

Indicator 13: Elevated Blood Levels Among Adults

Significance

The blood lead level (BLL) is the best biological indicator of recent lead exposure. The average BLL of the general population is less than 2 micrograms per deciliter ($\mu\text{g}/\text{dL}$). An adult BLL of 25 $\mu\text{g}/\text{dL}$ or greater is considered “elevated” in Colorado. The Council of State and Territorial Epidemiologists (CSTE) recommends the definition of an “adult elevated BLL” change from greater than 25 $\mu\text{g}/\text{dL}$, to greater than 10 $\mu\text{g}/\text{dL}$, based on evidence linking lower levels of lead in adults with decreased kidney function, cardiovascular disease and cognitive impairment.

The workplace is the main source of lead exposure for adults. The Occupational Safety and Health Administration (OSHA) requires employers covered under OSHA Lead Standard 29 CFR 1910.1025 and 1926.62 to monitor lead exposure in the workplace. When a worker’s BLL is 40 $\mu\text{g}/\text{dL}$ or greater, OSHA requires employers to offer an annual medical exam and other medical interventions, depending on the BLL. In addition, biological monitoring and medical surveillance programs are made available to all employees exposed to lead above the action level of 30 $\mu\text{g}/\text{m}^3$ time weighted average (TWA) for more than 30 days each year.

Methods

Colorado is one of ten states that does not participate in the national NIOSH Adult Blood Lead Epidemiology and Surveillance (ABLES) program. However, the Colorado Department of Public Health and Environment (CDPHE) does collect data on elevated blood levels for adults with BLLs of 25 $\mu\text{g}/\text{dL}$ or greater. All laboratories must report elevated blood lead tests to CDPHE. In 2007, CDPHE developed a dedicated electronic lead reporting database, (CDPHE PBDB) to collect and analyze reports of elevated adult and all childhood BLLs. Rates were calculated using, as the denominator, the state population estimates from the U.S. Census Bureau.

Results

Table 13.1 Number of Colorado Residents with Elevated Blood Lead Tests Reported to CDPHE, Colorado 2008-2009	2008	2009
# Colorado Residents age ≥ 16 with BLLs ≥ 25 $\mu\text{g}/\text{dL}$	26	26
# Colorado Residents age ≥ 16 with BLLs ≥ 40 $\mu\text{g}/\text{dL}$	8	11

Source: Reports of elevated BLLs from Colorado Department of Public Health and Environment (numerator); Bureau of Labor Statistics (BLS) Current Population Survey Data (denominator)

Table 13.2 Incidence Rate of Elevated Blood Lead Tests Reported to CDPHE, per 100,000 Employed Persons, Colorado 2008-2009	2008	2009
Rates per 100,000 employees in Colorado age 16 or older with a BLL ≥ 25 $\mu\text{g}/\text{dL}$	1.0	1.0
Rates per 100,000 employees in Colorado age 16 or older with a BLL ≥ 40 $\mu\text{g}/\text{dL}$	0.3	0.4

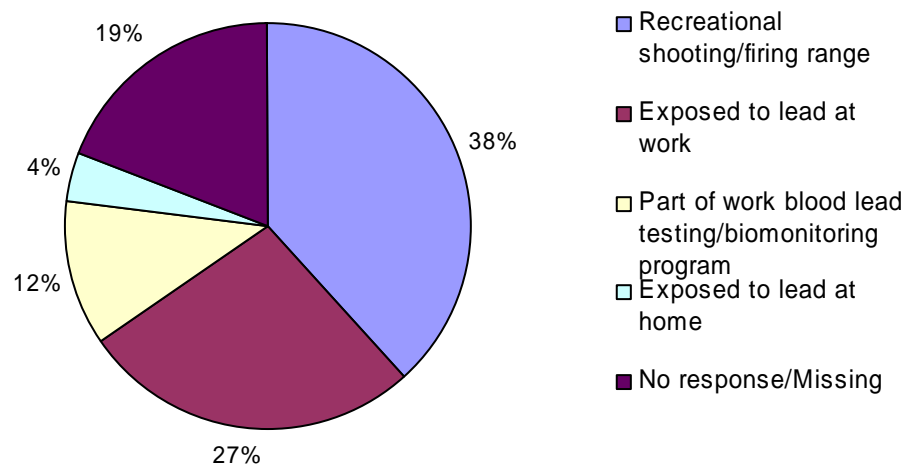
Source: Reports of elevated BLLs from Colorado Department of Public Health and Environment (numerator); Bureau of Labor Statistics (BLS) Current Population Survey Data (denominator)

- In 2009, CDPHE received 49 elevated blood lead reports, ≥ 25 $\mu\text{g}/\text{dL}$, from 26 Colorado residents. (Table 13.1)
- In 2008, CDPHE received 37 elevated blood reports, ≥ 25 $\mu\text{g}/\text{dL}$, from 26 Colorado residents. (Table 13.1)

- The rate of elevated blood lead levels for Colorado residents age 16 and older is 1 per 100,000 employed persons in Colorado. (Table 13.2)
- Colorado’s blood lead surveillance system most likely underestimates the true burden of exposure. It is suspected that medical monitoring is not routine, particularly with smaller businesses that are not covered by the OSHA Lead Standard and where lead exposure occurs.

