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Flint Water Crisis: Overview & Response

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Public Health Research and Surveillance Priorities from the East Palestine, Ohio Train Derailment

National Academies of Science, Engineering, & Medicine

November 7, 2023

Outline

- Flint Water Crisis overview
- Response
  - Flint Registry
- Recommendations

http://media.mlive.com/entertainment_impact/photo/michigan-satellite-photo-4c5d147b3f7dc883.jpg

http://theoldmotor.com/?p=39861

http://www.reuther.wayne.edu/ex/pic/sitdown/kids.jpg

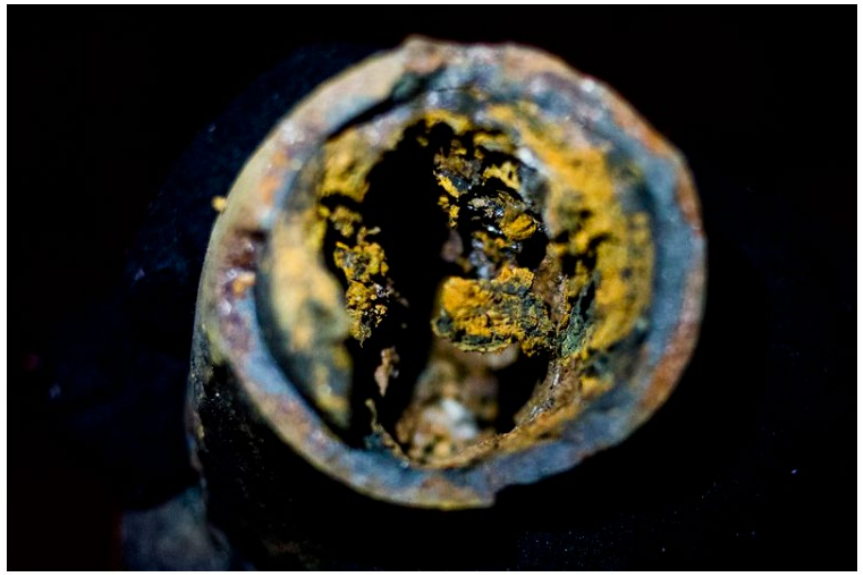
http://images.thetruthaboutcars.com/2010/11/closed.jpg

Flint Water Crisis – began April 2014

http://imgur.com/OjiNLmZ

Flint Water Crisis – began April 2014

LeeAnne Walters displays tap water samples at a public meeting in January 2015.
Ryan Garza/Detroit Free Press/ZUMA



One of the first lead pipes that was removed from Veronica Kelly's home shows the extent of the corrosion the harder Flint River water has had on Feb. 22, 2016 at her home on the city's north side. (Jake May | MLive.com)

Elevated Blood Lead Levels in Children Associated With the Flint Drinking Water Crisis: A Spatial Analysis of Risk and Public Health Response

Mona Hanna-Attisha, MD, MPH, Jenny LaChance, MS, Richard Casey Sadler, PhD, and Allison Champney Schnepp, MD

Objectives. We analyzed differences in pediatric elevated blood lead level incidence before and after Flint, Michigan, introduced a more corrosive water source into an aging water system without adequate corrosion control.

Methods. We reviewed blood lead levels for children younger than 5 years before (2013) and after (2015) water source change in Greater Flint, Michigan. We assessed the percentage of elevated blood lead levels in both time periods, and identified geographical locations through spatial analysis.

Results. Incidence of elevated blood lead levels increased from 2.4% to 4.9% ($P < .05$) after water source change, and neighborhoods with the highest water lead levels experienced a 6.6% increase. No significant change was seen outside the city. Geospatial analysis identified disadvantaged neighborhoods as having the greatest elevated blood lead level increases and informed response prioritization during the now-declared public health emergency.

Conclusions. The percentage of children with elevated blood lead levels increased after water source change, particularly in socioeconomically disadvantaged neighborhoods. Water is a growing source of childhood lead exposure because of aging infrastructure. (*Am J Public Health.* Published online ahead of print December 21, 2015: e1–e8. doi:10.2105/AJPH.2015.303003)

percentage of lead pipes and lead plumbing, with estimates of lead service lines ranging from 10% to 80%.[7] Researchers from Virginia Tech University reported increases in water lead levels (WLLs),[5] but changes in blood lead levels (BLLs) were unknown.

