

Designing the ECLIPS Study

Frank DiTraglia, Ludovica Gazze (and friends!)

Background on Childhood Lead Exposure

Lead is a potent neurotoxin

- ▶ Toxic whether inhaled or ingested
- ▶ Most harmful to young children
- ▶ Harm from even low levels of exposure

Didn't we get rid of the lead?

- ▶ Lead paint and pipes in older homes
- ▶ Soil near major roads still contaminated
- ▶ Industrial pollution, traditional products

US Policy Landscape

- ▶ EPA regulations for renovation (lead paint)
- ▶ Mandated screening of children on Medicaid
- ▶ Screening for representative sample: NHANES



The White House

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United States government organization



Even low levels of lead can cause behavior and learning problems in children – impairing their growth. The Bipartisan Infrastructure Framework will replace our nation's dangerous lead pipes and service lines.

LEAD SERVICE PIPES IN THE U.S.

There are up to 10 million lead service lines that need to be replaced across the country.



12:30 PM · Jun 30, 2021



4.8K



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Some Econ Papers on Lead Exposure

Aizer & Currie (2018; AEJ Applied)

Lower BLLs explain 75% of decline in school suspensions from 1994-2015 in RI

Aizer, Currie, Simon & Vivier (2019; ReStat)

Low levels of lead ($BLL \leq 5$) have a discernible negative affect on test scores.

Groenqvist, Nilsson & Robling (2020; JPE)

Long-term effects on human capital and crime from low doses of lead

Billings & Schnepel (2018; AEJ Applied)

Early interventions largely reverse negative effects for lead-exposed children.

Abbasi, DiTraglia, Gazze & Pals (2023; J. Health Econ.)

Estimate geographic distribution of undetected lead poisoning in Illinois; evaluate alternative screening policies.

Why did I start thinking about this?

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US news

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Half of US adults were exposed to harmful lead levels as kids, study finds

Researcher calls findings 'infuriating' as team finds significant impact on cognitive development

Associated Press

Tue 8 Mar 2022 00.20 GMT



Over 170 million Americans who were adults in 2015 were exposed to harmful levels of lead as children, a new study estimates.

Researchers used blood-lead level, census and leaded gasoline consumption data to examine how widespread **early childhood lead exposure** was in the country between 1940 and 2015.

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America's dirty divide

'We're losing IQ points': the lead poisoning crisis unfolding among US children

The US banned lead 30 years ago. So why are thousands of kids being poisoned every year?

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About this content

Erin McCormick in Rhode Island and Eric Lutz

Wed 8 Dec 2021 10.00 GMT



Nine-year-old Turokk Dow loves spelling, airplanes and basketball. He is learning to read and write in his third grade classroom.

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Our unequal earth

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'It was everywhere': how lead is poisoning America's poorest children

The toxin has endangered hundreds of thousands of kids. But parents in the hardest-hit neighborhoods may never be warned of the threat

