in high densities, which generate large quantities of waste. Neighboring water bodies and groundwater are at risk from contamination if the waste is not properly stored, or from breaches in storage pools during severe weather events.³

Another risk to water in rural areas comes from oil and gas drilling operations. The construction of well pads follows stringent standards established by federal and state agencies regarding where they can be built. This relegates the vast majority of

gas drilling sites to rural areas where there is adequate space for the well pads and associated infrastructure. There are numerous ways in which gas drilling poses a threat to ground water. Methods of drilling such as hydraulic fracturing pump large quantities of chemically treated water at high pressure deep into the ground. This fractures the surrounding rock, releasing the gas trapped within it. This cocktail of water, chemicals, and debris – known as effluent – is pumped back out of the ground, bringing with it the released gas.⁴

The hydraulic fracturing process involves the use of many chemicals that are known to be toxic to humans. Among these chemicals are benzene, strontium and barium. Though the industry has established a system of safeguards to mitigate risk of spilling these chemicals, there is still the potential for contamination. Spills can occur during the transportation of the hydraulic fracturing fluids to and from drill sites. During the drilling process, well cases can crack or rupture, spilling the fluid into underground aquifers. Because many methods of hydraulic fracturing use a technique known as horizontal drilling, the potential for chemical contamination exists beyond the area directly below the well pad. Each well can generate over one million gallons of waste water. This liquid may be stored in large tanks, which can be at risk to eventual corrosion and leaking.⁵

Water pollution is an issue of particular concern because it can become a “legacy problem.” This means that pollution can remain long after the source of the pollution is gone.⁵ Once a water body is contaminated, it is nearly impossible to completely decontaminate it. Because people in rural areas often have no other options for obtaining water, a contaminated water source can mean choosing between relocating and living with polluted water. It is difficult to determine the exact quantity at which a

chemical is toxic or how much exposure can have an impact on health. Even trace amounts of many chemicals can become a health hazard with long-term exposure.⁶

There are numerous health risks associated with the consumption of contaminated water. These include cancer, endocrine disorders, multiple chemical sensitivities, allergies and diabetes. Not all people are impacted equally by water pollution. Age can be a significant factor in determining health risks from chemicals. The compounds found in pesticides and fertilizers pose a greater threat to pregnant women and young children. Nitrates in fertilizer can cause methaemoglobinaemia, or “blue baby syndrome,” a potentially deadly condition in infants. Young children and the elderly are especially susceptible to gastrointestinal diseases from biological contaminants from livestock operations. These microorganisms can cause nausea, cramping, vomiting and diarrhea if ingested.⁶

Air Pollution

Another way in which rural health can be impacted is by air pollution. Though it is common to think that issues of air quality are only a problem in urban areas, this is a misconception. For example, more than 400 different gasses are produced from agriculture in the United States.⁷ The danger posed by agricultural air pollution is not relegated exclusively to agricultural facilities; human health in nearby communities may also be put at risk.

Just as the use of chemical pesticides and fertilizers can impact water quality, they can also be a significant source of air pollution. Pesticide drift occurs when chemicals are transported from their source by the wind. During times of low humidity and high temperature, toxic compounds can evaporate into the air and be inhaled.

Many pesticides and fertilizers use chemicals known as volatile organic compounds, or VOCs, which interact with other chemicals in the air and can have damaging environmental impacts.⁸

Large scale AFOs can release large quantities of toxic chemicals into the air. The amount of ammonia released from factory farms may have a significant impact on human health. Hog and cattle farms can release high levels of hydrogen sulfide, ammonia, methane, and other toxic compounds. Factory farms are large producers of endotoxins, which are the byproduct of dying bacteria.⁷

Another source of air pollution common in rural areas is the back yard burning of trash. Paper, yard waste, food and plastics may be burned instead of disposed of in a designated waste facility. Hazardous air pollutants, particle pollution, and volatile organic compounds can be released and inhaled when this occurs.⁹

There are many health impacts caused by air pollution. Regular exposure to air pollutants may increase the risk of asthma and allergies in children. Endotoxins are particularly damaging to the respiratory system, and can be dangerous in small concentrations. The risk of numerous types of cancer is increased with frequent exposure to air pollution. Cardiovascular disease has also been linked to frequent exposure to air pollution.¹⁰

A problem surrounding air pollution from factory farms is the lack of government regulation. Standards established under the Environmental Protection Agency's Clean Air Act mostly apply to non-farm industries. The responsibility of establishing regulations regarding air pollution from industrial farming has been largely left in the hands of state governments.⁷ Resources for enforcing regulations and monitoring pollutants may be limited.

