Preventing Childhood Lead Poisoning:
The Role of Infrastructure and Workforce Development

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February 27, 2017

Lead remediation infrastructure investments will put people to work and protect the health of millions of children.

Infrastructure investments to eliminate lead-based paint hazards in high-risk homes and replace lead service lines will have multiple benefits: they will mitigate the high personal and social costs of lead poisoning, and—if properly designed—they will offer a means of employment and the possibility of financial stability for tens of thousands of low-income families. These investments have a multiplier effect across the economy: every dollar invested in infrastructure employment creates $1.75 in related economic activity.[3]

There is an enormous amount of lead remediation work to be done to address the scope of the lead hazards that remain in the homes of millions of Americans. The U.S. Department of Housing and Urban Development estimates that 37 million U.S. housing units contain lead-based paint and that of these, 23 million are considered to have significant lead hazards associated with dust, chips and contaminated soil from deteriorated lead paint. In addition, the public health disaster in Flint, Michigan illustrates the potential for lead exposures to occur from lead pipes that connect a water main to individual or multiple-family housing units. Lead service lines are the leading source of lead contamination in residential water.[4]

A 2016 survey by the American Water Works Association (AWWA) reported that about 293 million Americans receive residential water from Community Water Systems; of these, between 15 and 22 million people (7%) receive their water through either a full or partial lead service line. AWWA estimates that there are 6.1 million lead service lines in operation in the U.S. today.[5] Tens of thousands of jobs are needed to do the work of lead paint remediation and lead pipe replacement.

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[3] Walsh J, Bivens J, Pollack E (2011). *Rebuilding Green: The American Reinvestment and Recovery Act and the Green Economy*. Economic Policy Institute and BlueGreen Alliance (pp. 12-13).

[4] 40 CFR 141.2 defines: "Lead service line means a service made of lead which connects the water main to the building inlet and any lead pigtail, gooseneck or other fitting which is connected to such lead line."

[5] Cornwell D, Brown R, Via S (April 2016). National Survey of Lead Service Line Occurrence. American Water Works J. 108(4):E182-E191. [Available: https://www.awwa.org/publications/journal-awwa/abstract/articleid/57880483.aspx] (Accessed Feb 9, 2017).

Large-scale infrastructure investments to remediate or abate lead paint hazards in housing and replace lead service lines will produce a sharp reduction in the social costs of childhood lead poisoning. Gould estimates that the long-term savings to society of preventing lead exposures in one million housing units for children ages 6 and under (not including savings associated with lead pipe replacement) are $11–$53 billion for health care services, $30–$146 million for special education, $267 million for services associated with attention deficit–hyperactivity disorder, and $1.7 billion in direct costs associated with criminal activity, as well as $25–$35 billion additional tax revenues realized from $165–$233 billion in improved lifetime earnings achieved among this cohort as a consequence of greater employment potential.(6)

Put another way, for every dollar invested in lead hazard remediation, between $17–$221 is returned in the form of health care benefits, increased IQ, higher lifetime earnings, tax revenue, reduced spending on special education and ADHD services, and reduced criminal activity. This return is striking when compared to the benefits of vaccination against the most common childhood diseases, which saves between $5.30 and $16.50 in costs for every dollar spent on immunizations.(7)

Lead poisoning and economic stress go hand-in-hand

Income inequality has increased in many industrialized countries, but it is especially pronounced in the United States. In the first three decades after World War II, real compensation (wages and benefits) moved roughly in tandem across all sectors of the American economy. Since 1979, however, the U.S. has experienced a striking increase in income inequality (Figure 1). During this period, over 15% of national aggregate income shifted from the bottom 90% of the income distribution to the top 10%.[8]

As a consequence of income insecurity and other factors, 44% of U.S. children under age 18 now live in low-income households, defined as 200% of the federal poverty threshold; one in five children (20%) live at or below the federal poverty threshold.(9) While about 30% of white and Asian children live in low-income families, about twice that percentage (63%) of Black, American Indian and Hispanic children live in low-income families.

