

(Not So New) Connection between Lead and Maternal Mortality/Morbidity

Isles

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Isles Inc.

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Isles Mission

To create the environment necessary for people and communities to grow and thrive.



Main Points

- An important body of research is missing from the conversation about disparities of maternal child mortality/morbidity outcomes by race: the impact of blood lead levels during pregnancy and the postpartum period.
- Research about the impact of lead on pregnancy and one-year postpartum.
- Partnership with NJ DOH Eric Bind, MPP
- Actions to translate research to action:
 - Legislation
 - Education campaigns
- Discuss other actions



Collaboration

- Robyn D'Oria—Central Jersey Family Health Consortium/ Preeclampsia Foundation/ Stillbirth Prevention campaign
- Eric Bind, Project Director, NJ DOH Biomonitoring Project
- Brian Buckley, PH.D -- director of Rutgers University Environment and Occupational Health Science Institute (EOHSI)
- Adrienne Ettinger, Ph.D—chief of staff and director of Research/ Rutgers Health/former division chief for lead @ CDC
- Dr. Kemi Alli, pediatrician---25-year director of Henry J. Austin Health center
- Dr. Diane Calello—pediatrician, director of NJ Poison Center
- Lead Free NJ (many partners)
- The Cooperative (many partners)



NYT Quote of the Day



“If you were going to put something in a population to keep them down for generations to come, it would be lead.”

(NYT January 30, 2016)

Dr. Mona Hanna-Attisha, of Flint MI, who has studied lead poisoning and the effects of lead exposure, for which there is no cure.



Lead, Race and Inequality

Lead toxicity ...is a pathway through which racial inequality literally gets into the body.

Dr. Robert Sampson, Harvard Researcher. 2016

https://scholar.harvard.edu/files/alixwinter/files/sampson_winter_2016.pdf

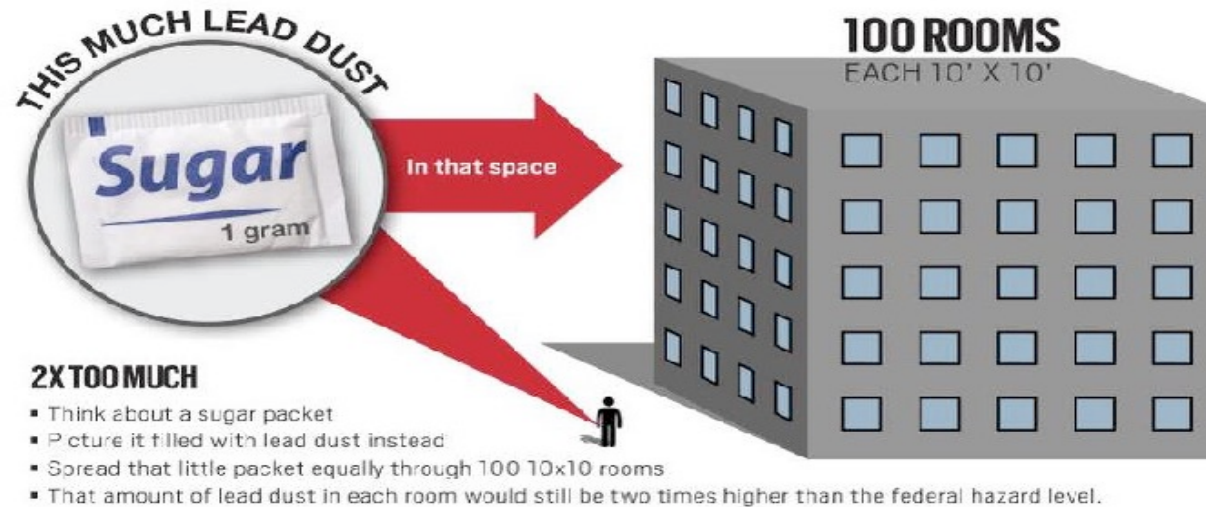


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Self-Reliant Communities

How Much Lead Dust?

