

Chapter 2 - Elevated Blood Lead Levels Among Adults

Exposure to lead adversely affects multiple organ systems and can cause permanent damage even at lower levels. In adults, exposure to lead can cause anemia, nervous system disruption, kidney damage, hypertension, decreased fertility and miscarriage.¹ Although the adverse health effects from exposure to lead have been recognized for centuries, exposure to lead through occupational, environmental and recreational sources still occurs in New York State (NYS). The blood lead level (BLL) is the best biological indicator of recent lead exposure. Regular surveillance of BLLs allows for early identification of individuals at risk for poisoning. The principle source of lead in adults is primarily occupational exposures, although NYS data indicate that more than 20% of exposures in NYS adult residents are due to non-occupational sources, especially among those individuals with severely elevated BLLs (60+ micrograms per deciliter [mcg/dL]).² It is important to note that the average BLL for the general population is less than 1.5 mcg/dL.³

Data on adults age 16 years old or older comes from the National Institute for Occupational Safety and Health (NIOSH) Adult Blood Lead Epidemiology and Surveillance (ABLES) program. The ABLES program is a state-based surveillance program of laboratory-reported adult blood lead levels. In NYS, the laboratory data are reported through the Heavy Metals Registry (HMR) which reports the data to NIOSH via ABLES. Funding for ABLES was discontinued in 2013, at which time, 41 states reported their data to NIOSH⁴; however, NYS has continued with the collection of this important information. There were 25 states participating in the ABLES program in 2000 while 40 states participated in 2010.

Over 4,100 adults reported to the HMR in 2000 had BLLs 10 mcg/dL or higher. As demonstrated in Figure 2.1, the number of reports has steadily decreased with the low occurring in 2009 with only slightly more than 1,900 people reported. Even with a slight rise in testing numbers and elevated BLLs during 2010, which was most likely due to the increase in transportation and infrastructure jobs funded by the American Recovery and Reinvestment Act of 2009,⁵ this decrease in reports of elevated BLLs over time is statistically significant (p value <.0001). Likewise, the number of adults reported with BLLs 25 mcg/dL or higher (p-value <.0001) and 40 mcg/dL (p-value <.0001) or higher has decreased over time. (Figure 2.1)

Figure 2.1. Annual Number of New York State Residents with Elevated Blood Lead Levels, 2000-2010

