



Analyzing the Flint Water Crisis: Insights and Suggestions for Future Resilience

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Letter to the Editor

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1. INTRODUCTION

The water crisis in Flint, Michigan, which is a tale of environmental injustice and poor judgment, started in 2014 when the city moved its drinking

water supply from Detroit's system to the Flint River to save money [1]. Residents of Flint experienced several serious water quality and health problems because of inadequate water treatment and testing; these problems were

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repeatedly disregarded, neglected, and denied by government officials even as complaints rose. For 18 months, over 9,000 kids in Flint received water that was tainted with lead [1]. But just as it is now, lead exposure has been connected to catastrophic health effects, including death and insanity which could only be preventable by avoiding water contaminated with lead thereby avoiding exposure [2]. The brain development of fetuses, newborns, and young children can be hampered by lead exposure even at low levels, according to contemporary knowledge [2]. The harm can last a lifetime, impairing physical development and IQ while also increasing the risk of anemia, hearing loss, cardiovascular disease, and behavioral issues [2]. Adults who are exposed to high levels of lead have recorded low fertility, heart and kidney problems, and high blood pressure [2].

2. UNDERLYING VULNERABILITY OF FLINT COMMUNITY

With 96,000 inhabitants in 2014, Flint, Michigan had a median age of 36.3 and a median household income of \$30,383 [3]. Flint, Michigan's population fell from 96,559 to 95,999 between 2014 and 2020, a 0.58% fall, while its median household income was \$28,834 [3]. As of July 1, 56.3% of the people living in Flint, which is a majority of Flint's population, is African American, and about 45 percent of its residents live below the poverty line. This makes a palpable percentage uninsured [2]. Overall, Flint has a low quality of education, with majority of its residents having their highest educational attainment as middle school and, in few cases, high school [2].

The citizens and residents of Flint were influenced by numerous variables that adversely affected a wide variety of health and development concerns. The quality-of-life outcomes prior to the decision by a state-appointed emergency manager to switch the water supply to the Flint River to reduce expenses was devastating [2]. Flint had been in crisis for decades because of numerous socioeconomic problems such as disinvestment, unemployment, racism, poverty, crime, food insecurity, and depopulation. The city was formerly an industrial city with the highest median pay for young workers in the country. Situated in the heart of the American Midwest, Flint had strategic geographical advantages for transportation and distribution. It was close to major raw materials like iron ore and coal,

essential for manufacturing, and its proximity to the Great Lakes facilitated shipping. With the rise of the automotive industry, Flint experienced unprecedented economic prosperity. Wages were relatively high, and workers enjoyed stable employment in the manufacturing sector. This economic prosperity fueled the growth of businesses, infrastructure, and residential areas in the city. However, with the recent water crisis, where lead contamination in the water supply caused serious health problems for residents, issues of environmental injustice, government negligence, and socioeconomic disparities in the city were heightened.

A little more than 43% of people became unable to meet their basic needs and lived in poverty, 45% of residences were inhabited by renters, only 11% of people had a bachelor's degree or higher, and about 13% of those under the age of 65 lacked health insurance. Children in Flint were already at a higher risk of lead exposure due to older and deteriorating housing stock, poor nutrition, and other factors, just like in many low-income and minority-populated metropolitan areas [2]. All these placed the populace in a disadvantageous position leading to health disparities.

Flint residents are victims of "environmental racism" -- been unfairly burdened with toxic waste sites, landfills, industrial facilities, and other environmental hazards. And in Flint's case, race and poverty are factored into how the community wasn't adequately protected and how its water became contaminated with lead, making the tap water undrinkable [2].

3. ROLE OF COMMUNITY LEADERS

It is impossible to overstate the importance of the role played by community leaders in drawing attention to the water situation [2]. For example, the community leaders wrote petitions to put the issue of appointing an emergency manager on the ballot before it was rejected [2]. They provided water to Flint houses with shutoffs; they also established a group of community-based organization representatives to serve as liaison between the Community and the Government [2]. While some community leaders tried to draw attention to citizens' problems by contacting the media, attending town council meetings, blogging, and organizing demonstrations, protests, and marches through the city and state capital, few people did so; even the local press rarely showed up [2]. They provided individuals

who were unable to leave their houses with packs of water and information on water-related issues. In addition to seeking out clear, consistent information for locals and communicating health concerns to health officials, they also connected neighborhood members with water giveaways and health care options [2].

4. POLICY AND REGULATORY DECISIONS

The key decisions and failures that led to the water crisis were first on April 25, 2014, when officials from Flint switched the city's water supply to the Flint River as a cost-cutting measure for the struggling city [1]. In doing so, they unwittingly introduced lead-poisoned water into homes, in what became a massive public-health crisis. However, the second policy failure implicated in the Flint water crisis involves the federal Safe Drinking Water Act's Lead and Copper Rule [1]. When Flint switched its drinking water source to the Flint River in April 2014, the state environmental quality department failed to require the city to treat the water for corrosion, as would be necessary to meet federal Safe Drinking Water Act (SDWA) standards [1]. At various levels of governance, there are numerous participants, some of whose functions occasionally overlap. This might also have prevented the Flint Community's agitations from reaching the appropriate ears. The health department's failure to act responsibly ended in their refusal to take ownership of situation¹.

5. SYSTEMIC RACISM

The fact that the emergency statute is disproportionately applied in communities of color is a criticism that lies at the heart of many observers' analyses of the Flint water issue. Nearly 50% of Michigan's African Americans have faced a catastrophe with less than 10% of the emergency manager's power, according to the Flint water crisis study by the Michigan Civil Rights Commission [4]. Michigan's whole population has dealt with emergencies. This conspicuous disparity in the law's application raises concerns about the intentional or unconscious biases of decision-makers at the state level, especially given the causal narrative of local misuse of resources that necessitates an immediate appointment of a manager [4]. Despite the state's continuous housing policies and the racialized system that causes segregation, infrastructure collapse, and

deterioration as the result. Systemic racism as it is practiced now is incredibly subtle, permeating cultural norms in such a way that people are unaware that racism even exists [4]. The Flint water disaster demonstrates a lengthy history of segregation, poor infrastructure maintenance, and officials' indifference to Black residents' concerns, along with frightening long-term health issues [4]. Therefore, part of the evidence of the deteriorating system began when the city switched its water supply in 2014. Almost immediately, residents of Flint, a majority-black city where 40 percent of people live in poverty — started complaining about the quality of the water. City and state officials denied for months that there was a serious problem. By that time, supply pipes had sustained major corrosion and lead was leaching into the water [5].

6. RECOMMENDATIONS FOR FUTURE ACTION

Partnerships between business, public, and nonprofit groups offer chances for cooperation that can aid in directing creative ideas for primary lead prevention, raising awareness, extending outreach and communication activities, and fostering a sense of shared ownership [1,6,7,8]. Children under the age of 21 and expectant mothers who were affected by the Flint water system and whose incomes are up to 400% of the federal poverty level should be covered under the ongoing Flint Medicaid Waiver expansion [2]. These groups should have access to medical care, behavioral health specialists, dietary assistance, and other educational and social services [2,9]. To adopt policies that consider and address it, the government must acknowledge the historical significance of race and racism as well as how it still affects today's society. It should also establish a "Truth and Reconciliation Commission" and integrate a racial equity framework within the state government to restore public confidence [2,10,11]. Finally, it should develop and implement a regional governance model that includes both suburbs and the urban cores from which they grew. All the subpar pipes need to be replaced and greater testing needs to be done on the local water sources [1,12,13].

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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