

Lead Poisoning and Pregnancy: Understanding risks and preventing harm for immigrant women, adolescents of child- bearing age, & their infants

November 6, 2023

Minnesota Center of Excellence in Newcomer Health

Acknowledgment

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Today's Speakers



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Poll Question

State your profession:

- A. Clinician (physician, nurse practitioner, PA), Ob/Gyn
- B. Clinician, Primary Care
- C. Nurse
- D. Public health
- E. Resettlement agency

Learning Objectives

- Identify who is at risk for elevated lead
- Understand the effects of lead on pregnant women and the fetus
- Understand ACOG guidelines for prenatal lead screening
- Understand best practices for ordering and obtaining lead samples
- Know how to care for a pregnant or lactating patient with an elevated blood lead level
- How to counsel the Afghan community about lead



What are the effects of lead on pregnant and lactating women?



Creative Commons



Centers for Disease Control and Prevention (2022)

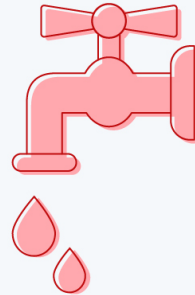
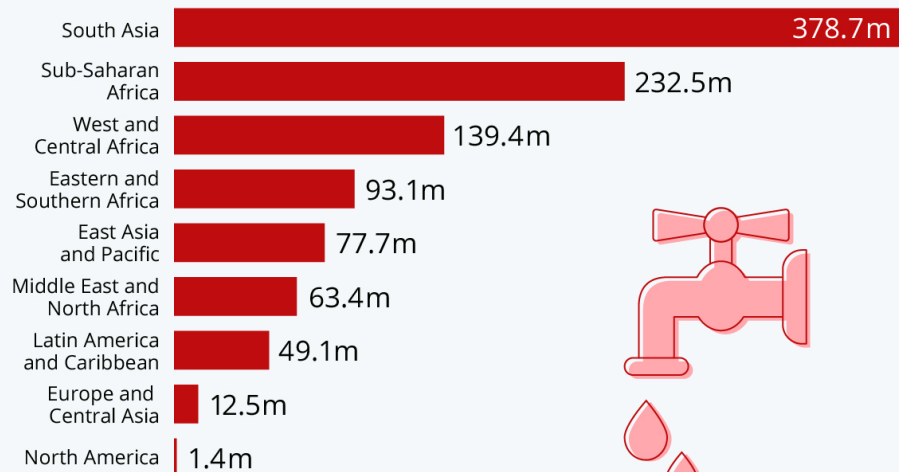
What are the effects of lead on pregnant and lactating women?

- Lead easily crosses from the mother to the developing infant (through the placenta)
- High maternal lead levels increase the risk of spontaneous abortion, low birth weight, and gestational hypertension
- Elevated blood lead levels in breast feeding women can result in lead in breastmilk
- The main target of lead toxicity is the nervous system
- This can affect the infant's development

Statistics

A Third Of The World's Children Are Affected By Lead Poisoning

Estimated number of children with blood lead levels at/above 5 micrograms per deciliter ($\mu\text{g}/\text{dL}$)*



* Lead blood level requiring action.

