

AN ANALYSIS OF LEAD CONTAMINATION RISKS OF PUBLIC WATER SUPPLIES IN THE MISSISSIPPI DELTA

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THE UNIVERSITY of
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Why Lead?

- Persistent environmental pollutant.
- There is no safe exposure level for lead.
- Mississippi ranks #18 in states for number of lead poisoning cases.
 - *Approximately 300 children per year with BLLs over 5 µg/dl.*
 - *MS may be detecting fewer than 30% of cases (Roberts et. al, Journal of Pediatrics, 2017).*

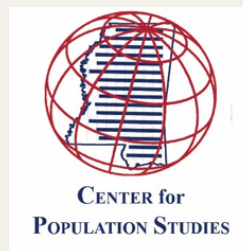


Why Drinking Water?

- All sources of lead exposure for children should be eliminated.
- According to CDC, up to 30% of cases of children with elevated blood lead levels have no immediate lead paint hazard.
- Recent high profile cases:
 - *Flint, Michigan*
 - *Jackson, Mississippi (2016)*



UM Team



Partners

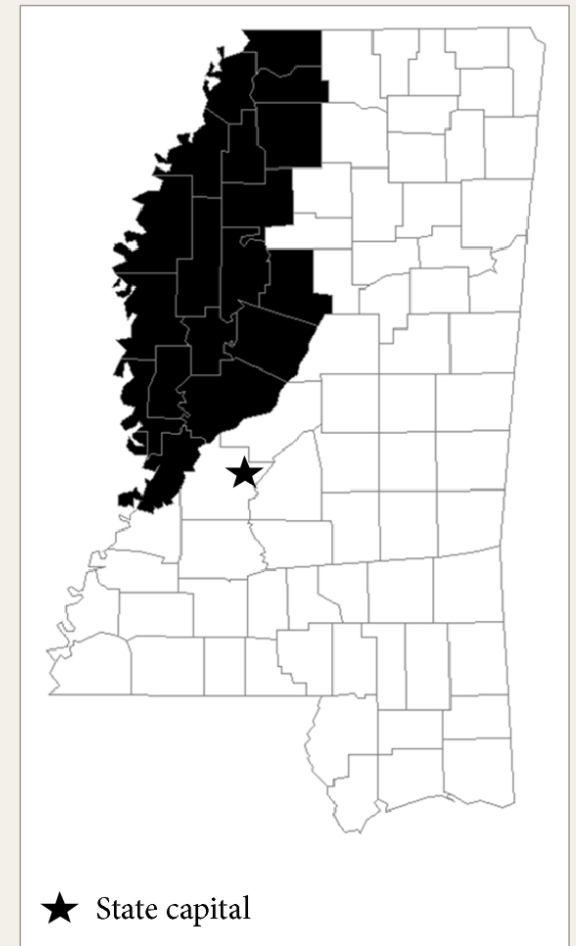


Funders



Community-Based Research

- Project Team has partnered with several organizations to organize collection events. 6 collection events since July 1, 2017, distributing 170 bottles.
 - *151 water samples returned for testing and 169 household surveys received.*
 - *Evaluating return rates to assess most effective engagement strategies.*
- Presented information on lead risks and proper sampling techniques to project participants.
- High school students participating in project meet researchers and tour UM toxicology lab during campus visits.



Safe Drinking Water Act

- SDWA regulates public water systems – systems having at least 15 service connections or serve at least 25 people for at least 60 days a year.
 - *Maximum Contaminant Level Goals – aspirational. Lead = 0*
 - *Maximum Contaminant Level – enforceable, based on technological feasibility and costs. Lead = 15 ppb.*
- Primary enforcement lies with the states – Mississippi State Department of Health

Lead and Copper Rule

- PWS monitor lead through sampling of household tap water.
- Number and frequency of sampling varies depending on size of system and past exceedances of MCL.
 - *Max: 100 sites every 6 months for systems serving over 100,000 people.*
 - *Min: 5 sites every 3 years for systems serving less than 100 people.*
- If more than 10% of samples are above the 15 ppb action level (MCL), certain actions are triggered.

County-level PWS Service Data

County	Population Est US Census 2016	Number of Public Water Systems	Pop. Served	Average Pop. Served	Min. Pop. Served	Max. Pop. Served
Bolivar	32,737	28 (2 non-community)	38,840	1,387	110	15,000
Coahoma	23,809	20 (1 non-community)	28,852	1,602	231	17,962
Humphreys	8,513	11 (1 non-community)	9,511	865	56	5,016
Leflore	29,856	17 (4 non-community)	29,791	1752	45	16,000
Panola	34,164	30 (6 non-community)	34,857	1162	25	9,971
Quitman	7,349	14	8,149	585	80	2,446
Sunflower	26,407	14	28,203	2,015	190	10,683
Tallahatchie	14,394	16	13,676	855	39	3,299
Washington	47,231	18 (3 non-community)	52,216	2,900	25	34,400

Gaps and Concerns

- SDWA does not regulate private wells.
- SDWA does not require testing in schools.
- 15 ppb is not a health-based standard. FDA has established 5 ppb limit for bottled water.
- Sampling sizes are very small. For many PWS in the state, less than 1% of homes served are tested for lead.
- PWSs only responsible for lead service lines under their control.

