

CHE 3.8.16

# #FlintWaterCrisis

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# Flint, Michigan



# #flintwatercrisis

HURLEY  
CHILDREN'S  
HOSPITAL



- Perfect storm for lead leaching
  - Flint River water more corrosive
  - Lack of corrosion control
  - Aging infrastructure (up to 80% lead plumbing)
  - Decreased water use - population loss, high water rates

# Why do we care about lead?

- Lead is a potent irreversible neurotoxin with lifelong, multigenerational impacts
- NO safe blood lead level
- Disproportionately impacts low income and minority children; environmental injustice
- Primary prevention

# Lead in Water

- Soluble metal
- Drinking and cooking risks
- Not what medicine/public health used to
  - Lead paint obsessed (CDC vs EPA)
  - Younger kids exposed
  - But “plumbing” ...



# Hurley Children's RESEARCH FINDINGS

**Sept 24**

**Medical Community Press Conference**

# Methods

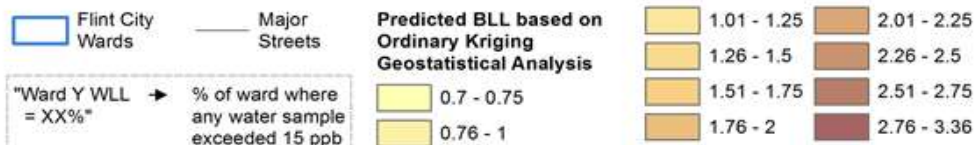
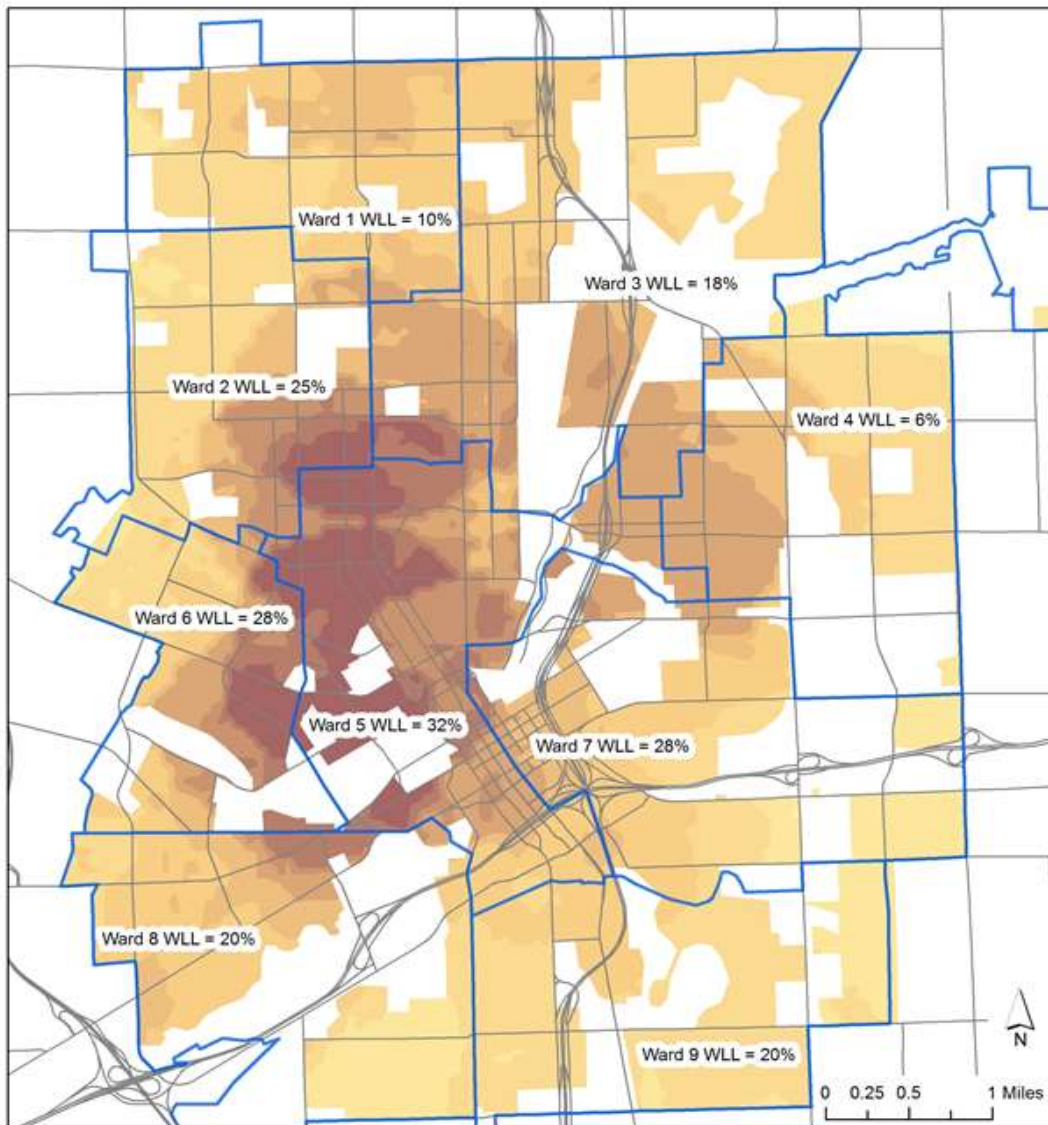
- HMC IRB approved
- Data from all blood lead levels processed at Hurley Medical Center
- Two periods of comparison (same seasons):
  - PRE-SWITCH: January 1, 2013 – September 15, 2013
  - **WATER SWITCH APRIL 26, 2014**
  - POST-SWITCH: January 1, 2015 – September 15, 2015
- Analyzed % Elevated Blood Lead (EBLL)
  - EBLL = Blood lead Levels  $\geq$  5 ug/dL