Source: UNICEF

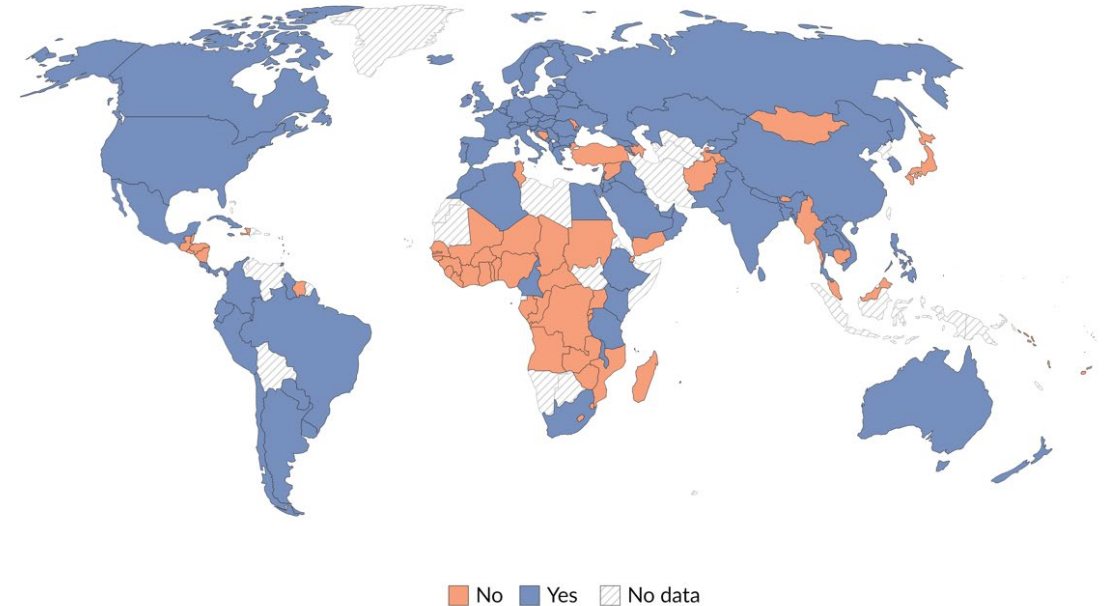


statista

Which countries have legally-binding controls on lead paint?

Our World in Data

Paint is a main contributor to harmful lead exposure. The stringency of controls on lead paint can vary by country. Maximum concentrations of lead can differ, and may only apply to particular types of paint (for example, products used in households).



Data source: World Health Organization (2023)

OurWorldInData.org/lead-pollution | CC BY

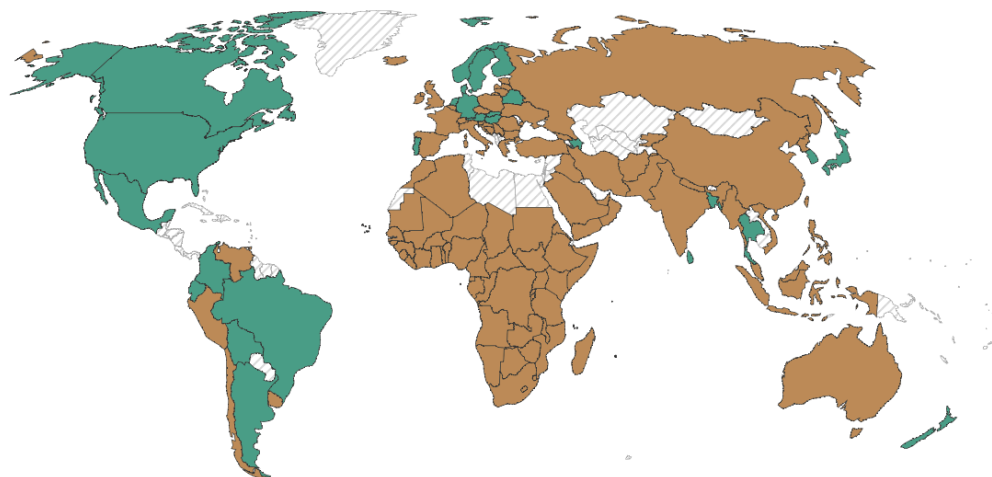
Removal of lead from gasoline

Global phase-out of leaded petrol in road vehicles, 1999

All countries have banned the use of leaded petrol in road vehicles. Algeria was the final country to do so in 2021.

Our World
in Data

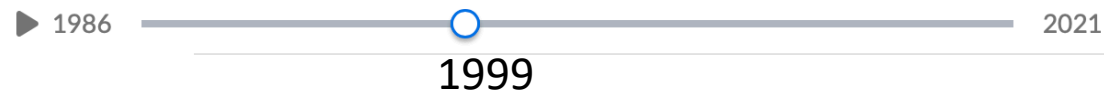
World



■ Still in use ■ Banned ▨ Unknown year of ban

Source: Collected by Our World in Data based on multiple sources

Note: The specific date of phase-out could not be found for some countries, but all countries have banned its use.
OurWorldInData.org/lead-pollution • CC BY



- U.S. removed lead from gasoline in 1986
- As of 1999, most of Africa and Asia still had lead in gasoline
- 2021 – most countries have banned lead from gasoline (some do not provide data)
- Afghanistan removed lead in 2016, Algeria was the last country, in 2020

From ourworldindata.org

11/6/2023

Poll Question – who needs lead screening?

You are seeing a newly arrived Afghan family: an 18-month-old and 5-year-old boys, 13-year-old and 17-year-old girls, and their pregnant 36-year-old mother.

Who should be screened for lead?

- A. The 18-month-old
- B. The 18-month-old and their mother
- C. The 18-month-old, 5-year-old, 13-year-old and their mother
- D. All of them

Case

You are seeing a newly arrived Afghan family: an 18-month-old and 5-year-old boys, 13-year-old and 17-year-old girls, and their pregnant 36-year-old mother.