HOW MUCH LEAD IS DANGEROUS?

Even low levels of lead exposure can damage the nervous system, and high levels of exposure can lead to coma or death. The Centers for Disease Control and Prevention say there is no safe blood lead level in children. Paint containing lead can deteriorate or chip, leaving traces of lead dust at dangerous levels.



Lead Exposure is Cumulative

It typically comes from these main sources.

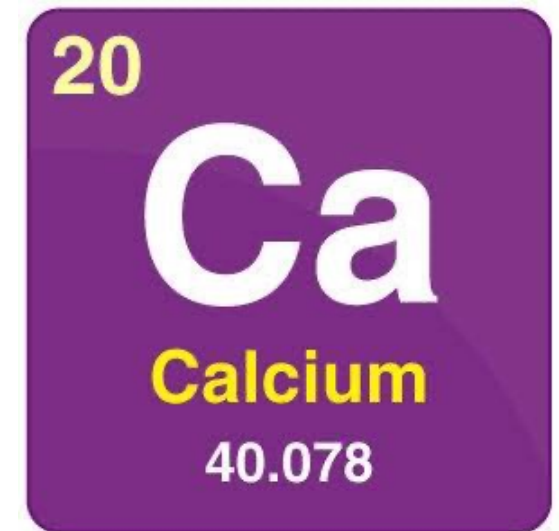
We don't test children past age 2 or 6

We don't typically test adults or pregnant persons



Key Facts about Lead in the Body

- Lead competes with calcium in the body and can also replace calcium, with serious long-term consequences for adult health
- The half-life of lead varies from about a month in blood, 1-1.5 months in soft tissue, and about 25-30 years in bone (ATSDR 2007).
- Lead in bone is considered a biomarker of cumulative exposure because **lead accumulates in bone over the lifetime** and most of the lead body burden resides in bone.
- In a lead burdened pregnant woman, lead is pulled from the bone where calcium should be if the woman is NOT lead burdened.



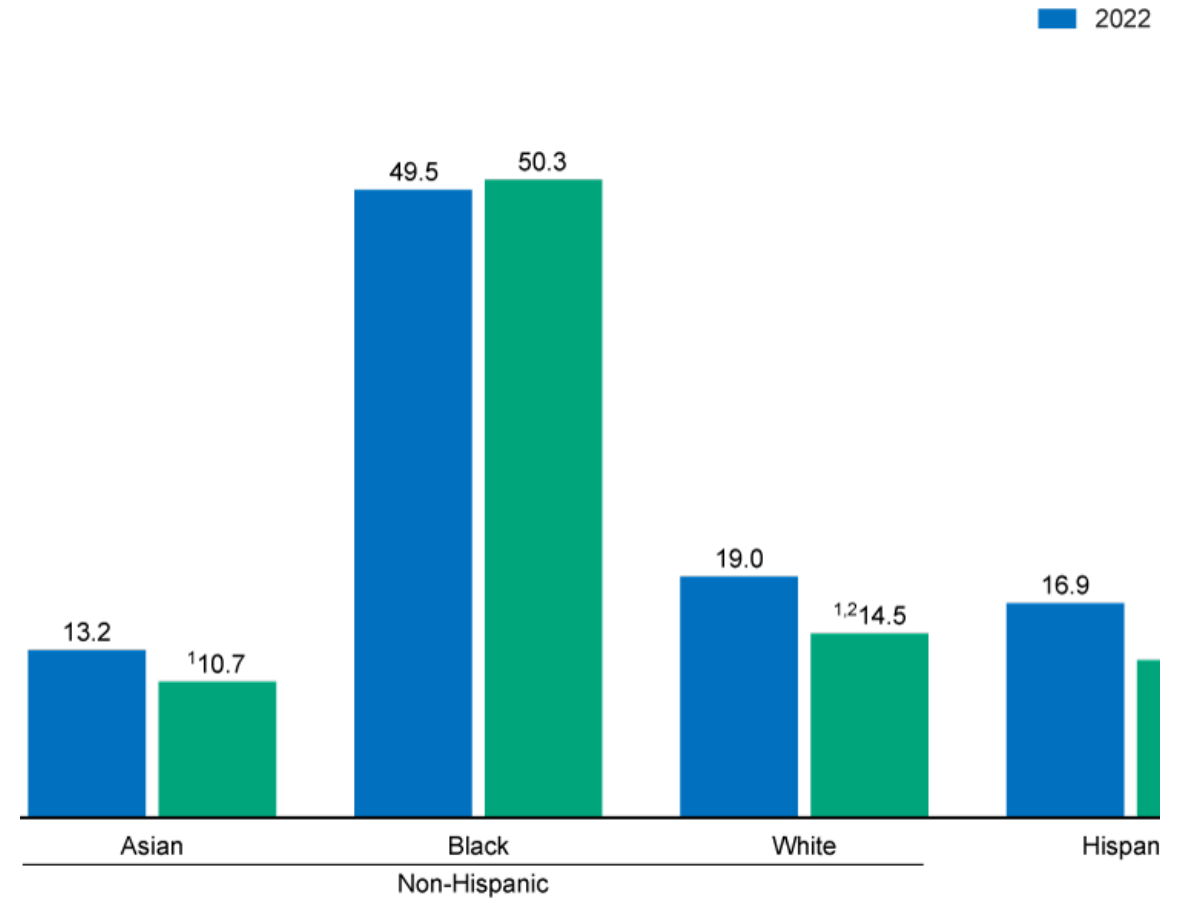
National Data on Maternal Mortality Health Disparities