Data Source

← → ↻ 🏠 🔒 https://apps.msdh.ms.gov/DWW/ 🔍 mississippi drinking water watch



Public Water Supply Systems Search Parameters

Water System No.	<input type="text"/>
Water System Name	<input type="text"/>
Principal County Served	<input type="text" value="All"/>
Water System Type	<input type="text" value="All"/>
Primary Source Water Type	<input type="text" value="All"/>
Point of Contact Type	<input type="text" value="None"/>

Sample Search Parameters

Sample Class	<input type="text" value="Click to select a value..."/>
Sample Collection Date Range <small>(The Sample Search always produces results for the last 2 years, unless you provide a specific date range.)</small>	<input type="text" value="3/27/2016"/>  To <input type="text" value="3/27/2018"/> 

[Click Here for the County Map of MISSISSIPPI](#)

Panola County

PWS	Pop. Served	Sample Size	Monitoring Period Begin	Monitoring Period End	90 th Percentile (ppb)
ASL Water Association	840	10	1/1/15	12/31/17	2.2
Chickasaw Hills Subdivision	132	5	1/1/15	12/31/17	3.6
City of Batesville	9,971	24	1/1/14	12/31/16	2
City of Sardis	3,255	10	1/1/15	12/31/17	.9
Concord-Macedonia W/A	407	5	1/1/15	12/31/17	1
Enid Shores Dev. Water Company	325	5	1/1/15	12/31/17	0
Enon-Locke Curtis Water Assn.	1,558	11	1/1/17	12/31/17	1.8
Eureka Water Association	1,122	8	1/1/15	12/31/17	.8
Hebron Water Association	1,119	10	1/1/15	12/31/17	3
Hide-a-way Hills Water Company	150	10	7/1/17	12/31/17	8.9
Hotophia Water Association	2,033	10	1/1/15	12/31/17	1.6
Independence Water Association	1,729	11	1/1/15	12/31/17	.55
Liberty Hill Water Association	713	10	1/1/15	12/31/17	1.8
Love Joy Water Association	731	10	1/1/15	12/31/17	0
Mt. Olivet Water Association	1,040	10	1/1/15	12/31/17	.6
North Panola Water District	1,260	10	1/1/14	12/31/16	1
Panola-Union W/A	750	10	1/1/15	12/31/17	1
Pleasant Grove Water Association	697	10	1/1/15	12/31/17	1.1
Plum Point Water System	126	5	1/1/17	12/31/17	5.5
Pope-Courtland W/A - North	1,637	10	1/1/14	12/31/16	1.2
Pope-Courtland Water Assn.	818	10	1/1/15	12/31/17	1.5
Sardis Lake Community W/A	1,417	11	1/1/15	12/31/17	.9
Town of Como	1,279	10	1/1/12	12/31/14	1.1
Town of Crenshaw	885	10	1/1/15	12/31/17	3.7

Hideaway Hills (2009 – 2017)

Monitoring Period Begin	Monitoring Period End	Number of Samples	90 th Percentile (ppb)	Highest Sample (ppb)
7/1/17	12/31/17	10	8.9	12.9
1/1/17	6/30/17	10	11.6	25.8
1/1/16	12/31/16	5	17*	7.8
1/1/15	6/30/15	10	11.5	26.3
7/1/14	12/31/14	10	5.2	28.9
1/1/14	6/30/14	10	16	22.3
7/1/13	12/31/13	10	14.4	35
1/1/13	6/30/13	10	11.5	32.3
7/1/12	12/31/12	10	30.7	69.1
1/1/12	6/30/12	10	18.1	24.3
7/1/11	12/31/11	10	18.5	30.1
1/1/11	6/30/11	10	13.7	23.7
7/1/10	12/31/10	5	19.9	26.6
1/1/10	6/30/10	10	15.2	39
1/1/09	12/31/09	6	27.1	46.4

* According to individual samples reported in database, the 90th Percentile sample would be 6.5 ppb.

Panola County Well Sampling Event

- Partnered with MSU Extension (Jason Barrett) to offer private well screening and workshop.
- Workshop held on October 10, 2017 at MSU Extension Office in Panola County.
- 21 samples were screened for bacteria and lead.
- All participants received letters sharing results. Owners with samples higher than 5 ppb were also provided with water filters.

