ValueofLeadPrevention.org Frequently Asked Questions (FAQ):

Who is included in the 2019 birth cohort? How are the number of births estimated?

The 2019 birth cohort includes all children born in each region (state or city) during that year. The number of births is estimated based on most recent US Census data on the current population by age for each region. Estimates of the number of children at risk for elevated blood lead levels and the number of children living in homes requiring lead remediation interventions are computed with percentages of the 2019 birth cohort population.

Why are the benefits for only a single cohort shown?

The benefits of lead prevention and the number of interventions are shown only for a single year birth cohort in order to bound the modeling scope and to increase the reliability and understandability of the results. Estimating the impacts for a recent birth cohort allows for the use of current data on blood lead levels and recent literature on the expected benefits of remediation activities; estimating the impacts for cohorts many years in the future increases the uncertainty in many of the model inputs. Policymakers should note that completing an intervention only for a single birth cohort would not eliminate all lead risks in a region and one should aim to design policies and interventions to comprehensively eliminate lead in homes for all future cohorts of children.

Will the impacts, blood lead levels, intervention costs and benefits estimated for 2019 be the same in future years, for example the 2020 birth cohort?

It is likely that many of the model inputs and results will change slowly over time and therefore will be similar for the 2020 birth cohort. However, the extent to which these results will change over time will depend on the region, economic trends, and ongoing policies to remediate lead. Average child blood lead levels, counts of homes with lead service lines, and counts of homes with lead-based paint hazards have all decreased over time and are expected to continue to shrink in future years. However, the pace of this change (and whether the recent declines will plateau, remain constant, or accelerate) is uncertain, making it difficult to directly apply the estimates generated for the 2019 birth cohort to many future cohorts.

How did you estimate the child blood lead levels for states and cities?

Details on the blood lead level estimation process are available in the Technical Appendix to the *valueofleadprevention.org* website. The overall approach uses data from studies of lead exposure risk factors, such as housing age and poverty rates; data from the National Health and Nutrition Examination Survey (NHANES); and local data collected directly from cities to estimate the 2019 birth cohort's blood lead levels. The team worked to incorporate, but did not necessarily directly apply data collected from state blood lead surveillance initiatives, because this data left an incomplete picture of the child blood lead distribution (typically only reporting the percentage of tests >5 μg/dL) and the testing in many states is designed to test children predisposed to be at the greatest risk for lead exposure, which unfortunately makes that data non-representative of the entire 2019 birth cohort.

Why do the child blood lead levels not match the most recent lead surveillance data in all cases?

The team worked to incorporate data from state blood lead surveillance data wherever possible, in particular for the city-level analyses where data from the individual cities could be collected and

analyzed. However, due to the inherent limitations of the surveillance data in many regions and the need to model the entire 2019 birth cohort blood lead level distribution (and not solely the number of children with elevated blood lead levels), an alternative approach estimating overall blood lead levels was employed. This is some cases resulted in blood lead levels that would not exactly match the surveillance results; however, the deviations in estimated costs and benefits of lead exposure are small.

Why does the estimate of the number of children with elevated blood lead levels use 2 µg/dL and not 5 µg/dL or 10 µg/dL?

The statistic reported on the *valueofleadprevention.org* website shows number of children estimated to have blood lead levels above 2 µg/dL due to the modeling approach used to estimate the complete distribution of child blood lead levels for the 2019 birth cohort. The >2 µg/dL statistic is a more reliable comparative metric across cities and states in this modeling. Furthermore, there is no known safe level of exposure to lead for children and evidence of harmful impacts for children include levels of exposure well below the current action level of 5 µg/dL.

How were the cities analyzed selected? Will more be added to *valueofleadprevention.org* soon?

The cities were selected for this project based on their involvement in a cohort of cities receiving funding to support local lead policies and also a variety of technical assistance services in partnership with the Robert Wood Johnson Foundation and the National Center for Healthy Housing. These cities were selected as part of a competitive application process. The project team will explore expanding the number of cities as time and funding are available.

What types benefits are included in the economic impacts of reduced blood lead levels?

The benefits estimated in the economic modeling are "societal benefits" and therefore include benefits to all major economic stakeholders, including individuals, households, the private sector and governments. The benefits estimated include benefits over the entire lifetimes of children impacted and therefore will take many years to be realized.

