

# Missouri Adult Blood Lead Epidemiology & Surveillance

**Annual Report for Calendar Year 2009**

**January 1, 2009 through December 31, 2009**



**Missouri Department of Health and Senior Services**

**<http://health.mo.gov/data/ables/index.php>**

**573-751-6102 or 866-628-9891**

## About Our Program

ABLES is a state-based surveillance program of laboratory-reported adult blood lead levels. The Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health ([NIOSH](#)) has funded states to operate the Adult Blood Lead Epidemiology and Surveillance ([ABLES](#)) program since 1987. Currently 41 states are funded to collect and analyze data on cases of elevated blood lead levels in individuals age 16 years and older. Nationwide data from the state ABLES programs are published in CDC's Morbidity and Mortality Weekly Report ([MMWR](#)). An interactive database of adult blood lead data is available for query at the national [ABLES](#) website.

The public health objective of the ABLES program is objective OSH-7 in [Healthy People 2020](#), which is to reduce the proportion of persons who have elevated blood lead concentrations from work exposures. The program objective is to build state capacity to initiate, expand, or improve adult blood lead surveillance programs which can accurately measure trends in adult blood lead levels and which can effectively intervene to prevent lead over-exposures. In 2009, the ABLES program updated the surveillance case definition of an elevated blood lead level as a blood lead concentration of greater than or equal to 10 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ). Elevated blood lead levels can damage the nervous, hematologic, reproductive, renal, cardiovascular, and gastrointestinal systems. The majority of lead elevations in adults are due to workplace exposures.

The Missouri ABLES (MO ABLES) program has been funded to participate in the national program since 2001. Non-identifying patient-level data are reported to NIOSH for surveillance purposes. All blood lead testing of Missouri residents is reportable to the Missouri Department of Health and Senior Services (DHSS) under the Missouri Code of State Regulations, [19 CSR 20.20-020](#) regardless of patient age or blood lead level. DHSS' Bureau of Environmental Epidemiology (BEE) administers the MO ABLES program. This report summarizes blood lead testing and elevated lead levels in Missouri residents age 16 years and older for calendar year 2009.

## Testing and Prevalence

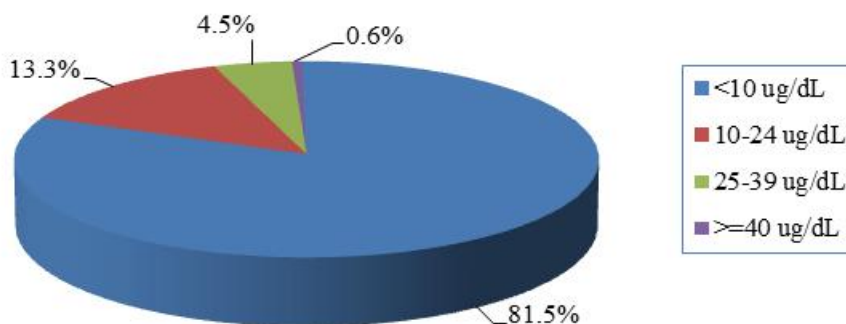
The MO ABLES program data are primarily collected through reporting by laboratories analyzing blood lead specimens. Information to be reported includes patient name, date of birth, home address, sex, race, date of blood lead test, laboratory results, and health care provider. However, laboratory data often do not include all information needed by the MO ABLES program to determine work-relatedness, occupation or industry. Missing information on individuals with blood lead levels  $>10 \mu\text{g}/\text{dL}$  is sought by contacting medical providers and employers; therefore, data on elevated adults are more likely to be complete in the MO ABLES database.

There were 22,500 blood specimens drawn, analyzed, and reported to the MO ABLES program for Missouri residents' age 16 years and older for the period January 1 through December 31, 2009. Blood

lead specimens drawn but not analyzed are excluded. The reported blood lead levels for 2009 ranged from zero (or non-detectable) to a high of 84  $\mu\text{g}/\text{dL}$ .

Individuals considered at-risk for lead poisoning or who are known to have exposure to lead may receive multiple blood lead tests within a year. For statistical purposes, blood lead level determination for Missourians tested more than once during a given timeframe is based upon their highest reported blood lead level. Analysis of the MO ABLES 2009 data revealed a total of 14,378 unduplicated individuals were tested in 2009. Of these, 11,723 (81.5%) had lead levels less than 10  $\mu\text{g}/\text{dL}$ ; 1,919 (13.3%) had lead levels between 10 and 24  $\mu\text{g}/\text{dL}$ ; 654 (4.5%) were reported with lead levels between 25 and 39  $\mu\text{g}/\text{dL}$ , and 82 (.6%) had a blood lead level greater than 40  $\mu\text{g}/\text{dL}$ .

