North Carolina CHIP Health Services Initiative Childhood Lead & Environmental Case Management and Healthy Homes for At-risk Medicaid-Eligible Children
State Plan Amendment (SPA) NC - DRAFT - *October 18, 2017*

Section 2.2 Health Services Initiatives – Describe if the State will use the health services initiative (HSI) option as allowed at 42 CFR 457.10. If so, describe what services or programs the State is proposing to cover with administrative funds, including the cost of each program, and how it is currently funded (if applicable), also update the budget accordingly (Section 2105(a)(1)(D)(ii); (42 CFR 457.10).

Background

The Centers for Disease Control considers a child to have an elevated blood lead (EBL) level if the lead in that child's blood is ≥5 µg/dL.[1] Lead exposure, in the form of paint chips or lead-contaminated dust from deteriorated lead-painted surfaces, continues to be an environmental hazard for many children in North Carolina. Out of an estimated 3,775,581 occupied housing units in North Carolina, 1,495,130 (39.6%) were built before 1980 and 351,129 (9.3%) were built before 1950.[2] As a result, North Carolina children, especially low- income children who live in older housing, are particularly vulnerable to lead exposure. In addition, while the primary source of lead exposure is deteriorating lead-based paint, changes in water treatment systems may increase blood lead levels.[3]

Exposure to lead can result in major physical and neurological damage to children, leading to serious consequences for their educational attainment and health including: stunted brain development, reduced intelligence quotient (IQ), hearing and speech problems, learning disabilities, anemia, hypertension, renal impairment and immunotoxicity, among a range of other conditions. In addition, children who are lead poisoned are seven times more likely to drop out of school and six times more likely to become involved in the juvenile justice system.[4] In 2015, there were an estimated 662,877 children under 6 years of age in North Carolina.[5] From 2014 to 2016, 383,987 were tested for lead poisoning (128,000 per year on average), and 1.3% of all children tested had EBLs ≥5 µg/dL. Interestingly, rural counties, where North Carolina's housing stock is the oldest and socioeconomic status is the lowest, have the highest concentration of these children.

Initiative Overview

North Carolina will use the health services initiative (HSI) option under Section 2105(a)(2) of the Social Security Act and 42 CFR 457.10 to advance a three-pronged initiative to combat improve the lives of children across NC:

1) *Program #1: Childhood Lead Poisoning Prevention Assessment, Education & Enforcement*: Expansion of county level programs to provide environmental assessment, in-home education, and lead hazard abatement with the aim of reducing the impact of lead for low-income children through programs delivered by all 86 North Carolina local health departments; and

2) *Program #2: Environmental Case Management and Healthy Homes for At-Risk Children*: Expansion of evidence-based programs to provide environmental assessment and in-home education programs with the aim of reducing the impact of lead and other environmental toxins on vulnerable low-income children. The program will be conducted by environmental case managers and community health workers seated in Local Health Departments (LHDs) and conducted statewide.

3) *Program #3: Data and Analysis Infrastructure to Support Lead Poisoning and Asthma Management Efforts*: Construction of a statewide data and analytical toolset to prioritize the efforts undertaken in Programs 2 & 3.

The proposed HSI Program #1 and HSI Program #2 are two distinct programs, and both will be supported by Program #3. Program #1 will serve eligible residents in the entire state of North Carolina and will be administered by all 86 local health departments. Program #2 will also serve eligible residents statewide, but will be administered by ten regionally-based Environmental Case Managers working out of a designated Local Health Department that takes the leadership for this program in each of 10 NC Public Health Regions, and the development of a trained Community Health Worker Program specifically for this purpose. Under both proposed programs, eligibility is limited to low-income children, who are enrolled in Medicaid or CHIP. Program #3 will help identify and prioritize all eligible at-risk children.

Program #1:

Childhood Lead Poisoning Prevention Assessment, Education & Enforcement

As a result of newly amended state law (General Statute 130A-131-7), families of children with elevated lead exposure (defined as a blood lead level of 5 µg/dL or greater) must be offered a home environmental assessment and homes of children with confirmed lead poisoning (defined as a blood lead level of 10 µg/dL or greater) must be abated or otherwise remediated of identified lead hazards. This state law is jointly administered by NC DHHS and 86 local health departments. State inspectors are responsible for conducting the initial home environmental assessment, and local health departments are responsible for providing enforcement of abatement requirements.