In 2023, the maternal mortality rate for Black women was 50.3 deaths per 100,000 live births and was significantly higher than rates for White (14.5), Hispanic (12.4), and Asian (10.7) women.

<https://www.cdc.gov/nchs/data/hestat/maternal-mortality/2023/maternal-mortality-rates-2023.htm#fig2>

- Rates for Black women were significantly higher than rates for White and Hispanic women.

Maternal mortality rate, by race and Hispanic origin: United States, 2022 and 2023



Significant difference from Black non-Hispanic women ($p < 0.05$).
Significant decrease in rate from previous year ($p < 0.05$).
Rates are single race. People of Hispanic origin may be of any race.
Source: Center for Health Statistics, National Vital Statistics System, mortality data file.

New Jersey - Black Maternal Mortality Health Disparities

New Jersey is ranked 29th in the nation for maternal deaths^[1] and has one of the widest racial disparities for both maternal and infant mortality. A Black mother in New Jersey is almost seven times more likely than a white mother to die from maternity-related complications.

Leading causes of NJ Black Maternal Mortality.

- Preeclampsia
 - Cardiomyopathy
 - Embolism
 - Bleeding/hemorrhaging
-
- Lead is associated with each of these conditions

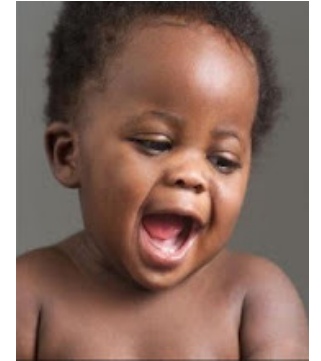


Childhood Lead Exposure Disparity

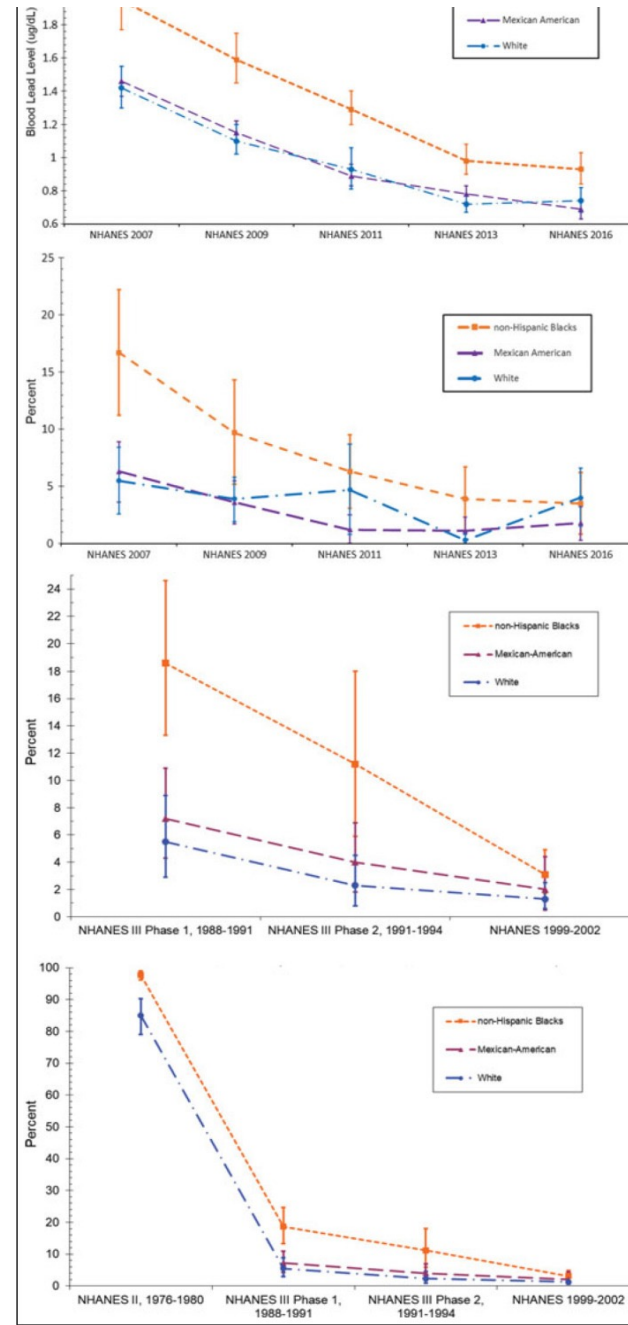
- Non-Hispanic Black children, those living in low-income households, and those who are immigrants or refugees, are more likely to live in communities where lead is pervasive.
- <https://www.cdc.gov/nceh/lead/data/healthy-people-objectives.htm#:~:text=Non%2DHispanic%20Black%20children%2C%20those,risk%20of%20exposure%20to%20lead.>