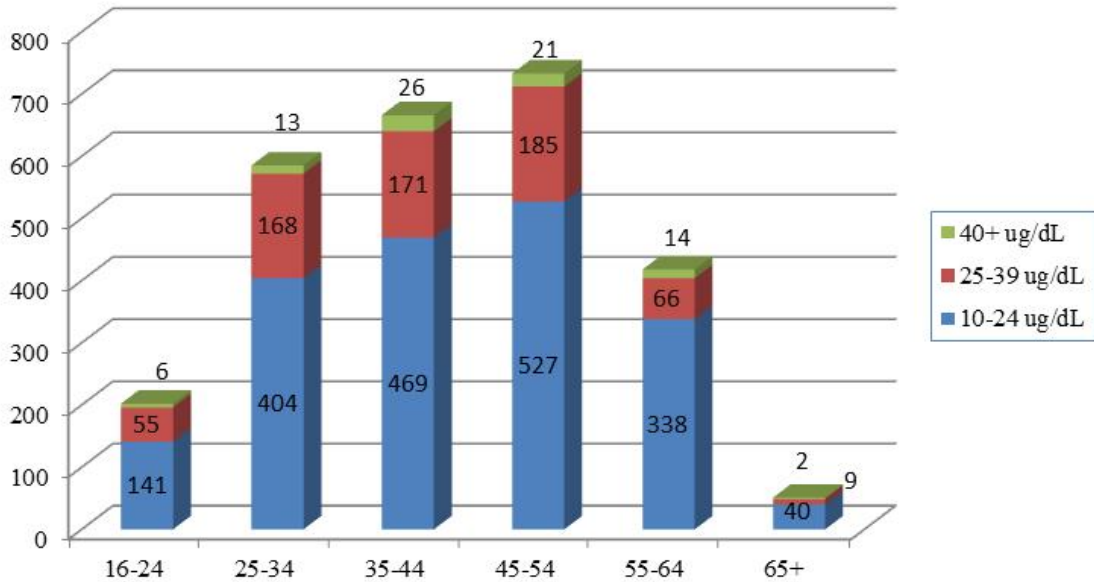
Adult Lead Testing by Blood Lead Level,  
Missouri 2009



During the 2009 calendar year, 2,655 (18.5%) of all individuals tested had at least one blood lead test greater than or equal to 10  $\mu\text{g}/\text{dL}$ , the current CDC lead level of concern for persons of all ages. The highest acceptable level for workers by the U.S. Occupational Safety and Health Administration (OSHA) standards is 40  $\mu\text{g}/\text{dL}$ . The following data analyses were performed on the data set consisting of only the 2,655 individuals with at least one blood lead level  $>10$   $\mu\text{g}/\text{dL}$  during calendar year 2009.

Of the 2,655 elevated adults tested in 2009, the majority (2,402, 90.5%) were between 25 and 64 years of age at the time their blood specimen was drawn. There were 202 (7.6%) elevations in the 16 to 24 year-old age range and 51 (1.9%) elevations among those age 65 or older.

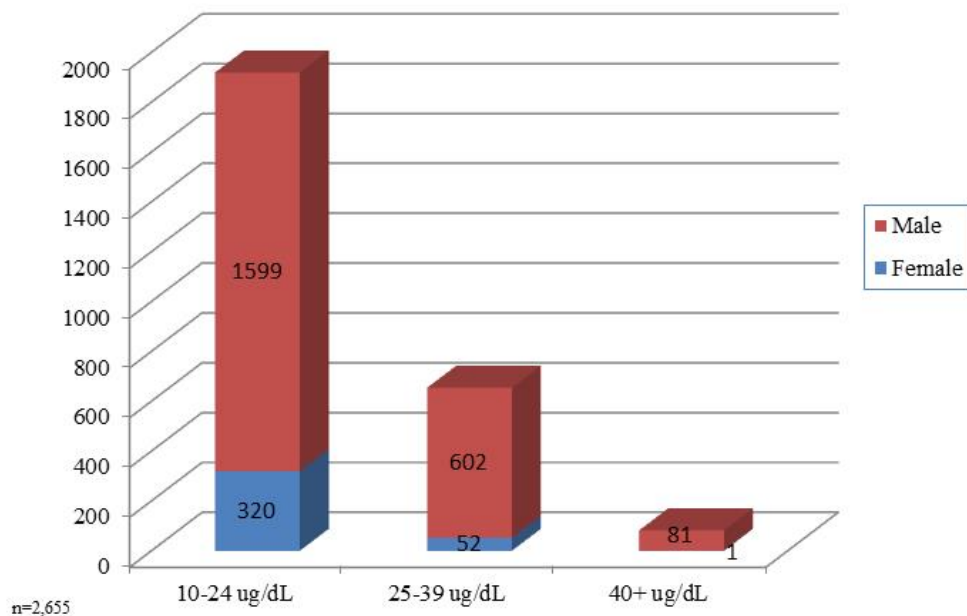
## Adults with Elevated Lead Levels by Age, Missouri 2009



