



DCPH-A

Army Quarterly Pediatric Lead Report Calendar Year (CY) 2023 Quarter (Q3)

THIRD QUARTER HIGHLIGHT

1,169 Army Child Dependents

received a blood lead test between 1 July and 30 September 2023;
1.3% of those tests indicated an elevated blood lead level (e BLL ≥ 3.5 $\mu\text{g}/\text{dL}$).

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 (e BLL). 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 e BLL reference value from 5 micrograms per deciliter ($\mu\text{g}/\text{dL}$) to 3.5 $\mu\text{g}/\text{dL}$.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, e BLLs 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 Based on the Defense Health Agency’s Armed Forces Health Surveillance Division guidelines, Army dependents with e BLLs must be reported to the Disease Reporting System internet (DRSi). 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 e BLLs.

METHODS

Laboratory Data

The Defense Centers for Public Health – Portsmouth (DCPH-P) 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 (MHS) GENESIS. Records are dated according to the BLL collection date, and this report covers test results collected from 1 July through 30 September 2023 (CY2023 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 medical treatment facilities (MTFs) on Army installations 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=44) were also not included as these tests are not considered in the case definition in the Armed Forces Reportable Medical Events – Guidelines and Case Definitions⁷, 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 CY2023 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), Medical Readiness Command (MRC), and installation. Results ≥3.5 µg/dL are considered elevated. All CY2023 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 2023 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 CY2023 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 CY2023 Q3 that were also reported via a medical event report in DRSi.

Public Health Nurses Program Status Report (PHN-PSR)

Starting in April 2019, specific questions regarding childhood lead exposure were included in the PHN-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 PHN-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 CY2023 Q3, 1,169 Army dependents aged 0 to 6 years received a blood lead test within the MHS; 15 of those results (1.3%) indicated an elevated BLL (≥3.5 µg/dL), as shown in Table 1. Because of the lower reference value for eBLL, six additional children with an eBLL were identified. In CY2023 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 CY2023 Q3

BLL Ranges (µg/dL)	CY2023 Q3 n (%)
<3.5	1154 (98.7%)
3.5–9	12 (1.0%)
10–19	3 (0.3%)
≥20	0
Total	1,169 (100%)

Twelve of the elevated results in CY2023 Q3 are new eBLL cases. Three Army dependents with an elevated result in CY2023 Q3 had an elevated result reported previously in CY2023. In the first three quarters of CY2023, there were a total of 25 Army dependents with an eBLL (Figure 1).

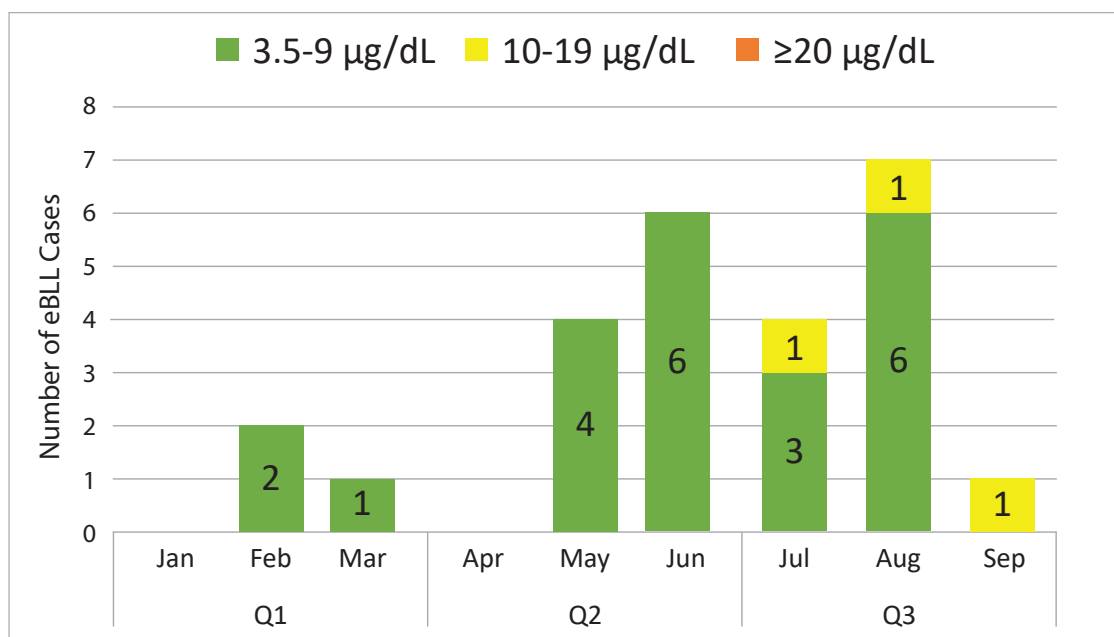


Figure 1. Number of Elevated Blood Lead Cases (≥3.5 µg/dL) by Month in CY2023
Data source: CHCS HL7 and MHS GENESIS

