

# **Childhood Lead Surveillance Plan**

## **Maine Healthy Homes and Lead Poisoning Prevention Program (MHHLPPP)**

### **Background**

In 2002, Maine revised legislation mandating blood lead screening tests for all children at 1 and 2 years of age by adding a determination of risk (MRSA 22 Chap 252 § 1314-A). The revised legislation mandates testing for all children at 1 and 2 years of age unless a provider determines that the child is not at risk for lead exposure. This statute included language reiterating the federal mandate to screen all Maine Care (Medicaid) enrolled children at 1 and 2 years of age with a blood lead screening test. This law provided the framework and foundation for Maine's statewide lead screening plan. The choice of screening at ages 1 and 2 was based upon random national blood lead data from the National Health and Nutrition Examination Survey (NHANES) III suggesting that 1 and 2 year old children are at the most vulnerable ages for lead poisoning. A lead risk assessment questionnaire is used to determine risk status (see below).

#### **Lead risk assessment questionnaire**

1. Does your child spend more than 10 hours per week in any house built before 1950?
2. Does your child spend more than 10 hours per week in any house built before 1978 that was renovated or remodeled within the last 6 months?
3. Does your child spend time with an adult whose job exposes him or her to lead?  
(Examples: painting, construction, metal workers including metal recyclers)
4. Is your child enrolled in MaineCare?

If a child's parent answered 'Yes' or 'Does not know' to one or more of these questions, the child should have a blood lead test.

Maine state law also mandates that all blood lead samples drawn from children under the age of 6 must be analyzed at the State Health and Environmental Testing Laboratory (HETL). The Maine Healthy Homes and Lead Poisoning Prevention Program (MHHLPPP), housed within the Maine CDC, monitors the results of these blood lead tests as part of their Childhood Lead Poisoning Surveillance System.

As noted above, the MHHLPPP has an established childhood lead poisoning surveillance system. This surveillance system uses a combination of clinical laboratory data, management data, and environmental data to describe the burden of childhood lead poisoning, estimate risk factors associated with lead poisoning, and evaluate prevention activities and interventions to reduce lead poisoning in children. Annual screening, testing, and elevated blood lead level rates stratified by calendar year or birth year over time, geographic location, sex, and age are used in combination with environmental data, such as home inspections, and risk factors, such as Pre 1950 housing, to describe childhood lead poisoning in Maine.

The MHHLPPP Surveillance System utilizes advanced techniques, such as, geospatial mapping to enhance their surveillance system. Using laboratory testing data, MHHLPPP identified areas at high risk for lead poisoning in Maine

using their enhanced mapping techniques. This information has allowed the MHLPPP to focus prevention activities in an efficient manner.

In addition to enhanced mapping, the MHLPPP is able to disseminate data and information from their surveillance system more readily and to a broader audience. The MHLPPP in partnership with the Maine Environmental Public Health Tracking Program (ME EPHT) provided surveillance data for display on the ME Tracking web portal available at 'https://tracking.publichealth.maine.gov/'. The ME Tracking web portal provides a query-able interface that displays data at differing geographic levels stratified by characteristics most appropriate to the underlying data. In partnership with ME EPHT's national partner, National Environmental Public Health Tracking Network, MHLPPP approved the display of Maine specific data and measures on the National web portal located at 'http://ephtracking.cdc.gov/showHome.action.'

This surveillance plan includes the goals and objectives of the system, a description of the system, indicators and measures monitored by the system, and the timeframe for dissemination of information collected from the system.

## Goal

The surveillance goals for the MHLPPP are:

To provide data and surveillance support in a timely basis to improve targeted primary prevention activities;  
To provide data and surveillance support in a timely basis to inform and direct case management activities; and  
To support stakeholders and the general public by responding to data requests and providing data through the ME-EPHT web portal.

## Major Objectives and Activities/Strategies

The MHLPPP surveillance goals will be achieved through activities specifically designed to fulfill major objectives.