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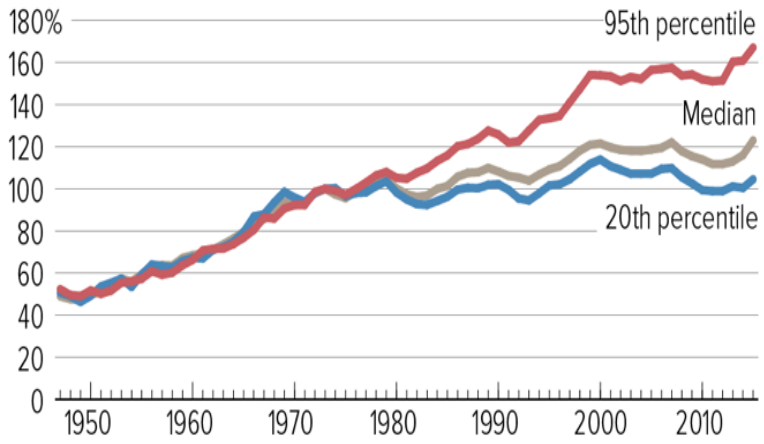
[6] Gould E (2009). Childhood Lead Poisoning: Conservative Estimates of the Social and Economic Benefits of Lead Hazard Control. *Environ Health Perspect* 117:1162–1167.

[7] Zhou F, Santoli J, Messonnier ML, Yusuf HR, Shefer A, Chu SY (2005). Economic evaluation of the 7-vaccine routine childhood immunization schedule in the United States, 2001. *Arch Pediatr Adolesc Med* 159:1136–1144.

[8] Kochan T, Riordan C (2016). Employment Relations and Growing Income Inequality: Causes and Potential Options for its Reversal. *J of Industrial Relations* 58(3): 419-440.

[9] Jiang, Ekono, Skinner (February 2016). *Basic Facts About Low Income Children. Children under 18 years, 2014*. Columbia University, Mailman School of Public Health, National Center for Children in Poverty [Available: http://www.nccp.org/publications/pub_1145.html] (Accessed Nov 15, 2016).

Figure 1. Real family income between 1946 and 2015 as a percentage of the 1973 level.[10]



In invisible ways, the profound effects of childhood lead poisoning compound the stress experienced by low-income families and the communities in which they live. Of the 28 million children six years of age or younger living in the U.S., the 2003-2006 NHANES study reported that about 6.9 million (25%) had lead in their blood at levels that would be expected to cause persistent cognitive damage (between 2 and 10 µg/dL blood).[(11)(12)(13)(14)]

NHANES reported that children living in low-income households were disproportionately more likely to have higher-than-average lead exposures. This effect was intensified among Hispanic and African American children.[(15)] In 2012, the Centers for Disease Control concluded that there is no safe blood lead level in a child's body at which there is no harm. The CDC subsequently established a new blood lead reference level of 5 µg/dL.

Lead poisoning causes learning disabilities, attention deficit disorder, speech development problems and reduced IQ, all of which contribute to a cycle of poor school performance, higher school dropout rates and decreased lifetime earnings. The long-term cognitive effects of lead

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[10] Stone, Trisi, Sherman & Horton (November 2016). *A Guide to Statistics on Historical Trends in Income Inequality.* Center on Budget and Policy Priorities [Available: http://www.cbpp.org/sites/default/files/atoms/files/11-28-11pov_1.pdf] (Accessed February 9, 2017). (p. 9)

[11] Bellinger DC (2008). Neurological and behavioral consequences of childhood lead exposure. *PLoS Med* 5:e115.

[12] Bellinger DC (2008b). Very low lead exposures and children's neurodevelopment. *Curr Opin Pediatr* 20:172–177.