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11th Hour Project

About this content

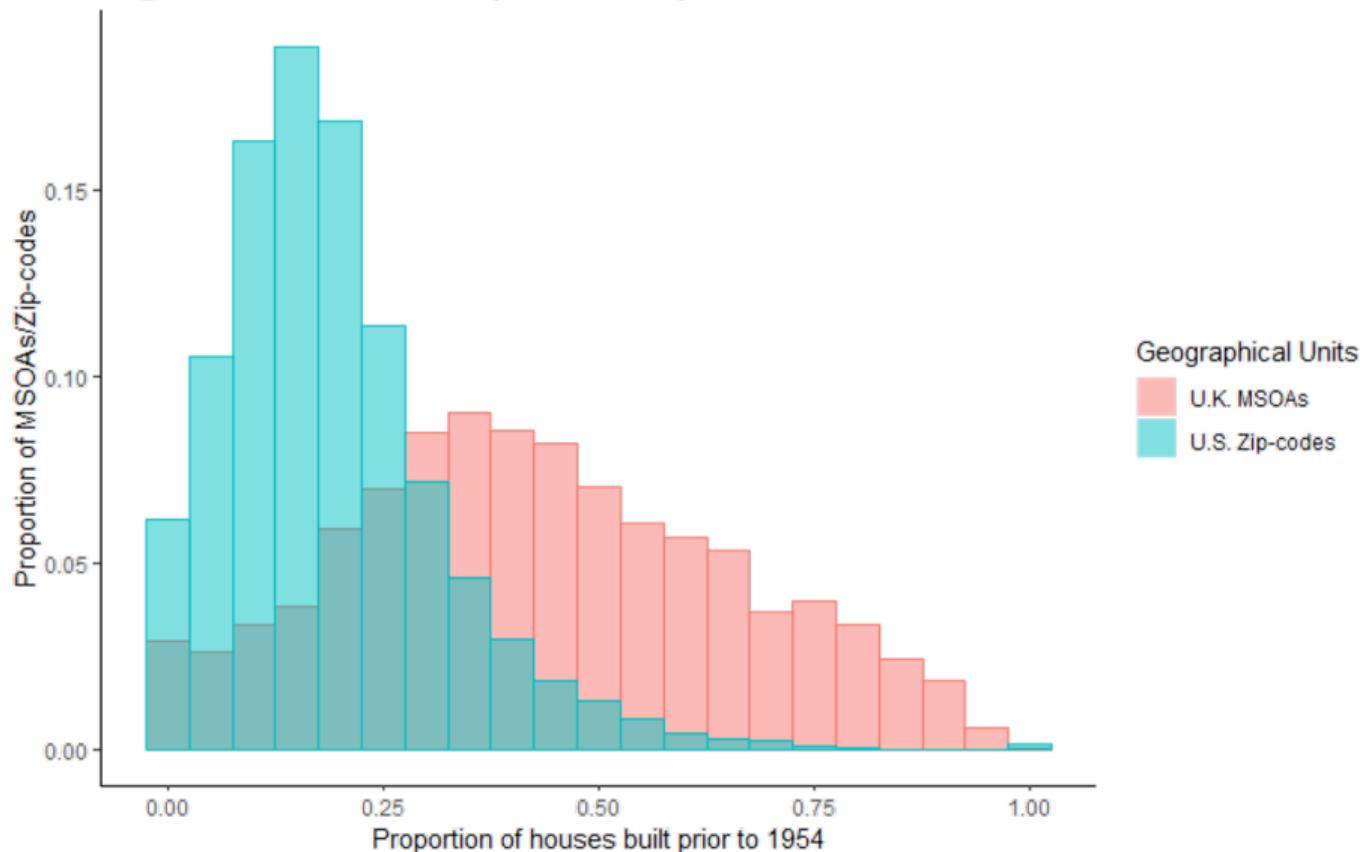
Nina Lakhani in Philadelphia

Wed 26 Feb 2020 09.00 GMT



Shanaya Bell did everything right during her pregnancy: she https://www.theguardian.com... well and kicked out the mercury for her

England MSOAs and US Zip-codes: Proportion of Houses Built Prior to 1954



Council Tax Stock of Properties, 2021; Valuation Office Agency

American Community Survey Five Year Estimates, 2020; United States Census Bureau

There is no lead screening in the UK whatsoever.

2018 National Screening Committee Report

The volume, quality, and direction of evidence published since 2012 does not indicate that screening for elevated BLLs should be recommended in the UK. Several uncertainties remain across key criteria including: lack of evidence that elevated BLLs in children is an important health problem in terms of UK prevalence.

2019 Lead Exposure in Children Surveillance System Report

There are no recent comprehensive survey data estimating how many children in England are exposed to lead.

2021 Public Health England (now HSA)

Public health intervention level for lead halved from 10 to 5 μ g/dl.

ECLIPS – Pilot a Childhood Lead Screening Program

Elevated Childhood Lead Interagency Prevalence Study

- ▶ Jane Entwistle, Lindsay Bramwell, *Northumbria*
- ▶ Frank DiTraglia, *Oxford*
- ▶ Ludovica Gazze, *Warwick*
- ▶ Carys Lippiatt, *Leeds Teaching Hospitals*
- ▶ Priya Mondal, Ovnair Sepai, *UKHSA*
- ▶ Jackie Morton, *Health & Safety Executive*
- ▶ Caroline Taylor, *Bristol*

UKRI Cross Research Council Responsive Mode Scheme

- ▶ Funded from Jan 2025 – Dec 2027
- ▶ Pilot a home test for childhood lead exposure in Leeds
- ▶ Finger-prick test using Capitainer (at right)