Other Medicaid funds reimburse for state inspectors who conduct the initial home investigation and no CHIP funds will be used for this purpose. North Carolina will continue to reimburse for these assessments using existing Medicaid funds (procedure code T1029). CHIP funds for Program #1 will be used primarily to support local health departments for assessment, education, and enforcement of existing state laws to protect lead-poisoned, low income children from continued lead exposure. CHIP funds will also be used to support environmental sample analysis by the NC State Laboratory of Public Health (State Lab) and legal consultation from the NC Office of the Attorney General.

From 2014 to 2016, there were 458 confirmed cases $\geq$10 µg/dL and 1,873 cases $\geq$5 µg/dL in North Carolina. More than 150 newly identified confirmed lead poisoning cases on average each year and

another 470 children with elevated blood lead levels of which 70% were Medicaid recipients. Program #1 will focus on assessment, education, and enforcement of lead hazard remediation in the homes and supplemental addresses (e.g., child care centers) of eligible children statewide.

The proposed HSI program will create an opportunity to remediate more than 150 homes in North Carolina each year. Under Program #1, eligible properties will include residential properties that are owner-occupied, occupied by a family member of the owner, or occupied by a tenant, as well as residential properties in the process of becoming licensed for, or currently maintaining a license for the provision of child care services. HSI funds will not be used for commercial, non-residential properties. Pregnant women are not eligible for the services proposed under the HSI.

To qualify for services through Program #1, children must meet two primary requirements. First, they must be enrolled in Medicaid or CHIP. Second, eligibility for Program #1 is limited to children with an EBL ≥5 µg/dL. When lead is detected in the residential property occupied by the eligible child, NC DHHS will provide lead abatement enforcement services to eligible properties reducing the overall risk of lead poisoning among low-income children in North Carolina. If the lead abatement work requires the families to vacate the premises, NC DHHS will provide relocation support for families.

If approved, Program #1 will have a proposed effective date of January 1, 2018, and will not be time limited.

Enrollment Strategy for Program #1 — Childhood Lead Registry

By state law, the NC DHHS Childhood Lead Registry (NC LEAD) receives electronic reports of all blood lead tests performed on North Carolina children aged zero to six years. A report is sent to NC LEAD after a child receives a test result from either an in-office (capillary) blood test or goes to a commercial (reference) laboratory for testing. If an EBL exists, the local health department (LHD) automatically receives information on the test results, as well as information for contacting the child's family. We will leverage NC LEAD to identify and enroll all eligible children with an EBL of ≥5 µg/dL. There are currently 2,360 children in NC LEAD with an EBL ≥5 µg/dL, of which we estimate that more than 1,650 are enrolled in Medicaid and thus eligible for this program.

North Carolina strives to test all children in the state at ages 1 and 2 years, which goes beyond the current mandated testing for Medicaid-enrolled children and children living in targeted "high-risk" areas of the state.[5] With support from the data and analytical toolset developed in Program #3 (see below), we will know on a house by house basis, which housing is most likely to contain biologically available lead. This information will inform the assessment, education, and enforcement work of LHDs. The state anticipates that the number of children and families who will be eligible to participate may increase in the short-term. However, based on historical trends and more than two decades of mass testing data, we expect to see a reduction in the number of children with lead poisoning long-term as ` housing is identified and remediated.

Services

Local health department activities to provide assessment, education, and enforcement are critical to improving long-term health outcomes for children with elevated lead exposure. In North Carolina, children less than six years of age are identified as having elevated exposure through blood lead testing routinely administered at 12 and 24 months of age and at other times as specified by state guidelines. All blood lead test results are electronically transmitted from accredited laboratories to the NC LEAD electronic data surveillance system where children are linked to properties investigated creating a "case event" in the database. Cases of children having an elevated blood lead level of 5 ug/dL or greater automatically populate a workflow in the database for follow-up by local health department staff.

Local Environmental Health Specialists (EHSs) receive training on NC LEAD as a part of being delegated authority to enforce childhood lead poisoning state laws in their jurisdictions. This training includes attendance at a state-sponsored 3-day workshop on childhood lead poisoning prevention and conducting practice field investigations and report writing under the guidance of a state inspector.

