The Low Down on Lead

Providing Health Education About Lead

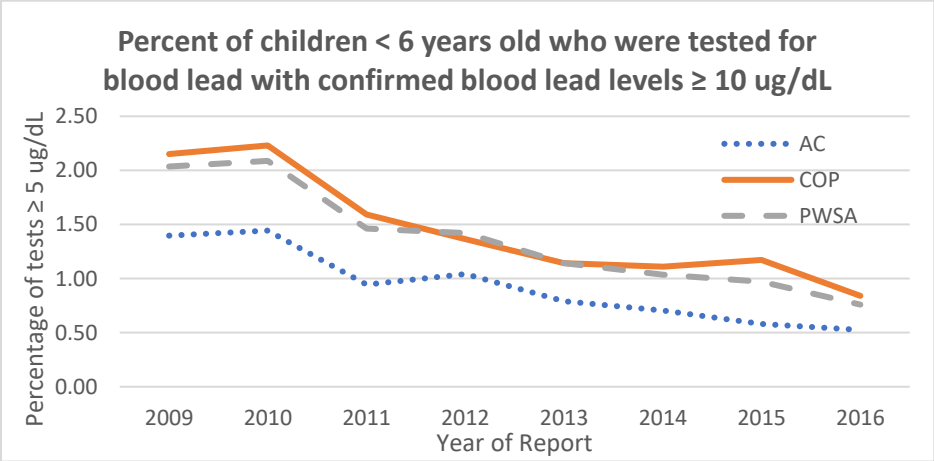
Recent news coverage, locally and nationally, has increased the level of interest and concern by the public about lead contamination in our region. For decades, the Allegheny County Health Department (ACHD) has provided health education to residents on the impact of lead, particularly on young children.

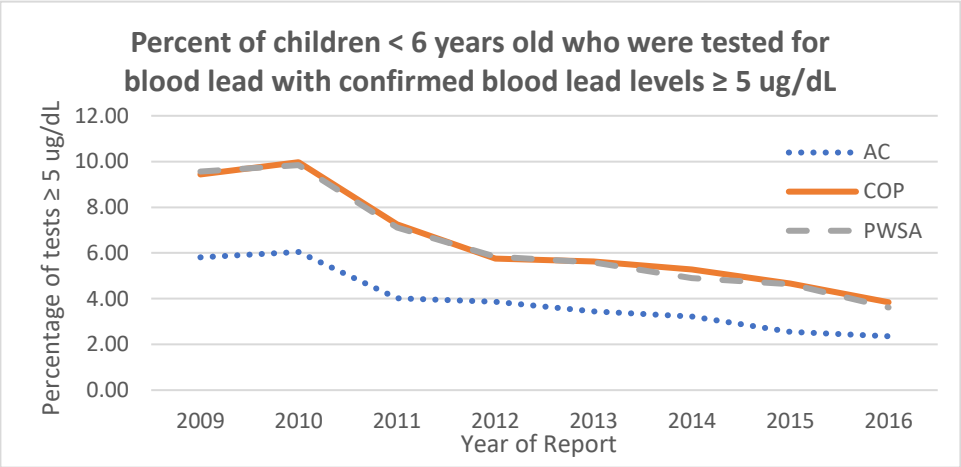
While the US Centers for Disease Control and Prevention (CDC) has indicated that no safe blood lead level in children has been identified, it is also clear from the science and available data that the greatest source of lead poisoning is the lead-based paint in houses built before 1950 that chips, peels and flakes, and becomes dust. There are also other sources of lead exposure including lead pipes and solder, and some toys and jewelry. It is important that we try to reduce lead exposure as much as possible. ***So, what is the low-down on lead in our community?***

Major Sources of Lead Poisoning

The major source of lead poisoning in Allegheny County and nationally is the presence of lead in paint and dust in older, dilapidated housing stock. Defective lead paint and household dust contaminated with lead account for up to 80% of elevated lead levels in US children. Lead dust and paint chips are prevalent in houses built before 1978 when lead was eliminated from paint. Updated 5 year estimates show that more than 80% of the county's housing stock was built before 1978 and 41% of homes were built before 1950, when lead-based paint was used more frequently. I n Pittsburgh, >60% of homes were built prior to 1950.