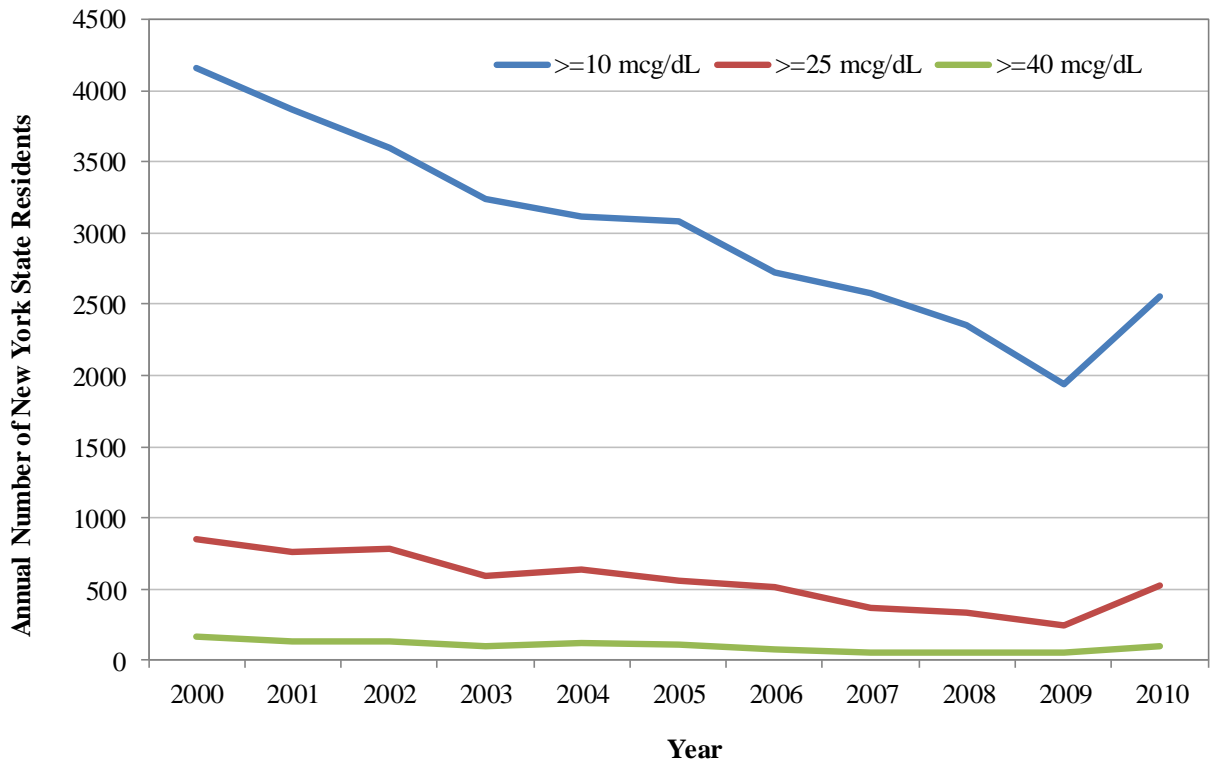
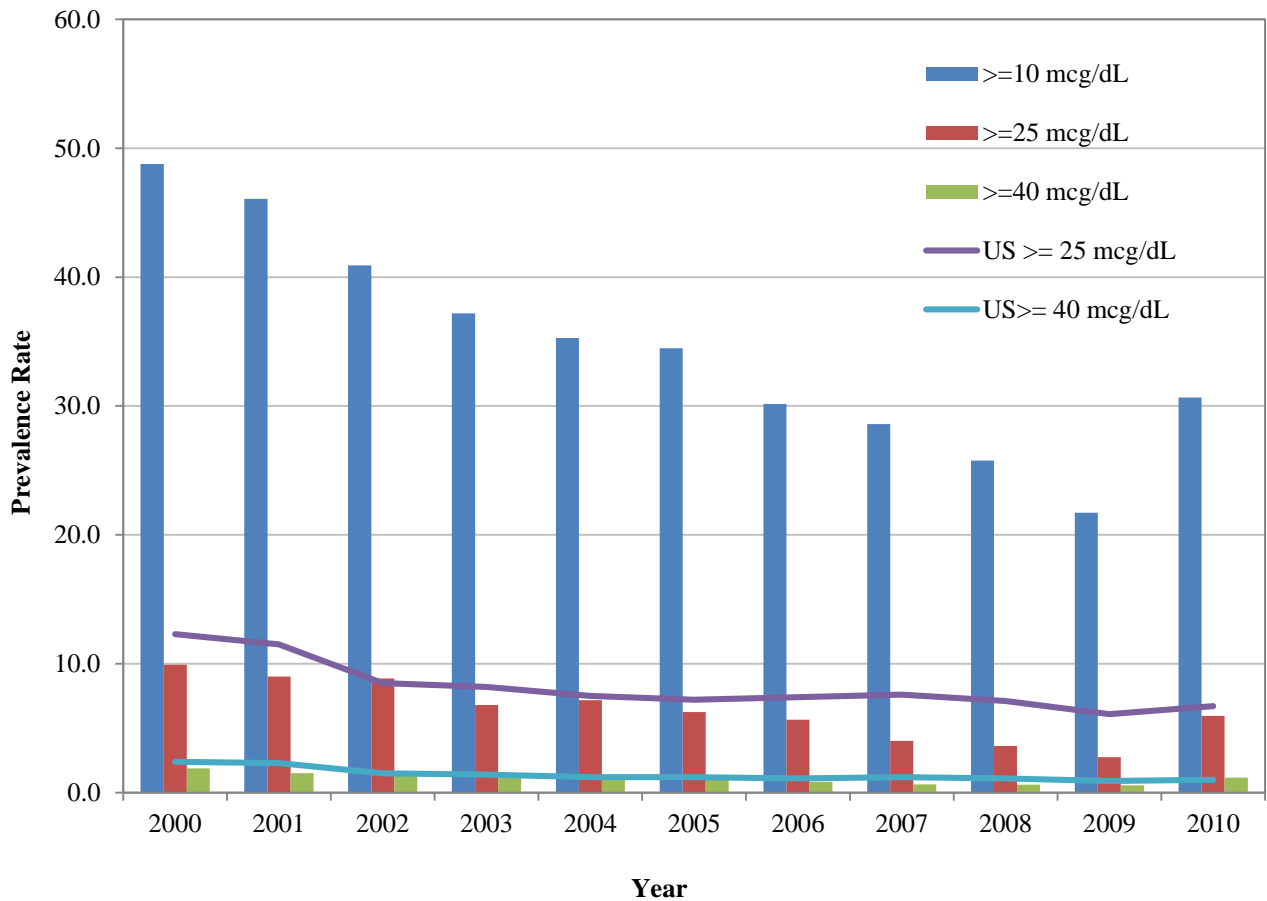