- Researchers report that Black children have the highest blood lead levels in the United States compared with other racial groups. The authors state this is largely due to greater exposure to lead through water, air, soil, and industrial emissions in the living environment. <https://www.medicalnewstoday.com/articles/history-of-lead-poisoning-in-black-communities#:~:text=In%20a%202020%20article%20%2C%20researchers,emissions%20in%20the%20living%20environment.>

NJ Black Infant Mortality

- Black mothers in NJ are 3.6 times more likely to lose their babies in the first-year post-birth than white women.
- <https://www-doh.state.nj.us/doh-shad/indicator/view/EPHTInfMort.RaceEth.html>
- Black infants are four times as likely to die from complications related to low birthweight as compared to non-Hispanic white infants.
- <https://minorityhealth.hhs.gov/infant-mortality-and-african-americans>
- If a pregnant woman is exposed to lead, the lead in her blood can easily cross the placenta to the fetus. High lead blood levels during pregnancy increase the risk of miscarriage and can make the baby be born early or at a low birth weight
- <https://kidshealth.org/en/parents/lead.html#:~:text=If%20a%20pregnant%20woman%20is,cause%20behavior%20and%20learning%20problems.>



Place holder



s 1

Lead and Preeclampsia

Meta-analysis---<https://pubmed.ncbi.nlm.nih.gov/28938191/>)

- **Conclusions:** Blood lead concentrations in pregnant women are a major risk factor for preeclampsia,, which appears to be the strongest risk factor for preeclampsia yet reported. Pregnant women with historical lead exposure should routinely have blood lead concentrations tested, especially after mid-term. Women with concentrations higher than 5µg/dL should be actively monitored for preeclampsia and be advised to take prophylactic calcium supplementation. All pregnant women should be advised to actively avoid lead exposure.
- There is no safe level of lead!



