NEW JERSEY LEAD POISONING PREVENTION ACTION PLAN

Green & Healthy Homes Initiative®

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

This New Jersey Lead Poisoning Prevention Action Plan is authored by the Green & Healthy Homes Initiative, with support from:

The Fund for New Jersey

New Jersey Health Initiatives
A BETTER STATE OF HEALTH

We would also like to acknowledge the partners who provided insights for the content of this report, including:

Isles,
Housing and Community Development Network of New Jersey,
Advocates for Children of New Jersey, and others.

Green & Healthy Homes Initiative®

I. EXECUTIVE SUMMARY

Despite progress in reducing lead poisoning, over 4,800 children in New Jersey were identified with elevated blood lead levels (at or above 5ug/dL) in 2016. The American Academy of Pediatrics has described lead exposure as "a causal risk factor for diminished intellectual and academic abilities, higher rates of neurobehavioral disorders such as hyperactivity and attention deficits, and lower birth weight in children."[1] Longitudinal studies of children with a history of elevated blood lead levels (EBL's) in the range of 5 or lower show the impact over the life course of early lead exposure, including diminished IQ scores, which lead to lower rates of high school graduation, lower earning potential, and fewer Quality-Adjusted Life Years (QALY's – perfectly healthy years of life).[2] Low-income communities and communities of color in New Jersey are particularly vulnerable to lead exposure, and the lifelong health effects associated with it, as they often lack access to lead poisoning prevention resources and safe, affordable housing, and are likelier to live in communities with older housing stock.

The analysis and recommendations contained in the 2018 New Jersey Lead Poisoning Prevention Action Plan provide a comprehensive framework for action steps that can be undertaken by the state, local agencies and other prevention partners to fully eliminate childhood lead poisoning within ten years in New Jersey. These strategies focus on the causal sources of environmental lead exposure, support improvements to services to mitigate the impact of lead exposure in at-risk communities, including communities of color, and suggest investment in targeted, data-driven primary prevention efforts. Key policy reforms and investment in infrastructure would increase the safety of the environment, and risk-based prevention activities would prevent lead poisoning for New Jersey's most vulnerable children.

The risk of lead exposure in New Jersey has been part of the public discourse for a number of years, but several high-profile incidents have directed more public attention to this

issue and resulted in increased state funding to support prevention initiatives. This confluence of developments represents a unique opportunity for New Jersey to craft innovative solutions to address lead risks in housing, soil, and drinking water that will finally end this entirely preventable disease through the following risk-based primary prevention strategies:

KEY RECOMMENDATIONS

To Address Causal Sources of Lead Exposure:

- In addition to the current general budget allocation for lead hazard remediation, re-dedicate surcharge funds to the New Jersey Lead Fund for lead hazard remediation, and increase overall funding for lead remediation.
- Support and promote policies that standardize housing code enforcement and recognize code enforcement as a tool to promote public health including lead poisoning prevention.
- Strengthen requirements to test and disclose results for lead in drinking water in residential properties.
- Update testing regimens and drinking water infrastructure to mitigate risks of exposure from lead in water.
- Consider increasing and targeting funding for the capital projects program to ensure that Abbott district schools are improved and maintained as needed to prevent and mitigate risks for lead exposure. Consider prioritizing schools with Head Start and Early Head Start programs.
- Incorporate stronger standards for lead in soil into existing efforts to address lead poisoning risks.
- Make more health and housing data available to providers, advocates, and the public.

To Invest in Targeted Primary Prevention:

- Increase Medicaid funding to support services to low-income families and children to reduce lead exposure risk and address the causes of lead poisoning.
- Develop philanthropic and corporate sector investments to support capacity building, innovation and leveraged investments.
- Work with Medicaid Managed Care Organizations to implement and evaluate a risk-based primary prevention program with a tiered approach to services for families at the time of pregnancy or birth of a child in New Jersey, which would increase screening and mitigate lead exposure risks.

To Support Improvements to Services to Mitigate Lead's Impact:

- Update the lead public health case management, environmental investigation and enforcement infrastructure to eliminate inefficiencies and allocate sufficient resources using data-driven approaches to respond to the lowered blood lead reference level.
- Equip educators with greater information in order to provide adequate services to children with EBLs in an effort to better mitigate the effects of lead poisoning[i].

By innovating state and local policies to mitigate risk, and seeking and supporting sustainable funding for prevention, New Jersey can eliminate lead poisoning in ten years, and allow the state's children to realize their full potential unburdened by the impacts of lead.

[i] See also Key Action Plan Recommendations summary in Appendix 2

II. INTRODUCTION

New Jersey is home to vibrant culture, a rich history of innovation in industry, and many natural resources. It also has a legacy of industrial pollution, heavy vehicle traffic, an aging drinking water infrastructure system, and lead-based paint contamination in aging housing, which contributes to the environmental risks for lead exposure.

Lead exposure, and the lifelong effects associated with it, disproportionately impact under-resourced communities and communities of color, which are targets of institutional racism, and often lack access to lead poisoning prevention resources and safe, affordable housing. Lead poisoning causes changes in brain structure and function, which lead to learning disabilities, loss of IQ, speech development problems, attention deficit disorder, impulse control and executive brain function loss, and aggressive behavior. These symptoms can lead to reduced academic achievement, increased likelihood for school drop-out, and lower earning potential, impacting a child's ability to reach her full potential.

The behavior issues that result from lead poisoning can lead to discipline issues that help feed the school to prison pipeline, especially for Black and Hispanic students. At the societal level, lead exposure leads to increased healthcare, special education and criminal justice costs. The cost of lead exposure to New Jersey, including spending on healthcare, special education, juvenile justice, criminal justice and lost earnings is estimated at a total of $27 billion per birth cohort across all children aged 0-6 years statewide, in 2009 dollars.[3]

Though the risk of lead exposure in New Jersey has been part of the public discourse for a number of years, several high profile incidents – the lead in water crisis in Flint, Michigan, high levels of lead found in drinking water in Newark, NJ, and the prior defunding of the state's Lead Hazard Control Fund – have directed more public attention to this issue. The state has recently taken significant steps to address lead hazards, including lowering the blood lead reference level and action level to 5µ/dL, and tying the reference level to the Centers for Disease Control recommended level of action, as well as devoting $20 million in state funding to residential lead hazard remediation[ii], public health case management and other prevention services.

> At the societal level, lead exposure leads to increased healthcare, special education and criminal justice costs.

This confluence of developments represents a unique opportunity to craft innovative solutions to address lead risks in housing, soil, and drinking water through risk-based primary prevention strategies. The following New Jersey Lead Poisoning Prevention Action Plan outlines the current lead poisoning problem in New Jersey and the existing framework for services to children with elevated blood lead levels, and makes recommendations for necessary evidence-based services, new partnerships, critically needed policy solutions and levels of investment to reduce and eliminate lead exposure risks for New Jersey's children.

[ii] Lead hazard remediation includes activities to remove lead hazards through abatement or mitigate hazards through lead hazard control.

III. PROFILE OF LEAD IN NEW JERSEY

The legacy sources of environmental lead are lead-based paint, dust, soil, and drinking water contaminated by leaded pipes. Each of these sources is associated with older, post-industrial communities like those found in much of New Jersey, and in similar states around the country. Exhaustive research has given us clear evidence of the neurological effects and societal costs of lead exposure and indicates that there is no safe level of lead for New Jersey's children. In the United States, it is estimated that 70% of elevated blood lead levels come from exposure to lead-based paint, and the remaining 30% from non-paint environmental sources, including drinking water and soil.[4] The US Environmental Protection Agency estimates that drinking water can make up 20% or more of a person's total lead exposure. For formula-fed infants, that number increases to 60% of total lead exposure.[5] In New Jersey, the extent to which non-paint sources of environmental lead exposure contribute to elevated blood lead levels in New Jersey is not well understood[iii].

Remediation of environmental sources of lead exposure before a child is exposed is the only effective way to prevent elevated blood lead levels and associated cognitive and health effects. Currently, there is an important opportunity to mitigate the effects of lead in New Jersey's communities and thereby avoid cognitive damage for growing children, improve both school performance of children and the state's housing stock and limit the unnecessary societal costs of lead poisoning – an entirely preventable disease.

The following findings outline the need and opportunity to address lead exposure from each of the legacy sources of lead, and examine the framework for services to children who have already suffered lead exposure. Subsequently, there is a discussion of specific strategies to address identified gaps, and engage providers, advocates, funders and other stakeholders in effective primary prevention to eliminate elevated blood lead levels in New Jersey's children.

[iii] Interview with Isles, Inc., 2017

LEAD AS A NEUROTOXIN

The US Environmental Protection Agency's Integrated Science Assessment for Lead found, based on multiple epidemiologic studies conducted in diverse populations of children, consistent causal relationships between lead exposure and decrements to cognitive function (as measured by IQ decrements, decreased academic performance and poorer performance on tests of executive function).[6] Blood lead-associated effects on cognitive function were found in populations of children (ages 4-10) with mean or group blood lead levels measured in the range of 2-8 µg/dL, and evidence suggests that lead-related cognitive effects may be irreversible and that the neurodevelopmental effects of lead exposure may persist into adulthood.[7]

The historical evidence linking early childhood lead exposure to lifetime neurological effects is abundant.[8, 9, 10, 11, 12, 13, 14, 15] Recent evidence from epidemiologic studies demonstrates that lead exposure is associated with externalizing behaviors such as decreased attention, and increased impulsivity and hyperactivity in children.[16] A review of 33 studies by Goodlad et al found that low level lead exposure is significantly associated with inattention and hyperactivity/impulsivity in children, with correlations of 0.16 and 0.13 respectively.[17]

The American Academy of Pediatrics has described lead exposure as "a causal risk factor for diminished intellectual and academic abilities, higher rates of neurobehavioral disorders such as hyperactivity and attention deficits, and lower birth weight in children."[18] Longitudinal studies of children with a history of elevated blood lead levels in the range of 5 or lower show the impact over the life course of early lead exposure, including diminished IQ scores, which lead to lower rates of high school graduation, lower earning potential, and fewer Quality-Adjusted Life Years (QALY's - perfectly healthy years of life).[19] In 2015, a group of the country's leading environmental health researchers issued a Consensus Statement on the need to eliminate childhood and pre-natal exposure to lead and other neurotoxins, as part of Project TENDR: Targeting Environmental Neurodevelopmental Risks. The group was born of the researchers' realization that, despite the clear causal link between lead exposure and neurodevelopmental damage, government has not effectively eliminated legacy or on-going sources of lead.[20]

Blood-lead concentration is a commonly used measure of body lead burden and there is an extensive body of research

which relates health effects of lead exposure to blood-lead concentration.[21] For example, lead-related reductions in intelligence, impaired hearing acuity, and interference with vitamin D metabolism have been documented in children at blood-lead concentrations as low as 10 to 15 µg/dL with no apparent threshold. At higher exposure levels, which result in higher blood lead levels, the severity of health effects are more pronounced and other adverse health effects are observed in a broader range of body systems.[22] Increased blood pressure, delayed reaction times, anemia, and kidney disease may become apparent at blood-lead concentrations between 20 and 40µg/dL. Symptoms of very severe lead poisoning, such as kidney failure, abdominal pain, nausea and vomiting, and pronounced intellectual disability, can occur at blood-lead levels as low as 60µg/dL. At even higher levels, convulsions, coma, and death may result.

The biological mechanisms by which lead exposure causes neurological effects are becoming increasingly well-understood as well.[23] Studies of gene expression within the brain suggest that exposures to low levels of lead can have significant effects on gene expression in the hippocampus and frontal cortex, two areas of the brain responsible for executive functions, impulse control and emotional regulation, and that these effects continue even beyond the critical brain development period in early childhood.[24]

These impacts on brain structure and function likely contribute to the correlation between lead exposure and risk for violent crime, arrest and early pregnancy.[25, 26, 27,28, 29] Long-term trends in exposure to leaded gasoline through

the early 1980's, and resulting average lead levels among children, have been found to be correlated with trends in violent crime and early pregnancy.[30] Variations in childhood lead gasoline exposure, for example, correlate directly to 70% of the variation in murder rates 20 years later.[31] A study of prenatal blood lead concentrations and subsequent arrest rates and violent crime found an increase in relative risk for both being arrested (1.4) and being arrested for commission of a violent crime (1.27) for every µ/dL of prenatal blood lead concentration.[32]

A 2009 study found that reducing the mean blood lead level for all US children between birth and 6 years to below 1µg/dL would reduce crime and increase high school graduation rates, resulting in $50,000 (+/- $14,000) in savings per child annually. The total costs savings that could be derived from a decrease in blood lead concentration across the US annually was calculated to be $1.2 trillion (+/-$341 billion) and 4.8 million QALY's (+/-2 million).[33] A 2002 study found the present value of economic losses attributable to lead exposure in the birth cohort of current 5 year-olds amounts to $43.4 billion per year.[34]

In addition to the neurodevelopmental impact, causal links have been established between lead exposure and a variety of long-term health impacts. Early lead exposure increases the risks for hypertension and coronary heart disease, including myocardial infarction and ischemic heart disease, in adulthood.[35] Lead exposure decreases the survival of red blood cells and alters the synthesis of heme – leading over time to anemia and decreased circulatory system function.[36] There are also long-term reproduction effects of early led exposure, including delayed onset of puberty in boys and girls, and decreased male reproductive function (see Appendix 1).[37] If the costs of these lifetime health impacts are considered, elevated blood lead levels could be associated with as much as $50,000 per child in additional healthcare costs over a lifetime.[38]

LEAD POISONING PREVALENCE IN NEW JERSEY

Statewide Trends in Elevated Blood Lead Levels

In 2016, 4,800 children were identified in the State of New Jersey with elevated blood lead levels of 5 µg/dl or higher (3.1% of children tested). Over time the mean childhood blood lead level has decreased in New Jersey, following national trends. Data from annual New Jersey Childhood Lead Exposure state reports shows this steady decline for children in highest risk group, 6-26 months, as well as all children under 6 years.[39] State annual reports reflect the blood lead level of action at that point in time, which has decreased over time from 20µg/dL to 5µg/dL. In reports prior to 2000, data is available for children at or above 20µg/dL. In subsequent years, data is available at 10µg/dL and then at 5µg/dL. The numbers of children at blood lead levels of 5-9µg/dL has decreased, but remained about six times higher than the number of cases at > 10µg/dL statewide.

Lead Screening in New Jersey

As elevated blood lead levels continue to decrease, screening rates for children at the critical ages of 6 to 26 months have fluctuated but overall have been on the rise since 2000. Currently, New Jersey has a universal screening requirement for children at 12 and 24 months and all children under 6 years who have never been screened. Medicaid and NJ FamilyCare, an extension of the state's Medicaid program, requires Managed Care Organizations to track providers' adherence to this requirement, and reach benchmarks for lead screening. The 2015 Medicaid and NJ FamilyCare Annual Quality Report indicates that each of the Managed Care Organizations (MCOs) serving New Jersey - United Health Care, Horizon NJ Health, WellCare and Amerigroup – met or exceeded HEDIS measures for childhood lead screening in 2015.[40]

The American Academy of Pediatrics (AAP) has issued revised blood lead screening recommendations for children at 12 and 24 months to align with the Centers for Disease Control 2012 findings regarding blood lead level prevalence. The AAP recommends targeted blood lead screening, using a lead exposure risk assessment, usually in the form of a caregiver questionnaire, at 6 months, 9 months, 12 months, 18 months, 24 months and 3, 4, 5, and 6 years of age. When the assessment reveals specific risk for lead exposure, for example living in a pre-1978 residence, the AAP recommends a blood lead test. These recommendations include specific exceptions for children living in higher EBL prevalence areas, or immigrants, refugees, or adoptees, who may be screened universally regardless of risk assessments results.[41] The CDC continues to recommend universal screening in communities where at least 12% of the children had elevated lead levels or where at least 27% of the housing stock was built before 1950,[42] and has also issued recommendations regarding testing for pregnant women who may be at-risk for lead

exposure.[43] The federal Centers for Medicare and Medicaid Services have allowed states to request moving to targeted lead screening, where there is sufficient state-level data to demonstrate that universal screening is not the most effective method of identifying exposure, and developed guidance for states wishing to make that request.[44] In the wake of the Flint, Michigan water crisis, the CMS targeted screening approach has come under scrutiny by Congress.[45] New Jersey, along with many other states, maintains the universal lead screening mandate for children at 12 and 24 months, and those under 6 years who have never been tested, and does not currently require testing for pregnant women.[46]

In May, 2012, New Jersey initiated a project to test the efficacy of point-of-care lead screening using Lead Care I and Lead Care II analyzers. These machines are designed to give on-the-spot analysis of capillary blood samples, and have been shown to adhere to clinical standards for accuracy and reliability for capillary samples.[47] The Pilot Project was expanded to nine counties after Superstorm Sandy, in an attempt to increase blood lead screening not only for children and pregnant women, but also for recovery and reconstruction workers in the nine counties that were most impacted by the disaster. Within the nine-county region, there was a statistically significant increase in blood lead levels among children, though it is not clear if this increase is due to increased testing or risks from the aftermath of Sandy. Some of the original pilot-participating local health departments continue to use the Lead Care II machines, while others have returned them to the State. The New Jersey Department of Health owns 39 Lead Care II analyzers that are currently on-loan or available for use by local departments of health (Interview with NJDOH, 2017). The local agency is responsible for all associated costs, including sample collection equipment and licensing, which could present a financial barrier to wider use of the technology by local health departments.

A New Jersey public law effective January, 2017, P.L.2016, c.86, lowered the licensing requirement for operating a Lead Care II analyzer. Facilities, including doctor's offices, that offer capillary blood lead testing using a Lead Care II analyzer no longer need to hold a NJ State Clinical Laboratory License, but can instead hold a federal CLIA Certificate of Waiver (Interview, NJDOH, 2017). Though it is not clear the extent to which this new public law has increased the use of point of care screening technology in the state at the current time, it could make blood lead testing more accessible within doctor's offices and other health care settings, reducing barriers to lead screening. Potential barriers to the expanded use of point-of-care analysis need to be addressed, including education of primary care providers and staff, and funding for equipment.

The State's Annual Lead Report indicates that 74% of children who turned three in the fiscal year between July 1, 2015 and June 30, 2016 had at least one blood lead test since birth, and 93% of children turning 6 years old that year had at least one test since birth. Thus, it might appear that statewide screening rates in New Jersey are strong as compared to states that lack universal screening requirements. However, one blood lead level test does not give a clear picture of a child's past or ongoing lead exposure, and screening rates and elevated blood lead levels also differ regionally across New Jersey. There are pockets of very low screening rates and high lead levels within communities across the state (Appendix, Table 1).

Recommendations to Support and Increase Blood Lead Screening in New Jersey

Strategy 1: Target lead screening resources to most at-risk census tracts using enhanced prevalence data and point-of-care blood lead analyzers.

Action 1: Institute policies at NJDHS that further incentivize universal lead screening for Medicaid recipients at 1 and 2 years using incentive payments to providers and/or MCO's for meeting or exceeding benchmarks, along with penalties for failure to increase screening rates over time.

Action 2: Assist local health departments in analyzing lead exposure risk at the census tract or neighborhood level by improving data access in order to allow improved targeting of lead screening and outreach efforts.

Action 3: Support NJDOH-funded health departments use of Lead Care II analyzers to provide targeted screening to at-risk census tracts and neighborhoods.

Strategy 2: Increase access to initial blood lead screening during health care encounters

Action 1: Directly support pediatric practices serving Medicaid patients in obtaining and using a Lead Care II analyzer through professional training and funding from Medicaid or another source.

> New Jersey demonstrates a great deal of geographic and regional variation in both lead screening rates and blood lead levels throughout the state.

Action 2: Consider directly supporting obstetric practices serving Medicaid patients in obtaining and using a Lead Care II analyzer through professional training and funding from Medicaid, MCO's or another source.

Strategic Partners: New Jersey Department of Health, New Jersey Department of Human Services, local health departments, pediatric and obstetric care providers and practices, and non-profits, State and local advocates.

Regional and Local Differences in Lead Exposure Risk

New Jersey demonstrates a great deal of geographic and regional variation in both lead screening rates and blood lead levels throughout the state. At the county level, annual screening rates for children under 6 years vary from a low of 7.2% in Gloucester, to a high of 40.4% in Essex (See Appendix, Figure 1). Among those screened in 2016, most had blood lead levels below 5 µg/dL, ranging from 89.7% in Salem County to 99.0% in Ocean County.[48] Despite current research that identifies a link between lead levels lower than 5µg/dL and increased cognitive decrement, the NJDOH report does not further delineate blood lead levels into groups below 5µg/dL, making it challenging to analyze the community-level risk posed by lower lead levels.

