



Provider Lead Testing Among Children Under Six Through GIS Mapping and Analysis in Sedgwick County, Kansas

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Outline

- Applied Practice Experience (APE) Site
- Background & Significance
- Purpose & Objectives
- Methods
- APE Products (GIS Analysis & Provider Survey)
- Results
- Key Findings & Interpretation
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- Limitations
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- Acknowledgements

- Sedgwick County Health Department

- Mission: “Cultivate a healthy, safe and welcoming community through exceptional public services, effective partnerships and dedicated employees.
- Location: Wichita, Kansas

- Epidemiology Program

- Kaylee Hervey, MPH
- Danielle Gauna, MPH
- Roxanne Greene, Lead Poisoning Prevention Specialist



SEDGWICK COUNTY
Health Department

Introduction

- Childhood lead exposure is preventable
- Persistent disparities in housing and healthcare access
- Screening is critical but unevenly distributed

What is Lead?

- Naturally occurring toxic metal
- Widely used in paint, gasoline, plumbing, and consumer products
- Banned from residential paint in 1978
- Still present in older housing, soil, and environmental dust



Why Lead Exposure Matters

3.5 $\mu\text{g}/\text{dL}$

Centers for Disease
Control and Prevention
(CDC) Blood Lead
Reference Value

- 97.5th percentile of U.S. children (ages 1-5)
- No safe level of exposure
- Potent neurotoxin
- Irreversible cognitive & behavioral harm

Main Sources of Exposure



Lead-based paint and dust in pre-1978 homes



Contaminated soil (especially near older buildings/roads)



Drinking water from lead pipes or plumbing

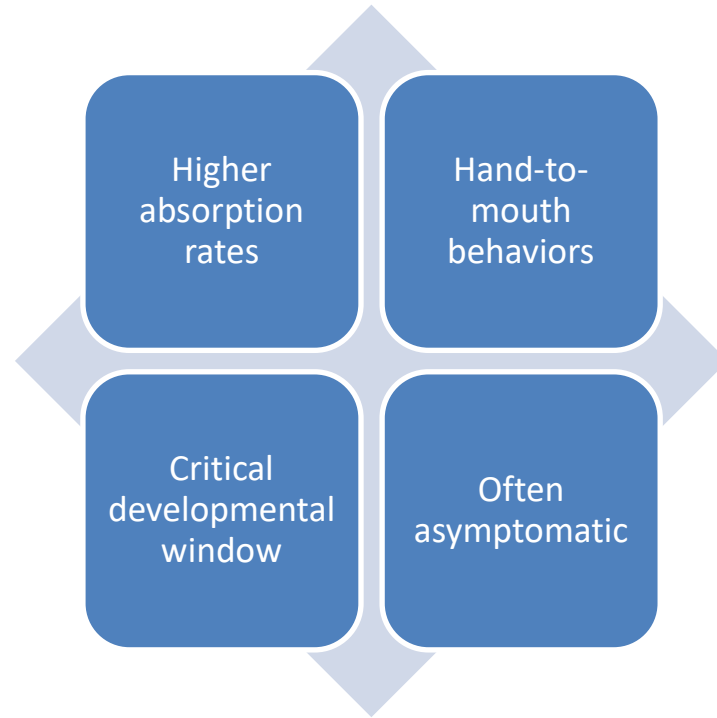


Imported products (toys, spices, cosmetics)



Take-home exposure from certain occupations

Why Focus on Children Under Six?



Local Context: Sedgwick County



Purpose



Examine

Examine childhood blood lead testing patterns



Identify

Identify geographic and provider-level gaps



Inform

Inform targeted prevention strategies

Objectives

- Analyze provider distribution using geographic information systems (GIS)
- Develop provider survey on knowledge and practices



