

# 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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Economists are allowed to write papers about 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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About this content

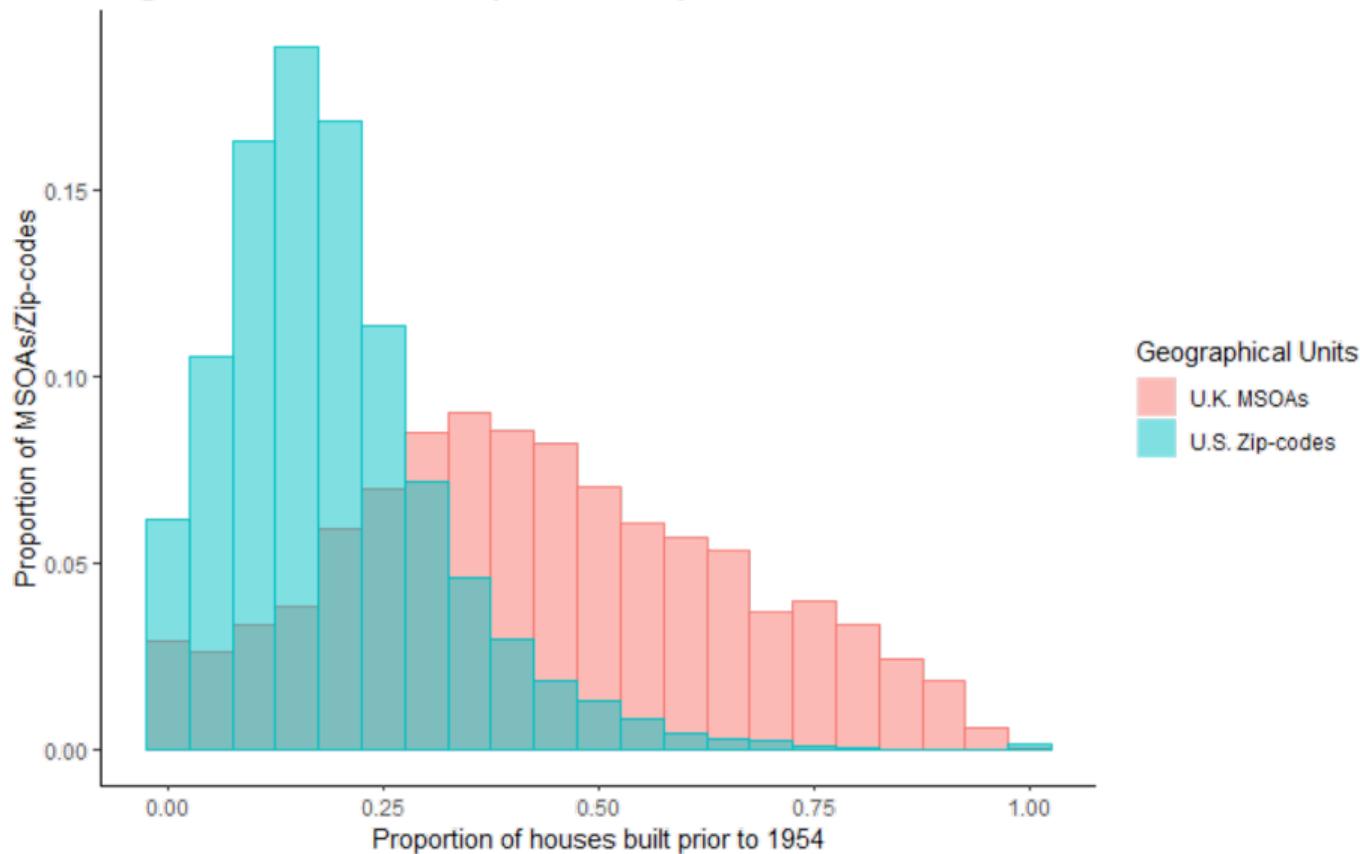
**Nina Lakhani in Philadelphia**

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 $\mu$ 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)





