



# Army Quarterly Pediatric Lead Report Calendar Year (CY) 2024 Quarter (Q1)

## FIRST QUARTER HIGHLIGHT

Between 1 January and 31 March 2024,

2,035 Army child dependents received a blood lead test; 0.5% of those tests exceeded the CDC blood lead reference value (BLRV  $\geq 3.5 \mu\text{g}/\text{dL}$ ).

## 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.<sup>1,2</sup> 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.<sup>2,3</sup> 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.<sup>3</sup> Children who screen positive for an increased exposure risk should be tested to determine if their blood lead level (BLL) exceeds the Centers for Disease Control and Prevention (CDC) blood lead reference value (BLRV).<sup>4</sup> Laws regarding lead exposure screening, testing, and reporting are established at the State level, and Army regulation directs installations to comply with State law.<sup>3</sup>

In 2021, the CDC lowered the BLRV from 5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ) to 3.5  $\mu\text{g}/\text{dL}$ .<sup>4</sup> This updated reference value was derived from the 97.5<sup>th</sup> 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, pediatric lead poisoning was established as a reportable medical event (RME) for Army dependents aged 0 to 6 years, according to the Army Lead Hazard Management Control Program.<sup>5</sup> Based on the Defense Health Agency’s Armed Forces Health Surveillance Division guidelines, Army dependents with a BLL that exceeds the CDC BLRV 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 BLLs that exceed the CDC BLRV.

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## 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.<sup>6</sup> Records are dated according to the BLL collection date, and this report covers test results collected from 1 January through 31 March 2024 (CY2024 Q1). The data include all BLL test results above and below the CDC BLRV 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.<sup>7</sup> Zinc protoporphyrin (ZPP), point of care (POC), and capillary blood tests (n=211) 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*<sup>8</sup>, 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 with a BLL higher than the CDC BLRV can be counted as a case only once per calendar year.<sup>8</sup> If an individual had more than one BLL result (e.g., duplicate record or follow-up blood test) during CY2024 Q1, 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 exceed the CDC BLRV.

### Disease Reporting System Internet Data

The DRSi is a tri-service reportable medical event system. Since 18 October 2018, pediatric lead poisoning has been reportable through the DRSi for children aged 0 to 6 years.<sup>5</sup> Only Army dependent cases reported to DRSi are included in this report. Among Army dependents, DRSi cases with medical event report dates from 1 January through 31 March 2024 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 CY2024 Q1 were considered in the measure of compliance with the BLL reporting policy. Reporting compliance was determined using the proportion of laboratory results that exceeded the CDC BLRV within CHCS and MHS GENESIS collected during CY2024 Q1 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.<sup>9</sup> 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 a BLL higher than the CDC BLRV. The PHN-PSR captures the following Lead Hazard Management Control Plan metrics based on the past fiscal quarter: (1) number of pediatric BLL tests conducted and reported to the state/local authorities; (2) number of confirmed elevated pediatric BLL test results reported to the state/local authorities per the state/local reporting requirements; (3) number of elevated pediatric BLL cases managed by Public Health Nursing.

