Georgia Occupational Health Indicator: Elevated Blood Lead Levels (BLL) among Adults, 2010-2015

Lead is a soft, malleable, and heavy post-transition metal that is highly poisonous to animals and humans. It can be found both in the environment and in the workplace. As a neurotoxin, lead accumulates both in soft tissues and in the bones, causing hypertension, cognitive dysfunction, adverse effects on renal function, and adverse effects on female reproductive outcomes.[1] In the United States, about 90% of adult lead poisoning is caused by occupational exposures.[1] The primary exposure pathways of lead are through inhalation and ingestion. In general, approximately 100% of inhaled lead is absorbed, compared with about *20-70%* of that ingested. Adults are exposed to lead mainly by breathing in lead dust and fumes at work or from hobbies that involve lead. For example, construction workers are exposed to lead during the removal, renovation, or demolition of structures painted with lead pigments. Certain industries are more likely to have lead exposures, such as manufacturers of ceramics, electrical components, plumbing fixtures, lead bullets, and rechargeable batteries. Lead exposure can occur not only during production, but also during the use (e.g., shooting ranges), repair (e.g., radiator repair), and recycling (e.g., battery recycling) of lead containing materials.[2,3]

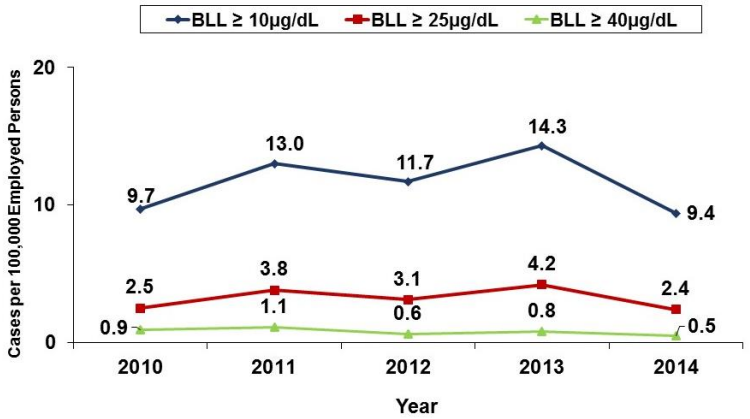
Adult blood lead levels (BLL) are considered elevated at 10 µg/dL or greater, however, toxicity can occur at levels as low as 5 µg/dL. In 2015, the National Institute of Occupational Safety and Health (NIOSH) revised the case definition for elevated BLL to include persons aged 16 years and older with blood lead concentrations of 5µg/dL or greater. No level of lead in the blood of children is currently thought to be safe. Approximately 24,000 children in the United States have an elevated BLL of 10 µg/dL or greater from lead being brought home from work by their parents.[1] The average BLL for the general population is less than 1.5 µg/dL.[3] Lead poisoning has been mandated a reportable condition in Georgia. The state of Georgia requires that all BLL screening and follow-up test results be reported to DPH within seven days. This report summarizes the burden of elevated BLL (10 µg/dL or greater) in Georgia among persons aged 16 years and older during 2010 – 2015.

- The annual number of Georgia residents aged 16 years and older with a reported elevated BLL of 10 *µg*/dL or greater increased from 819 cases in 2014 to 1,044 cases in 2015.[4]
- The number of new or incident cases reported among persons aged 16 years and older in Georgia with elevated BLL of **10 *µg*/dL or greater** increased from 415 cases in 2014 to 572 cases in 2015, a percent increase of 38% (Table 1).
- In 2015, there were 204 cases among persons aged 16 years and older in Georgia with elevated BLL of **25 *µg*/dL or greater**. Of these cases, 130 were incident cases (Table 1).
- There were 22 cases among persons aged 16 years and older in Georgia during 2015 that had elevated BLL of **40 *µg*/dL or greater**. Of these cases, 18 were incident cases (Table 1).

