Blood Levels In Refugee Children in Rhode Island

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In 2004, the Rhode Island Department of Health set a goal of eliminating lead poisoning by 2010, which included the removal of environmental lead hazards and universal screening of children.[1] The objective is to prevent blood lead levels of greater than 10 micrograms per deciliter (µg/dl).[2] This is not a threshold for health effects, but a programmatic action level set by the CDC Advisory Committee for Childhood Lead Poisoning Prevention.

While progress has been made, this goal will not be reached. If lead poisoning cases are to be eradicated entirely, interventions must be targeted towards vulnerable populations. Refugees, for instance, comprise less than 0.2% of children screened, yet account for greater than 1% of lead poisoning cases in Rhode Island.

In this report, we aimed to identify the prevalence of lead poisoning among refugee children in Rhode Island, and compare these rates to the non-refugee population in Providence. Although children in Rhode Island are required to be screened through age 6, the CDC recommends refugee children be screened through 16 years of age.[3]

Findings of elevated blood lead levels in children have historically been more frequent in Rhode Island than elsewhere, attributable to lead paint from older housing stock. Nevertheless, there has been a significant trend towards lower rates of lead poisoning in the state during the last decade.

Among children younger than age six, the statewide incidence of lead poisoning decreased from 6.9% in 1999 to 1.1% in 2008, indicating that the number of new cases is diminishing. Prevalence of childhood lead poisoning was likewise reduced in the past decade, dropping from 9.8% to 1.6% between 1999 and 2008. Lead poisoning remains a greater concern in the state's core cities (Central Falls, Newport, Providence, Pawtucket, West Warwick, and Woonsocket), defined as cities where the child poverty level is 15% or greater. Incidence of childhood lead poisoning in 2008 was 1.8% in these cities combined and 2.4% in Providence.[1]

The death of a 2 year-old Sudanese refugee in Manchester, New Hampshire, in 2000 from lead poisoning, the first such recorded fatality nationally in ten years, suggested an increased susceptibility to lead poisoning among refugee children.[4] Several recent studies conducted in New England have shown this link, including a study examining a cohort of refugee children in Massachusetts. The prevalence of elevated blood lead levels among recent refugees was found to be 11.3%, more than twice that of US-born children. Significant risk factors for lead poisoning included resettlement from a developing country, as well as the presence of concurrent anemia.[5]

A more recent case series of refugee children of predominantly African origin was performed in New Hampshire. Of the 242 children included in the study, 210 were screened for elevated blood lead levels within 3 months of arrival, and 92 were tested again within 3 to 6 months after their initial screening. Among those tested twice, 14% had elevated blood lead levels at both their initial and follow-up visits, while 11% had elevated levels only at their initial screening and 29% were not elevated at their initial screening but elevated at a follow-up test. This data demonstrate not only the increased prevalence of lead poisoning among refugee children upon arrival, but also the possibility for acquiring elevated blood levels from exposures subsequent to resettlement. Further investigations revealed several risk factors among the sample studied, including living in older homes, the presence of lead hazards, and evidence of chronic and acute malnutrition.[6]

Rhode Island settles over one hundred refugees, including a large proportion of children, each year. During a 21-month period between 2004 and 2006, 352 refugees arrived in the state; the majority were from sub-Saharan Africa.[7] Refugees from this region have often suffered from malnutrition. A 2003 survey of a Kenyan refugee camp inhabited mainly by Somalis found that 95% of the children below age 6 were iron deficient, predisposing them to absorbing lead even at minimal exposures.[8] In addition, most of the refugees arriving in Rhode Island are resettled in Providence neighborhoods where lead levels are markedly elevated compared to the rest of the state.

Methods

This report compares the prevalence of lead poisoning among refugee children in Rhode Island to prevalence rates in the non-refugee population of children in Providence. Data for all refugee children 16 years or younger and non-refugee Providence children 6 years or younger were gathered from the **Childhood Lead Poisoning Prevention Program (CLPPP)**, which records all lead test results for children in the state.

A number of refugees in Department of Health records were not found in the CLPPP database, indicating possible change in state residence or lack of testing compliance, and a number of refugees in CLPPP did not have settlement records at the Department of Health, signifying data entry error or arrival from another state. Moreover, while Rhode Island requires screening of all children and endorses CDC guidelines mandating screening of refugee arrivals, compliance has likely not reached 100%. Data from 2001-2005 collected by the Department of Health indicates that compliance never surpassed 75% during that period.[1]

Elevated Blood Lead Levels in Refugee and Non-Refugee Children, Rhode Island, 2004-2008

	Refugee Children	Non-Refugee Children
2004	39.4%	8.9%
2005	40.3%	7.0%
2006	24.7%	5.8%
2007	24.6%	4.6%
2008	14.1%	3.8%

A positive test for elevated blood lead was defined as a screening result (venous or capillary) greater than or equal to 10 µg/dl.[1] Data for refugee children though the age of 16 were used to ensure a more robust sample size from the refugee population. While this does not offer an identical comparison to non-refugees through the age of 6, prevalence of lead poisoning among refugees was found to be elevated across birth year cohorts. In addition, non-refugee children living solely in Providence were considered because it was initially believed that all refugees with screening records resided in Providence, though this proved to be incorrect in a few instances.

Results

We determined the annual prevalence of lead poisoning among refugee children and non-refugee children in Providence by ascertaining the number of children screened in that year as well as the number of children who had at least one positive test in that period. Data were collected from the years 2004 to 2008, and demonstrated some distinguishable patterns in childhood lead poisoning during that time. As is evident in the table, the prevalence of elevated blood levels in refugee children is markedly higher, reaching a peak of 40.3% in 2005, over fivefold greater than the non-refugee population. Also the prevalence of lead poisoning in both populations diminished over time, mirroring similar trends in the rest of the state and nation.

Conclusion

As noted in other studies in New England, the refugee population is particularly vulnerable to childhood lead poisoning. It will be crucial for future studies to investigate the onset of lead poisoning in refugee children, to determine whether exposure to lead is occurring predominantly prior to or following resettlement. The possibility of lead poisoning occurring after arrival would necessitate future precautions when resettling refugees, as well as increased vigilance among healthcare providers treating this population.

The Rhode Island Department of Health's goal of eliminating lead poisoning by 2010 has not been met. Screening rates must be improved, as well as housing inspections and the removal of environmental lead hazards, if lead poisoning among vulnerable populations and in the state as a whole is to be permanently abated.

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The authors have no financial interests to disclose.