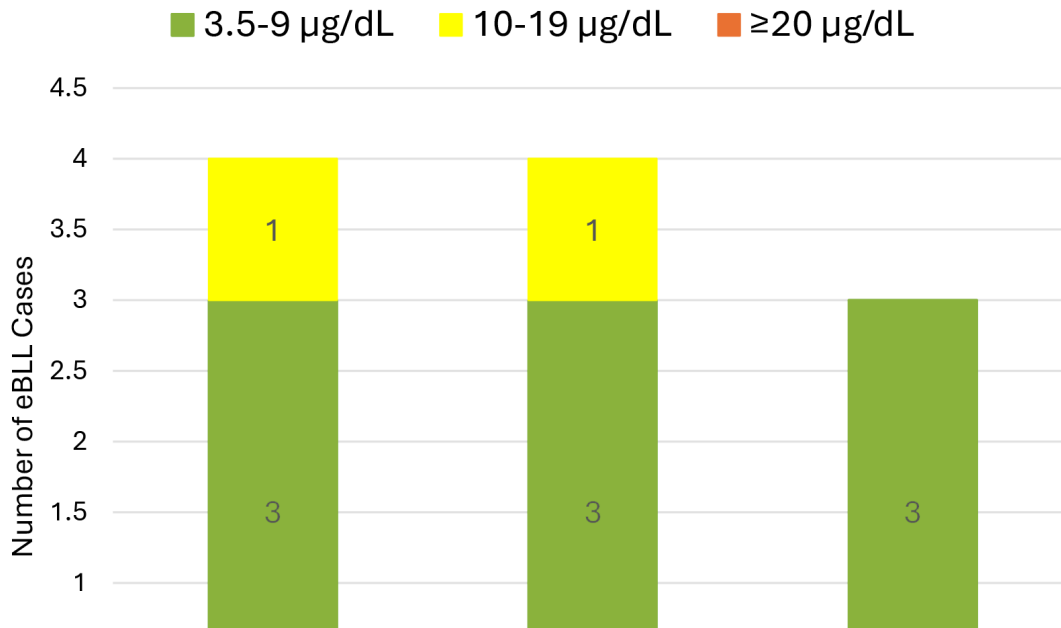
## RESULTS

### Laboratory Test Results

During CY2024 Q1, 2,035 Army dependents aged 0 to 6 years received a blood lead test within the MHS; 11 of those results (0.5%) indicated a BLL that exceeded the CDC BLRV (≥3.5 µg/dL), as shown in Table 1. Because of the lower reference value, five additional children with a BLL higher than the CDC BLRV were identified. In CY2024 Q1, 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). Figure 1 summarizes the number of test results above 3.5 µg/dL from each month in CY2024 Q1.

**Table 1.** Total Count of Pediatric (ages 0–6) Blood Lead Levels in CY2023 Q3

BLL Ranges (µg/dL)	CY2023 Q3 n (%)
<3.5	2,024 (99.5%)
3.5–9	9 (0.4%)
10–19	2 (0.1%)
≥20	0
<b>Total</b>	<b>2,035 (100%)</b>



**Figure 1.** Number of Cases Exceeding the CDC Blood Lead Reference Value (≥3.5 µg/dL) by Month in CY2024  
Data source: CHCS HL7 and MHS GENESIS

The highest BLL test results from CY2024 Q1 were retained for each child dependent; Table 2 summarizes these BLLs by MRC and installation. The results that exceeded the CDC BLRV were from Fort (Ft.) Bliss (2), Ft. Carson (1), Ft. Drum (2), Ft. Johnson (1), Ft. Leonard Wood (1), Ft. Liberty (1), Ft. Riley (1), Ft. Sill (1), and Schofield Barracks (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 CY2024 Q1.

**Table 2.** Pediatric (ages 0–6) Blood Lead Levels (BLL), by Medical Readiness Command and Installation, CY2024 Q1

MRC	BLL Ranges				Total
	<3.5 µg/dL	3.5–9 µg/dL	10–19 µg/dL	≥20 µg/dL	
<b>EAST</b>					
Aberdeen Proving Ground	20	0	0	0	20
Ft. Belvoir	43	0	0	0	43
Ft. Campbell	57	0	0	0	57
Ft. Detrick	8	0	0	0	8
Ft. Drum*	97	1	1	0	99
Ft. Eisenhower	6	0	0	0	6
Ft. Gregg-Adams	21	0	0	0	21
Ft. Jackson	3	0	0	0	3
Ft. Knox	33	0	0	0	33
Ft. Liberty*	173	1	0	0	174

**Table 2 (continued).** Pediatric (ages 0–6) Blood Lead Levels (BLL), by Medical Readiness Command and Installation, CY2024

MRC	Q1t BLL Ranges				Total
	<3.5 µg/dL	3.5–9 µg/dL	10–19 µg/dL	≥20 µg/dL	
<b>EAST (continued)</b>					
Ft. Meade	27	0	0	0	27
Ft. Moore	73	0	0	0	73
Ft. Novosel	25	0	0	0	25
Ft. Stewart	83	0	0	0	83
Walter Reed NMMC	6	0	0	0	6
West Point	3	0	0	0	3
<b>WEST</b>					
Ft. Bliss*	222	2	0	0	222
Ft. Carson*	93	1	0	0	94
Ft. Cavazos	143	0	0	0	143
Ft. Huachuca	1	0	0	0	1
Ft. Irwin	2	0	0	0	2
Ft. Johnson*	71	1	0	0	72
Ft. Leavenworth	24	0	0	0	24
Ft. Leonard Wood*	26	1	0	0	27
Ft. Riley*	131	1	0	0	132
Ft. Sill*	22	0	1	0	23
<b>PACIFIC</b>					
Ft. Shafter	14	0	0	0	14
Ft. Wainwright	31	0	0	0	31
Schofield Barracks	170	1	0	0	171
<b>EUROPE</b>					
Grafenwoehr	26	0	0	0	26
Hohenfels	10	0	0	0	10
Landstuhl	12	0	0	0	12
Vicenza	8	0	0	0	8
Vilseck	25	0	0	0	25
<b>JOINT BASES</b>					
JB Elmendorf-Richardson	21	0	0	0	21
JB Langley-Eustis	44	0	0	0	44
JB Lewis-McChord	63	0	0	0	63
JEB Little Creek-Ft Story	2	0	0	0	2
JB McGuire-Dix-Lakehurst	5	0	0	0	5
JB Meyer-Henderson Hall	2	0	0	0	2
JB San Antonio*	80	0	0	0	80
<b>USAF MTF**</b>					
	81	0	0	0	81
<b>NAVAL/MARINE CORPS MTF**</b>					
	17	0	0	0	17

\*Installation where a blood lead level exceeds the CDC blood lead reference value (BLRV ≥3.5 µg/dL)

\*\* See Appendix A for the list of USAF, Space Force, Navy, and Marine Corps locations where Army dependents received BLL tests in CY2024 Q1.

