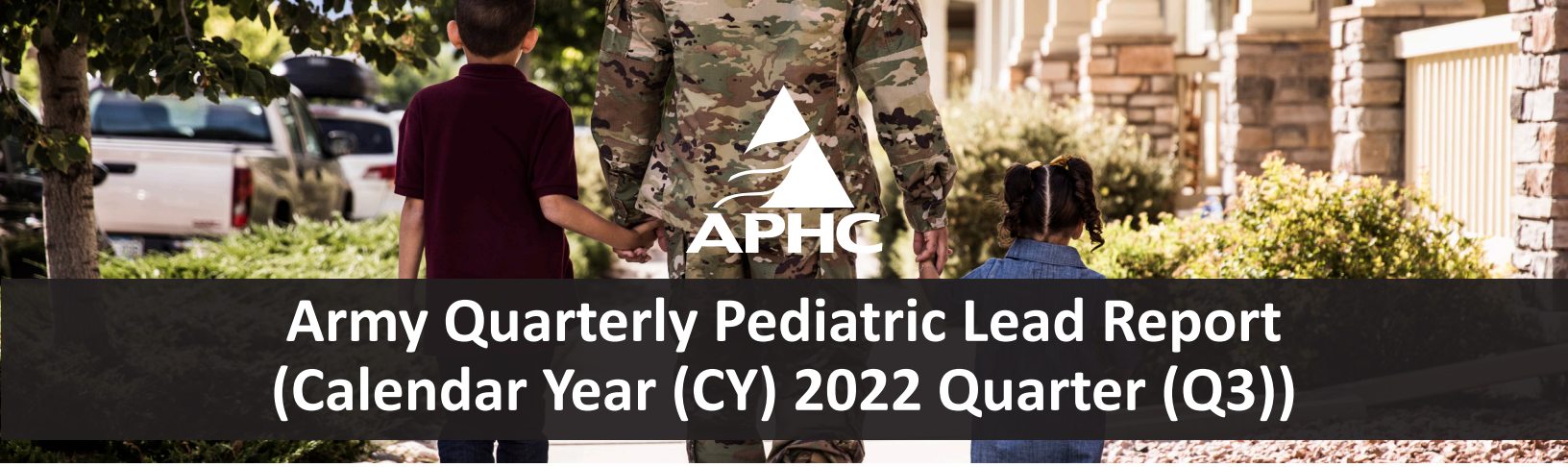

Army Quarterly Pediatric Lead Report (Calendar Year (CY) 2022 Quarter (Q3))

THIRD QUARTER HIGHLIGHT

1,376 Army Child Dependents

received a blood lead test between 1 July and 30 September 2022; 1.6% of those tests indicated an elevated blood lead level (eBLL). This quarterly report uses laboratory data based on the updated Centers for Disease Control and Prevention reference value for an eBLL (≥3.5 µg/dL).

INTRODUCTION

Lead is a naturally occurring heavy metal but can present an environmental and health hazard if it contaminates water, air, soil, or dust. In the U.S., the most common ways that people are exposed to lead are the inhalation or accidental ingestion of contaminated dust and soil as a result of aging or chipping lead-based paint.[1,2] Lead-based paint was banned from use in the U.S. in 1978, but many homes built prior to the ban still exist in communities across the country. Other potential sources of lead exposure are contaminated water, ammunition, soldering equipment, as well as some foreign-made toys, ceramics, make-up, and packaged foods.

Lead is neurotoxic and can cause cognitive and behavioral issues, as well as gastrointestinal and hematological problems.[2,3] Children are at higher risk of lead exposure because of their more frequent hand-to-mouth behavior. They are also more susceptible to the harmful effects of lead since the brain is in a period of rapid development during childhood.

Because children are at higher risk of poor health outcomes if exposed to lead, the American Academy of Pediatrics recommends that all children aged 6 months to 6 years, inclusive, be screened for increased risk of lead exposure via a parental questionnaire administered at routine well-child visits.[3] Children who screen positive for an increased exposure risk should be tested for an elevated blood lead level (eBLL). Laws regarding lead exposure screening, testing, and reporting are established at the State level, and Army regulation directs installations to comply with State law.[3]

In 2021, the Centers for Disease Control and Prevention (CDC) lowered the eBLL reference value from 5 micrograms per deciliter (µg/dL) to 3.5 µg/dL.[4] This updated reference value was derived from the 97.5th percentile of the blood lead values among U.S. children aged 1 to 5 years, resulting from the 2015–2016 and 2017–2018 National Health and Nutrition Examination Survey cycles. The CDC reference value should not be interpreted as a “safe” level, and the CDC continues to stress that there is no safe level of lead exposure.

