A Science-based Public Health Approach for Continued Progress in Reducing Lead Exposure

Reduction in lead exposure ranks as one of the ten great public health achievements in recent history.[1] Over the past 50 years, actions by EPA and other federal and state regulators have eliminated or drastically reduced the use of lead in gasoline, paint, plumbing pipes, food cans, and a variety of other products. More recently, EPA has cleaned up lead-contaminated waste sites and established standards for dealing with lead-based paint that was used in the previous century. In addition, the public health and medical communities have worked together to increase awareness, identify populations at risk, screen young children for lead poisoning, and provide blood lead testing for communities. As a result, blood lead levels have declined by more than 90 percent since the mid-1970s (see Figure).

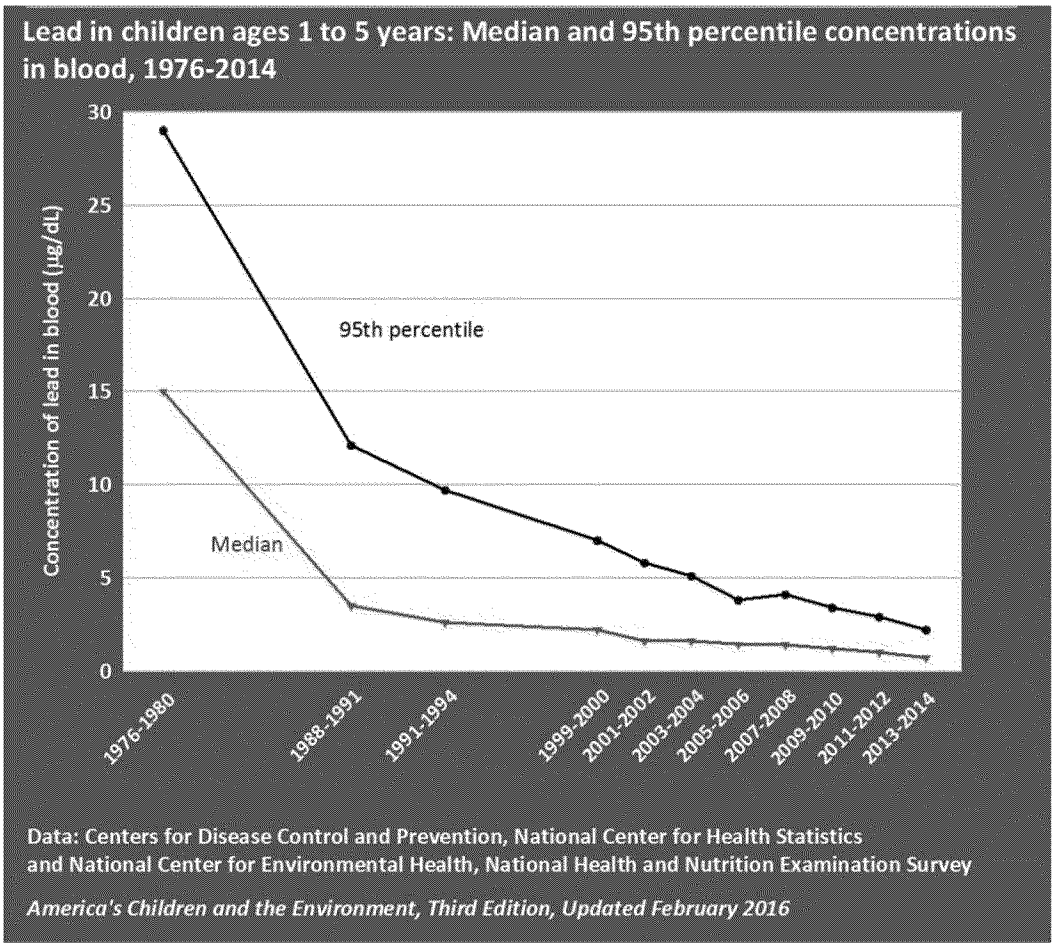

Figure. Lead in children ages 1 to 5 years: Median and 95th percentile concentrations in blood, 1976-2014.

As our understanding of the biological effects of lead exposure has improved, we now have scientific evidence indicating that even small amounts of lead can be harmful to a child's developing brain, resulting in detrimental effects on intelligence and behavior. Lead exposure is also associated with a variety of other harmful effects for both children and adults, including neurological, cardiovascular, kidney, developmental, and reproductive outcomes.

[1]http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6019a5.htm

While blood lead levels have declined dramatically in the U.S. over the past several decades, some populations continue to experience high levels of lead exposure. Thus, it remains a public health priority to continue reducing lead exposure, especially in highly-exposed communities. Current lead exposures are particularly challenging to address because most are a legacy of the past use of lead. Achieving continued meaningful reductions in lead exposure requires a long-term concerted effort that addresses all current and historic sources – including lead-based paint in older homes, aviation fuel, contaminated soil and house dust, and drinking water pipes. EPA is committed to continue to take action as needed to reduce lead in air, paint, soil, dust, and drinking water while we – along with other federal, state and local agencies –work towards reducing lead exposure sources for everyone in the future.

