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Final Report

June 2021

Elevated Blood Lead Levels in Refugee Children

King County Public Health Partnership

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Hazardous Waste Management Program
GOVERNMENTS WORKING TOGETHER FOR A HEALTHIER AND CLEANER KING COUNTY

The Hazardous Waste Management Program, a coalition of local governments in King County, Washington, prepared this report. Our customers are residents, businesses, and institutions with small quantities of hazardous wastes. Our mission is to protect and enhance public health and environmental quality in King County by reducing the threat posed by the production, use, storage, and disposal of hazardous materials.

Participating agencies include the Water and Land Resources Division and Solid Waste Division of King County's Department of Natural Resources and Parks, Public Health – Seattle and King County, Seattle Public Utilities, and 37 cities and Tribal governments in King County.

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Ali, M., Holland, A., Cohen, S., Vonnahme, D., Wilson, M., Amsalu, F. and Watson, T. (2020). *Elevated Blood Lead Levels in Refugee Children, King County Public Health Partnership.* Hazardous Waste Management Program, Seattle, WA.

Publication Number: LHWMP_0357

Alternative Formats Available

206-263-1650
TTY Relay: 711

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Summary

King County, Washington is home to a large and diverse refugee community. Lead poisoning impacts refugee and other newcomer children resettled in the United States. Refugees receive a health screening examination within 90 days of arrival to the United States and in King County, Public Health-Seattle & King County Downtown Public Health Center provides this examination. All children ages 6 months to 16 years receive testing for elevated blood lead levels (EBLLs) at the health screening examination. Screening results in 2018-2020 show newly arrived refugee children have blood lead levels (BLLs) above the Centers for Disease Control and Prevention (CDC) blood lead reference value of 5 micrograms per deciliter (µg/dL). Children from Afghanistan, who are a top arrival group to King County, are the most disproportionately impacted with 36 percent of children found to have EBLLs. There is no safe blood lead level (BLL) in children, and even at low levels, lead can impact a child's learning, growth, and behavior.

Although universal screening for lead has been offered to refugee children in Washington state since 2014, public health investigation and management of children with EBLLs is dependent upon local health jurisdiction capacity. In 2018 the Washington State Department of Health (DOH) provided funding for intervention and case management to increase services for refugee children in King County with EBLLs.

Through DOH funding, a collaborative Public Health Partnership (Partnership) was established in 2018 with the Public Health-Seattle & King County Downtown Public Health Center (Public Health Center) and Hazardous Waste Management Program, Public Health – Seattle & King County (Haz Waste). The goal of the Partnership is to support families in reducing their child's exposure to sources of lead in the home and to provide culturally and linguistically appropriate resources for children with EBLLs. Services provided by the Partnership include in-home environmental evaluation, nutritional and developmental screening, and referrals to resources in the community.

Home investigations conducted during the Partnership have greatly increased the number of children and families receiving public health assessment, on-site investigation, and coordinated care. During the Partnership 378 refugee children were found to have EBLLs at or above 5 µg/dL. Through services provided, 326 children reduced their BLL to below the CDC reference value of 5 µg/dL.

Public Health Partnership Increased Services in the Community

The Partnership was established in 2018 and provided enhanced services and additional support to families to reduce their child's exposure to lead through in-home environmental evaluations, nutritional and developmental screenings, and referrals to resources in the community. DOH funding was essential to increasing the services provided to children with EBLLs and their families, including:

- Increasing access to homes to identify sources of lead through environmental evaluations conducted by Health and Environmental Investigator (HEI) and work directly with families to eliminate sources of lead.

- Increasing the number of children receiving in-home services from the Public Health Registered Nurse (RN), including follow-up for children with a BLL at or above the CDC reference value of 5 µg/dL

- Providing children with developmental and health screenings by the RN which was not previously available to refugee children and their families.

- Working directly with families to coordinate services and increase the care provided to families through referrals to community resources and medical providers.

Figure 1. Services provided prior to and during Public Health Partnership

Before the Partnership was established, home environmental investigations by the HEI were limited due to challenges around families' familiarity with the Hazardous Waste Team and concern about allowing someone unknown in their home. Through the familiarity and trust already established with the community by the RN during health screening examinations, families allowed both the HEI and RN to conduct in-home investigations including environmental, developmental, and nutritional assessments.

