The background of the slide is a reproduction of the painting 'The Starry Night' by the Dutch Impressionist painter J.M.W. Turner. The painting depicts a night scene with a turbulent, swirling blue sky filled with bright, glowing yellow stars and a large, luminous moon. In the foreground, a dark, jagged cypress tree stands on the left, and a small village with a church spire is visible in the distance. The overall style is characterized by visible brushstrokes and a rich, textured color palette.

A Lead Free Louisville

Brian Guinn, PhD

University of Louisville

School of Public Health and Information Sciences

A Brief Overview of Lead

Lead Is In Our Environment

- Lead is a naturally occurring heavy metal that is found in topsoil at very low levels (15-40 mg/kg)

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- During the 20th century millions of tons of lead and lead waste were released into the environment
 1. Lead paint
 2. Leaded gasoline

Lead Is In Our Environment

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Lead Is In Our Environment

- Today this left-over lead from the 20th century is still present in our environment
 - Lead paint is still found in older homes
 - Lead from the lead gas era is still found in topsoil, especially in older urban environments

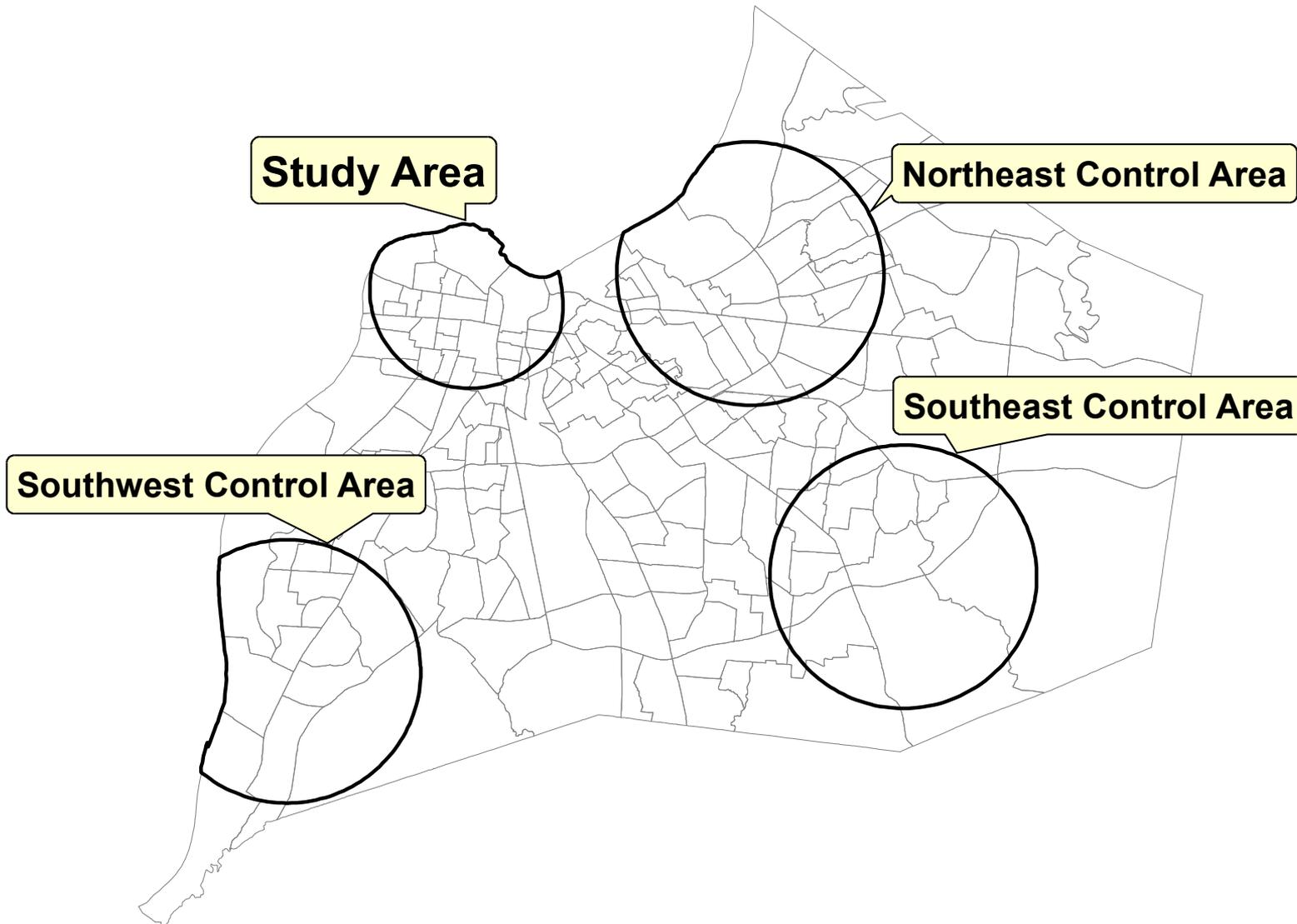




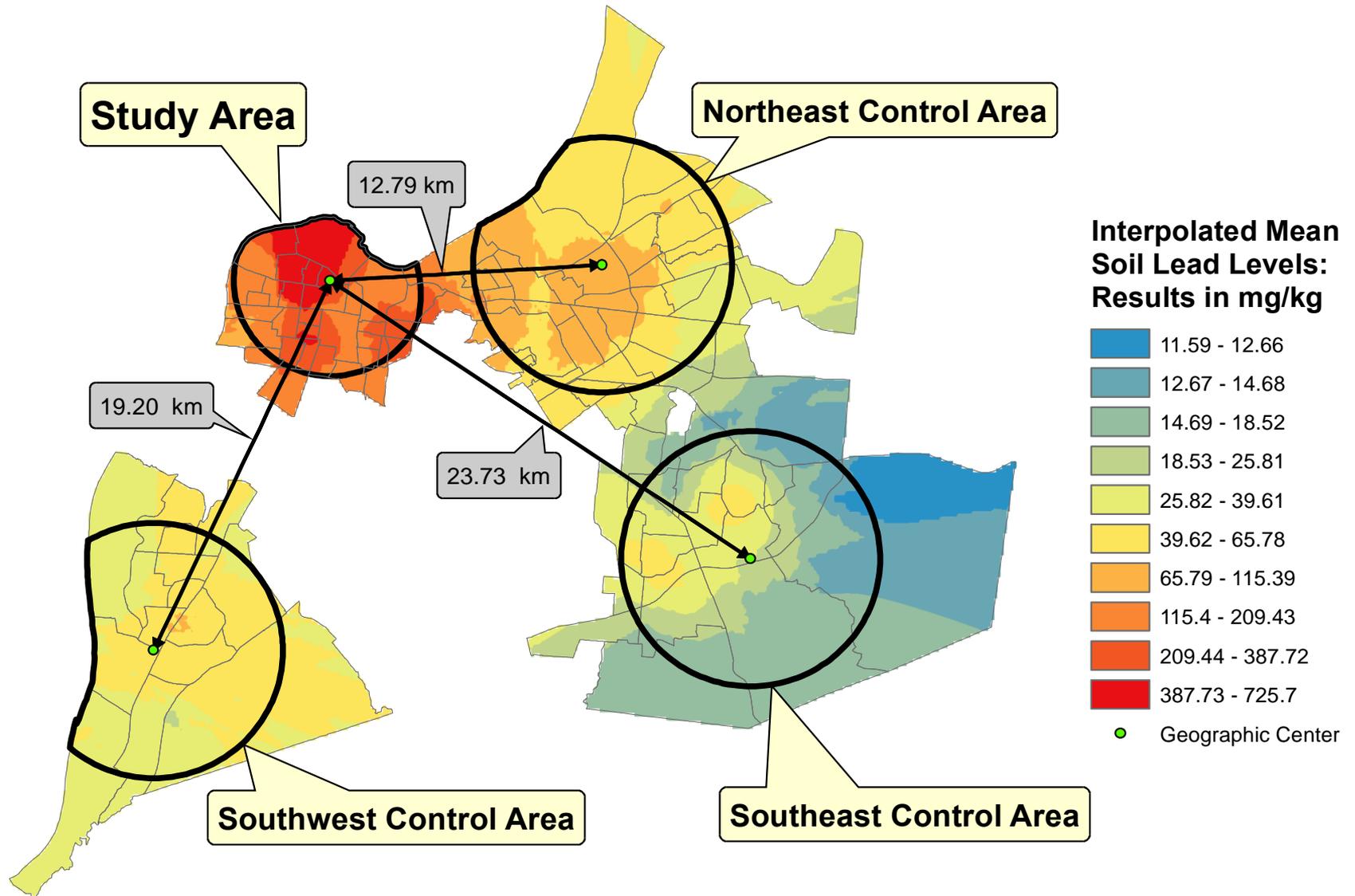


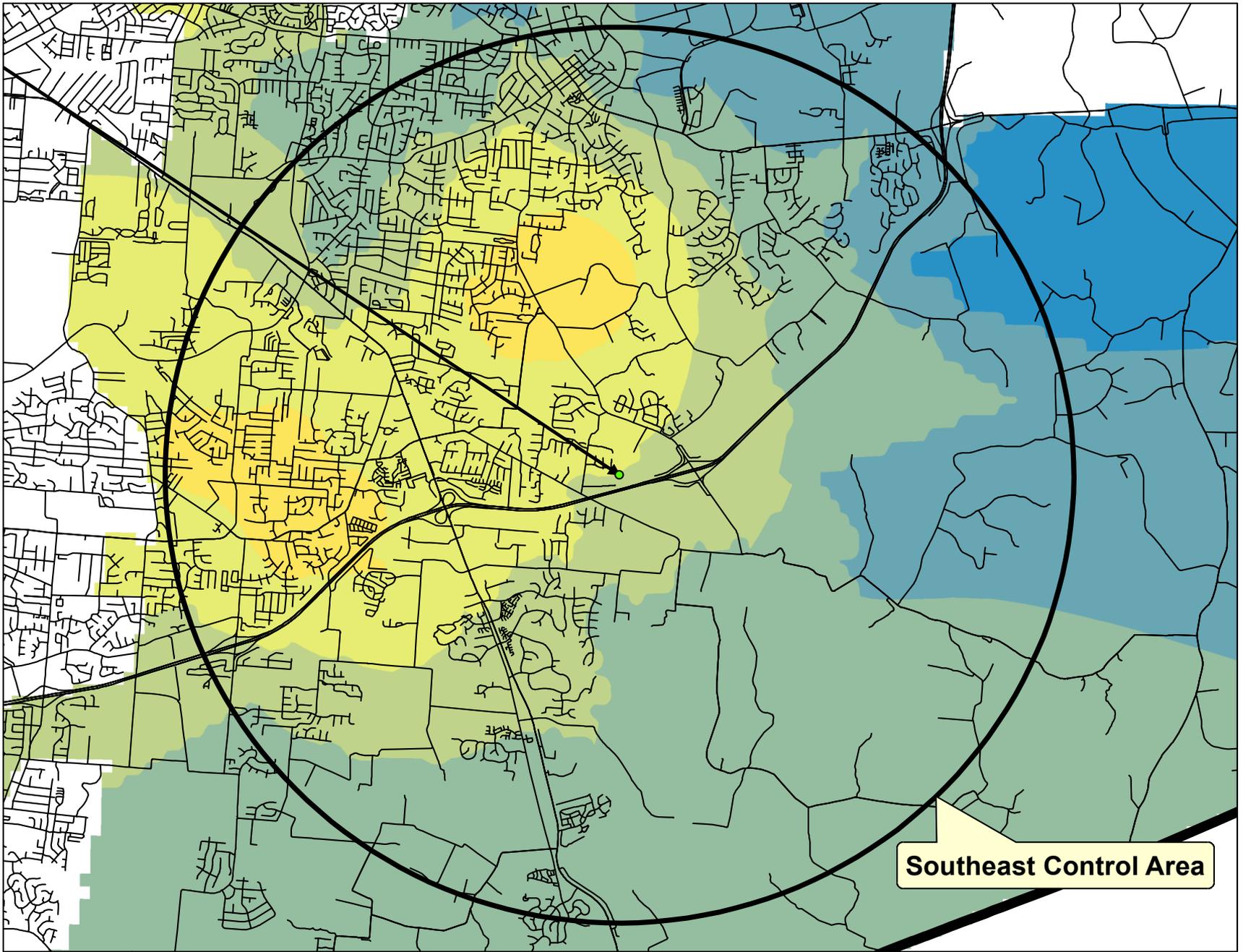
Soil Collection Areas in Jefferson County