ACHD's lead strategy includes enhanced surveillance, prevention and intervention elements. Data is an important part of that effort. We know that blood lead levels (BLL) in US children have been dramatically reduced over the past 40 years. Locally, in just the last eight years, our data show that fewer children have high BLLs. This data is from the PA NEDSS system (Pennsylvania National Electronic Disease Surveillance System) and was updated on July 6, 2017.





AC = Allegheny County COP = City of Pittsburgh PWSA=Pittsburgh Water Service Area

Defective lead paint and household dust contaminated with lead account for up to 80% of elevated lead levels in US children.

We have not seen an increase in lead poisoning in children. To the contrary, the number of confirmed lead cases reported in the county has decreased from 2014 to 2015.

The County Council passed universal child blood lead testing to ensure that all children with elevated lead levels are identified early.

Blood Tests for Lead in Allegheny County, City of Pittsburgh, PWSA Service Area (Children Aged 0-71 months) 2009-2016

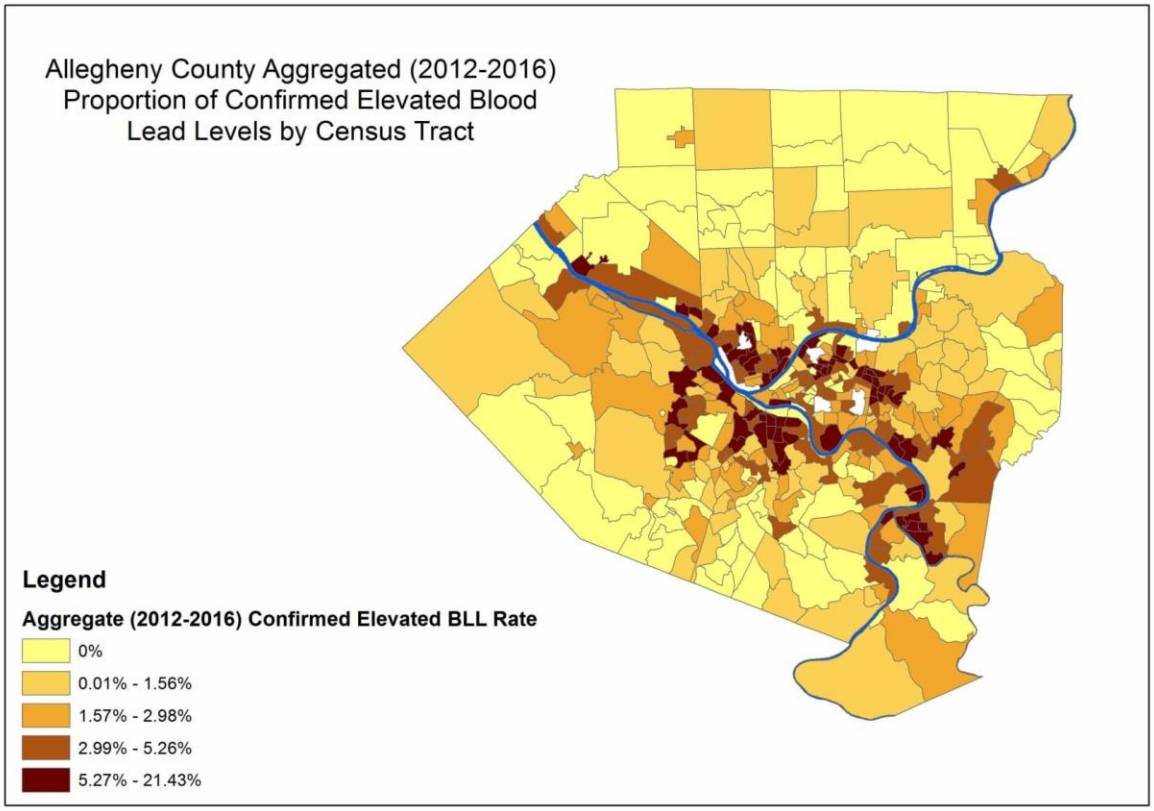
Year	Total Individuals Tested (County)	10+ ug/DL Confirmed (County)	5+ ug/DL Confirmed (County)	5-9 ug/DL Confirmed (County)	Total Individuals Tested (Pgh)	10+ ug/DL Confirmed (Pgh)	5+ ug/DL Confirmed (Pgh)	5-9 ug/DL Confirmed (Pgh)	Total Individuals Tested (PWSA)	10+ ug/DL Confirmed (PWSA)	5+ ug/DL Confirmed (PWSA)	5-9 ug/DL Confirmed (PWSA)
2009	10816	151	629	478	3255	70	307	237	2407	49	230	181
2010	11500	166	695	529	3721	83	371	288	2682	56	264	208
2011	13234	125	531	406	4084	65	296	231	2941	43	209	166
2012	14112	147	545	398	4540	62	261	199	3235	46	189	143
2013	13938	110	480	370	4550	52	256	204	3241	37	181	144
2014	13621	96	439	343	4240	47	224	177	2897	30	142	112
2015	13761	80	351	271	3920	46	183	137	2677	26	124	98
2016	14086	74	332	258	3928	33	151	118	2766	21	100	79