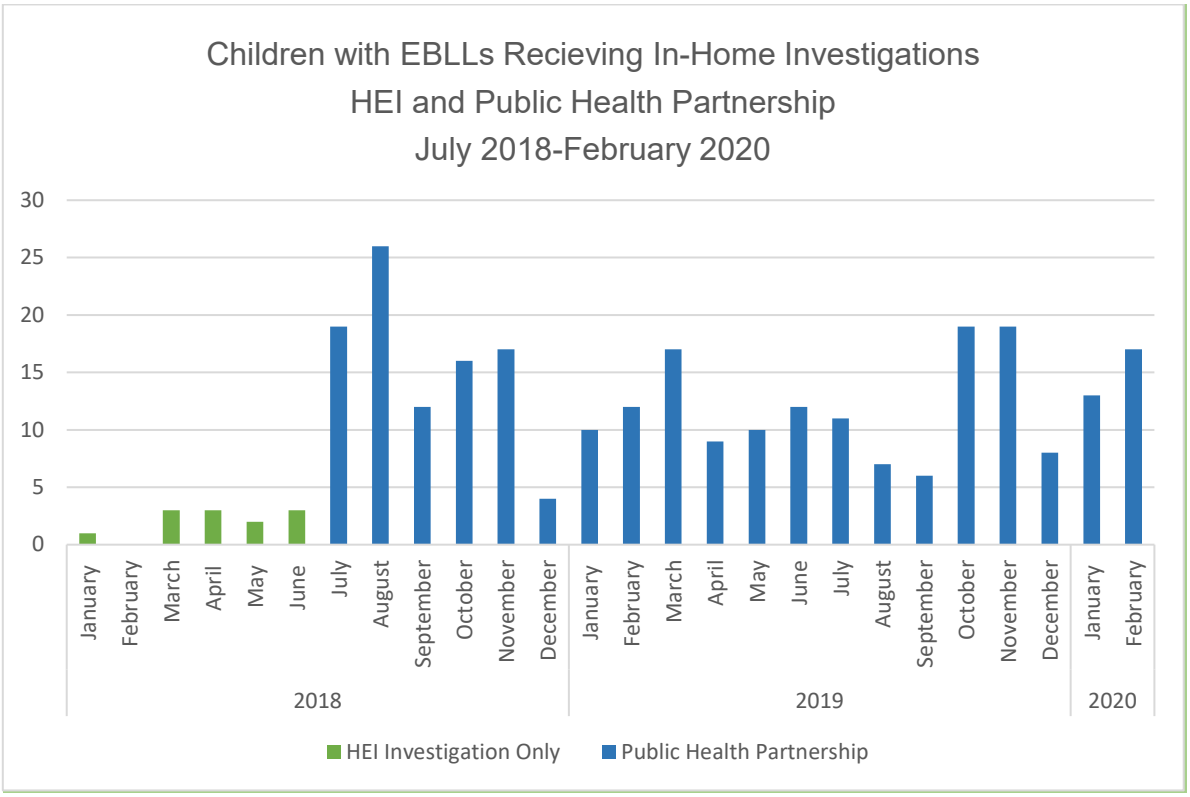
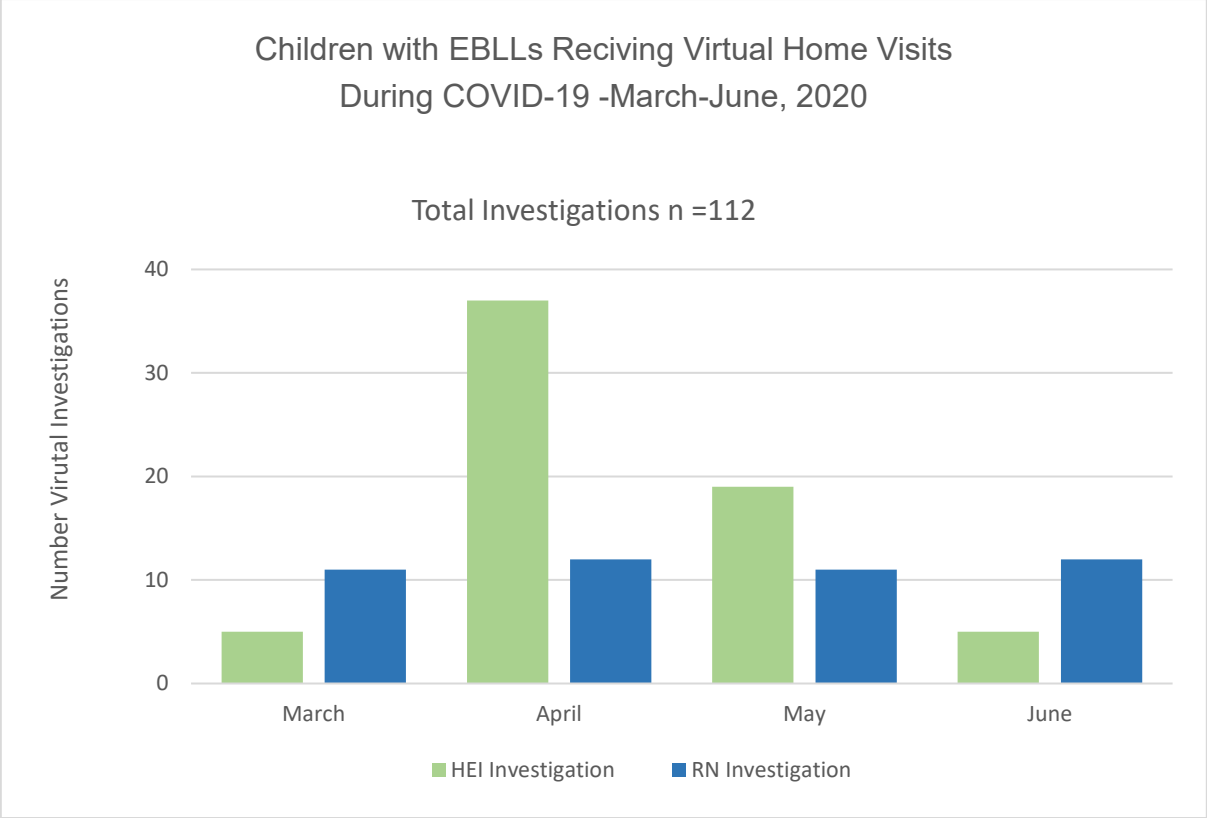