Figure 2.2 shows the annual prevalence rates per 100,000 employed persons of BLLs at or greater than 10 mcg/dL, 25 mcg/dL and 40 mcg/dL among persons 16 years or older residing in NYS. The prevalence rates per 100,000 employed persons of BLLs at or greater than 25 mcg/dL and 40 mcg/dL among all states participating in the ABLES program (represented by the US lines) is also shown in Figure 2.2. The year 2010 was the first year that the CDC/NIOSH included BLLs of 10 mcg/dL or higher in their case definitions of elevated BLLs so only 25 mcg/dL and 40 mcg/dL prevalence rates are shown. The NYS rate of BLLs at or greater than 40 mcg/dL is relatively similar to the rate for the US, however, the NYS rate of BLLs at or greater than 25 mcg/dL is consistently lower than that of the US.

Figure 2.2. Annual Prevalence Rate of Elevated Blood Lead Levels Among New York State Residents, per 100,000 Employed Persons, 2000-2010



Historically, most of the elevated BLLs reported to the HMR were due to occupational exposures. In recent years, however, many more NYS residents have been reported with exposures to lead via non-occupational sources such as target shooting and residential remodeling than in the past. In 2000, there were over 1,900 people with known occupational exposures and only 120 with known non-occupational exposures. (Figures 2.3 and 2.4). Since that time there has been a general decline in the number of reports associated with occupational exposures and a general increase in reports associated with non-occupational exposures. In 2010, only 1,400 people had known occupational exposures but more than 350 had non-occupational exposures. Non-occupational exposures continue to make up a large percentage of the most highly elevated BLLs. While the majority of the reduction in elevated BLLs appears to be due to better mechanisms to control lead exposure in the workplace, other factors may also be involved. The number of NYS companies using lead has decreased as a result of either work process changes to eliminate lead or company closings, following national trends.⁶ Another factor in the reduction of elevated BLLs may be the elimination or reduction of biomonitoring by some companies.

Figure 2.3. Number of New York State Residents, with Known Occupational Exposures, by Blood Lead Level Category, 2000-2010