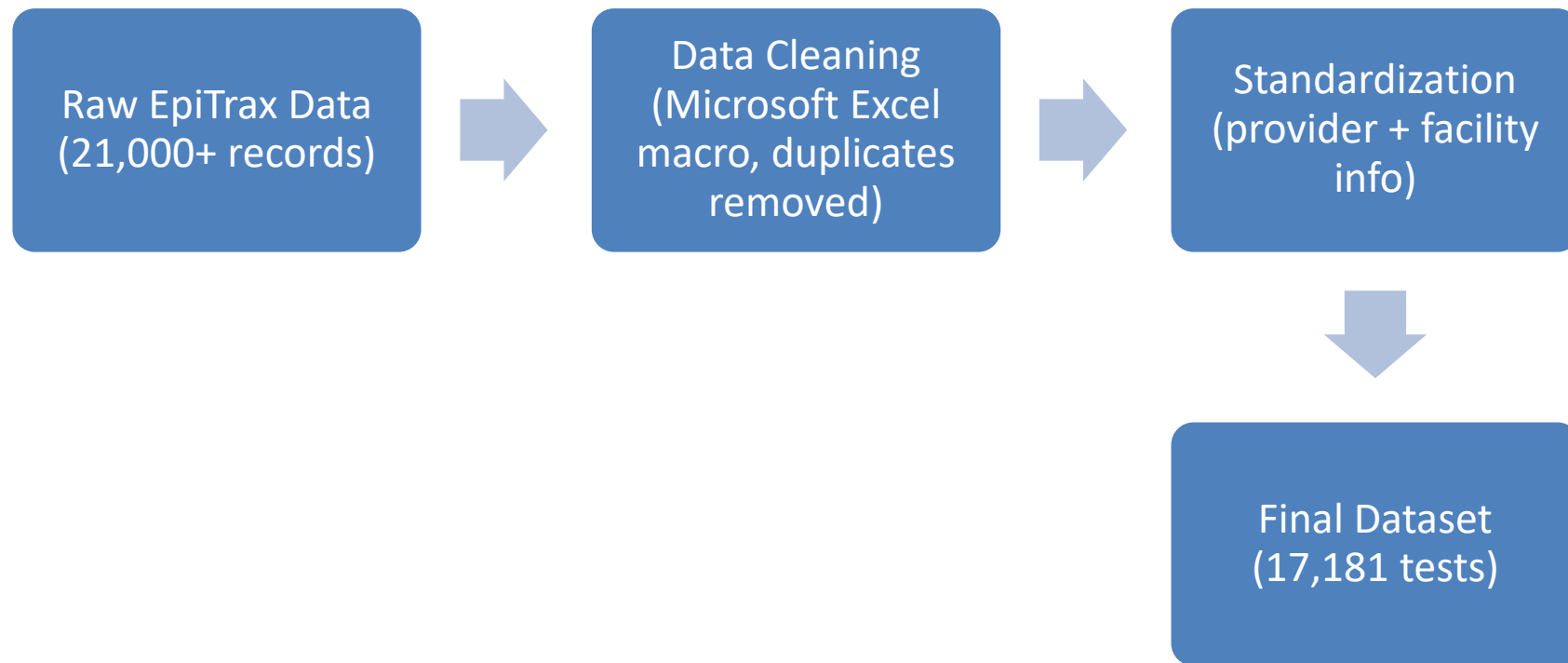
EpiTrax surveillance data

- Sedgwick County Health Department
 - 17,181 venous and capillary tests
 - The dataset included all reported childhood blood lead tests in Sedgwick County from January 1, 2022, through December 31, 2025.