Table 1. Number of Incident Cases of Elevated BLL among Persons Aged 16 Years or Older, Georgia, 2010-2015

	2010	2011	2012	2013	2014	2015
BLL ≥10 *µg*/dL	411	555	514	625	415	572
BLL ≥25 *µg*/dL	108	163	137	182	107	130
BLL ≥40 *µg*/dL	38	46	27	33	20	18

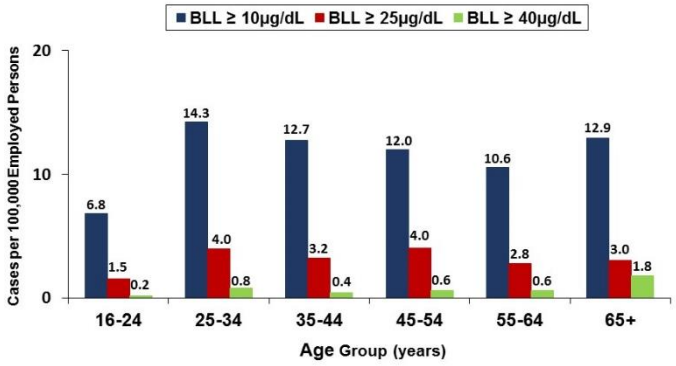
Figure 1. Annual Incidence Rate of Elevated Blood Lead Levels among Persons Aged 16 Years and Older, Georgia, 2010-2014*



Source: Georgia Adult Blood Lead Epidemiology Surveillance (ABLES)
*Rates not calculated for 2015 due to denominator data not available

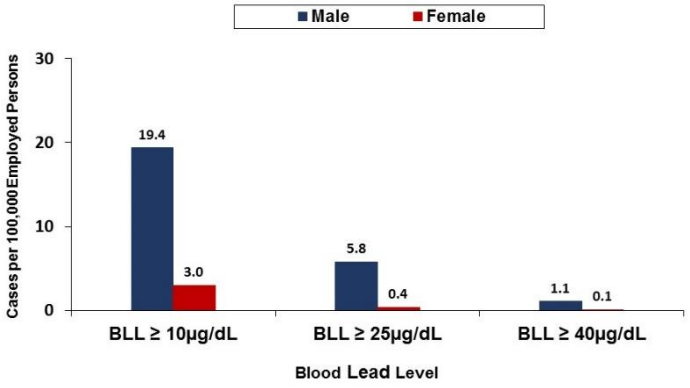
$$\text{Incidence rate} = \frac{\text{Number of cases with elevated BLLs in a given year}}{\text{Annual employed population} \geq 16 \text{ years in corresponding year}} \times 100{,}000$$

Figure 2. Age-specific Incidence Rates of Elevated Blood Lead Levels among Persons Aged 16 Years and Older, Georgia, 2013-2014



Source: Georgia Adult Blood Lead Epidemiology Surveillance (ABLES)

Figure 3. Sex-specific Incidence Rates of Elevated Blood Lead Levels among Persons Aged 16 years and Older, Georgia, 2013-2014



Source: Georgia Adult Blood Lead Epidemiology Surveillance (ABLES)

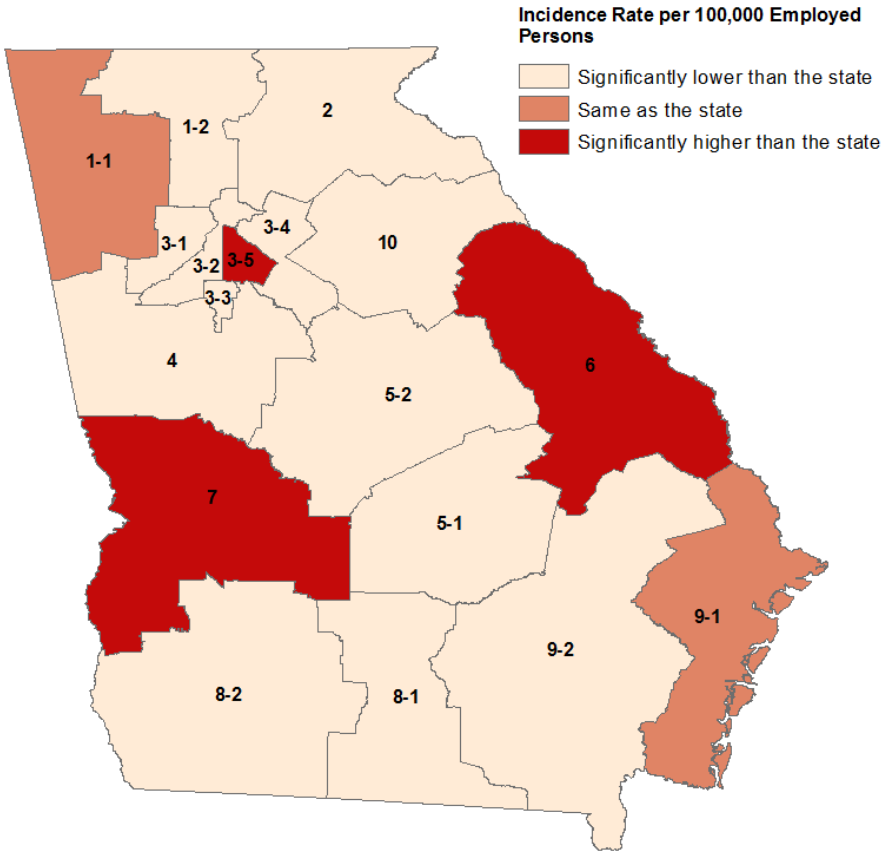
- The incidence rate per 100,000 employed persons aged 16 years and older with BLL ≥10 μg/dL increased from 11.7 in 2012 to 14.3 in 2013, and then decreased to 9.4 in 2014 (Figure 1).
- The incidence rate of BLL ≥ 25 μg/dL per 100,000 employed persons aged 16 years and older decreased from 4.2 in 2013 to 2.4 in 2014 (Figure 1).
- During 2013-2014, the incidence rate of elevated BLL of ≥10 μg/dL was highest among persons aged 25 – 34 years at 14.3 per 100,000 employed persons (Figure 2).
- The incidence rate of BLL ≥10 μg/dL was higher among males (19.4 per 100,000 employed persons) than females (3.0 per 100,000 employed persons) (Figure 3).
- The DeKalb (n=121), East Central (n=167), and West Central (n=189) Public Health Districts had the highest number of reported incident cases of elevated BLL ≥10 μg/dL during 2013-2014 (Table 2).
- During 2013-2014, incidence rates of BLL ≥10 µg/dL were significantly higher than the state rate (11.9 per 100,000 employed persons) in the DeKalb, East Central, and West Central Public Health Districts (Map 1).

