

Occupational Lead Exposures: Child Health Implications of Outdated Standards

Rachel M. Shaffer¹ and Steven G. Gilbert^{1,2}

¹Department of Environmental and Occupational Health Sciences, University of Washington Seattle School of Public Health, Seattle, Washington

²Institute of Neurotoxicology and Neurological Disorders

Contact information: Rachel M. Shaffer: rms14@uw.edu and Steven G. Gilbert: sgilbert@inn.d.org

Introduction

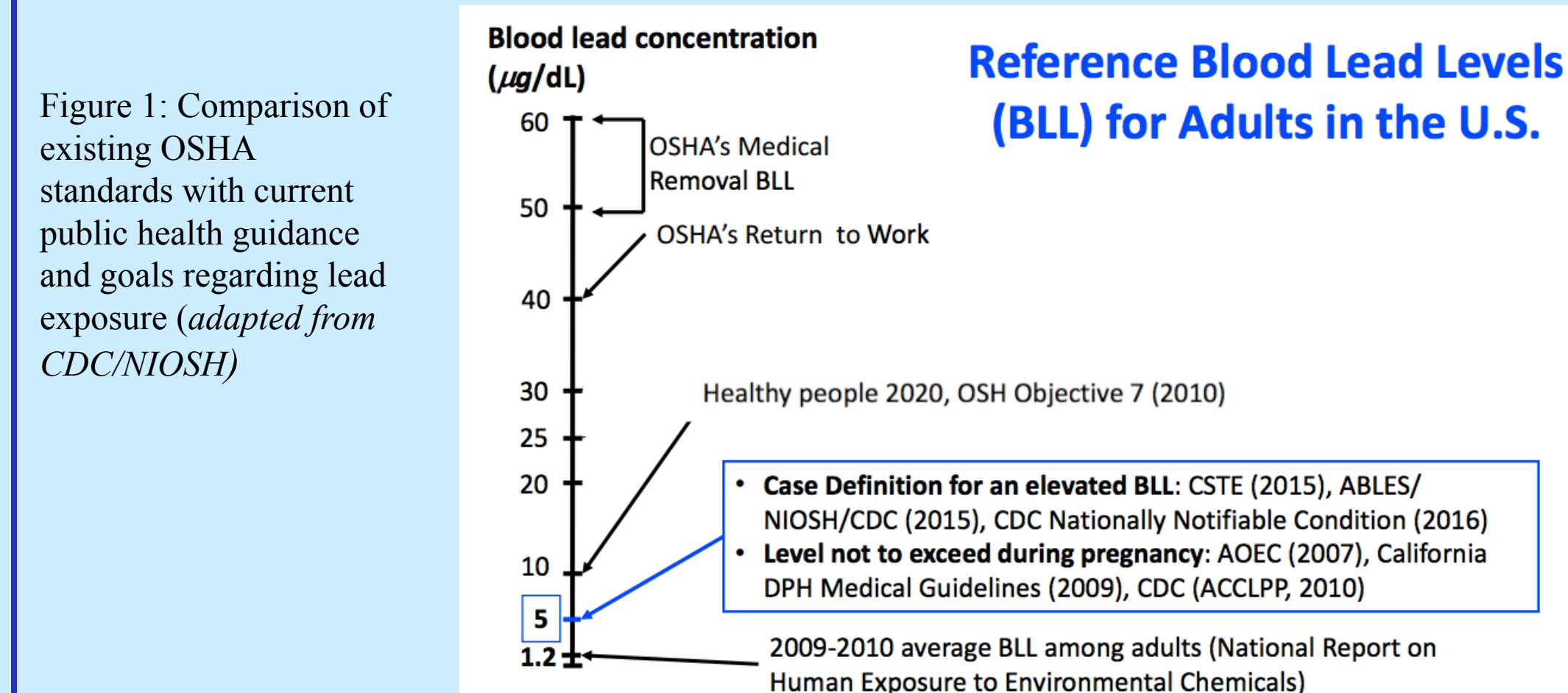
The U.S. Centers for Disease Control and Prevention (CDC) has stated that there is no safe level of lead exposure and has defined an elevated blood lead level (BLL) for children as any BLL greater than 5 µg/dL. It is estimated that over 500,000 U.S. children ages 1 to 5 have BLLs greater than 5 µg/dL. While there are a number of possible sources of childhood lead exposure, a relatively unexplored and underappreciated source is occupational lead exposure. Occupational lead exposure can affect children because lead is easily taken home on worker clothing or shoes, thereby contaminating the home. Children are uniquely vulnerable to the effects of lead because of their developing nervous systems and high calcium needs. Existing occupational lead standards are severely outdated and allow exposures that result in BLL up to 40-60 µg/dL. The Occupational Safety and Health Administration (OSHA) estimates that approximately 804,000 workers in general industry and an additional 838,000 workers in construction are potentially exposed to lead. Workers are exposed to lead as a result of the production, use, maintenance, recycling, and disposal of lead material and products, construction, manufacturing, wholesale trade, transportation, remediation and recreation such as fishing, hunting, and firing ranges. To demonstrate the importance of updating federal occupational lead standards, we perform example calculations that estimate the number of children exposed to lead through occupational exposure. Assuming only 10% of possible workers exposed to excessive amounts of lead bring contamination into the home, there would be 160,000 potential opportunities of family lead exposure. If each of these families had only one child exposed to take-home lead, then occupational lead exposure would contribute to elevated childhood lead exposure across the country. This does not include the millions of people that use gun firing ranges, which also accounts for occupational and non-occupational lead exposure. Therefore, to adequately protect workers and their families, occupational lead standards should be updated to prevent BLLs greater than 5 µg/dL. This change would eliminate the arbitrary distinction between workers and children. We have an ethical responsibility to protect workers and children from known hazards such as lead.