Using NC LEAD, authorized local EHSs are required to track children with elevated lead exposure and identify the child's home and other regularly visited properties, such as schools and child care centers and the homes of other family members. Access to NC LEAD is only granted to requesting local health department clinicians and EHSs after completion of on-line training to protect confidential medical information in accordance with HIPAA and NC DHHS requirements. All requests must be accompanied by a signed agreement from an EHS's supervisor. The NC LEAD data manager and epidemiologists provide regular instructional webinars for NC LEAD users on system software updates and new features. Local health department personnel can view and participate in these webinars from their offices and at regional educational programs.

Local health department staff must regularly monitor the NC LEAD database for eligible cases that require follow-up care. Appropriate educational materials (i.e., translated, educationally appropriate) are provided to families of identified cases. These resources are tailored to serve the family based on an extensive in-home interview and a standardized questionnaire. Information is provided to families on nutritional strategies to minimize lead exposure, specialized cleaning methods to reduce levels of household lead-contaminated dust, best practice hygiene methods for children and adults, and contact information for additional resources.

Authorized local EHSs make an initial site visit to the child's home to establish a date for an environmental investigation conducted by a state certified lead-based paint risk assessor, typically a NC DHHS inspector, and to collect a first-draw water sample from the residence. Water samples are analyzed by the State Lab to determine if lead is present in the water supply. Test results reported by the State Lab are provided to the family in addition to site specific consultation when tests results exceed the EPA maximum contaminant level for lead (15 ppb).

Authorized local EHSs also provide vital case coordination among the child's family, private medical providers, other local resources, and the state NC DHHS inspector. The local agent establishes an investigation date, contacts the state inspector, coordinates any necessary interpreter services, and ensures additional resources are provided to the family as needed.

Authorized local EHSs assist NC DHHS inspectors with conducting home investigations; however, certification to independently conduct lead-based paint inspections requires completion of an approved 5-day training course, and successful completion of an examination. In addition, to maintain certification two days of update training is required every two years. As a result of the additional training and licensing requirements as well as the expense of purchasing and maintaining an x-ray fluorescence (XRF) analyzer, most local health departments rely on NC DHHS inspectors to identify lead-based paint hazards during childhood lead poisoning investigations in their jurisdictions.

While a thorough investigation of the residence, communal areas, and play areas is conducted by the state inspector (who is a certified lead-based paint risk assessor), the authorized local EHS collects information regarding a child's habits, behaviors, and family exposure risks during an in-home interview with the parent or guardian. Surface coatings, such as paint, are tested on-site for lead content by the state inspector using an XRF analyzer, while additional environmental samples of suspicious non-paint items (e.g., toys, spices, candy) may be collected by the authorized local EHS and securely packaged and shipped to the State Lab for analysis of lead content. Materials used for sample collection during the investigation include: disposable gloves, sampling tubes, dust wipes meeting ASTM standards, data collection forms, dust sampling templates, shoe coverings, shipping containers and other supplies.

In North Carolina, when investigating the source of lead, lead paint is usually the culprit. However, other potential sources are always considered: time spent in other countries; pottery; cosmetics; foods; spices; candies; soil; and drinking water. Testing of other potential sources requires analytical laboratory support beyond the typical field measurements for lead paint using an XRF analyzer.

For properties testing positive for lead hazards as defined in NC General Statute 130A-131.7, notifications must be sent by the authorized local EHS to both the owner and occupants. Any identified hazards must be remediated in accordance with a plan reviewed and approved by the authorized local EHS. Approved remediation plans provide detailed information on the methods proposed to address identified lead hazards and timelines for completion. Property owners who fail to meet established timelines or are otherwise non-compliant are referred to the county attorney for enforcement action. Activities surrounding cases that require legal enforcement (e.g., administrative search warrants, warning letters, court action) are typically time consuming and often require consultation with the NC Office of the Attorney General.

The State recognizes that abatement activities would only be eligible for federal assistance when performance of these activities can be demonstrated to be effective. State law dictates that a clearance test must be performed after any remediation in response to a lead-poisoned child.

Clearance is conducted to verify the work area is safe enough for the eligible residents to return. On the inside of a house or apartment, the dust is tested to confirm that remediation work has not created lead dust hazards (as defined in state law) that can poison young children, other occupants, or pets living in the building.

