

Citizen Scientists and the Lessons of Flint

October 2016 | Gerald Markowitz, David Rosner | Online Exclusive

There is a fundamental tension in the field of public health. On the one hand, professionals are trained to provide technical services to maintain a healthful environment in a stable society. Guaranteeing pure water, unadulterated food, epidemic outbreak surveillance, vaccine distribution, preventive health services, STD and communicable disease control, and clean air are traditional goals of public health and allied departments such as sanitation and environmental protection. When public health works, it is generally invisible to most of the public. Few even know what goes into the system that delivers water to their taps. On the other hand, when public health systems break down or are confronted by unanticipated problems, officials are often faced by the dual demands from bureaucrats to maintain public order and calm fears while at the same time alerting and informing the public of the true dimensions of the problem.

At different moments in the history of public health, both its practitioners and its officials have chosen different paths. Early in the twentieth century, for example, public health administrators formed strong alliances with elite reformers as well as radical activists to improve housing and working conditions and to provide pure milk to “new children. They also worked with a diverse group of settlement houses, philanthropists, and social workers around more general urban and industrial problems as a way to control tuberculosis and other communicable diseases.^{1,2} At other times public health has served less as an advocate for reform and more as a defender of the state or public health bureaucracy, especially when public health concerns have been embedded in highly charged political, racial, ethnic, or class tensions.³⁻⁶ Certainly, the well-known example of the US Public Health Service’s 40-year experiment on African American men in Tuskegee, Alabama, who had been diagnosed with, but never fully treated for, syphilis after the discovery of the efficacy of penicillin is a classic example of what can happen when public health officials see themselves as apart from a larger social movement. Another tragic example is the Public Health Service’s study of the same disease in Guatemalan prisons in the 1940s.⁷ But it would be wrong to excuse these as anomalous, for they were the outcome of an evolving definition of public health as an apolitical endeavor. As we’ve discussed elsewhere during the 1930s public health officials removed themselves from the burning political issues, instead defining themselves as scientists whose sole role was to gather evidence and information, not to act as advocates for social change.^{8,9}

This article analyzes the differing responses of the public health community to the lead problem in Flint. We will look at the role of parents and the public in bringing this story into the national consciousness. Embedded in this story are the very different ways that public health practitioners and officials responded to the parents and the emerging crisis.

The story of Flint is a classic case of the dual legacies of public health, one rooted in advocacy and aligned with community residents and activists, and the other protecting the interests of state bureaucracies using their own in-house scientists. Out of that conflict a movement grew that forced the wider public health community to acknowledge

It is not necessary to describe in detail yet again the massive failure of public health and other government officials to protect Flint's children and their parents from the dangers presented by a polluted water system. Thousands of children were exposed to lead in their drinking water in a process set off by city and state officials intent on saving little money, who learned of the dangers and then ignored the warnings of scientists, revealed nothing to the public about the risks to their health, insisted on the water's safety, and, in some cases, suppressed information about its actual state.¹⁰⁻¹² As anyone who has picked up a paper or turned on the TV news in recent months knows, this is a basic description of the ongoing crisis in Flint, Michigan, in which "austerity" economics dictated that the city switch to using extremely corrosive water that often came out of the tap discolored and sometimes left those who bathe it with severe rashes.^{13,14}



Flint river seen from downtown Flint. Photo courtesy of the Flint Water Study Group.

The people of Flint noticed long before anyone else the crisis that was brewing and were able to call on a few public health professionals to help them document the nature and extent of the problem. This alliance of parents worried about the smelly, yellow brew that came out of their taps, community activists who were willing to press officials for redress, and a few professionals represents the other half of public health's history. Mona Hanna-Attisha, a pediatrician, and Marc Edwards, a professor of civil engineering, have justly received great praise for their roles in revealing and documenting the dangers to Flint's residents. But as their own speeches and publications have made clear, their actions would not have been possible without the people of Flint themselves. Edwards's research team at Virginia Tech defined the people of Flint as "*citizen scientists* . . . with independent information about their tap water. The scientists' technical expertise is critical, for it can document "the impact of water age and current water quality on Flint's water distribution systems." The research team also was able to provide crucial information about elevated lead levels in the residents' water. Such information, the Virginia Tech scientists believe, was not itself important but was useful only as a means of involving residents in "decision making and *policy considerations*."¹⁵(italics in original)