Confirmed refers to venous test or 2 elevated capillary tests taken within 12 weeks and not on the same day.

Census Tract Data

The following map provides information on proportions of children < 6 years of age tested for lead who had confirmed results ≥ 5ug/dL between 2012 and 2016. These data cannot be used to determine the percent of children in any given census tract with elevated lead levels. At this time, the average percent of children under 6 years of age who are tested is less than 50% County-wide.

Additional work is now being conducted to identify the percent of children tested by census tract, to determine areas with higher rates of unconfirmed capillary tests, and to identify the highest risk communities based on a variety of risk factors for future interventions and education.



Data Limitations

It is important to note that lead testing is voluntary and therefore, the number of children tested annually may not accurately represent all children in the County. Census tracts also differ by the number of children tested overall which does not reflect the actual number of eligible children in any census tract. In addition, the PA NEDSS system is prone to minor changes as it is constantly being updated. However, given the high rate of false positives in capillary tests, ACHD only considers venous tests to be confirmed.
[i]

Lead in Water Systems

A great deal of attention has been focused on efforts by the Pittsburgh Water and Sewer Authority (PWSA) to address reports of lead in its system. Here is what we know. Despite rising lead levels in water in 2 of the County's 36 water systems, we have not seen an increase in lead poisoning in children. To the contrary, the number of confirmed venous lead cases reported in the county over the level of 5 µg/dL and over the level of 10 µg/dL has decreased from 2014 to 2015. We have seen a decreasing trend since the late 1970s. During Allegheny County Health Department investigations of children with high blood lead levels during this time frame, water has never been found to be the primary source of the lead exposure. However, it is impossible for us to ever know the contribution of lead in water to children's lead levels. We know that aging infrastructure containing lead pipes is a reality and that lead content in water is variable. Therefore, we advise families to get their water tested and to utilize simple solutions if they have concerns: running cold water from their main drinking and cooking tap as directed by the CDC (https://www.cdc.gov/nceh/lead/tips/water.htm) and using NSF filters or bottled water especially where infant formula is concerned

To understand the impact of PWSA's changes in corrosion control on childhood blood lead levels, we examined rates of elevated venous BLL in children <6 years of age before, during, and after changes to corrosion control in the PWSA service area that occurred in 2014-2016. A similar study of Flint was done by the CDC[ii].

We found that rates of children with a confirmed BLL greater than or equal to 5 ug/dL, decreased from the period before, during and after the change in corrosion control (see table below). We also conducted the same analysis for venous BLL greater than or equal to 10 µg/dL and for all BLL (venous and capillary) and did not see a rise in rates during the corrosion control change period.

Confirmed BLL Tests ≥ 5 µg/dL Among All Children < 6 Years Tested in the PWSA Service Area Before, During and After Changes in Corrosion Control

Time Period	All Children Tested in the PWSA Service Area*	Children in PWSA Service Area with Results Greater or Equal to 5**	PWSA Service Area Rates (95% Confidence Intervals)
Pre-Corrosion Control Change: January 1, 2013 - March 31, 2014	3975	211	5.3 (4.6-6.0)
During Corrosion Control Change: April 1, 2014 - January 22, 2016	4953	238	4.8 (4.2-5.4)
Post-Corrosion Control Change: January 23, 2016 - December 31, 2016	2653	98	3.7 (3.0-4.4)

*This number represents the deduplicated number of all children tested in the PWSA service area with any method (capillary, venous testing or unknown). The PWSA service area was supplied by PWSA

** This number represents any child with a venous test or 2 elevated capillaries drawn within 12 weeks but not on the same day that were greater than or equal to 5 ug/dL.

