

# Should OSHA Lower Their Blood Lead Limits For Occupational Workers?

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The Occupational Safety and Health Administration (OSHA), within the United States Department of Labor, estimates that over 1.6 million workers are exposed to lead through both construction and industrial activities (Occupational Safety and Health Administration [OSHA]). Occupational workers come in contact with lead through the inhalation of lead particles during various activities that deal with the manufacturing, destruction, renovation, or construction, or replacement of numerous lead products (OSHA). Inhaling such particles can lead to the accumulation of lead within the blood and bones, which over time can cause many adverse health effects, including cardiovascular and neurological diseases. Currently, OSHA's workplace lead exposure standards state that a worker can have a permissible exposure limit up to 40  $\mu\text{g}/\text{dL}$  of blood and only require medical removal of lead when levels reach upwards to 60  $\mu\text{g}/\text{dL}$  of blood (Shaffer & Gilbert, 2016). These regulations were created in 1978 and have not changed, despite the Centers of Disease Control and Prevention (CDC) recommendations that an elevated blood lead level occurs at 10  $\mu\text{g}/\text{dL}$  of blood (Alarcon, 2015). That being said, it is clear that OSHA should reevaluate and lower their occupational blood lead regulations to CDC's level, in order to protect their workers and their families from suffering from chronic complications caused by high occupational lead exposures. College-aged environmental activists should care about this issue, because although they were fortunate enough to go to college, they might have friends who decided to work within labor industries instead. Labor workers are disproportionately affected by lead exposures, compared to those in occupations where a degree is required. Young environmentalists should call for OSHA to achieve environmental justice within their agency by contacting the Environmental Protection Agency about this discrepancy, so their friends are not put at a substantial risk of lead caused complications during their lifetime.

OSHA blood lead regulations are outdated and should be lowered, because the rule does not take into account that lead can cause chronic conditions and can accumulate in the body over time. First, when OSHA developed their lead requirements for occupational workers, they only emphasized the dangers of acute side effects, such as hematopoietic conditions, among workers who were heavily exposed to lead during short periods of time (Schwartz & Hu, 2007). This means long-term chronic diseases caused by low-level ongoing contact with lead based materials were not considered when determining proper blood lead standards. Since the creation of OSHA lead standards, numerous epidemiological studies have revealed that lead exposure is a predictor for cardiovascular disease, hypertension, dangerous cognitive and reproductive effects, and other negative health outcomes (Schwartz & Hu, 2007). This lack of awareness of widespread health threats caused by lead exposure should make OSHA update their policy, so workers are protected from a variety of health outcomes, instead of just a few. Next, Schwartz and Hu (2007) note that writers of these lead standards ignored information that lead can build up within bone deposits of those exposed and thus remain in the body for longer periods of time. This can be problematic, because bone turnover processes allow lead to be released back into the blood even after the end of the exposure, and therefore continue to put a person at risk for complications. Lastly, OSHA's blood biomarkers used to test blood lead levels can only measure the most recent lead dose and do not even account for cumulative bodily build-up (Schwartz & Hu). This is extremely concerning, because a worker may already be at an increased risk for developing adverse conditions due to bone lead storage, even though their blood lead levels met OSHA regulations. OSHA is long overdue to improve their lead regulations, because this rule completely fails to address the abundance of chronic illnesses

caused by ongoing lead exposure and that lead accumulation in the body can increase one's risk for negative health outcomes later in life.

It is crucial for OSHA to significantly lower their blood lead level standards, because recent epidemiological investigations revealed that adverse health outcomes from lead exposures can occur at much lower concentrations than suggested with OSHA's recommendations.