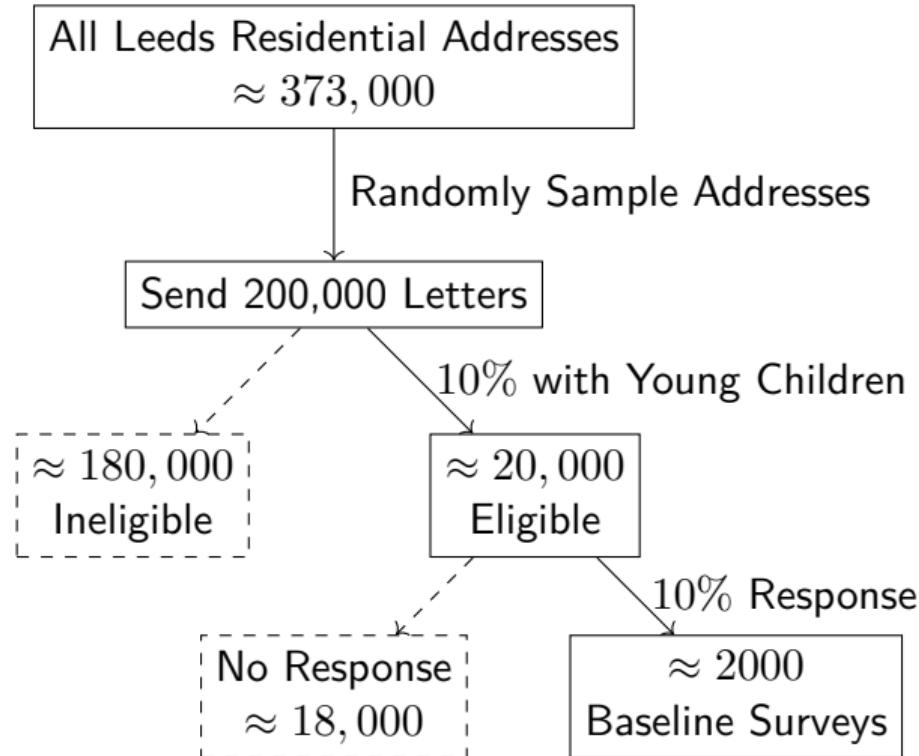
Learning as much as we can even if fail to get usable samples

- ▶ What fraction of families are willing to participate in home screening?
- ▶ Which families are willing to participate? (Selection into testing)
 - ▶ Dutz et al (2023) "What Drives (Gaps In) Scientific Study Participation?"
 - ▶ 6% un-incentivized response rate: 10% for low poverty, 2% for high
 - ▶ 17% with \$100 incentive: 24\$ for low poverty, 8% for high
- ▶ Estimates of exposure risk (housing age etc) correlate negatively with income
- ▶ Which families are more likely to return a valid sample?
- ▶ What motivates participation? Info about child's health? Altruism?

Testing Details

- ▶ Device requires one good-sized drop of blood (≈ 17 microliters)
- ▶ Extracting it, requires parents to apply a lancet to child's finger (1-2 mm depth)
- ▶ Planned for kids 6 months to 6 years, but 6 months seems less likely now
- ▶ Anecdote from our colleague Joe: hard to get your kid to cooperate!

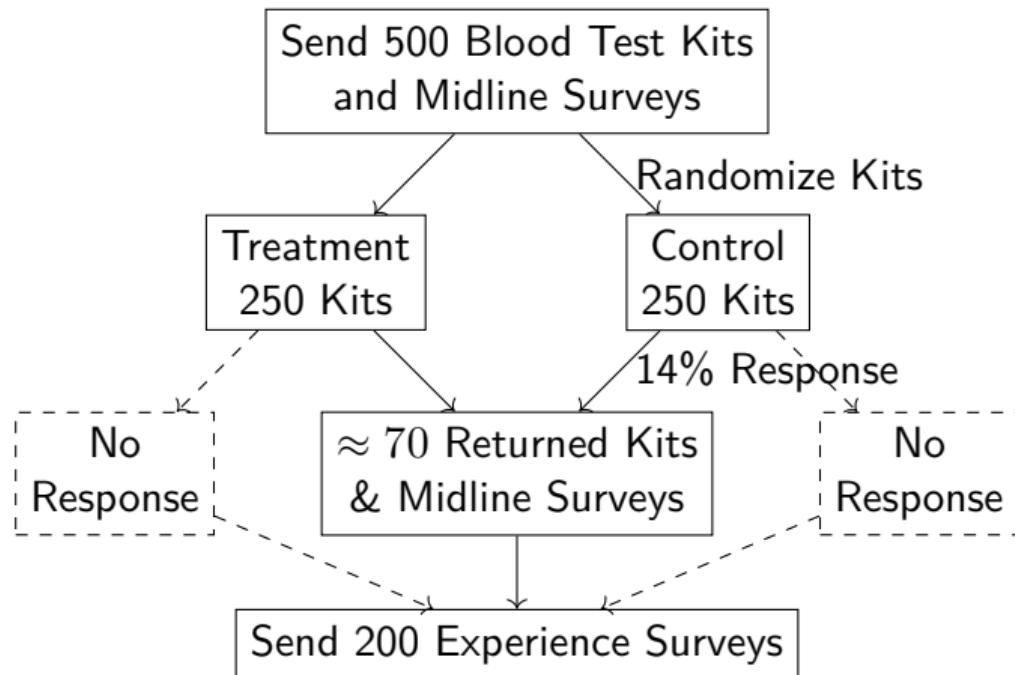
Overview of Phase I – From Our Proposal



5 GBP gift card for sign-up and baseline survey completion

Overview of Phase II – From Our Proposal

Baseline survey & census: choose probs of sending each household a kit (2000 to 500)



35 GBP for returned sample / midline survey; 10 GBP for experience survey

What we'd like feedback on today

Randomized Outreach Messages

Test effect of different outreach messages on participation; what's interesting here?