In October 2018, eBLLs were established as a reportable medical event (RME) for Army dependents aged 0 to 6 years, according to the Army Lead Hazard Management Control Program.[5] Army dependents with eBLLs must be reported to the Disease Reporting System internet (DRSi) according to Armed Forces Health Surveillance Division guidelines. In November 2022, the Tri-Service Reportable Medical Event Working Group updated the case definition of the elevated blood lead RME to reflect the change in the CDC reference value.

This quarterly report tracks all available BLL laboratory test results within the Army dependent population and monitors the occurrence of eBLLs. This iteration uses the updated CDC reference value for eBLL (3.5 µg/dL).

METHODS

Laboratory Data

The Navy and Marine Corps Public Health Center (NMCPHC) provided available BLL laboratory results for Army dependents from the Composite Health Care System (CHCS) Health Level 7 (HL7) chemistry data system and Military Health System

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(MHS) GENESIS. Records are dated according to the BLL collection date, and this report covers test results collected from 1 July through 30 September 2022 (CY2022 Q3). The data include all BLL test results above and below the eBLL cutoff collected within the MHS. These include test results for Army dependents who receive care at Army medical treatment facilities (MTFs) and other Department of Defense facilities. Test results were excluded from the analysis when the unit of measure or the result could not be determined, or the biological sample was not blood.[6] Zinc photoporphyrin (ZPP), point of care (POC), and capillary blood tests (n=122) were also not included as these tests are not considered in the case definition in the *Armed Forces Reportable Medical Events – Guidelines and Case Definitions*[7], hereafter referred to as the Armed Forces RME Guidelines.

Only BLL results for Army dependents aged 0 to 6 years were analyzed for this report. According to the Armed Forces RME Guidelines, a child can be counted as an eBLL case only once per calendar year.[7] If an individual had more than one BLL result (e.g., duplicate record or follow-up blood test) during CY2022 Q3, the highest BLL result was retained. The frequency of BLL test results is displayed by BLL range (<3.5 µg/dL, 3.5–9 µg/dL, 10–19 µg/dL, ≥20 µg/dL), Regional Health Command (RHC), and installation. Results ≥3.5 µg/dL are considered elevated. All CY2022 Q3 eBLL test results are reported.

Disease Reporting System Internet Data

The DRSi is a tri-service reportable medical event system. Since 18 October 2018, eBLLs have been reportable through the DRSi for children aged 0 to 6 years.[5] Only Army dependent cases reported to DRSi are included in this report. Among Army dependents, DRSi cases with medical event report dates from 1 July through 30 September 2022 were counted.

DRSi Reporting Compliance

DRSi report dates can differ from the BLL test collection date. Taking this into consideration, cases with test collection dates during CY2022 Q3 were considered in the measure of compliance with the eBLL reporting policy. Reporting compliance was determined using the proportion of eBLL laboratory results within CHCS and MHS GENESIS collected during CY2022 Q3 that were also reported via a medical event report in DRSi. Because the Armed Forces RME Guidelines case definition for an eBLL was updated after the dates covered in this report (1 July through 30 September 2022), only eBLL cases that meet the previous Armed Forces RME Guidelines case definition for eBLL (≥5 µg/dL) were counted in the compliance measure.[7]

Army Public Health Nurses Program Status Report (APHN-PSR)

Starting in April 2019, specific questions regarding childhood lead exposure were included in the APHN-PSR to assess the Environmental Health Hazard Management Control Program.[8] As part of installation safety and housing office-led environmental investigations, the installation's Department of Public Health (Preventive Medicine Services) conducts parent/guardian interviews after a child 6 years of age or younger is confirmed to have an eBLL. The APHN-PSR captures the following Lead Hazard Management Control Plan metrics: (1) number of pediatric BLL tests conducted in the past fiscal quarter reported to the State/local authorities; (2) number of confirmed elevated pediatric BLL test results in the past fiscal quarter reported to the State/local authorities per the State/local reporting requirements.

RESULTS

Laboratory Test Results

During CY2022 Q3, 1,376 Army dependents aged 0 to 6 years received a blood lead test within the MHS; 22 of those results (1.6%) indicated an elevated BLL (≥3.5 µg/dL), as shown in Table 1. Because of the lower reference value for eBLL, fifteen additional children with an eBLL were identified. In CY2022 Q3, no child's BLL exceeded the level at which chelation therapy is typically recommended (≥45 µg/dL) or fell within the highest range (≥20 µg/dL, Table 1).