County-level disparities exist in screening rates in New Jersey. Counties in the southwestern part of the state, including Burlington, Camden and Gloucester, have among the lowest screening rates statewide. Rural counties, including Hunterdon, Salem, and Sussex, also have lower screening rates that should be further examined. While Essex, Hudson, Passaic and Union Counties lead the state in numbers of elevated blood lead cases, Salem leads the state in the proportion of those screened with blood lead levels of 5µg/dL or above at just over 11%, followed by Atlantic and Cumberland counties (See Appendix Figure 1). Screening rates fall below the state average (27% of children aged 6 and under) in a number of counties, including Atlantic, Camden, Gloucester, Morris, and Sussex. These counties also have pockets of higher EBL prevalence, indicating a higher probability of having unidentified children with elevated blood lead levels residing there. Efforts to Incentivize and increase access to lead screening may be directed to these counties to address this issue.

Screening rates and blood lead levels at the municipality level reveal some important context for analysis of lead exposure risk. Municipalities in the urban north – Plainfield, Irvington, Newark, and Passaic – have the highest annual screening rates for children under 6 years statewide, along with Atlantic City[iv]. Screening rates in Gloucester City are among the lowest in the state. East Orange and Camden, two communities at risk for housing-related lead exposure, had low annual screening rates in both 2015 and 2016.

Despite lower screening rates, the East Orange Department of Health identified 7 children with blood lead levels at or above 20µg/dL in 2016, and Camden identified 2 children. These

[iv] See the "Innovation at Work in New Jersey" section in this report for a description of a successful initiative to increase lead risks awareness and screening rates through a mass media campaign in Atlantic City which has continued to yield results in that municipality.

numbers suggest that pockets of high blood lead levels exist in the locality and that a number of poisoned children may be going unidentified. Elizabeth, New Brunswick, Jersey City, and Paterson each have moderate annual screening rates, but each community has a relatively high proportion of cases between 5 and 9 µg/dL, suggesting that state regulations lowering the action level will increase the need for case management and other resources in these communities in particular (See Appendix, Table 1).

Importantly, jurisdiction level data are missing from the State's Report for key communities throughout the state including Asbury Park, Bound Brook, Bridgeton, Morristown and Orange, despite the fact that risk factors for lead exposure and other health indicators point to potential environmental health risks in these communities[v]. A key indicator of community-level risk for lead exposure, the proportion of households with young children living in poverty, reveals additional New Jersey communities at-risk for elevated blood lead levels, for which the report does not include data. Among the top one-third of NJ communities in terms of proportion of households with young children in poverty are rural communities like Salem and Phillipsburg (See Appendix Figure 2).

Socioeconomic Indicators of Lead Exposure Risk

Children living in poverty are most at risk for exposure to lead from a number of environmental sources. Very low-income families, those living below the Federal Poverty Level, are particularly at-risk, and are considered separately here. The most recent US Census estimates indicate that just over 10% of all New Jersey residents , and just under 18% of New Jersey children under the age of six are living below the federal poverty level (See Appendix Figures 2 & 3).[50] The proportion of very low income residents who are under the age of six gives an indication of the size of the at-risk population in a community. Statewide, just under 12% of those living below the FPL are children under the age of six.[51]

In many New Jersey communities, the proportion of those living in poverty is many times the statewide average. Camden, Passaic, Atlantic City and Salem City each have more than 30% of residents living below the FPL. Irvington, Newark, Plainfield and Trenton each have more than 20% of residents living below FPL. In these communities, 15% or more of those in poverty are children under the age of six (See Appendix, Figures 2 & 3).

More than 30% of Lakewood residents live below FPL, and 25% of very low income Lakewood residents are children under six. More than 30% of residents in the community of Bridgeton are living below FPL and of those 20% are children under the age of six. Low income communities in particular face increased risks for lead exposure due to a relatively high proportion of children in poverty and substandard housing conditions. The small town of Salem has the highest proportion of children under the age of six living below the federal poverty level statewide. (See Appendix, Figures 2 & 3)

The ALICE standard (Asset Limited Income Constrained Employed) is a national standard developed by the United Way, designed to provide a framework for discussing the growing number of households in New Jersey and nationwide that are struggling to afford basic necessities. ALICE defines households that earn more than the Federal Poverty Level, but less than the cost of living for the state. In New Jersey, over half of jobs pay less than $20 per hour, and most of those pay less than $15. Over 1/3 of New Jersey households (37%) are among the ALICE population. Counties with the highest proportions of ALICE households, include Cumberland (59%), Passaic (48%), Salem (46%), Essex (44%), Camden (44%), Atlantic (42%), Cape May (40%), Hudson (40%), and Ocean (40%).[52]

Lead poisoning prevention efforts targeted through the Medicaid system, which covers over 540,000 children in New Jersey,[53] are likely to reach many at-risk, low-income children. Following the lead of several states, New Jersey can use innovative strategies to increase prevention and minimize risk for this important target population through targeted services.

The Centers for Medicare and Medicaid Services (CMS) continue to require states to move beyond fee-for-service volume-based reimbursement strategies into value-based payments for services that improve health outcomes and reduce costs. An example of this is the Pay For Success model which allows MCOs to re-pay initial investors for programs that successfully bring down asthma-related healthcare costs, and does not require states to submit a waiver to CMS. New Jersey can similarly allow MCOs

[v] These communities are also included in the Robert Wood Johnson Foundation's New Jersey Health Initiatives Program's Communities Moving to Action grantee cohort, which is focused on partnering and aligning local resources to address the most pressing health issues identified in those communities.

to negotiate with non-traditional provider networks to provide preventive housing services to address lead hazards in the homes of at risk children or in response to an EBL diagnosis.

After receiving guidance from CMS, states like Maryland and Michigan are using Children's Health Insurance Program (CHIP) funds to pay for home lead hazard remediation for children with elevated blood lead levels. Although the future scope of CHIP is somewhat uncertain, the spending of CHIP resources on these prevention strategies ultimately improves health outcomes for children and can result in upstream healthcare cost savings as well as significant societal cost savings. Robert Wood Johnson and researchers from Princeton University recently released a policy brief providing guidance on using CHIP funds to address lead risks for low-income children.[vi]

It is important to note the disproportionate impact of lead exposure on New Jersey's majority Black and Hispanic communities. While lead poisoning can be a threat to any child, the New Jersey cities with the highest EBL prevalence are largely communities of color: Newark, Atlantic City, Camden, East Orange, Irvington, Paterson, Plainfield, Passaic, Trenton, and Elizabeth. Often, residents in these communities are also targets of institutional racism, underserved in terms of access to educational and career opportunities, health care, healthy foods, and affordable, high-quality housing, and experience higher rates of violence, crime and poverty. Lead is part of a cycle that interferes with children's ability to achieve their full potential. The behavior issues that result from lead poisoning diminish academic success, and lead to discipline issues that help feed the school to prison pipeline. The toxic legacy of lead impacts children of color disproportionately, and solutions to end lead exposure should focus on this disparity.

Recommendations to Address Socioeconomic Factors of Lead Exposure Risk

Strategy 1: Increase Medicaid Funding to support services to low-income families and children to reduce lead exposure risk and address the causes of lead poisoning

Action 1: Seek Medicaid funding reimbursement for state or local expenses incurred for lead case management or environmental investigation in EBL properties where diagnosed Medicaid recipients reside.

Action 2: Issue or amend policies and regulatory guidance from NJDHS that allow local reimbursement and Medicaid Managed Care Organizations to engage in value-based and fee-for-service payments for lead poisoning prevention-related services including public health case management, environmental investigation and lead hazard reduction services.

Strategy 2: Better track and understand the relationship between elevated lead levels, race and ethnicity and socio-economic factors in New Jersey

Action 1: Track lead screening rates by race and ethnicity, to allow providers, advocates and others to better understand racial and ethnic differences in lead screening rates, and work to identify and remove barriers to lead screening for underserved populations.

Action 2: Include data related to race and ethnicity for children with elevated blood lead levels in the State's 'Childhood Lead Exposure in New Jersey' Annual Report, to allow providers, advocates and others to better understand racial and ethnic disparities in risk for lead exposure, and target resources and interventions based upon risk.

Strategic Partners: New Jersey Department of Health, New Jersey Department of Human Services, Medicaid, NJ FamilyCare & NJDOH Childhood Lead Program; New Jersey Medicaid Managed Care Organizations; Local Health Departments, State and local advocates.

Lead Risks in New Jersey's Housing Stock

Renter-occupied, pre-1978 households with young children living at or below federal poverty level represent the highest risk category for lead exposure both in New Jersey and nationally.[54] It is estimated that there are 129,000 such households statewide.[55] Targeting these properties for lead poisoning prevention efforts, including inspection and remediation, reduces mean blood lead levels.[vii]

Housing affordability is an important consideration in lead exposure risk as well. The standard for affordable housing is widely considered to be spending at or below 30% of gross annual income on housing. Unaffordable housing, especially

[vi] http://www.statenetwork.org/resource/leveraging-chip-to-protect-low-income-children-from-lead/
[vii] Based on lead poisoning prevention strategies used in Baltimore, Maryland.

on the rental market, leads to instability and frequent moves, and increases the likelihood that the housing families can afford will be unsafe and of lower quality.[56] An analysis of income levels and average monthly rental rates reveals that the average monthly rent for a two-bedroom unit is unaffordable for families living in poverty in every county in the state with the exception of Warren County. This problem also exists in every metro area in New Jersey with the exception of the Warren Metro Area. An important disparity also emerges when examining the comparison of rental rates in Hudson County and Jersey City, specifically – where fair market rent for a two bedroom unit exceeds an affordable rate for those living in poverty. Similar affordability gaps exist in Atlantic and Cumberland Counties along with the Atlantic City-Hammonton Metro Area (See Appendix, Figure 4).[57]

Age of housing provides an important context for analyzing the risk for lead exposure. Not only is older housing likely to have lead-based paint hazards, but older neighborhoods are at higher risk of having lead service lines in their plumbing infrastructure and legacy lead in soil from industrial pollution, leaded gasoline emission residue or prior exterior renovation, increasing the risk for additional sources of exposure. Housing in New Jersey is among the oldest in the country. Eighty percent of the state's housing was built when lead paint was still in use. While lead-based paint was not banned for residential use until 1978, homes built prior to 1940 in particular have higher rates of lead-based paint and higher lead content in the paint utilized in those homes. Thus, differential risk for lead exposure at the community level is most obvious when considering the oldest housing in the state – those units built before 1940. Paterson has the largest proportion of pre-1940 housing, but there are a number of lower income communities where aging housing poses a significant risk including Passaic, Jersey City and Camden (See Appendix, Figure 5).[58]

Vacancy rates serve as an indicator of the level of disrepair and blight within a community's housing stock. Vacant housing often contributes to community disinvestment and deferred maintenance that can generate lead hazards such as chipping paint and lead dust. Abandoned or long-empty residential properties continue to deteriorate and develop lead hazards over time. This can add to the level of lead contamination in the soil at the community level, as well as increasing the risk to subsequent occupants in the home from chipping, peeling paint and other structural defects causing paint to deteriorate. New Jersey continues to lead the country in foreclosure rates and the data suggests that select communities are suffering from more residential abandonment and blight than the state as a whole which drives up the risk for lead exposure. Communities such as Atlantic City, Camden, East Orange, Irvington and Newark exceed the state average for vacancy by up to 25 times[viii]. Jersey City, Orange, Paterson and Plainfield also emerge as having higher-than-average vacancy rates, which may be leading to greater disinvestment in these communities (See Appendix, Figure 6).

Similarly, rental properties can pose a risk for lead exposure where properties are not well maintained. Children living in rental housing are over 3 times likelier to have an elevated blood lead level of 10µg/dL than children in owner-occupied housing.[59] Gloucester, Hunterdon, Salem and Warren counties lead the state in proportion of housing units that are renter-occupied, although the largest number of rental units are located in the urban counties in the state, including Camden, Essex, Hudson, Passaic, and Union.

Many of the municipalities with the largest proportion of elevated blood lead levels in New Jersey also have a high proportion of rental housing. Statewide, 35.5% of the housing stock is tenant-occupied. However, in many older, lower-income cities and towns, the number of rental units represents around 70% of the housing market. Union City leads the state in the proportion of rental housing, and Atlantic City, East Orange, Elizabeth, Irvington, New Brunswick, Newark, Passaic and Paterson have roughly double the statewide average of rental property composition of their housing stock (See Appendix, Figure 7).

The 2013 American Communities Survey data provides some comparison of reported housing deficiencies related to lead in the Northern New Jersey metro area which encompasses Newark, Jersey City and surrounding communities. Statewide data are not available for comparison, but as compared to national averages, respondents reported higher levels of external leaks, open cracks and broken plaster/peeling paint, which are contributing factors to indicators of potential lead hazards in older properties (Appendix, Figure 8).[60]

[viii] Cape May leads the state in vacancy rates, but this is largely because of seasonal vacancy in the town's small housing stock, and is not an indicator of lead exposure risk.

> While lead-based paint was not banned for residential use until 1978, homes built prior to 1940 in particular have higher rates of lead-based paint and higher lead content in the paint utilized in those homes.

Efforts are underway to strengthen protections, including preventing unjust eviction and blacklisting, for tenants seeking action against landlords for failure to maintain habitability standards in housing. Larger northern communities like Newark, Elizabeth and East Orange tend to have more low-income multi-family rental units, which are subject to periodic visual inspection by state (and sometimes local) housing code enforcement officials. Smaller communities like Atlantic City, Irvington, Passaic and Paterson have larger quantities of single or double unit properties which are currently subject to fewer controls or housing standards. The following recommendations explore strategies to standardize and enforce local housing code and improve housing standards, as well as policies to better coordinate housing and health regulatory processes at the local and state level that can address defective conditions that often contribute to the generation of lead hazards.

Recommendations to Address Lead Risks in New Jersey's Housing Stock

Strategy 1: Standardize and improve housing standards and enforcement statewide.

Action 1: Enact a law making receipt of a Certificate of Habitability a requirement for legally renting a property that meets or exceeds local standards, and include requirements for intact paint and other specific lead hazard reduction provisions recommended by the New Jersey Department of Community Affairs (NJDCA) in the Certificate of Habitability standard.[61]

Action 2: Mandate that all pre-1978 rental and owner-occupied housing is lead safe at the time of unit turnover or sale, indicating that the paint in the property is visibly intact, and the property has passed a lead dust clearance wipe inspection administered by a certified lead dust wipe technician or similar, accredited inspector. Dedicate appropriate level of funding for these inspections, and consider transferring authority and funds for inspections of one-and-two family properties to the local level. This represents a strengthening of current state regulations which mandate a visual inspection but no dust wipe clearance for rental properties. The State does not, in practice, complete visual inspections in one-and-two family rental properties.

Action 3: Promulgate Lead Safe Demolition Standards and enforce at the local level to reduce the risk of lead emissions, debris and hazards contaminating adjacent properties and communities during the demolition of pre-1978 constructed properties.

Action 4: Increase enforcement of the EPA Renovation, Repair and Painting Rule (RRP)[ix] for covered renovation activities in pre-1978 properties to improve lead safe work practices by contractors, thereby increasing worker protection through worker training. Seek designation as an EPA authorized state under the Renovation Repair and Painting Rule and enact legislation at the state level if necessary to implement the RRP requirements and conduct enforcement of the Rule. Train and deputize local inspectors to enforce RRP.

Action 5: HUD should adopt a lead hazard standard for HUD-owned and assisted properties. The current HUD Housing Quality Standard mandates units participating in the Housing Choice Voucher Program meet 13 performance

[ix] The EPA's Renovation, Repair and Painting Rule "requires that firms performing renovation, repair, and painting projects that disturb lead-based paint in homes, child care facilities and pre-schools built before 1978 have their firm certified by EPA (or an EPA authorized state), use certified renovators who are trained by EPA-approved training providers and follow lead-safe work practices". (EPA, 2017)

requirements. While these requirements assess for potential safety hazards, including lead, they do not adequately assess for environmental health hazards such as mold, allergens, asthma triggers, radon, and VOCs. Adopting a healthy housing standard will better ensure voucher recipients and their children live in homes that are protected against housing related health and safety hazards.

Strategic Partners: New Jersey State Legislature, New Jersey Governor's Office, New Jersey Department of Community Affairs, community-based housing providers and private firms providing housing services, Tenant's Associations, Realtors and Property Owners' Associations, Department of Housing and Urban Development, State and local advocates.

Strategy 2: Increase Housing Code enforcement and coordinate with health agencies – Support and promote policies that standardize housing code enforcement and recognize code enforcement as a tool to promote public health including lead poisoning prevention.

Action 1: Adopt a statewide uniform property maintenance code or other comparable code in particular for any jurisdiction that does not have an existing housing code, and/or coordinate adoption of a universal housing code by municipalities across the state. This represents a strengthening of the current regulatory framework, which is a patchwork of local property maintenance codes and rental property regulations.

Action 2: Implement a targeted, proactive and mandatory housing code inspection protocol, in place of the current complaint-based system, which allows local or state inspectors to conduct inspections in all of the properties of an owner who is found to have violations in any property. This would support housing quality standards and lower barriers to enforcement such as resident fear of reprisals.

Action 3: Increase rental housing inspections and enforcement of violations by mandating that local housing code officials statewide conduct periodic inspections for 1 and 2 unit rental properties, and provide resources to fully support these activities, including capacity-building, training and additional staff to local housing departments.

Action 4: Improve education for tenants regarding their rights to withhold rent or 'repair and deduct' rent for the repair of lead hazards in situations where owners are unresponsive to written notices of defect of lead hazards in properties constructed prior to 1978.

Action 5: Improve retaliatory eviction protections for tenants who are attempting to get lead hazards repaired in their home or who are occupants in properties that are subject to housing code or lead violation actions.

Action 6: Facilitate data sharing via shared platforms and systematic processes for better tracking the status of lead and housing code violations and making appropriate cross agency referrals.

Action 7: Allow local health departments to conduct coordinated inspections and/or issue joint violations for lead hazards and other health-related code violations. Cross-train staff to inspect for housing and health violations during visits.

Strategic Partners: State Legislature, New Jersey Governor's Office, New Jersey Department of Community Affairs, local and county housing code officials, tenant's associations, realtors' and property owners' associations, State and local advocates, and the EPA.

Strategy 3: Increase state and local lead hazard reduction funding and target funding more effectively to the most at-risk jurisdictions and housing.

Action 1: Assess current state allocation of funding for lead hazard reduction and direct funding to the most at-risk jurisdictions based upon data driven decision-making of where intervention can produce the greatest decline in EBLs.

Action 2: Over a period of time, reach a goal of at least 70% of state lead poisoning prevention funds being expended for lead hazard remediation primary prevention activities.

Action: 3: Increase state and local lead hazard reduction funding by securing new funding commitments and revenue sources, increasing leverage funding and developing innovative funding sources (as described below in the Funding section).

Action 4: Consider incorporating tax credits for homeowners as an incentive to complete lead remediation or repairs. This strategy is employed in Rhode Island, Michigan and Massachusetts.

Strategic Partners: New Jersey State Legislature, New Jersey Department of Health, New Jersey Department of Community Affairs, Local Health Departments, New Jersey Governor's Office, non-profits, State and local advocates and other strategic partners.

Lead Risks in New Jersey's Drinking Water

The US Environmental Protection Agency estimates that drinking water can make up 20% or more of a person's total lead exposure. For formula-fed infants, that number increases to 60% of total lead exposure.[62] Lead in drinking water can be introduced through leaded service lines, plumbing and fixtures that contain lead or use lead solder.[63] In many cases, lead is released in older pipes when corrosion occurs, as a result of changes in drinking water pH, chemical agents or physical breakdown of the pipes. Lead Services Lines (LSL) are leftover in the aging water system infrastructure in many communities. LSLs contain lead which can leech into drinking water as it flows through the pipes on its way into homes and buildings. Plumbing and fixtures within a home or school building can also contribute to lead content in drinking water. For example, end-use brass fixtures, like faucets, are required by federal law to be at least 99% lead-free, in order to receive a "lead-free" label. But prior to Jan. 4, 2014, a fixture could have as much as 8 percent lead content and still be labeled "lead free."

The US Environmental Protection Agency's Safe Water Drinking Act mandates that water systems routinely test the quality of drinking water, and specifically sets a limit for lead of 15 parts per billion under the Lead and Copper Rule (LCR). A preliminary scan of several local municipal water systems reveals that lead in water may be a contributing source of lead exposure in some jurisdictions.[64, 65, 66, 67] For example, in the City of Paterson, the 2016 annual water quality report reveals that 25 of the 286 water samples (8.74%) tested at or above the action level of 15 ppb.[68] This requires immediate follow-up action to assess the scope of the problem and to ensure that a remediation strategy has been adequately implemented to address the source of the lead in water in the jurisdiction.

A fuller examination should be conducted of other New Jersey municipalities as well as a review of multiple years of water testing reports for each jurisdiction to determine the extent of the lead in water exposure occurring in New Jersey and if the elevations were related to ongoing hazards or particular events such as water main maintenance, service line replacement or a change in the chemical composition of the water at the time of sampling. The Passaic Valley Water Commission (PVWC) was in violation of the EPA's Lead and Copper Rule, because the 90% percentile failure standard of tested samples exceeding the 15 ppb standard was exceeded. PVWC attributed the lead contamination to corrosion of service lines or plumbing. The water system's remediation plan consisted of placing additional corrosion control measures, weekly and monthly testing of the corrosion control measures, replacing lead service lines and informing the public through a lead awareness campaign.