n=2,655

There were 373 (14.0%) adult women with elevated lead levels in 2009, and 2,282 (86.0%) men. All but 1 of the 82 adults with lead levels greater than or equal to 40  $\mu\text{g}/\text{dL}$  were male.

## Adults with Elevated Blood Lead Levels by Sex, Missouri 2009

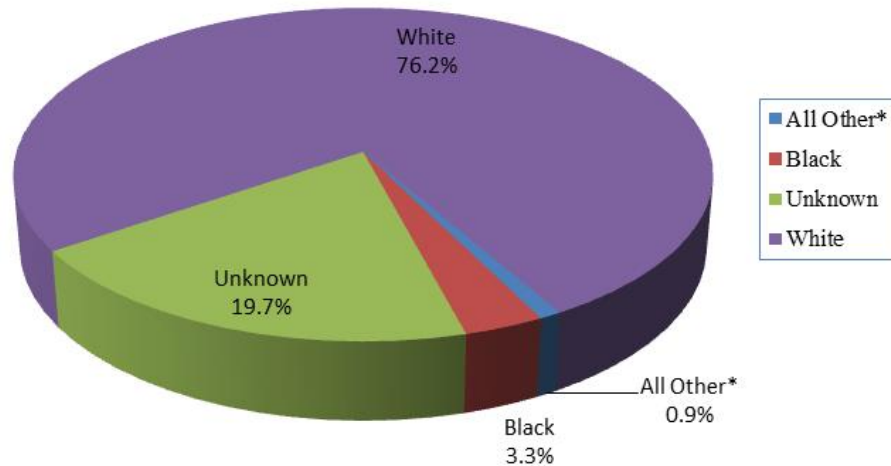


n=2,655

Although health care providers and laboratories are required to include the patient's race, this information is often missing when test results are reported. In 2009, there were 522 (19.7%) adults with

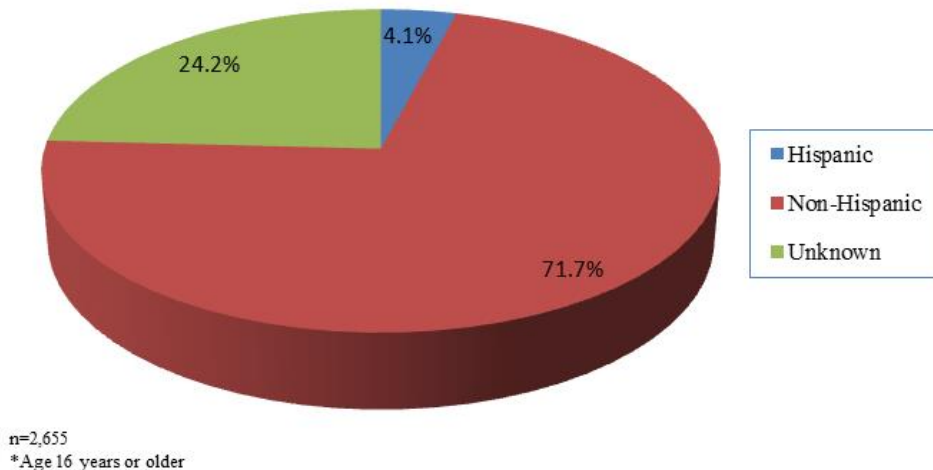
elevated lead levels whose race is unknown. People who were multi-racial or Pacific Islander comprised only .2% (2 each), Asians and American Indians .8% (10 each), and blacks 3.3% (87). The majority of adults with elevated lead levels were white (2,022, 76.2%) which is to be expected since whites comprise 87.5% of those employed in Missouri (source: U.S. Department of Labor).

Adults with Elevated Blood Lead Levels by Race, Missouri 2009



Ethnicity for Missourians tested for blood lead levels is also sought by the MO ABLES program. In 2009, 1,904 (71.7%) elevated adults were Non-Hispanic and 109 (4.1%) were Hispanic. However, ethnicity was unknown for 642 (24.2%) of adults with elevated lead levels.