Existing Inadequate Workplace Standards

OSHA regulates workplace lead exposure through two standards, the **general industry standard** and the **construction standard**. Both of these are based on scientific and medical evidence from the 1970s and do not reflect updated information regarding the hazards of low level lead exposure.

Examples of key inadequacies of the current standards are outlined below:

- Exposures of lead that result in up to 60 µg/dL BLLs (or an average of 50 µg/dL BLL on three or more tests) are allowed before medical removal is required
- Workers can return to work when BLLs are as high as 40 µg/dL
- The permissible enforceable limit (PEL) is set at 50 µg/m³ over 8 hours, which allows for BLLs as high as 60 µg/dL
- Reliance on air lead levels as entry condition for the occupational lead standard ignores the role of ingestion in worker lead exposure



Populations at Risk

- Industries reporting the highest percentage of BLLs > 25µg/dL among workers

Manufacturing	Construction	Services	Mining
Storage battery manufacturing	Painting and wall covering contractors	Remediation services	Copper, nickel, lead, zinc mining, gold
Alumina and aluminum production and processing	Highway, street, and bridge construction	Amusement and recreation services	
Nonferrous metal (except copper and aluminum) rolling, drawing, extruding, and alloying	Residential building construction	Automotive, mechanical, and electrical repair and maintenance	

- Industries with commonly reported family lead exposure

- Lead smelting
- Battery manufacturing/recycling
- Radiator repair
- Electrical components manufacturing
- Pottery/ceramics
- Stained glass making
- Carpentry / remodeling / furniture repair