“I know if I were a parent up there, I would be beside myself if my kids’ health could be at risk,” said President Obama in his January 2016 trip to Michigan.¹⁶ “Up there” was Flint, a rusting industrial city in the grip of a “water crisis” brought on by a government austerity scheme. To save a couple of million dollars, that city switched its source of water from Lake Huron to the Flint River, a longtime industrial dumping ground for the toxic industries that had once made their home along its banks. It was also widely reported that the use of an anticorrosive agent that might have prevented most of the corrosion in the city’s water pipes and the lead poisoning of untold numbers of its residents was skipped at a savings of approximately \$100 a day.¹⁷ Even when public officials learned that the drinking water was polluted, they ignored residents’ complaints about the brownish tap water, soothing them with half truths about its supposed safety.¹⁸ This sequence of events has had a massive impact, including calls for the resignation of the governor and other state officials and congressional hearings that damned the Environmental Protection Agency (EPA) and state and local authorities.¹⁹⁻²¹ And lest you think that any lessons were learned, Republicans in Congress refused to fund a complete fix of the problem.²² As Reuters reported in February 2016, “Senator John Cornyn of Texas, the second-ranking Republican in the Senate, said that aid to Flint must not add to US budget deficits for ‘what is a local and state problem.’”²³ The city became enveloped in a public health emergency, with elevated levels of lead in both its water supply and the blood of its children.

The price tag for replacing the lead pipes that contaminated its drinking water, thanks to the corrosive toxins found in the Flint River and the general disrepair of Flint’s water mains, has been estimated to be as much as \$1.5 billion.^{24,25} No one knows where that money will come from or when it will arrive. In the meantime, the cost to the children of Flint has been and will be incalculable. Lead in the water that children drink or in the paint dust that comes off the walls of old houses and is ingested can change the course of a life. The amount of lead dust that coats a thumbnail is enough to send a child into a coma or convulsions leading to death. Less than a tenth of that amount can cause a loss in IQ or hearing and behavioral problems like attention deficit hyperactivity disorder and dyslexia. The Centers for Disease Control (CDC), the government agency responsible for tracking and protecting the nation’s health, stated simply, “No safe blood lead level in children has been identified.”²⁶

The origins of the current crisis in Flint began with the auto giant General Motors (GM) and its rise in the middle decades of the twentieth century to become the world’s largest corporation. GM’s Buick plant alone once occupied “an area almost a mile and a half long and half a mile wide,” according to the *Chicago Tribune*, and several Chevrolet and other GM plants literally covered Flint’s waterfront.²⁷ Into the Flint River went the toxic wastes of factories large and small, which for much of the twentieth century supplied batteries, paints, solders, glass, fabrics, oils, lubricating fluids, and a multitude of other materials that made up the modern car. It was in these plants strung out along the banks of the Flint and Saginaw Rivers and their detritus that the current public health emergency originated.



1925 Chevrolet models leaving the plant and crossing the Flint River.

Although the crisis that attracted President Obama's attention is horrifying, the children of Flint have been poisoned in one way or another for at least 80 years. Three generations of those children living around Chevrolet Avenue in the city's old industrial heart inhabited an environment filled with heavy metal toxins that cause neurological conditions in children and cardiovascular problems in adults.²⁸

As Michael Moore documented in his film *Roger and Me*, GM abandoned Flint in a desperate attempt to stave off financial disaster. After soiling the nest that is Flint, the company ditched the city, leaving it to deal with a polluted hell but without the means to do so. Like many other industrial cities that have suffered this kind of abandonment, Flint's population is majority African American and Latino. Of its 100,000 residents, 65% are African American or Latino, and 42% are living below the poverty line.²⁹ If the pollution of the river resulted from the rise of the auto industry, the crisis over its polluted water supply is rooted in the decline of that same industry during the great recession of 2008. It was in these years, following decades of the slow decline of the city's tax base, that this impoverished city was further undermined by a newly elected Republican governor intent on balancing the budget even at the expense of the state's infrastructure and the health of its people. Then in 2011 the state replaced those local elected officials who might have been more responsive to residents' complaints about the quality of the water coming from their taps with a city manager answering only to the governor, whose focus was on the state's fiscal crisis, not on the local needs of Flint's residents. A series of "emergency managers" had the "unilateral authority to cut pay, outsource city services, merge departments, and, as a last resort, change employee contracts."³⁰ The man also had the power to switch the source of the city's water from Lake Huron, via the city of Detroit, to the polluted but less expensive, Flint River. Lead poisoning, America's longest-running childhood epidemic, was, however, on the latest of the various insults to this community.

The Long History of Lead Poisoning in America

Lead is probably the most widely dispersed environmental toxin affecting children in the United States. In part, this is because, for decades during the middle of the twentieth century, lead was marketed as essential to an industrial

only, or even the primary, source of danger to children left over from that era.

In the 1920s, tetraethyl lead was introduced as an additive for gasoline. At the time it was praised as a “gift of God” by a representative of the Ethyl Corporation, a creation of GM, Standard Oil, and DuPont, the companies that invented, produced, and marketed the tetraethyl lead.³¹ Despite warnings that this industrial toxin might pollute the planet, which it did, almost three-quarters of a century passed before it was removed from gasoline in the United States. During that time, it was spewed out of the tailpipes of hundreds of millions of cars and trucks, tetraethyl lead tainted the soil that children played in and was tracked onto the floors of houses that toddlers lived in. Despite being banned from use in the 1980s, toxic amounts still lurk in the environment today.

