

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Lead Poisoning Prevention Program

Childhood Blood Lead Surveillance in Maryland

Annual Report 2013

July, 2014



MARYLAND CHILDHOOD LEAD REGISTRY

ANNUAL SURVEILLANCE REPORT 2013

EXECUTIVE SUMMARY

The Maryland Department of the Environment's statewide Childhood Lead Registry (CLR) performs childhood blood lead surveillance for Maryland. The CLR receives the reports of all blood lead tests conducted on Maryland children 0-18 years of age, and the CLR provides blood lead test results to the Maryland Department of Health and Mental Hygiene including Medicaid and local health departments as needed for case management, and upon request to third parties for research and planning.

Since 1995, the CLR has released a comprehensive annual report on statewide childhood blood lead testing along with five "Supplementary Data Tables" which include a detailed breakdown of blood lead data by age, jurisdiction, blood lead level, and the trend of blood lead levels over the years. This current report presents the childhood blood lead test results for Calendar Year (CY) 2013. All data is based on blood lead testing (venous or capillary) on children. The CLR does not receive any reports on lead screening based on the lead risk assessment questionnaire that are completed by the primary care provider. With few exceptions, all data refer to children 0-72 months of age.

Maryland CY 2013 Surveillance Highlights:

Not all children in Maryland are required to be blood lead tested. Based on Maryland's "Targeting Plan for Areas at Risk for Childhood Lead Poisoning," children are required to have a blood lead test at ages one and two years if they meet following criteria;

- (a) Live in an indentified "at risk" zip code
- (b) Participate in Maryland's Medicaid program
- (c) Give a positive response to the "Risk Assessment Questionnaire" conducted on children up to six years of age, as required.

Statewide Testing, Including Baltimore City

- During **CY 2013** a total of **110,082 (21.2%)** children were tested of 518,865 children 0-72 months of age, as identified in the Maryland census population for 2010. This was a **decrease** of **457** children tested compared to **110,539 (21.7%)** children tested of a population of 509,885 in CY12. The population of children 0-72 months of age increased from CY12 to CY13 by 8,980 children.
- Of those **110,082** children tested in **CY13**, a total of **371 (0.3%)** were identified with a venous or capillary blood lead level ≥ 10 micrograms per deciliter ($\mu\text{g/dL}$) (**Prevalence:** any child tested in the given year with a first time or ongoing history of a venous or capillary blood lead level ≥ 10 $\mu\text{g/dL}$). This was an increase of **7** children compared to **364 (0.3%)** during **CY12**.
- Children identified with a first time venous or capillary blood lead level ≥ 10 $\mu\text{g/dL}$ during **CY13** totaled **304 (0.3%)** (Incidence: a child with a first time venous or capillary blood lead

level ≥ 10 $\mu\text{g/dL}$). This was an **increase** of **49** children with a new **Incidence** case compared to **255 (0.2%)** in **CY12**.

- Of the 304 children with a new incidence case statewide, a total of 274 children met the criteria for medical and environmental case management (**Confirmed Case**). This was an **increase** of **38 Confirmed** cases compared to the CY12 total of 236.
- During CY13, a total of 1,724 children had their first venous or capillary blood lead level of 5-9 $\mu\text{g/dL}$ compared to 1,792 children in 2012.
- The highest testing rates for children 0-72 months of age were found in Baltimore City (32.1%), followed by Somerset County (31.2%), Worcester County (25.2%), Talbot County (24.8%), Prince George's County (24.7%), and Allegany County (24.5%). Baltimore City, Somerset, Worcester, and Allegany Counties are identified in Maryland's Targeting Plan as being 100% "at-risk".
- The highest rates for children 0-35 months were found in Allegany County (42.5%), Baltimore City (42.3%), and Somerset and Talbot Counties each with 42.2%. Statewide, the overall testing rate for children 0-35 months was (29.7%).