Adults\* with Elevated Lead Levels by Ethnicity, Missouri 2009



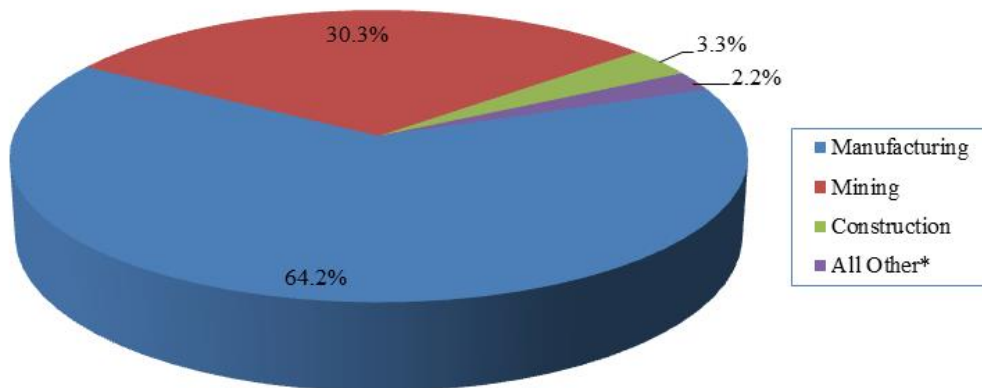
Lead battery manufacturing, mining, smelting, and other related industries are an important part of Missouri's economic base. Some of the world's largest known lead deposits are located in Missouri,

and mining has been ongoing since the 1700s. While lead is a great economic resource, lead in the human body is a health hazard. Missouri's largest lead industries provide community education and services, and test their employees according to OSHA requirements. These companies also cooperate in providing demographic information to aid the MO ABLES program in data collection.

Of the 2,655 individual records with blood lead levels >10 µg/dL drawn in 2009, 2,569 (96.8%) have a known industry and were assigned a 2002 North American Industry Classification System (NAICS) code. A worker's place of employment was assumed to be their source of exposure unless other source information, such as an exposure by hobby, was received.

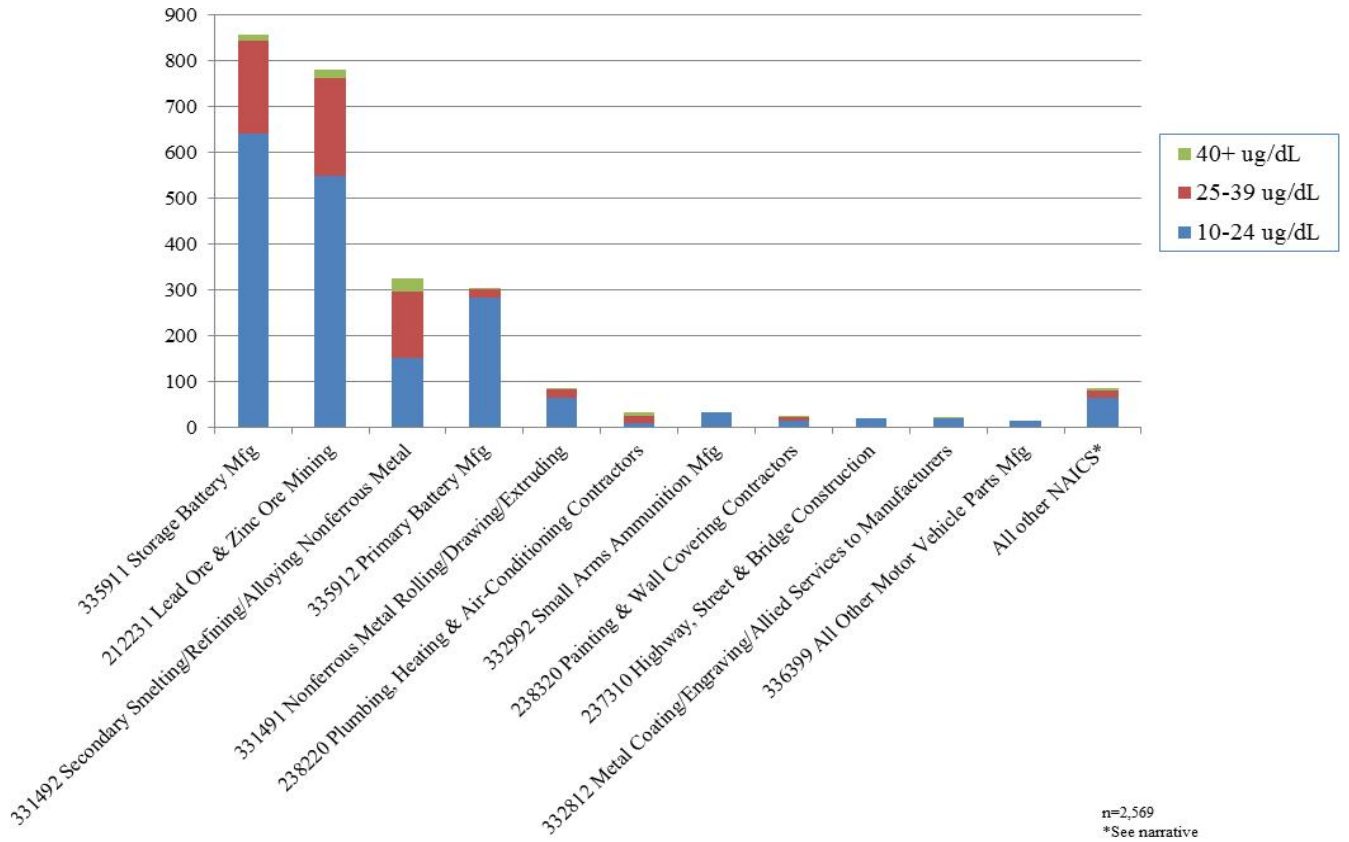
The majority of adults reported to MO ABLES in 2009 with elevated lead levels worked in manufacturing (1,649 or 64.2%), including storage and primary battery manufacturing, secondary smelting, and nonferrous metal rolling, drawing and extruding. Workers were also employed in mining (779 or 30.3%) and construction (85 or 3.3%). Construction activities included plumbing, painting, highway/bridge construction, and housing construction. Other industry sectors reported with elevated results were: Administrative Support and Waste Management and Remediation Services (15 or .6%); Public Administration (11 or .4%); Professional, Scientific, and Technical Services (6 or .2%); Arts, Entertainment and Recreation (5 or .2%); Utilities (5 or .2%); Wholesale Trade (5 or .2%); Retail Trade (4 or .2%); Other Services (3 or .1%); and Transportation and Warehousing (2 or .1%).

