



SPECIAL POLICY BRIEF:

Recommendations to Prevent and Mitigate the Effects of Lead Poisoning

In August 2017, the Health Impact Project, a collaboration between the Robert Wood Johnson Foundation and Pew Charitable Trusts released a seminal report: *Ten Policies to Prevent and Respond to Childhood Lead Exposure*. The Trust for America's Health, National Center for Healthy Housing, Urban Institute, Altarum Institute, Child Trends and many researchers and partners contributed to the report.

The report notes that, in 2016, about 500,000 children ages 1 to 5 years had dangerously elevated blood lead levels.¹ And, while every child can be at risk and no level of lead in blood is safe,² low-income and minority populations are more likely to live in older homes with lead paint, contaminated soil and lead pipes that leach into the drinking water.³

Lead poisoning is devastating for children and can lead to lifelong problems, including decreased IQs and poor academic performance, memory and executive function. Even at very low levels, lead exposure affects impulse control and the ability to grasp information, making children more likely to struggle in school, drop out, get into trouble with the law and, later, underperform at work.⁴

Much can be gained from preventing lead poisoning, mitigating the effects and addressing disparities, but state and federal efforts have been largely fragmented and underfunded. By focusing on addressing sources of lead affecting children and supporting interventions to help children overcome developmental obstacles, quality of life for children and families across the nation will be improved and society will save billions of taxpayer dollars.⁵

The report found that billions in public spending could be saved, while markedly improving the lives of children, families and communities, by preventing and mitigating the effects of lead poisoning, notably:

- Removing lead drinking water pipes would protect more than 350,000 children and result in \$2.7 billion in future benefits.
- Eradicating lead paint hazards from homes of children in low-income families would protect more than 311,000 children and provide \$3.5 billion in future benefits.
- Increasing enforcement of the Environmental Protection Agency’s (EPA) Renovation, Repair and Painting (RRP) rule would protect 211,000 children in 2018 alone and provide \$4.5 billion in future benefits.
- Curtailing lead emissions from airplane fuel would generate \$262 million in future benefits. In 2018, 226,000 children will be born and live near airports.
- Providing the roughly 1.8 million children with a history of lead exposure with targeted, evidence-based interventions could increase their lifetime family incomes by more than \$100,000.

If the nation prevented every child born in 2018 from lead exposure,

the nation could save \$84 billion, not including any costs to achieve total prevention.* This figure includes nearly \$18.5 billion for the federal government and more than \$9.6 billion for states in the form of increased revenue associated with higher lifetime earnings and savings to the healthcare, education and criminal justice systems.⁶

To accomplish these goals, the report offered 10 recommendations:

1. Reduce lead in drinking water in homes built before 1986 and in other places children frequent after 1986;
2. Remove lead paint hazards from older, low-income housing built before 1960 and other places children spend time;

3. Increase enforcement of EPA’s Renovation, Repair and Painting rule;
4. Reduce lead in food and consumer products;
5. Reduce air lead emissions;
6. Clean up contaminated soil;
7. Improve blood lead testing among children at high-risk of exposure and find and remediate the sources of their exposure;
8. Ensure access to developmental and neuropsychological assessments and appropriate high-quality programs for lead-exposed children;
9. Improve public access to local data; and
10. Fill gaps in research to better target state and local prevention and response efforts.⁷

Keeping Blood Lead Levels of Children Born in 2018 at Zero Would Generate \$84 Billion in Benefits Future Savings and Increased Earnings by Source and Recipient	
Benefit	Value (in billions)
Increased lifetime earnings for entire 2018 cohort	\$77.2
Health savings	\$1.7
Education savings	\$1.9
Quality-adjusted life years benefit	\$3.1
Total future benefits	\$84.0
Share to the federal government	\$18.5
Share to state and local governments	\$9.6
Share to households, private sector and other non-governmental entities	\$55.9

* Cost data are not available for all the interventions that contribute to total prevention of lead poisoning. However, cost-benefit ratios are provided in the report for several strategies, including lead water line replacement, lead paint eradication, and lead-safe renovation and repair practices.

1. Reduce lead in drinking water in homes built before 1986 and in other places children frequent.

Removing lead drinking water pipes would protect more than 350,000 children and yield \$2.7 billion in future benefits, or about \$1.33 per dollar invested.¹⁰

EPA, states and localities could implement a range of improvements to reduce lead in drinking water and provide consumers with more timely and complete information about risks.