In 2009, the CDPHE began following up with all adult elevated blood lead tests in Colorado to determine the reason for the elevated blood lead test and source of exposure.

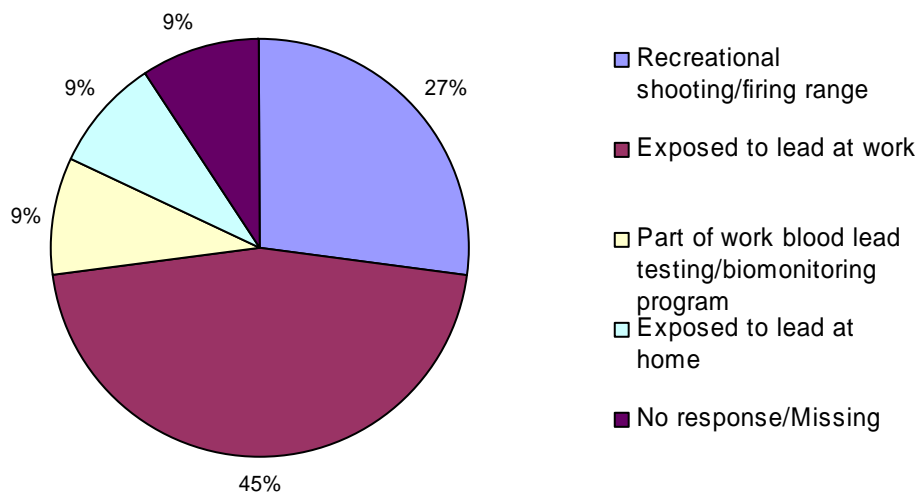
Figure 13.1 Reasons for blood lead tests $\geq 25 \mu\text{g/dL}$, Colorado, 2009



Source: Reports of elevated BLLs from Colorado Department of Public Health and Environment

- According to NIOSH, approximately 10-15% of elevated BLLs among adults nationwide are caused by non-occupational exposures. In 2009 in Colorado, at least 42% of all exposures were due to a non-occupational exposure; 38% of all elevated blood lead tests ($\text{BLL} \geq 25 \mu\text{g/dL}$) were due to lead exposure from hobby shooting/bullet loading or at a recreational shooting/firing range, and 4% were due to an exposure at home. (Figure 13.1)
- In 2009, 39% of all elevated blood lead tests ($\text{EBL} \geq 25 \mu\text{g/dL}$) in Colorado were work-related; 12% as part of a work blood lead testing/biomonitoring program and 27% due to a work-place lead exposure. (Figure 13.1)

Figure 13.2 Reasons for blood lead tests $\geq 40 \mu\text{g}/\text{dL}$, Colorado, 2009



Source: Reports of elevated BLLs from Colorado Department of Public Health and Environment

- For blood lead tests greater than $40\mu\text{g}/\text{dL}$ in Colorado in 2009, 27% were due to lead exposure from hobby shooting/bullet loading or at a recreational shooting/firing range. (Figure 13.2)
- For blood lead tests greater than $40\mu\text{g}/\text{dL}$ in Colorado in 2009, 54% were work-related as part of a work blood lead testing/biomonitoring program (9%) or due to a work-place lead exposure (45%). (Figure 13.2)

Data Resources:

- Reports of elevated BLLs from CDPHE Blood Lead Database (numerator)
- Bureau of Labor Statistics (BLS) Current Population Survey Data (denominator)

Limitations of Data Resources:

- Currently, CDPHE does not have a reporting requirement to collect all blood lead testing data, only elevated cases are reported.
- Even with a reporting requirement, laboratories may not report all adult elevated BLLs and data from laboratories are frequently incomplete.
- Many workers with significant occupational lead exposure are not appropriately tested.
- An individual's lead exposure and BLL testing may be done in their same state of residence or in a different state. Colorado attempts to determine state of residence for follow-up and reporting purposes.

Recommendations

- Increase testing in Colorado to accurately track rates of occupational lead exposure in Colorado.
- Modify CDPHE laboratory reporting requirements to include the reporting of all adult blood lead tests.
- Modify the case definition of an "adult elevated BLL" in Colorado from greater than $25 \mu\text{g}/\text{dL}$, to greater than $10 \mu\text{g}/\text{dL}$.