Workers with Elevated Lead Levels by Industry Sector, Missouri 2009



n=2,569  
\*Age 16 years or older  
\*\*See narrative

### Workers with Elevated Lead Levels by NAICS, Missouri 2009



## Workers with Elevated Blood Lead Levels by North American Industry Classification System (NAICS), Missouri 2009

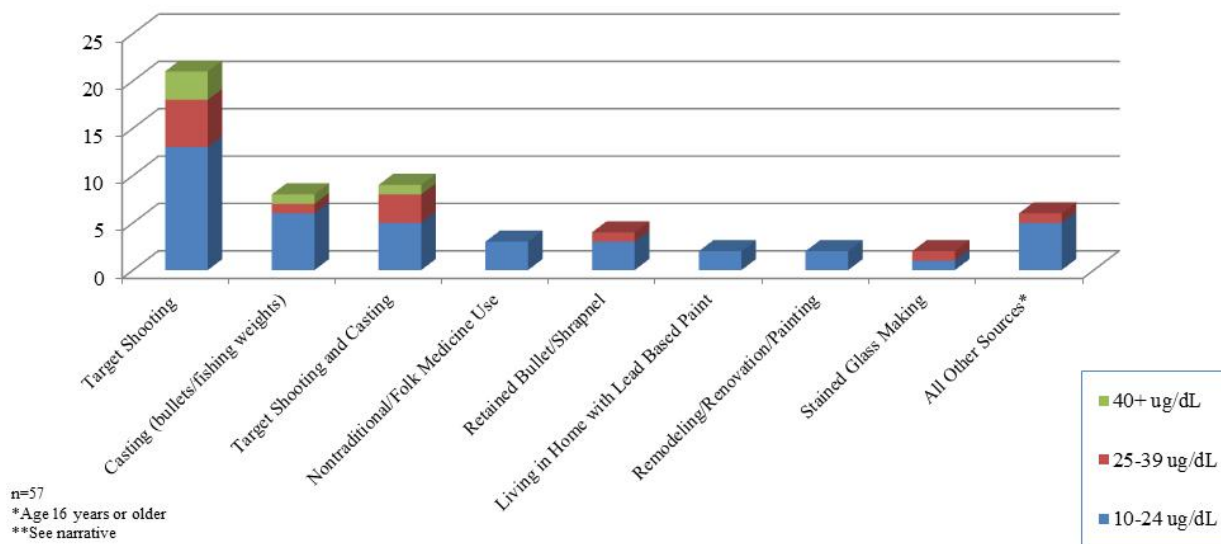
Industry Sector	NAICS	NAICS Title	Number of Workers Elevated >10 µg/dL
Manufacturing	335911	Storage Battery Manufacturing	856
Mining	212231	Lead Ore and Zinc Ore Mining	779
Manufacturing	331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)"	325
Manufacturing	335912	Primary Battery Manufacturing	301
Manufacturing	331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing and Extruding	82
Construction	238220	Plumbing, Heating, and Air-Conditioning Contractors	33
Manufacturing	332992	Small Arms Ammunition Manufacturing	31
Construction	238320	Painting and Wall Covering Contractors	22
Construction	237310	Highway, Street, and Bridge Construction	20
Manufacturing	332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	20
Manufacturing	336399	All Other Motor Vehicle Parts Manufacturing	15
	All other NAICS (<10 workers in each of 31 codes)		85
Total with NAICS			2,569