As such, EPA, U.S. Department of Housing and Urban Development (HUD) and other federal agencies should support local jurisdictions in removing lead service lines (LSL) that provide drinking water—it is the only approach that could permanently and reliably reduce a major source of exposure for children. Corrosion control is also an important component of prevention since leaded plumbing fixtures remain.

By 2019, EPA and states should require water utilities to submit plans to identify and replace all LSLs, including specific efforts by utilities to reduce the financial burden on low-income customers. In addition:

- State or local governments should require all properties to be inspected for drinking water lead risks before sale or lease;
- The EPA and U.S. Department of HUD should coordinate funding to

address lead in low-income housing so it includes the replacement of LSLs and plumbing as well as the removal of lead paint hazards; and

- Municipalities should require developers to replace LSLs during residential property development.

And at schools and child-care facilities:

- The U.S. Department of Agriculture (USDA) should partner with school districts and state child-care agencies to leverage requirements of the federal National School Lunch Program and the Child and Adult Care Food Program (CACFP) to ensure children are provided with safe drinking water;
- EPA and states should provide funding to schools and child-care operators to support lead hazard identification and mitigation;
- The USDA should use administrative reviews to ensure that schools and providers are in compliance with water safety standards; and
- At the state level, schools and licensed child-care facilities should be required to test for lead in drinking water and publicly release the results.



The Lansing Board of Water and Light (BWL) has

developed a faster, more efficient method for replacing lead pipes. What had been a nearly eight-hour, \$9,000 job requiring a trench to be dug from the main to the foundation of the house, was streamlined to four hours and \$3,600. Now, rather than trenching, BWL digs a hole in the street and another at the shut-off valve and pulls a new pipe in behind the old one. Where possible, the program has followed planned street, sewer and other infrastructure projects to minimize street closures and reduce reconstruction costs. Over 12 years, the BWL replaced 12,150 LSLs at a cost of \$44.5 million. And, water quality reports indicate a decrease in lead levels in water, with nine out of 10 homes experiencing significant decreases.⁸ BWL prioritized lines serving schools and licensed day-care centers, areas where testing showed that children had high blood lead levels, households with pregnant women or children under 6, and other places with large concentrations of LSLs.⁹

2. Remove lead paint hazards from older, low-income housing built before 1960 and other places children spend time.



Massachusetts' lead law requires that any property built

before 1978 and occupied by a child under 6 be "delead" by removing or covering lead paint hazards.¹¹ To help homeowners pay for abating lead hazards, including replacement of windows, Massachusetts offers income tax credits of \$500 to \$1,500, depending on a property's needs, and administers a series of loan programs to support compliance with the law.¹² Massachusetts also imposes surcharges on the annual fees of certain professional licenses, including real estate brokers, property and casualty insurance agents, mortgage brokers and lenders, small loan agencies and individuals who perform lead inspections. The collected revenue is deposited into the Lead Paint Education and Training Trust Account for use by the state's Department of Public Health. In 2015, testing found that 591 Massachusetts children younger than 6 had elevated blood lead levels, compared with 3,095 in 2001.¹³

Over the past few decades, research has shown a stark racial divide in the occurrence of lead poisoning. For example, a study of children in Rochester, New York, found that Black children were at higher risk of elevated blood lead levels than their peers of other races.¹⁴

Low-income and minority communities face a disproportionate risk of lead exposure from old housing and water infrastructure and a lack of funds to perform maintenance on their homes. And, children living in poverty have significantly higher average blood lead levels than their more affluent counterparts, with Black children's levels well above their peers.¹⁵

By eradicating lead paint hazards from the homes of children in low-income families, the nation would receive \$3.5 billion in future benefits, protect more than 311,000 children and generate \$1.39 for every \$1 invested.¹⁶

To address these disparities, HUD, EPA and the Centers for Disease Control and Prevention (CDC) should work with states and local governments to increase funding and enforcement

actions to replace windows coated with lead paint, fix peeling lead paint, clean up contaminated dust and treat toxic soil outside homes built before 1960 where children from low-income households live.