Maryland Counties

- During **CY13**, a total of **91,539 (19.8%)** children were tested of **461,172** children 0-72 months of age, as identified in the Maryland census population for 2010. This was a **decrease** of **208** children tested compared to **91,747 (20.2%)** of a population of **453,184** children tested in **CY12**. The population of children 0-72 months of age increased from CY12 to CY13 by **7,988** children.
- Of those **91,539** children tested in **CY13**, a total of **152 (0.2%)** were identified with a venous or capillary blood lead level ≥ 10 $\mu\text{g/dL}$ (**Prevalence**). This is an increase of **10** children with a **Prevalence** level compared to **142 (0.2%)** during **CY12**.
- Children identified with a first time (**Incidence**) venous or capillary blood lead level ≥ 10 $\mu\text{g/dL}$ during **CY13** totaled **133 (0.1%)**. This was an **increase** of **28** children with an **Incidence** level compared to **105 (0.1%)** in **CY12**.
- In Maryland Counties, 117 children with a first venous blood lead level ≥ 10 $\mu\text{g/dL}$ received medical and environmental case management (**Confirmed Case**). This was an **increase** of **25** children who received case management services over CY12 where 92 children were identified.
- Of the 117 Confirmed Cases, 29 (25%) of these cases involved children who were living in a pre-1950 residential rental dwelling (**Affected Property**). In the remaining 88 cases, 45 (38%) children were living in a post-1949 residential rental dwelling while 43 (37%) were living in an owner occupied property (**Non-Affected**).

Baltimore City

- During **CY13**, a total of **18,535 (32.1%)** children were tested of **57,693** children 0-72 months of age, as identified in the Maryland census population for 2010. This was a **decrease of 182** children tested compared to **CY12** for children tested **118,717 (33%)** out of a population of **56,701**. The population of children 0-72 months of age increased from CY12 to CY13 by **992** children.
- Of the **18,535** children tested in **CY13**; a total of **218 (1.2%)** were identified with a venous or capillary blood lead level $\geq 10 \mu\text{g/dL}$ (**Prevalence**). This is a decrease of **1** child with a **Prevalence** case compared to **219 (1.2%)** during **CY12**.
- Children identified with a first time venous or capillary blood lead level $\geq 10 \mu\text{g/dL}$ (**Incidence**) during **CY13** totaled **170 (0.9%)**. This was an **increase of 22** children identified with an **Incidence** cases compared to **148 (0.8%)** in **CY12**.
- In Baltimore City, 157 children with a first venous blood lead level $\geq 10 \mu\text{g/dL}$ (**Confirmed Case**) received medical and environmental case management. This was an **increase of 13** children who received case management over CY12 where 144 children were identified.
- Of the 157 Confirmed Cases approximately 82 (52%) of these cases children were living in a pre-1950 residential rental dwelling (**Affected Property**). In the remaining 75 cases, 4 (3%) children were living in a post-1949 residential rental dwelling while 71 (45%) were living in an owner occupied property (**Non-Affected**).

Lead Updates

Targeting Plan Evaluation

Currently, there is no statewide requirement for universal blood lead testing of children in Maryland. Based on Maryland's "Targeting Plan for Areas At-Risk for Childhood Lead Poisoning," children are required to have a blood lead test at one and two years if they meet any of the following criteria: (a) Live in an identified "at-risk" zip code, (b) Participate in Maryland's "MEDICAID" EPSTD Program, (c) Positive response to the "Risk Assessment Questionnaire" conducted at regular medical checkups on children up to age six years of age. Currently, the Targeting Plan is being re-evaluated by the Maryland Department of Health and Mental Hygiene and MDE.