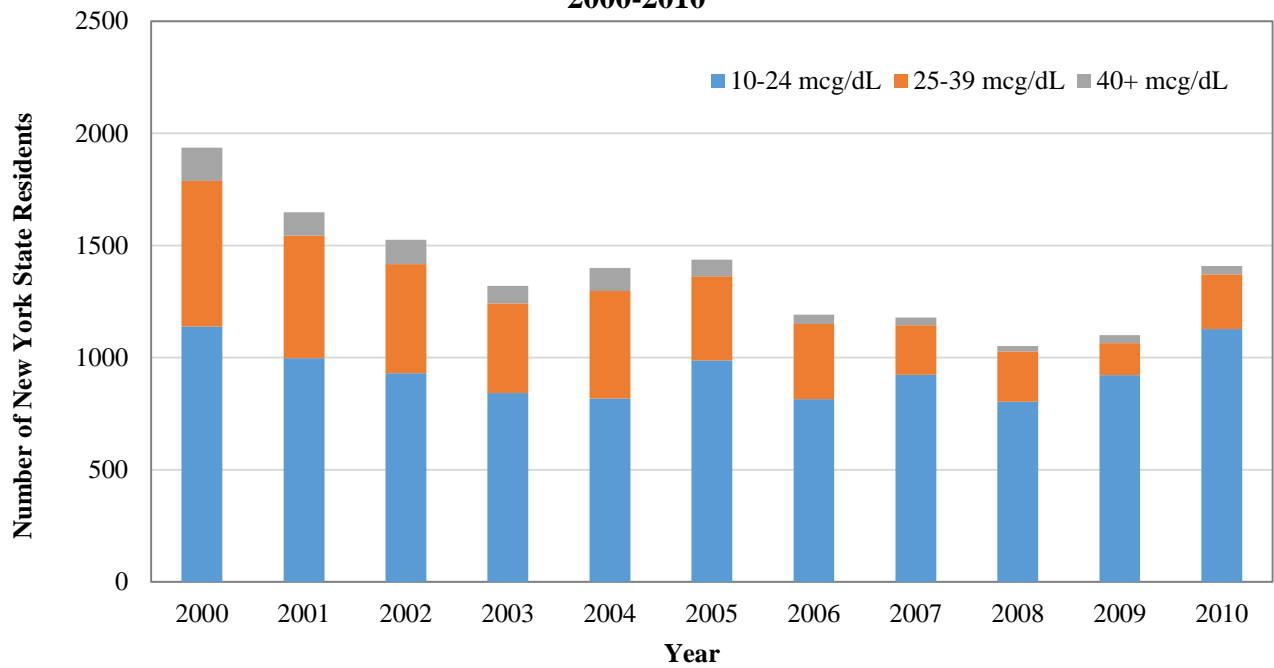
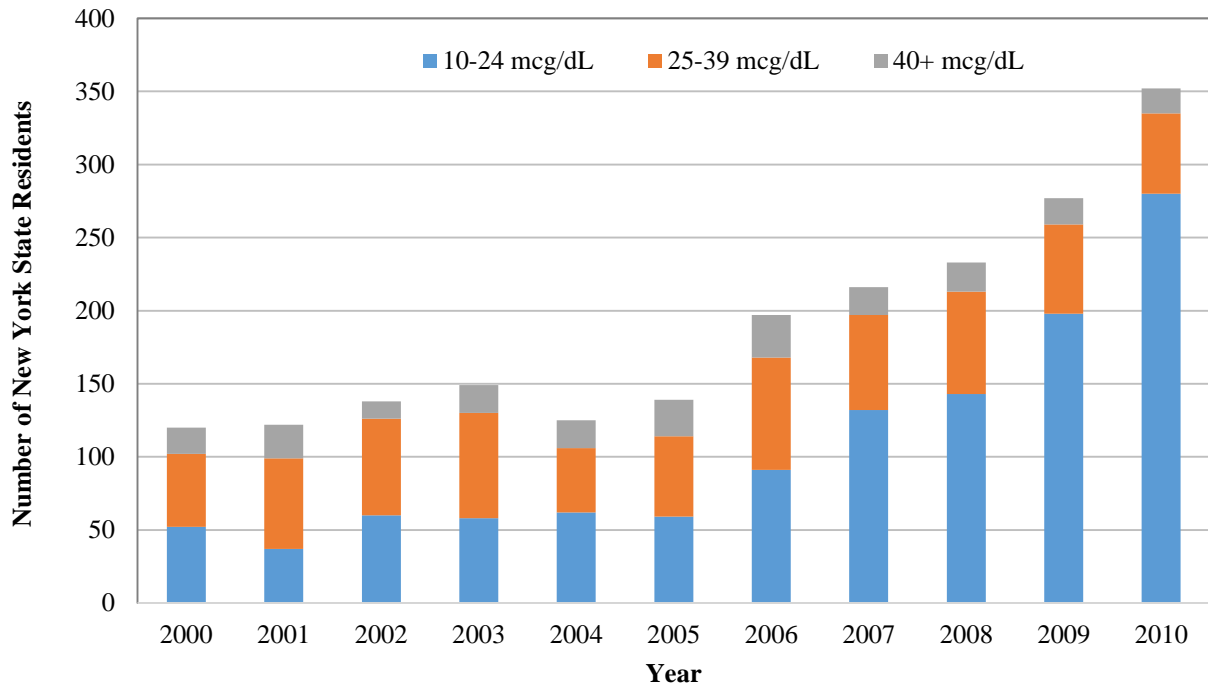