Study Area and Control Areas



Interpolated Mean Topsoil Lead Levels per Soil Collection Area Jefferson County, Kentucky





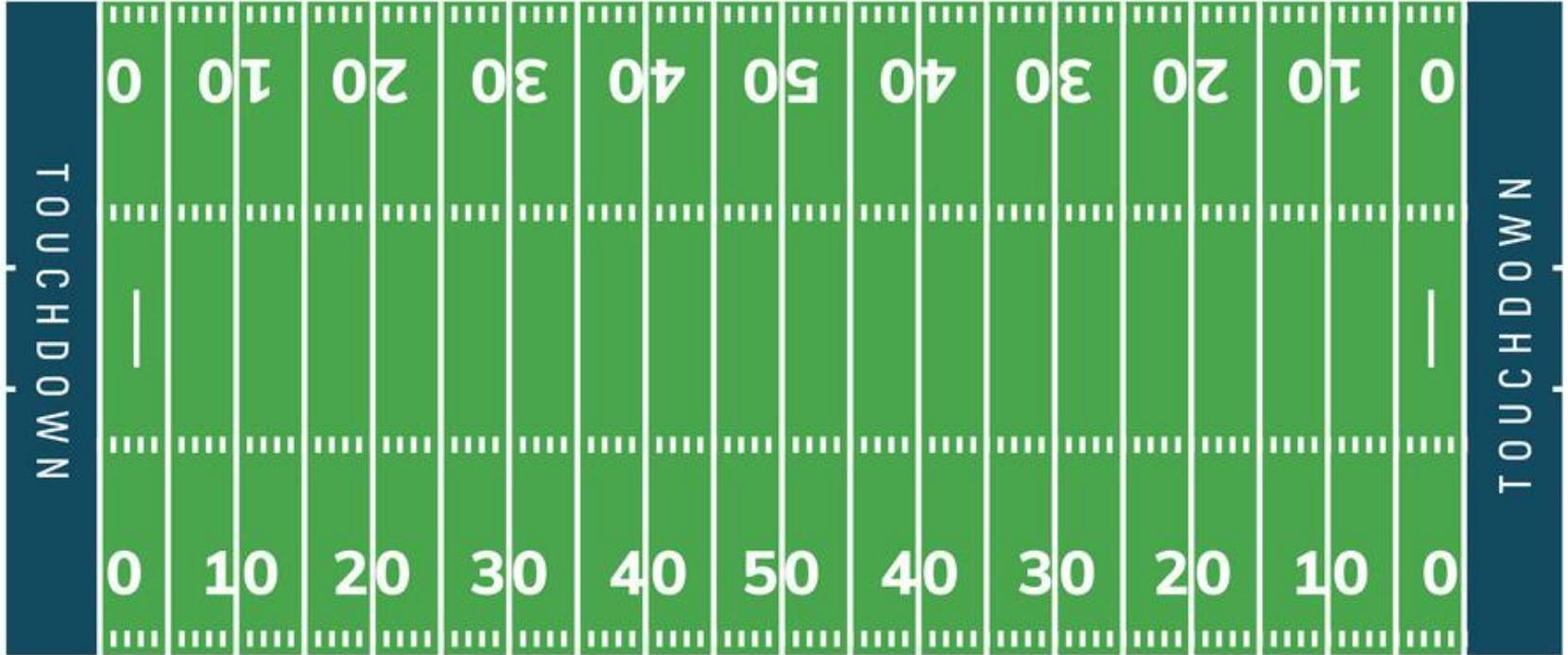
Southeast Control Area

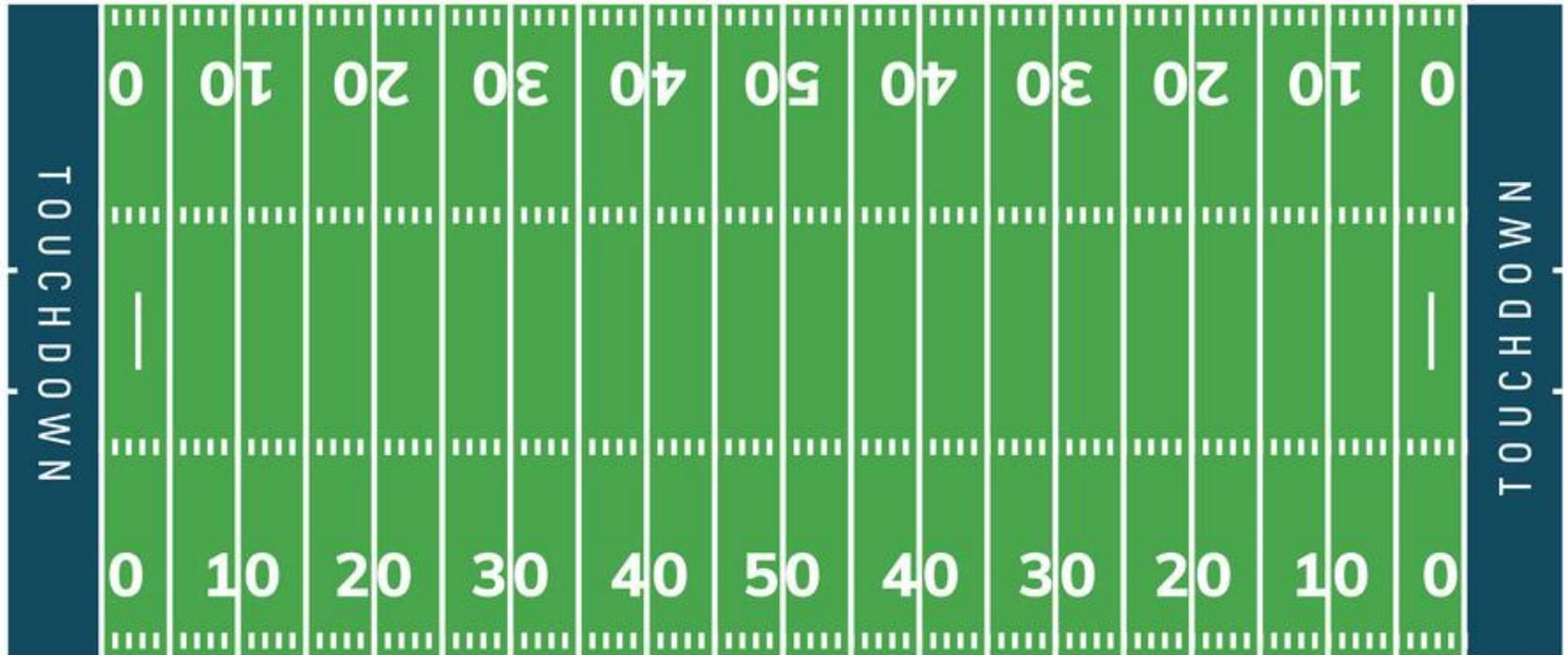
Lead is a Neurotoxicant



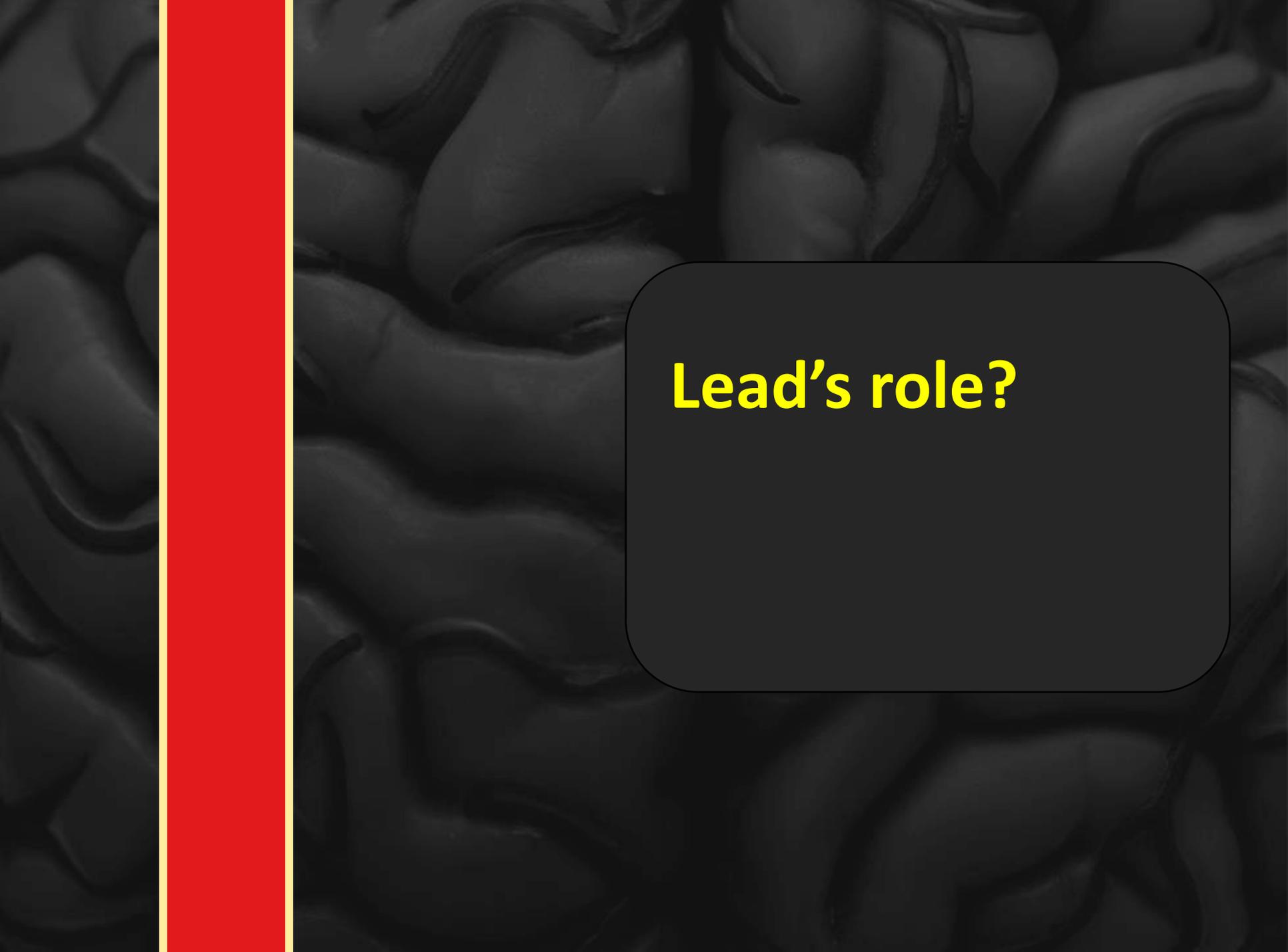




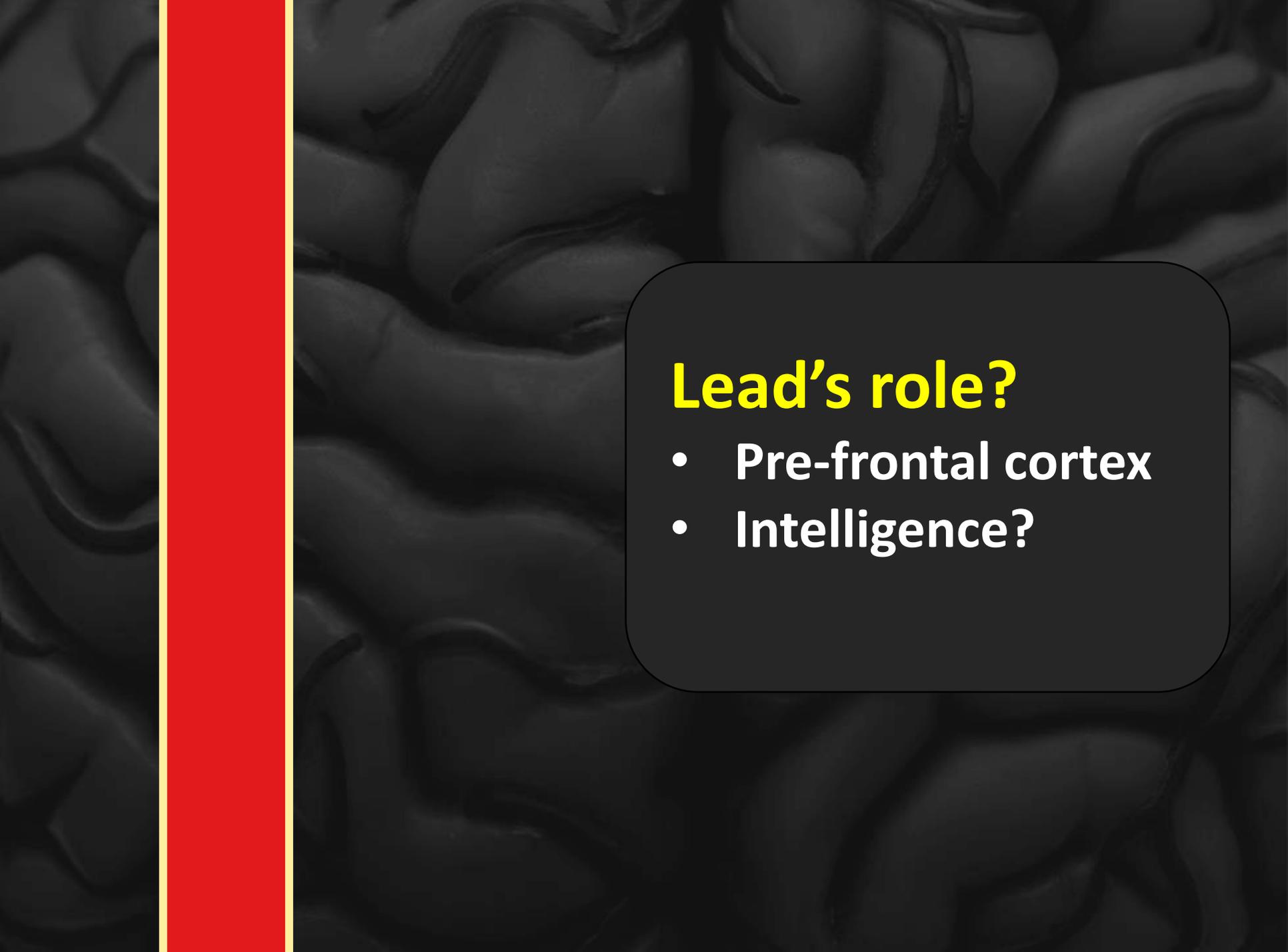




The amount of lead dust per square foot would more than double the EPA's threshold of no more than 10 micrograms of lead per square foot for ($\mu\text{g}/\text{ft}^2$)



Lead's role?



Lead's role?

- **Pre-frontal cortex**
- **Intelligence?**

Ca

Pb

Pb

Ca

Pb

Lead's role?

- Pre-frontal cortex
- Intelligence?

Ca

Pb

Pb

Ca

Pb

Pb

qd

Pb

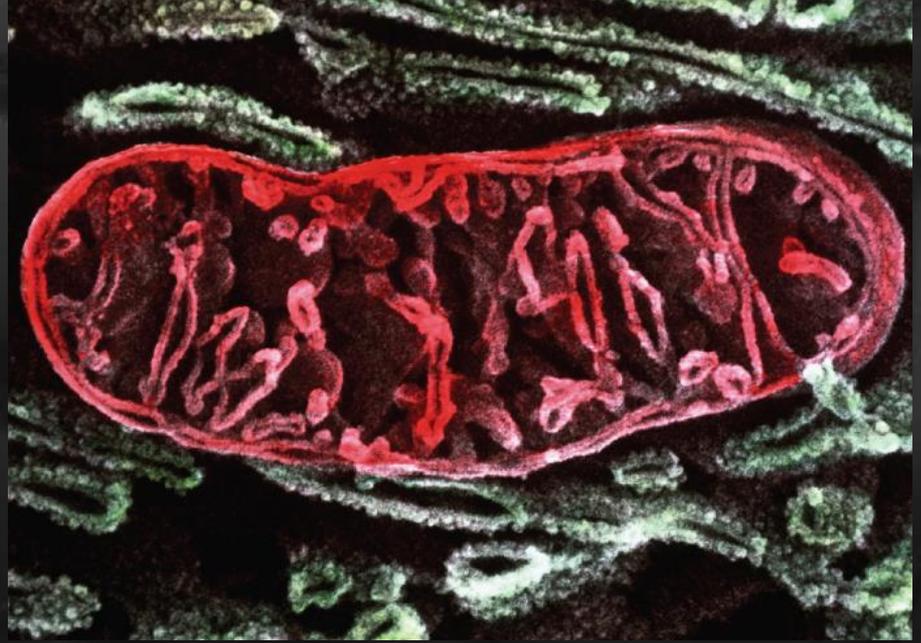
Pb

Ca

Ca

Ca

Ca



Lead Associated Brain Loss

There is an association between lead exposure and reduced brain volume of the **Frontal Lobe**

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Cecil and colleagues (2008)

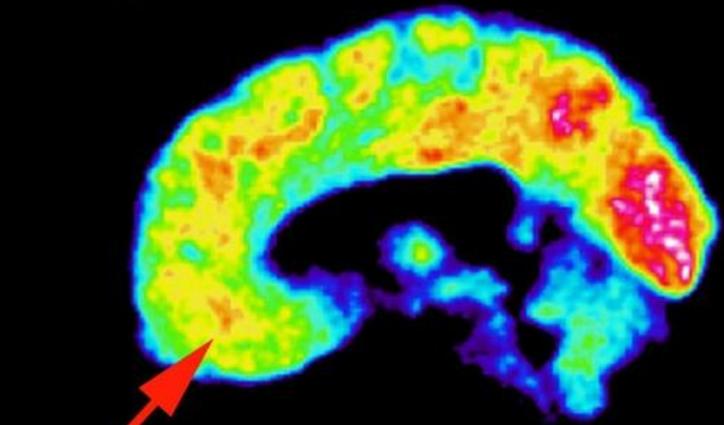
Prospective Cohort Study - MRI

- Significant association between early-life lead exposure and reduced brain volume in the anterior cingulate cortex and the ***ventrolateral prefrontal cortex***

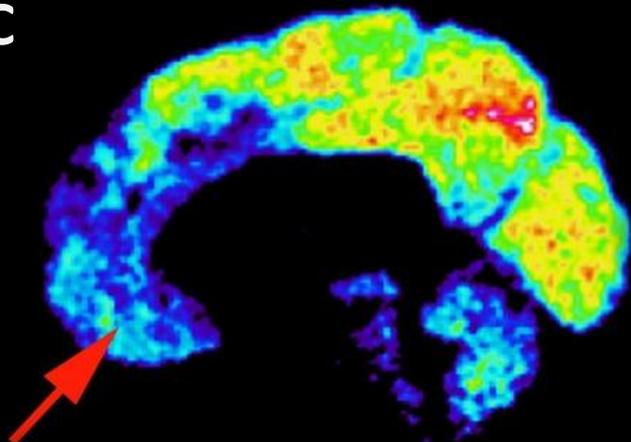
Brubaker and colleagues (2009)