The highest BLL test results from CY2023 Q3 were retained for each child dependent; Table 2 summarizes these BLLs by MRC and installation. The elevated BLL results were from Fort (Ft.) Bliss (3), Ft. Liberty (3), Ft. Drum (1), Ft. Johnson (1), Ft. Leavenworth (1), Ft. Leonard Wood (1), Ft. Moore (1), Ft. Novosel (1), Ft. Riley (1), JB San Antonio (1), and Landstuhl (1). Appendix A shows a list of U.S. Air Force (USAF), Space Force, Marine Corps, and Navy locations where Army dependents received BLL testing during CY2023 Q3.

Table 2. Pediatric (ages 0–6) Blood Lead Levels (BLL), by Medical Readiness Command and Installation, CY2023 Q3

MRC	BLL Ranges				Total
	<3.5 µg/dL	3.5–9 µg/dL	10–19 µg/dL	≥20 µg/dL	
EAST					
Aberdeen Proving Ground	16	0	0	0	16
Ft. Belvoir	34	0	0	0	34
Ft. Campbell	36	0	0	0	36
Ft. Detrick	12	0	0	0	12
Ft. Drum*	39	1	0	0	40
Ft. Gregg-Adams	6	0	0	0	6
Ft. Jackson	1	0	0	0	1
Ft. Knox	16	0	0	0	16
Ft. Liberty*	82	2	1	0	85
Ft. Meade	39	0	0	0	39
Ft. Moore*	44	0	1	0	45
Ft. Novosel*	12	1	0	0	13
Ft. Stewart	44	0	0	0	44
Redstone Arsenal	1	0	0	0	1
Walter Reed NMMC	5	0	0	0	5
West Point	2	0	0	0	2
WEST					
Ft. Bliss*	120	3	0	0	123
Ft. Carson	41	0	0	0	41
Ft. Cavazos	118	0	0	0	118
Ft. Huachuca	1	0	0	0	1
Ft. Johnson*	28	1	0	0	29

Table 2 (continued). Pediatric (ages 0–6) Blood Lead Levels (BLL), by Medical Readiness Command and Installation, CY2023 Q3

MRC	BLL Ranges				Total
	<3.5 µg/dL	3.5–9 µg/dL	10–19 µg/dL	≥20 µg/dL	
Ft. Leavenworth*	19	1	0	0	20
Ft. Leonard Wood*	30	0	1	0	31
Ft. Riley*	50	1	0	0	51
Ft. Sill	27	0	0	0	27
PACIFIC					
Ft. Shafter	83	0	0	0	83
Ft. Wainwright	15	0	0	0	15
Schofield Barracks	9	0	0	0	9
EUROPE					
Grafenwoehr	23	0	0	0	23
Landstuhl*	25	1	0	0	26
Vicenza	6	0	0	0	6
Vilseck	21	0	0	0	21
JOINT BASES					
JB Elmendorf-Richardson	12	0	0	0	12
JB Langley-Eustis	13	0	0	0	13
JB Lewis-McChord	4	0	0	0	4
JB McGuire-Dix-Lakehurst	2	0	0	0	2
JB San Antonio*	39	1	0	0	40
USAF MTF**					
	51	0	0	0	51
NAVAL/MARINE CORPS MTF**					
	28	0	0	0	28

*elevated blood lead level (eBLL ≥3.5 µg/dL) result in CY2023 Q3

** See Appendix A for the list of USAF, Space Force, Navy, and Marine Corps locations where Army dependents received BLL tests in CY2023 Q3.