Figure 2.4. Number of New York State Residents, with Known Non-Occupational Exposures, by Blood Lead Level Category, 2000-2010



The types of lead exposures also vary by gender. Women are primarily exposed to lead via non-occupational activities, and the number of known non-occupational exposures among women increased five-fold from 2000 through 2010. There were 36 women in 2000 and 186 women in 2010 exposed to lead from non-occupational sources. (Figure 2.5) The increase in reports among women of childbearing age suggest that women may be receiving prenatal screening for lead. Although NYS does not require blood lead testing for all pregnant women, NYSDOH regulations state that “Prenatal health care providers shall screen or refer for blood lead screening each pregnant woman found to be at risk for current high dose lead exposure.”⁷ NYSDOH, in collaboration with the American College of Obstetricians and Gynecologists, has developed “Lead Poisoning Prevention Guidelines for Prenatal Care Providers.”⁸ The Guidelines include risk assessment questions for pregnant women. Previous data analysis has shown that the most common sources of non-occupational exposures in NYS include folk remedy usage, target shooting and residential remodeling.⁹ An increase in non-occupational exposures over time has also been seen in men; from 83 in 2000 to 166 in 2010, but the primary source of exposure for men remains occupational. (Figure 2.6)

Figure 2.5. Number of New York State Female Residents with a Blood Lead Level ≥ 10 mcg/dL, by Known Exposure Type, 2000-2010