The estimation of economic benefits that result from reductions in lifetime blood lead levels include improvements in IQ, employment, and lifetime earnings; improved health and life expectancy; decreased health care costs and prevalence of chronic conditions, such as hypertension; and reductions in K-12 education spending, such as repeated grades and required special education. These benefits are estimated for the 2019 birth cohort and aggregate the benefits of earnings, decreased health care costs, and improved longevity for their entire lifetimes. Future benefits are discounted, and all benefits are reported in $2019 dollars. The majority of the benefits computed are driven by improved IQ and greater expected lifetime earnings. Also considered were benefits of decreased crime and incarceration; although the current evidence shows these impacts only occur in reductions from much higher blood lead levels, which are rare in today's children and therefore result in smaller benefits on average.

Who will receive the economic benefits estimated?

The benefits estimated will be received by a variety of current and future stakeholders. No single stakeholder will receive the entirety of the benefits estimated, although the modeling shows the largest components are benefits retained by the children themselves. These benefits, resulting from increased future lifetime earnings and decreased expected health care costs, improve the financial outcomes for children and their families.

How long will it take for these benefits to accrue?

The societal economic benefits of lead reduction are estimated over the entire lifetimes of children receiving lead prevention and remediation interventions. Therefore, the benefits take many years to accrue—in particular the benefits of increased lifetime earnings. These benefits must be contrasted against the significant upfront costs of these interventions, which likely will require immediate expenditures. In the vast majority of cases the long-term societal benefits of lead prevention exceed the upfront costs, but will take many years to be realized and recoup costs.

Who does the modeling assume is paying for the interventions?

The modeling does not assume any particular stakeholder or investor contributes the initial funds to support these interventions. Local private or philanthropic funds could be used or local, state, or national government funding through new or existing programs. The costs of the interventions would likely vary somewhat depending on the funder and program, but are currently estimated based on an average per home expected costs, independent of a particular payer or program.

Would an investor in these interventions be able to recoup the costs of completing an intervention based on the estimated societal benefits and savings?

It is likely difficult for any one particular investor or payer to recoup their costs, even though these lead prevention activities are expected to return greater than $1 in societal benefits per dollar invested. This is because the societal benefits calculated include benefits for many stakeholders and benefits accruing over many years. For example, a local city or state government investing in lead service line replacement would in most cases be creating long-term economic benefits greater than their upfront costs; however, the local benefits specific to that government are unfortunately lower than the costs of the interventions. Regardless, prevention and remediation of lead has a wide variety and diffuse set of benefits (and many benefits for local citizens beyond the direct economic impacts). Local and national partnerships between public and private sectors and between different levels of government could help increase likelihood a greater portion of the upfront costs in lead prevention are recouped by initial funders.

Are the estimations of benefits likely undercounting total benefits?

The benefits shown on the *valueofleadprevention.org* website are conservatively estimated and computed for impacts that are supported best by existing studies and literature. As mentioned in the types of benefits included, there are some economic benefits that are not included in these data. Furthermore, there are very significant health and equity impacts of lead prevention that must be considered in addition to the direct economic impacts shown in these results.

If the return on investment for an intervention is less than $1 per dollar invested, does that mean we shouldn't actively pursue these lead prevention activities?

Absolutely not. Not only are the current benefits estimated conservatively, there are great number of societal, equity, and qualitative reasons that likely far outweigh the upfront costs of these lead prevention interventions. Furthermore, the existence of lead in the environment will remain a permanent threat to future children until it is removed from homes and infrastructure, perpetuating the possibility of horrific exposure events such as the Flint, MI water crisis.

How are the costs of the interventions estimated?

Details on cost estimation approaches are available in the national work from which these models were originally developed. For state costs, local data on variations in labor costs were used to customize the national estimates, decreasing expected intervention costs in areas with lower average labor costs and increasing costs in high cost of living areas. For city-specific estimates, if local costs directly from local leaders or individuals actively completing these projects were available, they were used instead of the state level estimates.

What is included in the costs of the interventions? Are costs of program overhead and administration included?

The costs of the interventions include costs of both testing for the existence of lead and the costs of removing leaded pipes, paint, or performing renovations in a lead safe manner. We do not include overhead and administration costs in these estimates, as these will vary greatly depending on the nature of the program and funding source, or in many cases are costs already built into existing programs.