[13] Binns HJ, Campbell C, Brown MJ (2007). Interpreting and managing blood lead levels of less than 10 µg/dL in children and reducing childhood exposure to lead: Recommendations of the Centers for Disease Control and Prevention Advisory Committee on Childhood Lead Poisoning Prevention. *Pediatrics* 120(5):e1285–e1298.

[14] Lanphear BP, Hornung R, Khoury J, Yolton K, Baghurst P, Bellinger DC, et al (2005). Low-level environmental lead exposure and children's intellectual function: an international pooled analysis. *Environ Health Perspect* 113:894–899.

[15] NHANES (National Health and Nutrition Examination Survey) (2003–2006). US Centers for Disease Control and Prevention National Center for Health Statistics. Hyattsville, MD:U.S. Department of Health and Human Services. [Available: http://www.cdc.gov/nchs/nhanes.htm]. (Accessed 10 October 2008).

poisoning present enormous costs to society and pose a formidable barrier to escaping poverty for millions of American families.

Creating high-quality jobs and hiring locally will benefit the families whose children are the most affected by lead poisoning.

By hiring from low-income, minority communities, infrastructure investments can also provide skills training, work experience and the possibility of economic stability for tens of thousands of American families whose children have been disproportionately affected by lead's toxic legacy. Lead remediation infrastructure jobs can provide entry and mid-level positions to many of the more than 630,000 individuals returning home from incarceration each year. By providing unemployed, underemployed and low-income residents with stable employment, these investments can help restore the health of communities and create long-term pathways out of poverty. This reduces recidivism and the need for continuing reliance on direct government financial support.

These jobs offer the greatest promise for low-income families if they include apprenticeship training, living wages, safe working conditions, opportunities for advancement, and family-friendly benefits. These so-called "high-road" jobs differ from "low-road" jobs, which typically include little to no training, poor wages and benefits, and hazardous working conditions. The costs of high-road employment are steeper for employers, but the costs of low-road employment don't just disappear: they show up as turbulence in the job market, high turnover, untrained workers, economic stress for families, higher job injury and fatality rates, and greater costs to publicly funded programs such as Medicaid, taxpayer-funded vocational schools, payments for uncompensated medical care and indigent senior support, and long-term disability payments.

Public policies, regulation and incentive programs will be needed to support high-road employment in the construction and home renovation industries, where lead abatement and lead pipe replacement work will take place.

Effective employment policies can save workers lives, lift families out of poverty, and support American companies that invest in the safety and economic security of their employees.

The U.S. construction industry employs about 8% of the national workforce (more than 11 million workers), yet it accounts for more than 20% of all traumatic on-the-job fatalities—more than in any other industry.[(16)] In 2014, just under 1,000 construction workers died on the job in the U.S., out of 4,800 total on-the-job traumatic fatalities, according to the Bureau of Labor Statistics.[(17)] For every construction worker fatality, there are about 100 on-the-job injuries in construction that require time away from work.[(18)]

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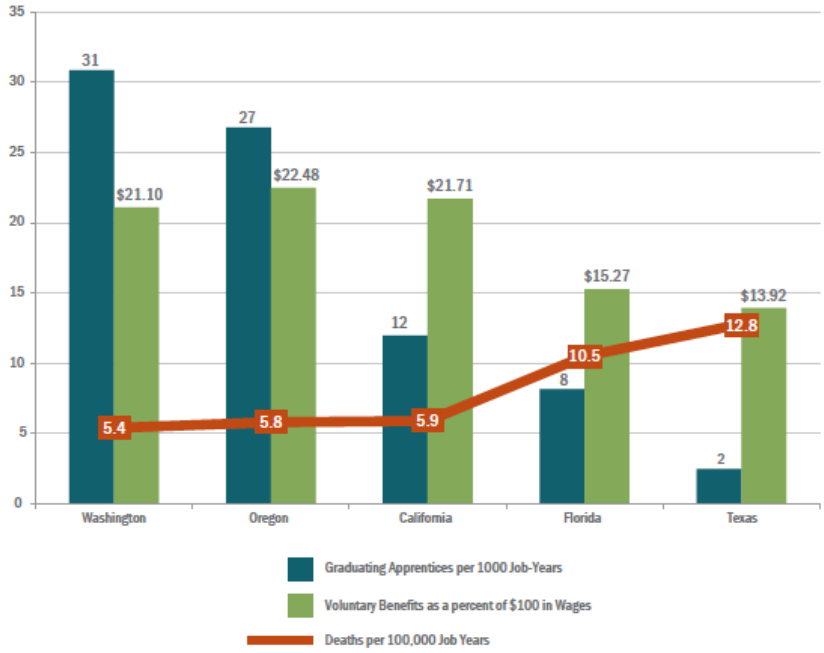
[16] Kriebel D, Jacobs M, Markkanen P, Tickner J (January 2011). *Lessons Learned: Solutions for Workplace Safety and Health.* Lowell Center for Sustainable Production. University of Massachusetts, Lowell. (p. 60).