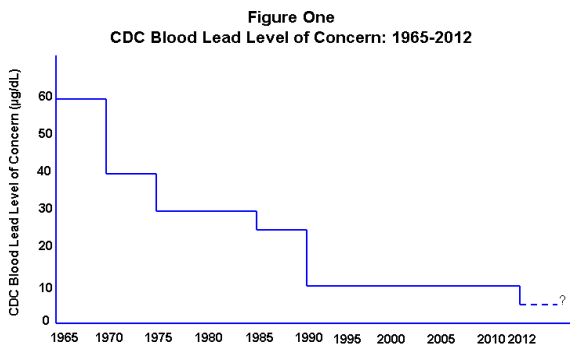
Universe of Affected Properties to Increase to Pre-1978

On January 1, 2015, all residential rental properties constructed prior to 1978 must be registered and lead inspected prior to each change in occupancy. Because the residential use of lead based paint was not banned until 1978, the amendment to the law that was passed during the 2012 legislative session seeks to expand the primary prevention aspects of the existing lead law that previously only mandated compliance for rental dwelling units built prior to 1950. MDE is gearing up to begin early registration for 2015.

Overview

Exposure to lead is still the most significant and widespread environmental hazard for children in Maryland. Children are at the greatest risk from birth to age six while their neurological systems are developing. Exposure to lead can cause long-term neurological damage that may be associated with learning and behavioral problems and with decreased intelligence.

There is no evidence of a blood lead level below which there are no health effects. The Centers for Disease Control and Prevention (CDC) concurs that the evidence shows that there is no threshold level for blood lead that can be considered “safe.” As evidence of adverse health effects were demonstrated at lower and lower blood lead levels, the CDC reduced the level of blood lead which required case management, and in March 2012, the CDC adopted the blood lead level of 5 µg/dL as the “Reference Value.” (See Figure One.)



Statistical Report

In CY 2013, a total of 110,082 children 0-72 months were tested for lead exposure statewide. Table One provides a summary of statewide statistics for blood lead testing in 2013.

Findings

The extent and severity of childhood lead exposure in 2013 remained was similar to 2012. The overall proportion of children with blood lead levels of ≥ 5 µg/dL dropped (Figure Two), but the proportion of children with the very first blood lead level of ≥ 10 µg/dL (incident cases) increased from 0.2% in 2012 to 0.3% in 2013. (See Table Two and Figure Three.) These changes, however, can be ascribed more to the annual variations of small numbers rather than real change in childhood lead exposure.

The decline in lead exposure is further demonstrated by the decline in percentage of children tested for lead and that had the highest blood lead level of 5-9 µg/dL. (See Figure Four.)

Sources of Childhood Lead Exposure

Lead paint dust from deteriorated lead paint or from renovation of old houses is the major source of lead exposure for children in Maryland. Of an estimated 2,138,806 occupied residential houses in Maryland, 440,056 (18.5%) were built before 1950 and 939,785 (39.5%) were built between 1950 and 1979. (Source: US Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates.) A significant number of pre-1950 and 1950-1979 residential rental units have been made lead free. Untreated units in those groupings are highly likely and likely to have lead based paint, respectively.

In addition, water, air, and soil, may provide low-level, “background” exposure.

Imported products, parental occupations, hobbies, and imported traditional medicines also cause lead exposure among children.

In-utero exposure to lead may affect fetal development. This can be of more significance among certain subgroup populations who may be more at risk of environmental lead exposure.

Table One
Calendar Year (CY) 2013 Statistical Report¹

Item	Number	Percent (%)
All Children 0-18 Years of Age		
Number of tests	128,483 ²	
Number of children	122,854	
Children 0-72 Months		
Number of tests	115,412	
Number of children	110,082	100.0
Age		
Under One	10,146	9.2
One Year	37,133	33.7
Two Years	31,224	28.4
Three Years	11,284	10.3
Four Years	11,669	10.6
Five Years	8,626	7.8
Sex		
Female	53,994	49.1
Male	55,787	50.7
Undetermined	301	0.2
Highest Blood Lead Level (BLL) (µg/dL)		
≤4	107,459	97.6
5-9	2,251	2.0
10-14	229	0.2
15-19	76	0.1
≥20	67	0.1
Mean BLL (Geometric mean)	1.41	
Blood Specimen		
Capillary	22,334	20.3
Venous	77,956	70.8
Undetermined ³	9,792	8.9

1. For detailed analysis and breakdown of data refer to Supplementary Data Tables 1-5.
2. Children may have multiple tests in a given year.
3. In supplementary data tables, blood tests with sample type unknown were counted as capillary.