Prospective Cohort Study – DTI

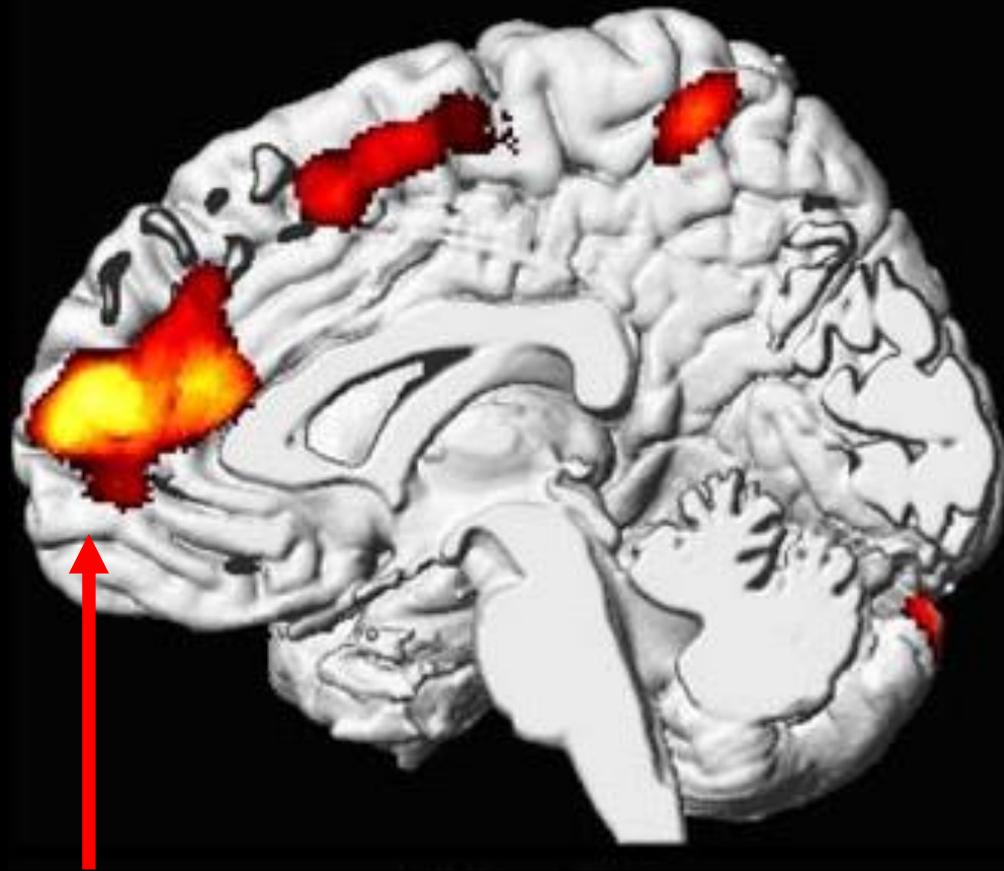
- Significant dose-response between childhood lead levels and **white matter organization and myelination**
-



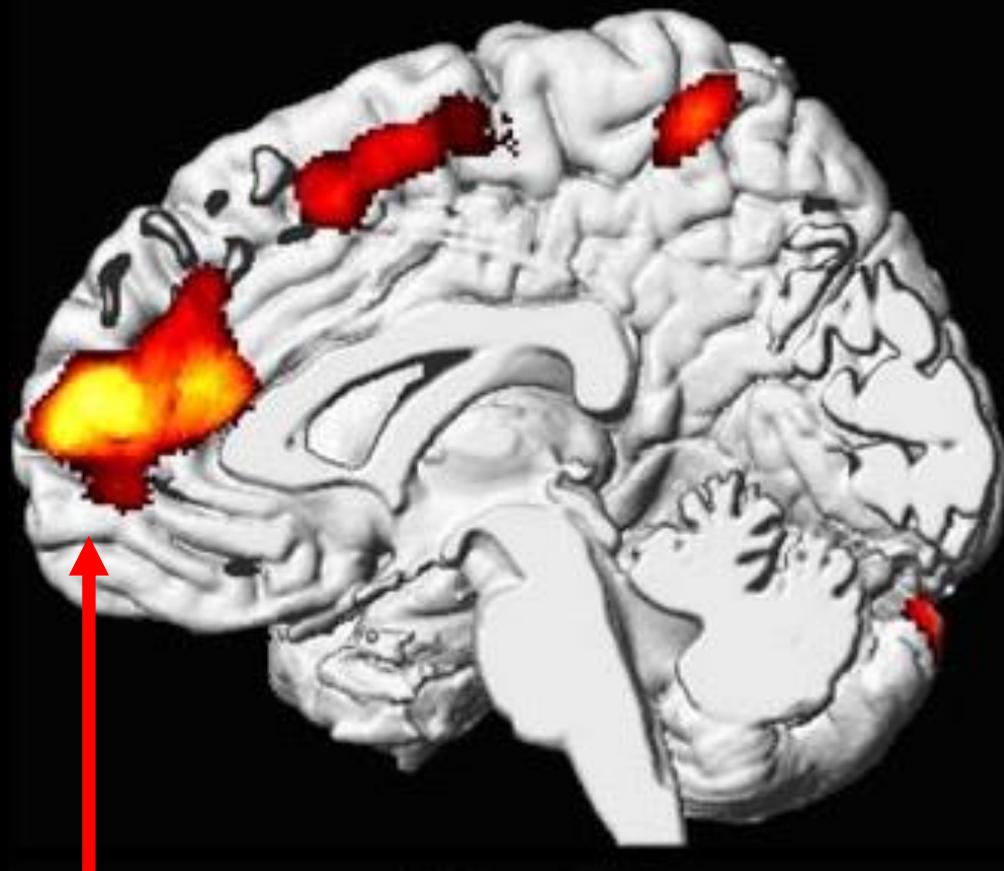
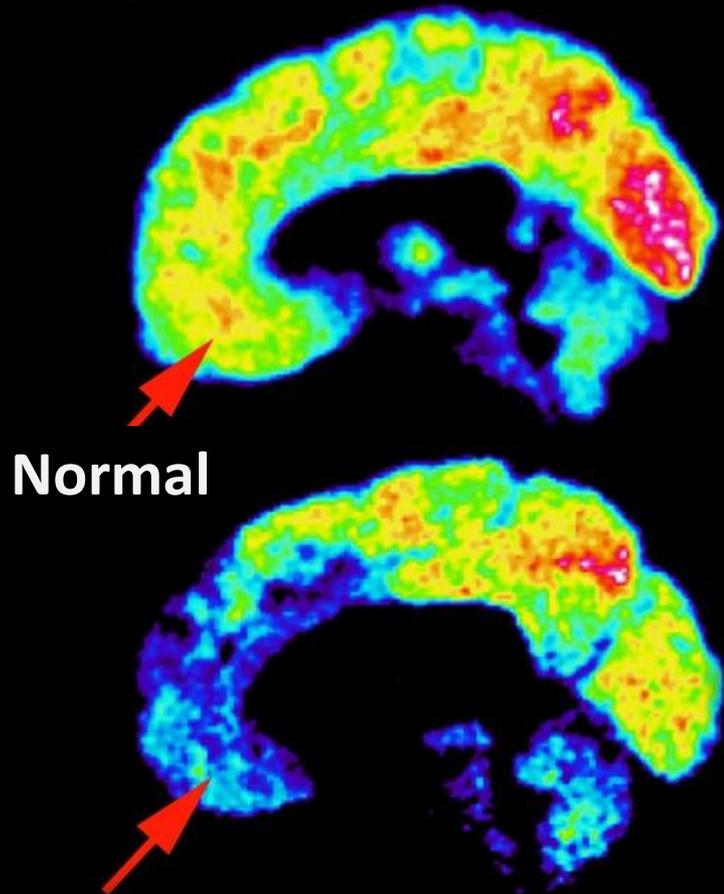
PFC

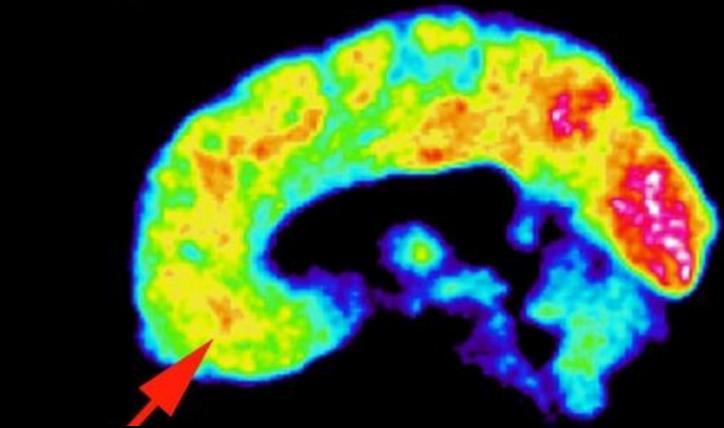


PFC

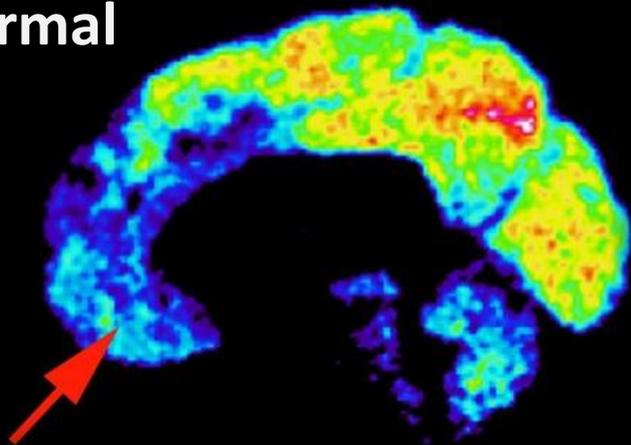


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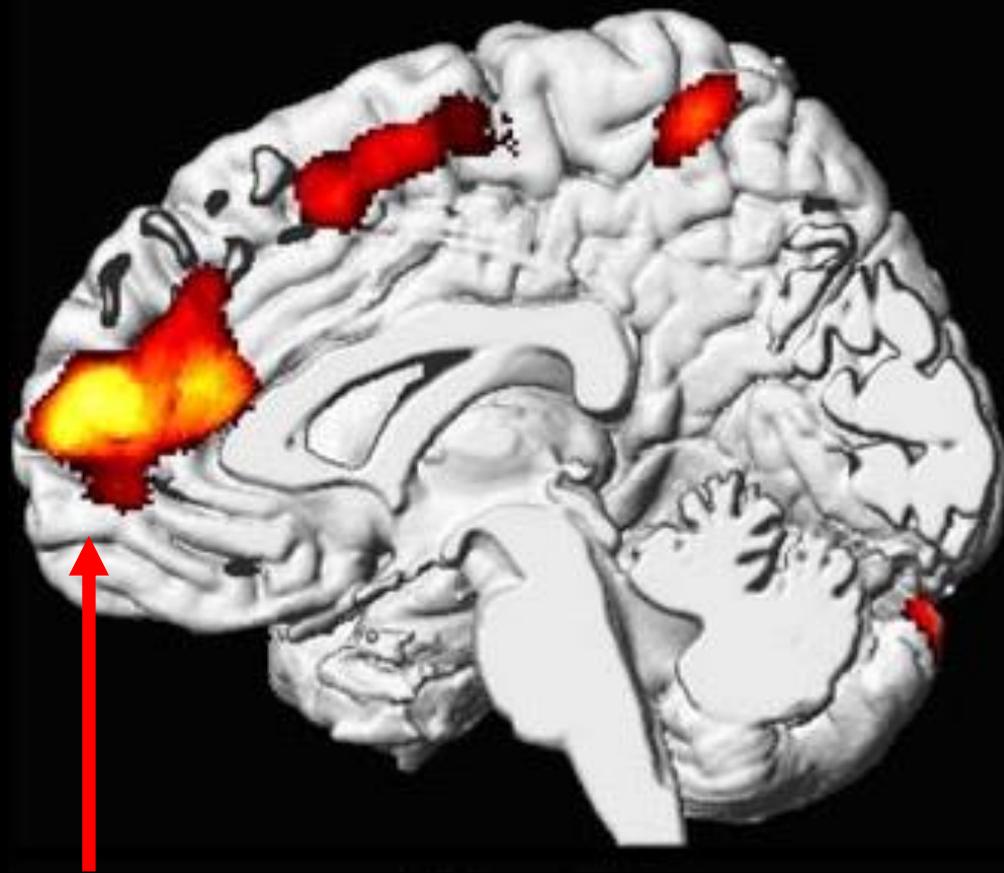