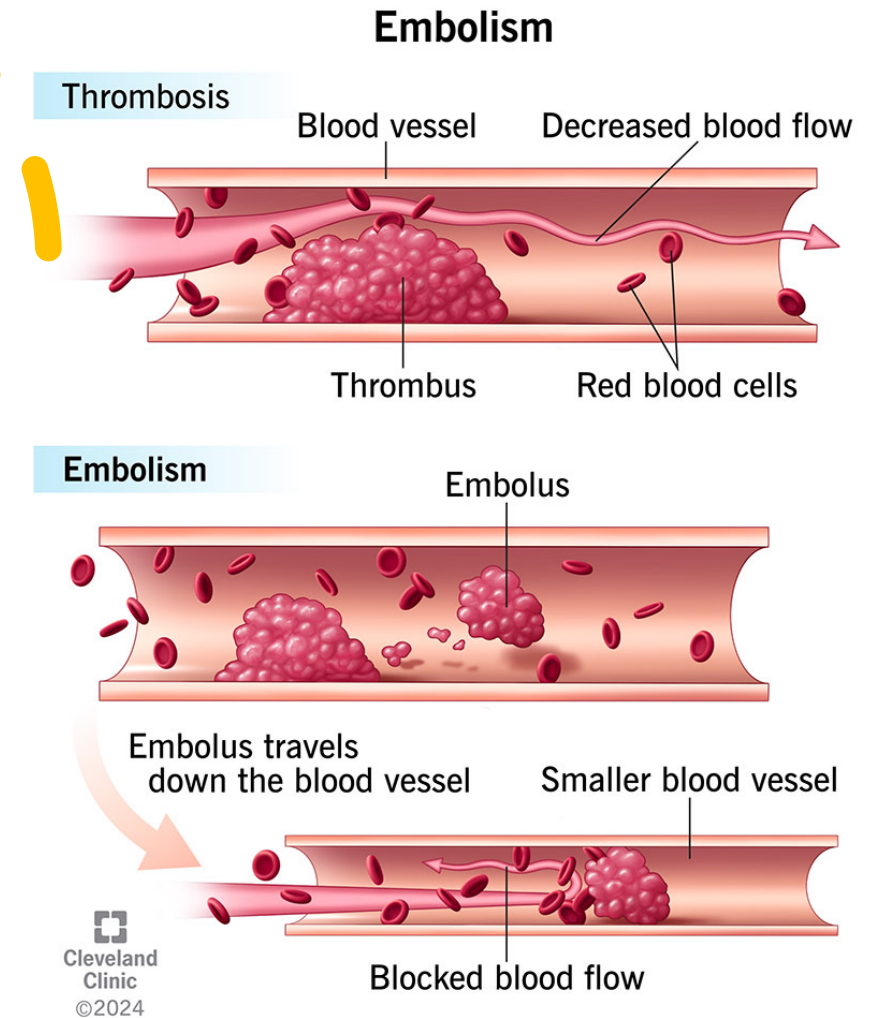
How Preeclampsia Leads to Eclampsia

- <https://www.nichd.nih.gov/health/topics/preeclampsia#:~:text=In%20preeclampsia%2C%20the%20mother's%20high,preeclampsia%20develop%20seizures%20or%20coma.>
- In preeclampsia, the mother's high blood pressure reduces the blood supply to the fetus, which may get less oxygen and fewer nutrients.
- Eclampsia is when pregnant women with preeclampsia develop seizures or coma.