- What guidelines would you use to decide who in this family to screen for lead?

Who Needs Lead Screening?

- For newly arrived immigrants, we recommend lead screening for all pregnant or lactating adolescent girls and adult women
[CDC: Screening for Lead during the Domestic Medical Examination for Newly Arrived Refugees \(www.cdc.gov/immigrantrefugeehealth/guidelines/lead-guidelines.html\)](https://www.cdc.gov/immigrantrefugeehealth/guidelines/lead-guidelines.html)
- CDC Division of Quarantine and Migration updated blood lead screening guidance in 1/2020 and recommended testing of all infants, children, and adolescents 0-16 years as well as any pregnant or breast feeding female
- Consider lead screening on an individual basis for all other adolescents and adult women
- If any risk factors are identified, perform lead screening at the earliest opportunity
- If screening is missed during pregnancy, screen postpartum

Why are newcomers at risk?

- Environmental causes in country of origin:
 - Leaded gasoline still in use in Afghanistan until 2016
 - Lead paint still in use in many countries
- Occupational exposures:
 - Working in mines, ammunition manufacturing, smelters, or battery recycling facilities
- Household items:
 - Care batteries used for household electricity, lead-glazed pottery, pewter or brass utensils or cooking pots, pressure cookers, leaded crystal, and chipped or cracked dishes
 - Use or consumption of products contaminated with lead such as traditional remedies, herbal supplements, spices, candies, cosmetics, and jewelries or amulets

Lead Screening During Pregnancy and Lactation

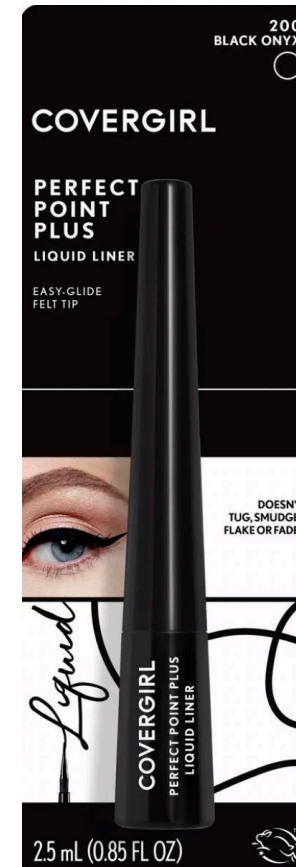
Committee Opinion ⓘ | Number 533 | August 2012

Risk Factors for Lead Exposure in Pregnant and Lactating Women

- Recent emigration from or residency in areas where ambient lead contamination is high – women from countries where leaded gasoline is still being used (or was recently phased out) or where industrial emissions are not well controlled.
- Living near a point source of lead – examples include lead mines, smelters, or battery recycling plants (even if the establishment is closed)
- Using lead-glazed ceramic pottery – women who cook, store, or serve food in lead-glazed ceramic pottery made in a traditional process and usually imported by individuals outside of the normal commercial channels
- Using imported cosmetics or certain food products – women who use imported cosmetics, such as kohl or *surma* or certain imported foods or spices that may be contaminated with lead.
- Using alternative or complementary substances, herbs, or therapies – women who use imported home remedies or certain therapeutic herbs traditionally used by East Indian, Indian, Middle Eastern, West Asian, and Hispanic cultures that may be contaminated with lead

[ACOG: Lead Screening During Pregnancy and Lactation \(www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2012/08/lead-screening-during-pregnancy-and-lactation\)](https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2012/08/lead-screening-during-pregnancy-and-lactation), Accessed 9/12/2023

Surma/Kohl-common source of lead



Other lead sources



Spices – including turmeric.



Many candies from Asia and Southeast Asia may contain lead

How to Order Lead Screening?

- Venous sample
- Usually ordered as “Lead”, “Lead, Blood”, or similar.
- CPT code 83655 (lead)

- Sample Lab Order

Lead (Venous)

Test code: 599

Clinical use

- Detect lead exposure and/or toxicity
- Monitor lead detoxification

Case—What else would you recommend?

- 36-year-old G5P4 mother
- Check lead level
- Prescribe a prenatal or multivitamin with adequate iron, calcium and phosphorous

What To Do If Results Are Abnormal?

