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Clelia Pezzi

Gayathri S. Kumar

Deborah Lee

Nuny Cabanting

Breanna Kawasaki

See next page for additional authors

Authors

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Blood Lead Levels Among Afghan Children in the United States, 2014-2016

Clelia Pezzi, MPH,[a] Gayathri S. Kumar, MD,[a] Deborah Lee, MPH,[a] Nuny Cabanting, MPH,[b] Breanna Kawasaki, MPH,[c] Lori Kennedy, MSPH,[c] Jenny Aguirre, MBA,[d] Melissa Titus, MPH,[e] Rebecca Ford, MPH,[f] Blain Mamo, MPH,[g] Kailey Urban, MPH,[g] Stephen Hughes, PhD,[h] Colleen Payton, PhD, MPH,[i] Marc Altshuler, MD,[i] Jessica Montour, MPH,[j] Emily S. Jentes, PhD, MPH[a]

Lead poisoning disproportionately affects children and can result in permanent neurologic damage.[1] Although blood lead levels (BLLs) declined among children in the United States over the past several decades, children resettling to the United States from other countries emerged as a population at risk for BLLs that are higher than the United States blood lead reference value of ≥5 μg/dL at the time of this analysis.[2] Among children screened for lead shortly after resettlement, children from Afghanistan have a higher prevalence of BLLs ≥5 μg/dL compared with children from other countries,[3,4] but timely sources of data available for analysis are limited. In 2021, the United States troop withdrawal from Afghanistan prompted the rapid evacuation and resettlement of more than 76 000 Afghans to the United States.[5] We analyzed existing data from domestic medical examinations (DMEs) conducted from 2014 to 2016 for refugees and eligible populations ≤90 days after arrival in multiple states. We described and compared the prevalence of BLL ≥5 μg/dL among Afghan and non-Afghan refugee children screened and evaluated select characteristics associated with BLL ≥5 μg/dL among Afghan children.

METHODS

We conducted a cross-sectional analysis of blood lead test results during immigration-related DMEs of children <17 years old screened in 9 United States sites (7 states, 1 county, and 1 university-affiliated clinic) between January 1, 2014, and December 31, 2016. Participating sites reported quantitative blood lead screening results from venous specimens (preferred), capillary, or unknown specimens. BLLs ≥5 μg/dL were considered elevated. We compared BLL ≥5 μg/dL prevalence between Afghan and non-Afghan children receiving DMEs and assessed prevalence by age, sex, days from US arrival to DME, lead specimen type (capillary, venous, or unknown), DME year, nationality, country of last residence, anemia (hemoglobin of ≤10 g/dL), and stunting (<-2 standard deviations from the median height-for-age *Z*-score for the reference population).

We included independent variables significantly associated with BLL ≥5 μg/dL ($P < .05$) in bivariate analysis to calculate prevalence ratios and 95% confidence intervals using generalized estimating equations adjusted for age with repeated subjects to account for site-level clustering. All analyses were conducted using SAS software,

[a]*Centers for Disease Control and Prevention, Division of Global Migration and Quarantine, Immigrant, Refugee, and Migrant Health Branch, Atlanta, Georgia;* [b]*California Department of Refugee Health, Office of Refugee Health, Sacramento, California;* [c]*Colorado Department of Public Health and Environment, Disease Control and Environmental Epidemiology Division, Refugee Health Program, Denver, Colorado;* [d]*Illinois Department of Public Health, Refugee Health Program, Chicago, Illinois;* [e]*Marion County Public Health Department, Indianapolis, Indiana;* [f]*University of Louisville Division of Infectious Diseases, Louisville, Kentucky;* [g]*Minnesota Department of Health, Saint Paul, Minnesota;* [h]*Bureau of Tuberculosis Control, New York State Department of Health, Albany, New York;* [i]*Thomas Jefferson University, Department of Family and Community Medicine, Philadelphia, Pennsylvania; and* [j]*Texas Department of State Health Services, Austin, Texas*

Ms Pezzi conceptualized and designed the project, conducted the initial analyses, drafted the initial manuscript, and revised the manuscript. Dr Kumar and Ms Lee conceptualized and designed the project, drafted the initial manuscript, and reviewed and revised the manuscript. Dr Jentes conceptualized and designed the project and reviewed and revised the manuscript.