- N= 1473 for Flint water children (pre n=736, post n=737)
- N= 2202 for non-Flint water children (pre n=1210, post n=992)

## **Flint results for children 5 years and under:**

- **PRE-SWITCH % EBLL: 2.4%**
- **POST-SWITCH % EBLL: 4.9%**
- **p < 0.05; STATISTICALLY SIGNIFICANT CHANGE**



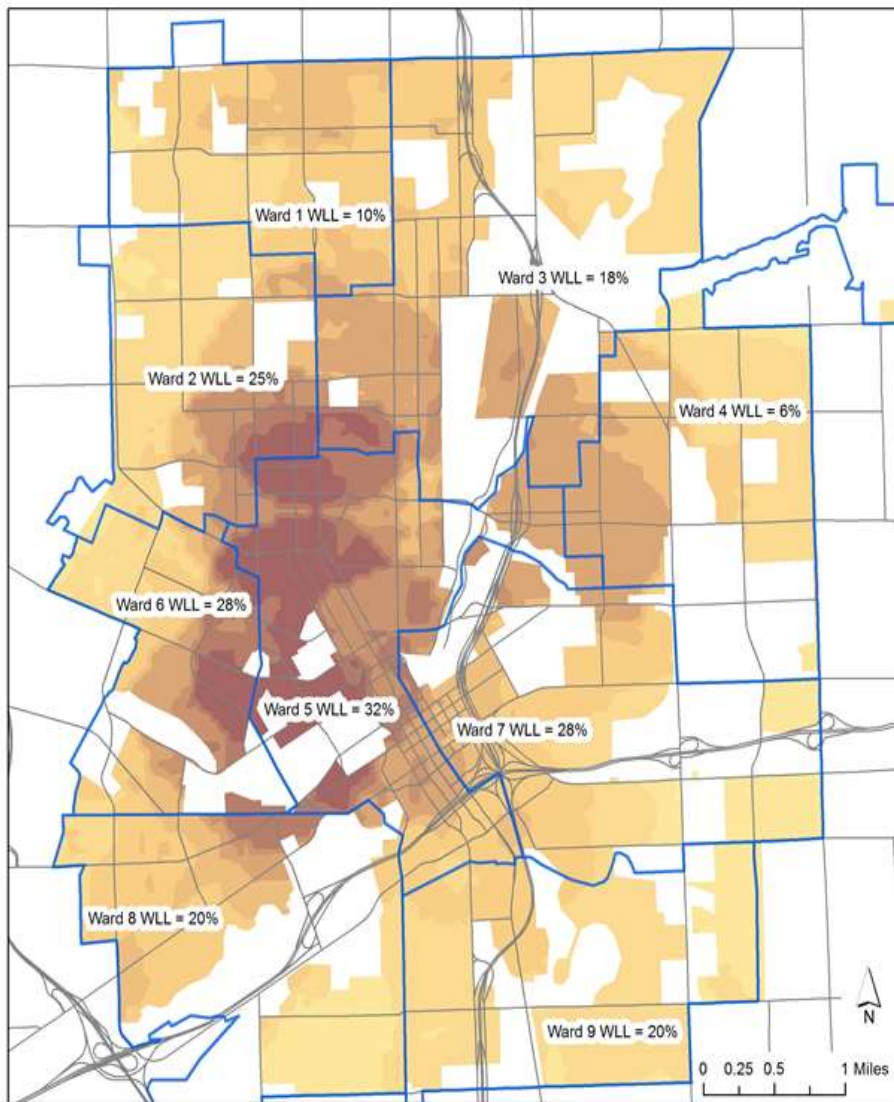
\*Non-residential zones screened from results