Under the current Lead and Copper Rule, homeowners are asked to absorb the cost of replacing the portion of a lead service line that is privately owned. This cost can range from $1,000 to $7,000. Homeowners who cannot afford to pay this cost could receive partial LSL replacement, a practice that has been shown to increase lead levels at the tap.[69]

Recent guidance from the New Jersey Department of Environmental Protection (March, 2017) references the requirement for water systems to replace the utility-owned portion of lead service lines at a rate of 7% of the total lines annually, and indicates that partial lead service line replacement is a permissible strategy to address high levels of lead in consumer's drinking water, and that residents should be warned of a "temporary" increase in lead in drinking water following the partial replacement, and given steps to reduce exposure.[70] New Jersey DEP should consider amending internal policies and/or supporting new legislation that would be introduced to ban partial lead service line replacement by water systems in New Jersey. In addition, there is a need to ensure that funding support is available to owners to address any remaining partial service lines that are not publicly funded.

The New Jersey Environmental Infrastructure Trust (NJEIT) is a state financing authority that provides low interest loans to qualified public water systems to finance water quality infrastructure projects. Currently, NJEIT has set aside $33 million in annual grants ($30 million) and no-interest loans ($3 million) for water systems to fully replace lead service lines in low income communities. New Jersey American Water has a project in Irvington, NJ that makes use of this program. Maintaining and expanding this financing vehicle is essential in tackling the drinking water infrastructure that leads to lead exposure risks in vulnerable communities.[71]

Recommendations to Address Lead Risks in New Jersey's Drinking Water

Strategy 1: Determine the extent of lead in water exposure occurring in New Jersey and update drinking water infrastructure to mitigate risks from lead.

Action 1: Conduct a fuller examination of New Jersey municipalities across multiple years of water testing reports

to better determine the extent of the lead in water exposure occurring in New Jersey. Where possible, link test results to ongoing hazards or events such as water main maintenance, service line replacement or a change in the chemical composition of the water at the time of sampling.

Action 2: Require utilities to develop plans for annual lead service line replacement goals and commit resources to work with property owners to replace the entire length of lead service lines (LSL's) under their control and ban partial LSL replacements.

Action 3: Secure funding from the New Jersey Environmental Infrastructure Trust, and/or other public/private sources of financing to assist with the cost of lead service line replacement.

Strategic Partners: New Jersey Department of Environmental Protection, New Jersey legislators. New Jersey Environmental Trust and other sources of public/private funds for this work, utilities, State and local advocates, and New Jersey legislators.

Strategy 2: Institute and strengthen requirements to test and disclose results for lead in drinking water in residential properties.

Action: Integrate lead in drinking water and the existence of lead pipes and lead service lines into current lead hazard disclosure requirements in connection with purchasing housing and obtaining a Certificate of Habitability for rental housing. Require that housing be tested for lead in drinking water and pipes as well as paint, and that results be disclosed to the buyer or renter. Consider mandating that lead hazards in drinking water be addressed at time of sale.

Strategic Partners: New Jersey Legislature, New Jersey Governor's Office, New Jersey Department of Community Affairs, Tenants' Associations, Realtors and Property Owners' Associations, and State and local advocates.

Lead Risks in New Jersey's Schools and Child Care Facilities

Children often spend more waking hours in school and child care than at home over the course of a year. The risk for lead exposure in these facilities is an important consideration in reducing lead levels across the state. Recently, the issue of lead in the school drinking water has been at the forefront of efforts to protect children from lead exposure in New Jersey, after a series of tests of drinking water in Newark schools revealed high levels of lead.

In July 2016, New Jersey instituted requirements that schools must test lead in drinking water and disclose lead test results to the public. GHHI's May, 2017 survey of 28 school districts in at-risk communities across the state indicates that 23% have not yet published any drinking water test results, and most districts had not completed testing in every school in the period between 2012 and 2016. All but two of the surveyed districts had positive lead test results in at least one school. Asbury Park, Atlantic City, Bound Brook, Bridgeton, Elizabeth, Freehold, Irvington, Jersey City, Morristown, Newark, Perth Amboy, Plainfield, Toms River, Trenton, and Hunterdon County school districts all reported one or more lead levels in excess of the EPA standard. This represents dozens of schools with lead hazards, which could come from corrosion in fixtures (drinking fountains, faucets), plumbing or service lines.

The ease with which these test results can be accessed varies district-to-district (Hunterdon County, for example, posts the lead test results for the entire district on one high school's webpage), and for the most part little context is provided for parents to understand test results, or what specific measures are planned to protect children.

The school district is required to take measures to stop the use of fixtures or facilities where water quality exceeds the EPA lead standard, and provide alternate drinking water if necessary. Additional remediation is not required by the regulations.[72] As a result, schools across New Jersey continue to provide bottled water as an alternative to remediating lead hazards in the water infrastructure.[73] Newark, the first district in the state to test school drinking water for lead, is now funding repairs to the school district's drinking water infrastructure through a municipal bond. This is due in large part to the advocacy of parents organized by the Ironbound Community Corporation working with the Education Law Center (Interview, Education Law Center, 2017). Camden schools, in contrast, have been relying on bottled water since 2002, and needed remediation and infrastructure investments have not been provided, despite this district's status as a former Abbott district.

In New Jersey, pre-1978 "child-occupied facilities", including child care centers, pre-schools and Kindergarten classrooms, are subject to regulations designed to mitigate lead exposure risks.[74] However, little information is publicly available concerning the results of lead inspections and drinking water test for child care. Licensed child care facilities[x] in New Jersey housed in properties built before 1978 must be free from lead paint

[x] Child Care Facilities are defined as public and private child care centers that are maintained for the care, development, or supervision of six or more children under 13 years of age for less than 24 hours a day (NJ Department of Children and Families, 2017)

hazards, and comply with lead paint inspection requirements, including periodic lead inspection/risk assessments by NJDCA, and submit documentation of the risk assessment results to the New Jersey Department of Children and Families, Office of Licensing and the local department of health.[75]

If the lead inspection reveals lead hazards, the center must remediate pursuant to NJAC 5:17 and 5:23 regulations, including using a licensed Lead Abatement Contractor, submitting a certificate of lead abatement, and informing parents. Child care centers are also required to follow the recommendations of the local department of health for enclosure, removal or other appropriate action to abate lead hazards, and must permit the local department of health to conduct follow-up inspections to ensure compliance with State statutes governing lead paint hazards. Upon license renewal, Child Care Centers must have an updated lead inspection/risk assessment only if there is a history of lead hazards in the property, in order to obtain a license renewal.[76]

Child Care Centers, including Head Start and Early Head Start, must comply with the New Jersey Department of Children and Families, Office of Licensing regulations, including N.J.A.C. 3A:52, which lay out requirements for testing and disclosure of lead in drinking water. As is the case with schools, child care centers have slightly different requirements, depending on the type of water system serving a child care center's community.[77]

Family child care homes, where care is provided for five or fewer children below 13 years of age in the provider's private residence, are not subject to licensing requirements in New Jersey, but may register voluntarily with the Department of Human Services.[78] Unregistered home-based child care facilities, including situations where children are cared for by family members, neighbors or other informal providers, are not regulated in New Jersey with regard to lead-based paint hazards, drinking water testing or other health and safety hazards. These child care arrangements may represent a source of lead exposure risk for children in New Jersey, particularly in under-resourced communities where family/child care providers face economic challenges to home maintenance.[79]

Publicly-subsidized pre-school programs housed in public schools, including Head Start and Early Head Start, are subject to the same testing and disclosure requirements for lead in drinking water. There is no testing protocol for lead-based paint in public elementary schools, but districts are required to maintain intact paint in school facilities (Interview, Education Law Center, 2017), and comply with the EPA's Renovation, Repair and Painting Rule when completing repairs in school buildings.[80] School Districts do have funds in their budgets for routine maintenance, but courts have ruled that the State of New Jersey is responsible for school conditions in Abbott districts, so there is a lack of clarity regarding which source of resources should cover lead remediation in both paint and drinking water in Abbott districts. The Abbott District capital program, which funds improvements to schools in these districts, has progressed slowly due to funding delays. Abbott districts have identified over 400 capital projects that need funding, but there are currently 10-12 schools in the capital program, and the program currently cannot add more schools to the project list due to lack of funding (Interview, Education Law Center, 2017). While school-based lead hazards may not pose a primary risk for lead exposure during early childhood, unless the school building also houses a pre-school program, it is still important to mitigate these risks where possible through appropriate building maintenance.

Recommendations to Address Lead Risks in New Jersey's Schools and Child Care Facilities

Strategy 1: Increase funding for improvements to keep schools lead-safe including remediation of drinking water infrastructure and other capital projects in Abbott School Districts, especially for schools with Head Start and Early Head Start Programs.

Action 1: Actively enforce required lead testing of school drinking water. Aggregate and make public lead test results from 2012-2016. Pair lead testing mandate with support for remediation in Abbott school districts.

Action 2: Consider increasing and target funding for the capital projects program to ensure that Abbott district schools are improved and maintained as needed to prevent and mitigate risks for lead exposure. Consider prioritizing schools with Head Start and Early Head Start programs.

Strategic Partners: New Jersey Department of Education, New Jersey Department of Environmental Protection, local school districts, New Jersey Governor's Office and New Jersey State Legislature, State and local advocates, and non-profit organizations.

Strategy 2: Increase lead paint regulation and inspection for home-based child care

Action: Incentivize registration for family-based child care by linking registered providers with financing, grants, education and other support to address health and safety hazards through federal or state funding. Regularly inspect and require

remediation in family-based child care facilities, require annual visual inspection and dust wipe clearance for facilities.

Strategic Partners: New Jersey Department of Families and Children, New Jersey Department of Human Services, Family Child Care Providers, State and local advocates, and non-profits.

Lead Risks in New Jersey's Soil

Lead in soil comes from three main sources – remains of pollution from vehicles that used leaded gasoline prior to 1980, dust and rain runoff from buildings painted with lead-based paint, and remnants of lead-containing pesticides (especially in rural areas). Contaminated soil puts children at risk both when they play in their yards and when the soil is tracked into homes.[81] There are several methods to mitigate lead hazards in soil. Soil remediation methods vary in costs, from as much as $30,000 per 1,000 square feet to remove and replace the top level of soil, to much less expensive but still effective methods of encapsulating or immobilizing soil including coverage with concrete or planting grass.[82]

In states and cities bordering New Jersey, lead contamination in soil as a result of demolition of older housing stock and commercial buildings has become a concern. The Kensington and Fishtown neighborhoods of Philadelphia are currently working with the EPA and the Philadelphia Department of Health to assess the impact of widespread demolition on soil lead levels, and work to better enforce standards for lead safe demolition.[83] In New Jersey, in 2016, 5,457 building units were demolished, 82% (4,494) of which were one-and-two family residential structures. Camden led the state in demolitions, with 446 structures demolished in 2016 (all of which were 1&2 family structures). A number of other communities had over one hundred structures demolished in 2016, including Toms River (198 properties), Elizabeth (186), Ocean City (159), Lakewood (156), Jersey City (145), Plainfield (128), Middletown (121), Ocean Township (108), and Stafford Township (101).[84] Many of these communities are along the New Jersey shore, where demolition and reconstruction activity remains relatively high in response to storm damage. New Jersey requires contractors to obtain a demolition permit, follow local regulations regarding utility shut-off and notice to adjacent neighbors, and assess for and dispose of asbestos safely.[85] There is not currently a provision in New Jersey's demolition permitting process to assess for lead hazards or lead safety requirements during the demolition process.

The current federal standard for lead in soil, 400 parts per million (ppm), has not changed since it was first adopted in the 1990s, and contains a dual standard for children's 'play areas' versus 'non-play areas' despite the fact that children are often in contact with soil beyond areas designed for play. The New Jersey Department of Environmental Protection has statutory authority to set standards for lead in soil, pursuant to New Jersey Administrative Code 7:26D. The state follows the federal standard for lead in soil, but NJDEP has the authority to amend the regulation and change the standard based on scientific evidence, as has been done in California (which has a universal standard for lead in soil of 80ppm).[86]

There are no publicly-available datasets of lead soil test results for the state, and no record of active projects to systematically test soil through NJDEP or the US Environmental Protection Agency. However, the EPA has been involved with lead soil testing and remediation in a number of areas across the state in recent years. In 2016, the EPA began testing the soil of 62 properties in West Deptford, after a large cache of discarded car battery casings was uncovered on a former EPA Superfund site, which is now a residential property in the Birchly Court Development. The test indicated high levels of lead, and the on-going clean-up

effort involves identifying and removing the contaminant debris, as well as many cubic feet of soil that had been covering the site.[87]

Recommendations to Address Lead Risks in New Jersey's Soil

Strategy 1: Incorporate stronger standards for lead in soil into existing efforts to address lead poisoning risks.

Action 1: Amend the safety standard for lead in soil to match the science-based standard of 80 ppm in California.

Action 2: Advance legislation calling for mandatory soil testing and reporting prior to the sale of a home; consider soil testing and reporting requirements for rental housing.

Action 3: Include funding for lead remediation in soil in state and federally-funded lead remediation programs, especially on properties where deterioration of lead-painted structures has caused high lead levels in surrounding soil or where other known sources exist or existed (lead paint manufacturers, smelters, battery plants, airports, etc.).

Action 4: Include lead hazard assessment and safety provisions in demolition permitting process.

Strategic Partners: New Jersey Department of Community Affairs, New Jersey Department of Environmental Protection, New Jersey Department of Health, Governor's Office, State Legislators, State and local advocates.

IV. LEAD POISONING SERVICES INFRASTRUCTURE IN NEW JERSEY

HEALTH DATA GAPS IN NEW JERSEY

Data in the Annual Report

The New Jersey Childhood Lead Exposure Annual Report, released yearly by the New Jersey Department of Health, presents a lot of information statewide, but lacks some key elements. The report presents data, but does not include meaningful analysis that would allow policy makers, advocates, service providers, parents and others to fully understand and plan to address the scope of the lead problem in New Jersey.

The report, for example, does not analyze lead screening or elevated blood lead level prevalence data at geographies smaller than the municipality, and it highlights the same list of municipalities year-to-year. This may fail to account for trends in community-level blood lead data and demographic and socioeconomic changes which could assist in the more strategic targeting of finite prevention resources.

The report does not track or compare elevated blood lead levels in the context of socio-economic characteristics, including race, ethnicity, poverty, or housing characteristics. This contextual information is important in understanding the groups that might be at highest risk for elevated blood lead level, and targeting resources and tailoring services to meet the needs of those groups.

In planning services to address the risk of lead exposure, it is important to understand how the lowered action level for services to children with EBL will impact need for service capacity for county and local health departments. Using 2016 EBL data as an indicator of future EBL rates, the statewide lowered action level is likely to have the greatest impact in the northern/north central counties of Essex, Passaic, Hudson and Union. It is anticipated that these counties will see the largest increase in EBL caseloads as services are mandated for children at 5µg/dL. Among municipalities, the anticipated impact of the lowered action level is likely to be largest in Newark, Paterson, and Jersey City, followed by Irvington, Trenton and Elizabeth.

The important step that New Jersey has taken to lower the lead action level will also impact service levels within specific communities, increasing the needs in particular neighborhoods and census tracts. It is important to

understand these needs at a granular level in order to be able to plan and allocate resources appropriately. There are, however, some challenges in the accessing of data for planning and evaluation of lead poisoning prevention in New Jersey. One of the biggest barriers is a political climate that makes information related to children's risk for lead exposure sensitive and sometimes requires high level approval within state government for routine data publications and release. This lack of transparency and failure to release available data hinders the provision of lead-related services and strategic planning in two important ways:

1. Effective geographic targeting of resources by public health and housing service providers and others is more difficult without granular level data depicting pockets of risk and low screening rates. This geographic level data is available but is not being released.

2. Applying for federal, philanthropic and other funds to support lead services and housing remediation is hindered by a lack of data to support targeting efforts for outreach, recruitment into the funded programs, and service provision in smaller geographic areas.

Lastly, current New Jersey regulations tie the state's level of action to the CDC's recommended level of action for lead, which is anticipated to drop to 3.5µg/dL in the near future. In anticipation of that drop, more detail is needed in the NJDOH annual report to understand the prevalence of blood lead levels less than 5µg/dL at the community level. It is expected

> [In New Jersey], no consolidated source of public information is available to ascertain the lead status of housing or view information regarding a property's compliance with past lead abatement orders.

that some communities that currently have fewer than 3 EBL cases per year will experience a large increase were the action level to decrease below 5µg/dL, which may necessitate hiring service providers or identifying partners to provide services in those communities. But the scope of that potential caseload increase cannot be calculated from the data in the Annual Report in its current format.

Housing Data Gaps

From 2008 through 2011, New Jersey had maintained a Lead Safe Housing Registry as part of the Department of Community Affairs Lead-Based Paint Hazard Control Program (LBPHC) (now defunded). The list included units that had been remediated through the low-interest and forgivable lead remediation loan program, as well as properties where the owner applied for lead free or lead safe certification. Currently, the New Jersey Housing Resource Center includes information about the disclosed lead status of housing on its searchable affordable housing property list, but the lead status of most NJ properties is not disclosed (as is the case in many states). No consolidated source of public information is available to ascertain the lead status of housing or view information regarding a property's compliance with past lead abatement orders . The lack of a Lead Safe Housing Registry and a public Lead Violation list also limits parents in their access to compliance information that could assist them in making lead safe housing decisions when seeking permanent housing.

Multi-family dwellings built before 1978 must be registered with the New Jersey Department of Community Affairs and are assessed a per-unit fee that covers periodic lead inspections. However, this registry information is not currently publicly available and is not integrated with housing code violation, Lead Violation or other property data at the local or state level. In some states, local or state Planning or Tax Departments publish searchable lists of pre-1978 properties, or share with other agencies lists of at-risk housing (pre-1978, child-occupied, low income rental properties). Some local health departments in other jurisdictions nationally maintain a publicly available list or searchable database of properties in the jurisdictions with outstanding health department lead violations. A similar system could be implemented in New Jersey in order to better coordinate enforcement, increase lead safe housing choices for parents, and target prevention efforts like prospective inspections or outreach and education.

Lastly, there is no publicly available, searchable database for current or past housing code violations in New Jersey properties which could assist health officials, tenants, advocates, researchers and others in enforcing codes, coordinating housing rehabilitation initiatives or providing individual tenant advocacy assistance. Understanding the history of a particular property or analyzing housing at the community level is strongly reliant on having accessible data on the housing stock and individual property compliance information.

New Jersey's state and local data systems should be refined and developed to allow for the evaluation of success based on community-level outcomes, to allow state government and other agencies to support innovation and success through evidence-based and strategic funding decisions, and to give the public access to data to make positive health and housing decisions including resource allocation, while safeguarding protested health information.

Recommendations to Address Gaps in New Jersey's Data Systems and Availability

Strategy 1: Create or refine data systems that promote inter-agency coordination.

Action 1: Improve public and agency access to testing data. Integrate state agency data systems that handle housing and health so that data is available to the appropriate officials and providers in order to coordinate and track services to children with EBLs or other housing-related health issues.

Action 2: Consider adopting a single intake portal for all state housing and health programs serving low income families, and/or standardize eligibility criteria so that data from one housing program may be used to qualify residents for other lead hazard reduction, weatherization and housing rehabilitation programs more seamlessly.

Strategy 2: Make more health and housing data available to providers, advocates, and the public.

Action 1: Mandate that New Jersey Department of Health and New Jersey Department of Community Affairs engage in regular data sharing through public portals, and consider adding a mapping function to existing state data portals for both health and housing.

Action 2: Re-instate the lead safe housing registry to improve lead safe housing choices for families when seeking rental housing and consider expanding the registry to include other healthy and energy-efficient housing characteristics.

Action 3: Increase data tracking and the availability of data analysis in more jurisdictions below the county level.

Action 4: Track and compare elevated blood lead level data by socio-economic risk factors, including race, ethnicity, poverty, housing tenure and age of housing, in order to better identify risks, and target resources.

Strategic Partners: New Jersey Department of Health, New Jersey Department of Community Affairs, New Jersey Department of Environmental Protection, Governor's Office, State Legislators, State and local advocates, Community-based service providers, and others.