How were the number of lead service lines in a region and number of children with a lead service line estimated?

The primary source for estimating the number of lead service lines in a state was work completed by the American Water Works Association, based on a survey of Community Water Systems. The number and percentage of lines that remain lead service lines was then applied to the population of children and homes for the 2019 birth cohort to estimate the number of children served by a lead service line that would require replacement. For the cities, in cases where local water systems had a reliable survey of their own lead line prevalence, those data were used directly. We found that when these city-level estimates were available it often reported a greater prevalence of lead service lines than the state-level estimates.

Does the lead service line replacement intervention include partial line replacements, i.e. only the public side replacement of a lead service line?

No, our modeling of the costs and benefits of lead service line replacement are only for full lead service line replacement, including replacement of both the private and public side of the line. Partial replacements in prior studies have not shown the same decreases in residential water lead levels and in some cases can even *increase* water lead concentrations as a result of disturbing the remaining leaded portions of the lines.

How were the number of homes requiring lead hazard control in region and number of children in a home with lead-based paint hazards estimated?

The number of homes with lead-based paint hazards requiring lead hazard control interventions are estimated based on the current age of homes in a region and the expected risks for lead-based paint hazards based on a home's age from the American Healthy Homes Survey. It is important to note this survey of lead-paint hazard risks was completed over ten years ago, and a refresh of those findings is currently underway by the US Housing and Urban Development (HUD) department.

What is included in the lead hazard control intervention?

The costs and benefits of the lead hazard control interventions are based on HUD's current Lead Hazard Control grant program. These interventions include costs for replacing some windows, treating deteriorated paint, remediating toxic soil, and repairing other high-risk areas, such as doors. More temporary lead paint remediation activities (such as "interim controls" and "paint stabilization") do exist; however, the costs and benefits of those interventions are not included in these analyses.

I know my region has more lead service lines or more homes requiring lead hazard control than the number shown on *valueofleadprevention.org,* why is this?

The baseline counts of lead service line replacements and lead hazard control interventions required for a region are based on the number of events needed to repair the homes only for the 2019 birth cohort. Therefore, there are likely a greater number of lead service lines and homes with lead paint that will also require remediation in order to completely eliminate these community lead risks.

What is meant by "enforcement" of the renovation, repair, and painting (RRP) rules?

Unsafe remodeling activities in homes with lead-based paint pose a significant risk for children due to the extreme volumes of dust and fumes that can be generated. A federal 1992 rule directed the US Environmental Protection Agency (EPA) to require lead safe work practices and updated regulations were put in place as recently as 2010. Yet, EPA's current enforcement and monitoring of renovation activities is *severely* underfunded and therefore puts many children at risk due to a lack of enforcement of these lead safe rules and recommendations. The modeling of this intervention involves the impacts of more complete enforcement and adherence to these regulations (preventing child lead exposure), while the costs involve the additional costs associated with lead safe work practices, such as supplies, plastic sheeting, and full dust clearance testing upon work completion.

Why is the return on investment greater for enforcement of renovation, repair, and painting safe lead practices?

The return on investment or benefits per dollar invested in RRP enforcement is greater than the other two interventions and results simply from the lower average intervention cost when compared to lead service line replacement and lead hazard control. Yet, these results are not intended to prioritize one intervention over another, and it is important to note that all three of these interventions typically return greater than $1 per dollar invested. Furthermore, lead service line replacement and lead hazard control are particularly important interventions because they permanently remove lead risks from a home. Lead safe work practices are important and can prevent significant lead exposure for children, yet permanent elimination of environmental lead risks must not be deprioritized just because of cost.

Where can I get more information on the modeling assumptions?

More data on the modeling and assumptions used in this work are available in the Technical Appendix and in the prior work, particularly pages 102-108. For other questions, please contact press@altarum.org.

What about other sources of lead exposure for children, such as air, food, and consumer goods?

Other sources of environmental lead exposure can be significant for some children. They are not explored in this work and are believed to contribute less on average to current child blood lead levels,

but also deserve careful consideration. Further research and literature are needed on these other sources of lead risks.

Can I download the complete data used on *valueofleadprevention.org*?

Yes! Please see the Download the Data link on the website homepage.