- Goal of <3.5 mcg/dl
- ACOG document from 2012 (reaffirmed 2016) has not been updated and still uses the old threshold of 5 mcg/dl

[ACOG: Lead Screening During Pregnancy and Lactation \(www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2012/08/lead-screening-during-pregnancy-and-lactation\)](http://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2012/08/lead-screening-during-pregnancy-and-lactation)

11/6/2023

Table 1. Frequency of Maternal Blood Lead Follow-up Testing During Pregnancy ↔

Venous Blood Lead Level* (micrograms/dL)	Perform Follow-up Test(s)†
Less than 5	<ul style="list-style-type: none">• None (no follow-up testing is indicated)
5–14	<ul style="list-style-type: none">• Within 1 month• Obtain a maternal blood lead level‡ or cord blood lead level at delivery
15–24	<ul style="list-style-type: none">• Within 1 month and then every 2–3 months• Obtain a maternal blood lead level‡ or cord blood lead level at delivery• More frequent testing may be indicated based on risk factors
25–44	<ul style="list-style-type: none">• Within 1–4 weeks and then every month• Obtain a maternal blood lead level‡ or cord blood lead level at delivery
45 or more (urgent but rare)	<ul style="list-style-type: none">• Within 24 hours and then at frequent intervals depending on clinical interventions and trend in blood lead levels• Consultation with a clinician experienced in the management of pregnant women with blood lead levels in this range is strongly advised• Obtain a maternal blood lead level or cord blood lead level at delivery

Updated CDC recommendations for all populations

Table 2: Schedule for Follow-Up Blood Lead Testing

Venous blood lead levels ($\mu\text{g}/\text{dL}$)	Early follow up testing (2–4 tests after initial test above specific venous BLLs)	Later follow up testing after BLL declining
≥ 3.5 –9	3 months*	6–9 months
10–19	1–3 months*	3–6 months
20–44	2 weeks–1 month	1–3 months
≥ 45	As soon as possible	As soon as possible

[CDC: Recommended Actions Based on Blood Lead Level \(www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm\)](http://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm)

What About Lactation?

- Initiation of breastfeeding “should be encouraged” if lead level is less than 40 micrograms per deciliter
 - If 40 or higher, pump and discard milk, recheck every 1-2 weeks, offer breast milk once levels are below 40
 - If 5 to 39, breastfeed, but inform the neonate’s health care provider so they can check serial lead levels for the infant
- Identify and eliminate sources of maternal lead exposure in collaboration with local public health-based lead programs, if available (e.g., for home inspections)
- Encourage good nutrition, e.g., sufficient calcium (supplement if needed), iron (supplement if needed), and Vitamin C

Treatment of Elevated Blood Lead (<40 mcg/dl)*

- Remove the source
- Improve the diet, including calcium and iron supplementation if needed
- Monitor the patient
- Tell the infant's medical team

Avoid products imported from the Middle East, Latin America, South Asia, and China that may contain lead:



Spices, including turmeric.



Many types of candy.

Skin creams, including Yisaoguang Yaogua, Hondan and Thanaka.



Cosmetics like Kohl (also known as surma or kajal).



Image: New York State Dept of Health

- *Higher levels require additional intervention

BRIEF COMMUNICATION

A Denver Refugee Clinic Blood Lead Level Analysis in Refugee Females of Reproductive Age, 13–45 years, 2014–2019


Melissa K. Tran¹ · Molly Lamb^{1,2} · Janine Young^{3,2,4} 

Table 1 Baseline characteristics of refugee females of reproductive age (13–45 years)

		Average ± standard deviation (range)
		N = 312
Overall blood lead level (mcg/dL)	Overall BLL range <2.0–26.2mcg/dL in FRA	2.63 ± 1.76 (≤2.0–26.2)
Age (years)		26.2 ± 8.4 (13–45)
		N (%)
Elevated blood lead level		16 (5.1)
		N (%)
Age		
13–16		45 (14.4)
17–21		56 (18.0)
22–35		158 (50.6)
36–45		53 (17.0)
Status		
Not pregnant		236 (75.6)
Pregnant		49 (15.7)
Missing data		27 (8.7)