Lead is a potent neurotoxin, and childhood lead poisoning has an impact on many developmental and biological processes, most notably intelligence, behavior, and overall life achievement.[8] With estimated societal costs in the billions,[9–11] lead poisoning has a disproportionate impact on low-income and minority children.[12] When one considers the irreversible, life-altering, costly, and disparate impact of lead exposure, primary prevention is necessary to eliminate exposure.[13]

Historically, the industrial revolution's introduction of lead into a host of products has contributed to a long-running and

Mona Hanna-Attisha, Jenny LaChance, Richard Casey Sadler, Allison Champney Schnepp, "Elevated Blood Lead Levels in Children Associated With the Flint Drinking Water Crisis: A Spatial Analysis of Risk and Public Health Response", *American Journal of Public Health* 106, no. 2 (February 1, 2016): pp. 283-290.

Crisis Takeaways

- Prolonged crisis – not one point in time (ie: explosion, spill, natural disaster)
  - Atop decades of crisis
- Multiple known & unknown contaminants
- Environmental injustice - dismissal of residents
- Usurped democracy
- Science denial
- Failure of prevention - disinvestment in public health, deteriorating infrastructure, weak environmental regulations
- Crisis of trust
- Not the first, worst, or last crisis

Acute Response

- Community Response
- City, County, State, Federal Response
  - State of Emergency declarations
  - Emergency Operating Center (EOC)
- Risk Communication
- Exposure Control and Monitoring
  - Bottled water
  - Water testing
  - POU water filters
  - Ready to feed formula
  - Blood testing

Long-term Response

- Community-driven, rooted in participatory democracy and self determination
- Secondary prevention intervention focused; not exposure determination or research focused
- Science-based, trauma-informed, strength-based, child-centric
- Longitudinal surveillance and support
- Truth, justice, and accountability
- Prevention of future crises

Secondary Prevention

Recommendations to EOC

Submitted 01/11/16
M. Hanna-Attisha

Below are evidence-based interventions for inclusion in the emergency response to the Flint lead exposure. These recommendations, which span the domains of education, nutrition, medical/health, are proven interventions to optimize children's health, especially for children with toxic stress exposures. Secondary Prevention interventions are targeted for all exposed children to prevent manifestation of the consequences of lead. Note: all children who lived in Flint water city limits from April 2014 until end date unknown (since water not safe yet) are considered exposed and at-risk. Estimated 8,000-9,000 children under the age of 6 years, as per census data. Tertiary prevention interventions are targeted for children already experiences the consequences of lead exposure. Several interventions are considered HIGH PRIORITY as noted.

EDUCATION

Please refer to "Educational Interventions for Children Affected by Lead" for additional information and references:
http://www.cdc.gov/nceh/lead/publications/Educational_Interventions_Children_Affected_by_Lead.pdf.