### High WLL Wards Results:

- PRE-SWITCH % EBLL: **4.0%**
- POST-SWITCH % EBLL: **10.6%**
- $p < 0.05$ ; **STATISTICALLY SIGNIFICANT CHANGE**

### Ward 5 Results:

- PRE-SWITCH % EBLL: **4.9%**
- POST-SWITCH % EBLL: **15.7%**
- $p < 0.05$ ; **STATISTICALLY SIGNIFICANT CHANGE**



Flint City Wards

Major Streets

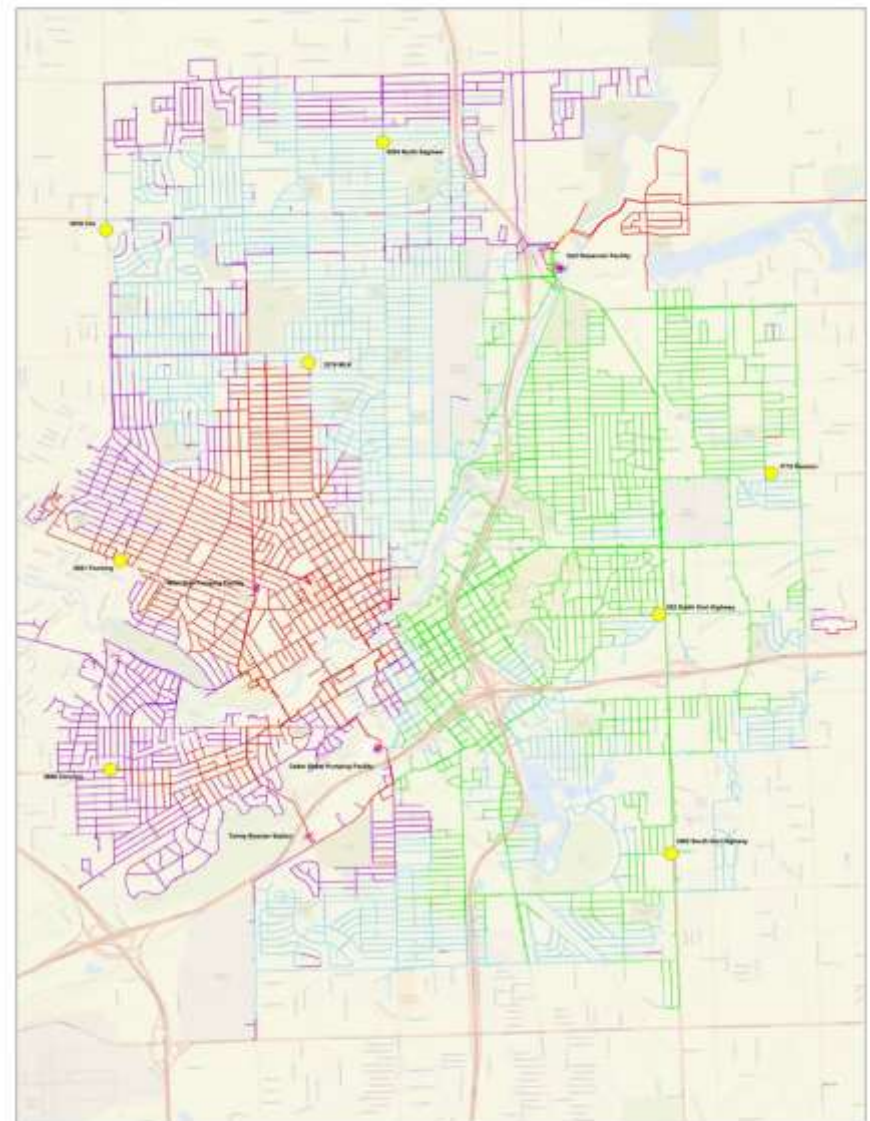
Predicted BLL based on Ordinary Kriging Geostatistical Analysis