Objectives and accompanying activities:

- 1) Provide data for MHLPPP and EPHT Data Portal on an annual basis

Activities:

- a. Develop and update (as needed) analytic plans for data measures.
- b. Maintain knowledge of procedures for handling laboratory data, including; daily download from HETL, and ongoing data checks and queries.
- c. Conduct secondary data cleaning, including but not limited to; street address cleaning and standardization and, assignment of latitude/longitude coordinates and 5-digit town level geo-codes (see geo-code protocol at [T:\EPI\\_data\Childhood Lead\Geocoding\Protocol\\_geocode112011.doc](T:\EPI_data\Childhood Lead\Geocoding\Protocol_geocode112011.doc).)
- d. Follow established protocol to update data on the ME Tracking portal (see lead portal protocol at [T:\EPI\\_data\Portal\Protocols\Lead\\_PortalProtocol.doc](T:\EPI_data\Portal\Protocols\Lead_PortalProtocol.doc).)
- e. Analyze and disseminate data.
  - i. Analyze and prepare indicators and measures in accordance with analytic plans.
  - ii. Assist/prepare analysis for annual legislative update report.
  - iii. Assist/prepare analysis for annual ME-Tracking portal updates
  - iv. Prepare other/additional ad-hoc reports as needed per MHLPPP.

- f. Conduct analysis of surveillance data consistent with National CDC case definitions and National EPHTN guidance.
- 2) Respond to public data requests within 2 weeks.  
Activities:
    - a. Maintain data request log and corresponding data.
    - b. Respond to and complete data requests.
  - 3) Identify and evaluate feasibility of new data measures as issues and/or need arise within MHHHLPP.  
Activities:
    - a. Assess changes in current risk factors and identify new risk factors and populations at risk for lead poisoning.
    - b. Assess spatial and temporal pattern changes in lead testing and the burden of lead poisoning in children.
  - 4) Participate in ongoing surveillance activities.  
Activities:
    - a. Participate in MHHLPPP activities, meetings, etc.
    - b. Participate in ME-EPHT and National EPHT Lead content workgroup.
    - c. Participate in surveillance related meetings with public health partners, i.e. MaineCare.
    - d. Attend national meetings and/or present information relative to lead findings in Maine, as needed.
    - e. Prepare manuscripts and submit findings on childhood lead surveillance or research in Maine to peer-reviewed journals.
  - 5) Evaluate the MHHLPPP surveillance system and accompanying plan on a routine basis.  
Activities:
    - a. Utilize the 'Updated Guidelines for Evaluating Public Health Surveillance Systems, Recommendations from the Guidelines Working Group' as the framework for MHHLPPP Surveillance evaluation.<sup>1</sup>
    - b. Prepare a plan for regular evaluation of the MHHLPPP surveillance system.
    - c. Report findings from regular evaluation of surveillance plan and system to MHHLPPP.

## Data Sources

There are five sources of data used to calculate measures within the MHHLPPP Surveillance System. They are: blood lead testing results from the Maine State Health and Environmental Testing Laboratory and Maine resident results analyzed out of state by private laboratories; MaineCare data from the State Medicaid Office, population estimates and housing characteristics from the US Census, number of live births from the Office of Data, Research, and Vital Statistics, ME CDC, and case management data including environmental and clinical data collected during investigation and follow-up activities by the MHHLPPP. A detailed description of data from these sources is included in previous data assessment reports (available upon request at ME Environmental and Occupational Health Programs, Maine CDC).