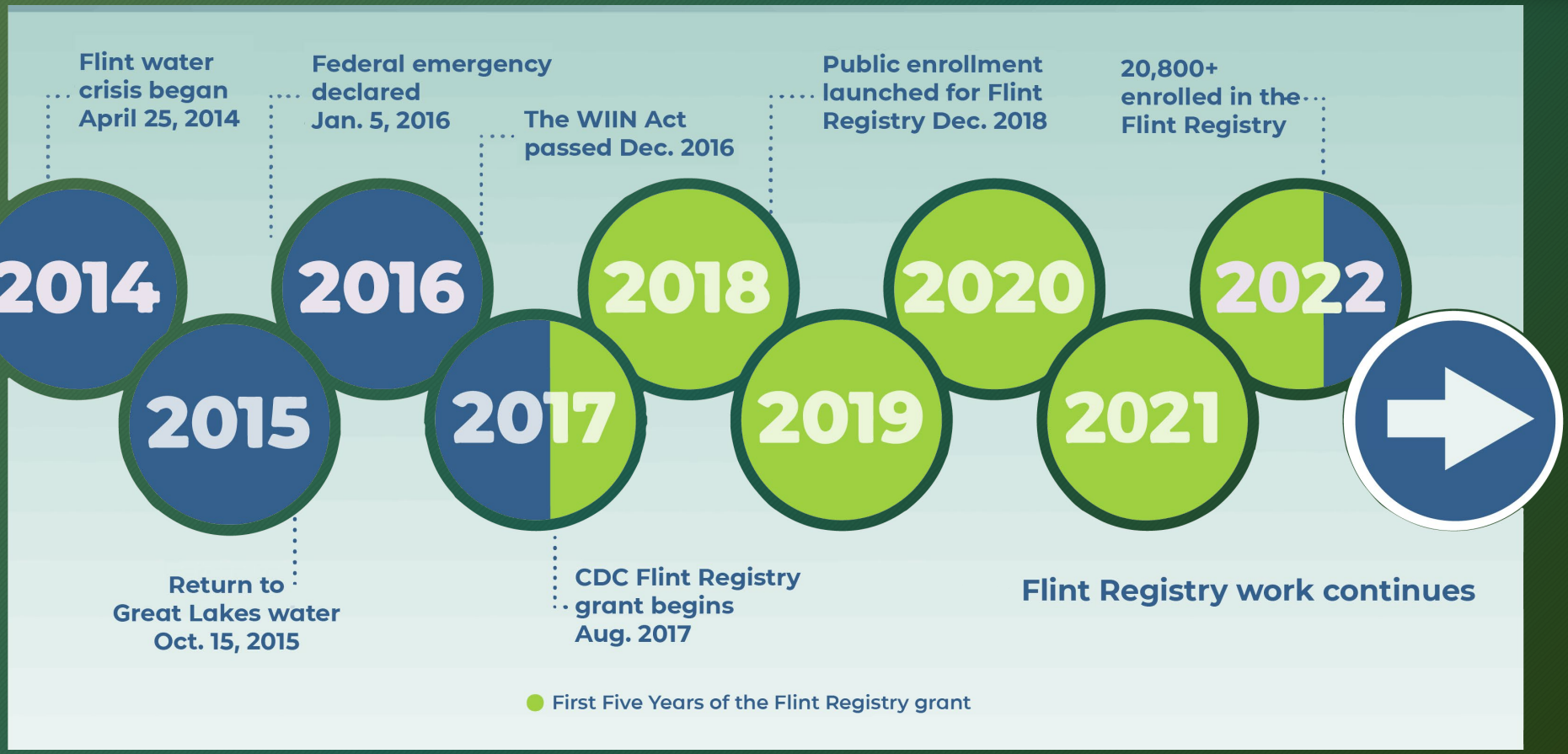
TYPE	PRIORITY	INTERVENTION	RATIONALE	COST	NOTES
Secondary Prevention	HIGH PRIORITY	Universal Early Education; Flint Pre-Promise	To mitigate toxic stress, buffer potential cognitive impact of lead exposure, promote school readiness, proven return on investment	Estimated cost of head start per child per year approx. $6000/child/yr	• Limited preschool capacity in Flint (only about 1200 children enrolled) with wait lists • Early Head Start – Ages 0-3, federally funded • Head Start – Ages 3-5, federally funded • Great Start Readiness Program – Age 4, state funded • Relax income eligibility for above programs so ALL Flint children are eligible • Campaign to promote enrollment
		Early literacy promotion	To buffer potential cognitive impact of lead and to address word/literacy gap, promote school		• Support expansion of Reach Out and Read is evidence based early literacy program – free books given to every kid at each medical visit starting at 6mos of age: http://www.reachoutandread.org/ • Consider support of additional early literacy programs

Secondary Prevention
Health, Education, Nutrition

- Medicaid waiver expansion
- Healthy start
- Universal early intervention
- Two new childcare centers
- Early literacy services
- Trauma informed care
- Expanded mental health services
- Nutrition prescriptions
- Mobile markets
- Medical home access
- Transportation services
- Home visits
- Care coordination
- Parenting support
- School nurses

Surveillance & Support

FLINTREGISTRY
Get Connected. Get Supported. Get Counted.