Inadequacies in Health Care

Because rural areas are geographically isolated by nature, residents in these areas may be less likely to receive adequate health care. Average emergency response times in rural areas are significantly higher than in urban areas. People in rural areas are statistically less likely to pursue medical attention for ailments that are perceived to be minor, but may actually be symptomatic of a more significant health problem.¹¹

Access to hospitals and health-care facilities may be limited for those living in rural areas. Medical facilities are statistically more likely to be under-funded than those in urban areas, and may be deficient in available medical equipment and technology. Critical Access Hospitals, or CAHs, are geographically isolated hospitals that have fewer than 26 beds. These are the most common type of hospital found in rural areas. Almost half of all CAHs are over 40 years old.¹²

Another problem faced by those living in rural areas is the lack of health-care professionals. Twenty-five percent of United States residents live in rural areas, though only 10 percent of doctors practice in them. The United States Department of Health and Human Services has designated many rural areas as Health Professional Shortage Areas, or NPSAs.¹³ The heavier workload and lower incomes associated with practicing in rural areas, along with a preference for living in larger cities, are some of the commonly-cited reasons why physicians choose not work in rural practices. Some medical schools have begun offering programs meant to teach students about the specific challenges encountered when practicing in a rural setting. Despite efforts to encourage new doctors into working in these places, it is estimated that the number of practicing medical professionals in rural areas will continue to decline.¹⁴

People living in rural areas are often in a lower socio-economic class than those living in suburban and urban areas. A higher percentage of people in rural parts of the country do not have health insurance, and are more likely to be dependent on government assistance such as food stamps or Medicare. Those who depend on Medicare are less likely to receive or use available benefits. Life expectancy is shorter for both men and women living in rural areas than in urban areas in the United States.¹⁵

Mitigation

There are several ways that the problems faced by rural areas can be addressed. Improving education is a fundamental step toward solving these problems. Implementing environmental education as part of school curriculums can create a greater understanding of how human action can impact natural systems and compromise human health.¹⁶

Better planning and policy reform are crucial components involved in overcoming rural health challenges. Conservation easements meant to protect ecological systems can be a viable solution to protect water resources.¹⁷ Due to the dynamic nature of environmental problems, adaptive management – the implementation of new information to improve management strategies – should be used in planning.¹⁸ Low impact development tactics, such as the use of green infrastructure and design, can also help reduce damage to the rural environment.¹⁹ Regulatory reform which address environmental problems specific to rural areas is also important. Healthcare reform is necessary to ensure that rural health does not continue to fall behind that in urban and suburban environments.²⁰

Conclusion

The problems faced by people living in rural communities are inherently different from those in urban and suburban areas. People in these settings often have closer ties to the land for their livelihood and health. Common environmental problems in rural areas relate to the pollution of water and air and are often the result of poor management of natural resources. Deficiencies in rural healthcare, along with unique socioeconomic challenges, exacerbate the problems associated with rural health. Due to a mix of factors that characterize rural areas, these challenges need to be addressed with improved education, strategic planning and policy reform.

Sources:

1. R. Swistock, Bryan R. "Drinking Water Quality in Rural Pennsylvania and the Effect of Management Practices." The Center for Rural Pennsylvania, Jan. 2009. Web. 11 Mar. 2014.
2. Player, Corrie. "Avoiding A Rural Public Relations Nightmare." Avoiding a Rural Public Relations Nightmare. Waste 360, Jan. 1997. Web. 23 Mar. 2014.
3. "Water Quality." GRACE Communications Foundation.. Web. 21 Mar. 2014.
4. "Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources: Progress Report." Environmental Protection Agency, Mar. 2014. Web. 23 Mar. 2014.
5. Bindell, Rich. "Is It Safe to Store Fracking Fluid Underground?" Food Water Watch General. Food & Water Watch, 27 Sept. 2011. Web. 23 Mar. 2014.
6. "Possible Health Effects of Drinking Contaminated Well Water." Halton Region,. Web. 23 Mar. 2014.
7. "Air Quality." GRACE Communications Foundation. Web. 23 Mar. 2014
8. United States. National Park Service. "Air Quality -- Airborne Synthetic Chemicals."National Parks Service. U.S. Department of the Interior, 23 Mar. 2014. Web. 23 Mar. 2014.
9. "Backyard Burning." EPA. Environmental Protection Agency. Web. 23 Mar. 2014.

10. "World Health Organization: Outdoor Air Pollution Causes Cancer." World Health Organization: Outdoor Air Pollution Causes Cancer.. Web. 23 Mar. 2014.
11. "Rural Health Concerns: MedlinePlus." U.S National Library of Medicine. U.S. National Library of Medicine,. Web. 21 Mar. 2014.
12. "What Are Critical Access Hospitals (CAH)?" What Are Critical Access Hospitals (CAH)?. Web. 23 Mar. 2014.
13. "Shortage Designation: Health Professional Shortage Areas & Medically Underserved Areas/Populations." Shortage Designation: Health Professional Shortage Areas & Medically Underserved Areas/Populations. N.p., n.d. Web. 21 Mar. 2014
14. "Doctor-starved: America's Heartland in Crisis." CNNMoney. Cable News Network, 26 Mar. 2010. Web. 18 Mar. 2014
15. "Healthcare Disparities & Barriers to Healthcare Download PDF." Healthcare Disparities and Barriers. Stanford School of Medicine, 2014. Web. 23 Mar. 2014.
16. "Environmental Education." Rural Action. Rural Action, 2014. Web. 24 Mar. 2014.
17. "What Is A Conservation Easement?" Watershed Agricultural Council, Web. 24 Mar. 2014.
18. "Adaptive Management." (n.d.): 85-89. Environmental Protection Agency, 2005. Web. 11 Mar. 2014.
19. "Low Impact Development (LID)." Low Impact Development. Environmental Protection Agency, 25 Feb. 2014. Web. 23 Mar. 2014.
20. "Health Reform and You." National Rural Health Association, 2014. Web. 16 Mar. 2014.