0.7 - 0.75  
0.76 - 1

1.01 - 1.25	2.01 - 2.25
1.26 - 1.5	2.26 - 2.5
1.51 - 1.75	2.51 - 2.75
1.76 - 2	2.76 - 3.36

"Ward Y WLL = XX%" → % of ward where any water sample exceeded 15 ppb

\*Non-residential zones screened from results



Legend  
Water Quality (hrs)  
less than 24.0  
24.0 to 72.0  
72.0 to 144.0  
greater than 144.0  
Water sample location

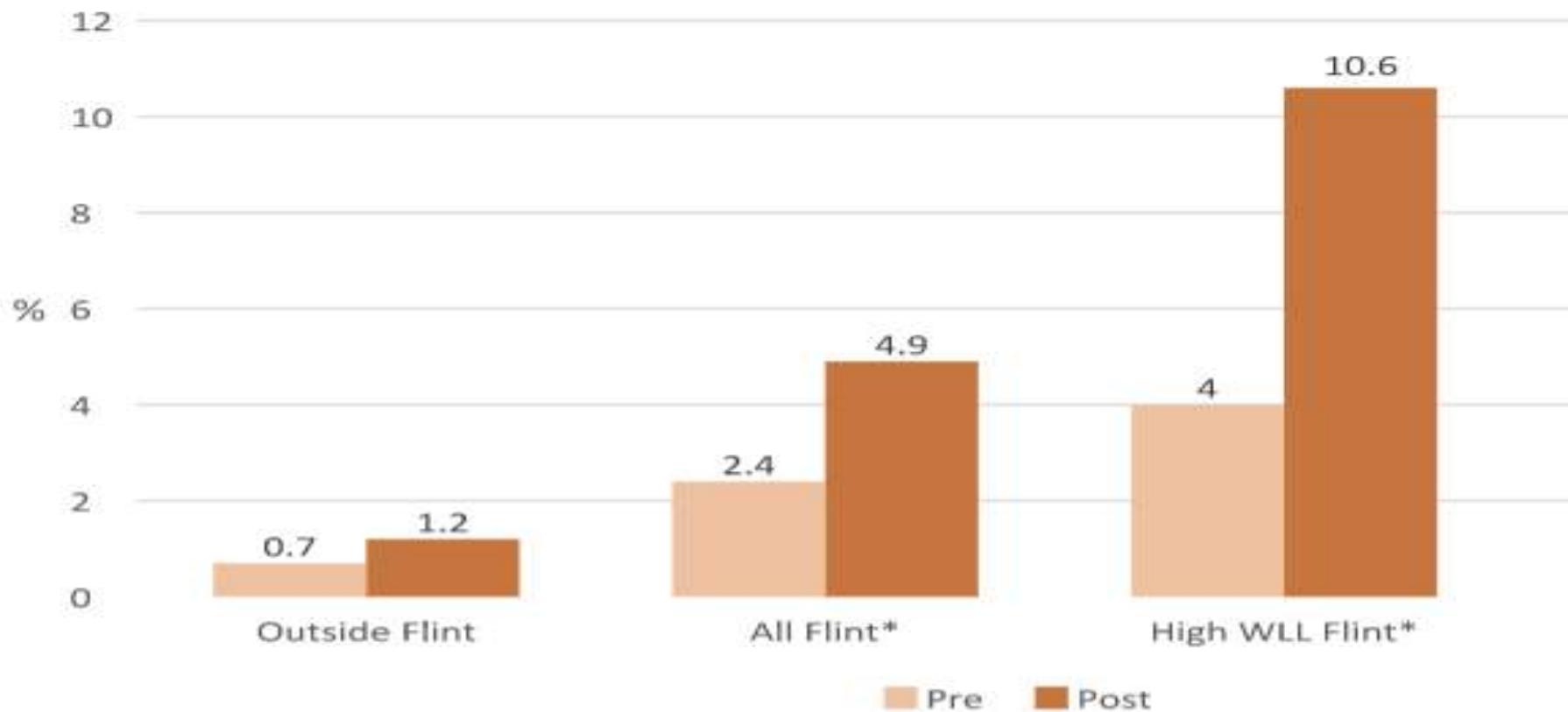
### CITY OF FLINT MAJOR WATER INFRASTRUCTURE WATER AGE & WATER SAMPLE LOCATION MAP