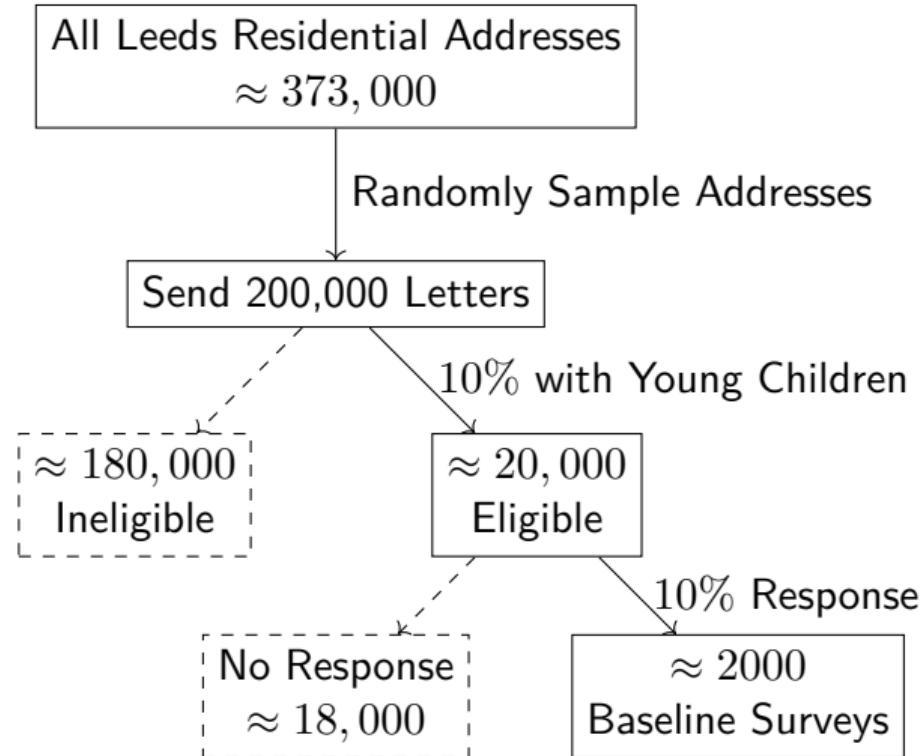
## Literature review /motivation about take-up?

Why is take-up / selection into testing interesting from an Econ perspective? This is better than “Economists have worked on lead”

- ▶ How much blood the device requires: tablespoon? Size of lancet etc.
- ▶ Planned for kids 6 months to 6 years, but 6 months seems less likely now
- ▶ Greenstone et al. take-up of something painful
- ▶ ELSA study? Take-up results?
- ▶ Exposure risk likely correlates (negatively) with income
- ▶ (Maybe something about our)
- ▶ Know that lower-income people are less likely to take up
- ▶ A bit more about how you need to collect 10 microliters (17 total)
- ▶ Maybe a picture with a kid crying and a needle.
- ▶ Need parents to actually do this!
- ▶ Motivations for participating: information about your kid's health, altruism (help other kids in the UK)
- ▶ But hard to make your kid cooperate? (Joe's anecdote)