Table 2. Number and Rate of Reported Incident Cases of Elevated Blood Lead Levels (≥10 µg/dL) by Public Health District, 2013-2014 (N = 882)

Public Health District	N	Rate[5] per 100,000 (95% CI)
1-1 Northwest (Rome)	38	11.7 (8.0 – 15.4)
1-2 North Georgia (Dalton)	20	7.6 (4.3 – 11.0)
2 North (Gainesville)	10	2.3 (0.9 – 3.8)
3-1 Cobb-Douglas	55	7.7 (5.7 – 9.7)
3-2 Fulton	46	3.0 (2.2 – 3.9)
3-3 Clayton (Jonesboro)	7	3.1 (0.8 – 5.4)
3-4 East Metro (Lawrenceville)	62	8.4 (6.3 – 10.5)
3-5 DeKalb	121	21.7 (17.8 – 25.5)
4 LaGrange	42	8.6 (6.0 – 11.2)
5-1 South Central (Dublin)	<5	~
5-2 North Central (Macon)	18	4.6 (2.5 – 6.8)
6 East Central (Augusta)	167	50.2 (42.6 – 57.8)
7 West Central (Columbus)	189	70.1 (60.1 – 80.1)
8-1 South (Valdosta)	<5	~
8-2 Southwest (Albany)	6	2.4 (0.5 – 4.4)
9-1 Coastal (Savannah)	63	14.0 (10.6 – 17.5)
9-2 Southeast (Waycross)	14	6.2 (3.0 – 9.5)
10 Northeast (Athens)	22	7.2 (4.2 – 10.2)

Note: Rate per 100,000 employed persons

Map 1. Incidence Rate of Reported Elevated Blood Lead Levels (≥ 10 µg/dL) by Public Health District, 2013-2014



To access the full Georgia Occupational Health Indicators Surveillance Report visit: http://dph.georgia.gov/georgia-occupational-health-and-safety-surveillance-program

References:

1. Council of State and Territorial Epidemiologists. Occupational Health Indicators: A Guide for Tracking Occupational Health Conditions and Their Determinants. June 2015.
2. Jacobs, D. E., Matte, T. D., Moos, L., Nilles, B., & Rodman, J. (2000). Eliminating Childhood Lead Poisoning: A Federal Strategy Targeting Lead Paint Hazards. President's Task Force on Environmental Health Risks and Safety Risks to Children. Washington, DC: US Department of Housing and Urban Development/US Environmental Protection Agency.
3. Centers for Disease Control and Prevention (CDC. (2011). Adult blood lead epidemiology and surveillance--United States, 2008-2009. MMWR. Morbidity and mortality weekly report, 60(25), 841.
4. Georgia Adult Blood Lead Epidemiology Surveillance (ABLES) Data.
5. Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW), 2013-2014.

Georgia Department of Public Health