Flint Registry Goals

Per CDC:

- To identify eligible participants and ensure robust registry data;
- Monitor health, child development, service utilization, and ongoing lead exposure;
- Improve service delivery to lead-exposed individuals;
- Coordinate with other community and federally funded programs in Flint

‘Public Health’ Registry

- Grant of Public Health Authority
- Conduct surveillance on exposed individuals
- Mitigate impact of exposure – secondary prevention

- Not a research registry
- Built with lessons from other disaster registries
- Community driven

Community Voice

- Director of Community Based Implementation and Engagement
- Parent Partners
- Flint Youth Justice League
- Community Advisory Board
- Focus Groups
- Pre-enrollment Feedback
- Local Presentations/Events
- Registry Ambassadors
- Local Community Ethics Review Board Approval
- Downtown Flint location & Flint-based staff

Jones N, Dotson K, Smith KD, Reynolds L, Key K, Hanna-Attisha M. **The Impact of Community Engagement in the Design and Implementation of the Flint Registry.** In Press. *Progress in Community Health Partnerships: Research Education and Action.*

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Outreach and Engagement Partners

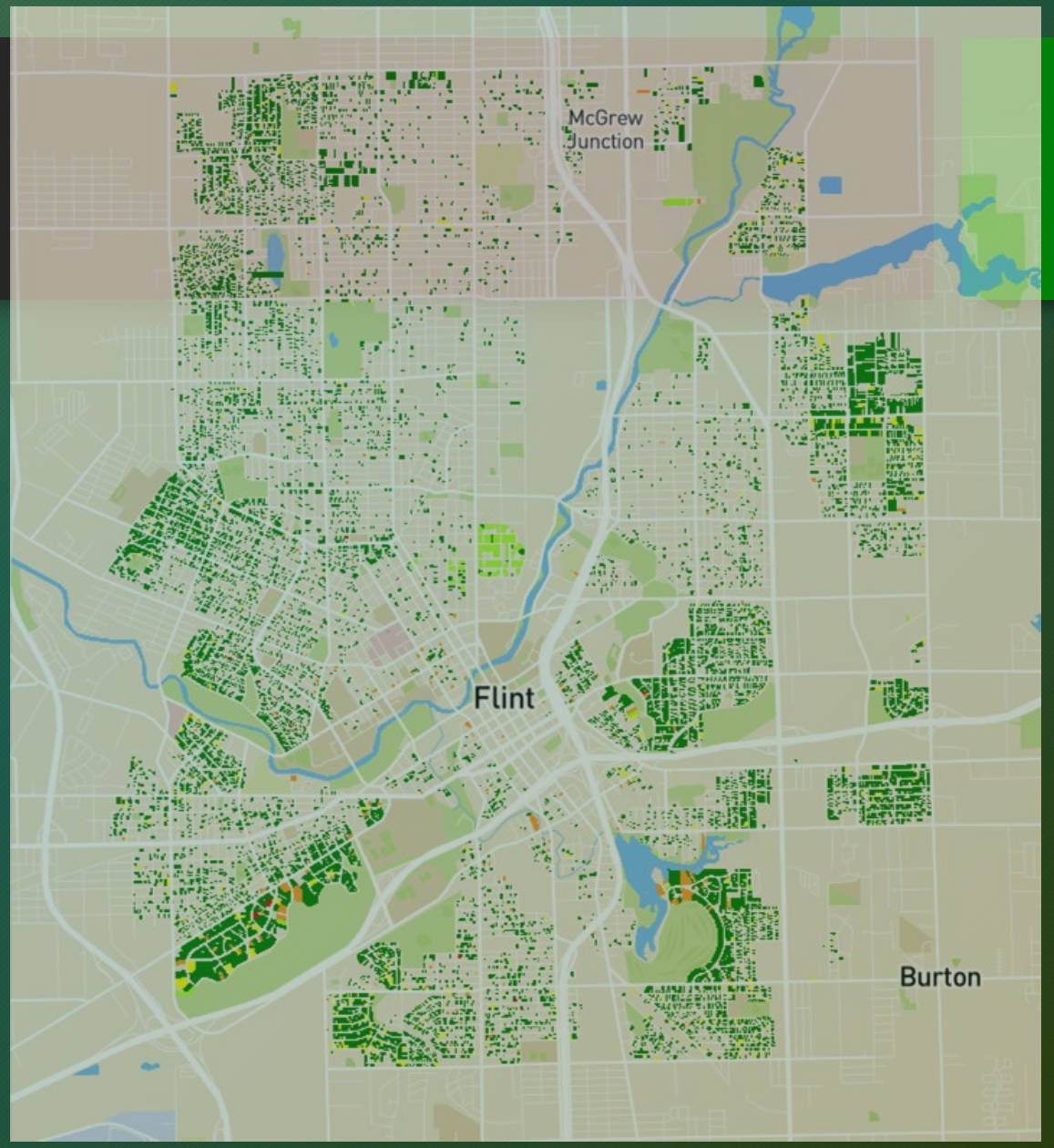
- Arab American Heritage Council
- Blue Cross Complete
- Boys and Girls Club of Greater Flint
- Brennan Senior Center
- Carriage Town Ministries
- Catholic Charities Center for Hope
- Child Care Network
- City of Flint
- Communication Access Center for Deaf and Hard of Hearing
- Crim Fitness Foundation
- Eastside Mission
- Flint and Genesee Literacy Network
- Flint Community Schools
- Flint Neighborhoods United
- Flint Public Library
- Flint Strive
- Community Health Access Program
- Genesee County Community Action Resource Department
- Genesee County Health Department
- Genesee County Medical Society
- Genesee District Libraries
- Genesee Health Plan
- Genesee Health System
- Genesee Intermediate School District
- Greater Holy Temple
- GST Michigan Works
- Hamilton Community Health Network
- HAP
- Hasselbring Senior Center
- Hurley Food FARMacy
- Hurley Hospital
- Kettering University
- LatinX Community Center
- Mass Transportation Authority
- Michigan Department of Health and Human Services
- Michigan State University Extension
- Mott Community College
- National Kidney Foundation of Michigan
- Neighborhood Engagement Hub
- Oak Street Health
- Pediatric Public Health Initiative
- St. Luke's N.E.W. Life Center
- University of Michigan-Flint
- United Way of Genesee County
- Wellness Services
- YMCA
- Youth Quest
- YWCA