[17] U.S. Bureau of Labor Statistics (December 16, 2016). Economic News Release. Census of Fatal Occupational Injuries Summary, 2015. [Available: https://www.bls.gov/news.release/cfoi.nr0.htm]. (Accessed Feb 9, 2017).

[18] Kriebel et al. op cit. (p. 59).

But these nationwide numbers obscure large differences in fatality rates among states, and they obscure the policy decisions that play a large role in determining those differences. During the period 2012 to 2014, for example, the Texas and California construction industries employed about the same number of workers (616,000 in TX and 634,000 in CA), but nearly twice as many construction workers died on the job in Texas (326) as in California (166) (Figure 2).[19]

Figure 2. Voluntary benefits, apprenticeship training, and construction industry fatality rates, 2012.[20]



These differences reflect public policies and laws in each state that protect—or fail to protect—the safety and health of workers in the construction industry. The most successful policies are worth replicating at the national level as the nation considers investing in large-scale infrastructure projects.

In the area of training, for example, in 2012, Texas invested $54 million in construction apprenticeship programs, compared to $300 million in California, for a workforce of comparable size.[21] There is considerable evidence demonstrating that effective training contributes to a lower risk of injury or death on the job. More broadly, California's project labor agreements, higher rates of unionization and long-standing Interagency Labor Enforcement Task Force (made up of nine state

[19] US Bureau of Labor Statistics, Injuries, Illnesses and Fatalities, State Occupational Injuries, Illnesses and Fatalities, Census of Fatal Occupational Injuries, California and Texas, 2012 to 2014. [Available: http://www.bls.gov/iif/state_archive.htm#TX]. (Accessed Feb 9, 2017).

[20] Jones B, Philip P, Zabin C (July 2016). *The Link Between Good Jobs and a Low Carbon Future: Evidence from California's Renewables Portfolio Standard, 2002—2015*. Donald Vial Center On Employment In The Green Economy, Center for Labor Research and Education, University of California, Berkeley. (p. 18).

[21] Jones B, et al. op cit. (p. 18).

agencies that enforce worker safety and labor laws) help prevent the kinds of problems that are occurring in the Texas construction industry.

The high rate of construction worker fatalities in Texas is one outcome of a more generalized "low-road" construction employment strategy in that state, where many contractors underpay workers, deny health and pension benefits, and make under-the-table cash payments. While low-road employers also operate in certain sectors of the California construction industry, the scale of low-road employment in Texas is striking. A 2015 study of the Texas construction industry, for example, estimated $7 billion in unreported wages annually and found that 50% of construction workers reported being denied overtime pay for overtime work. 70% reported receiving no health benefits, pension, or other benefits.[(22)]

Conversely, California has demonstrated that public policies can steer entire industry sectors toward high-road employment, with multiple benefits for workers, their families, taxpayers, the economy, and the industry itself. Between 2000 and 2014, California's renewable energy sector created 10,200 construction jobs during the expansion of the state's solar-based, utility-scale electrical generating facilities. As a consequence of public policy decisions, these jobs pay $78,000 on average per year and offer full health and pension benefits. Another 1,600 jobs were created in response to new business activities associated with these projects.