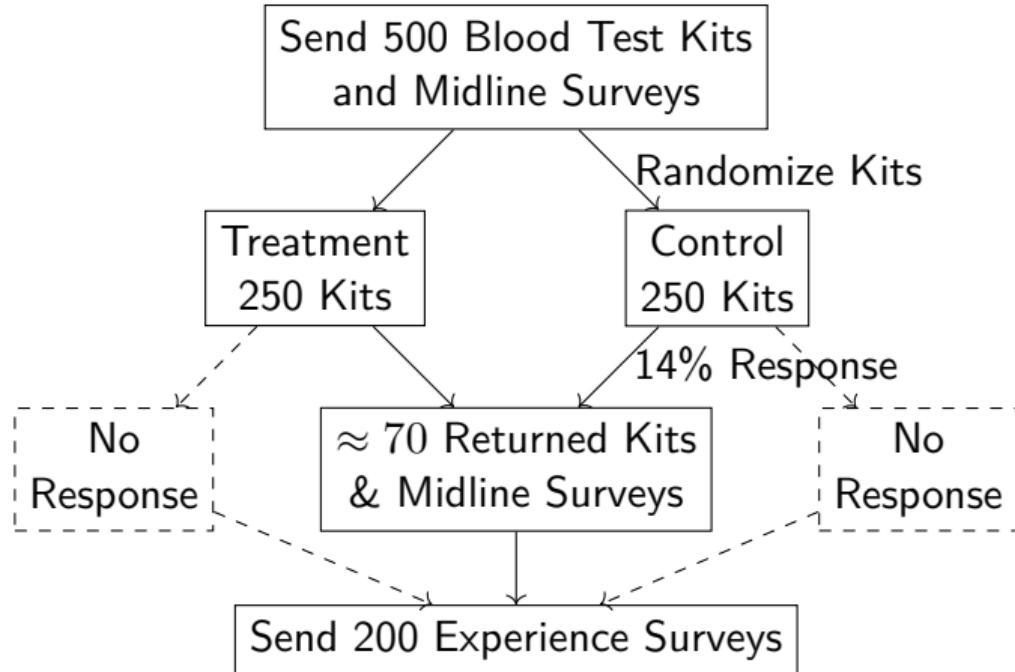
# Overview of ECLIPS Study: Phase I

- ▶ From our grant proposal
- ▶ Considering changes
- ▶ You can help us decide!



## Overview of ECLIPS Study: Phase II

- ▶ From our grant proposal
- ▶ Considering changes
- ▶ You can help us decide!



## 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: interested to hear what it would be interesting to randomize here.

# Randomized Messaging

Two Questions for our Expert Audience

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

## Letter Design Elements for Lead Testing Study

### Personalized Risk Information

- ▶ Considering personalization based on housing age (pre-XXXX construction)
- ▶ Research question: Effect of housing age information on lead awareness
- ▶ Need control group receiving general lead information to isolate personalization effect

### Blood Testing Language

- ▶ Testing terminology options: “at-home test” vs “finger prick” vs “drop of blood”
- ▶ Initial response rates likely higher with less explicit blood mentions
- ▶ Consider optimizing for kit return rates rather than just initial responses
- ▶ Opportunity to screen for committed participants through blood test framing

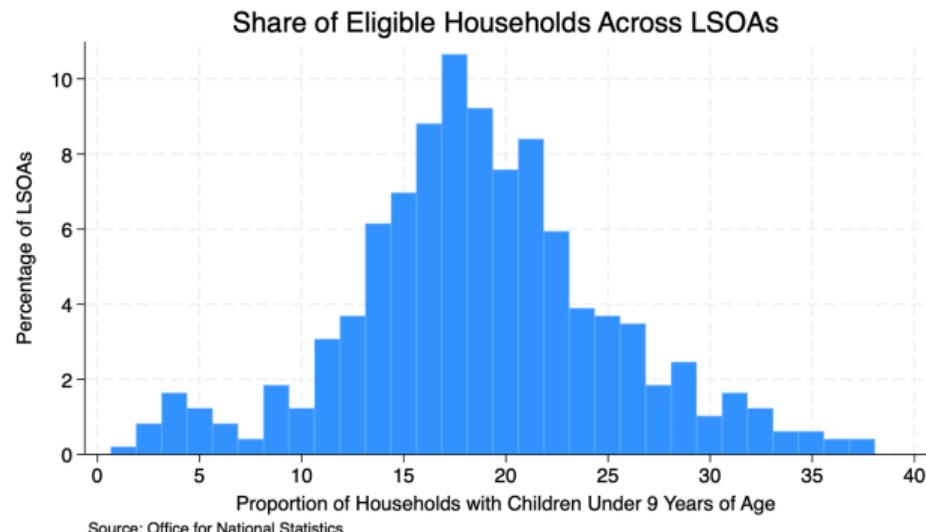
### Risk Communication Level

- ▶ Current draft letter identified as insufficiently specific about risks
- ▶ Consider standardizing detailed risk information across all letters
- ▶ Compare to ELSA diabetes study where health risks were widely understood

### Lead Exposure Sources

# Stratified Sampling

- ▶ Add various points here





## Randomized Test Kits

- ▶ Reward for kids? Hard to find something that is child-safe and appropriate for many ages (choking hazard)
- ▶ Delayed reward / surprise? (Stickers in an envelope versus not)
- ▶ Other ideas?