Sample ID	pH	Lead Concentration (ppb)
144	7.58	.29
147	7.77	8.87
150	6.53	5.57
153	7.84	0
156	6.19	2.83
158	6.01	0
161	7.84	.85
162	7.06	0
164	7.98	1.21
165	5.84	.36
166	6.29	3.02
168	8.16	.46
169	6.47	1.67
171	6.15	.36
172	6.03	12.44
174	6.49	5.23
175	8.36	.47
176	8.15	0
177	6.43	9.03
178	7.96	0
194	5.88	14.32



Quitman County

PWS	Pop. Served	Sample Size	Monitoring Period Begin	Monitoring Period End	90 th Percentile (ppb)
Big Field Water Association	400	4	1/1/15	12/31/17	4.4
Birdie Water Association	165	5	1/1/15	12/31/17	2.3
City of Marks	2,446	10	1/1/17	12/31/17	.6
Darling Water Association	300	5	1/1/17	12/31/17	4.5
Norfleet Utilities	80	5	1/1/15	12/31/17	1.4
South Lake Water Association	580	11	1/1/15	12/31/17	1.9
South Quitman – N. Tutwiler Utl.	182	3	1/1/15	12/31/17	2.1
South Quitman – S. Lambert Utl.	208	2	1/1/15	12/31/17	.5
South Quitman – West Crowder	325	4	1/1/15	12/31/17	1
Town of Crowder	700	10	1/1/17	12/31/19	29.2
Town of Falcon	167	5	1/1/15	12/31/17	0
Town of Lambert	1,638	10	1/1/15	12/31/17	.8
Town of Sledge	670	10	1/1/15	12/31/17	4.2
West Lambert Water Association	333	5	1/1/15	12/31/17	3.2

Sunflower County

PWS	Pop. Served	Sample Size	Monitoring Period Begin	Monitoring Period End	90 th Percentile (ppb)
Big Yeager Water Association	270	5	1/1/15	12/31/17	1.6
City of Drew	2,349	11	1/1/15	12/31/17	1.5
City of Indianola	10,683	30	1/1/14	12/31/16	.7
City of Ruleville	3,000	11	1/1/14	12/31/16	2.2
FMH Water Association #1	2,711	11	1/1/15	12/31/17	.9
MS State Penitentiary	3,700	11	1/1/15	12/31/17	18.2
Rome Water System	234	5	1/1/15	12/31/17	1.6
So. Sunflower W/A – Indianola	258	5	1/1/15	12/31/17	2.4
So. Sunflower W/A – Inverness	882	10	1/1/15	12/31/17	.8
Sunflower Water Association	498	5	1/1/15	12/31/17	23.4
Town of Doddsville	190	5	1/1/12	12/31/14	.6
Town of Inverness	1,019	10	1/1/15	12/31/17	1
Town of Moorhead	2,063	11	1/1/15	12/31/17	1
Town of Sunflower	346	11	1/1/15	12/31/17	5.4

Tallahatchie County

PWS	Pop. Served	Sample Size	Monitoring Period Begin	Monitoring Period End	90 th Percentile (ppb)
Blue Cane, Cowart & Tippo W/A	1,472	10	1/1/15	12/31/17	8.3
Brazil-Sumner Water Association	390	5	1/1/15	12/31/17	2.2
Cascilla Water Association	831	10	1/1/15	12/31/17	4.7
Charleston Utilities	3,112	22	1/1/15	12/31/17	1.5
East Charleston Water Association	192	5	1/1/17	12/31/19	16.8
North Tallahatchie W/A	3,299	10	1/1/15	12/31/17	1.5
Paynes Water Association	525	6	1/1/15	12/31/17	2.4
Philipp Water Association	621	10	1/1/15	12/31/17	2.4
South Quitman – East Tutwiler	39	5	1/1/12	12/31/14	1.3
South Quitman – South Tutwiler	94	3	1/1/15	12/31/17	1.7
Town of Sumner	368	5	1/1/15	12/31/17	1.2
Town of Tutwiler	1,150	11	1/1/15	12/31/17	1.4
Town of Webb	657	10	1/1/15	12/31/17	.5
Village of Glendora	161	6	1/1/13	12/31/15	0
W. Tallahatchie – Hwy S/D	92	5	1/1/15	12/31/17	1
W. Tallahatche Utl. Assn.	673	11	1/1/15	12/31/17	0

Summary

- 20 systems flagged for risk factor for lead contamination:
 - *4 systems with MCL Exceedance in current monitoring period*
 - *10 systems with 90th Percentile over 5 ppb (FDA Standard)*
 - *6 additional systems on standard (6 month) or annual monitoring (indicating previous MCL exceedance)*
- Samples are supposed to be taken at homes more likely to have lead in plumbing.
 - *Several systems reporting 90th Percentile concentrations of “zero”*
 - *Several systems reporting high percentage of samples in a single sampling event at or below .5 ppb.*

Next Steps

- Expanding PWS data analysis for all 20 counties designated as high-risk for lead poisoning.
- Developing county-based fact sheets for outreach to community leaders (mayors, health clinic staff, educators) that share information on:
 - *Blood lead level testing rates*
 - *Age of Housing*
 - *PWS data*
- Continuing community sampling events to increase awareness and assess risk in targeted neighborhoods.
- Exploring opportunities to work with organizations in Jackson to conduct research on water infrastructure challenges and childhood blood testing rates.

Questions? Comments?

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