DRSi Reporting Results

Thirteen eBLL cases among Army dependents were reported in DRSi during CY2023 Q3. Ft. Johnson reported two eBLL cases, and Ft. Bliss, Ft. Cavazos, Ft. Drum, Ft. Leonard Wood, Ft. Liberty, Ft. Moore, Ft. Novosel, Ft. Riley, Landstuhl, Tripler, and Vicenza each reported one eBLL case. Due to differences in the report date compared to the test collection date in the DRSi system, three children had a test result from CY2023 Q2 reported, and the remaining ten children had test results from CY2023 Q3 reported.

DRSi Reporting Compliance

Eleven of the twelve new eBLL cases identified in the laboratory data in CY2023 Q3 were reported to DRSi, a 92% reporting compliance. Ft. Leavenworth had one unreported eBLL during CY2023 Q3.

Public Health Nurses Program Status Report (PHN-PSR)

The results of the PHN-PSR indicated that a total of 979 BLL test results were reported to State and/or local authorities during CY2023 Q3 (Table 3). The PHN-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). MRC-West reported the most BLL test results to State and local authorities (n=753), followed by MRC-East (n=208). Eighteen (1.8%) of those results (n=979) indicated elevated BLLs.

Table 3. Blood Lead Levels (BLL) Reported through the PHN-PSR by Medical Readiness Command and Installation, CY2023 Q3

MRC	Number of BLL tests reported to the State/local authorities	Number of eBLL tests reported to the State/local authorities
EAST		
Carlisle Barracks	9	0
Ft. Belvoir	119	0
Ft. Drum	1	1
Ft. Knox	0	1
Ft. Liberty	2	2
Ft. Novosel	23	1
JB Langley-Eustis	49	0
Redstone Arsenal	5	0
WEST		
Ft. Bliss	256	4
Ft. Cavazos	189	1
Ft. Johnson	91	4
Ft. Leonard Wood	70	1
Ft. Riley	107	1
JB San Antonio	40	0
PACIFIC		
JB Lewis-McChord	16	0
Tripler AMC/Schofield Barracks	1	1
EUROPE		
Landstuhl	1	1

Note: Installations that are not listed did not report BLL tests or eBLL (≥ 3.5 $\mu\text{g}/\text{dL}$) tests.

DISCUSSION

Approximately 1.3% of the results of BLL tests performed in CY2023 Q3 (1 July – 30 September 2023) indicated eBLLs. Because of the lower reference value for eBLL, six additional children with an eBLL were identified. The number of Army dependents tested during CY2023 Q3 (n=1,169 BLL tests) increased 43% compared to the previous quarter (CY2023 Q2, n=819 BLL tests).

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 92% reporting compliance. This rate improved compared to the reporting compliance in CY2023 Q1 (0%) and Q2 (60%). 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 (dha.apg.pub-health-a.mbx.disease-epidemiologyprogram13@health.mil) for any questions regarding DRSi reporting of eBLLs.

LIMITATIONS

Across the MHS, the transition to the MHS GENESIS electronic medical record system is almost complete. The MHS GENESIS data provided by the DCPH-P were included in this report to provide visibility on the installations that have converted to that electronic medical record system. However, the DCPH-P has communicated concerns about the quality and completeness of these data.

This report may not include all Army dependent BLL test results. The DCPH-P extracted the blood lead laboratory results from CHCS and MHS GENESIS 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 DCPH-P 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.

REFERENCES

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8. Headquarters, U.S. Army Medical Command, January 7, 2021; USAMEDCOM Operations Order 21-17. *Environmental Health Hazard Management Control Plan*. Falls Church, VA.

Appendix A

Table A-1. U.S. Air Force, Space Force, Navy, and Marine Corps locations where Army Dependents Received a Blood Lead Test, CY2023 Q3

USAF/Space Force Bases	Naval/Marine Corps Stations
Aviano AB	Annapolis
Barksdale AFB	Chesapeake
Beale AFB	Indian Head
Buckley SFB	JB Marianas Guam-Andersen
Davis-Monthan AFB	JB Pearl Harbor-Hickam
Dover AFB	Lemoore
Eglin AFB	North Chicago
F.E. Warren AFB	Okinawa
Geilenkirchen AB	Patuxent River
Goodfellow AFB	Quantico
Hanscom AFB	San Diego
Hill AFB	Virginia Beach
JB Anacostia-Bolling	
JB Andrews	
Kadena AB	
MacDill AFB	
Nellis AFB	
Offutt AFB	
Osan AB	
Scott AFB	
Seymour Johnson AFB	
USAF Academy	