

Indicator 13: Elevated Blood Lead Levels Among Adults

Significanceⁱ

The blood lead level (BLL) is the best biological indicator of recent lead exposure. The average BLL of the general population is less than two micrograms per deciliter ($\mu\text{g}/\text{dL}$). 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.

In Colorado, a BLL of $10 \mu\text{g}/\text{dL}$ or greater is a mandatory public health reportable condition for adults over age 18.ⁱⁱ Following recommendations of the Council of State and Territorial Epidemiologists (CSTE) in 2009, the CDC/NIOSH Adult Blood Lead Epidemiology and Surveillance (ABLES) program changed their case definition of elevated BLL 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.ⁱⁱⁱ

Methods

All laboratories must report elevated adult BLL tests of $10 \mu\text{g}/\text{dL}$ or greater to the Colorado Department of Public Health and Environment (CDPHE). In 2007, CDPHE developed a dedicated electronic lead reporting database to collect and analyze reports of elevated adult and all childhood BLLs. Rates were calculated using employment estimates from the Bureau of Labor Statistics (BLS) Geographic Profile of Employment and Unemployment (GP) Current Population Survey (CPS) as the denominator.

ⁱ Council of State and Territorial Epidemiologists. *Occupational Health Indicators: A Guide for Tracking Occupational Health Conditions and Their Determinants*. Last updated April 2012.

ⁱⁱ Complete list of Colorado's Reportable Conditions online: <http://www.colorado.gov/cs/Satellite/CDPHE-DCEED/CBON/1251607755364>

ⁱⁱⁱ Adult Blood Lead Epidemiology and Surveillance (ABLES) interactive database: <http://wwwn.cdc.gov/niosh-survapps/ables/default.aspx>

Results

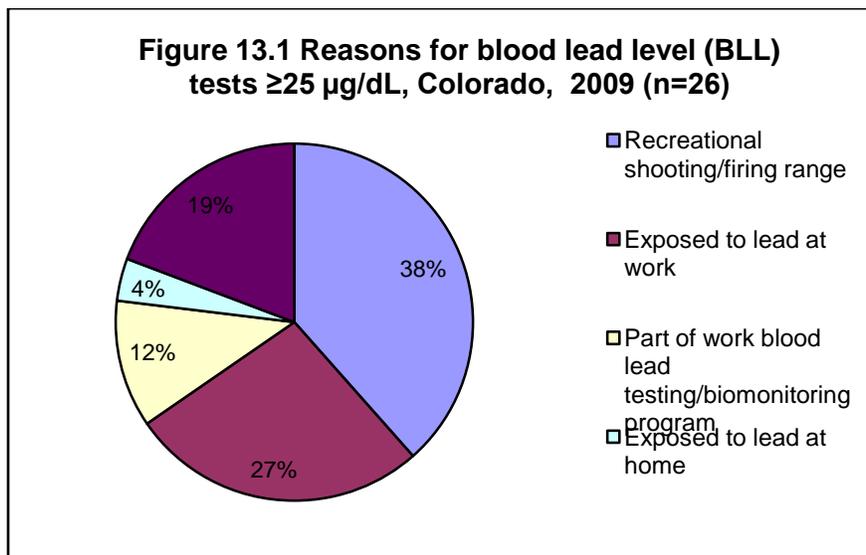
Table 13.1: Elevated blood lead incidence and prevalence cases and rates per 100,000 employed, Ages 16 and over, Colorado, 2008-2011
N (Rate per 100,000 employed)

| >=10 | 2008 | 2009 | 2010 | 2011 | Average |
|---------------------------------|-------------|-------------|-------------|-------------|----------------|
| Total Cases (Prevalence Rate) | 65 (2.5) | 78 (3.1) | 69 (2.8) | 81 (3.2) | 73 (2.9) |
| Incident Cases (Incidence Rate) | 62 (2.4) | 67 (2.7) | 60 (2.4) | 53 (2.1) | 61 (2.4) |
| >=25 | | | | | |
| Total Cases (Prevalence Rate) | 27 (1.0) | 23 (0.9) | 19 (0.8) | 33 (1.3) | 26 (1.0) |
| Incident Cases (Incidence Rate) | 23 (0.9) | 18 (0.7) | 13 (0.5) | 19 (0.8) | 18 (0.7) |
| >=40 | | | | | |
| Total Cases (Prevalence Rate) | 5 (0.2) | 9 (0.4) | 7 (0.3) | 11 (0.4) | 8 (0.3) |
| Incident Cases (Incidence Rate) | 4 (0.2) | 6 (0.2) | 4 (0.2) | 6 (0.2) | 5 (0.2) |

Numerator Cases: Reports of elevated BLLs from Colorado Department of Public Health and Environment (Includes all tests reported for ages ≥16)

Denominator: Bureau of Labor Statistics (BLS) Geographic Profile of Employment and Unemployment (GP) or Current Population Survey (CPS)

