Informing Environmental Health through Community-Engaged Research:
Testing for Lead in Drinking Water in the Mississippi Delta

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Background

- Lead exposure can have severe developmental and other health impacts, especially among infants and children.
  - ✓ Gastrointestinal absorption of lead is enhanced in childhood – up to 50% of ingested lead is absorbed by children, as compared with 10% in adults (World Health Organization, 2010).
- Much of the monitoring, research, and policy focuses on exposure through lead paint. Less attention is given to potential exposure through water.
  - ✓ Yet, contaminated drinking water may account for 10-20% of all cases of lead poisoning (Levin et al., 2008).
- Blood testing for lead in children is not required (with the exception of Medicaid enrolled children).
- Water from public utilities must be tested for lead, but only a small percentage of homes are included.

Project focus

- Can multi-disciplinary, multi-method, and community-based approaches to research provide more data to test for potential lead exposure?
- Can these data be used to inform better monitoring, outreach, and education efforts?
- Focus is on counties in and contiguous to the Mississippi Delta, specifically:

Bolivar	Panola
Carroll	Quitman
Coahoma	Sunflower
Grenada	Tallahatchie
Holmes	Washington
Humphreys	Yalobusha
Leflore	

Tri-County Workforce students tour the UM labs to understand how their water was analyzed.

Project partners (to date)

- James C. Kennedy Wellness Center
- New Pathways to Health Initiative, especially Tri-County Workforce Alliance
- Right! From the Start Program staff and church partners
- Mississippi State University Extension
- Harvard Law School Mississippi Delta Project/Delta Directions Consortium

Project methods and activities

- Workshops and lab tours for students in health professions/STEM program
- Meetings with students and other community residents to introduce the project, discuss water quality and health, complete the questionnaire, and receive water bottles and instructions for collecting samples
- Water bottles distributed and returned
- Survey and water samples analyzed (pH and lead)
- Results reported to families with helpful information

Water Testing Process

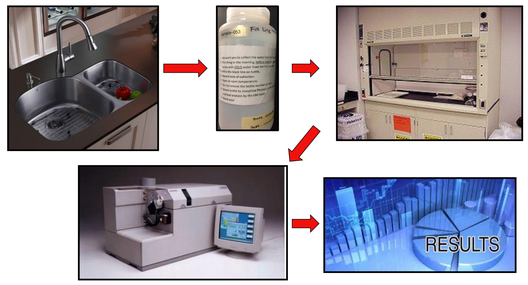

Table 1. Lead in water project sampling return (%)

Phase	# bottles passed out	# bottles returned	% return
1. New Pathways to Health Initiative/Tri-County Workforce Alliance	88	69	78%
2. Right! From the Start (church partners)	42	42	100%
3. James C. Kennedy Wellness Center (healthy cooking class)	10	7	70%
4. MSU Extension (well water users)	39	21	54%
5. Right! From the Start Maternal-Child Health Program (train-the-trainer event)	12	12	100%
Total	191	151	79%

Findings

- 170 households have participated in the project in some way
  - ✓ 169 responded to the survey
  - ✓ 151 water bottles were returned (but 1 did not have an address)
  - ✓ 147 households responded to the survey and returned water samples
  - ✓ Data represented 13 counties and 34 census tracts, majority from Humphreys (n=42) and Coahoma (n=37) counties, followed by Bolivar (n=18) and Quitman counties (n=13)

Researchers and community members discuss the dangers of lead exposure and the proper way to submit water for testing.

Train-the-trainer workshop participants check in water bottles and questionnaires.

Table 2. Lead in water project household characteristics
(Households returning both questionnaires and water samples, n=147)

Characteristics		*f*	%
Housing tenure (n=144)	Renters	36	25.0
	Owners	102	70.8
	Other arrangement	6	4.2
Housing type (n=146)	House	122	83.6
	Mobile home	10	6.8
	Apartment	14	9.6
Know when built (yes) (n=142)		80	56.3
Built 1985 or earlier (yes) (n=77)		37	48.1
Pipes ever replaced (n=128)	Yes	21	16.4
	Unsure	43	33.6
	No	64	50.0
Use filter for drinking water (yes) (n=147)		39	26.5
Use filter for ice (yes) (n=147)		43	29.3

Table 3. Lead in water project testing results (pb)
(Households returning both questionnaires and water samples, n=147)

Characteristics	Statistics
Mean	0.90
Median	0
Standard deviation	2.15
Minimum to maximum	0 to 14.32
Samples with some amount of lead detected	49.7%

Conclusion and next steps

- The methods used for this project were effective for obtaining water samples from a range of households and places.
- The data are now being analyzed in the context of census geographies and water districts to identify geographic, demographic, and socioeconomic patterns.
- Research team is assessing the efficiency and efficacy of the community engagement methods to scale up and inform policy recommendations.
- The project is being expanded to include more households by working with additional partners.

References

Levin, R., Brown, M. J., Kashtock, M. E., Jacobs, D. E., Whelan, E. A., Rodman, J., . . . Sinks, T. (2008). Lead exposures in U.S. children, 2008: Implications for prevention. *Environmental Health Perspectives, 116*(10), 1285-1293. doi:10.1289/ehp.11241.

World Health Organization. (2010). *Childhood lead poisoning.* Geneva, Switzerland: WHO Press.

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