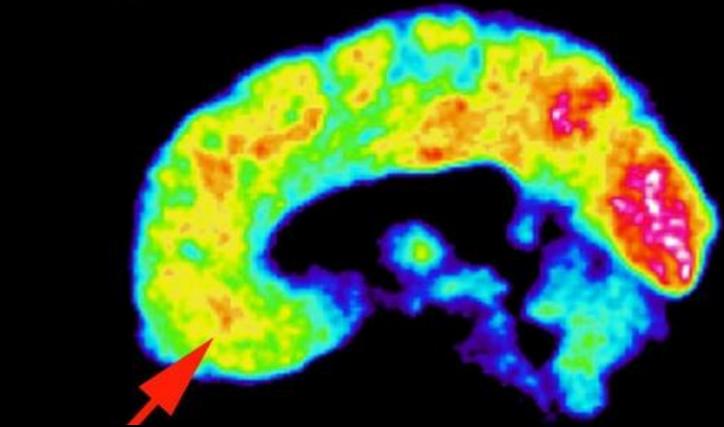


Normal

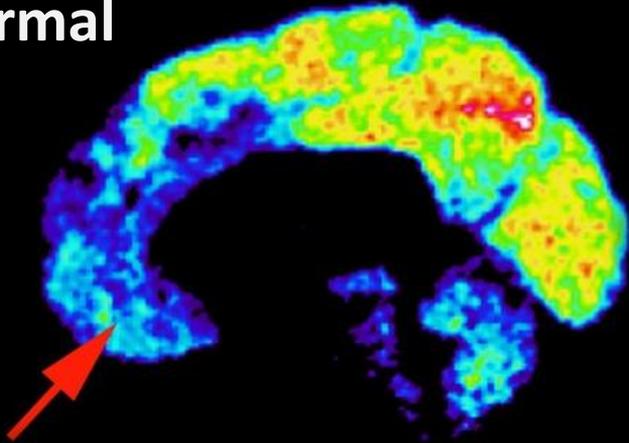


Psychopath

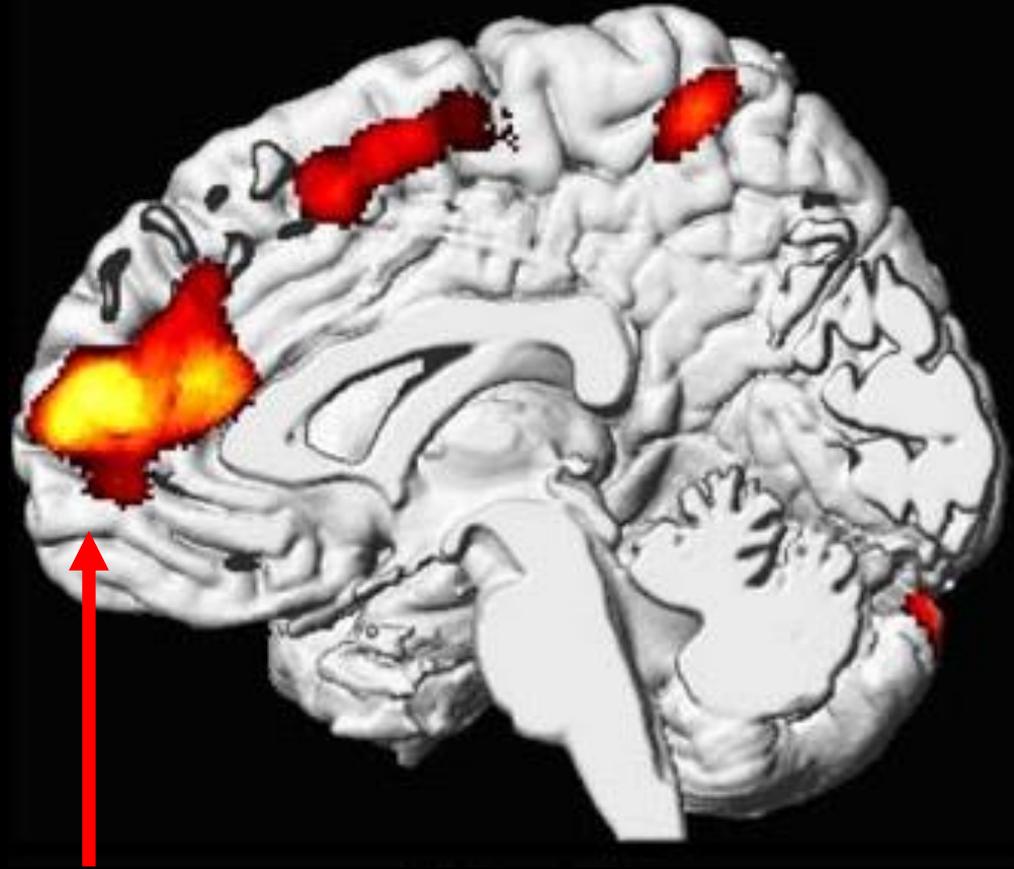




Normal



Psychopath



**Brain Loss – Associated with
Childhood Lead Exposure**

The Burden of Environmental Lead Poisoning in Louisville, KY

Table 1.1

LMPHW Blood Lead Data by Year:
All Follow-Up Tests Included

Year	All Tests		Elevated BLL	
	N	(%)	N	(%)
Unknown	319	(0.29)	70	(0.43)
2005	110	(0.10)	19	(0.12)
2006	10,731	(9.66)	3,039	(18.76)
2007	11,371	(10.24)	1,081	(6.67)
2008	10,257	(9.24)	1,334	(8.23)
2009	10,064	(9.06)	1,490	(9.20)
2010	9,771	(8.80)	1,411	(8.71)
2011	10,283	(9.26)	747	(4.61)
2012	9,781	(8.81)	904	(5.58)
2013	5,306	(4.78)	534	(3.30)
2014	4,275	(3.85)	488	(3.01)
2015	3,891	(3.50)	379	(2.34)
2016	5,157	(4.64)	548	(3.38)
2017	4,856	(4.37)	1,065	(6.57)
2018	5,834	(5.25)	1,259	(7.77)
2019	4,498	(4.05)	924	(5.70)
2020	3,254	(2.93)	674	(4.16)
2021	1,300	(1.17)	234	(1.44)
Total	111,058	(100)	16,200	(100)

Dataset includes all tests from 12/21/2005 – 6/25/2021

All Follow-up tests included: A child found with an EBLL may have follow-up blood tests over subsequent months given the unique the circumstances of the case

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Table 1.2

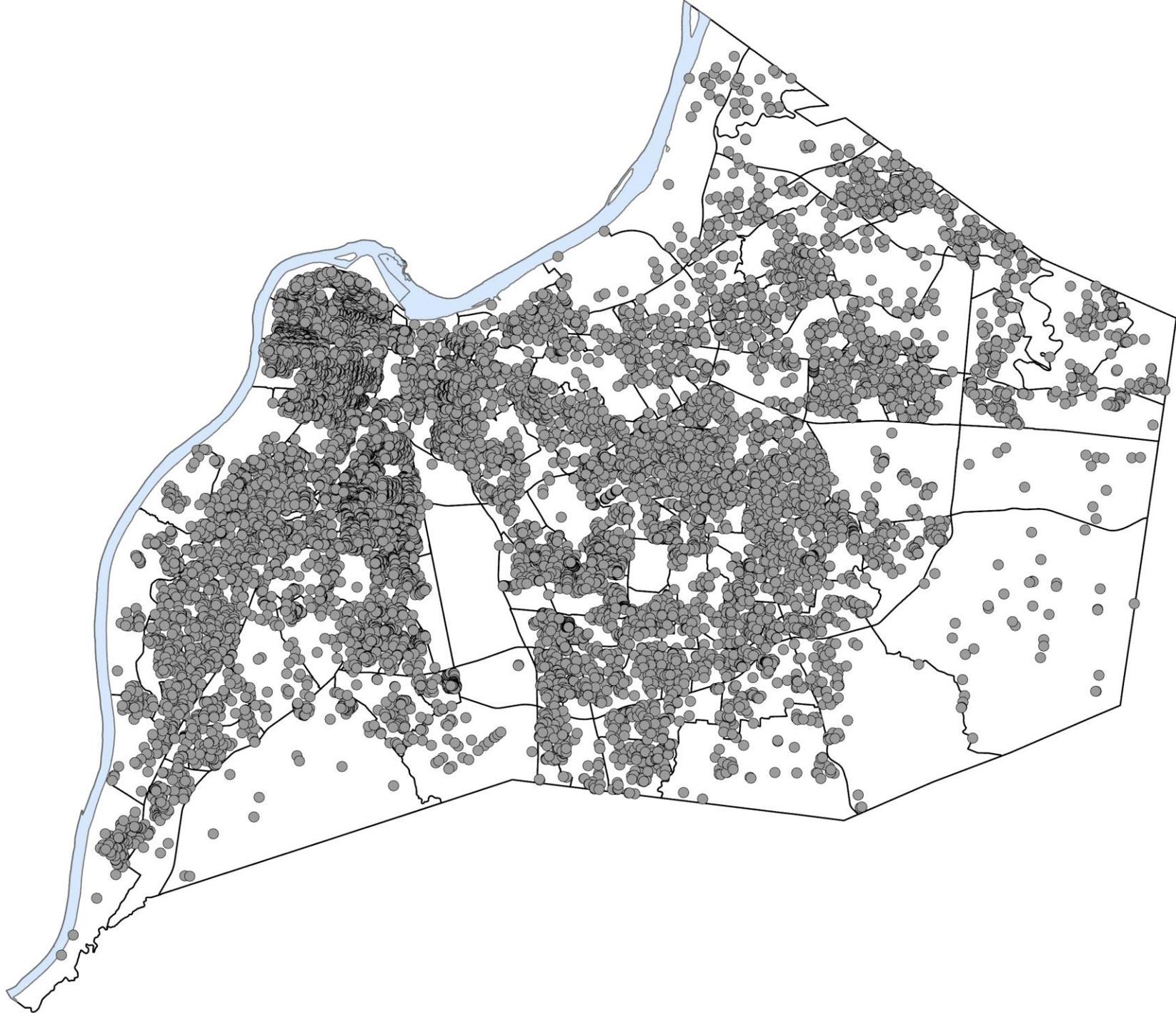
LMPHW Blood Lead Data by Year:
Follow-up Tests Excluded