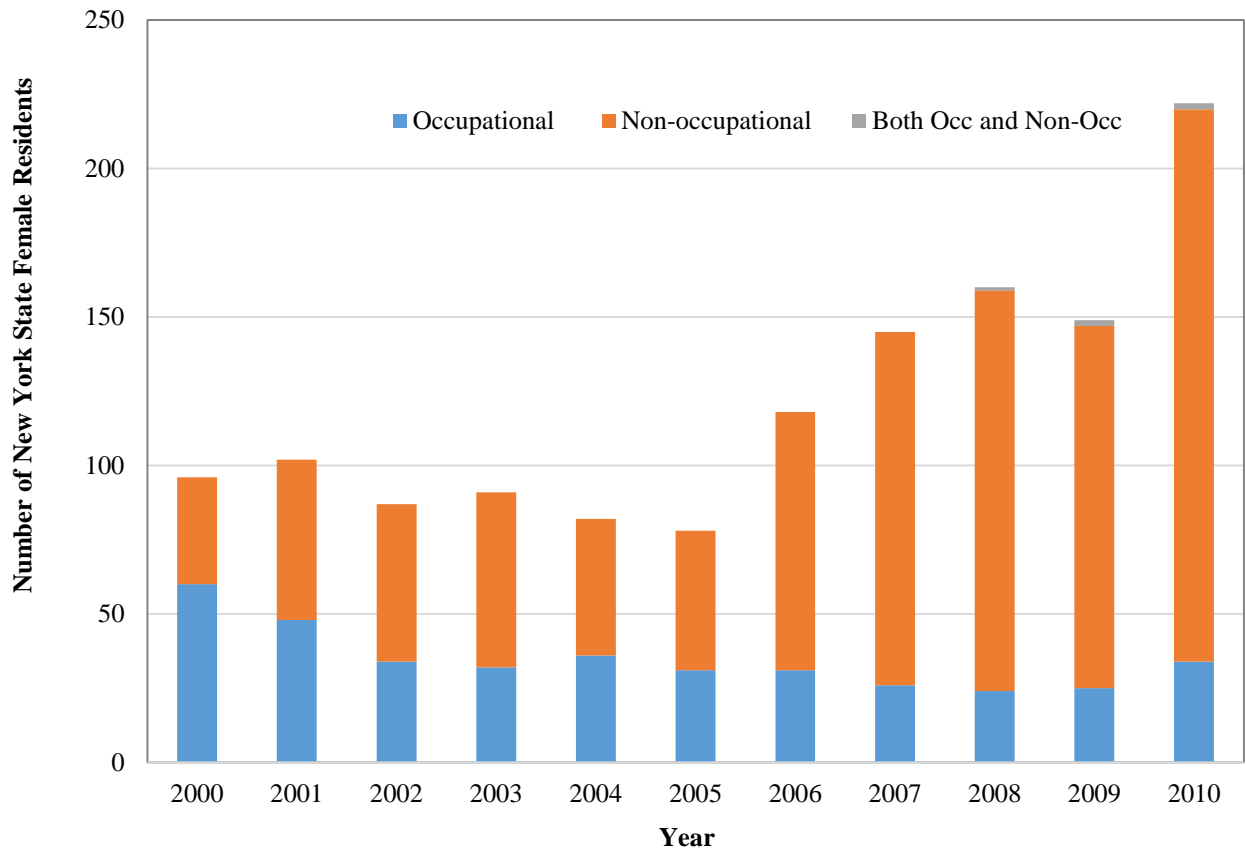
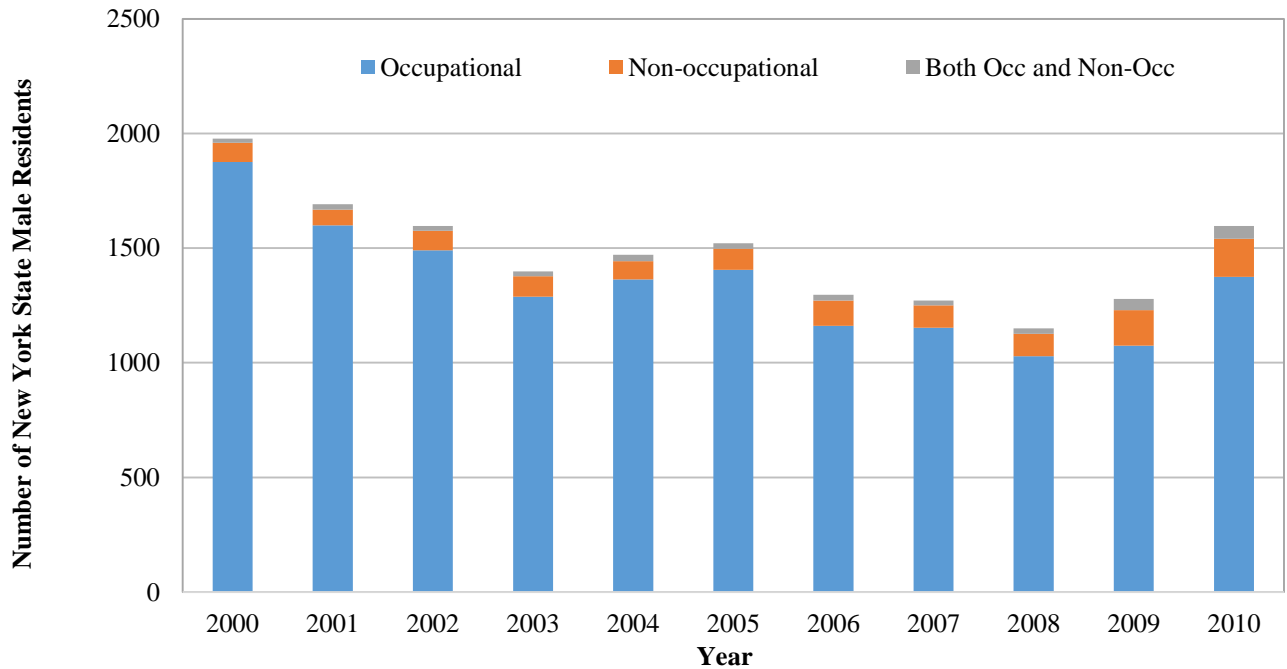


