Elevated Blood Lead Levels Among Pediatric and Pregnant Refugees Resettling in Louisville, Kentucky

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ABSTRACT

Background: Elevated blood lead levels (EBLLs) are associated with adverse effects in children such as abnormal cognitive development, behavior problems, decreased intelligence, and poor school performance. CDC established a new reference level of 5µg/dl in 2012 and based on this reference level, 2.5% of US children have EBLLs. The objective of this project is to determine the blood lead levels present in refugee children and pregnant women.

Methods: Data from the Newly Arriving Refugee Surveillance System database were reviewed for refugees arriving August 2012- August 2015. Data were categorized by blood lead level and stratified by country of origin.

Results: There were 74 pregnant women and 1388 children under the age of 19 from multiple countries resettled during that time frame. Of the children, 125/1388 (9%) had EBLLs of 5-9µg/dl and 14 (1%) had an EBLL ≥ 10µg/dl. Among the pregnant women, 1/74 had an EBLL of 5-9µg/dl and 1/74 had an EBLL ≥ 10µg/dl. Those from the Democratic Republic of the Congo, Bhutan, Afghanistan, Myanmar, Iraq, and Sudan represent those where EBLLs meet the CDC threshold for intervention.

Conclusions: EBLL remains a health concern for refugees arriving from multiple countries. More needs to be done with these groups to better understand the sources of exposure to lead.

INTRODUCTION

Elevated blood lead levels (EBLLs) are associated with adverse effects in children, such as abnormal cognitive development, behavior problems, decreased intelligence, and poor school performance. Young children are particularly susceptible to lead exposure due to tendency for hand-to-mouth behaviors. In 1991, the Centers for Disease Control and Prevention (CDC) established a "level of concern" for children at <10 µg/dL. However, additional research has establish that levels <10 µg/dL are detrimental to children's development. Thus, is 2012, the CDC established a new reference level of 5 µg/dL. Based on this new reference level, 2.5% of U.S. children have EBLLs.

While the number of U.S. children with EBLLs has declined, there are still vulnerable segments of the population that are at great risk for lead poisoning, including refugee children. Research has found that refugee children are two times more likely to have an EBLL with some subpopulations of refugees being 12-14.5 times more likely to have EBLLs than children born in the U.S.[1]

Reasons for EBLLs among refugees include lack of knowledge about the hazards of lead, use of traditional products and medications that contain lead, poor nutritional status, and, in general, refugee families are frequently resettled into low-cost older housing.

OBJECTIVES

The objective of this project is to determine the blood lead levels present in refugee children aged <19 years old and pregnant women.

METHODS

- Data from the Newly Arriving Refugee Surveillance System (NARSS) database were reviewed for refugees arriving August 2012- August 2015.
- Data were categorized by blood lead level and stratified by country of origin and age.

RESULTS

Between August 2012 and August 2015, there were 74 pregnant women and 1403 children under the age of 19 from multiple countries resettled in Kentucky. Of the children, 86/1403 (6%) had EBLLs of 5-9µg/dl and 13 (1%) had an EBLL ≥ 10µg/dl. Among the pregnant women, 1/74 (1.35%) had an EBLL of 5-9µg/dl and 1/74 (1.35%) had an EBLL ≥ 10µg/dl. Those from the Democratic Republic of the Congo, Bhutan, Afghanistan, Myanmar, Iraq, and Sudan represent those where EBLLs meet the CDC threshold for intervention. The nationality with the greatest number of cases with a blood lead level (BLL) above the CDC's threshold was Afghanistan with 52.18% of those tested having a BLL ≥ 5µg/dL. The region with the most cases of EBLLs was not the Middle East (10% ≥5µg/dL), however, but rather Southeast Asia (17% ≥ 5µg/dL). Children aged 1-5 years old had the highest prevalence of EBLLs. However, those with the highest EBLLs, were children aged 11-18 years old. A chi-squared test conducted for males and females with EBLLS ≥ 5µg/dL and ≤ 4.99 µg/dL determined that there was a significant difference between male and female children for EBLLs ≥ 5µg/dL with a p-value of 0.001.