In addition:

- States or localities should require housing inspections at regular intervals and remediation of lead paint hazards, including peeling or chipped paint and contaminated soil and dust, before a home is sold, rented or financed;
- State and local laws should mandate inspections of all apartments in buildings where one unit is found with hazards;
- Lead paint hazard control should be made financially accessible by offering low-interest loans, tax credits and other incentives to support property owners; and
- State Medicaid agencies should pay for state and local health department testing of homes in high-risk neighborhoods.



Research shows that laws requiring inspection and remediation paired with enforcement actions can prevent lead exposure. A study found that Massachusetts and Ohio, which mandate inspection and treatment, were 79 percent less likely than Mississippi, which lacks such a requirement, to have properties that continually contribute to high lead levels in children.¹⁷

3. Increase enforcement of EPA’s Renovation, Repair and Painting rule.

The RRP rule requires contractors to control the amount of lead dust and debris created during renovation, repair and painting activities.

If the RRP were fully enforced, 211,000 children would be protected from lead poisoning in 2018 alone and the nation would reap \$4.5 billion in future benefits or about \$3.10 per dollar spent.¹⁸

EPA—which has the power to regulate more than 4 million renovation jobs each year—should work with states and local agencies to ensure compliance with its rule.¹⁹

To ensure the millions of renovation, repair and painting projects that occur each year are done safely, EPA should:


- Create and implement a strategy for ensuring full compliance with the RRP rule and focus on older homes with children and child-care facilities;
- Provide state and local agencies with funding to support compliance with the rule and help educate businesses and consumers about the hazards of unsafe renovation; and
- EPA should require that contractors perform dust testing after completing work to ensure that the home is safe.

Local governments should require proof that a contractor has lead-remediation training before issuing a permit for work that is likely to disturb paint in housing built before 1978.


And, to protect workers, the Occupational Safety and Health Administration should enhance protections for workers and their children by updating standards for lead exposure to reduce on-the-job risks and the chance that hazards might move from the jobsite to workers’ homes.

Rigorous enforcement of safe renovation practices would:

- Protect 211,000 children from lead exposure.
- Prevent increases in blood lead levels.
- Provide positive net benefits of approximately \$4.5 billion.
- Return \$3.10 for every dollar invested.



In the **District of Columbia**, where about 75 percent of housing was built before 1978, contractors seeking renovation permits must show proof of EPA-required training.²¹ Providence and Pawtucket, **Rhode Island**, will not issue permits for construction work at homes and child-care facilities without proper certification.²²



To identify potentially unsafe renovations in **New York City**, health department inspectors who observe uncontained paint dust or debris must take samples and stop the work. Owners or contractors must then post a “conspicuous” sign with a phone number to access additional information, including inspection results, until they are cleaned up and re-inspected to confirm that the source of potential lead exposure has been addressed.²⁰

The return for every \$1 invested in safe renovation practices enforcement is \$3.10



“Companies need to stop making toys with lead.”

– Health Impact Project Focus Group Participant, Baltimore, Maryland.

Removing lead from commercially available products would greatly benefit children. Because products containing lead are often available at smaller stores serving low-income populations at increased risk of exposure, this action could help address disparities in lead poisoning.

Removing lead from food, **especially toddler food items**, would help decrease exposure.²³

4. Reduce lead in food and consumer products.

Surprisingly, many food products contain lead, including some marketed for the nation’s youngest.²⁴

To ensure babies and toddlers eat the safest food possible, the federal government should lower limits for lead in foods, particularly those that young children and babies are likely to consume.

And, federal, state and local governments should use local

surveillance data to identify areas where children are being exposed to lead from sources such as candy, health remedies or cosmetics. In these identified areas, state and local agencies should improve education and outreach to at-risk families; reach out to physicians; and increase investigation and enforcement of small retailers, who are more likely to sell goods that have lead in them.