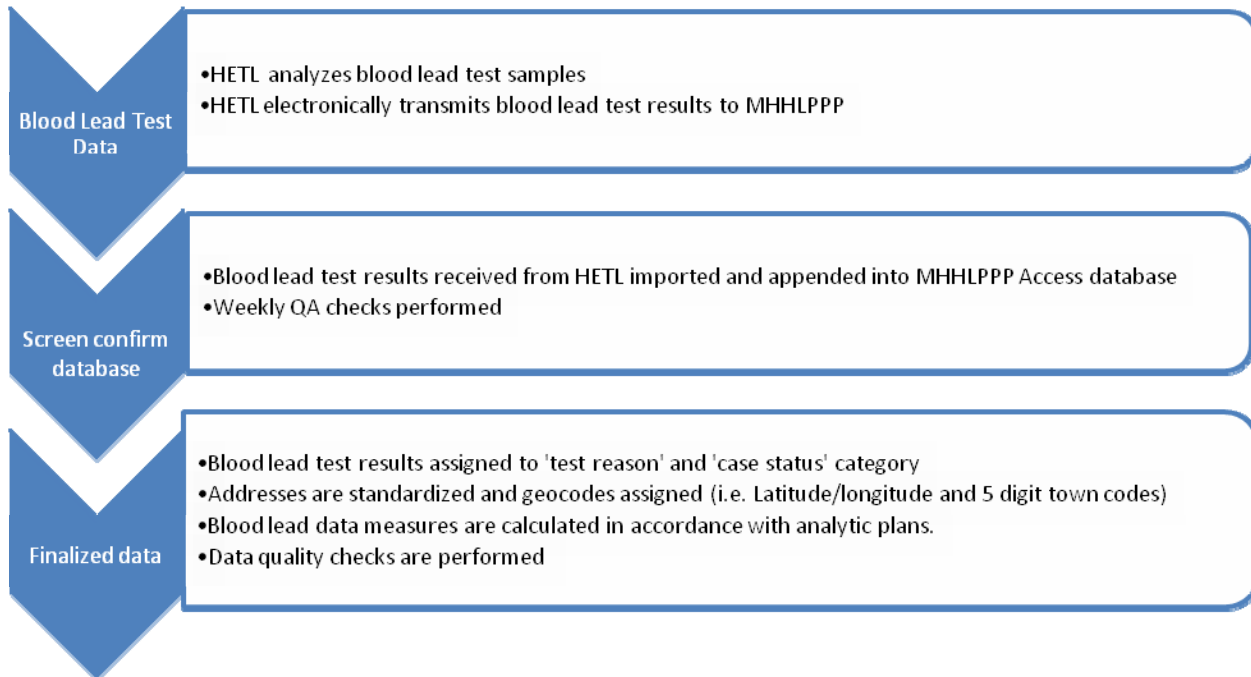
## Data Process Description

### Laboratory Data:

Blood lead test result data are received electronically each day by the MHHLPPP from the HETL. The data is imported into an Access database housed at the Environmental and Occupational Health Programs, Maine CDC. After data are received by the MHHLPPP, quality control checks are run, such as, identifying missing and duplicate information, logical and consistency checks on dates, etc. In accordance with the CDC lead case definitions, each blood lead test is then

assigned a test result (screening vs follow-up) and case status (non-case, confirmed case, possible case, or suspect case). The CDC case definitions are available at '<http://www.cdc.gov/nceh/lead/data/index.htm>.' After a test is defined according to result and status, the data is then assigned a five digit town geo-code and latitude/longitude coordinates based on street address. This process is called 'Geo-coding.' The protocol to geo-code annual childhood blood lead test data is available at '[T:\EPI\\_data\Childhood Lead\Geocoding\Protocol\\_geocde112011.doc](T:\EPI_data\Childhood Lead\Geocoding\Protocol_geocde112011.doc).' A flow chart depicting the process for receiving and processing the blood lead sample data from the laboratory is at Figure 1.