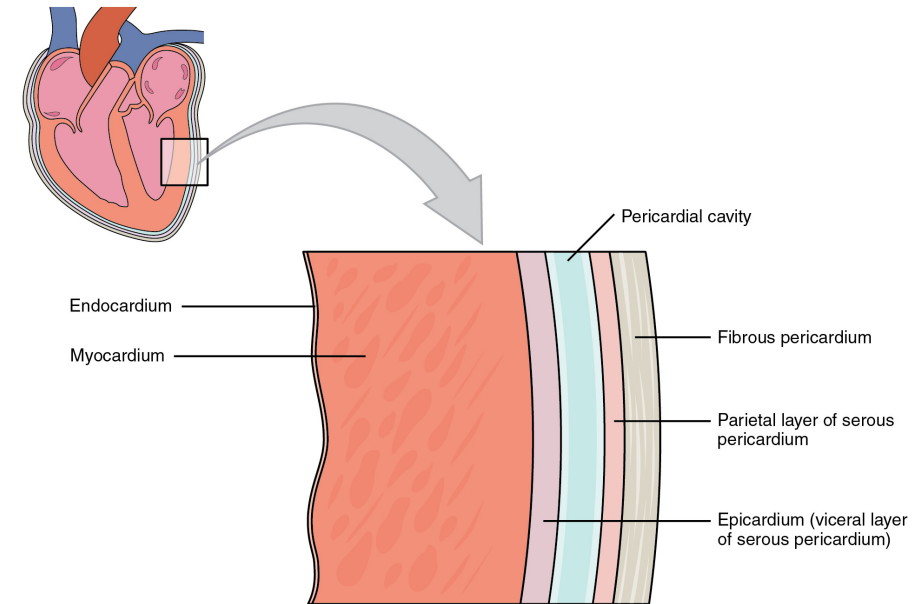
Lead and Embolism/Clot Formation

- **Abstract** -- <https://pubmed.ncbi.nlm.nih.gov/17226925/>
- [a]bout 95% of lead is associated with erythrocytes, [red blood cells] suggesting that erythrocytes could be an important target of lead toxicity in the cardiovascular system. Recent studies suggested that **erythrocytes could contribute to blood coagulation** via phosphatidylserine (PS) exposure and resultant procoagulant activation.
- The concentration of lead (1-5 microM) used in the current investigation is well within the ranges observed in blood from lead-exposed populations.
- **These results suggest that lead exposure can provoke procoagulant activity in erythrocytes by PS exposure, contributing to enhanced clot formation.** These data will provide new insights into the mechanism of lead-induced cardiovascular diseases.



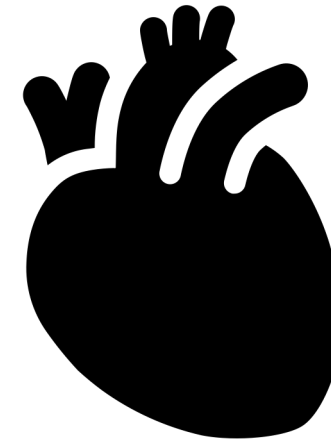
Lead and Cardiomyopathy

- <https://www.sciencedirect.com/science/article/pii/S2666084920306136#:~:text=The%20development%20of%20cardiomyopathy%20due,t he%20cardiotoxic%20mechanisms%20of%20le ad> .
- The development of cardiomyopathy – when the heart does not deliver blood to throughout the body---due to chronic lead exposure is most likely secondary to its direct toxic effect on the myocardium.



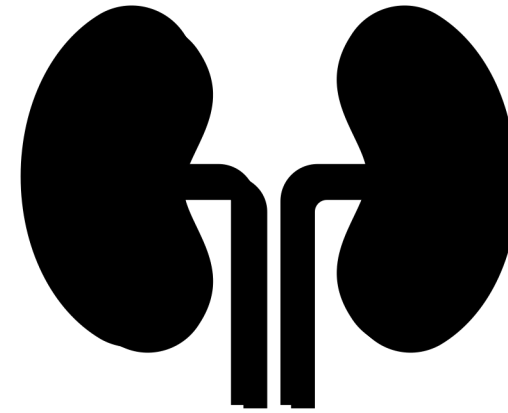
Lead and Cardiovascular Disease

- [https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667\(18\)30043-4/fulltext](https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(18)30043-4/fulltext)
- **Lead has a much greater effect on cardiovascular mortality than previously** recognized.
- Lead accounts for more than 400,000 deaths annually in the USA represents **a tenfold increase** over the number of deaths currently ascribed to lead.
- **Lead has long been recognized to be a cause of hypertension and a risk factor for heart disease, stroke, and chronic kidney disease.**⁹