In addition, houses across the country were tainted by lead in quite a different way. Lead carbonate, a white powder, was mixed with linseed oil to create the paint that was used in the nation’s homes, hospitals, schools, and other buildings until 1978. Even though its power to harm and even kill children who sucked on lead-painted windows, toys, cribs, and woodwork had long been known, it was only in that year that the federal government banned its use in household paints.³²

Hundreds of tons of the lead in paint that covered the walls of houses, apartment buildings, and workplaces across the United States remain in place almost four decades later, especially in poorer neighborhoods where millions of African American and Latino children currently live. Right now, most middle-class white families feel relatively immune from the dangers of lead, although the gentrification of old neighborhoods and the renovation of old homes can still expose their children to dangerous levels of lead dust from the old paint on those walls.^{33,34} Economically and politically vulnerable black and



1923 children's lead paint advertising booklet. Source: Dutch Boy Paint

Hispanic children, however, many of whom live in dilapidated older housing, still suffer disproportionately from devastating effects of this toxin. This is what institutional racism in action means today. Just like the water flowing into homes from the pipes of Flint’s water system, so the walls of its apartment complexes—not to mention those poor neighborhoods of Detroit, Baltimore, Washington, and virtually every other older urban center in the country—continue to poison children exposed to lead-polluted dust, chips, soil, and air.

Add to this the risks from industrial toxins like mercury, asbestos, and polychlorinated biphenyls (better known as PCBs), and you have a recipe for a Flint-like disaster but on a national scale. In truth, the United States has scores of “Flints” awaiting their discovery by community activists, journalists, and, finally, public health officials. Think of them as ticking toxic time bombs—just an austerity scheme or some official’s poor decision away from a public health disaster. It’s remarkable—even in the wake of Flint and the tremendous publicity it has engendered and the enormous number of groups throughout the country calling for a remedy—how slow our legislators at both the state and federal levels have been to act. As a result, we are ensuring that another generation of children will suffer the

How Does an Invisible Public Health Crisis Become Public?

Until relatively recently, lead was a “silent epidemic” affecting millions of American children.³⁵ How did Flint become the center of a public health crisis with national implications? There is a long history of activists and public health officials uniting to awaken the country’s conscience and stimulate political action. In fact, what is most important about the Flint experience is how paradigmatic this process is in explaining where public health’s history, energy and power emanates from. In the early 20th century as public health emerged as a distinct profession, much of its effectiveness in tuberculosis campaigns, pure food and drug legislation, child labor laws and protective legislation for women, the development of birth control clinics, fire safety codes for factories, and many other activities were achieved only through the joint efforts of public health officials, progressive reformers, nurses, social workers, women’s groups, journalists, and pediatricians.³⁶ For example, we often proudly cite public health professionalism in our conquest of infectious diseases. But our public health campaigns never would have succeeded without the great help of housing reformers and settlement house workers in providing the political muscle that made tuberculosis an issue that could not be ignored by either the public or government officials. Likewise, the field of industrial hygiene could not have developed without the critical roles of the labor movement, socialist agitators, and even business reformers concerned with the growing unrest over working conditions. The deteriorating conditions of work in the emerging American industrial system was central to the demands for reform by steelworkers, foundry workers, coal miners, railroad workers, and a host of workers from the Knights of Labor at the American Federation of Labor to the radical Industrial Workers of the World.

These movements behind the public health reform of industrial hygiene grew out of the country’s industrial experience in the nineteenth century. Speedups; monotonous tasks; exposure to chemical toxins, metallic, and organic dusts; and unprotected machinery made the American workplace among the most dangerous in the world. For instance, in England, Germany, and France, fewer than 1.5 per 1,000 miners died during the first years of this century, whereas in the United States more than 3 miners in every 1,000 could expect to die while working in a mine during any given year.³⁷ The enormous wealth produced by the new industrial plants was achieved at an inordinately high social cost. “To unprecedented prosperity . . . there is a seamy side of which little is said,” reported a writer in a magazine aimed at the emerging social work profession in 1907. “Thousands of wage earners, men, women and children, [are] caught in the machinery of our record breaking production and turned out cripples. Other thousands [are] killed outright,” he stated. “How many there [are] none can say exactly, for we [are] too busy making our record breaking production to count the dead.”³⁷ In a theme that would repeatedly appear, reformers likened the toll of industrial accidents to an undeclared war. As early as 1904 *The Outlook*, a mass-circulation weekly, commented on the horrendous social effects of industrialization:

The frightful increase in the number of casualties of all kinds in this country during the last two or three years has become a matter of the first importance. A greater number of people are killed every year by so-called

United States as to participate in actual warfare.