CURRENT SERVICES TO FAMILIES OF CHILDREN WITH ELEVATED BLOOD LEAD LEVELS

Services to families of children with elevated blood lead levels across New Jersey are provided by local – and to some extent county – Local Health Departments often funded through the New Jersey Department of Health. Localities throughout the state vary in terms of services provided

Inspection and Abatement in Municipalities with 20 or more EBL cases 2016

	Cases	Inspection Required		Inspection Completed		Abatement Required		Abatement Complete	
	N	N	%	N	%	N	%	N	%
Newark	86	38	44%	6	16%	14	420%	0	0%
Jersey City	61	45	74%	44	98%	18	41%	6	33%
Trenton	40	31	76%	31	100%	24	77%	3	13%
Paterson	29	26	90%	26	100%	15	58%	8	53%
Irvington	28	12	43%	12	100%	9	75%	1	11%
Plainfield	25	19	76%	18	95%	16	89%	8	50%
Total	269	171	64%	137	80%	96	70%	26	27%

Source: New Jersey Childhood Lead Exposure Annual Report, 2016

and the eligibility thresholds to receive prevention services. However, state health regulations require that public health case management and environmental investigation services are provided to children with blood lead levels of 10 µg/dL or higher. Public health case management includes: contact from a nurse case manager, provision of lead poisoning prevention education and materials, and at varying levels of service, one or more nurse home visits to provide additional lead poisoning prevention education and follow-up contacts to ensure timely blood lead re-tests of the EBL child.

Environmental investigation involves a lead inspection/risk assessment of the child's primary residence to determine the source of the lead exposure that is causing the elevated blood lead level. New regulations (NJAC8:51), effective September 18, 2017, require environmental investigations for a blood lead test of a child that reveals a confirmed (venous) blood lead level of 5 µg/dL or above, which is a major step forward in addressing lead exposure risks for New Jersey's children. Despite the challenges initially faced in implementing this new action level, this policy change is critical in order to reduce lead poisoning rates as well as the long term detrimental impact of poisonings by having inspections and interventions occur at lower blood lead levels. If the environmental inspection reveals lead hazards in the property, a Notice of Violation is issued by the local department of health, which mandates that, pursuant to New Jersey Administrative Code 8:51 (NJAC 8:51), a property owner must complete "a set of measures designed to permanently eliminate lead-based paint hazards in accordance with standards established by the commissioner in compliance with standards promulgated by the appropriate Federal agencies. Such term includes:

1. The removal of lead-based paint and lead-contaminated dust, the permanent containment or encapsulation of lead-based paint, the replacement of lead-painted surfaces or fixtures, and the removal or covering of lead-contaminated soil; and

2. All preparation, cleanup, disposal, and post-abatement clearance testing activities associated with such measures."

Enforcement of Notice of Violation is typically carried out by the local health departments, who, pursuant to regulations, require lead hazard abatement[xi] to be completed within 60 days of the initial inspection and issuance of the order. If the Notice of Violation is not satisfied within 60 days, a summons may be issued for the property owner to appear in Magistrates Court. The success of enforcement efforts in properties where a child has an EBL is mixed throughout the state as only 56% of required abatements are completed within a year of the case being referred to the jurisdictional health department by the State Department of Health lead surveillance system.

Within the municipalities with 20 or more new EBL cases annually, only 67% of referred cases are classified as requiring an environmental inspection,[xii] according to the state's annual report. Of those requiring inspections, approximately 78% are completed, but fewer than 40% of required abatements are completed in the year in which the case is referred. Typically, the vast majority of elevated blood lead level cases should require an environmental inspection to ascertain the source of the child's lead exposure. It warrants further investigation to determine why the rate of environmental investigation is low and what measures need to be implemented to reduce compliance delays by property owners in satisfying Notices of Violation.

Some of the gaps noted above may be due to missing information in the state's blood lead surveillance system, LeadTrax. Blood lead test results are automatically reported in the system, however, environmental investigation information requires manual data entry for which staff time and other resources may not be as available at the local level or where consistent protocol and reporting implementation may be lacking.

The City of Newark represents an obvious gap in the data with a report of only one abatement in 2016 in the entire city. Data entry gaps may exist throughout the state which indicates that local health departments are not using LeadTrax as intended to effectively manage environmental services or track enforcement of abatement orders. They may also be using other less efficient systems of data tracking and rudimentary project management of EBL cases. The Newark Department of Health and Community Wellness, specifically, reports that over 150 units were remediated in the City using HUD funds in 2015, including homes of children with

[xi] Lead hazard abatement, as described in NJAC 8:51, includes removal, permanent containment or encapsulation of lead hazards.
[xii] The report does explain why roughly 33% of EBL cases were not classified as requiring an environmental inspection.

elevated lead levels. In interviews, staff reports that there is little need for enforcement of Notice of Violation related to elevated blood lead levels in Newark due to the fact that "everyone takes the grant and gets the work done." However, Newark-based advocates and service providers report long administrative delays and other barriers for families accessing HUD funds for remediation through the City.

Public health case management service levels also vary slightly at the local level. For example, in some areas, families receive a nurse home visit at a blood lead level of 15µg/dL, or two tests between 10 and 15, as required by NJAC 8:51. Other local jurisdictions are able to provide nurse home visits at one blood lead test level of 10µg/dL or above. The evidence suggests that nurse home visit results in lower lead dust load in homes, and can help to reduce blood lead levels (though evidence is not conclusive on the efficacy of home visits in reducing blood lead levels over 10µg/dL).[88] Home visits also provide caregivers with effective strategies to mitigate lead risks and encourage blood lead testing for children and pregnant women in the household.

Currently, lead public health case management services are funded through the NJDOH with an annual budget of $2.2 million for nurse case management and environmental inspection for children with elevated blood lead levels at or above 10µg/dL. As described above, this budget covers a geographically complex network of grantee agencies, providing services to a variety of communities, some in more remote, rural locations. In FY 2018, an additional $10M state allocation was provided to NJDOH for the purpose of providing funding to implement the newly adopted rules (NJAC 8:51). A Request for Applications was issued October 16, 2017 with an initial 6-month project period commencing January 1, 2018. Importantly, the funding stipulations require grantees to become Medicaid providers to secure reimbursement for public health case management activities. Up to 35 local health departments may be funded under this allocation.

Along with deeper pockets comes the ability to incentivize health departments to meet obligations regarding health and housing services. NJDOH could allocate resources according to a formula based on the best available lead poisoning prevalence data (using the action level of 5µg/dL) and other indicators of need, and require county and local health departments to use funds to reach a certain level of staffing and case capacity as well as EBL reduction benchmarks.

Children with a history of elevated blood lead levels are uniquely at-risk for developmental delays. Early Intervention (EI) services can mitigate the impact of lead by giving children strategies to overcome developmental delays. However, the Early Intervention (EI) system in New Jersey is not a risk-based model. Children who have a history of elevated lead levels can be assessed for services, but if a developmental delay of at least one standard deviation below the mean is not evident at the time of assessment, a child is not eligible for services. The current system offers no subsequent coordinated follow-up, and parents often don't seek EI services again if delays emerge after the initial assessment.

New State of New Jersey Regulations Lowering the Blood Lead Action Level

As noted above, in 2017, the State of New Jersey adopted amendments to NJAC 8:51 which lowered the state's blood lead level of action, the level at which local health departments are mandated to provide case management and environmental investigations services, and tied it to the Centers for Disease Control (CDC) blood lead reference level of 5µg/dL. If the CDC lowers the blood lead reference level in the future, New Jersey's blood lead level of action will also decrease. The new regulations will require that nurse home visits be conducted at an EBL of 5µg/dL. The lowering of the blood lead action level for public health case management and environmental investigation is an important and laudable secondary prevention measure but is anticipated to cause a 6-fold increase in caseloads and required services. The lowered action level may also amplify local variations in lead case management services and EBL response practices.

Local Capacity

Thirteen local or county health departments are funded by the New Jersey Department of Health to provide services to their jurisdiction. In smaller municipalities or areas without county coverage, services are provided by municipal health departments from other parts of the state. For example, the Paterson Department of Health employs one nurse full time, and a part-time licensed lead inspector/risk assessor. These positions are funded by NJDOH to cover Paterson and 14 other municipalities, some of which are located over 60 minutes in travel time from Paterson.[89]

With funding from NJDOH, health departments in Trenton, East Orange and others contract with municipalities outside of their jurisdiction to provide services in a similar fashion.

> …most of the health departments serving smaller urban and rural areas within the state report being under-resourced for lead case management, environmental investigation and remediation funding.

This approach to geographic coverage for lead inspection services in properties where a child has an elevated blood lead level is due in part to the limitations of the historically small budget for lead case management and environmental inspection services within NJDOH. Few resources existed in the past for building capacity for a robust framework for services throughout the state, and municipalities or counties with relatively few elevated blood lead level cases may not choose to devote local resources to leverage limited state funding.

With the exception of Newark and Trenton, the two New Jersey municipalities currently receiving federal lead grant remediation dollars, most of the health departments serving smaller urban and rural areas within the state report being under-resourced for lead case management, environmental investigation and remediation funding. On average, local health officials anticipate needing to at least double the current number of staff to provide services to the increased caseload of families as a result of the state's lowered blood lead action level of 5 µg/dL.

New Jersey's lowering of the blood lead action level is a very important action, which will expand services and reduce lead exposure risk for thousands of children statewide[xiii]. Current regulations hold local health departments responsible for providing all necessary services to children with elevated blood lead levels at 5-9µg/dL. The New Jersey Department of Health anticipates that an increase in the NJDOH budget for case management funding will pay for services to every child with an elevated blood lead level under the new rules. Local health departments have expressed the need for additional capacity around training, technological capability, and assistance in applying for other funding sources as providers work to build out services to children at this critical level of 5µg/dL, and anticipate using some of the additional funds to address those needs. State agencies, including NJDOH and NJDCA, may need to increase their ability to provide these services or contract with outside providers to assist in providing prevention services statewide.

Philanthropic investment can provide catalyst funding for innovative projects, initiate investments in projects that will eventually garner public sector savings, and provide gap funding for projects that are primarily funded through other sources. Engaging philanthropy in this work is anessential step to ensuring sustainability and seeding innovation. Philanthropic engagement can also play a key role in convening coalitions to advocate for policy solutions, improved services and sustainable support to prevent and mitigate the impacts of lead exposure. Coalitions of advocates, providers and policy experts have played a key role in addressing lead poisoning in New Jersey, including advancing effective legislation and lobbying for increased funding for case management.

New Jersey's advocacy community has been integral in advancing systemic policy and funding solutions to protect children from lead exposure. Engaging local community leaders, building advocacy capacity within underserved communities, and connecting community members to partner organizations are all important strategies to support and strengthen advocacy efforts statewide.

Local or state governments may not have the ability to directly seek or accept private sector funds, but can develop partnerships that provide access to these funds for programs operated by non-profit or other private sector entities that are implemented through local or state government.

[xiii] based on 2016 EBL data

Federal Lead Poisoning Prevention Funding

Agency	Funding Source	Service Area	Services	Award Amount	Award Date	Length of Funding
NJ Department of Health	CDC/PPHF	Statewide	Surveillance, Primary Prevention	$316,643 ($105,548 annually)	Sept, 2014	4 years
City of Newark	HUD – Lead Hazard Reduction Demonstration Grant	Newark	Inspection & Remediation	$3,400,000 ($1,133,333 annually)	Sept, 2016	3 years
City of Trenton	HUD – Lead-Based Paint Hazard Control Grant	Trenton	Inspection & Remediation	$2,150,331 ($716,777) annually)	Sept, 2016	3 years
County of Hudson	HUD- Lead-Based Paint Hazard Control Grant	Hudson	Inspection & Remediation	$ 2,424,097 ($80,699 annually)	Sept, 2017	3 years

Examples of this lie in many NJ universities and institutions; for example the work of Dr. Janet Currie at Princeton University has demonstrated the positive community-level impact of policies and resources that support lead remediation on lead levels and educational outcomes in Rhode Island. The lowering of New Jersey's action level presents a ready opportunity for a similar study, if appropriate data is available to document the benefits of lead hazard remediation and more aggressive enforcement policies to improve education outcomes and reduce costs for special education and the criminal justice system.

Notably, research completed by Dr. Currie detailed the impact of lead prevention legislation. In 1997, Rhode Island mandated that rental housing be certified as "lead safe" regardless of the presence of children at the time of unit turnover. By linking individual data on lead safety certification, preschool blood lead levels, and third grade test scores, Dr. Currie's team found that an increase in blood lead of just one unit corresponded with a three point drop in overall proficiency test scores in third grade, and that childrenliving in housing that was subject to the lead safe mandate had lower preschool lead levels and higher achievement in third grade, and that these changes were more significant among lower-income children and children of color.[90] Thus, policy solutions which change the underlying norm or standards for housing conditions, from an assumption that affordable rental housing is lead-burdened, to certification that it is lead safe can make a substantial positive community-level public health impact. Such solutions should be priorities for New Jersey in order to bring the state to the forefront in lead poisoning prevention and to increase the rate of lead poisoning's decline.

Regional Perinatal Cooperatives are currently funded by NJDOH to facilitate regional Lead Stakeholder Coalitions. They are also involved in direct services including home visits to pregnant and parenting women, provider education and other initiatives with birthing hospitals in the state.

As service providers to a variety of stakeholders, the Cooperatives are uniquely situated to implement primary prevention initiatives that target pregnant women, medical providers working with new parents, community health professionals and the public at large.

The New Jersey Birth Defects and Autism Registry is a network of case management units, tasked with reaching out to New Jersey families of children with special healthcare needs with connections to resources, healthcare and other services. The system is well-suited to assist with the additional case load of children at lower blood lead levels.

Recommendations to Support Current Services to Children with EBL

Strategy 1: Update the lead case management and environmental investigation infrastructure to eliminate inefficiencies and allocate resources using data-driven approaches.

Action 1: Reassess and update the framework for NJDOH funding of lead case management and environmental investigation services using enhanced data tracking and analysis so that resources are allocated more strategically based on: geographic efficiency of service delivery, EBL prevalence, poverty rates, housing conditions and other indicators of current community-level need.

Action 2: Increase state agencies' lead-related funding and infrastructure for capacity-building to local and county governments and service providers.

Action 3: Update New Jersey Administrative Code 5:17 to reflect 2012 HUD Lead Inspection Guidelines, including updating regulations to include exterior lead hazard inspections in initial EBL environmental investigations rather than delaying or precluding exterior hazard assessments.

Action 4: Integrate NJDOH services, including referral, case management and home visitation with NJDCA Lead Safe Homes Pilot Program so that more children with elevated blood lead levels have access to health, housing and energy services.

Action 5: Engage in partnerships with researchers from New Jersey's academic institutions to assess the efficacy and make the case for the positive impact of health and housing programs.

Action 6: Link abatement tracking requirements to funding, and provide training and support to local health departments to track and report inspections and abatement.

Strategic Partners: New Jersey Department of Health, New Jersey Department of Community Affairs, New Jersey Legislators, academic institutions, local health departments, state and local advocates, and non-profits.

Strategy 2: Develop and strengthen partnerships to expand direct services to children with EBLs and families at-risk for lead exposure.

Action 1: Leverage Regional Perinatal Cooperatives to enroll families in current lead-related service programs including the Lead Safe Home Remediation Pilot Project, and to provide home lead assessments and other direct services through their home visiting programs.

Action 2: Integrate Other Home Visiting and Care Coordination Resources including the New Jersey Birth Defects and Autism Registry family resource workers, for example, to assist families of children with special health care needs in accessing hazard remediation resources and education.

Action 3: Automatically assess children with a history of EBLs and children in the same household for Early Intervention services, and track them via periodic follow-up with parents and teachers until a child ages out of the EI system to ensure access to services as needed to mitigate the impact of lead exposure. Develop enhanced educational and behavioral therapy resources for children poisoned by lead.

Action 4: Include history of EBLs in the Child Health Report and Individualized Education Plan.

Strategic Partners: New Jersey Department of Health, New Jersey Department of Community Affairs, regional perinatal cooperatives, New Jersey Birth Defects and Autism Registry, New Jersey Early Intervention System (New Jersey Department of Health), New Jersey Department of Education, New Jersey Legislature, community providers, local school districts, and state and local advocates.

Strategy 3: Integrate Medicaid more clearly into the NJDOH childhood lead program and develop sustainable sources of funds for services to children with EBL.

Action 1: Approach Medicaid and NJ FamilyCare to negotiate and obtain approval for reimbursement of lead public health case management and environmental investigation for Medicaid patients with EBLs.

Action 2: Utilize CHIP dollars to support lead remediation in the homes of recipients.

Action 3: Incentivize appropriate lead screening for medical providers to increase lead testing rates.

Strategic partners: New Jersey Department of Health, New Jersey Department of Human Services, Medicaid Managed Care Organizations, community providers of health and housing services, state and local advocates, and non-profits.

Strategy 4: Work with Medicaid Managed Care Organizations to implement and evaluate a risk-based primary prevention pilot program with a tiered approach to services for families at the time of pregnancy or birth of a child in New Jersey, which would increase screening and mitigate lead exposure risks

Action 1: Develop partnerships with MCO's, either through Medicaid and NJ FamilyCare or individually, that would allow for direct services or reimbursement of lead exposure prevention services for the most at-risk members.

Action 2: Develop partnerships with philanthropic and private funders to catalyze pilot phase for a risk-based primary prevention pilot in selected communities to pilot the model as necessary.

Action 3: Provide targeted services, including outreach and education, health promotion, case management and home hazard remediation to families of pregnant women and/or children under six months residing in the census tracts with highest EBL prevalence. Outreach to focus on educational efforts to prevent exposure to lead in paint, dust, soil, water and other known sources of risk in the state or local jurisdictions (cosmetics, cultural practices, food, consumer products, etc.).

Action 4: Evaluate individual and community-level impact of risk-based primary prevention pilot program and expand services to additional communities around the state.

Strategic Partners: New Jersey Department of Human Services, Medicaid Managed Care Organizations, Philanthropic and private funders, Community service providers, and State and local advocates.

FUNDING

Remediation Funding and Other Resources

The current framework for providing lead hazard remediation assistance in New Jersey includes three sources of remediation funding: The Lead Safe Home Remediation Pilot Project, administered and funded through the New Jersey Department of Community Affairs (NJDCA); a US Department of Housing and Urban Development (HUD) Lead Hazard Reduction Demonstration Grant awarded to the City of Newark, and HUD Lead-Based Paint Hazard Control Grants awarded to the City of Trenton and Hudson County.

Federal Funding

Over the last 10 years, New Jersey has averaged approximately $3 million in annual federal funding for lead remediation from the Department of Housing and Urban Development's Office of Lead Hazard Control and Healthy Homes (OLHCHH). Current funding levels in the state are just below $2 million. This is a funding level that on its face may appear significant, however, most of the funding is concentrated in Newark and, more recently, in Trenton as these municipalities apply directly to the federal government for funds. The State of New Jersey's Department of Community Affairs has not received HUD funding since 2005, despite several rounds of applications, including most recently in 2017.

The goal of the City of Newark's HUD funded Lead Hazard Reduction Demonstration Grant Program is to provide lead remediation and healthy homes services in properties where children have been identified with elevated blood lead levels, as well as preventative services including lead remediation in low-income, at-risk properties. Newark has the capacity to do geographic analysis, which allows the health department to target resources to neighborhoods with the highest identified risks of elevated blood lead levels – primarily in the South and West sectors of the City. In these neighborhoods, inspectors complete outreach door-to-door, targeted screening identifies EBL cases, and the City completes on-demand lead inspection and preventative remediation using City, State and HUD funds.

The goal of the City of Trenton's HUD funded Lead-Based Paint Hazard Control Program is to provide lead remediation and healthy homes services to low-income, at-risk families in and around Trenton, including case management and home repair. The funds cover remediation, relocation, and some additional staff to provide healthy homes assessments and education, as well as services to families of children at 5-9µg/dL.

While the level of funding in Newark ($3,400,000), Trenton ($2,150,331) and Hudson County ($2,427,097) represents on-going success, New Jersey is not getting its fair share of federal funding for lead activities, and widespread and equitable geographical coverage of lead remediation funds has not been achieved in communities outside of Newark and Trenton. New Jersey could receive more resources if the state increases the number of HUD lead grant applications submitted by state agencies and local jurisdictions.

In an effort to remedy this, the New Jersey Department of Community Affairs applied for a 2017 HUD Lead-Based Paint Hazard Control grant for three years of federal lead remediation grant funding, but was not among the HUD awardees. The current proposed FY2018 HUD budget for the OLHCHH includes an increase from $110 million to $130 million in funding for lead hazard reduction grants for city, county and state grantees. Despite deep cuts in other critical areas of support for low-income families, proposed House and Senate budgets keep funding level or slightly increase support for lead remediation.

The New Jersey Department of Health's Childhood Lead Program is also currently the recipient of Centers for Disease Control Prevention and Public Health funds for

Lead-Safe Home Remediation Pilot Program Grantees

Agency	Service Area	Number of Units	Award Amount
PACO, Inc.	Hudson County (includes Jersey City)	40 units	$1,052,560
La Casa de Don Pedro	Essex County (includes East Orange, Irvington and Newark)	64 units	$1,503,961
ISLES	Trenton	50 units	$1,120,000
PRAB, Inc.	Middlesex County	60 units	$819,091
PROCEED	Union County (includes Elizabeth and Plainfield)	98 units	$2,154,593
Community Affairs and Resource Center	Atlantic, Monmouth and Ocean Counties	40 units	$947,769
Greater Bergen Community Action	Bergen County (includes Passaic and Paterson)	90 units	$1,420,956
Saint Joseph's Carpenter Society	Camden	65 units	$981,070
TOTAL		**507 units**	**$10,000,000**

lead surveillance, outreach and targeted services. NJDOH uses these funds to support lead surveillance systems and fund a coordinator position at the state level. The annual funding period for this current CDC grant is drawing to a close, and CDC funded childhood lead programs face similar funding level uncertainties past September, 2018. The FY 2018 proposed HHS budget for the CDC's Lead Poisoning Prevention Program maintains level funding at $17 million in annual funding for city, county and state grantees.