Appendix A provides a breakdown of blood lead testing and the status of children by age groups of 0-35 and 36-72 months by jurisdiction in 2013, and Appendix B provides summary results for the past eight (8) years at the State, Baltimore City, and Counties levels. For a detailed breakdown of blood lead data, please refer to supplementary data tables: Supplements 1-5.

County	Population of Children ²	Children Tested		Children with BLL 5-9 µg/dL						Children with BLL ≥10 µg/dL					
				Old Cases ³		New Cases ⁴		Total		Old Cases ⁵		New Cases ⁶		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Allegany	4,939	1,210	24.5	20	1.7	40	3.3	60	5.0	1	0.1	4	0.3	5	0.4
Anne Arundel	49,109	8,294	16.9	9	0.1	68	0.8	77	0.9	0	0.0	10	0.1	10	0.1
Baltimore	68,408	16,549	24.2	29	0.2	200	1.2	229	1.4	6	0.0	25	0.2	31	0.2
Baltimore City	57,693	18,535	32.1	386	2.1	744	4.0	1,130	6.1	48	0.3	170	0.9	218	1.2
Calvert	7,286	635	8.7	0	0.0	5	0.8	5	0.8	0	0.0	0	0.0	0	0.0
Caroline	3,291	681	20.7	5	0.7	10	1.5	15	2.2	0	0.0	5	0.7	5	0.7
Carroll	13,279	1,322	10.0	5	0.4	17	1.3	22	1.7	2	0.2	7	0.5	9	0.7
Cecil	9,206	1,503	16.3	2	0.1	19	1.3	21	1.4	0	0.0	4	0.3	4	0.3
Charles	13,488	2,146	15.9	1	0.0	26	1.2	27	1.3	2	0.1	2	0.1	4	0.2
Dorchester	2,846	676	23.7	2	0.3	13	1.9	15	2.2	0	0.0	1	0.1	1	0.1
Frederick	21,347	2,973	13.9	2	0.1	25	0.8	27	0.9	3	0.1	5	0.2	8	0.3
Garrett	2,265	401	17.7	1	0.2	7	1.7	8	2.0	0	0.0	0	0.0	0	0.0
Harford	21,473	2,854	13.3	5	0.2	29	1.0	34	1.2	0	0.0	1	0.0	1	0.0
Howard	25,144	2,487	9.9	2	0.1	21	0.8	23	0.9	0	0.0	3	0.1	3	0.1
Kent	1,430	262	18.3	1	0.4	3	1.1	4	1.5	0	0.0	1	0.4	1	0.4
Montgomery	90,774	20,308	22.4	16	0.1	159	0.8	175	0.9	2	0.0	24	0.1	26	0.1
Prince George's	82,700	20,438	24.7	21	0.1	201	1.0	222	1.1	1	0.0	12	0.1	13	0.1
Queen Anne's	3,936	444	11.3	2	0.5	3	0.7	5	1.1	0	0.0	2	0.5	2	0.5
Saint Mary's	10,805	1,533	14.2	1	0.1	19	1.2	20	1.3	0	0.0	0	0.0	0	0.0
Somerset	1,805	564	31.2	1	0.2	3	0.5	4	0.7	0	0.0	4	0.7	4	0.7
Talbot	2,695	667	24.8	1	0.1	9	1.3	10	1.5	1	0.1	8	1.2	9	1.3
Washington	12,915	2,714	21.0	8	0.3	51	1.9	59	2.2	0	0.0	7	0.3	7	0.3
Wicomico	8,733	2,048	23.5	7	0.3	41	2.0	48	2.3	1	0.0	5	0.2	6	0.3
Worcester	3,297	830	25.2	0	0.0	10	1.2	10	1.2	0	0.0	3	0.4	3	0.4
County Unknown ⁷	0	8	0	0	0	1	0	1	0	0	0	1	0	1	0
Total	518,864	110,082	21.2	527	0.5	1,724	1.6	2,251	2.0	67	0.1	304	0.3	371	0.3