11/6/2020

Table 2 Prevalence ratios of EBLL by Country of origin

Birth country	Crude model		Age adjusted model	
	Prevalence ratio [CI]	P-value	Adjusted prevalence ratio [CI]	Adjusted P-value
Afghanistan (N= 53)	6.28 [2.44–16.12]	0.0001	6.90 [2.68–17.77]	<0.0001
Democratic Republic of Congo (N= 44)	0.87 [0.20–3.70]	0.85	0.94 [0.21–4.11]	0.93
Iraq (N= 30)	0.63 [0.09–4.58]	0.65	0.56 [0.08–4.07]	0.56
Myanmar/Malaysia/Thailand (N= 28) (Bhutanese refugees)	0.67 [0.09–4.93]	0.70	0.71 [0.10–5.17]	0.74
Bhutan/Nepal (N= 23)	0.84 [0.12–6.06]	0.86	0.88 [0.12–6.40]	0.90
Ethiopia (N= 21)	0.92 [0.13–6.66]	0.94	0.83 [0.11–5.99]	0.85
Jordan/Syria/Turkey (N= 20) (Syrian refugees)	NC	NC	NC	NC
Kenya/Somalia (N= 21) (Somalian refugees)	NC	NC	NC	NC
Eritrea (N= 17)	NC	NC	NC	NC
Cuba (N= 14)	1.42 [0.20–9.99]	0.73	1.21 [0.17–8.59]	0.85



NC not calculable

FRA who had elevated BLL were 6.90 times as likely to be from Afghanistan compared to those refugees w/o an elevated BLL adjusted for age

Lead Education in Newly Arrived Afghan Population

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Clinical Assistant (MHEDS, Erie, PA)

Visiting Scholar (Children's Hospital of Philadelphia, PA)

Co-founder & General Secretary (Afghan Community of Erie, Pennsylvania)

Between Aug. 14 to Aug. 30, 2021 the U.S. has helped evacuate approximately 116,700 people out of Afghanistan (Air Force Times)



Challenges

- Lack of information/knowledge about Lead poisoning.
- Many of the Afghan refugees who have arrived in the United States since 2021 may not have had access to formal education.
- Continue to use or consume products contaminated with lead, such as cookware, traditional herbal supplements, spices, cosmetics, and jewelry
- Older homes with lead-based paint or plumbing contaminating water supply.
- Transportation

Highlights of the Educational Content

- What is Lead?
- What are the sources for lead exposure?
- What are the clinical manifestations?
- What are the long-term effects?
- What is the treatment?

Cookware

- Resettled families brought several lead-containing items with them from Afghanistan
- Popular with consumers: Low cost, Light weight, efficient heat conduction
- Alternative Cookware options
- EPA Approved: Lead test kits



Fellows, K.M., Samy, S., Rodriguez, Y. et al. **Investigating aluminum cookpots as a source of lead exposure in Afghan refugee children resettled in the United States.** J Expo Sci Environ Epidemiol 32, 451–460 (2022). <https://doi.org/10.1038/s41370-022-00431-y>



Surma/Ranja

(Dari: Surma سرمه)


(Pashto: Ranja رانجه)

- Cultural Symbolism of beauty, in Poetry and Songs
- Religious Significance of Surma/Ranja

Cultural Significance

Browser address bar: <https://www.youtube.com/watch?v=QpztoBLIWnY>

YouTube logo and search bar: **YouTube** | سترگو تور رنجه



Video title: **زه چی په تورو سترگو تور رنجه کرم پوری موری**

Channel: ★ Brilliant Afghanistan ★ افغانستان درخشان | 161 subscribers

Engagement: 33 likes, Share, Download

Stats: 1.9K views 1 year ago TURKEY

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Filters: All | From your search | From ★ Brilliant Afghanistan

- Shan Khan new song 2023 | Janana Ta Sa Waye Attan son... | PB Studio Music | 9K views · 14 hours ago
- Alizeh khan | pashto New Song | Toro strago | Princess Farishta | 10K views · 1 year ago
- Mix - Ghazal | Shamali Afghan, Laila Khan, Mir Khan Moqori and more
- Wahab Rasooli feat. Gul Rukhsar - Masara OFFICIAL... | Afghan Smart | 942K views · 6 years ago

Video description: **زه چی په تورو سترگو تور رنجه کرم پوری موری**

Islamic Ruling on the use of Surma/Ranja

- رسول الله صلى الله عليه وسلم به كله دوه دوه حلي سترگي توري كړې او دريم حل به يې په يوه لرگي دواړې سترگي توري كړې.
(جمع الوسائل: پانه: ۱۰۳، ۱۰۴)
- Prophet Mohammad (peace and blessings of Allah be upon him) said: “The best of your kohl is ithmid (**Antimony, Sb**), for it makes the vision clear and makes the hair grow.”
- (Sunan al-Nasaa’I, 5113 and Sunan Abi Dawood, 3837)

Afghan Community Center of Erie, Pennsylvania

Lead survey in Pashto and Dari languages

(**Dr. Leena Anil**, Pennsylvania Department of Health, Bureau of Epidemiology)

Blood Lead Level Testing and Retesting Among Newly Arriving Refugee Children, Pennsylvania, 2015–2019

(<https://doi.org/10.2105/AJPH.2022.306856>)

(Am J Public Health. 2022;112(S7):S706–S714.)