Confirmed BLL Tests ≥ 10 μg/dL Among All Children < 6 Years Tested in the PWSA Service Area Before, During and After Changes in Corrosion Control

Time Period	All Children Tested in the PWSA Service Area*	Children in PWSA Service Area with Results Greater or Equal to 10**	PWSA Service Area Rates (95% Confidence Intervals)
Pre-Corrosion Control Change: January 1, 2013 - March 31, 2014	3975	44	1.1 (0.8-1.4)
During Corrosion Control Change: April 1, 2014 - January 22, 2016	4953	49	1.0 (0.7-1.3)
Post-Corrosion Control Change: January 23, 2016 - December 31, 2016	2653	21	0.8 (0.5-1.1)

*This number represents the deduplicated number of all children tested in the PWSA service area with any method (capillary, venous testing or unknown). The PWSA service area was supplied by PWSA

** This number represents any child with a venous or 2 elevated capillary tests that were greater than or equal to 10 ug/dL and not drawn on the same day.

There has also been misinformation on the role of the ACHD in its public drinking water program. The Pennsylvania Department of Environmental Protection (DEP) is the regulatory authority for the federal lead and copper rule (LCR), and only DEP has the authority to require action or issues penalties due to exceedance or violations of the rule. DEP has delegated inspections and some non-penalty compliance activities to ACHD, but DEP is still responsible for permitting water systems. The federal LCR rule requires the public water system itself to test water for lead every three years by requesting that homeowners and tenants voluntarily obtain samples in their homes. If its results exceed the federally-established action level, the system must then implement measures to decrease those levels. These actions include revisiting its corrosion control methodology, providing public education, increasing the lead testing intervals and replacing a percentage of lead services lines. Currently, that LCR action level is at 15 ppb.

What is ACHD Doing?

ACHD has lobbied the U.S. Environmental Protection Agency to consider a lower action level for lead in public water systems. The EPA has undertaken efforts to determine a health-based benchmark for lead in drinking water.

The mission of ACHD is to protect, promote and preserve the health and well-being of all Allegheny County residents, particularly the most vulnerable. As it pertains to lead levels in our county, ACHD is closely monitoring the lead levels in children and has reduced its blood lead level for investigation from 15 μg/dL to 10 μg/dL. The department is actively participating in educational activities and providing information to anyone with questions. Furthermore, ACHD and the Board of Health proposed universal child blood lead testing to ensure that all children are identified early. This was passed by County Council July 5th, 2017 and

will go into effect January 1, 2018. Additional initiatives to further address the lead issue include receiving funding to support efforts which include the development of educational materials for the public and providers, the implementation of blood lead level testing at ACHD facilities, and outreach and education for children with lead levels of 5 μg/dL to 9 μg/dL. Additionally, data would be used to focus efforts on high risk communities in an effort to prevent lead poisoning.

These efforts tie in with the department's Strategic Plan, as well as its Plan for a Healthier Allegheny, to assure health equity in our community while also prioritizing access, chronic disease health risk factors, environment, maternal and child health, and mental health and substance use disorders. With the completion of the community health assessment, we are better able to understand the health of the county and implement health improvements. The collaborative efforts underway in ACHD will lead to greater and sustainable changes in the health of Allegheny County.

For more information on home lead investigations please contact ACHD's Housing and Community Environment program at (412) 350-4046 or visit our website at http://www.achd.net/housing/index.html. Prior to launching our outreach program, families of children with confirmed elevated blood lead levels ≥5μg/dL, may call to request educational literature and a phone consultation about how to mitigate the risk of lead hazards. In addition, eligible families can apply to participate in ACHD's Safe and Healthy Homes Program, which involves a home visit to identify health and safety hazards, including potential lead-based paint hazards in the home.