Following completion of an approved remediation plan, the authorized local EHS coordinates with the child's family, the certified renovation or abatement contractor who completed the work, and the NC DHHS inspector to conduct a clearance inspection. This inspection involves both a visual examination of the work area and associated common areas and dust wipe sampling from these areas to verify that residual lead dust levels are below state and EPA established standards as stipulated in NC General Statute 130A-131.9C (see table below). Once again, regulatory dust samples must be securely packaged by the authorized local EHS and shipped to the State Lab for analysis of lead content.

Lead dust clearance standards

Material Tested	**Considered hazardous if lead is present at or above these levels***
Bare soil (child play areas)	At or above 400 parts per million (ppm) of lead
Bare soil (other areas)	At or above 1200 ppm of lead
House dust (floors)	At or above 40 micrograms of lead per square foot ($\mu g/ft^2$)
House dust (window sills)	At or above 250 $\mu g/ft^2$ of lead
House dust (window troughs)	At or above 400 $\mu g/ft^2$ of lead
Paint tested by an X-Ray Fluorescence (XRF) analyzer	Equal to or more than 1.0 milligrams per square centimeter (mg/cm^2) of lead on a deteriorated sampled surface or an elevated dust wipe sample corresponding to the surface.
Paint tested by paint chip analysis	Equal to or more than 0.5% (one half of one percent) lead by dry weight, or equal to or more than 5,000 ppm of lead.

**All levels indicated in the table above will be utilized until and unless more stringent guidelines are promulgated at the state or federal level.*

Many property owners choose a maintenance program to remediate lead hazards because of the lower cost compared to permanent abatement. If approved, maintenance programs require annual monitoring by the authorized local EHS and NC DHHS inspector. During an annual on-site visit, visual inspection and dust wipe sampling are conducted to determine that the property continues to be free of lead hazards. Owners and occupants of properties failing the monitoring inspection are notified via certified mail and given a timeframe in which to correct any lead hazards and schedule another clearance inspection. Legal support from the NC Office of the Attorney General may again be needed to draft appropriate warning letters as well as to pursue court action in some cases.

1) Monitoring Performance, Measuring Progress: Quality Metrics/Reporting Requirements

The State believes that this HSI, once approved, will help remediate identified lead hazards from homes and improve the health of Medicaid and CHIP eligible individuals. Providing for enhancement and expansion of the childhood lead poisoning prevention program will reduce the potential for ongoing exposure or re-exposure to lead hazards for the eligible population and future populations.

In order to monitor performance and quality, the State proposes to track the following key metrics and report to CMS quarterly, or at another approved interval, along with other metrics required by CMS:

1. Number of families with eligible children in NC LEAD who are contacted and informed that they may be eligible to participate;
2. Number of referrals received by NC DHHS to participate;
3. Proportion of referrals received that were subsequently enrolled;
4. Record of actual services provided in each house;
5. Clearance testing results for each home remediated, as well as proportion of homes remediated that pass the lead dust clearance test the first time;
6. Percentage of children receiving blood lead testing under EPSDT statewide; and
7. Percentage of children with an EBL statewide who have received services under this HSI.

Other metrics may be added at the agreement of the state and CMS during implementation of the HSI.

Program #3: Data and Analysis Infrastructure to Support Lead Poisoning and Asthma Management Efforts

Programs #1 and #2 will be supported by a data and analytical toolset designed to help identify and prioritize the highest risk geographic areas and specific children.

rity Model for the City of Durham coolaboration with the Children's Environmental Health Initiative (CEHI), now based at Rice University in Houston, Texas, but with continued staffing at Duke University in Durham, we developed a childhood lead exposure risk model that estimates relative risk of exposure to biologically available lead at the individual tax parcel level. With early funding from the CDC, CEHI used GIS technology and spatial statistics – combining county tax assessor, NC blood lead screening, and US Census data – to create household-level priority models for childhood lead exposure. **Figure 1** is a sample map drawn from the Durham County project. The map uses spatial analysis to categorize lead risk levels at the individual tax parcel unit level. Figure 1 depicts the priority categories for residences in Durham. Dark blue areas represent Priority 1 (highest risk) parcels, predicted most likely to contain lead paint hazards. Priority 2 and 3 parcels are colored medium and light green, respectively, and are less likely to contain lead paint hazards. Priority 4 (lowest risk) parcels are yellow and least likely to contain lead paint hazards. White areas represent commercial or industrial properties. Compared to