Table Two
Blood Lead Testing of Children 0-72 Months by Jurisdiction in 2013¹

1. The table is based on the selection of the highest venous or the highest capillary in the absence of any venous test. Blood lead tests with sample type unknown were counted as capillary.
2. Adapted from Maryland census population 2010, provided by the Maryland Data Center, Maryland Department of Planning, www.planning.maryland.gov/msdc.
3. Children with the blood lead level of 5-9 µg/dL in 2013 and a history of a blood lead level ≥5 µg/dL in the past.
4. Children with the very first blood lead level of 5-9 µg/dL in 2013. These children were either not tested in the past or their blood lead levels were below 5 µg/dL.
5. Children with a history of a blood lead level ≥10 µg/dL. These children may have carried over from 2012 or had a blood lead test of ≥10 µg/dL in previous years.
6. Children with the very first blood lead test of ≥10 µg/dL in 2013. These children were either not tested in the past or their blood lead levels were below 10 µg/dL. This definition may not necessarily match the criteria for the initiation of case management.
7. Includes cases with out-of-state residence address at the time of the highest blood lead test.

Figure Two
Blood Lead Distribution of Children 0-72 Months Tested for Lead in 2012 and 2013

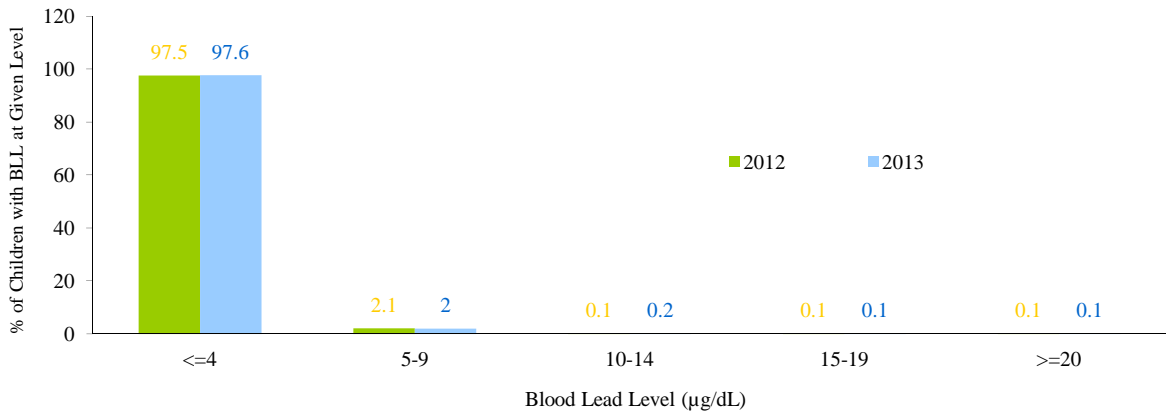
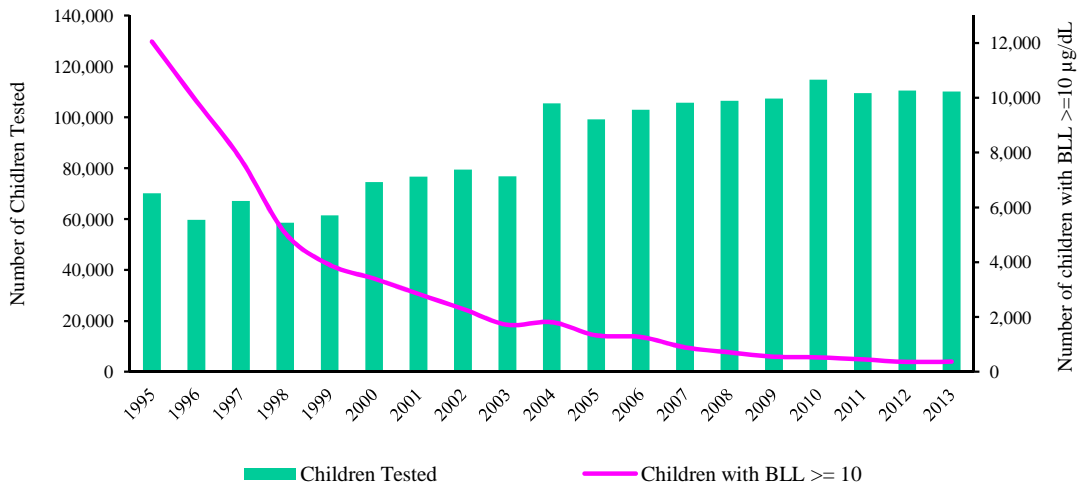