The editorial demanded that the state document the extent of industrial accidents “in order that the people of the United States may face the situation and understand how cheap human life has become under American conditions.”³⁸ The power of the early 20th-century movement depended on the widespread publicity provided by group of journalists and writers. These “muckrakers” exposed the horrible conditions of work to millions of Americans through magazine articles, pamphlets, and books. Their primary aim was to arouse the public through widespread propaganda campaign aimed at forcing reform legislation through Congress and especially state legislatures. They also sought to force particularly dangerous industries to clean up their workplaces. William Har was one such muckraker. His 1904 article, “Making Steel and Killing Men,” in *Everybody’s Magazine* detailed the horrible work conditions in the south Chicago plant of the United States Steel Corporation. Hard described the dangerous conditions that had led to the deaths of 46 workers and the

permanent disablement of 386 others in just one year. He also accused the company of endangering workers’ lives by failing to provide a variety of safeguards near the blast furnaces and cauldrons into which the molten metal was cast for steel rails and girders. In vivid detail he described how men fell into vats of molten metal or were showered with steel by sudden explosions in the furnace. The article created a tremendous stir among the 3 million readers of *Everybody’s* and forced the company to provide elementary safeguards for its

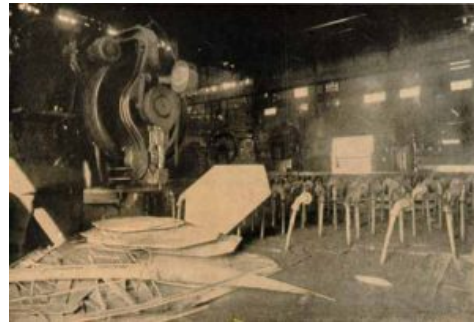


Image from William Hard’s 1907 Everybody’s Magazine article shows the interior of a plate-mill. The picture was taken by the company’s photographer just after one plate had fallen on a man’s foot.

workers. Looking back just three years after its publication, John Fitch, another popular writer, noted that Hard’s article had spurred the company to begin a safety campaign. Subsequently, US Steel bragged about its impressive safety record without acknowledging the role that popular pressure had played in forcing the improvements.³⁹ Upton Sinclair’s best-selling book *The Jungle*, a classic story of immigrant workers, raised public awareness of work conditions in the Chicago meat-packing industry.⁴⁰ His description of a man falling into a vat of boiling meat and ending up in the sausages that people would consume shocked the nation. As bad as conditions are today for American workers, we often forget how much worse they were just a few decades ago. During the first part of the last century, stories of the plight of workers were reported daily in popular magazines and newspapers, attesting to the pervasiveness of industrial hazards and the heightened consciousness that then existed. These stories finally led public health officials in states all across the country to support legislation to improve conditions in a wide range of industries.

The relationship between social reformers and public health was critical to establishing race and class as central concepts in public health’s history in the early 20th century and beyond. In 1896 Frederick Hoffman, a statistician

year the Supreme Court issued its decision upholding laws that enforced racial segregation in *Plessy v. Ferguson*. Hoffman used public health statistics to argue the biological inferiority of African Americans. That is, it was not public health officials who initially led the effort to analyze and ultimately discredit the social Darwinian and euge arguments underlying Hoffman's analysis—mostly because they were already eugenicists, particularly in Michigan.^{41,42} Rather, it was scholars and activists in the African American community, particularly W.E.B. Dubc (and Booker T. Washington⁴³), who challenged the science and the underlying ideology of Hoffman's work. To t day, the questions raised by these early critics from outside the public health community have shaped our concern about the misuse of science and even about the very use of categories of race in health disparities and scientific research.^{41,44-46}

Even our conception of and attention to chronic disease in the industrial setting owe a tremendous debt to the concerns and activism of labor both organized and unorganized. In the early 20th century, skilled artisans and oth workers in Vermont went on strike over the dusty conditions prevailing in the granite sheds and the quarries that public health officials and researchers to stream to the area. The impact of high speed drills, chippers, and other a and stream-powered equipment on workers' health became the focus of industrial hygienists from that moment forward. This in turn led to the recognition of the pneumoconioses, specifically silicosis, as a new category of chr disease. In the 1930s, silicosis and asbestosis became the focus of state and federal public health efforts as lawsuit brought by workers and social unrest in mining communities in Missouri and elsewhere brought the ravages of chronic diseases of long latency to the fore.⁹ In the 1950s, when the medical community shifted its focus away fro occupational diseases to the mounting cases of chronic conditions like heart disease and cancer, it was a labor uni the International Mine, Mill and Smelter Workers Union, that kept the issue of silicosis alive and forced congressional hearings that eventually led the US Public Health Service to issue reports on the continuing prevale of silicosis in mining communities. Similar alliances were formed in the 1960s between public health doctors and unions such as the International Association of Heat and Frost Insulators and Asbestos Workers. Those locals worked with Dr. Irving Selikoff and physicians at Mount Sinai School of Medicine to document the extent of asbestosis, lung cancer, and mesothelioma in the industrial workforce.^{47,48}

