

# Lead contamination in PRBCs

## Implications for fetal intrauterine transfusion & neonatal transfusion

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REVIEW ARTICLE

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# Lead Poisoning

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## Consequences of Low-Level Lead Poisoning

**Children**

70% of retained lead stored in skeleton



Preterm births



Increased blood pressure



Cognitive deficits ADHD



Reduced heart rate variability



Paint



Soil



Spices and foods



Battery recycling and smelting



Tobacco



Aircraft emissions



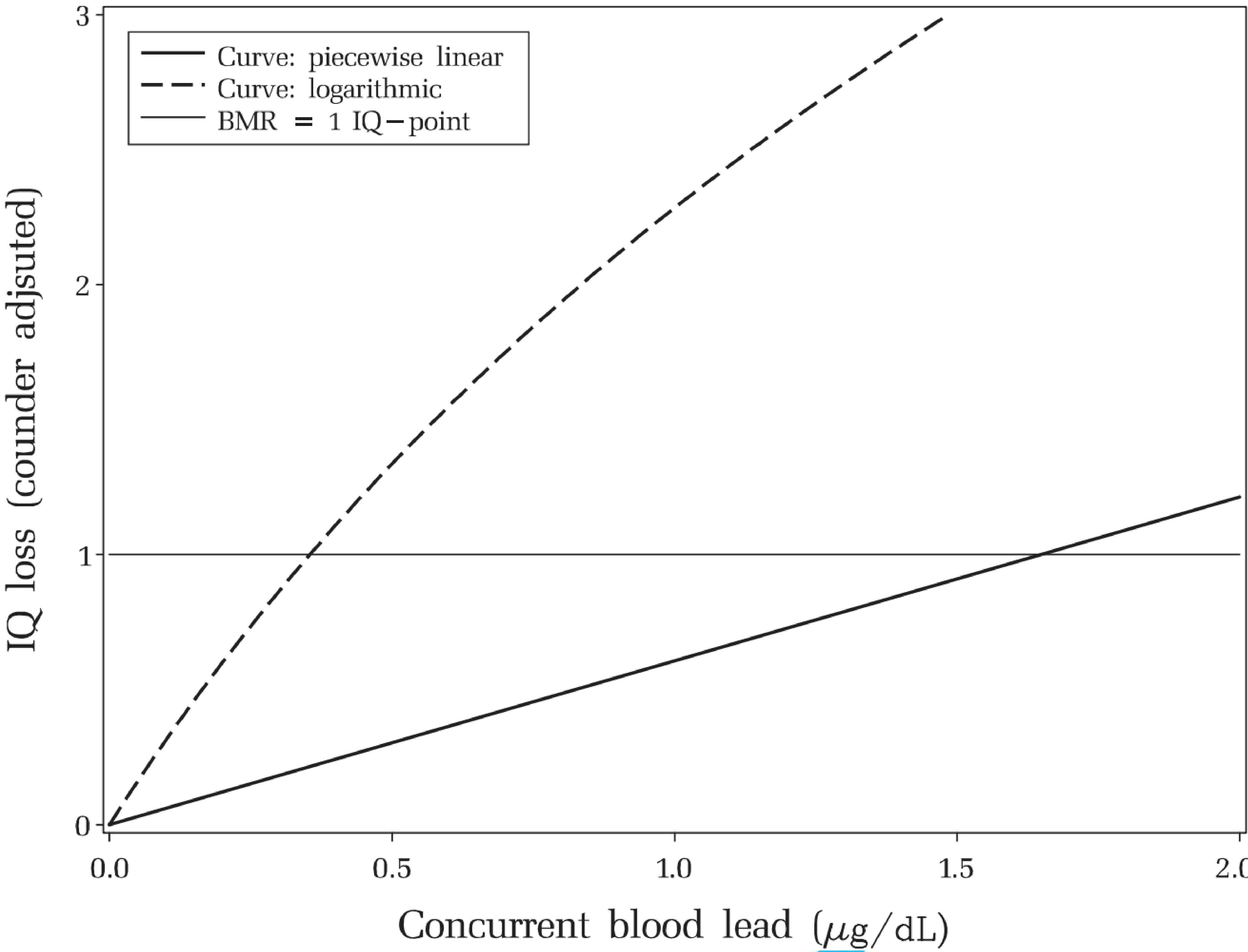
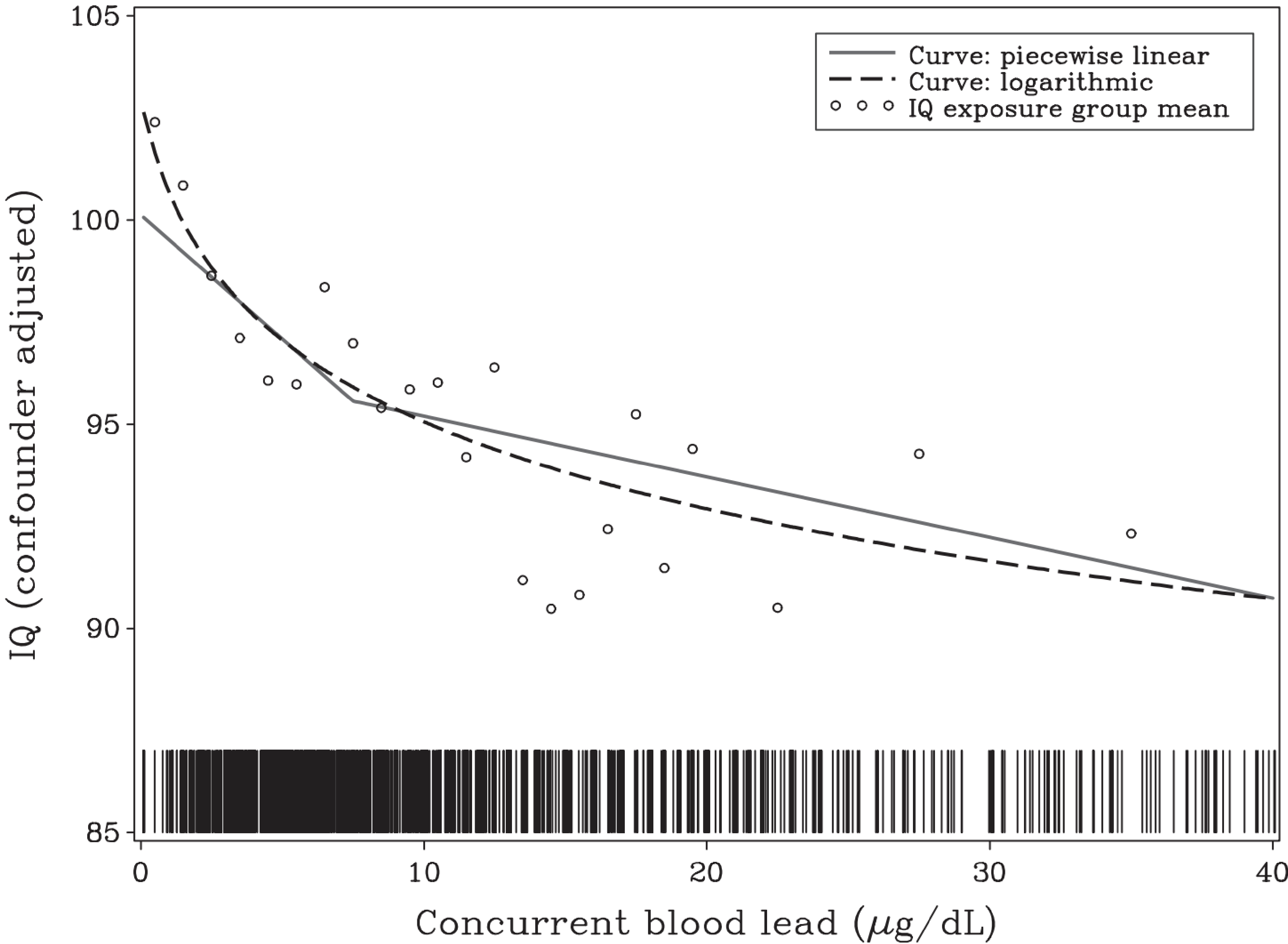
Lead service lines