TABLE 2— Number of Refugee Children Aged 16 Years or Younger With Elevated Blood Lead Levels (EBLLs) and Mean Blood Lead Levels Based on Country of Birth: Pennsylvania National Electronic Disease Surveillance System, 2015–2020

Birth Country	Children With Confirmed EBLLs, ^a No.	Children With Unconfirmed EBLLs, ^b No.	Children With EBLLs, ^c No. (%)	Children With No EBLLs, No.	Total No. Children	GM of Blood Lead Levels ^d (SE)
Afghanistan	66	3	69 (43.9)	88	157	4.27 (1.051)
Belarus	0	0	0 (0.0)	31	31	1.51 (1.068)
Burundi	21	14	35 (23.3)	115	150	2.84 (1.053)
Democratic Republic of Congo	24	4	28 (21.4)	103	131	2.60 (1.066)
Eritrea	2	3	5 (12.5)	35	40	2.06 (1.105)
Ethiopia	7	6	13 (17.8)	60	73	2.66 (1.074)
India	5	1	6 (23.1)	20	26	3.51 (1.075)

Birth Country	Children With Confirmed EBLLs, ^a No.	Children With Unconfirmed EBLLs, ^b No.	Children With EBLLs, ^c No. (%)	Children With No EBLLs, No.	Total No. Children	GM of Blood Lead Levels ^d (SE)
Afghanistan	66	3	69 (43.9)	88	157	4.27 (1.051)
Belarus	0	0	0 (0.0)	31	31	1.51 (1.068)

Rwanda	5	3	8 (10.0)	72	80	2.04 (1.080)
Somalia	2	17	19 (26.0)	54	73	3.05 (1.074)
South Africa	4	...	4 (12.1)	29	33	2.54 (1.116)
Sudan	2	3	5 (20.0)	20	25	2.65 (1.155)
Syria	20	5	25 (5.5)	427	452	2.22 (1.022)
Thailand	12	...	12 (25.5)	35	47	3.80 (1.100)
Uganda	62	5	67 (33.0)	136	203	3.08 (1.061)
Ukraine	2	1	3 (1.8)	163	166	1.48 (1.046)
United Republic of Tanzania	22	3	25 (8.8)	259	284	2.05 (1.037)
Zambia	4	3	7 (17.9)	32	39	2.98 (1.089)
Other countries	33	9	42 (22.1)	148	190	2.74 (1.051)
Total	478	100	578 (18.4)	2564	3142	2.67 (1.012)

APPH Supplement 7, 2022, Vol. 112

Note. GM = geometric mean.

^aChildren with 1 venous lead level of $\geq 5 \mu\text{g/dL}$ or 2 capillary lead levels of $\geq 5 \mu\text{g/dL}$, within 84 days.

^bChildren with 1 capillary lead levels of $\geq 5 \mu\text{g/dL}$ without a confirmation test.

^cSum of confirmed and unconfirmed EBLLs.

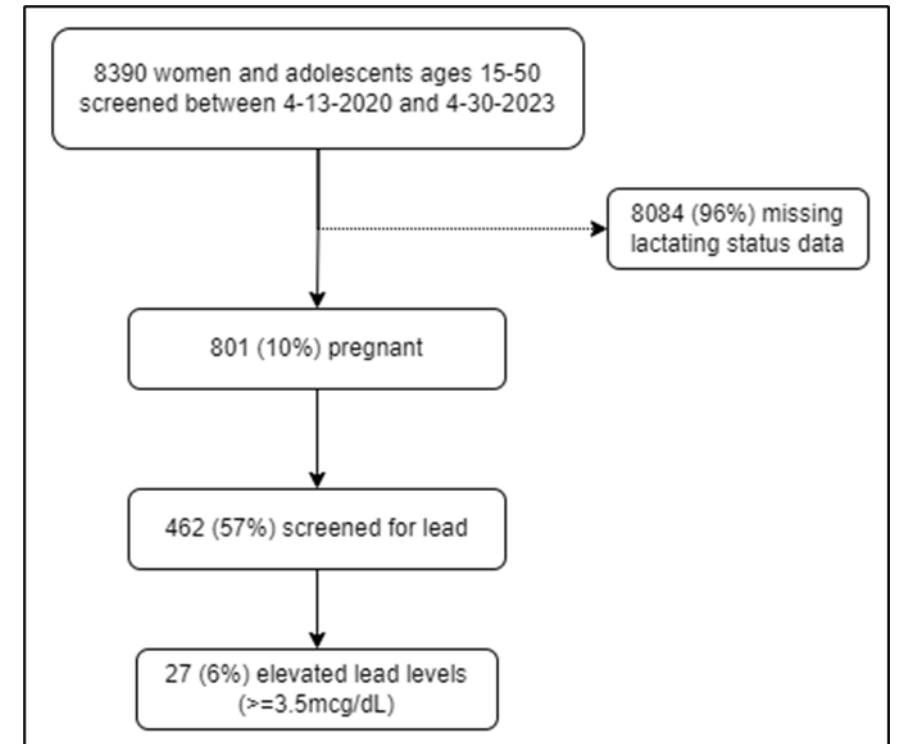
^dLess than minimum detectable level (MDL) of lead in blood was replaced by $\text{MDL}/\sqrt{2}$; a value of $2/\sqrt{2}$ was used when no MDL was available. In 2019, the average prevalence of EBLLs of all children ≤ 16 y in Pennsylvania was 2.5%.