Figure Three
Number of Children 0-72 Months Tested for Lead and Number Reported to Have Blood Lead Levels ≥ 10 µg/dL: 1995-2013



Identifying Children with Lead Exposure

The critical issue in childhood lead poisoning is early detection. Because there are no specific clinical symptoms, a blood lead test is the most reliable technique to identify children with elevated blood lead levels. If there is any suspicion that a child is being exposed to lead, a health care provider should do a blood lead test.

Figure Four
Percent of Children 0-72 Months Tested for Lead with the Highest Blood Lead Level
5-9 µg/dL: 2000-2013



Statewide Activities to Reduce (Eliminate) Childhood Lead Poisoning

The State Elimination Plan calls for zero new cases of blood lead levels of ≥ 10 µg/dL. The plan focuses on primary prevention (removal and elimination of lead hazards) while maintaining well-established secondary prevention (identifying children who may be at risk of lead exposure) and tertiary prevention (case management of children exposed to lead) efforts in the state.

Primary Prevention: Much of the decline in blood lead levels is the result of implementation and enforcement of Maryland’s “Reduction of Lead Risk in Housing Act” (Act). The Act requires owners of pre-1950 rental dwelling units (Affected Properties) to reduce the potential for child exposure to lead paint hazards by performing specific lead risk reduction treatments prior to each change in tenancy. The “State Elimination Plan for 2010” called for zero new blood lead levels of ≥ 10 µg/dL. Though the percentage of children with elevated blood lead levels is consistently lowering in Maryland, there still remains new case incidence. There also continues to be a reduction in children identified with blood lead levels in compliant “Affected Properties” that have met the required risk reduction standards required at change of tenancy. To view a breakdown of blood lead levels of ≥ 10 µg/dL and age of housing, see Figure Five. A further breakdown of housing type and confirmed cases by jurisdiction can be seen on page 12, Table Three.

NEW LAWS TO AIMED AT CHLDHOOD LEAD POISONING PREVENTION

Maryland’s 1994 Reduction of Lead Risk in Housing Act requires owners of pre-1950 rental dwelling units to register their properties and reduce the potential for child exposure to lead paint hazards by performing specific lead risk reduction treatments prior to each change in tenancy. **House Bill 644**, passed by the Maryland General Assembly in 2012, requires owners of rental properties built before 1978, when the use of lead paint was prohibited, to register these properties and take steps towards reducing the risk of lead poisoning beginning in January, 2015. The legislation also allows MDE to seek delegation to administer a U.S Environmental Protection Agency rule that regulates renovations, repairs, and painting in homes that were built before 1978, whether they are rental units or owner-occupied, and in pre-1978 facilities with young children. The rule requires contractors who do work on these properties to receive training and use safe work practices. Maryland regulations to allow MDE to administer the federal rule are being drafted.