Thus, a wide range of public health efforts and victories were the result of public health officials joining forces wi reformers and activists. This was also true of lead poisoning itself, which for much of the 20th century remained invisible epidemic. The exception came in the 1960s and 1970s when activists such as the Black Panthers and the Young Lords worked with community residents in poor neighborhoods all across the United States to demand th the government do something about the lead that was cracking and peeling in homes, causing irreparable damage children. These groups began agitating for more testing of children, better enforcement of existing housing laws, poisoning surveillance and prevention programs, and new laws to hold landlords accountable.^{49,50} Public health workers in poor urban neighborhoods worked with these groups and forced public health authorities in many citi to address many of the worst conditions that existed. A similar process began to take hold in Flint, as we shall see

On April 25, 2014, Flint's emergency manager, Darnell Earley, formerly the city manager in Saginaw, switched its water supply to the Flint River to save money. As the *Flint Journal* later reported, "At the time of the switch, city and state officials assured residents they wouldn't notice a difference in the smell or taste of the tap water once the river was tapped."⁵¹ But one of Flint's "citizen scientists," Jackie Demberton, disagreed: "I don't know about you, but I grew up in Flint, and I know what Flint River water is about."⁵² Indeed, "almost immediately citizens began complaining . . . about the smell, color and taste of the river water,"⁵¹ and parents noticed that their children had begun to develop skin rashes, serious enough to prompt mothers to bring them to the local hospital.⁵³ In mid-July local media reported that "Flint residents have increasingly been complaining about both the costs and quality in recent weeks." The Reverend Barbara Bettis told the Flint city council, "It stinks. It's nasty, and we shouldn't even be drinking it." The mayor had a succinct, if totally off the mark, response to the citizens' complaints: "It's a quality issue, not a quantity issue. I think people are wasting their precious money buying bottled water."⁵⁴ Several months later, the city of Flint acknowledged that they were concerned that *E. coli* had been detected in the water and issued "boil water" advisories from August 15 to August 20 and September 5 to September 9, 2014. In early January 2015, the city's public health officials announced that the city was in violation of the Safe Drinking Water Act because of excessive levels of trihalomethanes, a disinfectant by-product related to liver and kidney problems.⁵⁵



LeeAnne Walters of Flint, Michigan, shows water samples from her home from January 21, 2015 and January 15, 2015 to Flint's emergency manager Jerry Ambrose after city and state officials spoke during a forum discussing growing health concerns being raised by Flint residents at the Flint City Hall dome on January 21, 2015. (Credit Image: © Ryan Garza/Detroit Free Press via ZUMA Wire)

At this point Flint's residents started to mobilize. They attended a meeting at city hall, bringing with them jugs of discolored water and telling city officials that the water tasted bad and smelled worse. This event was critical to forcing both public officials and media outside Flint to pay attention to the evolving crisis. As the *Flint Journal* reported at the time, about 40 people demanded that the city improve the quality of their drinking water as in the meantime, at least lower their water rates, which were among the highest in the county. "Protestors stood

and ‘safe water, that’s all we want.’” One resident brought a jar of water he drew from his tap that was filled with solid deposits. “I wouldn’t drink this,” he told the reporter.⁵⁶ Flint councilman Eric Mays told the *Detroit Free Press*: “The quality of water has people in an uproar. People are saying they are getting rashes.”⁵⁷ In what would develop as a theme in city and state officials’ responses to residents’ concerns, the director of the Flint Department of Public Works announced, “We want the residents, businesses and visitors of Flint to know that the water in Flint is safe.”⁵⁷ At the demonstration outside the Flint city hall, residents voiced their frustration with the city and state officials’ argument that the water was “safe.” The mayor, Dayne Walling, whose powers had been usurped by the state-appointed city manager, acknowledged that the river had long been known as an industrial dump and that local residents distrusted it. But, he insisted, the water was safe, and according to the *Detroit Free Press*, Walling “said he drinks it.”⁵⁸ All in all, according to the *Flint Journal*, hundreds of Flint residents came out to protest and to attend meetings to express their dissatisfaction with the quality of Flint’s water.⁵⁹ The *Free Press* described the residents as “raw with anger.” For example, Nayyirah Shariff, a community activist for the grassroots organization Democratic Defense League, remarked, “I’ve taken to calling it ‘poop water.’” At the demonstration at the Flint city hall, a distinct theme was the underlying environmental racism that had shaped the crisis. One sign read, “Are You Trying to Kill Us?” and another, “No More Poison.” As one protester complained to a reporter, “People think all the crap happens in Flint and everyone is poor in Flint, so there’s this stigma. Now we’re fighting against dirty water. Really?”⁵⁸ Another demonstrator, a mother of a 5-year-old, told the reporter, “They said it’s safe. But it’s brown water. Why do we have to drink brown water? No one else has to drink brown water.”⁵⁸