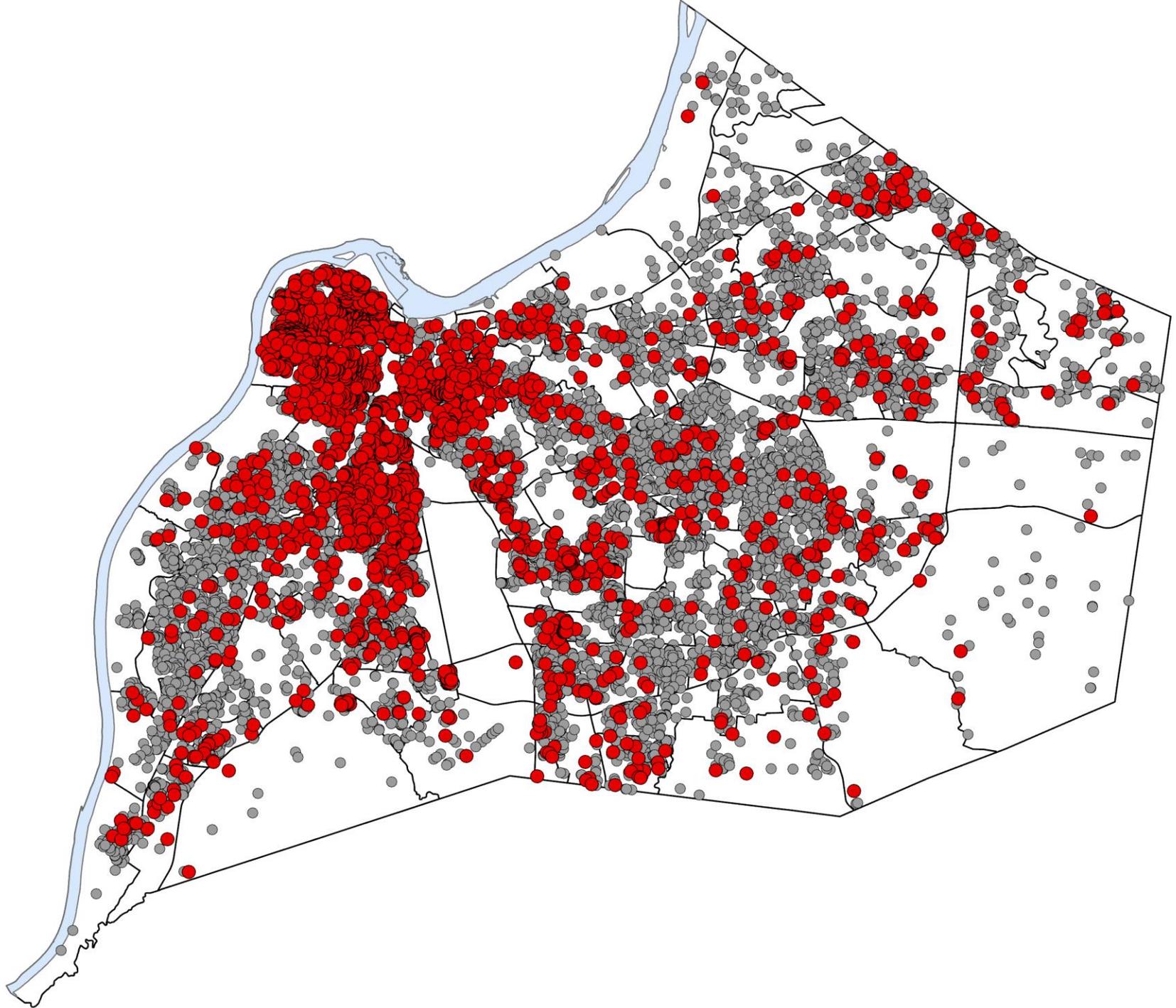
Year	All Tests		Elevated BLL	
	N	(%)	N	(%)
Unknown	219	(0.30)	62	(0.63)
2005	95	(0.13)	14	(0.14)
2006	9,257	(12.51)	2,566	(26.12)
2007	7,488	(10.12)	632	(6.43)
2008	6,477	(8.75)	914	(9.30)
2009	6,220	(8.40)	980	(9.98)
2010	6,758	(9.13)	959	(9.76)
2011	6,792	(9.18)	471	(4.79)
2012	6,774	(9.15)	646	(6.58)
2013	3,677	(4.97)	338	(3.44)
2014	2,796	(3.78)	269	(2.74)
2015	2,377	(3.21)	203	(2.07)
2016	3,480	(4.70)	313	(3.19)
2017	2,847	(3.85)	392	(3.99)
2018	3,308	(4.47)	435	(4.43)
2019	2,620	(3.54)	279	(2.84)
2020	2,007	(2.71)	252	(2.57)
2021	822	(1.11)	98	(1.00)
Total	74,014	(100)	9,823	(100)

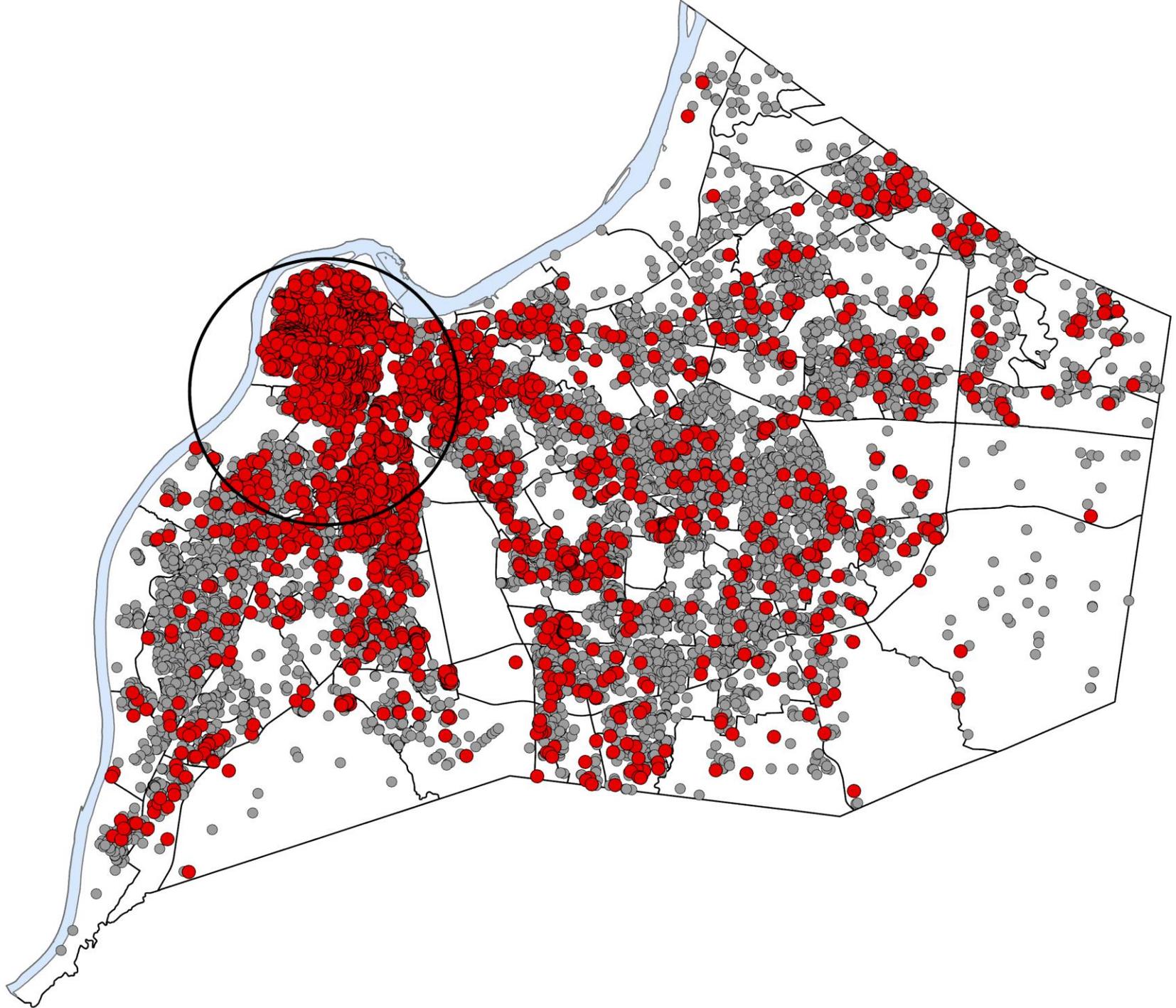
Dataset includes all tests from 12/21/2005 – 6/25/2021