Figure 2. Services provided during COVID-19 pandemic

In response to the COVID-19 pandemic and Public Health requirements for limited in-person contact, the Partnership conducted virtual in-home visits starting in March 2020. HEI and RN investigations were each conducted virtually and provided resources and information to families with children with EBLLs.



In-Home Child Lead Assessment

In Washington state, WAC 246-101 requires laboratories to report all blood lead test results to the Washington State Department of Health. Blood lead levels are a notifiable condition. These results are made available to local health jurisdictions through the Washington Disease Reporting System (WDRS). In-home child lead assessment begins when EBLL results are received from the WDRS. The family is contacted by the refugee health screening registered nurse (RN) to schedule an in-home visit at the child's primary residence to assess the potential source of lead exposure. Contact with the family, including scheduling a home visit and providing health education and additional resources is conducted and provided in the primary language of the family.

To assess a baseline of information, at the start of the in-home visit, the RN asks the family questions about the child's hand-to-mouth behavior and other behaviors that may lead to potential lead exposure. Information is also documented for the age of the home and occupation or hobbies outside of the home for the family that could indicate a potential lead source.

Developmental and Nutritional Assessment

Using the Denver Developmental Screen Test II (DDST II), the RN identifies children with developmental delays so they can be referred to a health care specialist for further evaluation and additional resources. The RN also conducts a nutritional assessment to determine if the child is getting a nutritious and well-balanced diet that contains sufficient iron, calcium, and vitamin C which may reduce the child's absorption of lead. Nutrition is an important factor in managing lead poisoning. The RN makes recommendations for foods that are nutritious and culturally appropriate.

Child Assessment Action Plan

After the in-home visit is completed and BLL test results are received, a plan of care is sent to the child's health care provider by the RN, including suggested follow-up by additional recommended resources (e.g. speech therapist, schools, tutoring, development therapist, etc.). A packet of information is provided to the

family including resources such as the child's growth charts, BLL and other test results from the clinic, information related to proper nutrition, and environmental sources of lead exposure. The family is also informed during the in-home visit that the RN will send a follow-up report to their health care provider.

In-Home Environmental Assessment

Concurrent with the child assessment provided by the RN, children with a BLL ≥5 µg/dL and their families receive an environmental assessment from the HEI to identify potential sources of lead exposure in the home. Potential sources of lead that easily transmit lead through hand-to-mouth behaviors of a child are included. If items are found during the assessment that are known or suspected to contain lead, a request is made by the HEI to the family to take samples for analysis to confirm the presence of lead.

Environmental Assessment Action Plan

The environmental action plan contains a summary of the findings from the HEI's visit, x-ray fluorescence (XRF) screening results, and laboratory test results that are translated into the family's primary language. Measures to reduce and/or eliminate lead exposures that were identified are included in the summary based on the assessment of all possible lead sources. Recommendations are included for follow-up with the child's health care provider to determine the best time to have the child's blood retested.

Identifying Sources of Lead

During an in-home environmental assessment, items, materials, and areas of the home are screened for lead using an XRF according to standard testing and safety protocols. Commonly found sources of lead include items used in food preparation such as pressure cookers, cookware, glazed dishes, silverware, prepackaged food, and spices and personal products including surma/kajal and cosmetic jewelry.

Safer Alternative Cookware Exchange

Items found to contain lead, such as pressure cookers and cookware shown in Table 1, are removed from the home with the permission of the family and taken by the HEI to the Haz Waste Laboratory for further test by the Haz Waste Research Team. The HEI provides the family with a replacement pressure cooker and/or cookware that have been identified as having no detectable lead by the Haz Waste Research Team. All other items are disposed of in the household trash by the family. To date, 31 families have received replacement cookware impacting 69 children with EBLLs.