These newly created construction, maintenance, and business-related jobs boosted consumer spending, which in turn created more than 3,700 additional jobs across the economy. In total, more than 15,000 new jobs were created by the renewable energy construction sector in California during this period.[(23)]

In addition to protecting the safety and economic security of construction workers, California has funded its Labor Enforcement Task Force in part because the state loses between $8 and $28 billion in tax revenues from businesses operating off the books and shielding themselves from income, insurance, and sales taxes.[24] This increases the burden on taxpayers to provide public services, and it makes it difficult for law-abiding businesses to compete against those that have gained an unfair advantage by evading employment responsibilities.

Public policies to support high-road employment should be considered in creating the jobs that will be needed to remediate lead hazards and remove lead pipes.

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[22] Jone B et al. op cit. (p. 17).

[23] Jones B, et al. op cit.

[24] State of California, Department of Industrial Relations, Labor Enforcement Task Force. [Available: https://www.dir.ca.gov/LETF/LETF.html] (Accessed Feb 9, 2017).

A 'Severe Violator' of OSHA Regulations Retains State License, Kills Two Workers.[25]

In November 2016, two employees of the Boston-based Atlantic Drain Company, Kevin Mattocks and Robert Higgins, were working inside a 12' deep, 20' long trench on Dartmouth Street.

Kevin Mattocks was 53 and had worked for 18 years at Atlantic Drain and held down two other jobs that he relied on to support his three daughters. Robert Higgins was 47 and had recently started working for Atlantic after having been laid off from his 12-year job as a machine operator at a Boston chemical plant.

For reasons that are still unclear, the water main broke open while Mattocks and Higgins and two other workers were inside the trench.

The break created a powerful eruption of water into the trench that caused dirt and gravel to cascade off the sides to the bottom, where it may have buried the men's boots and lower legs, preventing them from escaping. The two other workers were able to scramble out of the trench before the mud and gravel came down.

Kevin and Robert disappeared under 12' of water almost instantly, according to co-workers, who tried to rescue them as the water filled the trench and spilled over the top onto the street. When they finally were able to shut the line down, it took Boston firefighters hours working on their hands and knees to recover their bodies.

As described by the Boston Globe, the Atlantic Drain Company was designated a "severe violator" by federal OSHA, but it continued to operate as a contractor in the City of Boston. According to OSHA, Atlantic Drain was one of only 12 "severe violators" of workplace safety in the Commonwealth of Massachusetts. This classification is reserved for "recalcitrant employers that endanger workers by committing willful, repeat, or failure-to-abate violations," according to OSHA.

OSHA had cited Atlantic Drain for three different trench safety violations before this incident, the most telling being a citation in 2012 where "an employee was exposed to cave-in hazards while working in a 9-foot-deep trench that had straight-cut walls with no cave-in protection." OSHA termed the violation "willful" or deliberate. It was one of four violations that year that led to $72,000 in fines.

Atlantic Drain not only accumulated about $100,000 in OSHA fines over the past few years, but it also had avoided paying them, a practice that is not unusual.

Despite the history of willful OSHA violations and unpaid fines, all of which were publicly reported on OSHA's website, the City of Boston continued to issue permits to the company to conduct trench work throughout the city, and the company's owner continued to hold a construction supervisor license issued by the Commonwealth of Massachusetts.

[25] Ramos N, Lazar K. New questions about company involved in fatal trench collapse (October 29, 2016). *The Boston Globe.*

Purchasing materials from American manufacturers will further support families and communities.