Staffing federal grants can be a challenge for state governments, due to the typical requirement of federal grant-funded program managers to devote 75% of their time to the project. New Jersey can address this by reallocating staffing resources and/or using contractor resources where possible to implement federal grants.

Another potential funding barrier exists in the mismatch between New Jersey's lead hazard abatement requirement in elevated blood lead cases and HUD's regulations which disallow the use of HUD lead grant funds for abatement in most instances. New Jersey Administrative Code 8:51 (NJAC 8:51) requires removal or containment of all interior lead hazards in the case of a property with an EBL child. In contrast, HUD OLHCHH specifically instructs lead grantees to engage in lead hazard control rather than lead abatement interventions as the primary remediation strategy pursuant to the HUD's stated cost-effectiveness research supporting hazard control remediation. Lead hazard control is focused on paint stabilization and interim control measures, while lead abatement is defined as any set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Permanent elimination includes the enclosure or encapsulation of lead-based paint through measures lasting for a period of at least 20 years or more. Abatement is not considered cost effective by the Department of Housing and Urban Development, but it's the gold standard for reducing lead exposure risk from a public health perspective.

HUD-funded lead hazard control activities support lead interim controls. New Jersey may need to utilize other resources, such as state funds, to support the higher level of lead abatement that the state requires. The cities of Newark and Trenton, two current HUD fund recipients, may be able to provide technical assistance to other potential grantees in the state in how to align a HUD-funded program plan with current New Jersey abatement regulations.

STATE FUNDING

Department of Health Childhood Lead Exposure Prevention Program

The Department of Health's annual childhood lead program budget in FY 2017 was $2.2 million. The New Jersey

Department of Health (NJDOH) funding is used to support elevated blood lead case management and environmental investigations at the local level. Two recent funding streams have increased or re-opened greater support of lead poisoning prevention work statewide. NJDOH has received an additional $10 million allocation in the state budget in FY 2018, to be used by county or local health departments for public health case management for children with elevated blood lead levels (at or above 5 µ/dL). The five-fold budget increase came about as a result of advocacy on the part of service providers and community groups and NJDOH is currently creating the plan for distribution of these additional funds.

Department of Community Affairs Lead-Safe Home Remediation Pilot Program

The Department of Community Affairs Lead-Safe Home Remediation Pilot Program is a $10 million state-funded initiative that is designed to replace the State's Lead Hazard Control Assistance Fund. According to funding guidelines, 10% of the Pilot Program funds may be used for properties occupied by a child with an elevated blood lead level and/or an outstanding Abatement Order, but the primary objective according to the NJDCA is for the funding to be used for primary prevention activities. The eight Pilot Program grantee agencies are geographically distributed throughout the state and many are also recipients of federal Weatherization Assistance Program funds through NJDCA. This funding strategy can facilitate coordination of lead remediation and weatherization services to low income residents, making units eligible for weatherization by supplementing WAP health and safety dollars to address lead-related deficiencies, and increasing affordability and housing stability of lead-safe homes post intervention by decreasing monthly utility bills through weatherization. The goal of the Lead Safe Home Remediation Pilot Project is to provide lead hazard remediation in owner- and renter-occupied one to three unit properties where children under age 6 reside in order to prevent lead exposure and reduce blood lead levels among young children.

The funded Pilot Project agencies are experienced in many aspects of housing repair program administration, however, grantee agencies are experiencing some initial challenges recruiting property owners and building contractor capacity for providing lead hazard assessment and remediation. One barrier is built into the program design. NJDCA required that funded agencies request proof of citizenship from any resident involved in the Project, including tenants in rental

properties. These requirements can be a barrier for agencies in gaining trust and buy-in for the Pilot Project, particularly in at-risk communities with high immigrant populations that sometimes resist participating in the program due to these requirements. Although this is a mandate for grantees receiving federal funds, the Pilot Project is state-funded, and so this requirement can be lifted at the State's discretion.

Importantly though, some areas of the state – where geographic analysis of lead screening rates and elevated blood lead data suggest that there may be unmet needs for targeted lead grant funding – are not covered by the first round of Pilot Project funding. These areas include Gloucester City, and more rural counties like Cumberland, Salem and Warren. Improved and granular-level data on housing and EBL prevalence would assist in strategically allocating funds for this program going forward.

Recommendations for funding lead poisoning prevention services at adequate levels to reach the goal of eliminating lead poisoning in New Jersey

Strategy 1: Increase and better align HUD Lead Grant funding in the State.

Action 1: The New Jersey Department of Community Affairs should more regularly apply for Lead-Based Paint Hazard Control and Lead Hazard Reduction Demonstration Grant funding from HUD's Office of Lead Hazard Control and Healthy Homes. Agencies should apply together with the New Jersey Department of Health, so that coordination between housing and lead case management services is clear, and health data can be used to target and measure the impact of housing interventions.

Action 2: The state should align efforts to apply for HUD funding across local and county jurisdictions, to identify what match and leverage funding is needed to support any such HUD lead grant application and ensure a larger number of applicants in New Jersey. Periodic planning meetings should be conducted jointly by NJDCA and NJDOH to secure new HUD lead grants yearly to jurisdictions in the state with particular emphasis on the most at-risk jurisdictions which have not received adequate grant funding resources.

Action 3: Reallocate staffing resources or use contractor resources to implement federal grants.

Strategic Partners: New Jersey Department of Community Affairs, New Jersey Department of Health,, county and local health departments, and State and local advocates.

Strategy 2: Re-dedicate the New Jersey Lead Hazard Control Assistance Fund for lead hazard remediation.

Action 1: Enact or amend state legislation to sustainably and robustly fund the New Jersey Lead Hazard Control Assistance Fund, which keeps state Lead Safe Home Remediation Pilot Program funding at or above its current $10 annual million level, re-instates the direct input of funds from the paint surcharge (rather than the current year-to-year budget allocation), and adds additional revenue through taxation of paint manufacturers with facilities in New Jersey.

Action 2: Consider including provisions for low-and–moderate income household plumbing and soil remediation in state lead remediation funding programs, in particular where lead in water sources are identified as the primary source of a child's elevated blood lead level in a home.

Strategic Partners: New Jersey legislators, Health and environmental advocates, Governor's office and others.

PUBLIC-PRIVATE PARTNERSHIPS

Role of Medicaid

There is another potential source of funds that fits into the current framework for providing lead related services. NJAC 8:51 requires that children with elevated blood lead level receive a home visit by a registered public health nurse who provides education and follow-up, connects families with resources, and manages the case and communicates with pediatricians, insurance providers and others regarding case status. Currently, public and private insurance providers are not billed by local health departments for these services despite the fact that NJ Medicaid regulations would allow for fee-for-service payments to clinical professionals for lead case management services. Similarly, lead inspections through environmental investigations are also not billed to Medicaid. This represents an untapped potential funding source to supplement existing resources and increase capacity, assuming the administrative capacity exists or could be built within local health departments to track services, collect and securely store insurance coverage information, and bill Medicaid as occurs in many other states.

In addition to providing direct support for ongoing case management activities, New Jersey has other opportunities to involve Medicaid in advancing lead poisoning prevention work. Other states around the country, including Michigan, Maryland and Rhode Island, have effectively obtained approval to use Medicaid and/or Children's Health Insurance Program (CHIP) funds to cover not only inspections and nurse case management for elevated blood lead levels, but also the remediation of lead hazards and prevention education. This use of funds is already approved within the Centers for Medicaid and Medicare Services' current regulations for CHIP, and requires no additional level of federal approval including a waiver.

Maryland has also been a leader in exploring innovations to Medicaid funding under a value-based system, and is in the transaction structuring phase of a major Pay For Success project with a team of providers who will offer evidence-based interventions to address asthma in the

> There is a potential to create innovative solutions to lead poisoning within the Medicaid value-based payment system, including structuring interventions that reduce lead levels, and prove out savings in Medicaid dollars.

home environment. There is a potential to create innovative solutions to lead poisoning within the Medicaid value-based payment system, including structuring interventions that reduce lead levels, and prove out savings in Medicaid dollars related to the physical, behavioral and chronic health conditions that arise from lead exposure further down the line.

Public/Private Investment Partnerships

New Jersey is a unique environment in which to grow public-private partnerships because of key philanthropic partners that include corporate, family and donor-funded foundations. One strategy to leverage these resources in support of lead poisoning prevention is to leverage the federal investment in services to address and prevent lead poisoning with local and private sector resources to spur groundbreaking new approaches. Another is to provide additional funding for evidence-based lead hazard reduction activities including resources from property owners, healthcare, philanthropy, paint and pigment manufacturers and impact investors

The New Jersey Housing Mortgage Finance Agency (NJHMFA) is a state agency dedicated to promoting and preserving affordable homeownership and rental opportunities in New Jersey, through direct grants and access to affordable financing for purchase and rehabilitation of existing housing. NJHMFA initiatives are financed through partnerships with lenders, appraisers, housing counselors, real estate market analysts and other public and private-sector partners and investors. NJHMFA represents an important model of public-private partnership in the area of housing rehab, and may present opportunities to address lead hazards through subsidizing and financing remediation.

Similarly, the New Jersey Environmental Infrastructure Trust (NJEIT), described in the Drinking Water Risks section above, utilizes private and public-sector funding to invest in drinking water infrastructure, and has a specific program for lead service line replacement.

Role of Philanthropy

New Jersey has a number of philanthropic partners, with over 120 national, statewide, family and corporate foundations and funders headquartered here. Many of these funders are interested in supporting improved health outcomes for children and improved environmental conditions and/or affordable housing. Additionally, the lead crisis in Flint, Michigan has had an impact on the level of public interest and available funding for lead-related initiatives nationally and in New Jersey. Philanthropic funding has been made available for policy analysis activities, but has not, thus far, been directed to direct lead hazard reduction services to families of children with elevated blood lead levels in any large measure or for more expansive prevention efforts.

By designing programs and agencies to align at the state level, exploring alternative private and public funding sources, and being willing to innovate, states such as Maryland have created a strong framework for lead poisoning prevention and healthy homes services that can be supplemented by philanthropy. New Jersey has the same set of opportunities to emerge as a national leader in this space.

Community Benefit Investments

In 2015, New Jersey hospitals spent over $2.75 billion in Community Benefit dollars, investments that are intended to address the upstream drivers of high healthcare costs, and result in tangible benefits to the communities served by healthcare institutions. Just under 0.3%, or about $7.5 million, was invested by hospitals cross New Jersey in the category of Community Building Activities, which include physical improvements, housing, economic development, community support, environmental improvements, leadership development, training for community members, coalition building, community health improvement advocacy, and workforce development. This relatively minor investment across a broad category of services does not go far enough to start to address the housing-related determinants of health in New Jersey communities, including lead exposure risks in aging housing. More attention needs to be focused on maximizing community benefit investments in the area of housing quality improvements specifically related to lead hazard remediation.

Recommendations to Leverage Public/Private Partnerships in New Jersey

Strategy 1: Engage public and private partners to provide more comprehensive services to prevent and mitigate the impact of lead exposure.

Action 1: Develop and expand financing mechanisms through public or quasi-public agencies, using private investment to support infrastructure and housing repairs in sectors that are not supported by the traditional investment market (i.e. the New Jersey Environmental Infrastructure Trust's $33.3 million grant and loan program for water systems serving low-income communities to subsidize lead service line replacement[91]).

Action 2: Incentivize hospitals to increase and utilize Community Benefit dollars, in partnership with community agencies, to address housing conditions that lead to elevated blood lead levels, under the "Community Building Activities" provision of the Community Benefit requirement of the Affordable Care Act.

Action 3: Develop low interest loans or other subsidized financing for property owners to proactively address lead hazards in housing, in partnership with NJHMFA.

Strategic Partners: Public/private financing agencies, hospitals, state and local advocates, and non-profits.

Strategy 2: Develop philanthropic and corporate sector investments to support capacity building, innovation and leveraged investments.

Action 1: Develop support for pilot projects to test the operational and economic feasibility of evidence-based health and housing programs, including integrated service delivery models that can generate Medicaid cost savings or utilize non-traditional funding sources such as Pay For Success.

Action 2: Develop support for up-front philanthropic, private sector and health care investment in lead Pay For Success projects with the expectation of a return on those dollars if the projects are successful.

Strategic Partners: Philanthropies, New Jersey Department of Health Services, community-based organizations and other providers, State and local advocates.

INTERAGENCY COORDINATION

Interagency coordination related to lead poisoning takes place at the state level through the Interagency Task Force on the Prevention of Lead Poisoning. The group was re-started in 2016 after several years in hiatus. Current areas of focus include updating the state strategic lead poisoning prevention plan[xiv] and sharing and disseminating information among the DOH-funded health departments and other agencies. While the Task Force serves a coordinating and information sharing function, the Task Force in its current form is not able to directly influence state-level lead policy, request data or apply for funding as a body.

State agencies have shown movement toward greater coordination at the highest levels through the New Jersey Population Health Action Team (NJ PHAT) which includes a Lead Work Group comprised of Commissioners from eight state departments (or their designees) and state department level subject matter experts. The stated purpose of the PHAT is to "work collaboratively on creating and advancing policies that build healthy communities and improve health outcomes".[93] Direction from the top levels of state agencies and the administration could break down a number of

[xiv] The statewide strategic plan outlines NJDOH's plan to provide services to children with elevated blood lead levels, including home visits, education, case management and follow-up, through partnerships and funding. The impacts of the strategies outlined in the plan are tracked via NJDOH's annual lead report. The update to the report is intended to address the lowered action level for case management and other services.

barriers to interagency collaboration including information silos, program overlap and redundancy, and conflicting eligibility requirements. This Work Group could also focus on leveraging and coordinating existing programs at the systems level and designing new programs to complement and better align with on-going efforts within other agencies.

Within the current framework for services, there are barriers to integration of agencies and programs at the state level. The Lead Safe Homes Remediation Pilot Project, for example, is not designed to align with the activities of the NJDOH childhood lead program's intake processes, data collection, eligibility criteria or program evaluation. NJDCA did not work with NJDOH or other state agencies to design or submit their application for HUD Lead-Based Paint Hazard Control funds, despite HUD's emphasis on the ability to track community-level health outcomes. The NJ Department of Health and the NJ Department of Community Affairs should work together to more effectively coordinate public health care management of lead poisoned children with administration of the state's lead remediation funding, so that lead hazards are addressed in homes of children with EBL.

Outside of state agencies, state and local advocacy organizations lead by Isles, Inc. and the Homes and Community Development Network of New Jersey, have created a task force called the New Jersey Lead Advisory Group, utilizing catalyst funding from The Fund for New Jersey. This group is able to work outside of and in parallel to state agencies, and advocate for policy solutions, greater transparency, more efficient cooperation and other innovations that can improve the framework for prevention services.

The most efficient approach to coordinating lead poisoning prevention services is at the systems level, starting with state-funded programs targeting at-risk families and known at-risk housing. When programs are designed to align - in terms of goals, eligibility, outreach methods, intake processes, services and data collection and sharing – it leads to cross-sector efficiencies that can save public dollars.

Homes in need of lead hazard reduction interventions often are poorly weatherized, contain other home-based environmental health hazards (mold, radon, asbestos, asthma triggers, and household injury risks) or have structural defects that place the occupants at risk of harm or result in the property being deferred by the lead grant program. An improved system is needed that includes a comprehensive assessment of properties that are applying for lead grant funding and includes interagency coordination to produce whole house interventions.

Recommendations to Advance Interagency Coordination in New Jersey

Strategy 1: Create and fund an interagency Lead Poisoning Prevention Coordinator, who will be responsible for advancing lead poisoning prevention initiatives statewide.

Action 1: Establish a role that is within state government, able to affect policy at a high level and work with state agencies to set the agenda for coordination of lead-related services and funding streams (i.e. a staff person in the governor's office).

Action 2: The Coordinator should work with key staff in the governor's office to set statewide priorities for addressing environmental lead from all major sources, including housing, institutions, drinking water and soil.

Action 3: Work to establish and implement a model for coordination of various funding streams and programs with state and local agencies working on lead and housing in New Jersey, and to increase lead poisoning prevention funding through various sources.

Strategic Partners: Governor's office, New Jersey Department of Health, New Jersey Department of Community Affairs, New Jersey Department of Environmental Protection, State and local advocates, and other state agencies.

Strategy 2: Strengthen and focus the work of current interagency groups in State government.

Action 1: Set an agenda for the Population Health Action Team (PHAT) Lead Work Group that includes coordinating state agencies at the highest level around data sharing and utilization between agencies, establishing a framework for systematic program coordination and opportunities for joint funding and cross-sector support for programs. Align with the work of the Interagency Task Force on the Prevention of Lead Poisoning, and allow for open communication between these two working groups so that there is alignment of goals, strategies and priorities.

Action 2: Strengthen the Interagency Task Force on the Prevention of Lead Poisoning, by inviting key stakeholders

outside of the current membership, allowing the body to elect leadership, setting a strong agenda with measurable goals, and seeking funding to function as an independent body. Align with the work of the PHAT Lead Work Group, and allow for open communication between these two working groups so that there is alignment of goals, strategies and priorities.

Strategic Partners: New Jersey Department of Health, Public Health Action Team Lead Poisoning Prevention Workgroup, Interagency Task Force Members, key stakeholders currently not participating in these groups, Governor's Office and relevant departments, and State and local advocates.

Strategy 3: Explore adoption of a statewide integrated housing services delivery model coordinating lead hazard reduction services and funding with healthy homes, energy efficiency, weatherization and housing rehabilitation programs to improve client service delivery, reduce client deferral rates and better leverage resources.

Action 1: Assess the feasibility of a coordinated model for housing service delivery in New Jersey, including current assets and gaps in services, and the viability of innovative, sustainable funding for housing services from Medicaid and other sources.

Action 2: Pilot coordinated services at the local level, evaluate the community-level impact of this approach and test assumptions in preparation to scale the model up to cover all of New Jersey.

Action 3: Utilize new and existing resources to cross-train housing professionals, building capacity for safe and comprehensive energy, health and safety interventions at the local level.

Strategic partners: Governor's office, New Jersey Department of Community Affairs, New Jersey Department of Health, other local and state government agencies and stakeholders, Community organization partners, Funders, Technical assistance providers, State and local advocates, and non-profits.

INNOVATIONS IN LEAD POISONING PREVENTION IN THE NATIONAL CONTEXT

A number of states around the country have engaged Medicaid in advancing and supporting lead poisoning prevention. In June 2017, CMS approved a proposal from the Maryland Department of Health and Mental Hygiene to launch a $7.2 million initiative to address two conditions of home environmental health - childhood lead poisoning and asthma. The initiative leverages federal funds available through the Maryland Medicaid Children's Health Insurance Program (CHIP) under the authority of a Health Services Initiative (HSI) State Plan Amendment. The Healthy Homes for Healthy Kids Program will receive $4.17 million in funding, using a combination of $3.67 million in CHIP federal matching funds and $500,000 in State fiscal year 2018 funds. The Childhood Lead Poisoning Prevention & Environmental Case Management Program will receive $3 million in total funding, using a combination of $2.64 million in CHIP federal matching funds and $360,000 in state funds.[94, 95] This arrangement could be an example for other states to use CHIP to fund an even broader set of healthy housing services that result in improved health outcomes.

In November 2016, CMS approved a Health Service Initiative submitted by Michigan Medicaid as a State Plan Amendment that included funding of $119 million over five years for abatement of lead hazards and related costs. CMS released a

memo stating that allowable activities under a HSI include, "the removal, enclosure, or encapsulation of lead-based paint and lead dust hazards; the removal and replacement of surfaces or fixtures, which can include water service lines and other fixtures identified during an environmental investigation as lead hazards; the removal or covering of soil lead hazards; and training to ensure there is a sufficient number of qualified workforce to complete the lead abatement activities."[96] Similar to Michigan and Maryland, the Ohio Department of Health is pursuing a CHIP HSI State Plan Amendment to leverage $5 million in federal funds for lead hazard abatement.[97]

CMS has approved Oregon's amendment to its Rule 1115 Waiver that allows for flexible services authorized by the waiver, and community-benefit initiatives conducted by their managed care providers to be classified as "health-related services" with the associated expenditures included in the numerator of the medical-loss ratio for those managed care entities. Air conditioners for members with respiratory issues are used as an example of the type of service that can be included.[98] A similar model could be used for environmental assessment and home remediation as health-related services.