January 21, 2015



# Pre/Post EBLL

## Comparison of Pre/Post EBL Percentage



\*p<0.05

# Research results

- % of children with EBLL in Flint increased
  - Most striking increase in areas with highest water lead levels
- **Results significantly underestimate exposure:**
  - Infants not screened for lead
  - BLL may have peaked before being measured (blood half life 20-30 days)
- Widened disparities
- Failure of primary prevention

## 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 Schnepf, 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%.<sup>7</sup> Researchers from Virginia Tech University reported increases in water lead levels (WLLs),<sup>5</sup> 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.<sup>8</sup> With estimated societal costs in the billions,<sup>9–11</sup> lead poisoning has a disproportionate impact on low-income and minority children.<sup>12</sup> When one considers the irreversible, life-altering, costly, and disparate impact of lead exposure, primary prevention is necessary to eliminate exposure.<sup>13</sup>

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

# NOW

- Preventable population-wide exposure
- Community traumatized
- Loss of trust in government and agencies
  - In 2016, in the middle of the great lakes, no guarantee of safe drinking water
- Task forces, federal investigation, lawsuits, resignations, international media, celebrities...
- Jan 2016 Federal State of Emergency

# NOW

- Water still not safe; water & filters





# Moving Forward

- Unique opportunity to be proactive, to build a model public health program to buffer impact of exposure
- Serve as a model for other communities