Community health is further improved when infrastructure investments encourage or require that products be purchased from domestic manufacturers whenever possible, and that those products are manufactured using safer materials and chemicals. This has its own multiplier effect, because American manufacturing jobs tend to come with decent wages and benefits: manufacturing workers earn just over $26 an hour, for example, and 92% have access to employer-sponsored health care plans, compared to 79% of U.S. workers overall.[26]

The great majority of the 252,000 manufacturing companies in the U.S. employ fewer than 20 workers; only 3,700 (1.5%) employ more than 500 employees.[27] All of these companies—along with their employees and communities—would benefit from the production increases that would occur if domestic purchasing is included as part of infrastructure investments to remediate household lead hazards and replace lead service lines.

Policy Recommendations

Create high-road jobs.

- Congress should enact infrastructure policies that support the creation of high-road jobs, with apprenticeship training, family-friendly wages and benefits, provisions to ensure on-the-job safety, and opportunities for advancement. This should include language requiring that contractors pay wages at the rates prevailing in the communities where they work, consistent with the Davis–Bacon Act of 1931. [C; First 100 Days]

- These policies should include provisions to encourage participation by contractors who have demonstrated a commitment to high-road employment and effective worker safety and health programs. Contractors who have repeatedly violated OSHA or other Department of Labor (DOL) regulatory requirements should be prohibited from participating. [C; First 100 Days]

Support a range of training opportunities.

- Skills Training: Congress should provide funding to support training in the building and construction trades that support basic lead hazard abatement and lead service line replacement work. While it is relatively straightforward to provide training to tradespersons on working safely around lead, many localities lack plumbers and carpenters with the skills necessary to perform the underlying tasks that are part of lead abatement work. Funding should be provided to trade union apprenticeship programs, vocational schools, and community colleges, including those in small and mid-size cities, to carry out this training.

[26] Schwartz, Nelson. The Power of Small Factories. Plants with dozens, not hundreds, of workers are making a dent in poverty (Oct 30, 2016). *The New York Times.*

[27] Schwartz, Nelson. Small Factories Emerge as a Weapon in the Fight Against Poverty (Oct 28, 2016). *The New York Times.*

Apprenticeship programs, in addition to skills training, are particularly important in overcoming the unique employment barriers faced by reentry individuals. [C; First Term]

- Professional training: Congress should provide funding to support training for lead professionals, such as lead hazard risk assessors, planners, supervisors, trainers and others. The Department of Labor training programs, including those in individual states, should coordinate with EPA and its delegated states to ensure a sufficient supply of lead hazard professionals. [B; First 100 Days]

- Basic training: Congress should provide funding to support low-to no cost training in lead safe work practices, as required under EPA's Renovation, Repair, and Painting (RRP) rule, and it should amend Title X to eliminate the requirement that EPA set licensure and certification fees to cover the cost of administering these programs. Under the current requirement, small contractors and individuals often find the cost of licensure or certification to be a barrier to entry; these trainees should be exempted from the fees set by EPA. EPA should use its grant guidelines to encourage delegated state programs to likewise reduce or eliminate certification and licensure fees for trainees. [C; First 100 Days]

Support local hiring.

- HUD should ensure compliance with Section 3 requirements for low-income employment opportunities in the lead grants it funds, and Congress should expand requirements to ensure opportunities for minority and female hiring in future lead grant funding awards. Technical support, increased allocation of funds to training, and additional monitoring is needed. [B; First 100 Days]

Support American manufacturers.

- Congress should require HUD and EPA to develop and enforce purchasing specifications for products that are permissible for use by contractors who perform lead service line replacements and who conduct lead hazard reduction work. The specifications should favor domestically manufactured products to the greatest extent practical and should include provisions to support the manufacture of products that are safer for workers and residents. (B, First 100 Days)

Support state monitoring and enforcement.

- Congress should appropriate funds for use by HHS, EPA, and HUD to provide expanded training and hiring for state and local government staff to implement lead elimination plans and conduct public health data analysis, code enforcement, program management, interagency program coordination and other functions. [C; First Term]

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