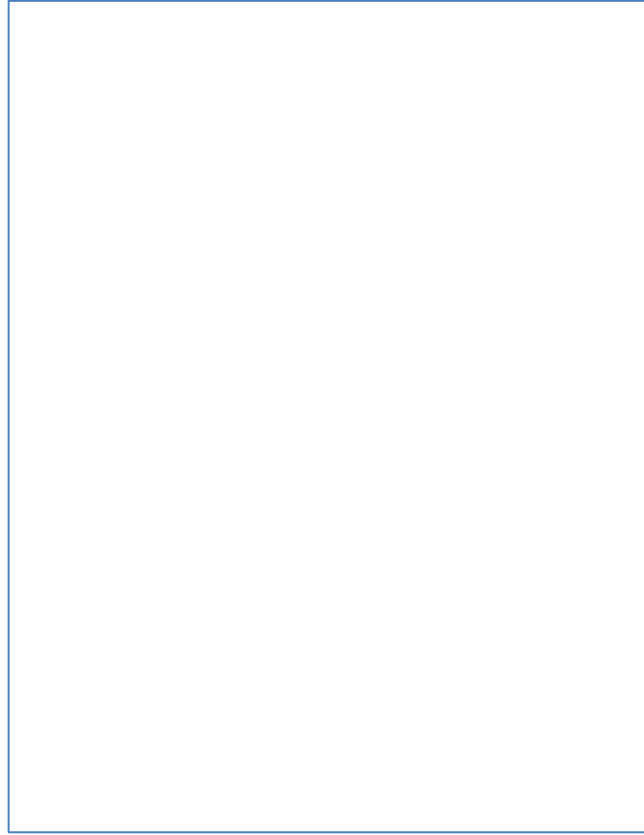


GIS mapping using ArcMap

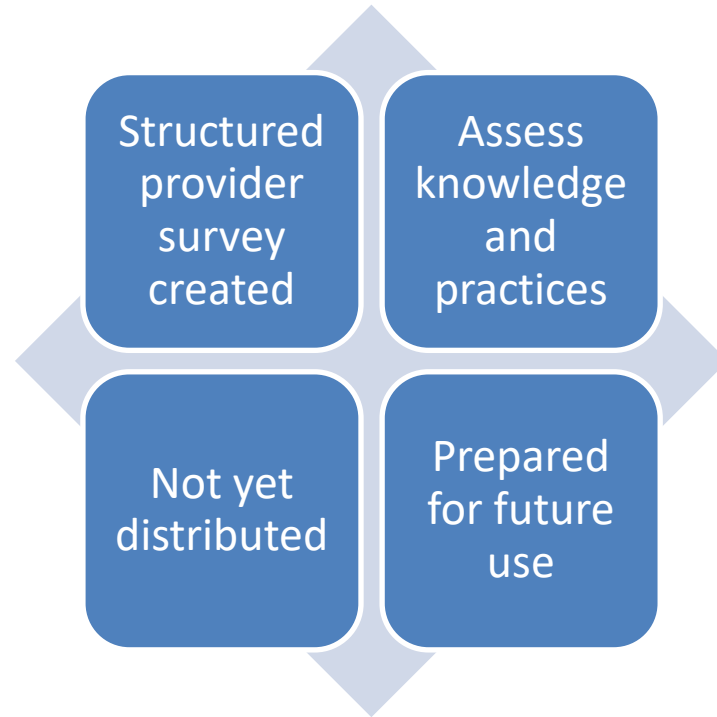
Methods: Data Processing



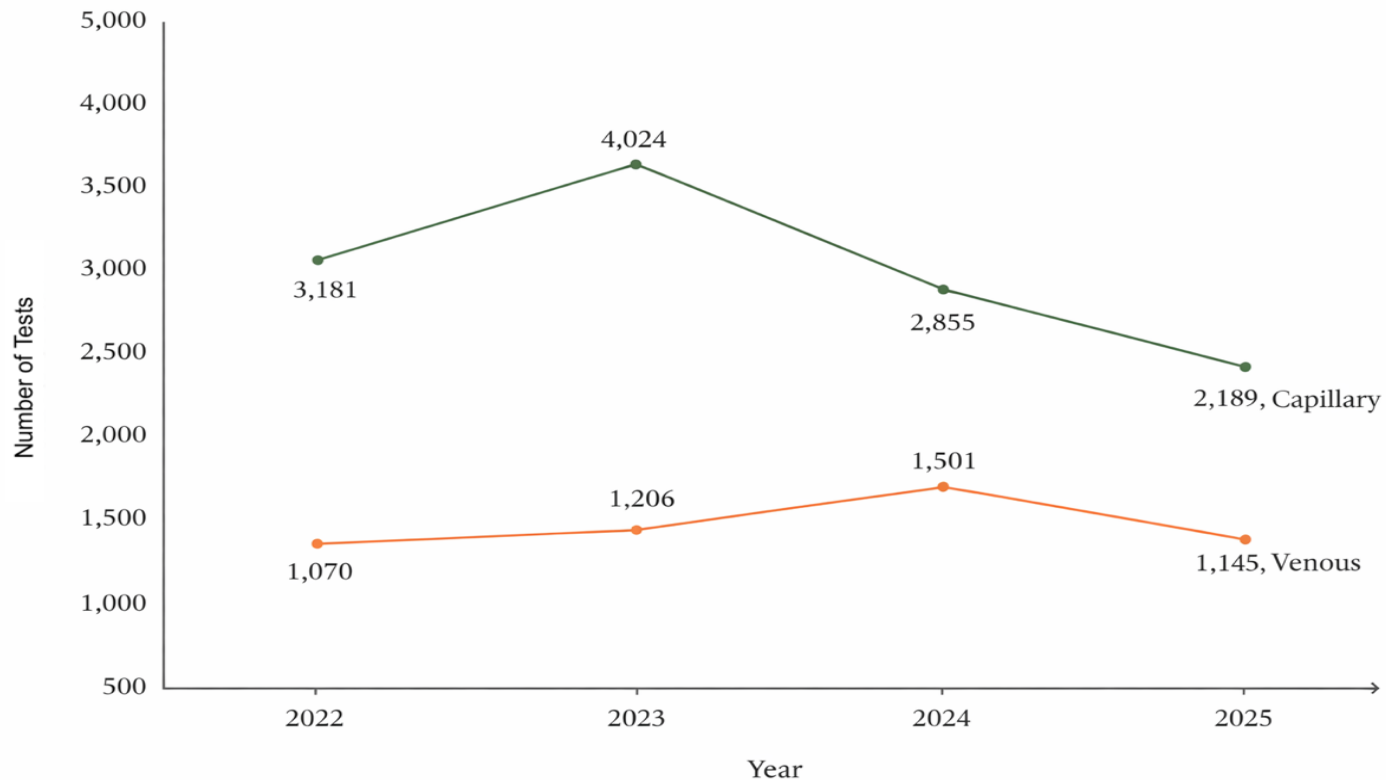
Product #1 – GIS Analysis & Map



Product #2- Survey Development



Results: Testing Volume



Results: Blood Lead Levels

Blood Lead Test Values

Provider ZIP Code	< 3.5 µg/dL (%)	3.5- 4.9 µg/dL (%)	≥ 5.0 µg/dL (%)	Total
67206	6,241 (97.8%)	85 (1.3%)	55 (0.9%)	6,381
67214	2,691 (85.7%)	160 (5.1%)	290 (9.2%)	3,141
67208	2,629 (95.4%)	55 (2.0%)	73 (2.6%)	2,757
67212	813 (96.7%)	11 (1.3%)	17 (2.0%)	841
67207	682 (94.2%)	20 (2.8%)	22 (3.0%)	724
67235	608	≤6	≤6	--
67218	541 (92.8%)	20 (3.4%)	22 (3.8%)	583
67037	512	≤6	≤6	--
67211	319 (92.5%)	16 (4.6%)	10 (2.9%)	345
67203	279 (94.3%)	8 (2.7%)	9 (3.0%)	296
67205	277	≤6	7	--
67219	201	13	≤6	--
67226	90	0	≤6	--
67204	71	6	≤6	--
67210	73	≤6	≤6	--
67215	59	≤6	≤6	--
67213	46	≤6	7	--
67052	36	≤6	8	--
67217	26	≤6	3	--
67216	28 (100%)	0 (0.0%)	0 (0.0%)	28
67110	≤6	≤6	0	--
67026	≤6	0	0	--
67060	≤6	0	0	--
Total	16,227	416	538	17,181

¹ Values are presented as n (%), where percentages represent the proportion of blood lead level tests within each ZIP Code relative to the ZIP-specific total. Data reflect total tests rather than unique children; some children received multiple tests during 2022–2025, which may overestimate the number screened and inflate elevated counts. Data exclude tests reported by laboratories outside Sedgwick County or at McConnell Air Force Base, and tests with unknown provider name. Cells with counts ≤6 were suppressed to protect confidentiality. Row totals were also suppressed where necessary to prevent back-calculation of small cell counts.

Number and Percentage of Childhood Blood Lead Tests by Provider Specialty in Sedgwick County, Kansas, January 1, 2022-December 31, 2025

Specialty	Count of Tests (%)
Pediatrics	6,872 (40.0%)
Family Medicine	3,787 (22.1%)
Surgery, Surgical Critical Care	423 (2.5%)
Infectious Disease	155 (0.9%)
Internal Medicine	6 (0.0%)
Otolaryngology	4 (0.0%)
Emergency Medicine	2 (0.0%)
Psychiatry & Neurology	2 (0.0%)
Unknown Specialty	5,930 (34.5%)
Total	17,181 (100.0%)

*Data exclude tests that had providers outside Sedgwick County or at McConnell Air Force Base, and tests with unknown provider name.