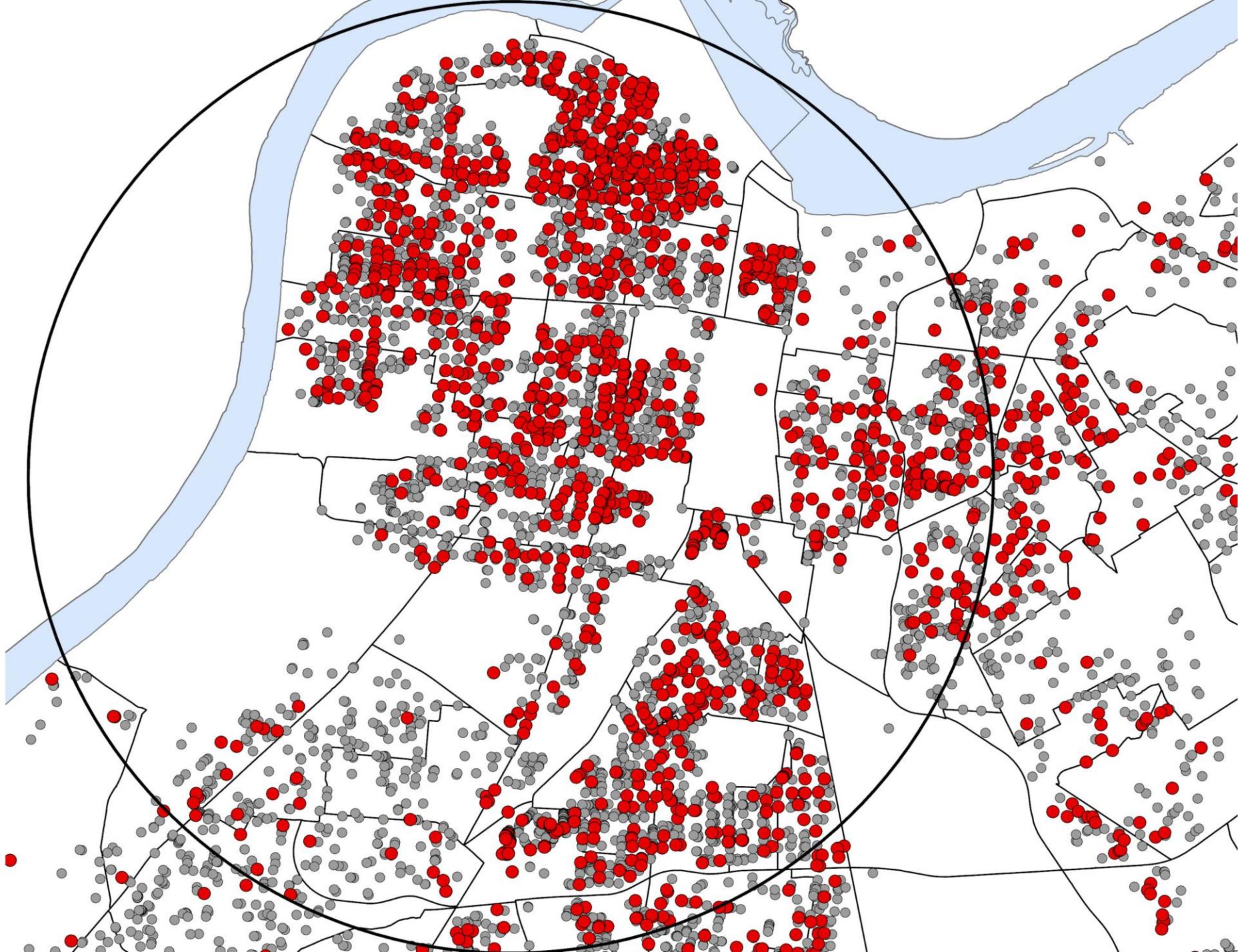
Follow-up blood lead tests excluded from the data