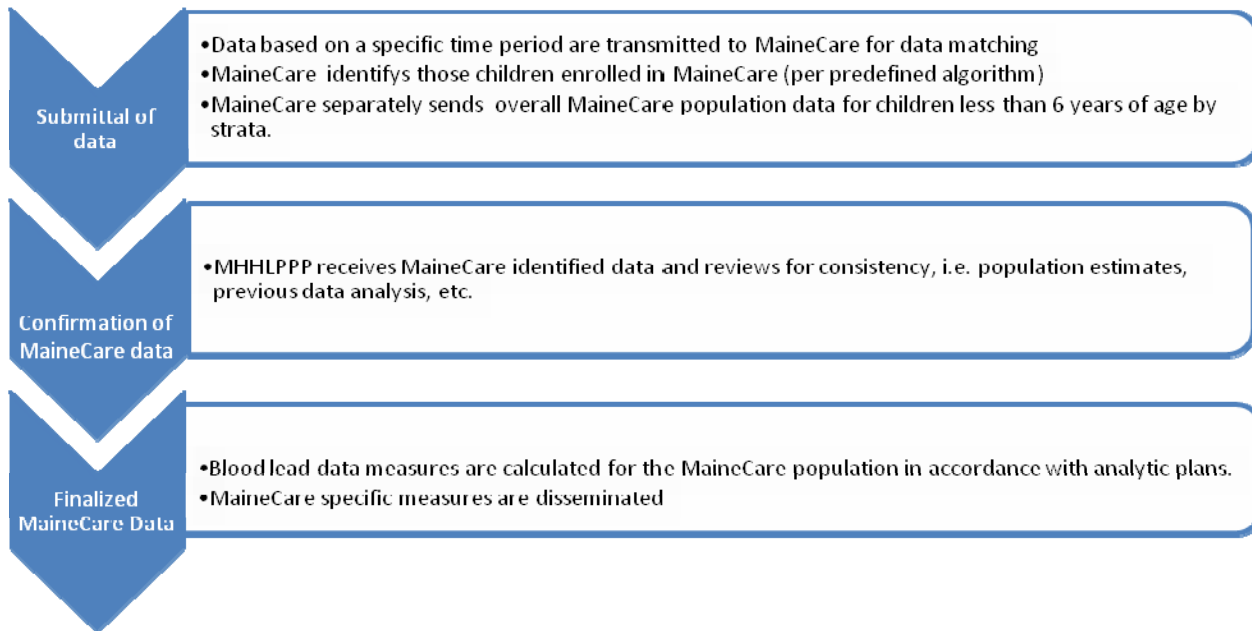
Figure 1. Laboratory data flow chart



Medicaid Data:

Analysis of Maine data indicate that children enrolled in Medicaid make up the majority of our children who have blood lead levels at or above 15µg/dl. At the same time, the blood lead data collected by HETL and provided to the MHHLPPP may not have accurate identification of laboratory tests covered by MaineCare (Medicaid). To ensure accurate analysis of our MaineCare population, MHHLPPP partnered with MaineCare to identify which laboratory tests were performed on children enrolled in MaineCare and to receive MaineCare enrollment estimates for rate calculations. A flow chart depicting the process for collaborating with MaineCare is at Figure 2.

Figure 2. MaineCare data flow chart.



Census Data:

Older housing stock, homes built prior to 1950, is a primary source of exposure to lead for children in Maine<sup>ii</sup>. The MHHLPPP surveillance system presents data on Pre-1950 housing estimates collected from the U.S. Census as a risk factor for lead poisoning. Pre-1950 housing data are stratified by geographic location and are available decennially at ‘[www.census.gov](http://www.census.gov).’

Census data are also used to calculate annual screening and testing rates in the general population of children less than 6 years of age. These data are available by individual year of age at ‘<http://wonder.cdc.gov/>.’ Measures are calculated using census population estimates per analytic plan.

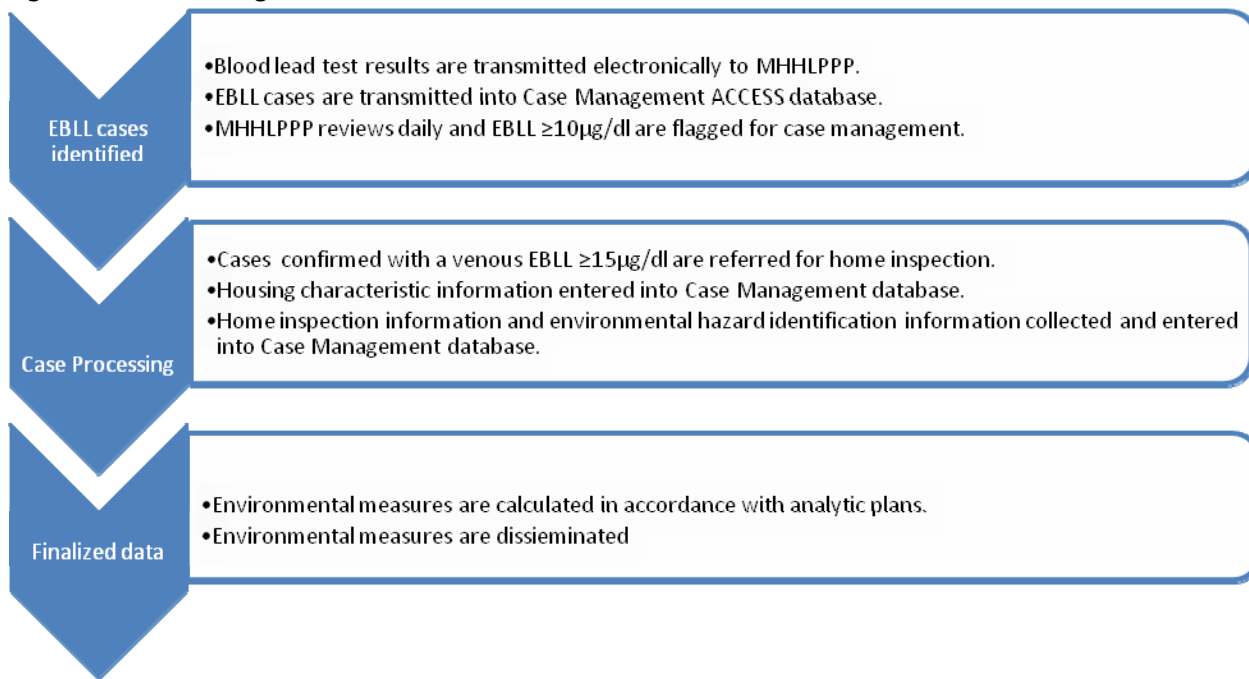
Birth Data:

The number of births in a given year is used in conjunction with laboratory data to measure testing and elevated blood lead level rates in a cohort of children born in the same year (i.e. birth year cohort). Birth year cohort testing analysis allows the MHHLPPP to look at testing penetration, i.e. the number of children tested prior to 36 months of age. Birth data are collected annually from the Office of Data, Research and Vital Statistics, Maine CDC. These data are located at ‘T:\EPI\_data\Births.’

Case Management Data:

The MHHLPPP collects data on housing characteristics and possible exposure source for children with a confirmed EBLL  $\geq 15\mu\text{g}/\text{dl}$ . This information is used to quantify the number of household inspections, exposure sources for lead poisoning, and identify other children at risk for lead poisoning. The MHHLPPP environmental data are collected and maintained in an access database located at ‘x:\xxxxxxxxx.’ A flow chart depicting the broad process involved in environmental data collection is depicted below in Figure 3.

Figure 3. Case Management data flow chart.



## Categorical Indicators and Measures

Indicators and measures are used to monitor progress across the surveillance system structure, i.e. meeting objectives and completing activities. Indicators and measures have been developed and grouped accordingly to: 1) assess the appropriateness (i.e. timeliness, accuracy, compliance) of blood lead testing and environmental investigations; 2) describe the burden of lead poisoning in children and their home environment; 3) prevent primary and secondary exposure to lead by identifying risk factors; and 4) identify disparate populations at risk for lead poisoning. Nine indicators and accompanying measures used to survey childhood lead poisoning are summarized in Table 1. Analytic plans have been developed for each measure and are located at '[T:\EPI\\_data\Childhood Lead\MHHLPPPSurveillance\Data Analysis Plan.doc](T:\EPI_data\Childhood Lead\MHHLPPPSurveillance\Data Analysis Plan.doc).' Analytic plans provide information pertinent to the calculation of each outcome measure, such as:

1. What is the underlying data type used in the calculation?
2. How often is the data available for analysis and who provides the data?
3. How are the data stratified?
4. What is the name of the analytic program used to calculate the outcome measure? And, where is it located?
5. What are the limitations of the data?
6. Is this outcome measure a part of a programmatic or statewide objective? And, is there a national comparison?
7. Is the outcome measure included on the ME Tracking Network portal?
8. What numerator and denominator are used in the calculation of the outcome measure?
9. What assumptions and methods are used to calculate the outcome measure?

Table 1. Indicators and measures used for childhood lead poisoning surveillance.

<b>Indicator</b>	<b>Outcome Measure</b>	<b>Population</b>	<b>Strata</b>	<b>Updated</b>
Appropriate testing for lead poisoning	Percent of children screened for lead poisoning	Children tested	Time period Geography Age group Insurance Status (i.e. Mainecare, no insurance, etc.)	Annually by Epidemiologist Date: Aug. 1 <sup>st</sup>
	Percent of children screened at both 1 and 2 years of age.	Children tested	Time period Geography Age group Insurance Status (i.e. MaineCare)	Annually by Epidemiologist Date: Aug. 1 <sup>st</sup>
	Percent of children tested at least once by 24 months, 36 months, and 72 months of age	Children tested	Geography Insurance Status (i.e. MaineCare)	Annually by Epidemiologist Date: Aug. 1 <sup>st</sup>
	Percent of children enrolled in MaineCare not tested	Children enrolled in MaineCare	Geography Time period Age group	Annually by Epidemiologist Date: TBD
Appropriate follow-up to blood lead testing	Percent of children who receive EBLL confirmatory testing according to CDC guidelines.	Children tested with EBLL	Geography Time period Age group Insurance Status (i.e. MaineCare) Confirmatory Status (i.e. EBLL yes/no)	Annually by Epidemiologist Date: Aug. 1 <sup>st</sup>
	Percent of unconfirmed Elevated Capillary Tests.	Children tested using capillary specimen type	Geography Time period Insurance Status (i.e. MaineCare)	Annually by Epidemiologist Date: Aug. 1 <sup>st</sup>
	Capillary testing false positive rate.	Children tested	Time period Insurance Status (i.e. MaineCare)	Annually by epidemiologist Date: Aug. 1 <sup>st</sup>