A 1986 **California** state law, Proposition 65, requires manufacturers, retailers, and other businesses to notify consumers when they are being exposed to toxic chemicals, including lead. More recently, the state has enacted additional policies

- The 2006 Lead-Containing Jewelry Law requires jewelry and components, such as dyes and crystal that are sold, shipped, or manufactured for sale in California to meet limits set by the state under a 2004 consent judgment that applied to a number of manufacturers, retailers and distributors.²⁵
- A 2010 law restricted the use of heavy metals including lead in motor vehicle brake pads to no more than 0.1 percent by weight. In January 2015, brake manufacturers agreed that all brake pads sold in the United States will meet California standards.²⁶
- The 2003 Toxics in Packaging Prevention Act, which limited harmful substances in packaging, originally exempted lead in paint or applied ceramic decoration on glass bottles, but a 2008 amendment banned such uses in excess of 600 ppm.²⁷
- To protect wildlife, a 2013 law required that only lead-free ammunition be used for hunting with a firearm.²⁸



5. Reduce air lead emissions.

Aviation gas used by piston-engine aircraft (PEAs) is the nation's largest source of lead emissions into the air, at about 450 tons a year.²⁹

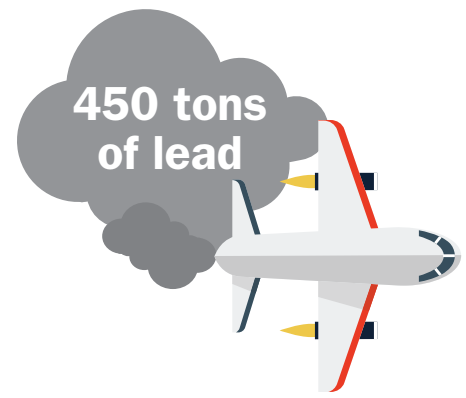
Recently, EPA found that about half of emissions remain in the vicinity of the airport—with approximately 16 million people living near airports and 3 million children attending school near an airport.³⁰

If the nation lowered lead emissions from aviation fuel, 226,000 children would be protected in 2018 alone and the nation would generate \$262 million in future benefits.³¹

Several policy interventions are available that could address air emissions, notably:

- State and local governments should impose a fee on airports serving PEAs that rely on leaded gas to finance the cleanup of soil in surrounding residential neighborhoods, parks and schools;
 - EPA could help to expedite the elimination of lead in aviation fuel by using its authority under the Clean Air Act to issue an “endangerment finding,” indicating that leaded aircraft fuel emissions are polluting and harmful to public health, which would then require the FAA to adopt regulations;
 - EPA should implement the Children’s Health Protection Advisory Committee’s recommendation to reduce the National Ambient Air Quality Standard for lead to 0.02 µg/m³.
- The Federal Aviation Administration (FAA) should expedite efforts to find suitable alternatives to leaded fuel and eliminate its use;

Amount of lead emissions generated by piston engine aircraft per year



6. Clean up contaminated soil.

Children, who play in parks and around homes, even at schools and child-care facilities, come into contact with lead through soil. If there are elevated levels of lead in the soil, children can ingest it directly or track it into their homes.

- EPA and other federal agencies should collaborate with each other and businesses to remediate dangerous conditions in neighborhoods, and near factories and facilities that extract lead from batteries and other electronics.
- To ensure children are safe, EPA and states should do further investigations in neighborhoods near current and former lead smelter sites and other industrial and hazardous waste facilities. The findings should be shared with the community in a culturally competent manner and in partnership with organizations trusted by local communities.
- Congress should restore EPA’s authority to tax crude oil, imported petroleum products and hazardous chemicals to provide additional resources for Superfund cleanup. At the local level, state agencies must develop and fund a coordinated cleanup effort for contaminated neighborhoods.
- In addition, EPA and HUD should coordinate Superfund efforts and lead hazard control activities so that when a residence is treated for contaminated soil, the inside of homes are also made lead-safe.



A lead-acid battery recycling plant in Boyle Heights, **California**, purchased by Exide Technologies in 2000, ran seven days a week, processing 25,000 batteries a day and emitting lead, arsenic and other cancer-causing pollutants.³² In 2014, EPA found that Exide had violated the Clean Air Act emissions standards more than 30 times and was subject to fines of up to \$37,500 a day per violation, resulting in the plant’s second temporary closure.³³ Under criminal investigation, Exide agreed to avoid prosecution in exchange for permanent closure and \$50 million to tear it down and clean the site, including \$9 million for removing lead from nearby homes.³⁴ In April 2016, California appropriated an additional \$177 million to cleanup about a 2-mile radius surrounding the plant and plans to seek reimbursement from Exide.³⁵

7. Improve blood lead testing among children at high-risk of exposure and find and remediate the sources of their exposure.