Recruitment

Marketing and lists

High-risk populations

- Children
  - Ages 0-6
  - Blood Lead Levels > 3.5mcg/dL
  - Prenatally exposed
- Homes with at-risk service lines; lead in water risk score



Health Assessment Priorities

Survey content

Measures related to Lead and Connection to Services		Measures of Public Health Interest
Health Outcomes	**Mental Health Screeners**	**Social Determinants of Health**
Health Status/Self Rated Health	Global Mental Health/Cognitive Function	Economic Distress
Physician Diagnosed Conditions	Depression	Discrimination
Health Related Symptoms	Perceived Stress	**Food & Nutrition**
Reproductive Health	Social support	Fruit and Vegetable Consumption
Alcohol and Substance Use	**Service Related**	Food Access
Child Development	Health Care Access/Services Used	Food Insecurity
Provider Diagnosed Child Development	**Lead Exposure**	Breastfeeding Duration
Parent Reported Child Behavior	Residential History/Water Usage	**Demographics**
Educational Support	Environmental Lead Screening	

Referral Programs

- Lead Elimination
- Health
- Child Development
- Nutrition

Flint Registry Impact

- Over 21,000 enrollees
- Over 34,000 referrals to secondary prevention services
- Ongoing monitoring of health impacts
- Survey waves: baseline, one year follow up, mini surveys

Registry Findings

- www.FlintRegistry.com
- Participants struggle with income, meeting basic needs, and nutrition security
- Using validated instruments and when compared to county, state, and national rates, disparities in everything, especially:
  - stress
  - physician-diagnosed adult health conditions (>45% with HTN)
  - adult and child mental health
  - child behavioral health (almost 50% of kids with concerns and need referrals for behavioral health assessment)
  - skin conditions

I feel like I'm a Flintstone… Flint is my home, there's no other place I knew before that

Because I believe me and my kids were affected

Help my community

The long term effects especially for children may be devastating

Wife encouraged me, to provide more information to help myself and others

For my son and I

I decided to participate because I want my voice heard

$50 and to see what's going on

Something needs to be done about this water

I'd like to be aware of resources that might help us. I don't know what is available