Ms Cabanting, Ms Kawasaki, Ms Kennedy, Ms Aguirre, Ms Titus, Ms Ford, Ms Mamo, Ms Urban, Dr Hughes, Ms Payton, Dr Altshuler, and Ms Montour collected data and reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Ms Aguirre's current affiliation is Illinois Department of Healthcare and Family Services, Chicago, IL. Ms Ford's current affiliation is Kentucky Office for Refugees, Louisville, KY. Dr Payton's current affiliation is Moravian College, School of Nursing and Public Health, Bethlehem, PA. Ms Montour's current affiliation is the US Committee for Refugees and Immigrants, Austin, TX.

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Address correspondence to: Clelia Pezzi, Centers for Disease Control and Prevention, 1600 Clifton Rd, Altanta, GA 30333. E-mail: kathryn.pezzi@acf.hhs.gov

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TABLE 1 Blood Lead Level Results and Characteristics of Non-Afghan and Afghan Children <17 Years Old in 9 US Sites, 2014–2016

Characteristic	Total	Non-Afghan (Col %)	Afghan (Col %)	*P*
BLL screened[a]	30 435	26 305 (87.3)	4130 (82.9)	<.0001
Geometric mean blood lead level among children with BLL ≥5 μg/dL (SD)	7.0 (1.5)	6.7 (1.4)	7.5 (1.5)	<.0001
BLL results, μg/dL				<.0001
<5	26 685	23 876 (90.8)	2809 (68.0)	
≥5	3750	2429 (9.2)	1321 (32.0)	
5–9	3151	2113 (8.0)	1038 (25.1)	
≥10	599	316 (1.2)	283 (6.9)	
Ag, y				<.0001
Median age (IQR)	7 (3–11)	7 (3–12)	5 (2–9)	
≤2	5502	4382 (16.7)	1120 (27.1)	
3–6	10 615	8900 (33.8)	1715 (41.5)	
7–12	8646	7764 (29.5)	882 (21.4)	
13–16	5672	5259 (20.0)	413 (10.0)	
Sex[b]				.3
Female	14 692	12 728 (48.4)	1964 (47.6)	
Male	15 741	13 575 (51.6)	2166 (52.4)	

[a] Values in this row serve as the denominators for percent calculations in each column.
[b] Excludes 2 people with unreported sex.

version 9.4 (SAS Institute Inc, Cary, NC). This project was reviewed in accordance with Centers for Disease Control and Prevention's institutional review policies and procedures and was determined to be nonresearch program evaluation.

RESULTS

Nine sites provided lead screening results for 30 435 children, including 4130 Afghans. Prevalence of BLLs ≥5 μg/dL among Afghan children was 32.0%, 3 times higher than non-Afghan children (9.2%, adjusted prevalence ratio [aPR] = 3.1, $P < .0001$) (Table 1) and was associated with having been examined in April through September, stunting, and country of last residence. Most (98.4%) Afghan children were screened within 90 days of US arrival.

Among Afghan children only, the highest prevalence of BLLs ≥5 μg/dL occurred among children ≤2 years old; 47% of these children had BLLs ≥5 μg/dL and 17% had a BLL ≥10 μg/dL (Table 2). Approximately 8.8% of Afghans were stunted; stunting was significantly associated with BLLs ≥5 μg/dL (37.8% of children with stunting compared with 29.6% of children without, $P = .0013$). This association remained after adjusting for age (aPR 1.2, $P < .0001$). After age adjustment, children screened in April through September were significantly more likely to have BLLs ≥5 μg/dL compared with children screened in October through March (aPR 1.2, $P = .0007$; not shown), and prevalence of BLLs ≥5 μg/dL among Afghan children last residing in Pakistan was higher compared with children coming from Afghanistan (aPR 1.8, $P < .0001$; not shown).

CONCLUSIONS

Children resettled from Afghanistan had a higher prevalence of BLLs ≥5 μg/dL compared with non-Afghan children screened shortly after United States resettlement and to all United States children (3.8% in 2016).[6] Current Centers for Disease Control and Prevention guidance recommends that clinicians caring for Afghan arrivals screen for lead and potential sources of lead exposures (eg, use of surma/kajal—eye cosmetics commonly used in Afghan children[7,8]) in children ≤16 years of age and in pregnant or lactating people.[9] Clinicians should also promptly evaluate and manage the nutritional status of Afghan children. Afghans may not arrive through immigration channels that connect them to the domestic medical examination including blood lead screening. State-based refugee health and lead programs, clinicians treating Afghans, and resettlement agencies supporting Afghans should work with families to ensure lead screening is conducted for all recently arrived Afghan children.

