Case Examples

FLINT WATER CRISIS

The Challenge

The safety of our nation's drinking water systems has recently been called into question. The water crisis that began in Flint, Michigan, in April 2014 sheds light on the interplay between weak governmental policy, the physical environmental health infrastructure, and the lack of oversight and accountability in a post-industrial region suffering from years of under-employment and industry divestment. Over the course of many months, a population of nearly 100,000 was stripped of one of the most basic human needs: clean drinking water.

Flint's aged water system—similar to that in many US urban areas—contains a large percentage of lead pipe sand plumbing.[1] In April 2014, the city switched its water source from treated Lake Huron/Detroit River water to improperly treated Flint River water, which corroded pipes and caused lead to leach into the water.

Lead can enter the body through drinking water, through foods cooked with contaminated water, or through infant formulas mixed with lead-tainted water. While lead occurs in the environment naturally, both EPA and CDC maintain no safe blood lead level in children.[2, 3] In fact, lead exposure is linked to developmental and neurological damage in children,[4] whose bodies absorb ingested lead at the alarming rate of 40 to 50 percent, compared with 3 to 10 percent in adults.[1] Groups suffering disproportionate lead exposure include children, pregnant women, and low-income individuals.[1]

Most water system damage, as in Flint, is preventable with enforcement of proper regulatory safeguards. The application of federally mandated anticorrosive water pipe treatments would have cost Flint an estimated $100 a day. Absent such treatments, the cost to replace Flint's lead water pipes is an estimated $1.5 billion.

As the water crisis was ongoing, Flint experienced a second, unrelated emergency (though also pertaining to water safety): 91 cases of Legionnaires' disease, resulting in 12 deaths. The disorder is a form of pneumonia caused by bacteria commonly found in lakes and rivers.[5] The *Legionella* bacteria is contracted through aspiration of contaminated water, often droplets of water from large building air conditioning systems or from water used in showering. While there are no vaccines for Legionnaire's

disease, 9 out of 10 outbreaks can be avoided by effective water management.[6] CDC recently developed a practical guide addressing the implementation of industry standards for water management to reduce the growth and spread of *Legionella* in buildings.[7]

The difficulty for the residents of Flint to recover from such an environmental health disaster is multifactorial.

Environmental Health Response

The Flint Water Crisis has brought attention to a nationwide problem. Washington, DC; Los Angeles, CA; Newark, NJ; and Baltimore, MD, all face similar challenges. The reoccurrence of this problem demonstrates the need for a universal solution, such as an environmental health system.

Housing

Although lead use was restricted in plumbing materials in 1986, lead-laced service lines, solders, and plumbing fittings are still extant in many older homes and neighborhoods.[1] Coupled with contaminated water from the Flint River, inadequate water systems treatment, corroded water system infrastructure, and older homes, the community of Flint was unacceptably exposed to lead.

Screening and Biomonitoring

CDC's Childhood Lead Poisoning Prevention Program provides resources to nearly 60 state and local health departments to screen for high blood lead levels in children and conduct various lead poisoning prevention activities.[8] When elevated blood lead levels are detected, the child is referred to a physician for remediation.

Biomonitoring—analysis of human specimens to detect exposure to environmental toxicants—plays a critical role in lead poisoning surveillance in children and adults.[9] Data collected through the National Health and Nutrition Examination Survey show background levels of exposure for a typical (noninstitutionalized) US resident to more than 200 environmental chemicals. This baseline data complements state- and local-level biomonitoring data, which may show spikes in exposure for certain populations. Few states, however, have an adequate biomonitoring program, and not all test for lead exposure.

Most water systems damage, like in Flint, Michigan, could be prevented with the proper investments, regulations, and enforcement.

The National Environmental Health Tracking Network,[10] a program of CDC's National Center for Environmental Health, can overlay data on lead-poisoned children with geospatial maps to

determine whether a particular water system might be implicated in the lead contamination and to monitor exposures in vulnerable communities.

Vulnerable Populations
Historically, lead was introduced into the environment through gasoline and paint. However, recognizing the risk of childhood lead poisoning, it was banned from these products and, as a result, childhood blood lead levels began to decline. In contrast, incidences of lead in drinking water have increased due to the corroding water system infrastructure.

In Flint, exclusionary housing practices forced minorities and low-income families into older homes[1] with older plumbing. Additionally, 42 percent of Flint children live in poverty, compared with 16.2 percent in the state of Michigan and 14.8 percent nationally.

Workforce
Just as an airport ground crew works to ensure passenger safety, the well-trained, multidisciplinary environmental health workforce endeavors to maintain an environment conducive to human health. Instead of pre-flight plane inspections, environmental health professionals monitor water safety, conduct mosquito control activities, carry out syndromic surveillance and biomonitoring, and engage in other critical activities. The work that environmental health professionals perform is greatly realized at the community level, especially those most vulnerable to harmful environmental exposures.

Opportunities for Action

1) Offer stronger enforcement of the Safe Drinking Water Act's Lead Copper Rule, which sets an action level of 0.015 mg lead per liter tap water.
2) Improve surveillance capabilities to prevent, detect, and monitor exposures to harmful environmental chemicals over time.
3) Instill confidence in the public by creating a robust environmental health system with a lead agency.
4) Provide resources and training to ensure a qualified environmental health workforce.
5) Develop a federal interagency plan to eliminate lead exposure.

References

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