Conclusion

- Lead poisoning is a significant health concern for Afghan families.
- They often arrive in the United States with significant overseas exposure and are more likely to have continued exposure to lead because of sociocultural issues after resettlement.
- Therefore, comprehensive education on lead exposure is essential to avert long-term consequences.

MN COE Lead Screening Among Pregnant Adolescents and Women

- Data from 6 states: MN, CO, IN, UT, WA, MA
- Inclusion criteria
 - 15-50 years old
 - Female at birth
 - Completed DME between April 2020-April 2023
- 8390 women in the sample
- 10% were pregnant
- Of those, 57% were screened for lead
- Of those, 6% had EBLL's



MN COE Lead Screening Among Pregnant Adolescents and Women

- Lead screening rates have improved over time with 41% in 2020 and 68% in 2022.
- Lead screening rates differ by country of origin and language
- Most arrivals (96%) do not have lactation status reported to public health systems
 - CDC lead screening guidance specifically recommends screening for newcomers who are lactating or breastfeeding

Table 2. Percent of Newcomers with Missing Lactation Status Over Time

US Arrival Year	No. Missing (%)
2020	665 (100%)
2021	2506 (98%)
2022	4273 (95%)
2023*	640 (95%)
Total	8084 (96%)

*Data through April 2023. There are significant time delays with receiving screening results.

Table 1. Lead Screening Status and Demographics of Newcomer Pregnant Adolescents and Women, 2020-2023*

Characteristic	Lead Screened No. (% Screened)	Total No. (col %)
Age		
15-17	<10 (43%)	<10 (1%)
18-20	21 (54%)	39 (5%)
21-30	297 (58%)	513 (64%)
31-40	128 (57%)	225 (28%)
41-50	13 (76%)	17 (2%)
US Arrival Year		
2020	24 (41%)	59 (7%)
2021	179 (52%)	345 (43%)
2022	243 (68%)	356 (44%)
2023*	16 (39%)	41 (5%)
Arrival Status		
Humanitarian Parolee**	158 (50%)	318 (40%)
Primary Refugee	56 (47%)	118 (15%)
SIV	19 (38%)	50 (6%)
Other	28 (57%)	49 (6%)
Missing/Unknown***	201 (76%)	266 (33%)
Country of Origin		
Afghanistan	336 (62%)	543 (68%)
Burma	14 (74%)	19 (2%)
Cuba	20 (67%)	30 (4%)
DR Congo	26 (50%)	52 (6%)
Ukraine	29 (41%)	71 (9%)
Other	37 (43%)	86 (11%)
Language		
Dari	203 (62%)	327 (41%)
Pashto	113 (61%)	186 (23%)
Spanish	24 (56%)	43 (5%)
Swahili	12 (46%)	26 (3%)
Ukrainian	24 (43%)	56 (7%)
Other	86 (53%)	163 (20%)
Total****	462 (58%)	801

*Data through April 2023. There are significant time delays with receiving screening results. One state did not report 2023 data.