Just 41 percent of Medicaid-enrolled 1- and 2-year-olds are tested for blood lead levels, despite a federal requirement that 100 percent be tested.³⁶

Prevention is the most critical approach to protecting children from lead exposure. Yet, finding children who have already been exposed so that they can receive appropriate academic, behavioral and other interventions is also important. Currently, many children go without being tested for lead, including children enrolled in Medicaid where such tests are required.

Federal and state health agencies should work with parents of lead-poisoned children, providers, Medicaid and the Children's Health Insurance Program to remove barriers to blood lead testing and reporting.

To further improve testing and interventions:

- CDC should collaborate with the American Academy of Pediatrics and other professional organizations to determine the factors that contribute to the persistent lack of appropriate testing of high-risk children;
- The U.S. Department of Health and Human Services (HHS) and CDC should provide funding to upgrade and improve blood lead surveillance at the state and local levels to ensure health agencies have the necessary resources to provide follow-up care;
- The Centers for Medicare and Medicaid Services (CMS) should work with state Medicaid agencies to increase the number of states that include blood lead testing of Medicaid-enrolled children as a Healthcare Effectiveness Data and Information Set (HEDIS)—which elevates the performance of more than 90 percent of America's health plans—measure;
- The USDA should develop mechanisms to reimburse blood lead testing conducted at Supplemental Nutrition Assistance Program (SNAP) sites in concert with hemoglobin testing;
- State and local health departments should offer blood lead testing at clinics and schools and through mobile health units to improve access for at-risk families; and
- State Medicaid agencies should only allow healthcare providers to receive an increased reimbursement rate for Early and Periodic Screening, Diagnostic and Treatment services if required blood lead testing is also conducted.



Under **Connecticut's** Child Find program, the State Department of Education collaborates with local school districts and the Connecticut Parent Advocacy Center to identify children with a history of lead exposure or elevated blood lead

levels and notify the parent, refer the family to medical providers and housing assistance, and obtain a health history.³⁷ The school team then creates a monitoring plan with an annual review and determines IDEA eligibility, conducts an evaluation, develops an individualized education

program, and places the child in an age-appropriate enrichment program. If the child is not eligible under IDEA, the team investigates eligibility under Section 504 of the Rehabilitation Act of 1973 and completes related evaluations as appropriate.³⁸

8. Ensure access to developmental and neuropsychological assessments and appropriate high-quality programs for lead-exposed children.

The Administration for Children and Families provides grants to states and communities through the Head Start/Early Head Start program to deliver high-quality early learning opportunities to low-income infants, toddlers and young children. Given the federal support and focus on addressing disparities, Head Start could be a valuable way to reach children who have been exposed to lead.

While prevention is the best way to address childhood lead exposure over the long-term, for those already exposed, the nation must do a better job of mitigating the effects of poisoning.

Among the many adverse consequences of lead poisoning, research shows that exposure has particularly detrimental effects on executive functioning skills (memory, mental flexibility and self-control).³⁹ Hampered development—at such an important age—can lead to delinquency, criminal behavior, substance misuse and teen pregnancy.⁴⁰

Research, while not specifically done on lead poisoned children, shows that targeted interventions during development can yield significant benefits that could possibly mitigate some of the issues lead poisoned children suffer.⁴⁴ And, by **providing the roughly 1.8 million children with a history of lead exposure with targeted, evidence-based interventions, the nation could increase their lifetime family incomes by more than \$100,000.**⁴⁵

To reap these rewards and improve the lives of millions of children, the report recommends:

- HHS, the U.S. Department of Education and state health and education agencies should improve access to high-quality early and middle childhood education programs for children with a history of lead exposure;
- CMS should provide adequate reimbursement for comprehensive follow-up services for children affected by lead, including lead hazard remediation and developmental and neuropsychological assessments;

- USDA should increase funding for programs such as Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and SNAP to expand their ability to improve children’s nutrition and provide supplemental benefits for participants to purchase bottled water where their water is not safe;
- State education agencies, through Child Find programs, should collaborate with local health departments to identify children with a history of lead exposure or high blood lead levels to ensure they receive needed supports and services;
- States should modify IDEA Part B programs to help local education agencies identify and provide interventions and accommodations for children affected by lead; and
- State education agencies should modify their IDEA Part C programs so neurocognitive and developmental deficits of lead exposure qualify for services and should presume that children with a history of lead exposure are eligible for services.