Table 1. Total Count of Pediatric (ages 0–6) Blood Lead Levels in CY2022 Q3

BLL Ranges (µg/dL)	CY2022 Q3 n (%)
<3.5	1,354 (98.4%)
3.5–9	21 (1.5%)
10–19	1 (0.1%)
≥20	0
Total	**1,376 (100%)**

Twenty of the elevated results in CY2022 Q3 are new eBLL cases. Two Army dependents with an elevated result in CY2022 Q3 had an elevated result reported previously in CY2022. In the first three quarters of CY2022, there were a total of 51 Army dependents with an eBLL (Figure 1).

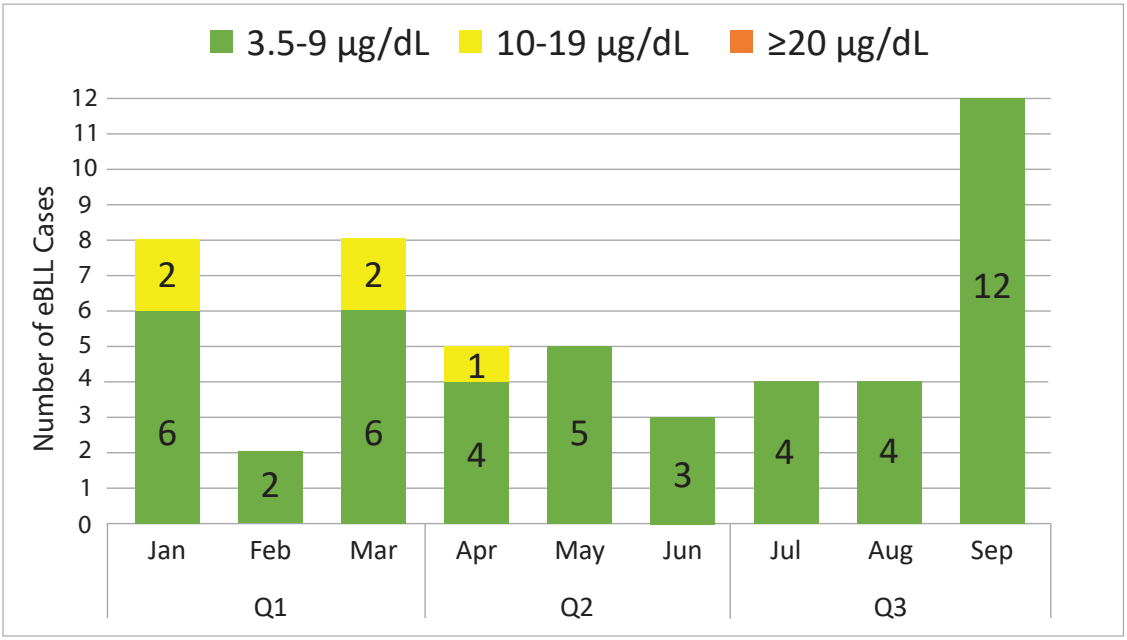

Figure 1. Number of Elevated Blood Lead Cases (≥3.5 µg/dL) by Month in CY2022
Data source: CHCS HL7 and MHS GENESIS

The highest BLL test results from CY2022 Q3 were retained for each child dependent; Table 2 summarizes these BLLs by RHC and installation. The elevated BLL results were from Fort (Ft.) Belvoir (1), Ft. Bliss (1), Ft. Drum (1), Ft. Hood (1), Ft. Leavenworth (1), Ft. Polk (2), Ft. Riley (1), Ft. Sill (1), Ft. Stewart (1), Ft. Wainwright (1), Joint Base (JB) Lewis-McChord (2), JB San Antonio (8), and West Point (1). Appendix A shows a list of U.S. Air Force (USAF), Marine Corps, and Navy locations where Army dependents received BLL testing during CY2022 Q3.

Table 2. Pediatric (ages 0–6) Blood Lead Levels (BLL), by Region and Installation, CY2022 Q3

	BLL Ranges				
REGION	**<3.5 µg/dL**	**3.5–9 µg/dL**	**10–19 µg/dL**	**≥20 µg/dL**	**Total**
ATLANTIC					
Aberdeen Proving Ground	26	0	0	0	26
Carlisle Barracks	3	0	0	0	3
Ft. Belvoir*	67	1	0	0	68
Ft. Benning	31	0	0	0	31
Ft. Bragg	56	0	0	0	56
Ft. Campbell	58	0	0	0	58
Ft. Detrick	11	0	0	0	11
Ft. Drum*	115	1	0	0	116
Ft. Jackson	6	0	0	0	6
Ft. Knox	23	0	0	0	23
Ft. Lee	22	0	0	0	22
Ft. Meade	52	0	0	0	52
Ft. Rucker	29	0	0	0	29
Ft. Stewart*	42	0	1	0	43
Redstone Arsenal	3	0	0	0	3
Walter Reed NMMC	11	0	0	0	11
West Point*	18	1	0	0	19
CENTRAL					
Ft. Bliss*	80	1	0	0	81