Figure 2.6. Number of New York State Male Residents with a Blood Lead Level ≥ 10 mcg/dL , by Known Exposure Type, 2000-2010



Risk of elevated BLLs varies among ethnicities in NYS also. The overall trend from 2000 to 2010 has been a decline in rates of elevated BLLs (25 mcg/dL or greater) among adults in NYS across all ethnicities during the time period, except for the increase in 2010. As indicated previously, this was most likely due to more construction jobs funded by the Recovery Act of 2009.^v It is important to note that Hispanics have almost double the rate of elevated BLLs. (Figure 2.7) This trend in decreasing rates is the same for those with BLLs less than 25 mcg/dL (data not shown).

Figure 2.7. Rate of New York State Residents with a Blood Lead Level of ≥ 25 mcg/dL, per 100,000 Employed Persons, by Ethnicity



Although the number and rate of NYS residents with elevated BLLs has decreased since 2000, many residents continue to be exposed to lead. Ongoing surveillance and examination of the data in the NYS HMR are important and can support early intervention to help prevent and reduce exposures and potential illness.

¹ Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead. Atlanta: ATSDR; 2007. TP-92/12.

² Gelberg KH, Fletcher AM. Adult Blood Lead Reporting in New York State, 1994-2006. Public Health Reports, 2010; 125:103-110.

³ Centers for Disease Control and Prevention (CDC). *Fourth National Report on Human Exposure to Environmental Chemicals, 2009*. Available at: <http://www.cdc.gov/exposurereport/>. Updated July 2014. Accessed July 2014.

⁴ Centers for Disease Control and Prevention. National Institute for Occupational Safety and Health. Adult Blood Lead Epidemiology and Surveillance (ABLES). Available at: <http://www.cdc.gov/niosh/topics/ABLES/ables.html>. Updated May 2013. Accessed April 2014.

⁵ The American Recovery and Reinvestment Act; State/Territory Summary – New York.

Available at:

<http://www.recovery.gov/arra/Transparency/RecoveryData/Pages/statesummary.aspx?StateCode=NY>. Updated May 2014. Accessed August 2014.

⁶ Okun A, Cooper G, Bailer AJ, Bean J, Stayner L. Trends in Occupational lead exposure since the 1978 OSHA lead standard. AM J Ind Med, 2004 Jun;45(6):558-72.

⁷ New York State Regulations for Lead Poisoning Prevention and Control- NYCRR Title 10, Part 67-1.5. Available at: http://www.health.ny.gov/regulations/nycrr/title_10/part_67/#sec67-1-5. Accessed July 2014.

⁸ New York State Department of Health, American College of Obstetricians and Gynecologists, District II. Lead Poisoning Prevention Guidelines for Prenatal Care Providers. Albany (NY): New York State Department of Health; June 2009. Available at: <http://www.health.ny.gov/publications/2535.pdf>. Accessed July 2014.

⁹ New York State Department of Health, Center for Environmental Health, Bureau of Occupational Health and Injury Prevention, Heavy Metals Registry Report, 2006 through 2010. Available at: https://www.health.ny.gov/environmental/workplace/heavy_metals_registry/report_2010.htm. Updated November 2013. Accessed July 2014.