There were 57 records (2.1% of 2,655) for elevated adults who have non-occupational sources of lead exposure. These included target shooting (21, 36.8%), both target shooting and casting of bullets or fishing weights (9, 15.8%), only casting bullets or fishing weights (8, 14.0%), bullet/shrapnel lodged in body (4, 7.0%), using nontraditional or folk medicines (3, 5.3%), living in a home with lead-based paint (2, 3.5%), non-occupational remodeling, renovating or painting (2, 3.5%); making stained glass (2, 3.5%), other unspecified hobby (2, 3.5%), living near a lead smelter (1, 1.8%), immigrant with a history



of lead poisoning as a child (1, 1.8%), refinishing furniture, (1, 1.8%) and the intentional ingestion of lead (1, 1.8%). The highest adult blood lead level reported to MO ABLES in 2009 was 84 µg/dL. The source of exposure for this person was non-occupational target shooting and casting of bullets.

Adults\* with Elevated Lead Levels by Non-Occupational Source of Exposure, Missouri 2009

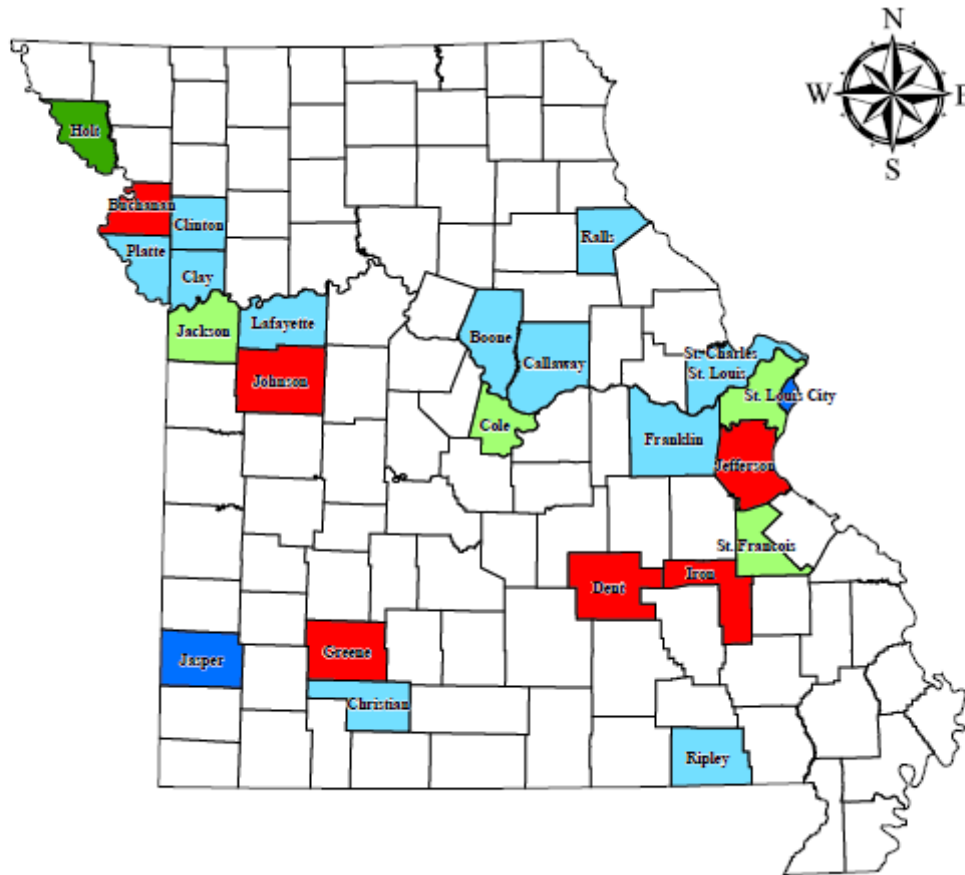


Employment or non-occupational source information on 29 (1.1%) adults with lead levels >10 µg/dL could not be determined after contacting patients and/or health care providers. The range for these tests was from 10 to 28 µg/dL. Of the 29 unknown cases, three are thought to be false-positive results.

The MO ABLES database includes all Missouri adults even if their place of employment is out of state. Of the 2,569 occupationally exposed adults in 2009, there were 167 elevated Missourians who were employed in another state. These were Kansas (130), Iowa (20), Illinois (8), Florida (4), and one each in Indiana, Maryland, Minnesota, South Carolina, and Texas. There were 20 workers (<1%) for whom industry is known, but the address of employment is unknown. There were 2,382 (92.7%) workers who were known to both live and work in Missouri, representing 64 Missouri companies.

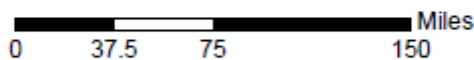
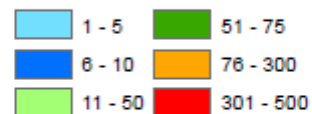


## Elevated Blood Lead Levels by County of Employment, Missouri 2009



A total of 2569 workers had elevated blood lead levels of 10 micrograms of lead per deciliter of blood (ug/dL) or greater. There were 167 workers employed outside of Missouri, including 127 in Wyandotte County, Kansas. A county of employment was not known for 20 workers.