Partial Lead Line Replacement

As public water systems try to reduce lead in public drinking water, there are concerns about partial lead service line replacement (PLSLR). Partial lead service line replacement is the construction practice of "digging up old lead water pipes ("service lines") and replacing a portion with [non-lead] pipe"[iii]. In 2011 an advisory board to the U.S. EPA concluded that there was inadequate data to fully assess the impact of partial (PLSLR) versus full line (FLSLR) replacement.[iv] However, recent research suggests that partial lead line replacement instead of full lead line replacement can pose increased risk of lead in water.[v,vi] The EPA Lead and Copper Rule (LCR) Revisions White paper [vii] in October 2016 noted the following:

"The EPA Science Advisory Board concluded in its 2011 report to EPA that: PLSLRs have not been shown to reliably reduce drinking water lead levels in the short term, ranging from days to months, and potentially even longer. Additionally, PLSLR is frequently associated with short-term elevated drinking water lead levels for some period of time after replacement, suggesting the potential for harm, rather than benefit during that time period. Available data suggest that the elevated tap water lead levels tend to then gradually stabilize over time following PLSLR, sometimes at levels below and sometimes at levels similar to those observed prior to PLSLR"

The EPA is currently considering revising the LCR and is evaluating a number of issues related to PLSLR. These issues include the risk to the public, the cost of private line replacement, and the legal issues related to ownership of lines by the private and public sectors. At this time, the EPA requires any systems that have

exceeded the LCR rule action level of 15 parts per billion to replace 7% of the lead lines that they own. Since public water systems must comply with EPA regulations, this will unfortunately result in PLSLR. Therefore to mitigate any risk from PLSLR, water systems that have exceeded the LCR action for lead must comply with EPA requirements including:

1) Alert customers that they may experience a temporary increase in lead levels in their water after PSLCR and provide them with guidance for mitigation.
2) Notify customers 45-days prior to PLSLR to provide homeowners with the opportunity to replace their private portion of the service line and explore all options to facilitate this action.
3) Conduct home water testing in the home 72 hours after replacement and inform customers of results as required.

In addition to these requirements, ACHD recommends that customers

1) Receive water tests prior to partial line replacement.
2) Fully flush their systems after partial line replacement as recommended.
3) Be provided with NSF certified lead water filters for up to 9 months after the replacement.
4) If 72-hour water testing is above the LCR action level, water should be tested again 6 months later.
5) If the customer has a child <6 years of age they should contact the ACHD for additional education and guidance about blood lead testing.

For populations at high risk such as infants, only filtered or bottled water should be used for formula preparation.

Here in Allegheny County, ACHD recognizes that PLSLR has the potential to raise lead levels in water in the short term posing an increased risk to the public. Whenever possible it is preferred to do full lead line replacement. Nationally some municipalities are trying to address legal issues and have passed their own ordinances requiring full line replacement. ACHD urges municipalities to consider such ordinances to resolve jurisdictional issues and develop financial strategies to help achieve this goal. ACHD is prepared to work with all stakeholders towards a more effective solution. If you have questions, contact ACHD Housing and Community Environment program at (412) 350-4046.

To find out what your water system might be doing to mitigate risk please contact your water system.

[i] Binns HJ, Campbell C, and Brown MJ, *Interpreting and managing blood lead levels of less than 10 microg/dL in children and reducing childhood exposure to lead: recommendations of the Centers for Disease Control and Prevention Advisory Committee on Childhood Lead Poisoning Prevention*. Pediatrics, 2007. 120:e1285-98.

[ii] Kennedy C, Yard E, Dignam T et al. *Blood lead levels among children aged<6 years—Flint Michigan, 2013-2016*. MMWR 2016;65(25)).

[iii] Renner R. Reaction to the Solution: Lead Exposure Following Partial Service Line Replacement. Environmental Health Perspectives. 2010;118(5):A202-A208. *The word copper was replaced with non-lead as copper is not the only material that is used.*

[iv] Sackhamer and Griffiths letter to EPA re SAB Evaluation of the Effectiveness of Partial Lead Service Line Replacements September 2011 https://yosemite.epa.gov/sab/sabproduct.nsf/02ad90b136fc21ef85256eba00436459/964CCDB94F4E6216852579190072606F/$File/EPA-SAB-11-015-unsigned.pdf

[v] Brown MG, Margolis S. *Lead in Drinking Water and Human Blood Lead Levels in the United States* MMWR 2012 / 61(04);1-9

[vi] Trueman BF, Camara E, Gagnon. *Evaluating the effects of full and partial lead service line replacement on lead levels in drinking water.* Environmental Science and Technology. 2016, 50; 7389-7396

[vii] Lead and Copper Rule Revisions White paper. US EPA Office of Water, Washington DC, October 2016