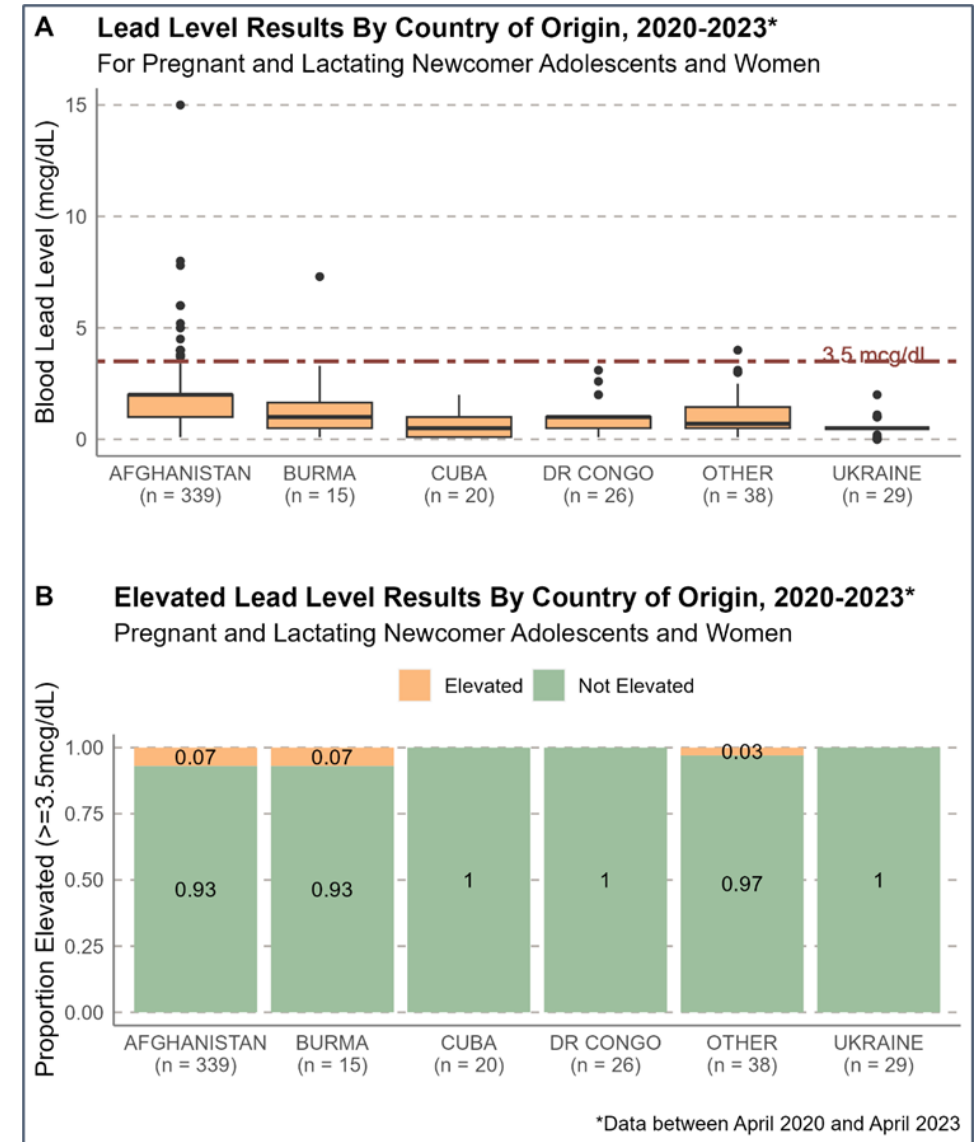
**Within Parole is a visa status called Humanitarian Parole that makes up the majority if Parole. This status is mostly comprised of Afghan and Ukrainian newcomers that have been resettling in the US since 2021.

***Some sites were not able to report arrival status. Most arrivals would be primary refugees or humanitarian parolees.

****Total percent represents the row %.

MN COE Lead Screening Among Pregnant Adolescents and Women

- Afghan newcomers had the highest level of elevated lead levels (7% elevated).
 - Small N in other countries
- Range of elevated lead levels for Afghan arrivals are 3.5-15mcg/dL



MN COE Lead Screening Policy Recommendations

- Continue screening all pregnant and lactating/breastfeeding newcomers per CDC guidance
- Regularly collect lactating and breastfeeding status to be able to comply with this guidance
- Consider universal screening for all women of child-bearing age for select countries



Visit NRC-RIM's website for some helpful tools and information related to lead poisoning in newly arrived Afghans:

- [Lead Poisoning Conversation Guide \(https://nrcrim.org/conversation-guide-lead-poisoning\)](https://nrcrim.org/conversation-guide-lead-poisoning)
- [Lead Poisoning Health Education Collection \(https://nrcrim.org/afghans/health-education/lead-poisoning\)](https://nrcrim.org/afghans/health-education/lead-poisoning)

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