### Number of Workers with Elevated Blood Lead Levels



Last edited: 09/12/2011

Source: Missouri ABLES 2009

**Workers with Elevated Lead Levels  
by County of Employment,  
Missouri 2009**

<b>County of Employment</b>	<b>Number of Elevated Workers</b>	<b>Percent of Total</b>
Jefferson	415	16.2%
Iron	385	15.0%
Johnson	385	15.0%
Dent	332	12.9%
Greene	320	12.5%
Buchanan	302	11.8%
Holt	75	2.9%
Jackson	43	1.7%
Cole	33	1.3%
St. Francois	33	1.3%
All other Missouri counties	59	2.3%
Non-Missouri counties	167	0.8%
<b>Total</b>	<b>2,569</b>	<b>100.0%</b>

There were 24 Missouri counties where at least one elevated Missourian worked in 2009. However, 2,139 (83.3%) occupationally elevated adults worked in only six counties, reflecting the concentration of lead industries in these areas.

National ABLES reporting benchmarks have included blood lead levels  $\geq 25$   $\mu\text{g/dL}$  and  $\geq 40$   $\mu\text{g/dL}$ . Overall, national prevalence rates of lead levels  $\geq 25$   $\mu\text{g/dL}$  declined from 14.0 per 100,000 employed adults in 1994 to 6.3 per 100,000 employed adults in 2009.

Prevalence rates for Missouri were calculated for 2009 for blood lead level concentrations of  $>10$   $\mu\text{g/dL}$ ,  $>25$   $\mu\text{g/dL}$ , and  $>40$   $\mu\text{g/dL}$ . Rate numerators were all Missouri resident adults with elevated lead levels, whether occupational, non-occupational or from an unknown source. The denominator used was 2,753,762, the average employed Missouri population aged  $\geq 16$  years for 2009 from the Missouri Economic Research and Information Center, Missouri Department of Economic Development.



## Statewide Prevalence Rates of Elevated Lead Levels, Missouri 2009

Blood Lead Levels >10 µg/dL		Blood Lead Levels >25 µg/dL		Blood Lead Levels >40 µg/dL	
Number Elevated	Rate per 100,000	Number Elevated	Rate per 100,000	Number Elevated	Rate per 100,000
2,655	95.5	736	26.5	82	2.95

Prevalence rates per 1,000 employed adults for all Missouri counties were also calculated for 2009. For these rates, an elevated blood lead level was defined as a concentration  $\geq 10$  µg/dL. Location used was county of residence. These rates ranged from zero in 23 counties that had no elevated adults to 68.6 per 1,000 adults in Reynolds County. County Prevalence Rate\_2009.pdf