# Background

## An International Pooled Analysis for Obtaining a Benchmark Dose for Environmental Lead Exposure in Children

Esben Budtz-Jørgensen,<sup>1,\*</sup> David Bellinger,<sup>2</sup> Bruce Lanphear,<sup>3</sup> Philippe Grandjean,<sup>2,4</sup>  
on behalf of the International Pooled Lead Study Investigators<sup>†</sup>



$1\text{ }\mu\text{g/dL} = 10\text{ }\mu\text{g/L}$

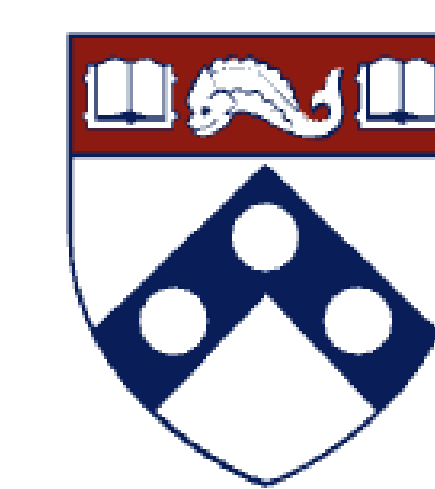
# Study Design

## Definitions

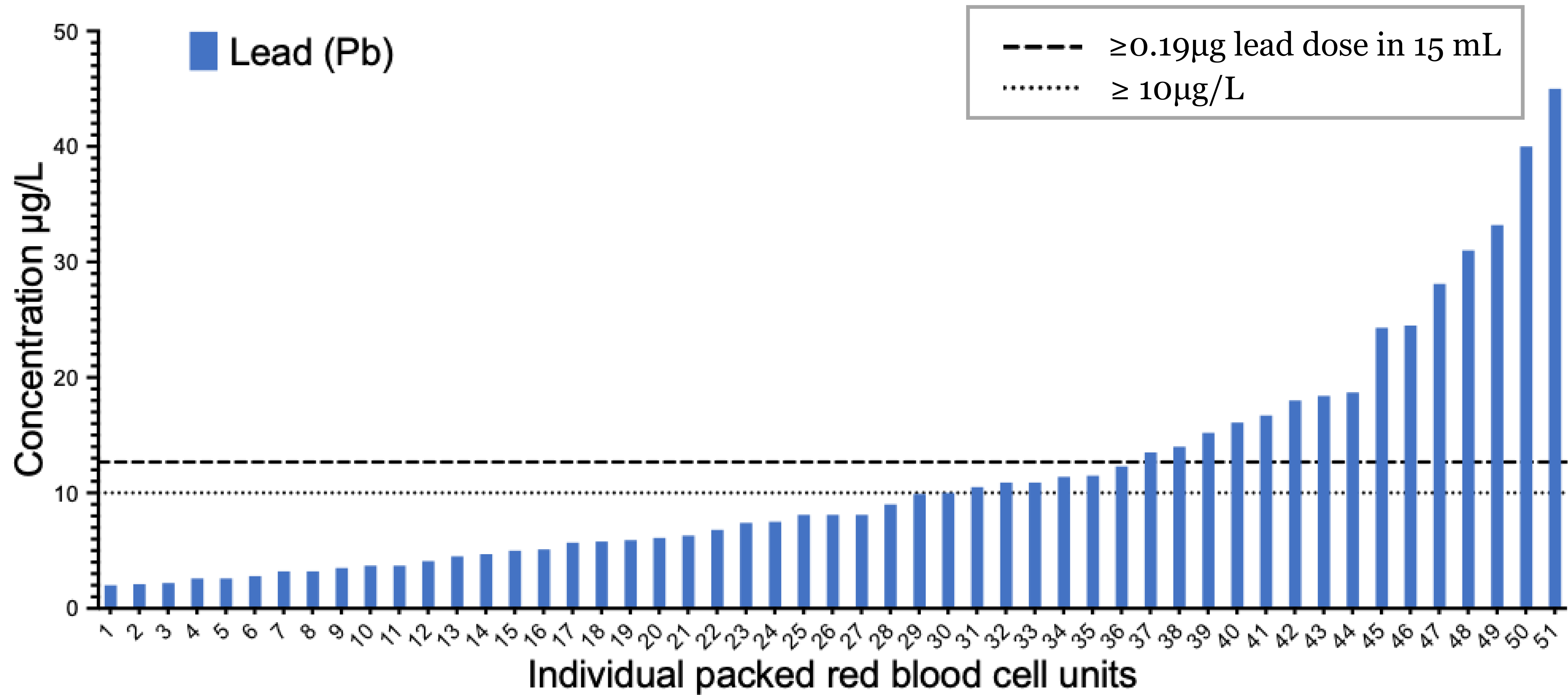
- Elevated lead:  $\geq 10\mu\text{g/L}$
- Small transfusion definition:  
 $\geq 0.19\mu\text{g}$  dose = 15mL transfusion  
in a 1 kg infant
- $1\mu\text{g/dL} = 10\mu\text{g/L}$

## Methods

- 51 PRBC units tested
- 50  $\mu\text{L}$  aliquot was digested in  
250 $\mu\text{L}$  of nitric acid at 60 °C
- Mass Spectrometer (Thermo  
iCAP RQ ) for lead detection
- Serial dilution to create  
calibration curve
- Limit of detection: 0.015 ppb