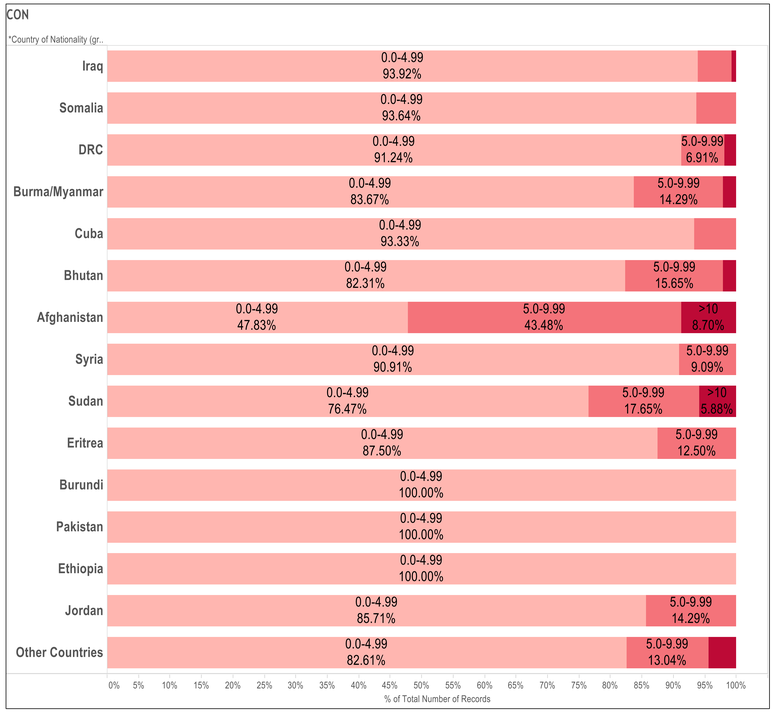

Figure 1 depicts lead levels by Country of Nationality for those >19 years of age.

RESULTS

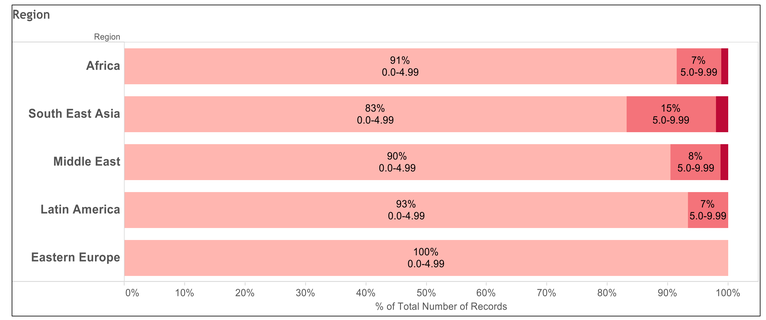

Figure 2 depicts lead levels by Region of Nationality for those >19 years of age.

Table 1 demonstrates the percentage of those tested between August 2012 and August 2015 with EBLL by age and level range.

Total Lead Screened	# (%)	# (%)	# (%)	# (%)
	<1 year	1-5 years	6-10 years	11-18 years
Less than 5 µg/dL (0 -4.9)	19 (1.35%)	453 (32.29 %)	379 (27.01%)	448 (31.93%)
5-9.9	3 (0.21%)	36 (2.57 %)	26 (1.85 %)	21 (1.50%)
10-14.9	0 (0.00%)	6 (0.43 %)	4 (0.29 %)	3 (0.21%)
15-19.9	0 (0.00%)	2 (0.14%)	0 (0.00%)	1 (0.07%)
20-44.9	0 (0.00%)	0 (0.00%)	0 (0.00%)	2 (0.14%)
45-69.9	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
>70	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)

CONCLUSIONS

EBLLs remain a health concern for refugees. More research is needed to better understand the sources of exposure to lead and it's effects on refugee children. Future research should focus on those <18 years of age. Further investigation into gender differences in exposure levels should also be considered to determine if this is accurate outside of the U.S. refugee population. .

REFERENCES

1. Geltman, P., Brown, M., & Cochran, J. (2001). Lead Poisoning Among Refugee Children Resettled in Massachusetts, 1995 to 1999. *Pediatrics,* 158-162.