Kosnett et al.'s (2007) mini-monograph study suggests that hypertension and cardiovascular disease may occur at blood lead levels well below OSHA's 40  $\mu\text{g}/\text{dL}$  limit. For example, their review of numerous epidemiological studies found that lead might be a strong predictor for high blood pressure in adults with a blood lead concentration of less than 20  $\mu\text{g}/\text{dL}$  of blood (Kosnett et al., 2007). Furthermore, long-term lead exposure measured by lead deposits within bone demonstrated a significant association between high bone lead stores and hypertension (Kosnett et al., 2007). Next, Kosnett et al.'s (2007) review of a longitudinal study conducted by the National Health and Nutrition Evaluation Surveys (NHANES) discovered that blood lead concentrations that ranged from 20 to 29  $\mu\text{g}/\text{dL}$  correlate with a 39% increase in death from circulatory diseases. Moreover, an additional longitudinal NHANES investigation found that adults over 40 years of age with a blood lead concentration at or above 10  $\mu\text{g}/\text{dL}$  of blood had a relative risk of 1.59 of dying from cardiovascular disease compared to adults with a blood lead concentration of less than five  $\mu\text{g}/\text{dL}$  of blood (Kosnett et al., 2007). Finally, in Khalil et al.'s (2009) cross-sectional and longitudinal study, they found that cumulative lead build-up in the bones of lead exposed workers has an inverse relationship with cognitive ability, including learning and memory skills, in older populations. This occurs when lead is released back into the blood during high bone turnover, which can be due to age related osteoporosis, and begins to concentrate within the brain (Khalil et al., 2009). With this, it is evident that OSHA should

account for lead's storage capacity within bone, because workers can experience disastrous health outcomes well after their retirement from the workforce. OSHA needs to change their recommendations to reflect published scientific evidence that lead is already substantially toxic at blood lead levels well below their 40 µg/dL of blood threshold.

Occupational blood lead levels should be lowered not only for the safety of workers, but also to prevent possible transfer of lead particles to their families. Take-home lead contamination occurs when lead dust from one's work environment settles on a worker's skin, clothing, and other personal belongings and is then transported to their car and home (Centers for Disease Control and Prevention [CDC], 2015). This is a cause for concern, because children of lead exposed occupational workers may potentially come in contact with lead particles and suffer from adverse health effects. One meta-analysis study concluded that children who live with lead-exposed employees are at a higher risk of having increased blood lead levels (Roscoe, Gittleman, Deddens, Petersen, & Halperin, 1999). Of this sample, more than 52% of children had blood lead levels above the CDC blood level cutoff of 10 µg/dL of blood (Roscoe et al., 1999). Based on this conclusion, Roscoe et al. (1999) determined that around 24,000 US families of lead exposed employees have children of ages six and under with blood lead levels at or above 10 µg/dL of blood. Negative health effects, such as decreased cognitive and physical development can be observed among children starting at this concentration (CDC, 2015). Child lead exposures caused by take-home mechanisms can be prevented if stricter workplace controls are put in place. Lowering OSHA occupational blood lead standards may result in construction and other lead industries to reduce the use of lead based materials or limit exposure time during work hours. Therefore, if lead workers are protected by more stringent blood lead

concentrations, which can be achieved by lowering overall lead exposure, they are less likely to contaminate their living environments with take home lead and put their children at risk.

Although OSHA has not lowered their occupational blood lead standards since 1978, US adult occupational blood lead levels have been steadily declining. Between the years of 2010 and 2012, the prevalence of people with elevated blood lead concentrations above 10  $\mu\text{g}/\text{dL}$  of blood has dropped from 26.6 to 22.5 per 100,000 workers above 16 years of age (Office of Disease Prevention and Health Promotion [ODPHP], 2016). This continual decrease in occupational blood lead levels can put the US on track for achieving their Healthy People 2020 target goal of reaching a prevalence of only 20.2 per 100,000 workers (ODPHP, 2016). With this in mind, college aged environmentalist might find there is no reason to lower OSHA lead regulations, because these government statistics illustrate that lead industries are already taking better precautions to protect their workers. Despite this improvement, the CDC believes this prevalence rate of 22.5 per 100,000 workers is still at an unacceptable level (Alarcon, 2015). Recent research has proved that lower blood lead levels of 10  $\mu\text{g}/\text{dL}$  can still cause hypertension and other conditions, than previously presumed (Kirschner, Leinenkugel, Makowski, Fletcher, & Braun, 2013). Therefore, these standards should be lowered to ensure a maximum number of workers are protected from chronic implications caused by cumulative lead exposures. Furthermore, the Office of Disease Prevention and Health Promotion (ODPHP) gets its data, regarding the prevalence of workers with elevated blood lead levels, from the CDC's Adult Blood Lead Epidemiology and Surveillance (ABLES) program, a state run occupational health surveillance system (Kirschner et al., 2013; ODPHP, 2016). There has been some dispute over whether this data is truly reflective of a decline of blood lead levels in workers, because a loss of federal funding in 2013 resulted in a decrease of state participation from 41 states to 34 (Alarcon,