To help get answers on how people were affected

For valid information and direction

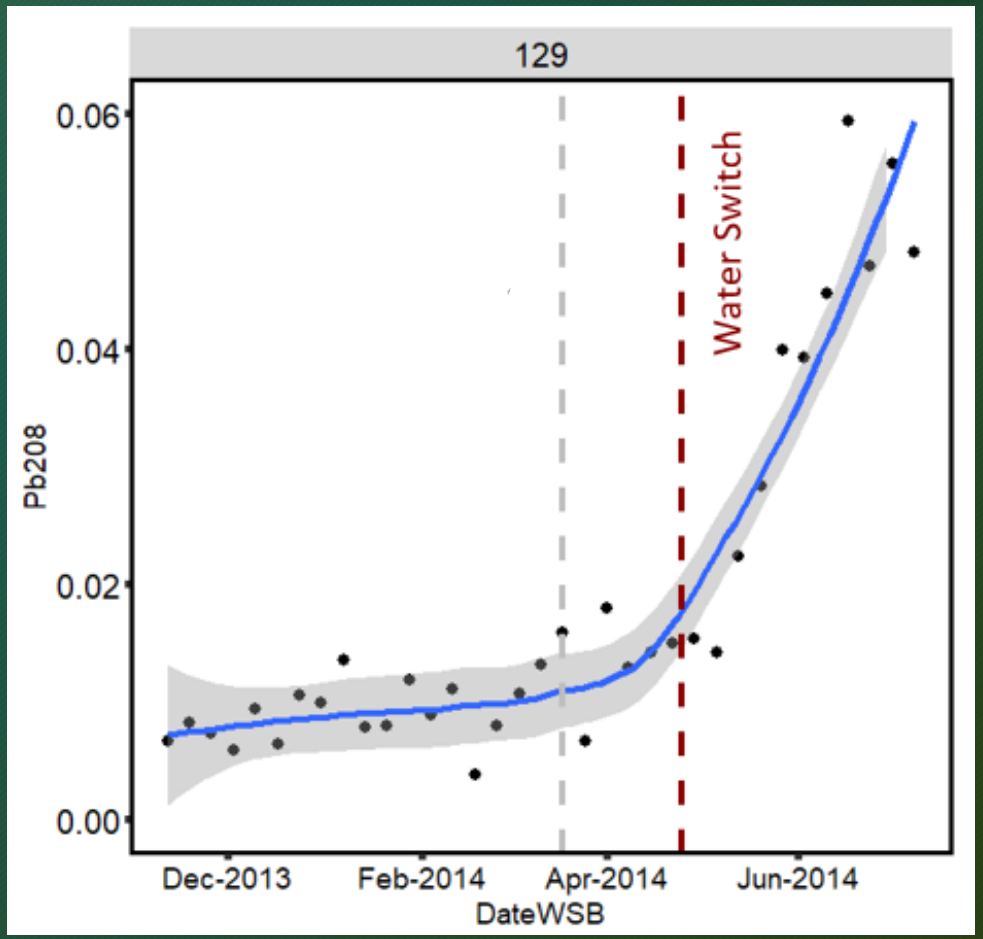
Reports and Publications https://flintregistry.org/reports/

"This handbook shares our lessons learned regarding the legal nuances of public health registries. It is our hope that this playbook of sorts will inform future registries and their efforts to recovery from a crisis and improve public health."

Reports and Publications https://flintregistry.org/reports/

- "…the combined future economic benefits for Flint and its residents from lead service line replacements, home abatements, and demolitions completed from 2013 through 2021 are expected to amount to **$201.8 million.** These benefits include the impacts of reduced lead exposure for Flint children, and the resulting long-term impacts on health, lifetime earnings, and longevity, plus the financial benefits of demolishing distressed structures."

Other Research



Recommendations

- Don’t reinvent the wheel
- Listen to and work humbly with impacted community
- Consider a holistic and long-term response: a crisis is more than an exposure – betrayal is toxic
- Share stories with journalists and policymakers
- Hold polluters/culprits accountable; justice is key to health and recovery
- Continue to push for stronger policies and investments in public health and environmental regulations to **PREVENT the next crisis**

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THANK YOU