In 2009, CMS approved the Rhode Island Comprehensive Demonstration 1115 Waiver, which encompasses the majority of Rhode Island's Medicaid program, RIte Care. RIte Care covers case management, education, assessment, and window replacement for lead-poisoned children.[99]

Maryland has seen a 98% decline in elevated blood lead levels from 1993 to 2015, most of which occurred after the passage of groundbreaking legislation designed to identify and reduce lead hazards in housing, improve compliance rates and provide more effectively targeted lead screening. Over the course of a decade, Maryland has passed over 30 pieces of prevention legislation including:

- First-in-the-nation Maryland Reduction of Lead Risk in Housing Law requiring proactive rental inspections and remediation of lead hazards in older rental properties
- Clean Hands Bill – requires certification that property owners are in compliance with the state's lead laws in order to collect rent in District Courts
- Strong lead law enforcement including heavy fines for violations
- Strong local housing code and Health Department Lead Violation enforcement
- Coordinated enforcement strategy developed with local Health and Housing Departments as well as licensing agencies
- Required testing of all children at 12 and 24 months
- Required lead dust clearance testing at rental turnovers in pre-1978 properties
- Private enforcement actions permitted through rent escrow process in District Court for the repair of lead hazards in non-compliant properties
- Required testing of schools

Similar innovations have been recommended in this report, and can be replicated in New Jersey to achieve more rapid reductions in blood lead levels in the state.

V. CONCLUSION

Each day, children in New Jersey are exposed to lead in their homes, child care settings, and through drinking water and soil. There are significant societal costs to lead exposure which stem from the neurological and long-term health effects of exposure in childhood, which disproportionately affect poor children and children of color. National and local events brought statewide attention to lead exposure and subsequent policy advances and funding, which create a unique opportunity to advance lead poisoning prevention in the state. Key policy reforms and investment in infrastructure would increase the safety of the environment, and risk-based prevention activities would prevent lead poisoning for New Jersey's most vulnerable children. The analysis and recommendations contained in the 2018 New Jersey Lead Poisoning Prevention Action Plan provide a comprehensive framework for action steps that can be undertaken by the state, local agencies and other prevention partners.

Eliminating Relevant Sources of Lead Exposure

Research tells us that drinking water accounts for as much as 20% of lead exposure risk (more for formula-fed infants), and as much as 70% of risk comes from lead-based paint in housing and other child-occupied facilities. Thus, many of the Action Plan recommendations to eliminate elevated blood lead levels in New Jersey's children focus on mitigating lead-based paint risks. Lead exposure risks, particularly in low-income rental housing, can be eliminated through a standardized statewide property maintenance code, enhanced lead specific standards, improved lead violation enforcement (including targeted lead inspections at time of unit turnover) at the state and local levels, and financial incentives for property owners to remediate and maintain older housing. The state should allocate resources for lead prevention resident education and lead risk assessment services using a

data-driven approach to targeting at-risk areas based on prior EBL prevalence as well as socioeconomic and housing factors. Some of these approaches require low-or-no cost policy changes, but the level of lead hazard remediation support required to effectively address lead hazards must come from increased federal, state and local funds as well as strategic private investment.

To address risks outside the home, New Jersey needs to set consistent standards in particular for lead-based paint testing in all child care, day care and educational facilities, and support remediation of lead hazards relate to paint, soil and drinking water in those environments. Risks in community drinking water require increased investment to support full lead service line replacement, and mandated lead testing and disclosure for drinking water upon property sale or occupant turnover. To remediate lead risks in soil, New Jersey should consider lowering standards for lead soil content, passing more stringent soil testing and disclosure regulations, including lead safety requirements in demolition permitting, and providing support for soil remediation through existing state and federal programs.

Targeted Primary Prevention

Supports to children who have been exposed to lead hazards are critical to mitigating lead's impact throughout the state, however, a primary prevention strategy allows children and families to avoid exposure altogether, preserving their ability to succeed, increasing lifetime earning potential and saving public sector dollars in the long term for investments in education and other priorities. A targeted, risk-based lead poisoning prevention program for available lead poisoning resources (including potential Medicaid funding) should be implemented that includes a tiered protocol to provide outreach, education, and remediation of environmental lead hazards for homes where children under age 6 reside and where known lead hazards exist. Using evidence-based indicators of lead exposure risk and a data driven funding allocation system, public and private prevention funding can be deployed to the most at-risk census tracts and individual homes.

While many of the recommendations in the Action Plan can and should be implemented immediately, the comprehensive primary prevention approach, including comprehensive policy changes, enhanced enforcement and innovative funding sources, could be piloted in a number of communities, evaluated and expanded to reach specific areas of highest lead risk across the state.

Supporting and Improving Services to Children with Elevated Blood Lead Levels

The network of services to children identified with elevated blood lead levels has been bolstered by $10 million in recent state investment and could be improved and further supported through key strategies to eliminate inefficiencies in how resources are delivered and increase support for educational and behavioral support services to mitigate the impacts on lead poisoned children. A more robust network for supportive services, including Early Intervention, home visiting and supports to children with behavioral health needs, can mitigate the impact of lead exposure on children and families' ability to succeed. Increasing case management and environmental investigation to improve policy and practices such as delaying the lead inspection/risk assessment for property exteriors must be implemented. Lastly, Medicaid must be more directly involved in supporting services to children with elevated blood lead levels, including reimbursing local health departments for case management and environmental inspections, and supporting lead remediation.

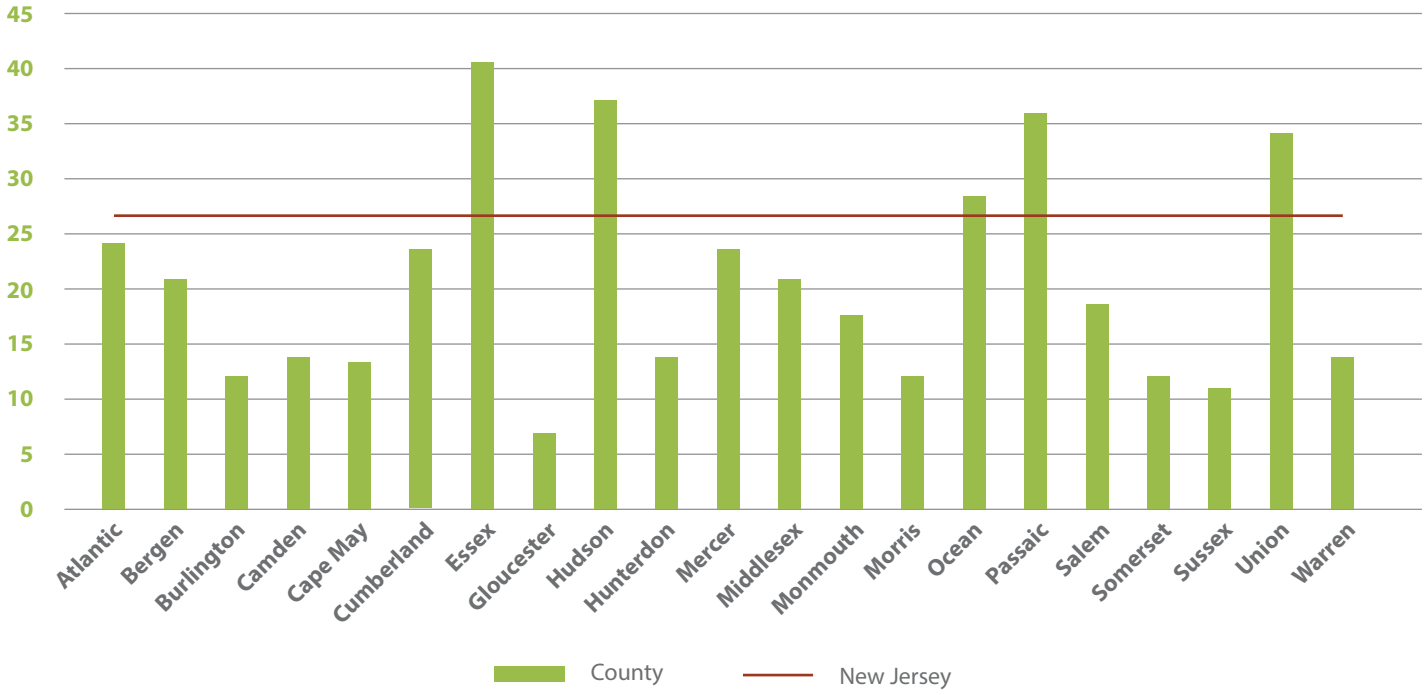
The Opportunity for the State of New Jersey

Key to the success of the strategies described above are opportunities to reform policies and increase and leverage investment, especially through public-private partnerships, and coordination of public policies and government services at state and local levels. The injection of public and private capital into programs that improve housing infrastructure and prevent adverse health outcomes saves public sector dollars, providing a basis for repayment of the initial investment. If New Jersey is able to harness current momentum to reduce lead risks, and invest meaningfully in effective lead poisoning prevention strategies, lead poisoning prevention can be achieved on a statewide scale, allowing New Jersey's children to realize their full potential, unburdened by the impacts of lead. By focusing on the causal sources of environmental lead exposure, supporting improvements to services to mitigate the impact of lead exposure, and investing in targeted primary prevention through data driven processes, New Jersey can fully eliminate childhood lead poisoning in the state in ten years.

VI. Appendix 1

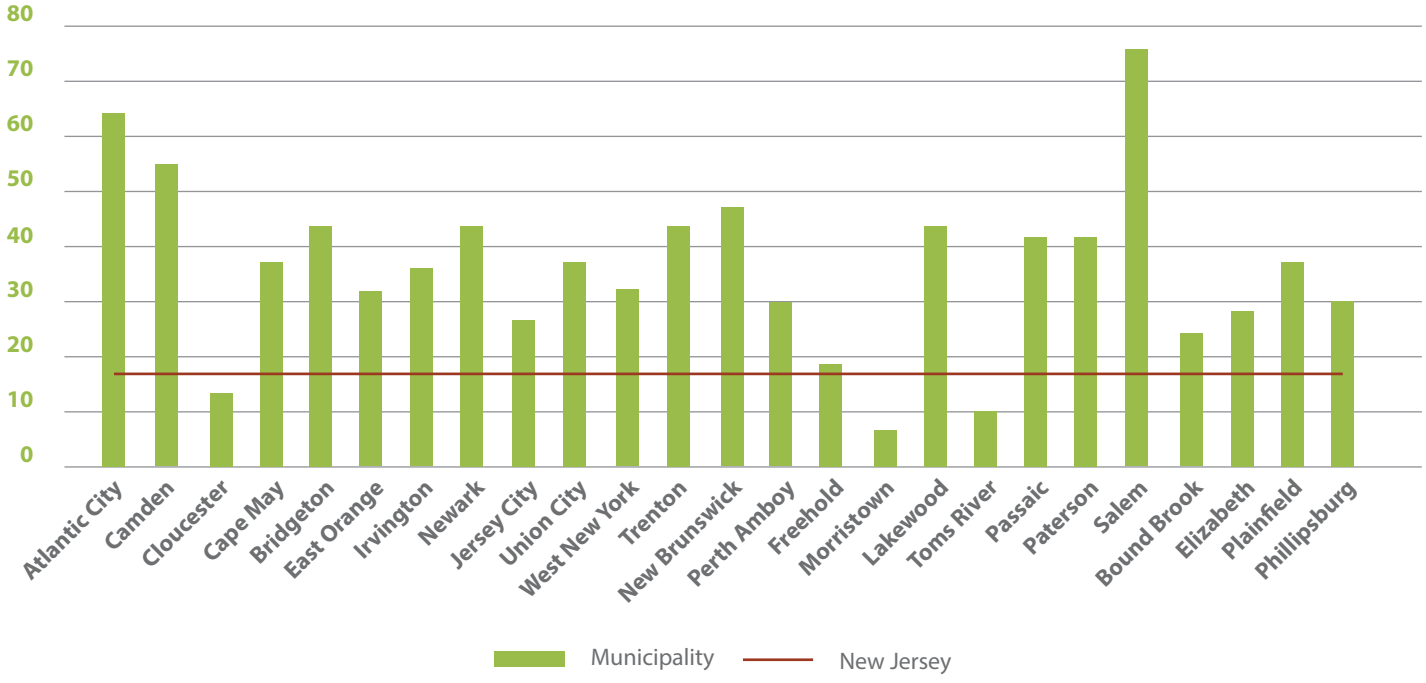
Percent Screened by County, Aged Six Years and Under, 2016

Figure 1



Percent Children Under 6 Years Below Federal Poverty Level, 2016

Figure 2



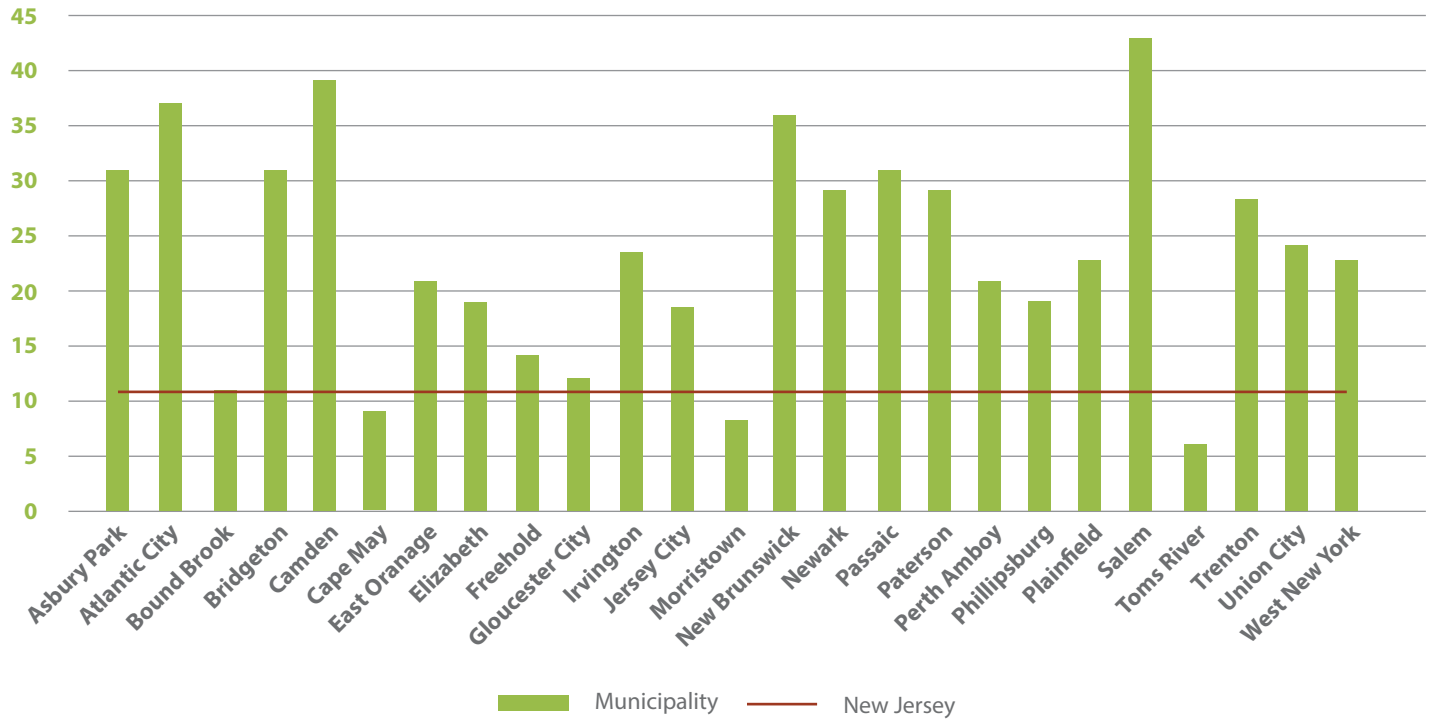
Screening Rates and Elevated Blood Lead Levels by Municipality, 2016

Table 1

Municipality	% Screened < 6 years	<5		5 to 9		10 to 14		15 to 19		20 to 44		> 45		Total
		N	%	N	%	N	%	N	%	N	%	N	%	N
Asbury Park	MISSING													
Atlantic City	45.5	1,526	7.91	133	7.9	9	0.5	3	0.2	5	0.1	0	-	1,676
Bridgeton	MISSING													
Bound Brook	MISSING													
Camden	24.5	1,994	95	79	3.8	8	0.4	3	0.1	2	0.1	0	-	2,086
Cape May	MISSING													
East Orange	36.7	1,899	94	107	5.3	13	0.6	5	0.2	7	0.3	0	-	2,031
Elizabeth	44.4	5,032	96	167	3.2	24	0.5	7	0.1	3	0.1	0	-	5,233
Freehold	31.4	665	98.2	11	1.6	1	0.1	0	-	0	-	0	-	677
Gloucester	3.6	161	96	3	1.8	2	1.2	0		0	-	0	-	166
Hackensack	35.2	1,109	97.6	22	1.9	3	0.3	2		0	-	0	-	1,136
Irvington	54.2	2,478	92	181	6.7	28	1	4		12	0.4	1	0.03	2,704
Jersey City	43.2	8,453	96	280	3.2	52	0.6	10	0.1	10	0.1	1	0.01	8,806
Lakewood	40	7,481	99	65	0.9	5	0.1	3	0	2	0	0	-	7,556
Morristown	MISSING													
New Brunswick	37.6	1,715	96	58	3.2	6	0.3	4	0.2	3	0.2	1	0.1	1,787
Newark	57.4	13,471	95	669	4.7	74	0.5	22	0.2	15	0.1	6	0.04	14,257
Orange	MISSING													
Passaic	54.2	4,295	96	131	2.9	18	0.4	4	0.1	9	0.2	0	-	4,457
Paterson	44.8	5,938	95	284	4.5	31	0.5	8	0.1	11	0.2	0	-	6,272
Perth Amboy	42.4	1,963	97	41	2	7	0.3	2	0.1	2	0.1	1	0	2,016
Phillipsburg	MISSING													
Plainfield	62.5	2,966	96	108	3.5	13	0.4	5	0.2	9	0.3	0	-	3,101
Salem	MISSING													
Toms River	21.7	1,211	99.3	5	0.4	1	0.1	1	0.1	1	0.1	0	-	1,219
Trenton	44.2	3,331	94	171	4.8	19	0.5	6	0.2	8	0.2	1	0	3,536
Union City	34.3	1,926	98	34	1.7	4	0.2	3	0.2	0	-	1	0.1	1,968
West New York	39	1,633	98	19	1.1	4	0.2	2	0.1	1	0.1	0	-	1,659

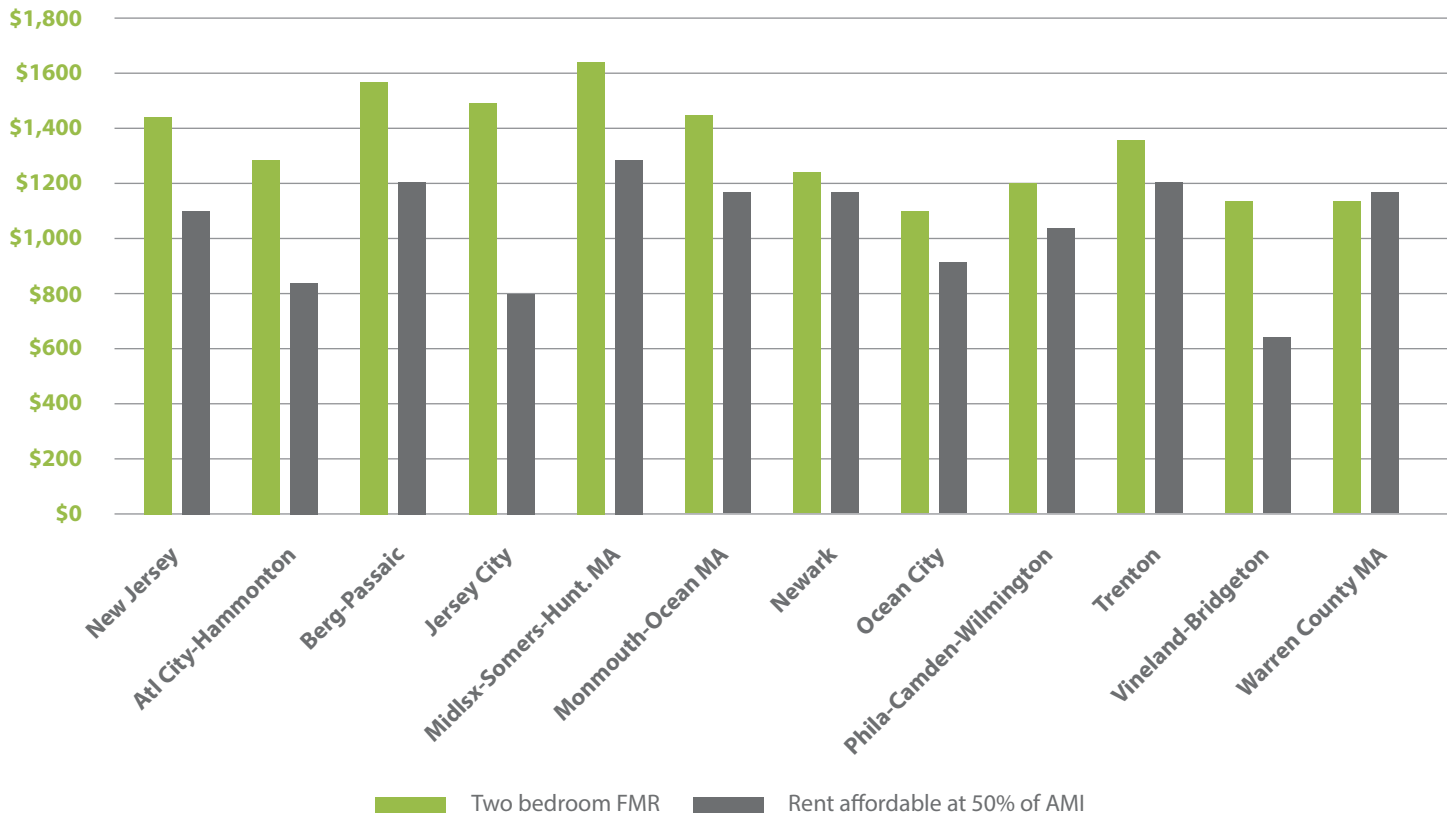
Percent below Federal Poverty Level, 2016

