

Prevalence and Geographic Distribution of Elevated Blood Lead Levels in Pregnant Women in Indiana

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Background: Prenatal lead exposure increases the risk of pregnancy complications and results in fetal neurodevelopmental damage. Despite well-documented risks, most clinicians predominantly rely on risk-based screening rather than on universal lead testing. The study aim was to measure whole blood lead levels (BLL) in pregnant women from parts of Indiana and explore associations with maternal age, residential zip code, and median household income (MHI).

Methods: Remnant whole blood (WB) samples collected during routine antenatal care and submitted to Indiana University Health Pathology Laboratory between May - July 2025 were analyzed. Samples were prepared by mixing 20 μ L of WB with 1 mL of solution A (1% ethanol, 0.5% ammonium hydroxide, 0.02% TritonX-100, and 0.01% nitric acid). The mixture was then vortexed and further diluted with 3.98 mL of solution B (0.5% nitric acid) followed by analysis on Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). A BLL of ≥ 1 μ g/dL was classified as elevated. Age and zip codes were extracted from electronic health records.

Results: Among 548 samples analyzed, 37 (6.8%) had BLL >1 μ g/dL; two samples were between 3.6 to 5 μ g/dL, and four samples were >5 μ g/dL. The following table shows BLL >5 μ g/dL with corresponding zip codes, county names, and MHI.

BLL (μ g/dL)	Zip Code	County Name	MHI (\$)
6.67	46902	Howard County	59,548
6.71	47581	Martin County	56,864
10.55	46040	Hancock County, with overlap into Hamilton County & Madison County	144,834
15.96	46074	Hamilton County	123,580

Participants were also grouped by age, and higher age was positively correlated with lead levels (ANOVA $p < 0.05$).

Conclusion: Nearly seven percent of the sampled population had elevated BLL. Our findings suggest that Indiana clinicians should continue to surveil for lead exposure and increase communication with their patients about potential sources of lead exposure in the environment.