Are there Geographic or Site-Specific Trends in Adult Elevated Blood Lead Levels in South Carolina?

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Background

- Lead becomes toxic when it is used by humans in more concentrated forms.[1]
- For adults, the most common exposure to lead is through their places of employment.[2]
- Lead exposure can cause negative neurological, musculoskeletal, and gastrointestinal effects.[3]
- At levels below 10 µg/dL, lead exposure can increase the risk of hypertension and essential tremor, and even at levels below the current reference level of 5 µg/dL, lead exposure can decrease renal function.[2]

Objectives

- Examine trends in adult elevated blood lead levels (EBLL) by country or DHEC region.
- Determine if any medical facilities, businesses, residences, or apartment complexes had significantly higher percentages of adult EBLL tests.

Methods

- An EBLL was defined as BLL ≥5 µg/dL.
- Adult EBLL data (South Carolina Department of Health and Environmental Control) was cleaned in SAS 9.4 to isolate only the first test for each unique patient.
- The number of EBLL tests for each county was divided by the total number of BLL tests reported.
- The percentage of EBLL tests by county was linked to an SC county shapefile in ArcMap.
- The EBLL tests were sorted by street address, and each address with ≥10 unique individuals with an EBLL was flagged.
- Using Zillow and Google Maps, the flagged addresses were then classified a medical facility, a business, a residence, or an apartment complex.

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Results

Table 1: A Table Listing the Five Counties with the Highest Percent EBLL

County	Percent EBLL	DHEC Region
Abbeville	35.48	Upstate
Marion	26.98	Pee Dee
Chesterfield	25.46	Pee Dee
Newberry	20.59	Midlands
Darlington	20.00	Pee Dee

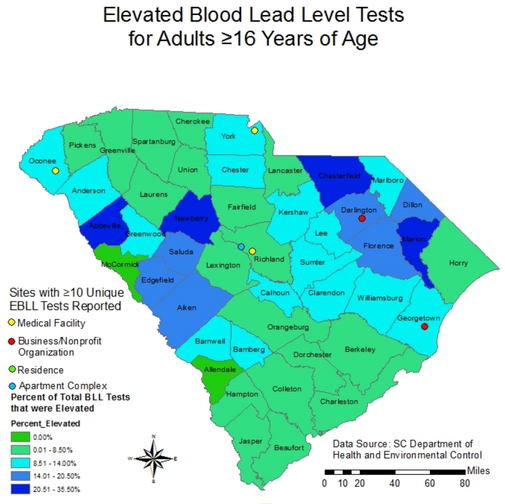
Table 2: A Table Showing the Mean Percent EBLL by DHEC Region

Percent EBLL	DHEC Region
8.93	Upstate
12.01	Midlands
15.74	Pee Dee
6.26	Lowcountry

Table 3: A Table Showing the Results of a One-Way ANOVA and Two Sample T-Tests Between Significant DHEC Regions

One-Way ANOVA	F-Value	P-Value
	4.6459	0.0068
Two-Sample Unpaired T-Tests	**T-Value**	**P-Value**
Midlands and Lowcountry	3.0286	0.0064
Pee Dee and Lowcountry	4.4887	0.0002

Image 1: A Map Showing the Percent EBLL by County and Sites Reporting ≥10 Unique EBLL Tests



- The Pee Dee DHEC Region had the highest mean percent of EBLL tests, as well as both business sites flagged for ≥10 unique EBLL tests.
- The Lowcountry had the lowest mean percent of EBLL tests and zero sites flagged for ≥10 unique EBLL tests.

Results Continued

- The percent of EBLL by county ranged from 0.00 (McCormick, Allendale) to 35.48 (Abbeville).
- Of the five counties with the highest percent EBLL, three were in the Pee Dee, one was in the Upstate, and one was in the Midlands.
- The Lowcountry had the lowest mean percent EBLL, and the Pee Dee had the highest.
- There were six sites that had ≥10 unique EBLL tests reported: three medical facilities, two businesses, and one apartment complex.
- Of the six sites, three were in the Midlands, two were in the Pee Dee, and one was in the Upstate.
- Both businesses belong to industries known to have higher risks of lead exposure.

Conclusions

- These analyses provide preliminary evidence of a geographic association between the mean percent of EBLL tests and DHEC region. For the two businesses flagged, it may be beneficial to perform environmental assessments, and for the three medical facilities flagged, it may be advantageous to send a Health Alert Network Health Update to remind providers of proper BLL reporting techniques.

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