TABLE 2 Blood Lead Levels by Characteristics Among Afghan Children <17 Years Old in 9 US Sites, 2014–2016

Characteristics	Total N (Col %)	BLL <5 μg/dL (Row %)	BLL 5-9 μg/dL	BLL 10+ μg/dL	Total BLL ≥5 μg/dL	*P*
Total	4130	2809 (68.0)	1038 (25.1)	283 (6.9)	1321 (32.0)	
Age, y						<.0001
≤2	1120 (27.1)	594 (53)	336 (30)	190 (17)	526 (47.0)	
3–6	1715 (41.5)	1100 (64.1)	543 (31.7)	72 (4.2)	615 (35.9)	
7—12	882 (21.4)	753 (85.4)	116 (13.2)	13 (1.5)	129 (14.6)	
13–16	413 (10.0)	362 (87.7)	43 (10.4)	8 (1.9)	51 (12.3)	
Sex						.7
Female	1964 (47.6)	1330 (67.7)	498 (25.4)	136 (6.9)	634 (32.3)	
Male	2166 (52.4)	1479 (68.3)	540 (24.9)	147 (6.8)	687 (31.7)	
Blood specimen type						<.0001
Capillary or unknown	927 (22.4)	784 (84.6)	116 (12.5)	27 (2.9)	143 (15.4)	
Venous	3203 (77.6)	2025 (63.2)	922 (28.8)	256 (8)	1178 (36.8)	
Month of domestic medical examination[a]						.0006
January–March	1053 (25.5)	759 (72.1)	237 (22.5)	57 (5.4)	294 (27.9)	
April–June	933 (22.6)	594 (63.7)	268 (28.7)	71 (7.6)	339 (36.3)	
July–September	907 (22.0)	608 (67.0)	223 (24.6)	76 (8.4)	299 (33.0)	
October–November	1191 (28.8)	824 (69.2)	297 (24.9)	70 (5.9)	367 (30.8)	
Visa						<.0001
Special immigrant visa holder	3275 (79.3)	2190 (66.9)	847 (25.9)	238 (7.3)	1085 (33.1)	
Other[b]	855 (20.7)	619 (72.4)	191 (22.3)	45 (5.3)	236 (27.6)	
Days between US entry and domestic medical examination[c]						.4
0–90	4037 (97.7)	2744 (68.0)	1017 (25.2)	276 (6.8)	1293 (32.0)	
>90	67 (1.6)	42 (62.7)	18 (26.9)	7 (10.4)	25 (37.3)	
Hemoglobin (g/dL)[d]						<.0001
<11	212 (5.1)	104 (49.1)	72 (34.0)	36 (17.0)	108 (50.9)	
≥11	3520 (85.2)	2465 (70.0)	840 (23.9)	215 (6.1)	1055 (30.0)	
Stunting[e]						.001
No	3190 (77.2)	2245 (70.4)	762 (23.9)	183 (5.7)	945 (29.6)	
Yes	365 (8.8)	227 (62.2)	104 (28.5)	34 (9.3)	138 (37.8)	
Country of last residence						<.0001
Afghanistan	3131 (75.8)	2088 (66.7)	815 (26.0)	228 (7.3)	1043 (33.3)	
Pakistan	200 (4.8)	114 (57.0)	72 (36.0)	14 (7.0)	86 (43.0)	
Turkey	124 (3.0)	123 (99.2)	1 (0.1)	—	1 (0.8)	
Other	101 (2.4)	92 (91.1)	150 (22.2)	41 (6.1)	9 (8.9)	

Stunting is defined as less than -2 SD from the median height-for-age *Z*-score using the World Health Organization reference population. BLL, blood lead level. —, not applicable.

[a]Excludes 46 people with unknown month of assessment.

[b]Includes individuals who initially resettled to the United States with refugee (17.9%), asylee (1.5%), or unknown (1.4%) status.

[c]Excludes 26 records with missing entry to screening information.

[d]Excludes 398 with missing hemoglobin levels.

[e]Excludes 575 with missing height/weight measures or who have biologically implausible values.

ABBREVIATIONS

aPR: adjusted prevalence ratio
BLL: blood lead level
DME: domestic medical examination

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