2015). Without maximum state involvement, the ABLES program will be missing large amounts of data regarding occupational lead exposures, which may present a false decrease in prevalence statistics. Moreover, not all employers issue lead testing to their workers as required by OSHA, and some laboratories that conduct these tests do not report their results to the ABLES program (Alarcon, 2015). Therefore, this decrease in elevated blood lead levels among occupational workers, determined by the ABLES program, can only be observed as a low approximation of the vastness of lead exposed workers within the US. OSHA's blood lead standards should be lowered to ensure that workers not represented in ABLES data are protected from high lead exposures.

College aged environmentalist should be definitely be concerned with OSHA's outdated blood lead regulations to ensure their friends that are already in the workforce are properly protected from dangerous lead exposures. Also, lowering these guidelines will help OSHA achieve environmental justice within their agency, because not doing so will allow labor workers to be disproportionately affected by lead exposures. ABLES 2012 data revealed that manufacturing, mining, and construction industries have the highest percentages of workers with elevated blood lead levels (Alarcon, 2015). These jobs usually do not require a high education as seen in the United States Department of Labor's (2016) report of education level in relation to occupation. More than 70% of construction workers, 65% of mining workers, and 50% of manufacturing workers over the age of 25 only achieved a high school diploma or equivalent (United States Department of Labor [DOL], 2016). Education level helps determine occupational opportunities and income attainability, and can therefore be a strong predictor of health (Ji, Schwartz, Sparrow, Hu, & Weisskopf, 2014). With this in mind, individuals without a high level of education can be limited to laborious, blue-collar occupations with numerous

environmental hazards in order to support themselves and their families. One study even concluded that blue-collar workers have considerably higher bone lead levels compared to their white-collar counterparts (Elmarsafawy et al., 2002). Due to this discrepancy, OSHA must lower their occupational lead standards to ensure that all workers are fairly protected against detrimental health outcomes from lead exposure. Individuals should not have to put their health at risk, because their lack of education limited their job opportunities to occupations dealing with hazardous materials. Those who are in college should recognize that although this issue may not affect them directly, every worker has the right of protection against environmental harms.

OSHA has ignored nearly 40 years of well-founded scientific evidence regarding lead's widespread health implications, bone accumulation abilities, and high toxicity below their blood lead level threshold of 40  $\mu\text{g}/\text{dL}$  of blood. Furthermore, their inability to lower their guidelines puts thousands of children at risk for exposure due to take home lead. Although occupational blood levels appear to be declining, adult blood lead levels continue to be at unacceptable levels and ABLES data does not represent a true estimation of the magnitude of this issue. OSHA must face their years of apathy against this problem and realize that it is time to lower their permissible exposure blood lead limit of 40  $\mu\text{g}/\text{dL}$  of blood, in order to protect workers and their families from experiencing preventable adverse health effects. College environmentalists should work for this regulation change not only for the health of workers, but also to make OSHA recognize their actions of environmental injustice. Education can be a limiting factor for occupational opportunities, but it does not mean that it should be a predictor for high lead exposure. Lead and its detrimental health effects should not disproportionately affect laborers, even though OSHA's high blood limit allows them to experience dangerously high blood lead levels and continue working in exposure environments. Lowering their blood lead level



recommendations to 10  $\mu\text{g}/\text{dL}$  of blood can potentially protect thousands of workers from chronic effects and ensure that all workers are equally shielded from leads toxicity. If college environmental activists mobilize for this change, their friends and other young individuals entering the workforce will be guarded against debilitating diseases that can affect their way of life late into adulthood.