Indicator	Outcome Measure	Population	Strata	Updated
Lead poisoning burden	Percent of children with confirmed EBLL $\geq$ 10 ug/dl	Children screened	Geography Time period Age Group Insurance Status (i.e. MaineCare) Specimen type	Annually by Epidemiologist Date: Aug. 1 <sup>st</sup>
Appropriate environmental investigation	Percent of children who have their home inspected for lead	Children with EBLL $\geq$ 15 $\mu$ cg/dl	Time period Housing unit type (i.e. Primary or Secondary/Addl units) Age of housing Home ownership	Annually by Environmental Coordinator Date:
Environmental investigation characteristics	Percent of housing units inspected for lead hazards	Homes of children with EBLLs $\geq$ 15 $\mu$ cg/dl	Time period Age of housing Home ownership status (i.e. owner, rental) Housing unit type (i.e. Primary or Secondary/Addl units)	Annually by Environmental Coordinator Date:
	Percent of housing units with no identified lead hazard	Homes of children with EBLLs $\geq$ 15 $\mu$ cg/dl	Geography Time period	Annually by Environmental Coordinator Date:
	Percent of homes inspected where a renovation has occurred in the last 6 months.	Homes inspected	Geography Time period Home ownership Renovator (i.e. Professional or other)	Annually by Environmental Coordinator Date:
Environmental burden	Percent of housing units identified with lead hazards	Homes of children with EBLLs $\geq$ 15 $\mu$ cg/dl	Geography Time period	Annually by Environmental Coordinator Date:



Indicator	Outcome Measure	Population	Strata	Updated
	Distribution of lead hazard exposure sources identified in homes	Homes of children with EBLLs $\geq$ 15 $\mu$ cg/dl	Time period	Annually by Environmental Coordinator Date:
Appropriate environmental follow-up	Percent of lead hazard units remediated or abated	Homes with lead hazards	Geography Time period Housing unit type (i.e. Primary or Secondary/Addl units)	Annually by Environmental Coordinator Date:
Risk Factors	Percent of Pre-1950 Housing	Homes	Geography Time period	Census by Epidemiologist Date: as data available
	Percent of children with EBLL whose parents are occupationally exposed	Children with EBLLs $\geq$ 15 $\mu$ cg/dl	Time period	Annually by Environmental Coordinator Date:
	Percent of children who transitioned to an EBLL (initial test 5 -9 $\mu$ cg/dl)	Children Tested	Geography Time period Insurance Status (ie MaineCare)	Annually by Epidemiologist Date: Sept. 1 <sup>st</sup>
At risk populations	Percent of EBLLs who are Somali, Somali Bantu, African Descent, or newly immigrant.	Children with EBLLs	Geography (i.e. Selected cities)	As data available by Epidemiologist Date: TBD

Table Notes:

A blood lead test is considered a 'screening' when a child has either never been tested or previous blood lead tests were not elevated.

EBLL is defined as having a blood lead level of 10  $\mu$ g/dl or above.

Measure specific 'Analysis Plans,' located at '[T:\EPI\\_data\Childhood Lead\MHHLPPPSurveillance\Data Analysis Plan.doc](T:\EPI_data\Childhood Lead\MHHLPPPSurveillance\Data Analysis Plan.doc)', provide detailed information on how measures are calculated.

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<sup>i</sup> Centers for Disease Control and Prevention (July 27,2001). Updated guidelines for evaluating public health surveillance systems. MMWR: 50, 1-34.

<sup>ii</sup> Decker, K. et.al. (2008, June 26<sup>th</sup>). *Assessment of risk factors for lead poisoning among children tested for blood lead levels*. Presented at Lead Poisoning Prevention Fund (LPPF) meeting, Augusta, ME.