In 2009, CDPHE followed-back with treating physicians of BLL tests ≥ 25 $\mu\text{g}/\text{dL}$ to determine the reason for the test and/or the source of exposure. The following figure demonstrates results from this effort:

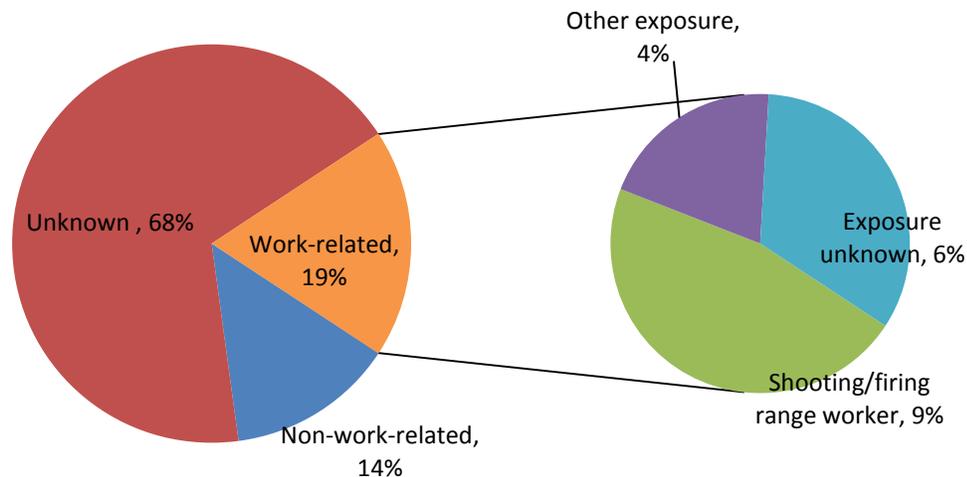


Source: Reports of elevated BLLs from Colorado Department of Public Health and Environment

Note: Includes duplicate individuals who may have had more than one BLL test in the time period

A follow-back effort was also conducted in 2011 using exposure definitions of the NIOSH Adult Blood Lead Epidemiology and Surveillance (ABLES) Program. The following figure depicts these results for BLL tests ≥ 10 $\mu\text{g}/\text{dL}$:

Figure 13.2: Work-relatedness of lead exposure for adult blood lead level (BLL) tests $\geq 10 \mu\text{g}/\text{dL}$, Colorado, 2011 (N=81)



*Source: Reports of elevated BLLs from Colorado Department of Public Health and Environment
Note: Includes duplicate individuals who may have had more than one BLL test in the time period*

Limitations

- There is great variation among states in the resources dedicated to adult lead surveillance, including varying state reporting requirements, outreach and education efforts, surveillance activities and lead testing by public health authorities. For this reason, it is difficult to draw conclusions in state-to-state and state-to-national comparisons. Higher rates of adult elevated BLLs in one state might be an artifact of that state having more resources for case-finding and monitoring.
- It is suspected that many workers exposed to lead do not have routine medical monitoring on the job, particularly in businesses and industries that are not covered by the OSHA lead testing standards.^{iv}
- Currently, CDPHE does not have a reporting requirement for all adult blood lead testing data; only cases $\geq 10 \mu\text{g}/\text{dL}$ are reportable by the Colorado Board of Health regulation.
- Even with a reporting requirement, outreach and education are needed to ensure laboratories appropriately report adult elevated BLLs and active follow-back surveillance is required to collect essential demographic and occupational data for identified cases. These activities are time-intensive and are not currently supported with designated funds at the state level.
- An individual's lead exposure and BLL testing might be done in their state of residence or in a different state. Colorado attempts to determine state of residence for follow-up and reporting purposes.

^{iv} See OSHA's lead standards for General Industry (29 CFR 1910.1025) and Construction (29 CFR 1926.62)

Accomplishments to Date

- In February, 2012, the Colorado Board of Health approved a proposal to modify the state's Reportable Conditions List. Prior to this change, laboratories were only required to report BLL tests $\geq 25 \mu\text{g/dL}$ for persons ≥ 18 years old. The approved change now requires laboratory reporting of BLL tests $\geq 10 \mu\text{g/dL}$ for this age group.
- The CDPHE Occupational Health and Safety Surveillance Program began reporting state surveillance data to the CDC/NIOSH ABLES program in March 2012. By doing so, the CDPHE is held to national standards for follow-back investigation and reporting.

Recommendations and Next Steps

- Using the CDC's Framework for Program Evaluation, evaluate the lead surveillance program to ascertain effectiveness in identifying and describing elevated adult BLLs.
- Identify businesses and industries using lead products or materials and conduct outreach to ensure workers are being tested appropriately. CDPHE's Air Pollution Control Division, which maintains the Colorado Lead Services Directory, and the OSHA Regional and Area Offices in Denver would be good partners in this work.