Provider Facility ZIP Codes Reporting Childhood Blood Lead Tests, Sedgwick County, Kansas, January 1, 2022-December 31, 2025



ZIP Code	Count (%) Providers
67214	236 (35.2%)
67208	76 (11.3%)
67218	60 (9.0%)
67206	56 (8.4%)
67211	39 (5.8%)
67212	36 (5.4%)
67205	26 (3.9%)
67213	18 (2.7%)
67207	15 (2.2%)
67037	15 (2.2%)
67235	13 (1.9%)
67215	13 (1.9%)
67204	12 (1.8%)
67217	11 (1.6%)
67203	9 (1.3%)
67052	9 (1.3%)
67226	8 (1.2%)
67210	7 (1.0%)
67216	6 (0.9%)
67110	2 (0.3%)
67026	1 (0.1%)
67060	1 (0.1%)
67219	1 (0.1%)
Total	670 (100.0%)

Key Findings

Testing reflects healthcare access, not exposure risk

Screening concentrated in a few provider ZIP Codes

Patterns influenced by system-level factors

Data structure impacts interpretation

Interpretation

- Patterns reflect access, not true exposure risk
- Higher counts do not equal higher exposure
- Healthcare distribution drives results
- Suggests screening gaps that may mask true exposure risk

Public Health Implications



Targeted provider
outreach needed



Place-based
prevention strategies



Integration with
housing systems

Recommendations



Annual GIS review



Provider education
and outreach



Implement survey



Improve data
reporting systems

Limitations

Provider-based (not residential) data

Incomplete provider data

Data exclusions impact trends

Test-level (not individual-level) data

APE Products & Core Competencies

Practice-based products that demonstrate competency attainment

Specific products	Competency
Provider survey; ZIP Code testing analysis and map	MPH Competency #1- Epidemiological principles were applied to examine screening patterns, surveillance gaps, and geographic variation in blood lead testing.
Provider survey; ZIP Code testing analysis and map	MPH Competency #3 - Quantitative surveillance data were analyzed using informatics and geographic mapping tools to examine pediatric blood lead testing patterns by ZIP Code. The provider survey was structured to generate analyzable quantitative and qualitative data, with response formats aligned to future statistical and thematic analysis.
Provider survey; ZIP Code testing analysis and map	MPH Competency #4 - The products were designed to support interpretation of analytic findings to identify gaps in testing coverage, provider knowledge, and screening practices, with the goal of informing public health practice, policy planning, and prevention strategies.
Provider survey; ZIP Code testing analysis and map	MPH Competency #7 - Provider-level needs, resources, and capacities related to childhood lead screening were assessed through the survey, while the ZIP Code analysis assessed geographic distribution of testing access and capacity across the community.
Provider survey; ZIP Code testing analysis and map	MPH Competency #9 - Both products were intentionally designed to inform population-based childhood lead prevention efforts, including targeted provider education, outreach strategies, and data-driven allocation of public health resources.

MPH Competencies: Synthesis and Integration

Competency	Description of Synthesis and Integration
MPH Competency #1 Apply epidemiological methods to settings and situations in public health practice	I applied epidemiological methods to examine pediatric blood lead testing patterns and exposure risk in Sedgwick County. I synthesized national guidance, peer-reviewed literature, and local surveillance data to analyze geographic variation, provider screening practices, and policy influences on blood lead testing. By integrating descriptive epidemiology with geographic priority mapping. By synthesizing epidemiologic findings with geographic context, I identified testing gaps and areas of elevated risk to inform targeted prevention strategies.
MPH Competency #4 Interpret results of data analysis for public health research, policy, or practice	I interpreted results from the analysis of pediatric blood lead testing and surveillance data to inform public health research and practice in Sedgwick County. I evaluated trends in testing volume, geographic distribution, and provider screening patterns to identify disparities and gaps in case ascertainment. By synthesizing quantitative findings with existing literature and policy guidance, I integrated the findings within broader prevention approaches and applied the combined evidence to develop concrete recommendations for provider engagement, targeted response efforts, and program development.
IDZ Competency # 3- Examine the influence of environmental and ecological forces on infectious diseases.	I examined how environmental and ecological forces influence disease distribution and risk by analyzing geographic, housing, and community-level conditions that shape population health outcomes. I interpreted spatial patterns and contextual factors to evaluate how place-based risks, resource distribution, and environmental conditions contribute to disease vulnerability. By synthesizing surveillance data with existing literature, I applied an ecological framework to understand how environmental determinants inform public health research, guide prevention strategies, and support targeted interventions.

Conclusion



GIS + surveillance = actionable insights



Identifies screening gaps



Supports data-driven action

Acknowledgements

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- Dr. Margaret Kincaid, PhD
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MPH Team:

- Plern Kongsamut

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- Kaylee Hervey, MPH
- Danielle Gauna, MPH
- Roxanne Greene, Lead Poisoning
Prevention Specialist





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