Table 1. Cookware Containing Lead

This table shows an example of a pressure cooker and aluminum cooking pot that was screened during an in-home visit in February 2020. Both items were screened by XRF inside the pot and cooker where food can come in contact (bottom, two sides and lid). Screening result for the pot and cooker range in value based on location and mix of metals. For all cookware screened by XRF, results range from 415 to 6,900 ppm.

Cookware	Lead Result (ppm)
Aluminum cooking pot – screen 1	1,863 +/- 70
Aluminum cooking pot – screen 2	676 +/- 43
Aluminum cooking pot – screen 3	2,064 +/- 74
Aluminum cooking pot – screen 4	2,389 +/- 79
Traditional pressure cooker – screen 1	415 +/- 33
Traditional pressure cooker – screen 2	776 +/- 47
Traditional pressure cooker – screen 3	615 +/- 41
Traditional pressure cooker – screen 4	581 +/- 39

Some of the common sources of lead come from the family's country of origin and often hold sentimental value and significance, such as pressure cookers and cookware that have been passed down through generations or given to commemorate a special event. When the family requests to keep a pressure cooker or cookware the HEI advises the family to store the item to display or keep. However, it should no longer be used for cooking or other purposes.

Sources of Lead Follow-Up

At the conclusion of the in-home visit, a summary of the XRF screening results identifying potential sources of lead in the home is communicated to the family in their primary language.

If the sources of lead exposure are not identified during the initial in-home visit, and if the child spends a significant amount of time at another location such as a childcare facility or extended family's home, the family is contacted to request an additional visit at one of the other locations to further assess sources of potential lead exposure.

EBLL Case Management

Protocols established for case management of children with EBLLs include the RN and HEI providing outreach to the family/caregiver of each child. All children screened for BLLs are reported in the WDRS for the total number of children screened and whether they are below, at, or above the CDC blood lead reference value of <5 µg/dL. EBLL reporting to WDRS includes information for completed environmental investigations and developmental and nutritional plan of care recommendations.

Cases are received by the Partnership when EBLLs are ≥5 µg/dL. Once the blood lead level is <5 µg/dL cases continued to be monitored for three months by the HEI before the case is closed in the WDRS database. BLL cases reported at <5 µg/dL at the first BLL testing are automatically closed in the WDRS database and are not received by the Partnership.

Additionally, if a provider is not retesting or when families refuse services the EBLL case continues to be monitored until it is below 5 µg/dL. Cases are maintained in WDRS should the child's status change and further retesting has occurred at a later date. The HEI and RN periodically also follow-up with the health care providers to encourage additional testing.

Cases may also be closed in WDRS if they are lost to follow-up. For example, cases are closed if the child is no longer being seen by their health care provider, is not following through on scheduled appointments, not able to contact the family by phone, mail, or email, or now live outside of King County or Washington state. If test results report a false positive EBLL or if the child turned 15 years old their case will be closed in WDRS.

Table 2. Public Health Partnership Services and Case Management

Partnership services for newly arrived refugee children are provided for children with EBLLs and their families. Over 36 percent of refugee children screened during the Partnership were found to have EBLLs. The following information includes the total number and status of children screened, Partnership services received, and outcomes.

Public Health Partnership Services and Case Management	Total Number
All refugee children screened by the RN during the Partnership within 90 days of arrival to the United States and in King County.	1,152
Children screened with BLLs ≥ 5 µg/dL received in-home and virtual visits and partnership services from HEI and PH	378
Cases closed for children with BLLs ≥ 5 µg/dL who received Partnership services and reduced their BLLs to <5 µg/dL	326
Cases closed for children screened with BLL <5 µg/dL, no action taken by the Partnership	343
Cases closed for BLL reported through Electronic Laboratory Reporting that is not standardized	105
All closed cases during the Partnership, including children screened <5 µg/dL, BLLs reduced to <5 µg/dL, lost to follow-up, moved out of state and false positives.	941

Conclusions

Exposure to even low levels of lead can impact a child's learning, growth, and behavior. During the 2018-2020 Public Health Partnership, newly arrived refugee children with EBLLs and their families received an in-home environmental evaluation, nutritional and developmental screening that was not previously available. Families also received referrals to resources in the community through increased follow-up by the Public Health Partnership.

The increased services provided by the Public Health Partnership through in-home assessments improved the lives of children with EBLLs and their families. This work also provided a continuity of care from refugee health screening, and helped build relationships with refugee families, which is central to successful in-home visits and evaluations to reduce sources of lead in their home.

Without the support of DOH funding provided in the 2018-2020 Childhood Lead Poisoning Prevention Program contract, it would not have been possible to provide the needed services to refugee children with EBLLs and their families. It also would not have been possible to conduct the ongoing work to reduce lead exposures and health impacts of EBLLs in the children we served.