Table 2 (continued). Pediatric (ages 0–6) Blood Lead Levels (BLL), by Region and Installation, CY2022 Q3

	BLL Ranges				
REGION	**<3.5 µg/dL**	**3.5–9 µg/dL**	**10–19 µg/dL**	**≥20 µg/dL**	**Total**
Ft. Carson	57	0	0	0	57
Ft. Hood*	110	1	0	0	111
Ft. Huachuca	4	0	0	0	4
Ft. Irwin	2	0	0	0	2
Ft. Leavenworth*	13	1	0	0	14
Ft. Leonard Wood	33	0	0	0	33
Ft. Polk*	15	2	0	0	17
Ft. Riley*	42	1	0	0	43
Ft. Sill*	51	1	0	0	52
White Sands Missile Range	1	0	0	0	1
PACIFIC					
Camp Zama	2	0	0	0	2
Ft. Shafter	14	0	0	0	14
Ft. Wainwright*	17	1	0	0	18
Schofield Barracks	28	0	0	0	28
EUROPE					
Grafenwoehr	14	0	0	0	14
Landstuhl	32	0	0	0	32
Vicenza	22	0	0	0	22
Vilseck	11	0	0	0	11
JOINT BASES					
JB Elmendorf-Richardson	17	0	0	0	17
JB Langley-Eustis	42	0	0	0	42
JB Lewis-McChord*	4	2	0	0	6
JB Little Creek-Ft. Story	2	0	0	0	2
JB Meyer-Henderson Hall	3	0	0	0	3
JB San Antonio*	60	8	0	0	68
USAF MTF*+					
	82	0	0	0	82
NAVAL/MARINE CORPS MTF*+					
	23	0	0	0	23

*elevated blood lead level (eBLL ≥3.5 µg/dL) result in CY2022 Q3

*+ See Appendix A for the list of USAF, Navy, and Marine Corps locations where Army dependents received BLL tests in CY2022 Q3.

DRSi Reporting Results

Thirteen eBLL cases among Army dependents were reported in DRSi during CY2022 Q3. JB San Antonio reported eight eBLL cases. Ft Bliss and JB Lewis-McChord each reported two eBLL cases, and Ft. Bragg reported one eBLL case. Due to differences in the report date compared to the test collection date in the DRSi system, one child had a BLL test result from CY2022 Q1 reported, and the remaining twelve had test results from CY2022 Q3 reported.

DRSi Reporting Compliance

Based on the Armed Forces RME Guidelines case definition for eBLL (≥5 µg/dL) during the dates of this report (1 July through 30 September 2022), five out of the 20 new eBLL cases identified in the CHCS and MHS GENESIS laboratory data were considered in the measure of reporting compliance. All five of these cases were reported to DRSi; a 100% reporting compliance for CY2022 Q3.

Army Public Health Nurses Program Status Report (APHN-PSR)

The results of the APHN-PSR indicated that a total of 741 BLL test results were reported to State and/or local authorities during CY2022 Q3 (Table 3). The APHN-PSR question related to pediatric lead is relevant for installations located in State and local jurisdictions that require reporting of all BLL test results, including those below 3.5 µg/dL (e.g., Louisiana, New York,

North Carolina). RHC-Central reported the most BLL test results to State and local authorities (n=392), followed by RHC-Atlantic (n=349). Twelve (1.6%) of those results (n=741) indicated elevated BLLs.

Table 3. Blood Lead Levels (BLL) Reported through the APHN-PSR by Region and Installation, CY2022 Q3

REGION	Number of BLL tests reported to the State/local authorities	Number of eBLL tests reported to the State/local authorities
ATLANTIC		
Ft. Belvoir	274	0
Ft.Bragg	2	2
Ft Rucker	46	0
JB Langley-Eustis	27	2
CENTRAL		
Ft. Bliss	2	2
Ft. Carson	100	0
Ft. Hood	240	2
Ft. Huachuca	5	1
Ft. Polk	40	3
Redstone Arsenal	5	0
PACIFIC		
JB Lewis-McChord	0	2

Note: Installations that are not listed did not report BLL tests or eBLL (≥3.5 µg/dL) tests.