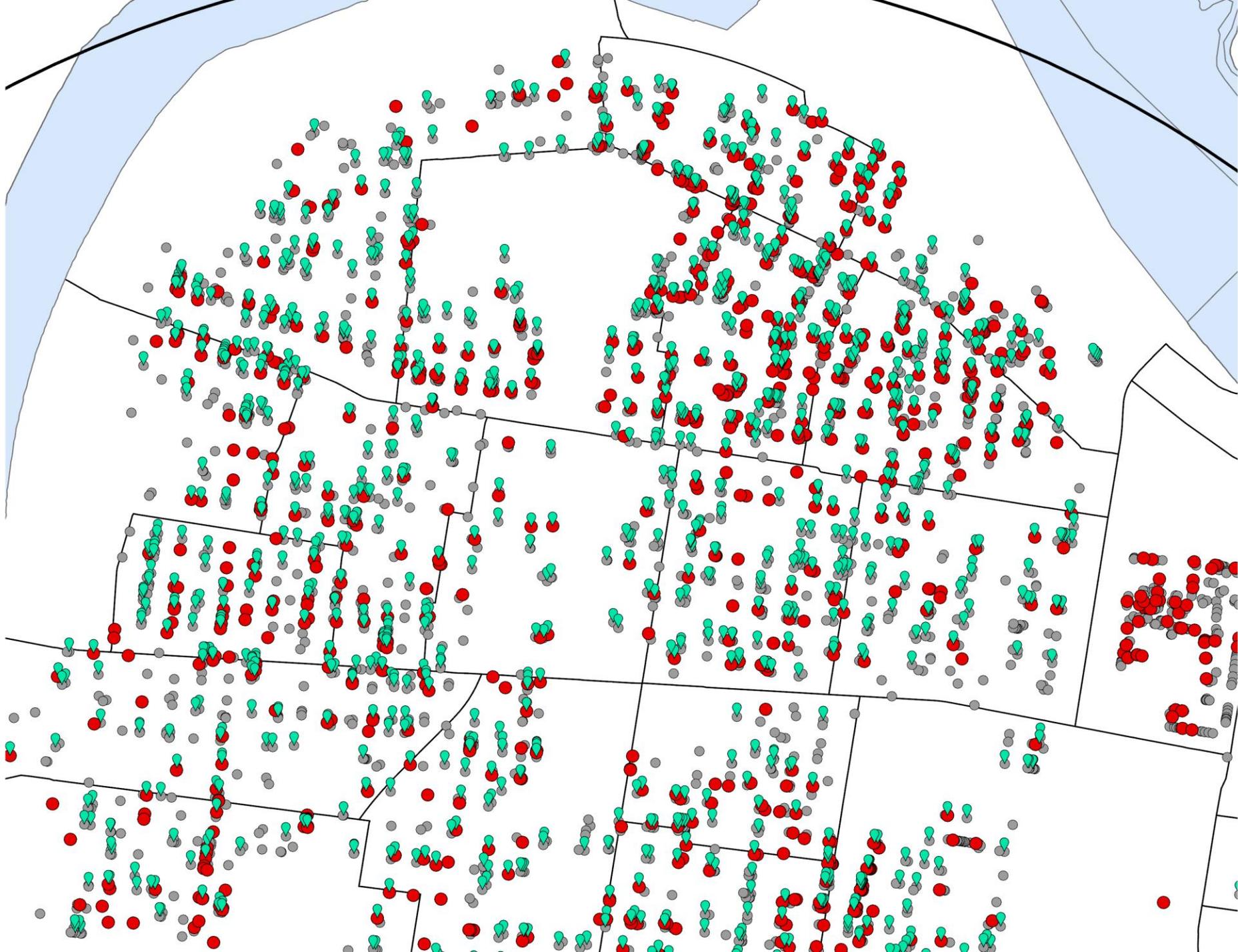


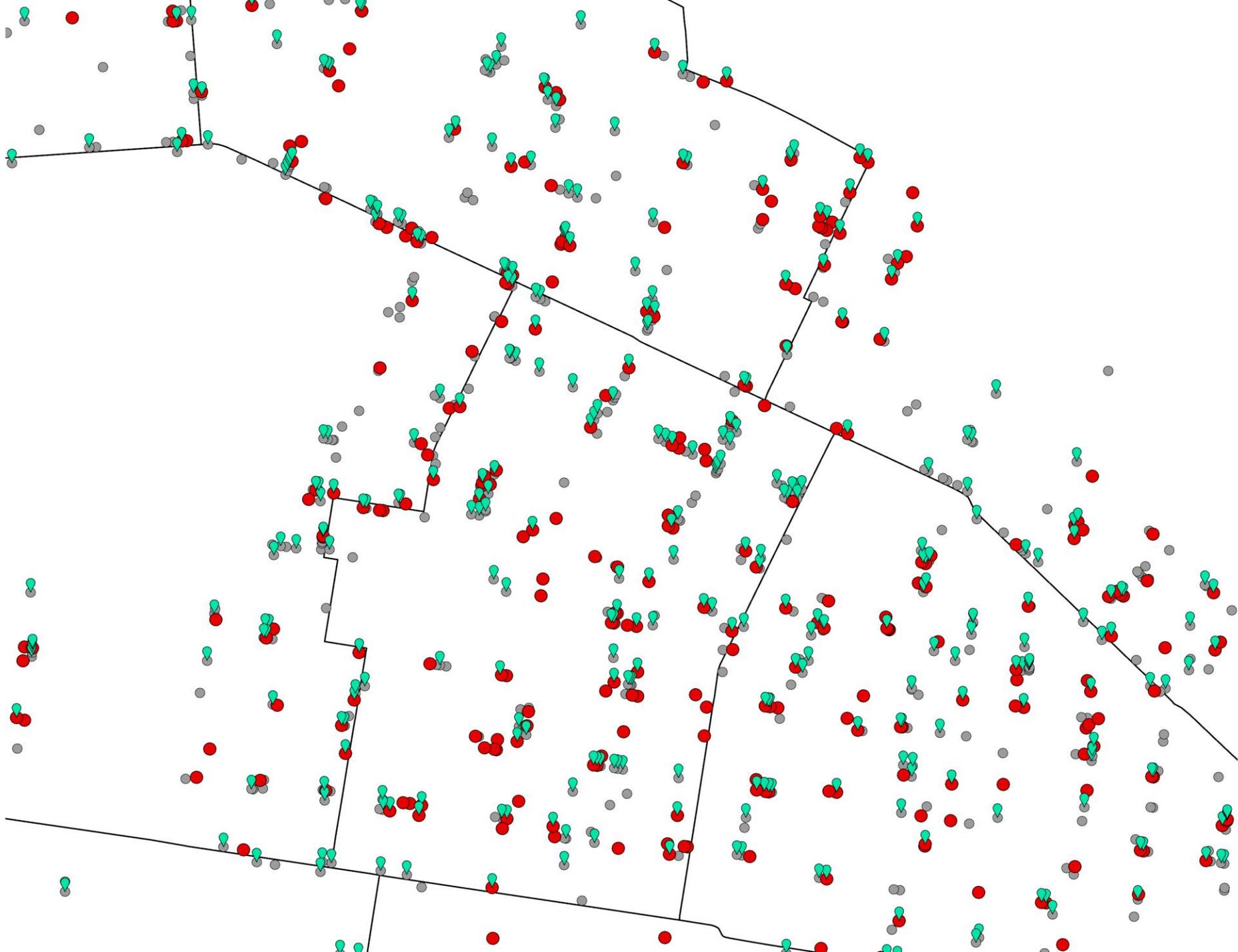


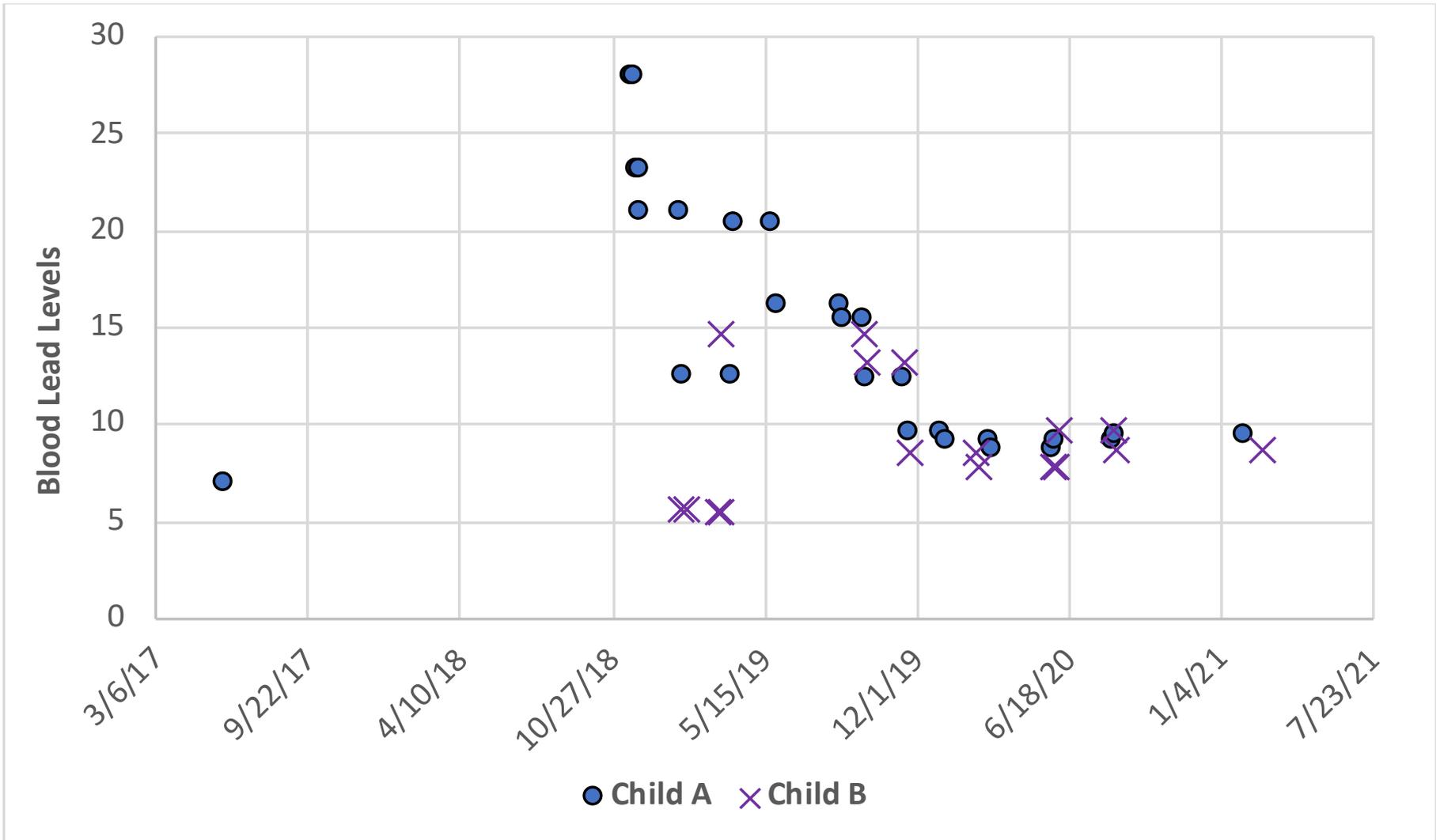




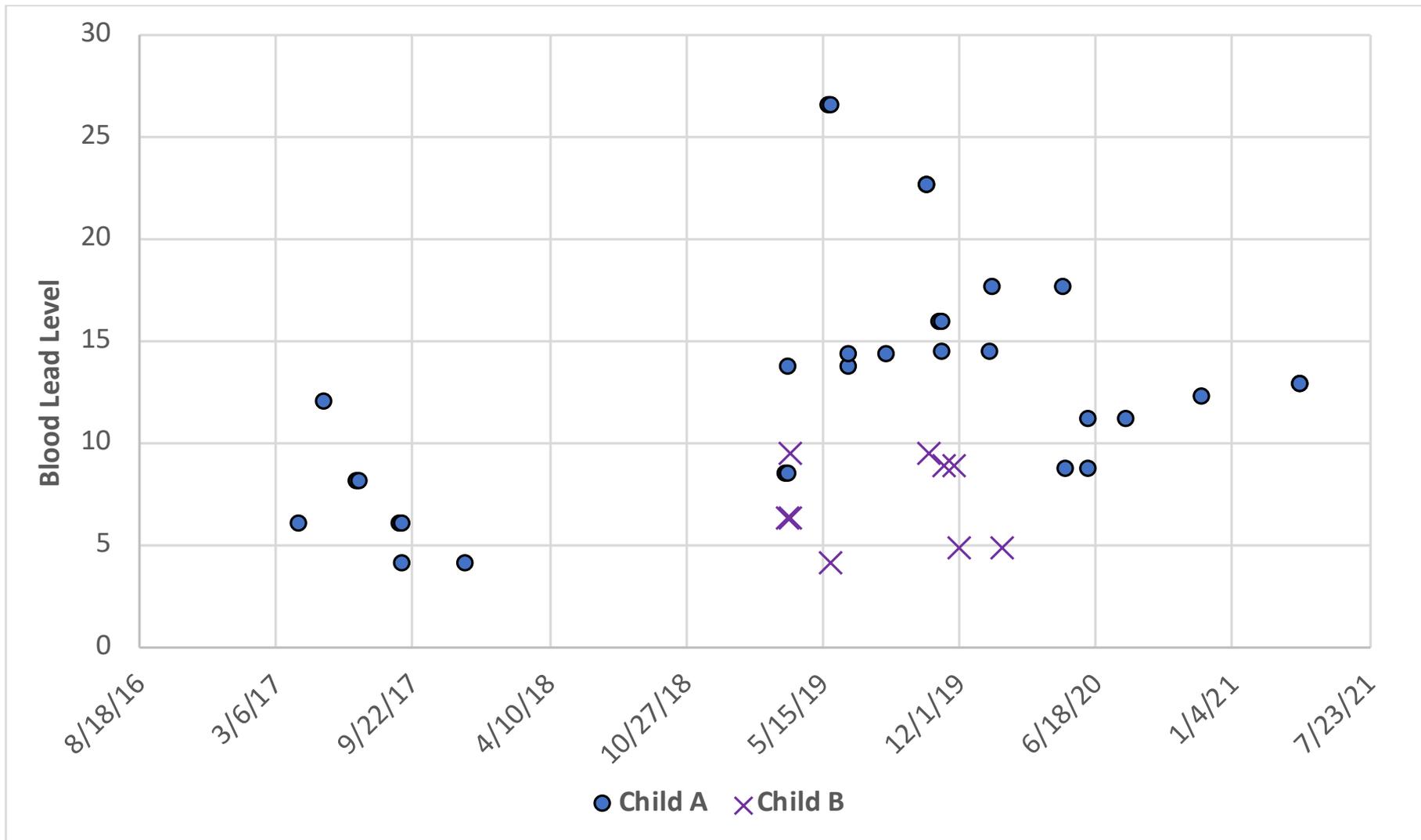




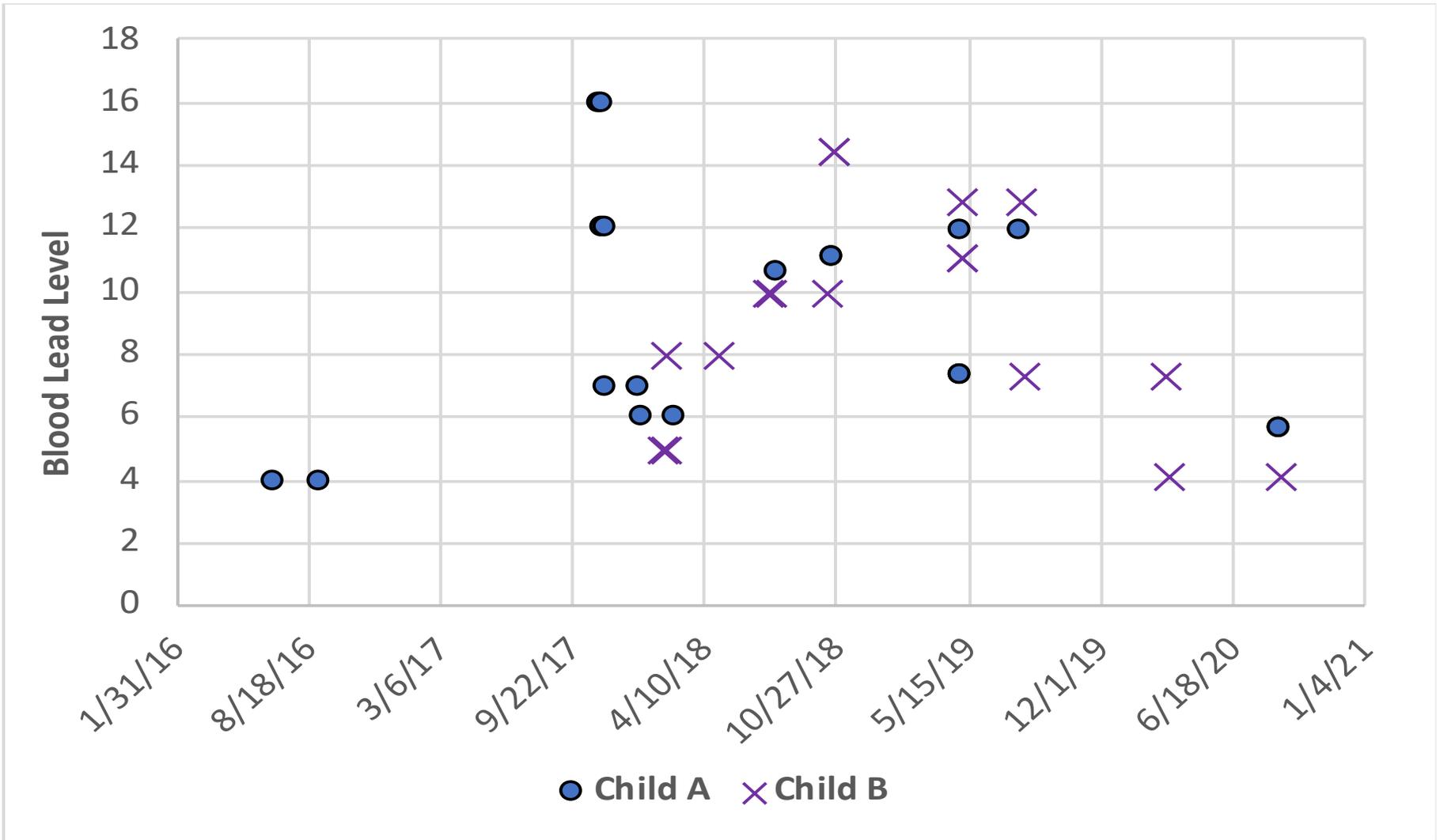




Graph 1: Siblings with a combined 44 EBLL's over a 5-year period. This suggests a repeated lead exposure from a common source. This family lived in a rental property built in 1920.



Graph 2: Siblings with a combined 40 EBLL over a 4-year period. This suggests a repeated lead exposure from a common source. This family lived in a rental property built circa 1900.



Graph 3: Siblings with a combined 36 EBLL over a 4.5-year period. This suggests a repeated lead exposure from a common source. This rental property is in the Portland neighborhood, and was built in 1900.