Nurse-Family Partnership (NFP) connects young, low-income, first-time expectant mothers with a public health nurse, who meets with the woman in her home, starting during pregnancy and continuing until the baby turns 2. The model has been shown to have a 54 percent return to the federal government on its investment, lower enrollment

in Medicaid, a 9 percent reduction in Medicaid costs, a decrease in emergency room visits for poisonings, and fewer behavior and intellectual problems among children. A 2012 study found long-term benefits of the program of almost \$23,000 per participant.⁴¹ At age 12, children who had received nurse visits in early childhood out-performed

their counterparts on standardized reading and math tests and were 70 percent less likely than children who did not participate to have used harmful substances, including cigarettes and alcohol.⁴² By age 15, participating children were half as likely to have behavioral problems and had half as many arrests as those without visits.⁴³



New York City's

Environment and
Health Data Portal

collects local data to provide community leaders and others with important public health statistics to help track progress in meeting health metrics. Through the portal, anyone can create reports, tables, charts and maps of water and other lead-related public health issues.

9. Improve public access to local data.

Data—by identifying high-risk locations, assessing testing rates, evaluating the impact of remediation efforts and detecting housing units responsible for multiple exposures over time—are vital to preventing and responding to childhood lead exposure.

However, the nation has long made inadequate and inconsistent investments in building and supporting state and local technology and capacity for collecting, analyzing and sharing data.

And, no single agency currently compiles data on national blood lead levels and information about sources of exposure such as air, water and housing into a single database.

Federal, state and local authorities must work together to compile and make available lead-risk data.

At the federal level, CDC should:

- Work with community organizations, local health agencies and private

philanthropy to collect census-tract-level data on blood lead level results; the presence of leaded drinking water pipes; and lead in water, dust, paint and soil of homes, schools, child-care facilities and other places children spend time; and

- Use data to produce culturally competent and accessible community reports on sources of lead and prevalence rates that are broadly disseminated to healthcare providers, school administrators and child-care operators.

Additionally, states should:

- Require laboratories to submit all blood lead test results to state health departments so the information can be aggregated;
- Report blood lead surveillance data to CDC; and
- Work with local health agencies and municipalities to make property- and neighborhood-specific information on lead easily available to the public.

10. Fill gaps in research to better target state and local prevention and response efforts.



Data play an important role in the nation's ability to prevent and respond to childhood lead exposure. Yet, for decades, the nation has made insufficient investments in technology and capacity to track lead poisoning.

To improve knowledge of lead poisoning and enable interventions at the earliest possible stages:

- EPA should develop and validate a standardized method for sampling water for homes, schools and child-care facilities that can be implemented in the field by environmental health professionals;

- The federal government should support a national survey of children's blood lead levels and sources of environmental exposure;

- HUD should work with EPA to design and implement a study of water from a representative sample of housing to estimate how much lead is getting into water systems; and

- Federal, state and local agencies and philanthropy should conduct small-area population-based studies to identify relative risks among communities compared to the general population.

Conclusion

Childhood lead poisoning is preventable, and by implementing the 10 recommendations in this report, the health and well-being of millions of children would improve while generating billions of dollars in benefits for families, communities and society.

Yet, at the same time, crises in Flint, East Chicago, and other communities across the country demonstrate the need for continued attention and action to prevent children from the harmful effects of lead.

Eliminating lead from drinking water, paint in older housing, dust from unsafe renovations, industrial and environmental sources, food and everyday products and places where children learn and play is incredibly important for the future health and wealth of the nation—and could yield \$84 billion in long-term benefits per birth cohort. In the absence of lead, the nation’s children will do better in school and be less likely to become teen parents or convicted of crimes.⁴⁶

While prevention is key for the future, we must also help those children already exposed. Giving these children the best

opportunity for success begins with ensuring that clinicians follow blood lead testing guidelines and that local and state health agencies eliminate further exposures. The nation must also link children with evidence-based, high-quality childhood interventions that have been found to reduce skill deficits and behavioral issues.

By focusing on addressing sources of lead affecting children and supporting interventions to help lead-exposed children overcome the obstacles they face, federal, state and local governments along with business and philanthropic leaders can save billions of taxpayer dollars, develop a stronger pool of employees, generate thousands of jobs and improve the quality of life for children and families across the nation.



Endnotes

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