### DRSi Reporting Results

Among Army dependents, 10 cases with a BLL higher than the CDC BLRV were reported in DRSi during CY2024 Q1. Due to the differences in the report date compared to the test collection date in the DRSi system, four children had BLL test results from CY2023 Q4 reported and the remaining six had test results from CY2024 Q1 reported. Table 3 summarizes the locations of case reports.

**Table 3.** DRSi Report Location for Cases Exceeding the CDC Blood Lead Reference Value\*

Installation	CY2024 Q1
Ft. Bliss	2
Ft. Carson	1
Ft. Leonard Wood	1
Ft. Moore	1
Ft. Riley	1
Ft. Sill	2
Tripler Army Medical Center	1
Wright-Patterson AFB	1
<b>Total</b>	<b>10</b>

\*Blood lead reference value (BLRV)  $\geq 3.5$   $\mu\text{g}/\text{dL}$

Note: Case counts are based on DRSi reporting date and may not reflect the counts in Table 1.

### DRSi Reporting Compliance

Nine of the eleven new cases exceeding the CDC BLRV identified in the laboratory data in CY2024 Q1 were reported to DRSi, an 82% reporting compliance. Ft. Drum had two BLL results above 3.5  $\mu\text{g}/\text{dL}$  that were unreported during CY2024 Q1.

### Public Health Nurses Program Status Report (PHN-PSR)

The results of the PHN-PSR indicated that a total of 1,300 BLL test results were reported to state and/or local authorities during CY2024 Q1 (Table 4). 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  $\mu\text{g}/\text{dL}$  (e.g., Louisiana, New York, North Carolina). MRC-West reported the most BLL test results to state and local authorities (n=748), followed by MRC-Pacific (n=345), MRC-East (n=206), and MRC-Europe. Seven (0.5%) of those results (n=1,300) indicated BLLs higher than the CDC BLRV, and Public Health Nursing managed all seven cases.

**Table 4.** Blood Lead Levels (BLL) Reported through the PHN-PSR by Medical Readiness Command and Installation, CY2024 Q1

MRC	Number of BLL tests reported to the State/local authorities	Number of eBLL tests reported to the State/local authorities	Number of eBLL cases managed by Public Health Nursing?
<b>EAST</b>			
Carlisle Barracks	9	0	0
Ft. Belvoir	101	0	0
Ft. Novosel	35	0	0
JB Langley-Eustis	61	0	0
<b>WEST</b>			
Ft. Bliss	238	1	1
Ft. Carson	101	1	1
Ft. Cavazos	141	0	0
Ft. Johnson	91	1	1
Ft. Leavenworth	33	0	0
Ft. Riley	1	1	1
Ft. Sill	29	1	1
JB San Antonio	114	0	0
<b>PACIFIC</b>			
Ft. Wainwright	34	0	0
JB Lewis-McChord	77	0	0
Tripler AMC/Schofield Barracks	234	1	1
<b>EUROPE</b>			
USAG Vicenza	1	1	1

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

## DISCUSSION

Less than 1% of the results of BLL tests performed in CY2024 Q1 (1 January – 31 March 2024) exceeded the CDC BLRV. Because of the lower reference value, five additional children with a higher BLL were identified. The number of Army dependents tested during CY2024 Q1 (n=2,035 BLL tests) was 32% higher than the number tested in CY2023 Q1 (n=1,539 BLL tests). This increase may be due to a more complete capture of MHS GENESIS laboratory test results.

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 a BLL higher than 3.5 µg/dL to ensure each case receives proper treatment and management. Reporting cases of pediatric lead poisoning to DRSi is an important aspect of that control and prevention program. This quarter, reporting compliance was high, with MTFs reaching 82% reporting compliance. For comparison, the average quarterly reporting compliance in CY2023 was 60%. Reporting cases higher than the CDC BLRV is critical to reliably identifying installations where children may be at increased risk of lead exposure. Children with a BLL that exceeds the CDC BLRV 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

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 Q1 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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3. Council on Environmental Health. 2016. "Prevention of Childhood Lead Toxicity." *Pediatrics* 138(1):e20161493. doi: 10.1542/peds.2016-1493
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9. 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, CY2024 Q1

USAF/Space Force Bases	Naval/Marine Corps Stations
Beale AFB	Chesapeake
Davis-Monthan AFB	JB Pearl Harbor-Hickam
Dover AFB	Kaneohe
Eglin AFB	Norfolk
F.E. Warren AFB	Okinawa
Goodfellow AFB	Patuxent River
Grand Forks AFB	Suffolk
Hanscom AFB	Virginia Beach
Hill AFB	
JB Anacostia-Bolling	
JB Andrews	
Keesler AFB	
MacDill AFB	
Malmstrom AFB	
Nellis AFB	
Offutt AFB	
Patrick SFB	
Peterson SFB	
Ramstein AB	
Sheppard AFB	
Tinker AFB	
USAF Academy	
Vance AFB	
Whiteman AFB	