The residents were not the only people affected by the water’s quality. Restaurant owners, for example, were particularly hard hit, since they depended on the city’s water to prepare food for their customers. The manager of one Mexican restaurant estimated that his business had gone down “20 to 30 percent.” The waitress at that restaurant, Ashely Trujillo, complained that “one customer left three pennies as a tip after fuming about having to pay for [bottled] water.” “They call it bull crap—like we have something to do with it.”⁵⁸ Even General Motors, a corporation that had largely abandoned the city that it built around its automobile factory, found the Flint River unsuitable for its one remaining plant. The *Free Press* reported that General Motors considered Flint’s water “so corrosive . . . that the automaker’s Flint Engine Operations pulled off the city water system, connecting instead its water system operated by nearby Flint township.”⁵⁸

At the same time that officials were assuring residents that the water was safe, the state began trucking water into the city and setting up water coolers next to drinking fountains in state buildings “so that state workers could choose to continue to drink Flint water or a safe alternative.”⁶⁰ In February 2015, as the street protests continued,⁵² LeeAnn Walters, a mother of two children in Flint, one of whom had developed rashes over his entire body, contacted the district office of the Environmental Protection Agency about the Flint water department’s tests of her tap water that showed excessive levels of lead.⁶¹ The next day, Jennifer Crooks, Michigan Program Officer for the EPA’s Region 5, sent the staff at Michigan’s Department of Environmental Quality (MDEQ) an urgent message regarding high levels of lead in the water in the home of Flint resident Lee Anne [sic] Walters and her family. . . . The tests had discovered the water in Walters’ home contained lead levels of 104 parts per billion [ppb], about 8 times the level of concern

spend \$50,000 on corrosion control chemicals because, the consultant argued, “iron is leaching from the pipes and turning the water brown.”⁵³ Soon the problem went well beyond the aesthetics and a few pollutants when the Genesee County Health Department saw an increase in the number of reported cases of Legionnaires’ disease.⁵³

When Walters was informed about the results of the tests of her tap water, she began organizing parents in the community, who demanded that the state act to protect them. In April 2015, on the first anniversary of the switch of Flint’s water supply to the Flint River, about 100 residents of Flint “marched through their city’s downtown in protest.” Curt Guyette, an investigative reporter working for the Michigan branch of the American Civil Liberties Union, later reported,

At that time their demand for return to the Detroit system seemed virtually hopeless. A collection of working-class and poor people in a town with an African-American majority with no access to local democracy [a city manager had been appointed by the state]—what chance did they have? But they persevered by refusing to remain silent, relentlessly searching to find allies that would ultimately help them overcome the massive obstacles in their way.

The marchers chanted, “Stop poisoning the children.” As Guyette commented, “Barely anyone noticed. The protestors were literally shouting into the wind.”⁶⁴ They did, however, have support from some of the representatives on the Flint city council. The vice president of the council, Wantwaz Davis, told the *Flint Journal*, “I do believe maybe five, maybe 10 years from now, some people are going to contract a disease they cannot ever get rid of.” But he went further, posting a comment on Facebook that described the Flint water crisis as “an obvious genocide against the residents in Flint, Michigan, who are forced to drink the contaminated, unhealthy water.”⁶⁵

Public health officials had very different reactions to these problems. Most of the state public health officials sought to define the problem narrowly and to downplay the importance of the parents’ concerns. The spokesman for the city of Flint was quoted by the *Flint Journal* as stating, “The quality of Flint’s drinking water has been confirmed to be safe by numerous tests, including tests recently conducted by the Michigan Department of Environmental Quality.”⁶⁵ The powerless mayor, Dayne Walling, repeated his earlier reassurances, reinforcing the state’s position: “My family and I drink and use the Flint water every day, at home, at work, and schools.”⁶⁶

One ray of hope was a single administrator in EPA’s regional office who read the tests very differently, seeing them as a serious indication of a real problem that demanded immediate attention. In the spring of 2015, the EPA’s Regional 5 regulations manager, Miguel Del Toral, realized that the state public health officials were not going to protect the people of Flint, so he became a whistle-blower. He went outside official channels, connecting LeeAnne Walters, another citizen scientist, and a resident whose water tests had first set off alarm bells in the EPA, along with Marc Edwards, the Virginia Tech scientist who several years earlier had helped expose the dangerous levels of lead in

Edwards shared with the EPA his test results, which showed “very high lead levels” (between 200 and 13,200 ppb).^{61,63} In June 2015, Del Toral “sounded the alarm about the potential of a significant problem regarding lead the Flint water system” (email from Curt Guyette to Jason Lorenz, July 7, 2015). He “wrote and then leaked an internal memo in June” about the lead contamination in people’s homes.⁶⁴