# MSU/Hurley Pediatric Public Health Initiative



- Assess
- Monitor
- Intervene

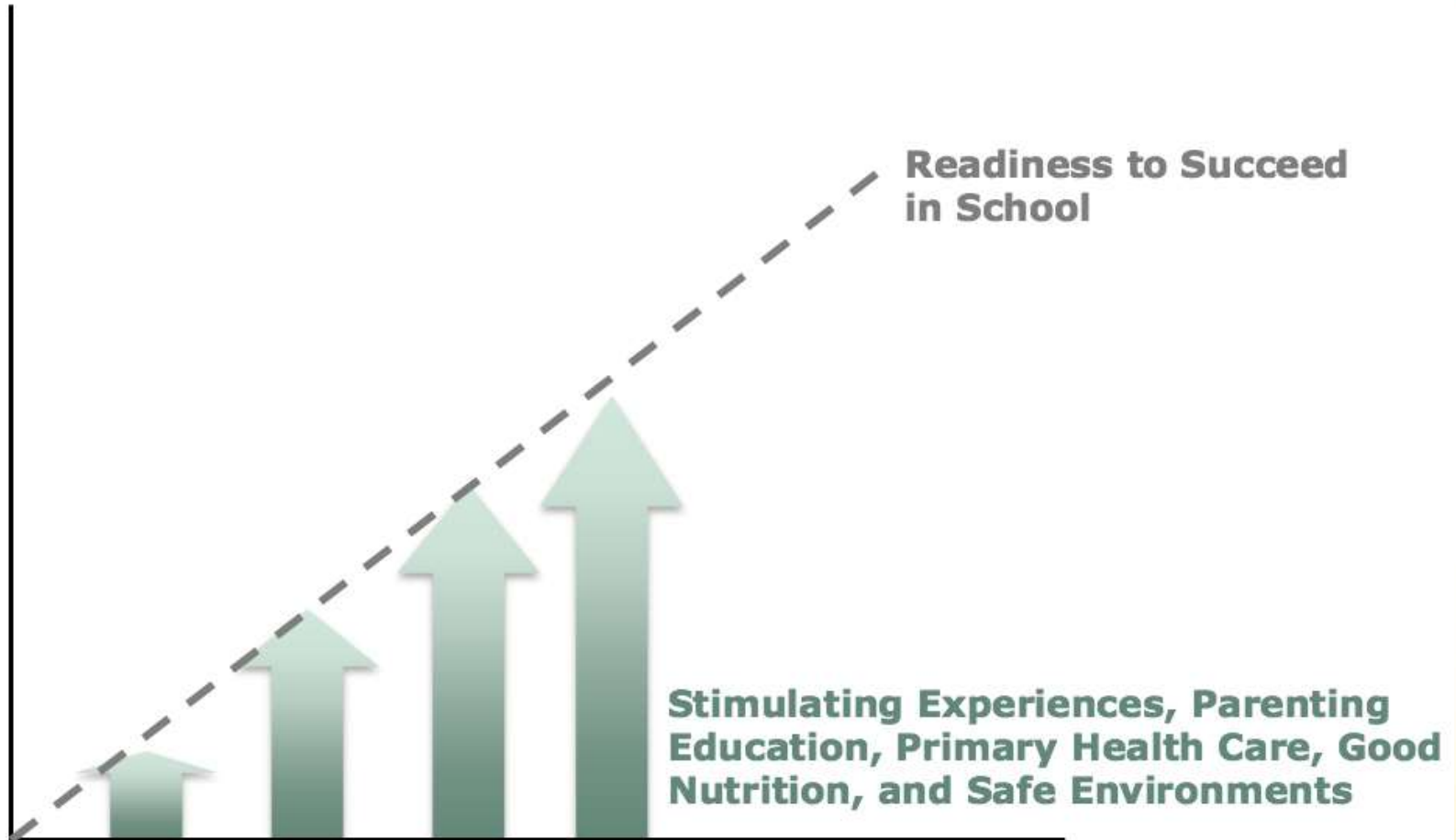


- Experts and community

- <http://humanmedicine.msu.edu/pphi/>

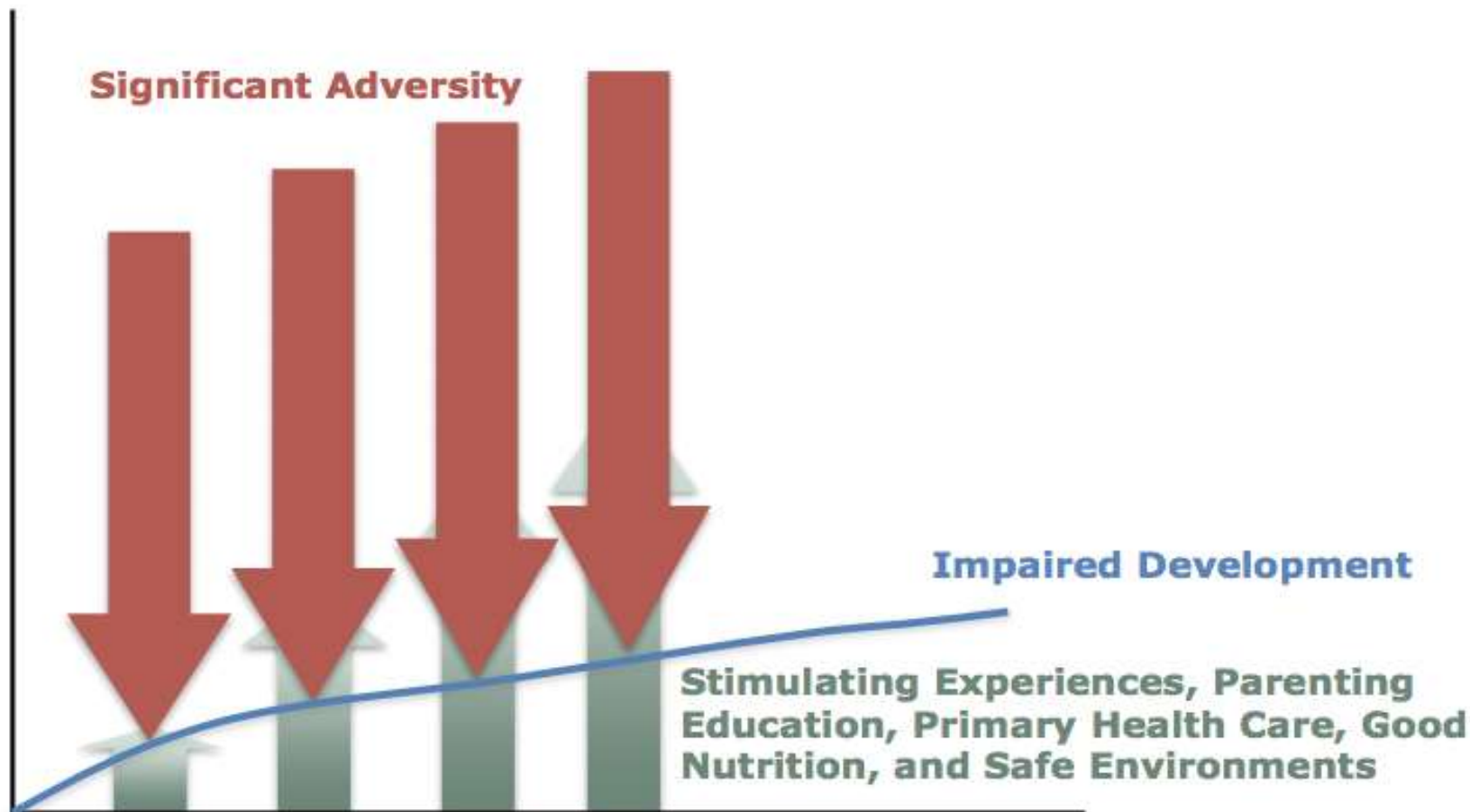


# We know what works....



<https://www.aap.org/en-us/advocacy-and-policy/federal-advocacy/Documents/Panel%201%20-%20Shonkoff%20Center%20on%20the%20Developing%20Child%20Presentation.pdf>

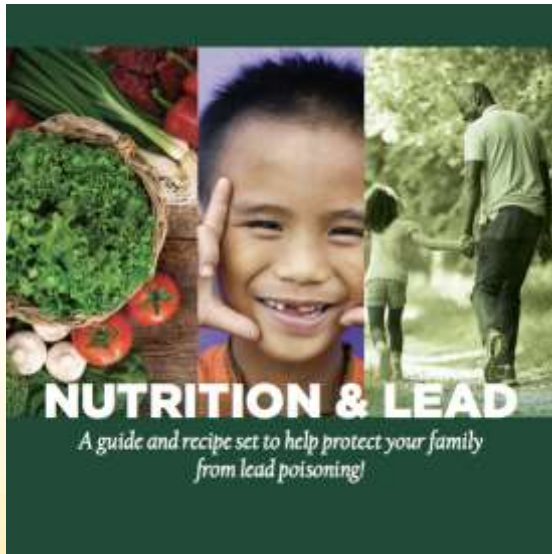
# And we know what hurts...



