

## Flint, Michigan: A Case Study



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## What Happened?

- Water source switched from Lake Huron to Flint River in April 2014
- Residents noticed color, odor, rashes



Rash on four-year-old Gavin Walters' foot.



Tap Water, Walter's residence, Flint, MI, Dec. 2014

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- Fall 2015 elevated lead levels observed (water and blood)
- President Obama declares state of emergency



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### Is lead a problem?

- Neurotoxin
- Lower IQ
- Behavioral problems
- Learning disabilities
- Decreased ability to pay attention
- Increased antisocial behavior
- Underperformance in school

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### Lead exposure also causes

- Anemia
- Hypertension
- Renal impairment
- Immunotoxicity
- Toxicity to the reproductive organs

Lead poisoning is irreversible!

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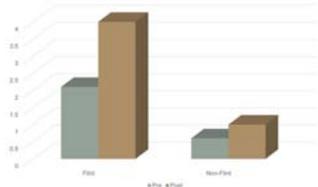
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### Pediatrician Begins Investigating

- Dr. Mona Hanna-Attisha noticed increase in lead blood levels among patients

Change in % EBL Flint vs Non-Flint



Dr. Mona Hanna-Attisha

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### NSF-Funded Independent Study

- Marc Edwards, Virginia Tech, begins study of Flint's water
- Tested 252 water samples
- Found 40% contained more lead than allowed



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### Cause for Concern?

- Maximum allowed lead in water is 15 ppb (parts per billion)
- 25% Flint homes had levels significantly higher (some as high as 13,200 ppb!)
- Almost 100% had water that was distasteful or discolored



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### Flint Schools Were Tested...

- 13 schools in Flint tested
- 4 had lead levels higher than 15 ppb
- Freeman Elementary water had 101 ppb



A disabled fountain in a Flint public school

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### City's Response

- "Boil Advisory"
- Run water for 5 minutes before using it
- Use only cold water for drinking and cooking
- Install lead-removing water filters.



Flint, MI, Oct. 2015

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### But wait, there's more...

- Legionnaires' Disease on the rise in Flint
- Caused by the Legionella bacterium
- Respiratory disease transmitted via water droplets (breathing, drinking)
- Damaged/corroded pipes encourage growth of Legionella

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### Legionnaires' Disease Cases

Legionellosis Cases by Month Reported - Genesee County  
May 2010-December 2015



<http://flintwaterstudy.org/>

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### Positive Steps Taken

- Oct. 2015: the water supply switched back
- Dec. 2015: added corrosion inhibitor to the water
- Mayor declared public health state of emergency
- Jan. 2016: county-wide emergency declared

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- State Police start delivering cases of water
- National Guard called in to assist
- President Obama Declares state of Emergency (1/16/16)



Residents of Flint lined up on 1/16/16 to get cases of bottled water distributed by members of the Michigan National Guard. Credit: Brittany Greenup for The New York Times

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### What Went Wrong?

- Regulatory failure at state level
- Failure in tone and substance in response to public
- Failure to correctly interpret federal Lead and Copper Rule

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### Intentional Wrong-Doing?

- **“Documents show Flint filed false reports about testing for lead in water”**
- State data not consistent with independent testing results
- Samples submitted from “low risk” pipes labeled as “high risk”

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### Corrosion Control

- Law requires protection against corrosion
- State official claimed Flint had corrosion control program in place
- EPA emails reveal this was not true
- City used river water for more than 17 months without treating it to make it less corrosive

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### The End?

- On-going problem...
- Poor record-keeping and culture of minimal compliance at Michigan’s Department of Environmental Quality (MDEQ)
- Biological effects of lead poisoning in kids are irreversible; will affect victims permanently and with long-term consequences

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### What Can We Learn?

- Scientific issues
- Economic issues
- Political issues
- Social justice issues

1. Which of these factors do you think is most responsible for what's happening in Flint?
2. What about this situation do you personally find most concerning?

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