Edwards realized that he needed to test the water in Flint more extensively, so he applied for, and received, an emergency grant from the National Science Foundation to do so. While this was happening, Walters, along with 10 pastors and community activists, went in August to Lansing, the state capital, to meet with the governor’s aides and officials from the state department of environmental quality to discuss their concerns about the elevated lead levels in Flint’s water. Edwards’s study was released in September, confirming the parents’ suspicions that Flint’s water was unsafe. After testing 271 homes, Edwards found levels of lead ranging from 27 ppb (5 times the EPA limit) to 5,100 ppb, a level that the EPA defines as equivalent to toxic waste. According to an investigative study by the American Civil Liberties Union (ACLU), Edwards found that the Michigan Department of Environmental Quality (MDEQ) “did not consider it necessary to address the highly corrosive nature of the river water to distribution-system pipes that include lead and iron.” This failure, he said, had wreaked havoc with Flint’s infrastructure and caused the very high lead levels.⁶⁷ (Indeed, MDEQ officials misled the EPA into thinking that anticorrosive materials were in fact being used.⁶⁸)

The state’s response was defensive and reflected the broader tensions in the public health community regarding its dual role as a protector of the public’s health and a representative of the government. Brad Wurfel, spokesman for the MDEQ, told one reporter: “Let me start here—anyone who is concerned about lead in the drinking water in Flint can relax.” Curt Guyette later wrote, “If a small group of citizens working in conjunction with researchers at Virginia Tech and the ACLU of Michigan, had been willing to swallow that claim, children in Flint would still be getting lead poisoned.”⁶⁹

In August 2015, the state MDEQ and the Region 5 office of the EPA held a conference call to discuss their response to Edwards’s work. Thomas Poy of the regional EPA branch questioned the Edwards team’s methodology, and “everyone at the meeting agrees Flint is in compliance with the action level for lead.” Even so, they agreed that Edwards’s findings added political pressure for public health officials to do more. The MDEQ acknowledged that it was prudent to install corrosion control treatment for Flint’s water system. The EPA was more concerned, however, pointing out, “To delay installation of corrosion control treatment in Flint “would likely cause even higher levels of lead” over time.⁷⁰

But even that was not enough to persuade Michigan public health officials to act. Consequently, doctors at Hurley Children’s Hospital at Flint—specifically, Mona Hanna-Attisha, a young pediatrician born into a union family—followed up the Virginia Tech study in September by analyzing Flint children’s blood-lead levels. Dr. Hanna-Attisha sent her results to the Greater Flint Health Coalition on September 21, which showed that the number of children with elevated blood-lead levels had doubled following the switch over to the Flint River. The study also found that the percentage of infants and children with elevated blood-lead levels had “nearly tripled among children in ‘high

documented having the highest lead levels in the water, and that group “passed a resolution recommending that c of Flint issue a health advisory for the water, warning of lead contamination.” The next day, the Genesee County Medical Society, after it was presented with the results of the study, passed a similar resolution. When neither the nor the county health departments acted on these recommendations, Dr. Hanna-Attisha publicly announced her results on September 24, 2015.⁷¹⁻⁷³

Even though the state itself had conducted tests showing that children’s blood-lead levels had risen after the water switch-over, the state’s initial response was to discount Dr. Hanna-Attisha’s research. The *Flint Journal* reported, “. . . spokesperson from the state Department of Health and Human Services has questioned that study and said blood lead levels in Flint have remained fairly steady for children under 16 years old since the city switched from Lake Huron water to the river.”⁷⁴ A spokesperson for the department told a local reporter that “the state’s data on lead blood is more comprehensive and ‘much more accurate’ and said seasonal changes have tended to cause lead levels to fluctuate in Flint—both before and after the change in water source.”⁷³ The MDEQ’s Wurfel again went on to attack, claiming that the water controversy “is becoming ‘near hysteria.’ ‘I wouldn’t call them irresponsible [mean the researchers at Hurley Children’s Hospital] I would call them unfortunate.’”⁷⁵ Moreover, when Dr. Hanna-Attisha and Dr. Lawrence Reynolds, head of Flint’s Mott Children’s Health Center, met with Flint public officials after they first presented their data on September 21, they “were told that a return to purchasing water from Detroit would bankrupt the city.” Reynolds responded, “No amount of lead is good for human beings. We cannot predict which child will be affected by high lead levels and we have a . . . risk we can prevent . . . you can pay now or pay later.”

On October 1, 2015, a coalition of local and national groups “petitioned the Environmental Protection Agency . . . to take emergency action to secure safe lead-free water for the city’s children and families.” The groups included Coalition for Clean Water, Water You Fighting For, Democracy Defense League, Concerned Pastors for Social Action, Flint Water Study Team, Michigan Nurses Association, NAACP, American Civil Liberties Union of Michigan, Natural Resources Defense Council, and National Conference of Black Lawyers. Around this time, Genesee County, in which Flint is located, declared a public health emergency. “But even then,” according to the ACLU’s Guyette, “city and state officials were only supporting half-measures such as stepped-up blood testing and distribution of water filters.”⁷⁶

Finally, in mid-October 2015, as a result of the Edwards team’s testing and Dr. Hanna-Attisha’s study of blood-lead levels, Governor Rick Snyder finally decided to allow the city to stop using corrosive water drawn from the Flint River.