DISCUSSION

Approximately 1.6% of the results of BLL tests performed in CY2022 Q3 (1 July – 30 September 2022) indicated eBLLs. Because of the lower reference value for eBLL, fifteen additional children with an eBLL were identified. The number of Army dependents tested during CY2022 Q3 (n=1,376 BLL tests) compared to CY2021 Q3 (n=2,343 BLL tests) decreased by 41%. The decrease in blood lead test results may be because more dependents are seeking care outside the MHS or a decrement in the laboratory data received from installations that have transitioned to the MHS GENESIS electronic health record. For example, three eBLL cases from JB San Antonio and one case from Ft Bragg were reported to DRSi, but were not included in the MHS GENESIS laboratory data sent by NMCPHC, indicating a potential gap in the data.

Since there is no safe level of lead in the blood, the Army will continue its Lead Hazard Management Control Program to both prevent childhood lead exposure and monitor children with an eBLL to ensure each case receives proper treatment and management. Reporting eBLLs to DRSi is an important aspect of that control and prevention program. This quarter, reporting compliance was high, with Army MTFs reaching 100% reporting compliance. This rate is significantly improved from the first half of 2022 (Q1–Q2 reporting compliance range: 10–17%). eBLL case reporting is critical to reliably identifying installations where children may be at increased risk of lead exposure. Children with an eBLL are reportable to DRSi once per calendar year. Contact the Disease Epidemiology Branch (usarmy.apg.medcom-aphc.mbx.disease-epidemiologyprogram13@health.mil) for any questions regarding DRSi reporting of eBLLs.

LIMITATIONS

This report may not include all Army dependent BLL test results. The NMCPHC extracted the blood lead laboratory results from CHCS one month after the end of Q3 to minimize the chance of missing any results collected during that quarter. However, it is still possible that some of the results were not certified by the laboratory and entered into CHCS or MHS GENESIS at the time the Navy performed the data extraction. In addition, only BLLs collected within the MHS are available through either CHCS or MHS GENESIS, meaning blood samples collected and tested outside the MHS are not represented in this report.

The MHS GENESIS data provided by the NMCPHC were included in this report to provide some visibility on the installations that have converted to that electronic medical record system. However, the NMCPHC has communicated concerns about the quality and completeness of these data. At the time of this publication, installations that transitioned to MHS GENESIS include Ft. Benning, Ft. Bliss, Ft. Bragg, Ft. Carson, Ft. Gordon, Ft. Hood, Ft. Huachuca, Ft. Irwin, Ft. Jackson, Ft. Leavenworth, Ft. Leonard Wood, Ft. Polk, Ft. Riley, Ft. Rucker, Ft. Shafter, Ft. Sill, Ft. Stewart, Ft. Wainwright, JB Elmendorf-Richardson, JB Lewis-McChord, JB San Antonio, Presidio of Monterey, Redstone Arsenal, and Schofield Barracks.

To improve BLL surveillance, the Army established a RME for eBLLs in children 0 to 6 years old. The USAF similarly reports eBLLs through DRSi. The Armed Forces RME Guidelines elevated blood lead case definition was updated to reflect the current CDC reference value after the dates of this report, so children with a BLL of 3.5 – 5 µg/dL may not have been reported to DRSi. The Navy relies solely on laboratory data and does not report eBLLs through DRSi, so it is possible that those cases will not be immediately visible to the APHC. However, the data from CHCS/MHS GENESIS show that there were no eBLLs among the Army dependents who received BLL tests at Navy or Marine Corps MTFs.

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Appendix A

Table A-1. U.S. Air Force, Navy, and Marine Corps locations where Army Dependents Received a Blood Lead Test, CY2022

USAF Bases
Buckley AFB
Davis-Monthan AFB
Eglin AFB
FE Warren AFB
Fairchild AFB
Hill AFB
JB Anacostia-Bolling
JB Andrews
JB Charleston
Kadena AB
Keesler AFB
Los Angeles AFB
Luke AFB
MacDill AFB
Maxwell AFB
McConnell AFB
Misawa AB
Nellis AFB
Osan AB
Patrick AFB
Peterson AFB
Ramstein AB
Robbins AFB
Tinker AFB
Travis AFB
USAF Academy
Wright-Patterson AFB

Naval/Marine Corps Stations
Chesapeake
Indian Head
JB Marianas Guam-Andersen
Norfolk
Patuxent River
Portsmouth
Quantico
Sigonella
Virginia Beach