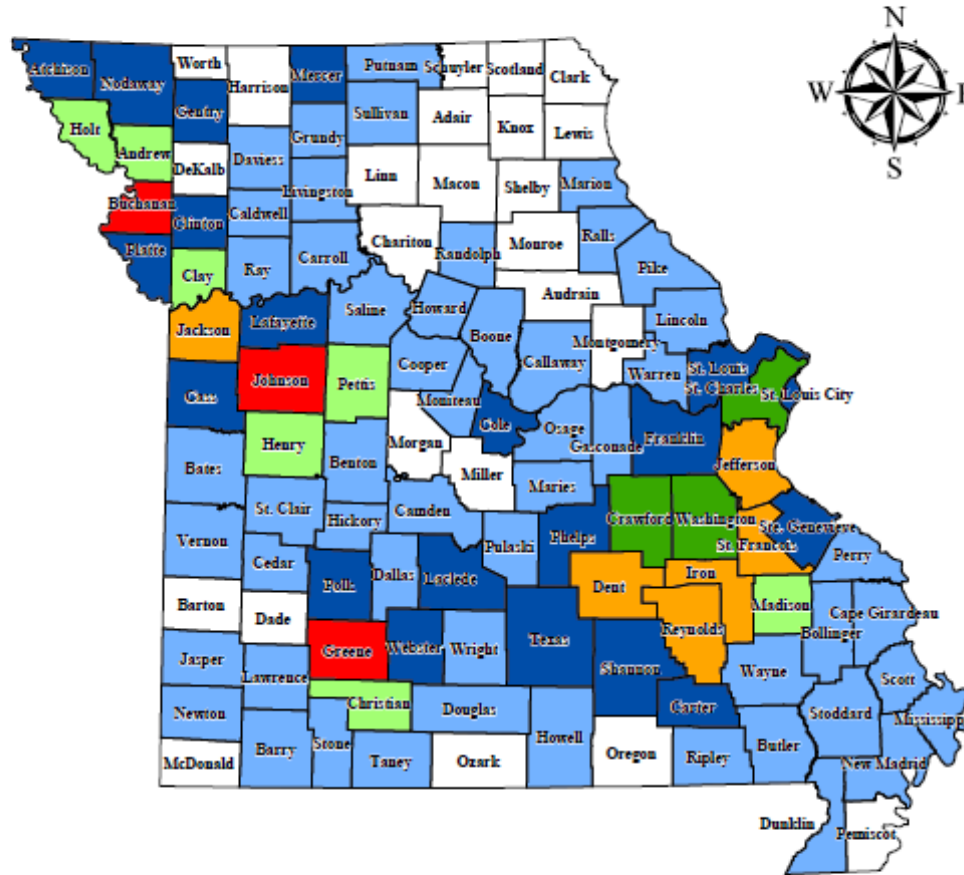
### Ten Counties with Highest Prevalence Rates of Elevated Lead Levels, Missouri 2009

County	Average Employment	Number Adults >10 ug/dL	Rate per 1,000
Reynolds	2,390	164	68.6
Dent	6,100	201	33.0
Iron	5,260	149	28.3
Holt	2,592	49	18.9
Johnson	24,011	292	12.2
Washington	8,743	103	11.8
Mercer	1,629	13	8.0
St. Francois	27,133	186	6.9
Crawford	10,846	68	6.3
Shannon	3,296	17	5.2

County of residence was known for all of the 2,569 workers with elevated BLLs in 2009. Of the 115 Missouri counties (including the City of St. Louis), there were adults with occupational lead elevations living in 92 counties, illustrating that many workers commute across county boundaries to work.

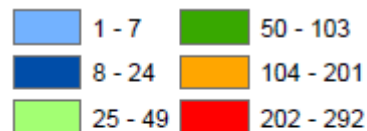
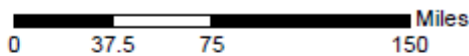


## Elevated Adult Blood Lead Levels by County of Residence, Missouri 2009



A total of 2655 adult Missouri residents had elevated blood lead levels of 10 micrograms of lead per deciliter of blood ( $\mu\text{g}/\text{dL}$ ) or greater.

### Number of Residents with Elevated Blood Lead Levels



Last edited: 09/12/2011

Source: Missouri ABLES 2009

For more information on the Missouri Adult Blood Lead Epidemiology and Surveillance Program, contact:

Bureau of Environmental Epidemiology  
Missouri Department of Health and Senior Services  
PO Box 570  
Jefferson City, MO 65102-0570  
573-751-6102 or toll-free 866-628-9891  
<http://health.mo.gov/ABLES>