(From left) Former Flint resident Lee-Anne Walters, EPA regional regulations manager Miguel Del Toral, Hurley Medical Center pediatrician Mona Hanna-Attisha, and Virginia Tech Professor Marc Edwards pose for a photo in Flint. Photo courtesy of the Flint Water Study Group.

The crisis in Flint showed how fragile the American infrastructure had become. But, instead of addressing this long-term problem, state and federal officials blamed each other for the decades of neglect and the failure of public officials to protect Flint's 100,000 residents. Despite the abundance of information gathered over the past year we still don't have a full accounting of the social, economic and physical costs to Flint's residents.⁷⁷

What we do know is that poor people—both children and adults—who live in older, often poorly maintained, houses in politically disempowered communities of color are most at risk of lead poisoning, along with myriad of threats, including stress, violence, poor nutrition, and inadequate health care. More specifically, we do not know which communities in which states, which homes, and which children are most exposed. We do not have an inventory of which homes have lead paint and which cities and towns have lead service lines. Most frightening, there is no standardized national database that reliably allows officials to identify specific children at risk of lead exposure before they are harmed. Instead, officials must depend on the uncoordinated reporting of injured children, samples from the National Health and Nutrition Examination Survey, and state data to estimate the total number of children with elevated blood-lead levels attributable to polluted water sources and lead paint. Children are still the canaries in the mine: when tests show children have elevated blood-lead levels, this becomes the primary means of identifying a dangerous home.

What's Next?

Flint is not the only community threatened by lead. There's a lead crisis for children in Washington, DC; Jackson, Mississippi; Baltimore, Maryland;⁴⁹ Herculaneum, Missouri; and Sebring, Ohio, and that's just the beginning.⁷⁸⁻

⁸⁰ State reports suggest, for instance, that "18 cities in Pennsylvania and 11 in New Jersey may have an even higher share of children with dangerously elevated levels of lead than does Flint."⁸¹ Today, scientists agree that there is no

blood.⁸² The CDC is especially concerned about the more than 500,000 American children who have substantial amounts of lead in their bodies. Over the past century, an untold number—certainly millions of children—have had their IQs reduced, their school performances limited, their behaviors altered, and their neurological development undermined.⁸³ From coast to coast, from the Sun Belt to the Rust Belt, children have been, and continue to be, imperiled by a century of industrial production, commercial gluttony, and abandonment by the local, state, and federal governments that should have protected them. Unlike in Flint, the “crises” over environmental pollution and justice seldom come to public attention, and when they do, public health officials are rarely the first to identify the problem.

A series of decisions by state and local officials turned Flint’s chronic postindustrial crisis into a public health disaster. If willfully ignorant, or heartless, government officials get all the blame for this (and blame they do deserve),⁸⁴ the larger point will, unfortunately, be missed: that there are many postindustrial Flints, many other hidden tragedies affecting America’s children that await their moment in the news. If you treat Flint as an anomaly you will condemn families across the nation to bear alone the damage to their children, abandoned by a society unwilling to invest in cleaning up a century of industrial pollution or even to acknowledge the injustice.

Flint may be years away from a solution to its current crisis, but in a few cities elsewhere in the country, there is at least a modicum of hope for developing ways to address this country’s poisonous past. In California, for example, several counties and cities, including San Francisco, San Diego, Los Angeles, and Oakland, have successfully sued and won an initial judgment, \$1.15 billion, against three lead-pigment manufacturers. That money will be invested in removing lead paint from the walls of houses in these cities. If this judgment is upheld on appeal, it would be an unprecedented and pathbreaking victory, since it would force a polluting industry to clean up the mess it created and from which it profited.⁸⁵

There have been other partial victories, too. In Herculaneum, Missouri, for instance, where half the children within a mile of the nation’s largest lead smelter suffered lead poisoning, jurors returned a \$320 million verdict against Fluor Corporation, one of the world’s largest construction and engineering firms.⁸⁶ That verdict is also on appeal while the company moved its smelter to Peru, where whole new populations are undoubtedly being poisoned.⁸⁷

President Obama hit the nail on the head with his recent comments on Flint, but he also missed a larger point. Though he was, just a few dozen miles from that city’s damaged water system when he spoke in Detroit, another symbol of corporate abandonment with its own grim toxic legacy. Thousands of homes in the Motor City, the former capital of the auto industry, are still lead-paint disaster areas. Perhaps it’s time to widen the canvas when it comes to the poisoning of America’s children and face the terrible human toll caused by “the American century.”

But we will not be able to do this until we understand one of the lessons of Flint: public health’s greatest constituents are not the public officials or bureaucracy but people in the affected communities and neighborhoods themselves. Residents are often the first to understand the dangers they face, and they have the power to embolden public health officials to do the right thing. Now it is up to those officials to live up to their responsibilities and the expectations of the public. If a traditional tension has been whether public health officials are advocates or experts above the poli-

health is not just a field composed of professionals with technical skills. When we choose that path, we are in danger of being seen as apologists for the status quo.

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