Figure 3



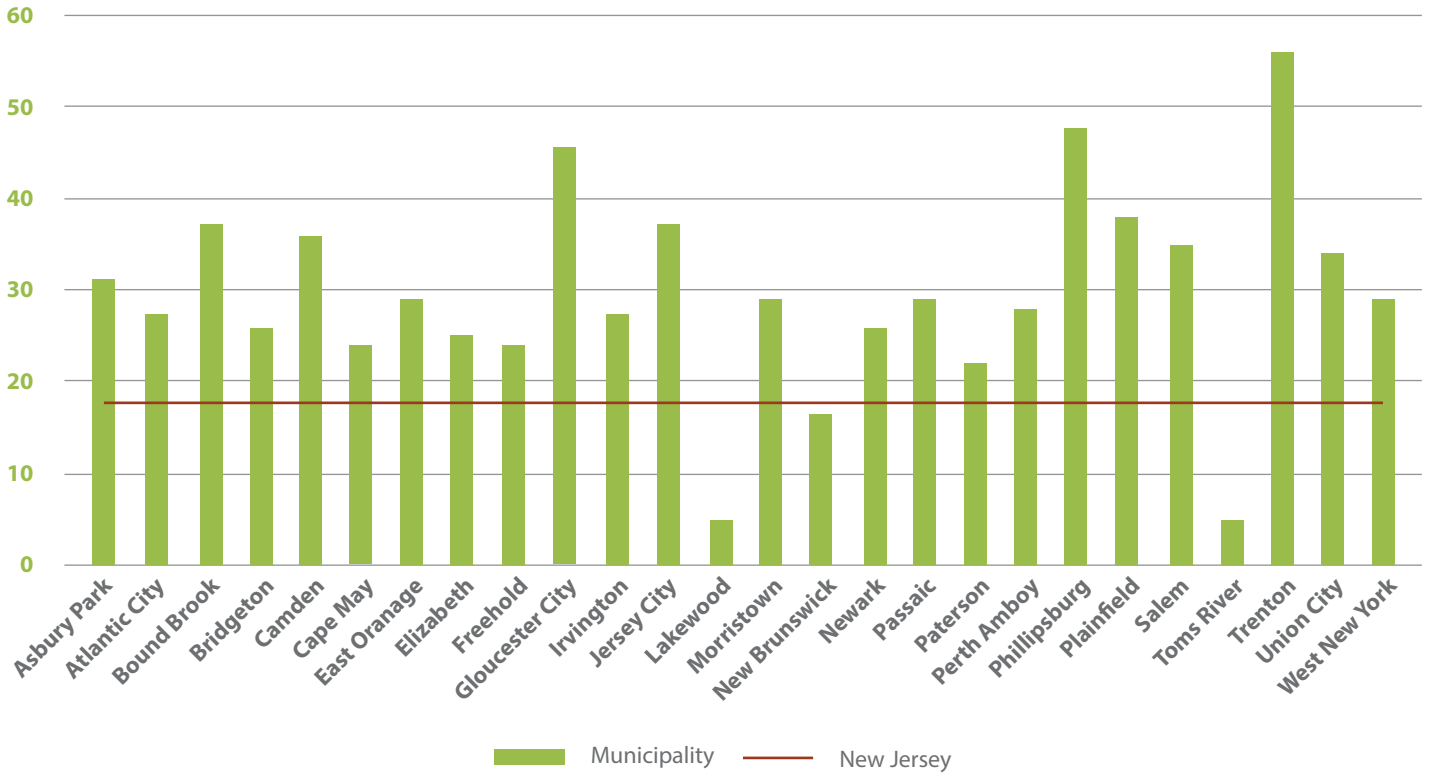
Fair Market Rent vs. Affordable Rent at 50% Average Monthly Income, by Metro Area

Figure 4



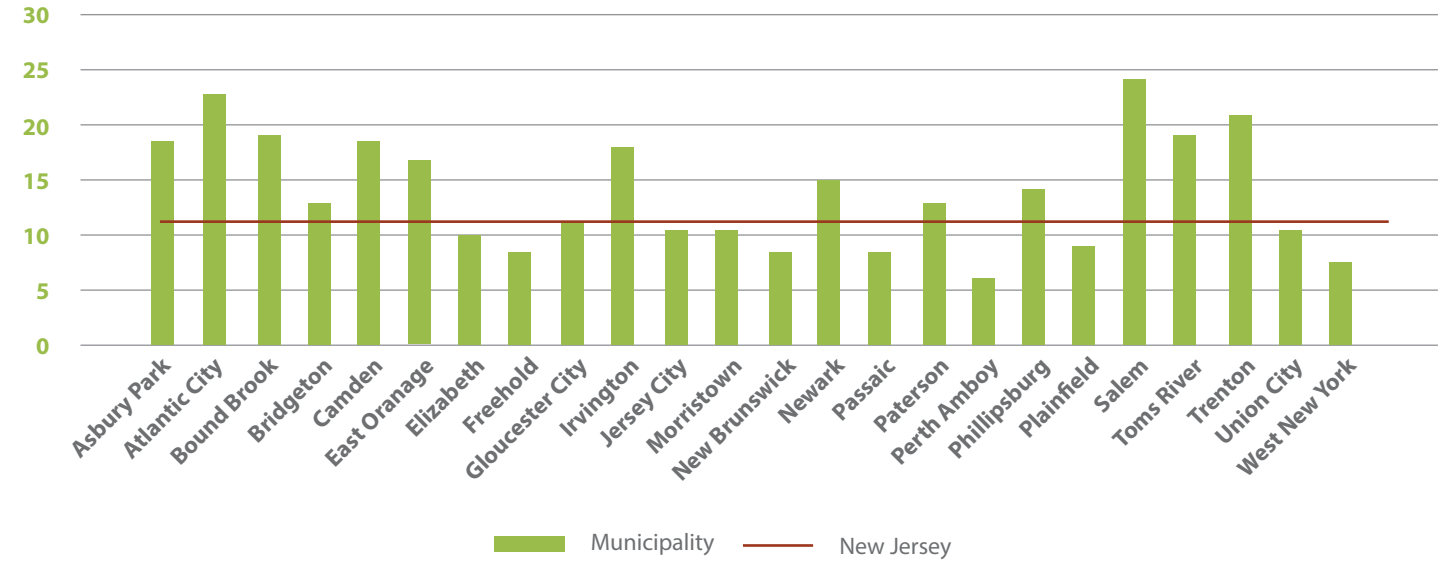
Pre-1940 Housing, 2016

Figure 5



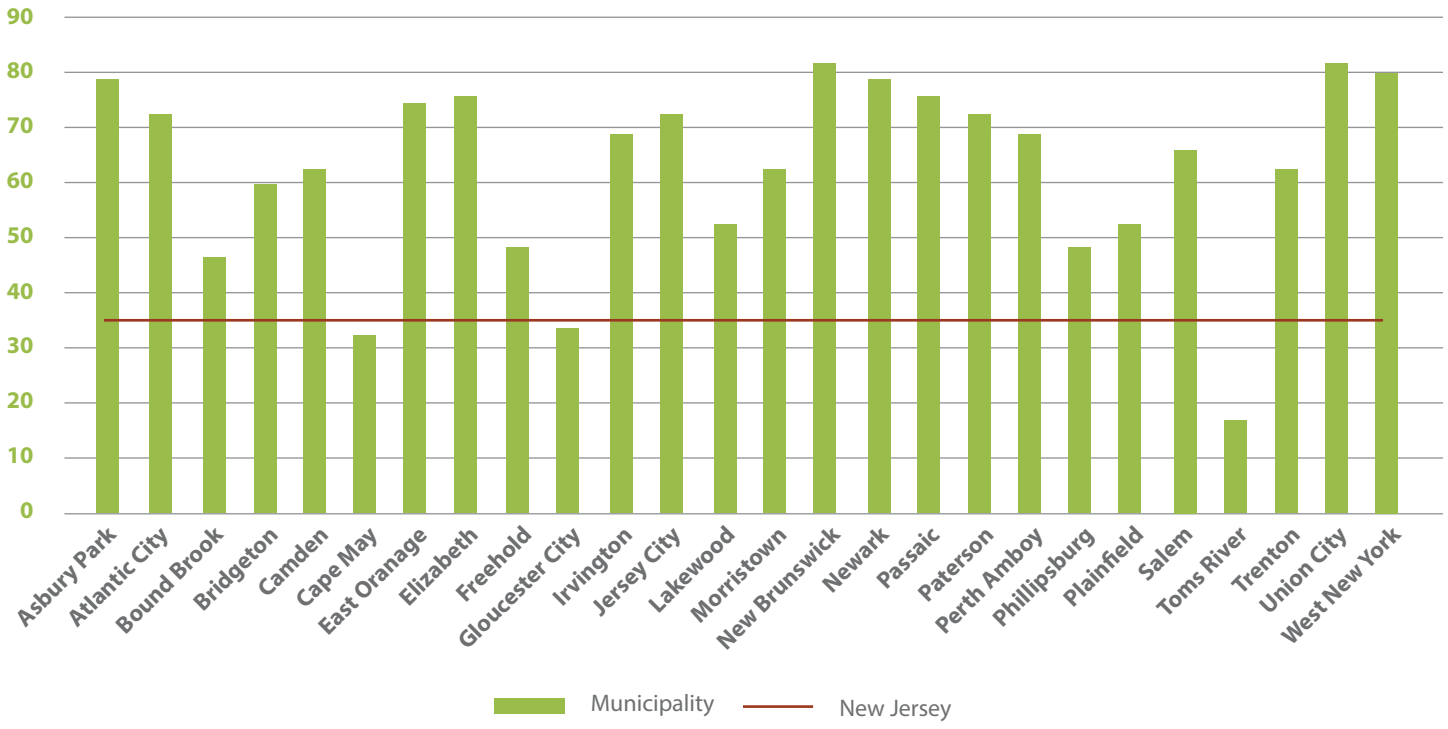
Vacant Housing, 2016

Figure 6



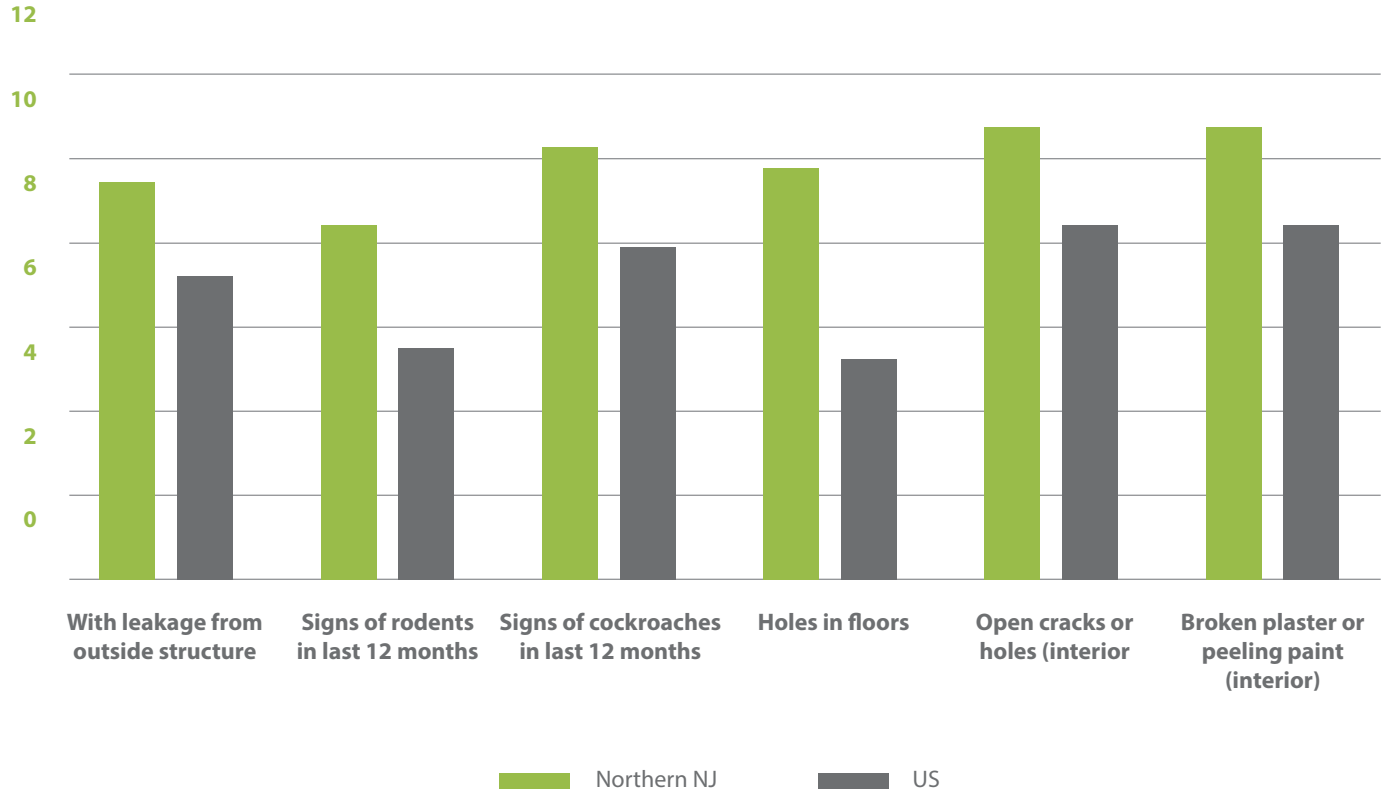
Percent Renter-Occupied, 2016

Figure 7



Housing Conditions, %

Figure 8



VI. Appendix 2

NEW JERSEY LEAD POISONING PREVENTION ACTION PLAN SUMMARY OF KEY RECOMMENDATIONS

To Address Casual Sources of Lead Exposure:

- In addition to the current general budget allocation for lead hazard remediation, re-dedicate surcharge funds to the New Jersey Lead Fund for lead hazard remediation, and increase overall funding for lead remediation.
- Support and promote policies that standardize housing code enforcement and recognize code enforcement as a tool to promote public health including lead poisoning prevention.
- Strengthen requirements to test and disclose results for lead in drinking water in residential properties.
- Update testing regimens and drinking water infrastructure to mitigate risks of exposure from lead in water.
- Consider increasing and target funding for the capital projects program to ensure that Abbott district schools are improved and maintained as needed to prevent and mitigate risks for lead exposure. Consider prioritizing schools with Head Start and Early Head Start programs.
- Incorporate stronger standards for lead in soil into existing efforts to address lead poisoning risks.
- Make more health and housing data available to providers, advocates, and the public.

To Invest in Targeted Primary Prevention:

- Increase Medicaid funding to support services to low-income families and children to reduce lead exposure risk and address the causes of lead poisoning.
- Develop philanthropic and corporate sector investments to support capacity building, innovation and leveraged investments.
- Work with Medicaid Managed Care Organizations to implement and evaluate a risk-based primary prevention program with a tiered approach to services for families at the time of pregnancy or birth of a child in New Jersey, which would increase screening and mitigate lead exposure risks.

To Support Improvements to Services to Mitigate Lead's Impact:

- Update the lead public health case management, environmental investigation and enforcement infrastructure to eliminate inefficiencies and allocate sufficient resources using data-driven approaches to respond to the lowered blood lead reference level.
- Equip educators with greater information in order to provide adequate services to children with EBLs in an effort to better mitigate the effects of lead poisoning.

VI. Appendix 3

NEW JERSEY LEAD POISONING PREVENTION ACTION PLAN LEGISLATIVE RECOMMENDATIONS

Address Lead Exposure Risks in Housing

1. Enact a law making receipt of a Certificate of Habitability a requirement for legally renting a property that meets or exceeds local standards, and include requirements for intact paint and other specific lead hazard reduction provisions recommended by the New Jersey Department of Community Affairs (NJDCA) in the Certificate of Habitability standard.

2. Mandate that all pre-1978 rental and owner-occupied housing is lead safe at the time of unit turnover or sale, indicating that the paint in the property is visibly intact, and the property has passed a lead dust clearance wipe inspection administered by a certified lead dust wipe technician or similar, accredited inspector. Dedicate appropriate level of funding for these inspections, and consider transfering authority and funds for inspections of one-and-two family properties to the local level. This represents a strengthening of current state regulations which mandate a visual inspection but no dust wipe clearance for rental properties. The State does not, in practice, complete visual inspections in one-and-two family rental properties.

3. Promulgate Lead Safe Demolition Standards and enforce at the local level to reduce the risk of lead emissions, debris and hazards contaminating adjacent properties and communities during the demolition of pre-1978 constructed properties.

4. Adopt a statewide uniform property maintenance code or other comparable code in particular for any jurisdiction that does not have an existing housing code, and/or coordinate adoption of a universal housing code by municipalities across the state. This represents a strengthening of the current regulatory framework, which is a patchwork of local property maintenance codes and rental property regulations.

5. Implement a targeted, proactive and mandatory housing code inspection protocol, in place of the current complaint-based system, which allows local or state inspectors to conduct inspections in all of the properties of an owner who is found to have violations in any property. This would support housing quality standards and lower barriers to enforcement such as resident fear of reprisals.

6. Increase rental housing inspections and enforcement of violations by mandating that local housing code officials statewide conduct periodic inspections for 1 and 2 unit rental properties, and provide resources to fully support these activities, including capacity-building, training and additional staff to local housing departments.

7. Improve retaliatory eviction protections for tenants who are attempting to get lead hazards repaired in their home or who are occupants in properties that are subject to housing code or lead violation actions.

8. Consider incorporating tax credits for homeowners as an incentive to complete lead remediation or repairs. This strategy is employed in Rhode Island, Michigan and Massachusetts.

Address Lead Exposure Risks in Water

1. Require utilities to develop plans for annual lead service line replacement goals and commit resources to work with property owners to replace the entire length of lead service lines (LSL's) under their control and ban partial LSL replacements.

2. Integrate lead in drinking water and the existence of lead pipes and lead service lines into current lead hazard disclosure requirements in connection with purchasing housing and obtaining a Certificate of Habitability for rental housing. Require that housing be tested for lead in drinking water and pipes as well as paint, and that results be disclosed to the buyer or renter. Consider mandating that lead hazards in drinking water be addressed at time of sale.

Address Lead Exposure Risks in Soil

1. Amend the safety standard for lead in soil to match the science-based standard of 80 ppm in California.

2. Advance legislation calling for mandatory soil testing and reporting prior to the sale of a home; consider soil testing and reporting requirements for rental housing.

Increase Access to Information

1. Mandate that New Jersey Department of Health Childhood Lead Program and New Jersey Department of Community Affairs engage in regular data sharing through public portals, and consider adding a mapping function to existing state data portals for both health and housing.

2. Re-instate the lead safe housing registry to improve lead safe housing choices for families when seeking rental housing and consider expanding the registry to include other healthy and energy-efficient housing characteristics.

Support Current Services to Children with EBL

1. Update New Jersey Administrative Code 5:17 to reflect 2012 HUD Lead Inspection Guidelines, including updating regulations to include exterior lead hazard inspections in initial EBL environmental investigations rather than delaying or precluding exterior hazard assessments.

2. Automatically assess children with a history of EBLs and children in the same household for Early Intervention services, and track them via periodic follow-up with parents and teachers until a child ages out of the EI system to ensure access to services as needed to mitigate the impact of lead exposure. Develop enhanced educational and behavioral therapy resources for children poisoned by lead.

3. Include history of EBLs in the Child Health Report and Individualized Education Plan.

Ensure Adequate Funding of Lead Poisoning Prevention

1. Enact or amend state legislation to sustainably and robustly fund the New Jersey Lead Hazard Control Assistance Fund, which keeps state Lead Safe Home Remediation Pilot Program funding at or above its current $10 annual million level, re-instates the direct input of funds from the paint surcharge (rather than the current year-to-year budget allocation), and adds additional revenue through taxation of paint manufacturers with facilities in New Jersey.