EPA's current tools for reducing children's exposure to lead are divided among many statutory authorities and programs. EPA's major regulations for lead exposure reduction include:

- Lead in air: The National Ambient Air Quality Standards (NAAQS) for Lead set a maximum level of lead in ambient (outdoor) air. In 2008, the NAAQS were reduced by a factor of ten to a 0.15 micrograms per cubic meter three-month average of lead in total suspended particles.
    - Clean Air Act Section 231 provides EPA with the authority to regulate lead emissions from piston-engine aircraft if EPA finds their use of leaded aviation gasoline – the last leaded fuel in widespread use and the largest source of lead emissions to air – causes or contributes to air pollution that may reasonably be anticipated to endanger public health or welfare. EPA is currently planning to issue a proposed determination on this question of endangerment in 2017.

- Lead in drinking water: The 1991 Lead and Copper Rule set a goal of zero lead concentration in drinking water. Recognizing that this goal is not feasible for most systems, the rule requires that drinking water systems implement procedures such that no more than 10 percent of tap water samples exceed 15 parts per billion (ppb).

- Lead at contaminated sites: EPA remediates lead-contaminated soil at Superfund sites. The current screening level for further testing and possible cleanup action is 400 parts per million (ppm) for residential soil.

- Lead in homes: Paint and other legacy sources (such as soil contaminated by past uses of gasoline and industrial emissions) represent the most significant source of childhood lead exposure today. In 2001, EPA set residential lead hazard standards for interior dust of 40 or 250 micrograms per square foot, depending on location, and for exterior soil of 400 or 1200 parts per million, depending on location, at homes, schools, and daycares. EPA has issued regulations for abatement and renovation contractors to ensure that all work is done safely and avoids leaving dust that exceeds these standards. EPA is currently analyzing whether renovations of public and commercial buildings present a hazard, and if so, will consider similar approaches. In addition, the residential lead hazard standards for interior dust and exterior soil are currently under review and may be adjusted in the future.

Along with these programs, federal efforts on lead exposure include a wide range of activities such as research, surveillance, regulation, enforcement, and funding for community interventions and educational outreach. Most activities are integrated across federal, state, and local levels and

community stakeholder groups to reach target populations, such as preschool and low-income children, health educators, school officials, child-care providers, industrial workers and renovation contractors.

The decline in population-wide lead exposure attests to the effectiveness of these efforts, but improvements are still needed as elevated blood lead levels persist in a small percentage of children. Disparities in exposure, nutrition, educational opportunities, and other factors unduly burden minority families and low-income families with the adverse effects of lead exposure.

EPA is reviewing and considering updates to its current policies to ensure that we continue to make progress across the spectrum of lead exposure sources and pathways. The core of these efforts involves examining the limits and action levels for different media to ensure they contribute to reductions in lead exposure and help EPA meet its mission of protecting public health. The multi-media nature of the problem requires a coordinated approach. Given the multiple pathways of lead exposure, EPA is developing lead exposure assessment approaches that will provide national, regional, local and household assessments of lead exposures across relevant populations resulting from lead in drinking water, soils, dust, food and air. These scientific assessments will support policies under the Clean Air Act, the amended Toxics Substances Control Act, the Safe Drinking Water Act, Superfund, and other statutes, and will improve public health decision making.

EPA is working through a diverse array of statutory authorities, all guided by the public health goal of eliminating adverse effects from lead exposure, and will apply a common set of public health principles.

- **There is no known threshold for the effects of lead**. Even small amounts of exposure can affect children's health.

- **The best way to reduce blood lead levels is to address all sources of exposure.** EPA is reviewing its programs to ensure that we are addressing environmental sources of lead exposure across all media.

- **Reducing and minimizing sources of lead exposure is a long-term goal.** Given the presence of lead in homes, air, soil, and drinking water systems, EPA targets opportunities for reduction where exposures are highest and/or most feasible to address.

- **Children's vulnerability to lead exposure through any given exposure pathways varies with their stage of development**. Drinking water may pose a particular concern for formula-fed infants, while paint and related dust and soil are often the primary sources of exposure for toddlers and preschoolers during indoor and outdoor play. As a result, the policies of different EPA programs, and the technical analyses used to inform those policies, may differ in certain elements.

- **When evaluating new actions, EPA uses a common set of science-based analytical tools to assess the impacts on children's and adults' blood lead levels and health outcomes.** EPA uses data and models that account for exposure from all major sources of lead, including consumer products and the environment. These models help inform EPA about the effectiveness of various policy options and the selection of numerical targets for meeting public health goals related to lead exposure.

- **While the public health goal is to eliminate exposure, national sampling of blood lead levels helps to track progress and identify children and communities at highest risk for adverse effects.** CDC establishes a reference level (the 97.5th percentile of the national sample) that represents unusually high blood lead levels among today's U.S. children. Public health officials use this reference level to identify children and communities at risk and guide lead exposure reduction actions.

EPA's activities have been the cornerstone of the nation's progress in reducing lead exposure. However, our work is not done. Through this coordinated public health approach, EPA is working with CDC and other federal, state, and local agencies to identify and address environmental sources of exposure and prevent the adverse effects of lead in our communities.