Lead and Kidney Disease Complicated by Hypertension → Adverse Pregnancy Outcomes

- Lead exposure can potentially cause both acute and chronic kidney damage.
- The major causes of kidney disease.....hypertension, and cardiovascular disease, are all more prevalent among Black Americans. <https://www.kidney.org/advocacy/legislative-priorities/health-disparities>
- Preeclampsia is more common in women with kidney disease
- Increased risk of anemia
- Increased risk of end-stage renal disease
- Additional challenges if on dialysis



Lead and Internal bleeding

- <https://www.mountsinai.org/health-library/poison/lead-poisoning#:~:text=Very%20hig.>
- High lead levels may cause internal bleeding, staggering walk, muscle weakness, and seizures

Dr. Brian Buckley: Rutgers University/ EOHSI

“The data confirms high lead levels in the blood of a pregnant woman makes the usual risks of pregnancy worse.”



Translating Research
to Action:
Informed Use of Data

Presentations



NURTURE NJ



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Pending Legislation: NJ A-4848 & S-3616

- **Provider responsibility**

- The bill requires a physician or registered professional nurse to assess each pregnant person for possible risk factors for lead exposure and elevated blood lead levels
- If they identify at least one risk factor, they must perform lead screening on the patient
- If a provider receives laboratory test results indicating elevated blood lead level, they must:
 - Notify the patient
 - Provide an explanation
 - Ensure that any of the patient's household members <6 are screened for lead
- First visit and 3rd trimester screening
- *Patient may refuse test



- **Laboratory responsibility**

- The laboratory must report the results to NJDOH, the local health department, and the provider within 5 days

- **NJDOH shall adopt rules and regulations necessary to carry out the provision of the act**

Seeking NJDOH/ACOG/NJAAP Clinical Guidance

- Call for universal screening of lead during pregnancy because lead affect pregnant person, fetus and infants. "You don't know unless you test."
- <https://pubmed.ncbi.nlm.nih.gov/39352032/>
- First test: earliest prenatal visit---
 - is there lead in pregnant person's current environment?
- Second test: beginning third trimester of pregnancy
 - Has lead remobilized from the bone?
 - Has the person's environment changed such that new lead exposure has occurred?

Expansion of NJ Biomonitoring Study

- Expansion of program to St. Peter's University Hospital and Capital Health System.
- Data: 24% of Newark women had lead levels $\geq 1\mu\text{g}/\text{dL}$. 13% of babies are in a range that could result in adverse health outcomes (small heads/stomachs, low birth weight, shorter heights, and much more).
- Remember: there is no safe lead level.



- Add question about ***childhood*** lead exposure to Perinatal Risk Assessments
- Even better: Universal screening for lead 2x during pregnancy

FVF Page 1 of 2

Educate Educate Educate

The Cooperative is leading the creation of two campaigns:

“In collaboration, the Regional Childhood Lead Poisoning Prevention Coalitions, the Prematurity Prevention Initiative, and other New Jersey stakeholders are spearheading a campaign focusing on the importance of lead poisoning prevention and testing during pregnancy.”

Campaign theme: **(Draft) Toxic Truths: How to Protect You and Your Baby**

- Public-facing campaign: community members, pregnant persons, women of childbearing age
- Healthcare Provider Campaign: Physicians and healthcare providers, Clinical and environmental professionals
- Development of website, powerpoint presentations
- Handouts in multiple languages
- Webinars

Special thanks to leaders Lauryn Tilghman, Nudar Chowdry, Kelly Danielson, Michaela Knoll.



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NEXT....

- When our education and practice changes are underway for lead and maternal child health → → →
- Start campaigns of education about lead's role in adult health: kidney and cardiovascular disease, dementia, AND more.



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