Sampling Plan

Two-stage, adaptive, stratified sampling plan. Comments / concerns?

Randomized Test Kits

If we have time: what might be interesting to randomize here?

Randomized Messaging: Overview

What to put in our recruiting letter?

Many possibilities: why not randomize something to see what improves take-up?

Possible Comparisons

- ▶ Personalized Risk Information
- ▶ Blood Testing Language
- ▶ Risk Communication Level
- ▶ Lead Exposure Sources
- ▶ Framing Benefits from Participation

Questions for our Expert Audience

1. Which comparisons are most interesting from a research perspective?
2. What to pick as a baseline / control from among the less interesting questions?

Recruitment Messaging: Details

Personalized Risk Information

- ▶ Merged EPC certificates for Leeds with residential addresses
- ▶ Gives us age of 250k properties (out of \approx 373k)
- ▶ “Our records indicate that your home was built before XXXX so it might have lead paint or pipes. Taking part can help you learn if these may affect your child’s health.”

Lead Exposure Sources

- ▶ “Lead can be found in various products including XXXX. Taking part can help you learn if any of these affect your child.”
- ▶ Does it matter which sources we list? How many? Child-relevant only?

Recruitment Messaging: Details

Blood Testing Language

- ▶ Consent forms and participation leaflet will explain about the blood test. - Should we mention blood in the recruitment letter itself?
- ▶ Con: people may not read further. Pro: only committed participants proceed.

Framing Benefits from Participation

- ▶ Private benefits “learn information about your child’s health”
- ▶ Altruism / Public Health: “help us learn how to improve the health of UK children”

Stratified Sampling

Budget

Send outreach letters to $\approx 40\%$ of residential addresses in Leeds.

Simple Random Sample

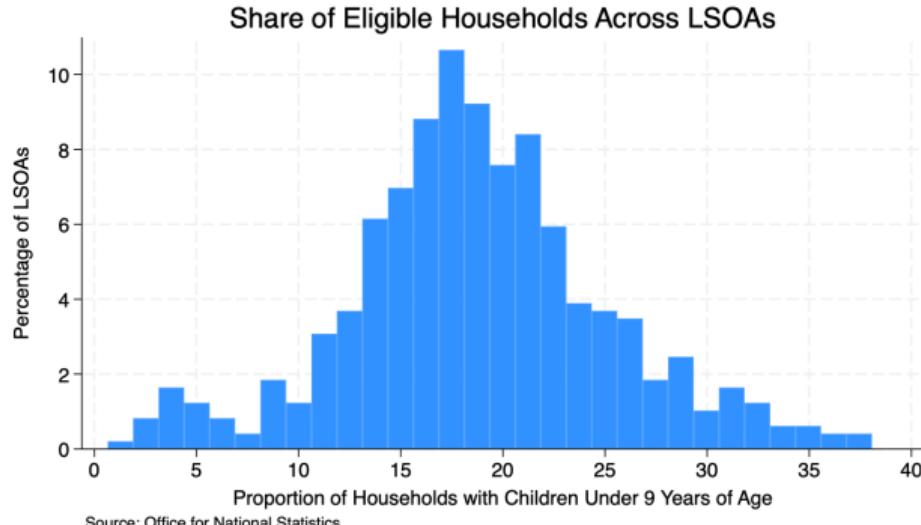
Choose 40% of addresses at random, without replacement.

Stratified Random Sample

More letters to LSOAs where more households have kids (census)

Adaptive Sampling?

Considering sending 20% of letters initially, modeling the response rates based on LSOA & respondent characteristics and adjusting the sampling scheme for the remaining 80%





Randomized Test Kits

- ▶ We have the opportunity to randomize the test kits
- ▶ Considered a toy for kids, but hard to find something:
 - ▶ age-appropriate (6 months to 6 year!)
 - ▶ not choking hazard
 - ▶ fits in flat pack
- ▶ Considering stickers instead. Potentially randomize delayed reward / surprise?
 - ▶ Stickers in envelope to be opened afterwards?
- ▶ Other ideas?

Thank you for your time and suggestions!