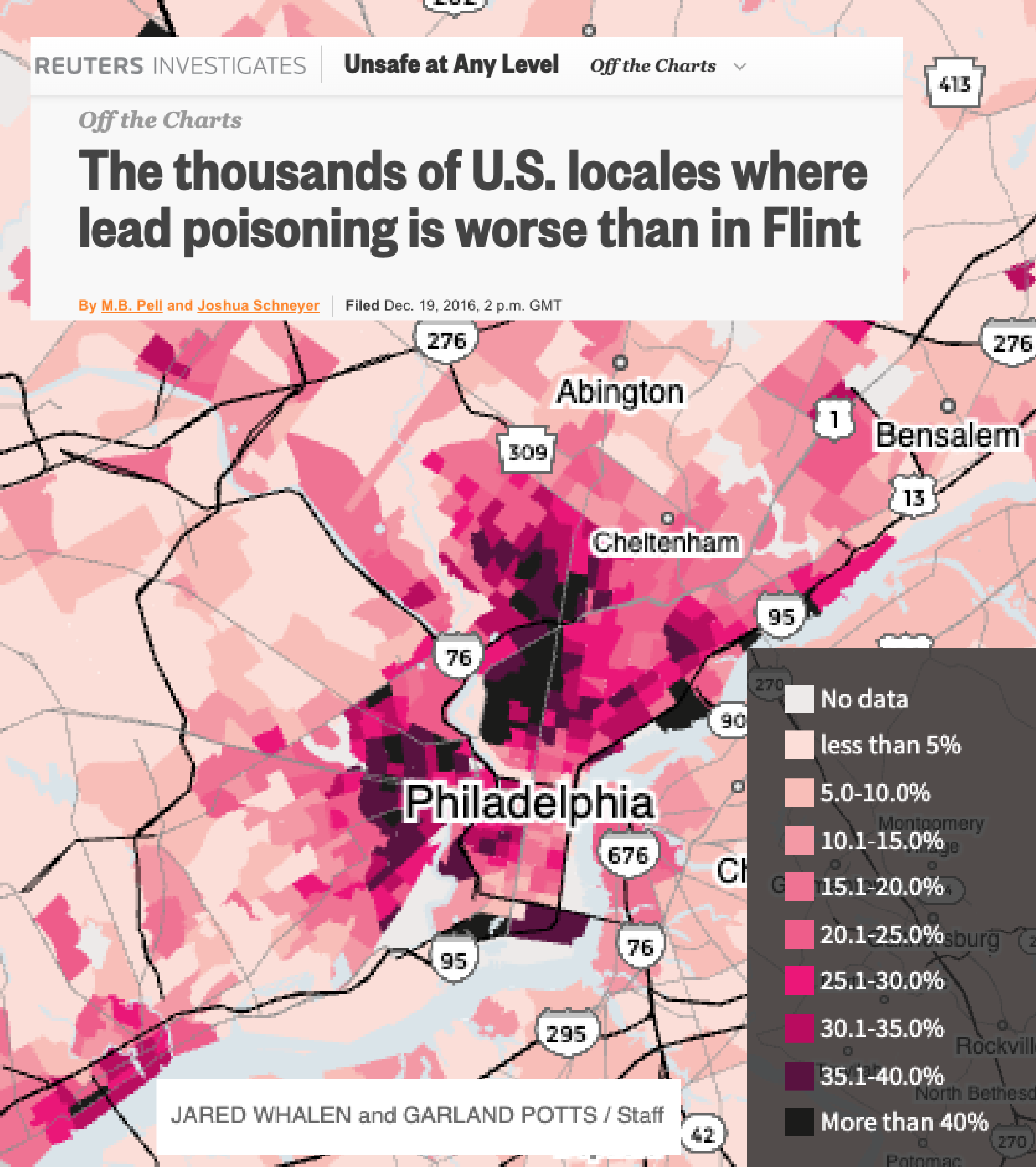


# Results



# Conclusions

- Pilot study of lead levels in PRBC units (n=51)
  - 43% of units  $\geq 10\mu\text{g/L}$
  - 29% of units  $\geq 0.19\mu\text{g}$  lead dose in 15 mL
- Lead exposure at levels detected in PRBC units may be clinically important in high-risk groups:
  - Fetuses receiving intrauterine transfusions
  - Neonates with congenital anomalies requiring ECMO or CPB
  - Premature infants receiving serial transfusions
- Even low-level lead exposure associated with decreased IQ
- Infants at risk of receiving serial or large volume transfusions may have increased risk for neurodevelopmental delays due to their underlying condition



# Acknowledgements

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