2. Consider including provisions for low-and–moderate income household plumbing and soil remediation in state lead remediation funding programs, in particular where lead in water sources are identified as the primary source of a child's elevated blood lead level in a home.

VII. REFERENCES

1. Rabinowitz M, Leviton A, Bellinger D. "Home refinishing: Lead paint and infant blood lead levels," *American Journal of Public Health*. 75(4) 1985. pp.403-4.

2. Gould E. "Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control. *Environmental Health Perspectives*. 2000 July; 117(7):1162-1167

3. Muennig, Peter. *The Societal Costs of Lead Exposure in New Jersey.* December, 2009. Retrieved from: http://leadpoisoninfo.com/pressreleases/NJ_Lead_Report_Final-5.pdf

4. Nick Newman, DO; Camille Jones, MD; Elena Page, MD; Diana Ceballos, PhD; Aalok Oza, MS. *Investigation of Childhood Lead Poisoning from Parental Take-Home Exposure from an Electronic Scrap Recycling Facility — Ohio, 2012.* Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report, July 17, 2015. 64(27);743-745. Retrieved from: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6427a3.htm

5. New Jersey Department of Health Consumer, Environmental and Occupational Health Service, Environmental and Occupational Health Surveillance Program. *Lead in Drinking Water Facts: Lead in Drinking Water at Schools and Child Care Centers.* Retrieved from: http://www.nj.gov/health/ceohs/documents/dwf_lead_schools.pdf

6. U.S. Environmental Protection Agency. "Integrated Science Assessment for Lead". National Center for Environmental Assessment. Office of Research and Development. June 2013. EPA/600/R-10/075F Errata Sheet created 5/12/2014.

7. U.S. Environmental Protection Agency. "Integrated Science Assessment for Lead". National Center for Environmental Assessment. Office of Research and Development. June 2013. EPA/600/R-10/075F Errata Sheet created 5/12/2014.

8. Lanphear BP, Roghmann KJ. "Pathways of lead exposure in urban children." *Environmental Research*. 1997; 74(1):67-73.

9. Lanphear B.P., Matte T.D., Rogers J., Clickner R.P., Dietz B., Bornschein R.L., Succop., Mahaffey K.R., Dixon S., Galke W., Rabinowitz M., Farfel M., Rohde C., Schwartz J. Ashley P., Jacobs D.E., "The Contribution of Lead-Contaminated House Dust and Residential Soil to Children's Blood lead Levels: A Pooled Analysis of 12 Epidemiological Studies," *Environmental Research.* 79:51-68, 1998.

10. Rabinowitz M, Leviton A, Bellinger D. "Home refinishing: Lead paint and infant blood lead levels," *American Journal of Public Health.* 75(4) 1985. pp.403-4.

11. Shannon, M.W., and J.W. Graef. "Lead Intoxication in Infancy." *Pediatrics* 89(1). 1992. pp.87-90.

12. American Academy of Pediatrics, Council on Environmental Health. "Prevention of Childhood Lead Toxicity". *Pediatrics.* 2016, 138(1) e20161493.

13. Gould E. "Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control. *Environmental Health Perspectives.* 2000 July; 117(7):1162-1167

14. Bellinger DC. "Very Low Lead Exposures in Children's Neurodevelopment". *Current Opinion in Pediatrics.* 2008 Apr; 20(2):172-7

15. Lanphear, Bruce P, Horung, Richard, Khoury, Jane, Yolton, Kimberly, Baghurst, Peter, Bellinger, David, Canfield, Richard, Dietrich, Kim, Bornschein, Robert, Greene, Tom, Rothenberg, Stephen, Needleman, Herbert L. Schnaas, Lourdes, Wasserman, Gail, Graziano, Joseph, Roberts, Russell, " Low-Level Environmental Lead Exposure and Children's Intellectual Function: An International Pooled Analysis. *Environmental Health Perspectives.* 2005, July. 113(7): 894-899.

16. U.S. Environmental Protection Agency. "Integrated Science Assessment for Lead". National Center for Environmental Assessment, Office of Research and Development. June 2013. EPA/600/R-10/075F Errata Sheet created 5/12/2014

17. Ibid.

18. Rabinowitz M, Leviton A, Bellinger D. "Home refinishing: Lead paint and infant blood lead levels," *American Journal of Public Health*. 75(4) 1985. pp.403-4.

19. Gould E. "Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control. *Environmental Health Perspectives.* 2000 July; 117(7):1162-1167

20. Bennett D, Bellinger DC, Birnbaum LS, Bradman A, Chen A, Cory-Slechta DA, Engel SM, Fallin MD, Halladay A, Hauser R, Hertz-Picciotto I, Kwiatkowski CF, Lanphear BP, Marquez E, Marty M, McPartland J, Newschaffer CJ, Payne-Sturges D, Patisaul HB, Perera FP, Ritz B, Sass J, Schantz SL, Webster TF, Whyatt RM, Woodruff TJ, Zoeller RT, Anderko L, Campbell C, Conry JA, DeNicola N, Gould RM, Hirtz D, Huffling K, Landrigan PJ, Lavin A, Miller M, Mitchell MA, Rubin L, Schettler T, Tran HL, Acosta A, Brody C, Miller E, Miller P, Swanson M, Witherspoon. "Project TENDR: Targeting Environmental Neuro-Developmental Risks". The TENDR Consensus Statement. *Environmental Health Perspectives.* 124:A118–A122;

21. EPA. "Risk Analysis to Support Standards for Lead in Paint, Dust, and Soil". EPA 747-R-97-006.TSCA Section 403 Report Chapter Two: Hazard Identification. June 1998.

22. Ibid.

23. Schneider, J. Mettil W. Anderson, D.W. "Differential effect of postnatal lead exposure on gene expression in the hippocampus and frontal cortex". *Journal of Molecular Neuroscience.* 2012, May. 47(1): 76-88.

24. Bellinger DC. "Very Low Lead Exposures in Children's Neurodevelopment". *Current Opinion in Pediatrics.* 2008 April 20(2):172-7

25. Shannon, M.W., and J.W. Graef. "Lead Intoxication in Infancy." Pediatrics 89(1). 1992. pp.87-90.

26. Schneider, J. Mettil W. Anderson, D.W. "Differential effect of postnatal lead exposure on gene expression in the hippocampus and frontal cortex". *Journal of Molecular Neuroscience.* 2012, May. 47(1): 76-88.

27. Nevin, Richard. "How lead exposure related to temporal changes in IQ, violent crime, and unwed pregnancy". *Environmental Research.* 2000, May; 83(1): 1-22.

28. Muenning, Peter. "The Social Costs of Childhood Lead Exposure in the Post-Lead Regulation Era". *Archives of Pediatric Adolescent Medicine.* 2009;163(9):844-849.

29. Landrigan, Philip J., Schechter, Clyde B., Lipton, Jeffrey M., Fahs, Marianne C., Schwartz, Joel, "Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality and Costs for Lead Poisoning, Asthma, Cancer and Developmental Disabilities", *Environmental Health Perspectives.* 110:721-728 (2002).

30. Bennett D, Bellinger DC, Birnbaum LS, Bradman A, Chen A, Cory-Slechta DA, Engel SM, Fallin MD, Halladay A, Hauser R, Hertz-Picciotto I, Kwiatkowski CF, Lanphear BP, Marquez E, Marty M, McPartland J, Newschaffer CJ, Payne-Sturges D, Patisaul HB, Perera FP, Ritz B, Sass J, Schantz SL, Webster TF, Whyatt RM, Woodruff TJ, Zoeller RT, Anderko L, Campbell C, Conry JA, DeNicola N, Gould RM, Hirtz D, Huffling K, Landrigan PJ, Lavin A, Miller M, Mitchell MA, Rubin L, Schettler T, Tran HL, Acosta A, Brody C, Miller E, Miller P, Swanson M, Witherspoon. "Project TENDR: Targeting Environmental Neuro-Developmental Risks". The TENDR Consensus Statement. *Environmental Health Perspectives.* 124:A118–A122;

31. EPA. "Risk Analysis to Support Standards for Lead in Paint, Dust, and Soil". EPA 747-R-97-006.TSCA Section 403 Report Chapter Two: Hazard Identification. June 1998.

32. Wright, John P., Dietrich, Kim N, Ris, M. D., Hornung, Richard W, Wessel, Stephanie D, Lanphear, Bruce P, Ho, Mona, Rae, Mary N. "Association of Prenatal and Childhood Blood Lead Concentrations with Criminal Arrests in Early Adulthood". 2008, May.

33. EPA. "Risk Analysis to Support Standards for Lead in Paint, Dust, and Soil". EPA 747-R-97-006.TSCA Section 403 Report Chapter Two: Hazard Identification. June 1998.

34. Ibid.

35. U.S. Environmental Protection Agency. "Integrated Science Assessment for Lead". National Center for Environmental Assessment, Office of Research and Development. June 2013. EPA/600/R-10/075F Errata Sheet created 5/12/2014

36. Ibid.

37. Ibid.

38. Reyes, Jessica W. "Lead Exposure and Behavior: Effects on Antisocial and Risky Behavior Among Children and Adolescents". National Bureau of Economic Research Working Paper 20366. August, 2014.

39. New Jersey Department of Health, "New Jersey Childhood Lead Exposure Annual Reports, 2000-2016. http://www.state.nj.us/health/childhoodlead/documents/reports

40. New Jersey Department of Human Services, Division of Medical Assistance and Health Services, Medicaid and NJ FamilyCare 2015 Annual Report.

41. American Academy of Pediatrics/Bright Futures. *Recommendations for Preventative Pediatric Health Care.* April, 2017. Retrieved from: https://www.aap.org/en-us/Documents/periodicity_schedule.pdf

42. CDC Advisory Committee on Childhood Lead Poisoning Prevention, "Low Level Lead Exposure Harms Children" January 4, 2012, p. 23, https://www.cdc.gov/nceh/lead/acclpp/final_document_030712.pdf.

43. CDC, "At-Risk Populations," last updated February 23, 2015, Retrieved from: https://www.cdc.gov/nceh/lead/tips/populations.htm

44. Department of Health and Human Services, Centers for Medicare and Medicaid. *Center for Medicaid and CHIP Services Informational Bulletin: Targeted Lead Screening Plans.* June 22, 2012. Retrieved from: https://www.medicaid.gov/federal-policy-guidance/downloads/cib-06-22-12.pdf

45. Committee on Energy & Commerce Democrats, "Pallone & Wyden Ask CMS for Information on Lead Screening Practices," June 24, 2016, https://democrats-energycommerce.house.gov/newsroom/press-releases/pallone-wyden-askcms-for-information-on-lead-screening-practices

46. Safer Chemicals, Healthy Families. *Children at Risk: Gaps in State Lead Screening Policies.* January, 2017. Retrieved from: http://saferchemicals.org/sc/wp-content/uploads/2017/01/saferchemicals.org_children-at-risk-report.pdf

47. New Jersey Department of Health. *FDA/CDC Health Advisory regarding Magellan Lead Care Analyzers: Information for Local Health Departments.* May 18, 2017. Retrieved from: https://njlmn2.njlincs.net/sites/default/files/Magellan%20LeadCare%20Advisory%20for%20LHDs%2020170518_0.pdf

48. New Jersey Department of Health, "New Jersey Childhood Lead Exposure Annual Report, 2016". http://www.state.nj.us/health/childhoodlead/documents/reports/childhoodlead2015.pdf

49. U.S. Census (2016). *Poverty Status in the last 12 months, by sex, by age, American Community Survey 5-year estimates*, 2016.

50. National Center for Children in Poverty. *New Jersey Early Childhood Profile.* January, 2017. Retrieved from: http://www.nccp.org/publications/pub_1170.html

51. U.S. Census (2016). *Poverty Status in the last 12 months, by sex, by age, American Community Survey 5-year estimates,* 2016.

52. United Way of Northern New Jersey. *ALICE: New Jersey*. Fall, 2016. Retrieved from: http://www.unitedwayalice.org/documents/16UW%20ALICE%20Report_NJUpdate_Lowres_12.13.16.pdf

53. American Academy of Pediatrics, Children's Hospital Association. *Medicaid Facts New Jersey.* January, 2017. Retrieved from: https://www.aap.org/en-us/Documents/federaladvocacy_medicaidfactsheet_newjersey.pdf

54. Green & Healthy Homes Initiative. "Strategic Plan to End Childhood Lead Poisoning: A Blueprint for Action". October, 2016.

55. Green & Healthy Homes Initiative. "Strategic Plan to End Childhood Lead Poisoning: A Blueprint for Action". October, 2016.

56. National Low Income Housing Coalition, "Out of Reach 2017". http://nlihc.org/sites/default/files/oor/OOR_2017.pdf

57. RealtyTrac. *2016 Annual Housing Report.* June 23, 2016. Retrieved from: https://www.housingwire.com.

58. US Census Bureau. 2015 American Community Survey. https://www.census.gov/data.html

59. Lanphear, B. P., Hornung, R., & Ho, M. (2005). Screening housing to prevent lead toxicity in children. Public Health Reports, 120(3), 305–310. doi: 10.1177/003335490512000315

60. US Census Bureau (2013). *American Housing Survey*, 2013. Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=AHS_2013_C05AOM&prodType=table

61. New Jersey Department of Community Affairs Division of Codes and Standards Landlord-Tenant Information Service. "Habitability Bulletin". 2008, February.

62. New Jersey Department of Health Consumer, Environmental and Occupational Health Service, Environmental and Occupational Health Surveillance Program. *Lead in Drinking Water Facts: Lead in Drinking Water at Schools and Child Care Centers*. Retrieved from: http://www.nj.gov/health/ceohs/documents/dwf_lead_schools.pdf

63. New Jersey Department of Environmental Protection, Division of Water Supply and Geoscience. *Lead in Drinking Water.* March 16, 2017. Retrieved from: http://www.nj.gov/dep/watersupply/dwc-lead.html

64. Passaic Valley Water Commission. *2017 Water Quality Report.* April, 2017 Retrieved from: http://www.pvwc.com/wp-content/uploads/2017/05/PVWC_1605002_2017CCR_2016WQReport.pdf

65. City of Trenton, Trenton Water Works. *2016 Water Quality Report.* 2016. Retrieved from: http://www.trentonnj.org/documents/2016%20Trenton%20Water%20Works%20CCR.pdf

66. New Jersey American Water. *2016 Annual Water Quality Report.* 2016 Retrieved from: http://www.amwater.com/ccr/coastalnorth.pdf

67. City of East Orange Board of Water Commissioners. *2016 Annual Drinking Water Quality Report.* Retrieved from: http://www.eastorange-nj.gov/ArchiveCenter/ViewFile/Item/84

68. Passaic Valley Water Commission. *2017 Water Quality Report.* April, 2017 Retrieved from http://www.pvwc.com/wp-content/uploads/2017/05/PVWC_1605002_2017CCR_2016WQReport.pdf

69. EPA, *Scientific Advisory Board Evaluation of the Effectiveness of Partial Lead Service Line Replacements* at 12-13 (Sept. 28, 2011), http://www.epa.gov/sites/production/files/2015-09/documents/sab_evaluation_partial_lead_service_lines_epa-sab-11-015.pdf.

70. New Jersey Department of Environmental Protection, Division of Water Supply and Geoscience. "Guidance for Developing a Lead and Copper Sampling Plan". 2017, March. http://www.nj.gov/dep/watersupply/pdf/lead-copper-spg.pdf

71. New Jersey Environmental Infrastructure Trust (2013). *New Jersey Environmental Infrastructure Financing Plan State Fiscal Year 2014 Financial Plan.* July, 2013. Retrieved from: https://assets.njeit.org/njeit/publications/sfy2014/SFY2014_May_Report.pdf

72. Hansen, Kristen, New Jersey Department of Environmental Protection. "The Lowdown on Lead Testing in Schools" *New Jersey School Boards Association School Leader Magazine.* November/December 2016. Retrieved from: https://www.njsba.org/news-publications/school-leader/november-december-2016-vol-47-no-3/lowdown-lead-testing-schools/

73. Matthau, David. Hochran, Adam. "These 88 NJ Schools Have Lead in the Water: Poland Springs is not a Real Fix, Activists Say". *New Jersey 101.5.* March 16, 2017.

74. New Jersey Administrative Code Chpt 17 § 5:17. Lead Hazard Evaluation and Abatement Code. 2014. Vol. 46 No. 21, November 3, 2014.

75. New Jersey Department of Children and Families. *Manual for Requirements for Child Care Centers.* March 6, 2017.

76. Ibid.

77. New Jersey Department of Environmental Protection. *Crosswalk for Lead Sampling in Schools and Child Care Centers.* July, 2017. Retrieved from: http://www.nj.gov/dep/watersupply/pdf/ntnc-school-crosswalk.pdf

78. New Jersey Department of Children and Families, Office of Licensing. *Child Care Licensing.*2017. Retrieved from: http://www.nj.gov/dcf/about/divisions/ol/

79. Enterprise Foundation, National Center for Healthy Housing. *A Guide to Implementing a Home-Based Child Care Lead Safety Program.* April, 2005. Retrieved from: http://www.nchh.org/LinkClick.aspx?fileticket=pRczRNDqJLk=&tabid=181

80. New Jersey Department of Community Affairs, *US EPA Lead-Based Paint Renovation, Repair and Painting (RRP) Rules.* 2010. Retrieved from: http://www.state.nj.us/dca/divisions/codes/alerts/pdfs/lead_epa_rrp_rules.pdf

81. Rutgers University, New Jersey Agricultural Experiment Station. L*ead-Contaminated Soil: Minimizing Health Risks.* May, 2010. Retrieved from: https://njaes.rutgers.edu/pubs/fs336/

82. Urban Homesteading. *Remediating Lead in Soil.* February 12, 2012. Retrieved from: http://urban-homesteading.org/remediating-lead-in-the-soil/

83. Barbara Laker & Wendy Ruderman. "River ward residents want city, others to protect kids from lead in soil". *Philadelphia Inquirer.* July 3, 2017.

84. New Jersey Department of Community Affairs. *Demolition Permits Yearly Summary Data.* 2016. Retrieved from: http://www.state.nj.us/dca/divisions/codes/reporter/demo_permits.html

85. Ibid.

86. State of New Jersey. *New Jersey Administrative Code NJAC 7:26D.* May 7, 2012. Retrieved from: http://www.nj.gov/dep/rules/rules/njac7_26d.pdf

87. Romalino, Carly. "EPA Clean-up could displace West Deptford residents". *Courier-Post.* June 22, 2017. Retrieved from: http://www.courierpostonline.com/story/news/local/south-jersey/2017/06/23/epa-proposed-lead-cleanup-neighborhood/421204001/

88. Brown, MJ. McLaine, P. Dixon, S. Simon, P. "A randomized, community-based trail of home visiting too reduce blood lead levels in children". *Pediatrics.* 2006 January;117(1):147-53.

89. Interviews with local and county health department staff, conducted by GHHI in April, 2017.

90. Aizer, Anna. Currie, Janet. Simon, Peter. Vivier, Patrick. "Do Low Levels of Blood Lead Reduce Children's Future Test Scores?" National Bureau of Economics Working Paper Series, Working Paper 22558. August, 2016. http://www.nber.org/papers/w22558.

91. Council of New Jersey Grantmakers, 2017. https://www.cnjg.org/about/our-story

92. New Jersey Environmental Infrastructure Trust (2013). *New Jersey Environmental Infrastructure Financing Plan State Fiscal Year 2014 Financial Plan.* July, 2013. Retrieved from: https://assets.njeit.org/njeit/publications/sfy2014/SFY2014_May_Report.pdf

93. Interview with New Jersey Department of Health childhood lead program, April, 2017.

94. Maryland.gov Press Release. http://governor.maryland.gov/2017/06/29/governor-larry-hogan-announces-multi-agency-efforts-to-reduce-lead-poisoning-asthma-cases/

95. Maryland Department of Health Presentation. https://mmcp.health.maryland.gov/Documents/MMAC/2017/February/MMAC%20Lead%20Presentation%20Feb%2017.pdf

96. CMS. Health Service Initiatives. Frequently Asked Questions. Jan 12, 2017. https://www.medicaid.gov/federal-policy-guidance/downloads/faq11217.pdf

97. Center for Community Solutions. http://www.communitysolutions.com/assets/docs/Public_Policy_incl_testimony/housepassed%20budget%20presentation_05152017.pdf

98. Oregon.gov 2017-2022 1115 Waiver Renewal http://www.oregon.gov/oha/HPA/HP-Medicaid-1115-Waiver/Pages/Waiver-Renewal.aspx

99. CMS Medicaid and CHIP Information. https://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Waivers/1115/downloads/ri/ri-global-consumer-choice-compact-fs.pdf

100. New Jersey Department of Community Affairs Division of Codes and Standards Landlord-Tenant Information Service. "Habitability Bulletin". 2008, February.


Green & Healthy Homes Initiative®


The Fund for
New Jersey


New Jersey
Health Initiatives
A BETTER STATE OF HEALTH