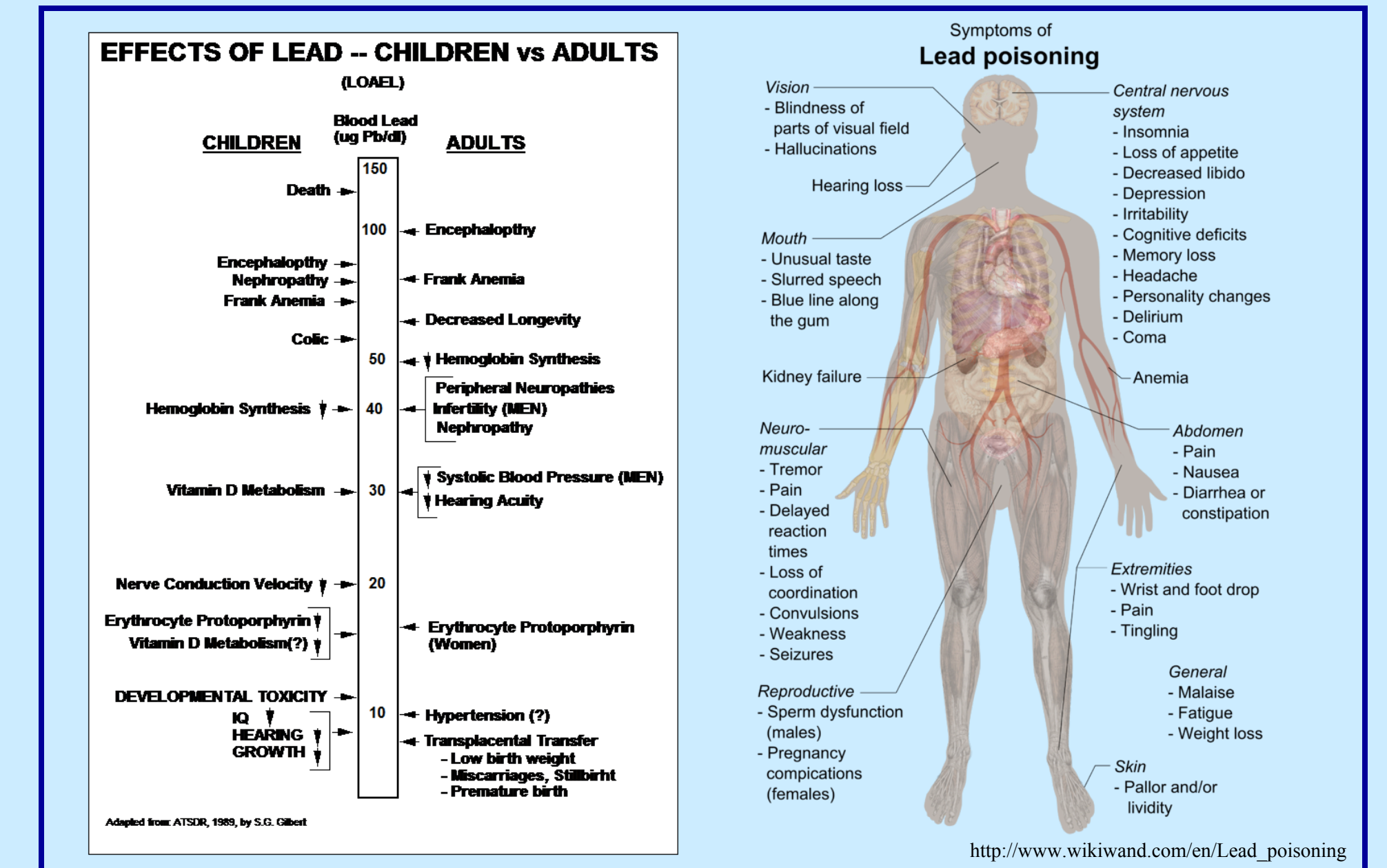
- Worker populations of particular concern

- Younger workers ages 14-21
 - Organ systems are still developing
 - Neurological systems especially vulnerable
- Women of reproductive age
 - Implications for fetal & child exposures
- Ethnic/minority groups:
 - Disproportionate exposures based on job patterns
 - May have inadequate understanding of risks because of language barriers

Take-Home Lead Exposure: Estimated Risks to Children

- OSHA estimates of workers exposed to lead:
 - General industry: 804,000 workers
 - Construction industry: 838,000 workers
 - *Not included: potential exposure through firing/shooting ranges*
- Estimates of child exposures from take-home lead (based on Roscoe et al 1999):
 - If we assume that 10% of all workers take lead home to their families, then 160,000 families affected by occupational lead exposure
 - If we assume that one child per family is affected, then 160,000 children might be exposed through take-home lead exposure from the workplace
- Occupational lead exposure due to inadequate OSHA standards may result in elevated risk of lead exposure in children
- Further work is needed to quantify the frequency and magnitude of take-home exposures

Implications of Lead Exposure



Conclusions & Recommendations

- Current occupational lead standards **are not protective for workers and their families.**
- Occupational lead standards should be updated to **prevent BLLs greater than 5 µg/dL in all workers**, in accordance with current scientific and medical evidence. This change would eliminate the arbitrary distinction between workers and children.
- Children of workers exposed to lead on the job should receive **regular BLL screening**
- **CDC acknowledges that there is no safe level of lead.** We have an ethical responsibility to protect workers and children from known hazards such as lead.

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