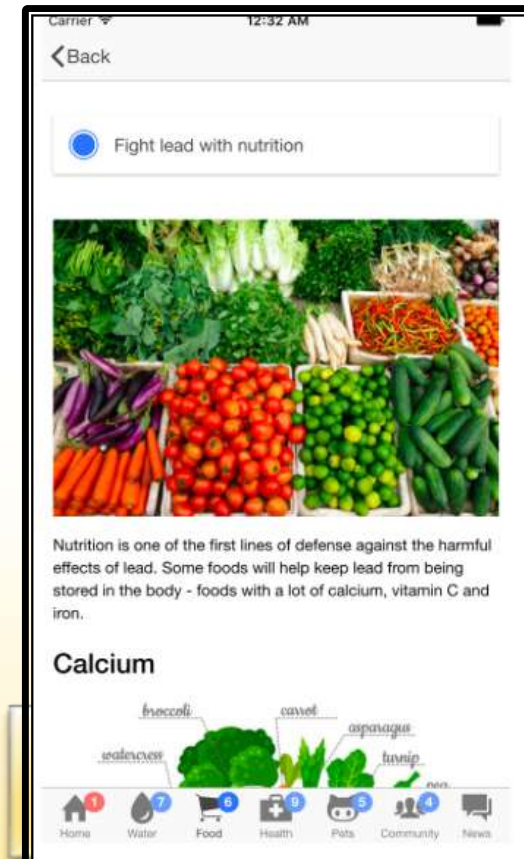
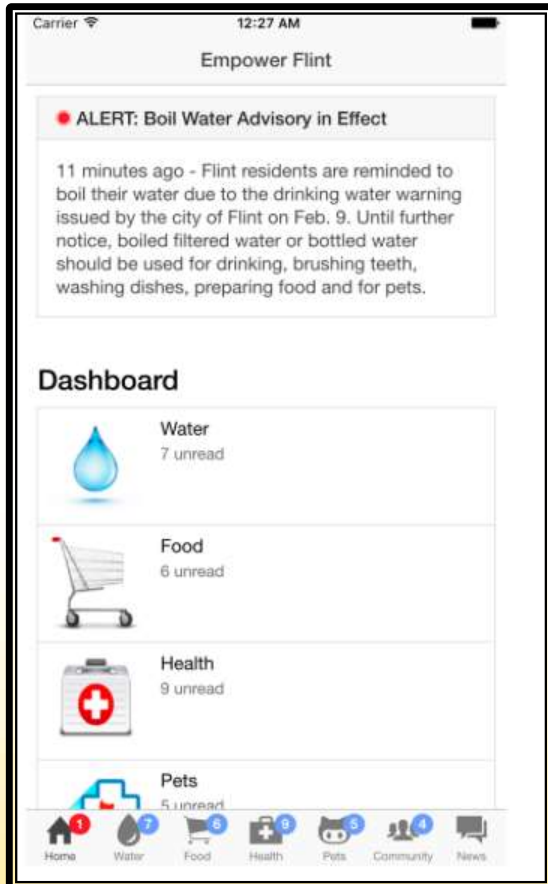
# #flintwatercrisis Interventions

HURLEY  
CHILDREN'S  
HOSPITAL

- Education
- Nutrition
- Medical/Health

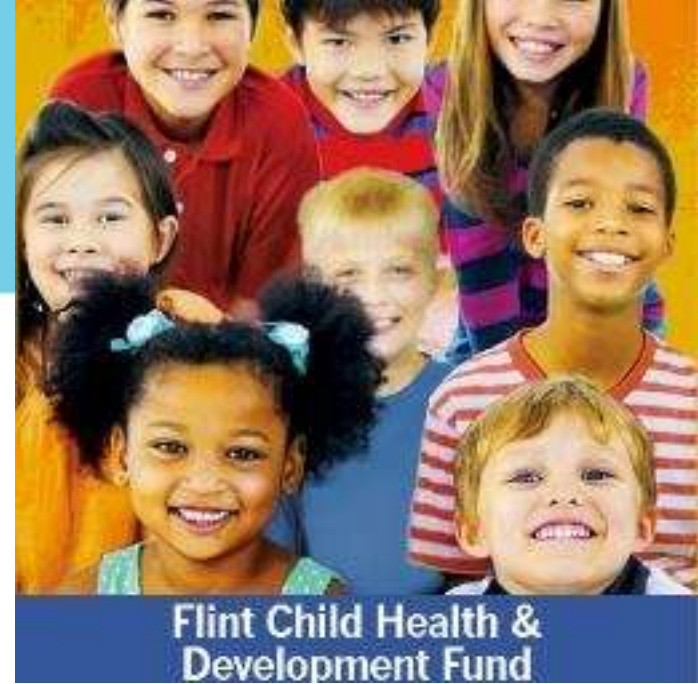


# Empower Flint App



# Flint Child Health & Development Fund

- Focus is building the capacity to serve all Flint children exposed over the next 20 years
- Fund will support children and families with interventions to support optimal child health & development, early childhood education, continuous access to a pediatric medical home, nutritional education, integrated social services, etc.
- [www.flintkids.org](http://www.flintkids.org)



# Flint, Michigan





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**Thank you!**