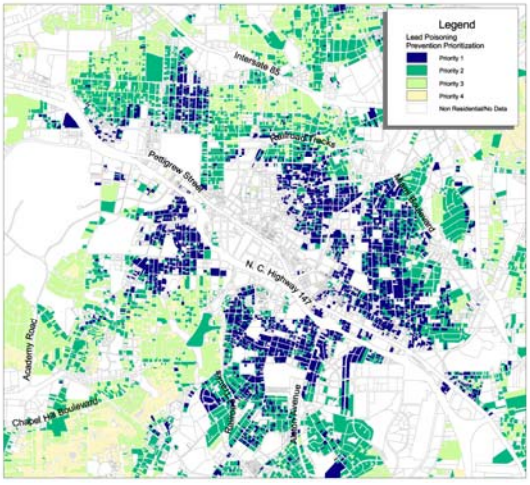

Figure 5. Childhood lead exposure risk model for Central Durham

South and Northeast Durham, Central Durham has a heavier concentration of higher risk parcels.

This map is the product of spatial statistical analysis that was then validated by collection of environmental samples. Analysis of environmental samples indicates excellent model fit and predictive performance. Holdout analyses on the original years of lead surveillance data yielded low prediction errors, and subsequent years of lead surveillance data were well-predicted by the models. In addition, when used in the field, the model has proven especially useful. For example, the Durham County Health Department's decision in 2003 to base its screening strategy on this model resulted in a 600% increase in its capture rate of children with elevated blood lead levels.

CEHI originally built this childhood lead exposure risk model for 43 counties in North Carolina, demonstrating the widespread replicability of this modeling approach. The previous effort was limited to 43 counties because tax assessor data were only available electronically for those counties. Tax assessor data are now available electronically for all 100 North Carolina counties.

We propose to contract with CEHI to develop a larger toolset to support Programs 1 and 2 to include:

- Updated and expanded childhood lead exposure risk models covering all 100 North Carolina counties
- A tracking tool for changes in water treatment system choices that may affect lead in water, along with the required water testing reported to the USEPA
- A spatial model that lays out school districting lines and the school-level and individual student absences, as well as any recorded information on presence of childhood asthma or other respiratory vulnerability
- An overall linkage of children in the NC LEAD database, Medicaid enrollees, and school records to understand the geographic distribution of at-risk children and to support enrollment of at-risk children into programs 1 & 2

All of the data and tools referenced above will be geographically referenced and analyzed so overall risks and children to be prioritized can be discerned. The tools will be made available through a secure platform for local personnel to use in delivering services through this proposed work. We note that we already have in hand the data, via data sharing agreements and approved IRB protocols, to accomplish all of the tasks laid out above.

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[1] https://www.cdc.gov/nceh/lead/acclpp/blood_lead_levels.htm

[2] Selected Housing Characteristics, 2011-2015 American Community Survey 5-Year Estimates. https://factfinder.census.gov/

[3] M.L. Miranda, D. Kim, A.P. Hull, C.J. Paul, and M.A. Overstreet Galeano. 2007. "Changes in blood lead levels associated with use of chloramines in water treatment systems." Environmental Health Perspectives, 115 (2): 221-225. PMCID: PMC1817676.

4 Recommendations for Blood Lead Screening of Medicaid-Eligible Children Aged 1-5 Years: an Updated Approach to Targeting a Group at High Risk. MMWR Recommendations and Reports, August 7, 2009/58(RR09); 1-11

[5] http://www.schs.state.nc.us/data/vital.cfm

Funding for Program 1: ***Childhood Lead Poisoning Prevention Assessment, Education & Enforcement Program***

Local health department aid-to-county - $1,000 per child for 750 cases annually ($750,000)

Office of the Attorney General - Attorney III ($150,000)

State Lab & GIS modeling ($100,000)

Year 1: CEHI Lead Risk Model update ($97,300) non-recurring

Year 2: State Laboratory of Public Health ($97,893) - Personnel ($90,893) & Supplies ($7,000)

Total annual cost: $1,000,000