Table Three
Lead Poisoning Prevention Program: Childhood Lead Registry
Property Status of New Cases of Blood Lead Levels ≥ 10 $\mu\text{g/dL}$ for CY2013
By Jurisdiction

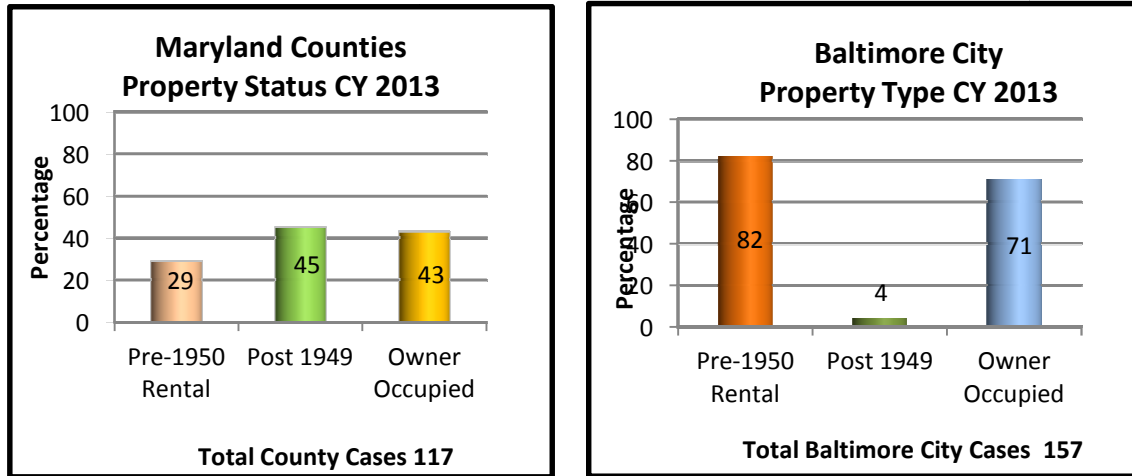
County	Number of Properties (compared to last year)	Owner-Occupied Property		Affected Property		Non-Affected Property	
		Number	Percent	Number	Percent	Number	Percent
Allegany	4	3	75%	0	0%	1	25%
Anne Arundel	9	3	33%	0	0%	6	67%
Baltimore	25	7	28%	5	20%	13	52%
Baltimore City	157	71	45%	*82	52%	4	3%
Calvert	0	0	0%	0	0%	0	0%
Caroline	5	1	20%	3	60%	1	20%
Carroll	4	1	25%	3	75%	0	0%
Cecil	4	2	50%	1	25%	1	25%
Charles	2	1	50%	0	0%	1	50%
Dorchester	1	0	0%	1	100%	0	0%
Frederick	5	2	40%	2	40%	1	20%
Garrett	0	0	0%	0	0%	0	0%
Harford	1	1	100%	0	0%	0	0%
Howard	3	2	67%	0	0%	1	33%
Kent	1	0	0%	1	100%	0	0%
Montgomery	16	8	50%	0	0%	8	50%
Prince George's	10	3	30%	0	0%	7	70%
Queen Anne's	2	1	50%	1	50%	0	0%
Saint Mary's	0	0	0%	0	0%	0	0%
Somerset	4	2	50%	0	0%	2	50%
Talbot	8	3	38%	4	50%	1	12%
Washington	6	2	33%	4	67%	0	0%
Wicomico	5	1	20%	3	60%	1	20%
Worcester	2	0	0%	1	50%	1	50%
Counties' Total	117	43	37%	29	25%	45	38%
Statewide	274	114	42%	111	40%	49	18%

Note:

*Nine rental properties in Baltimore City with construction year unavailable are assumed to be rental properties constructed prior to 1950.

Figure Five

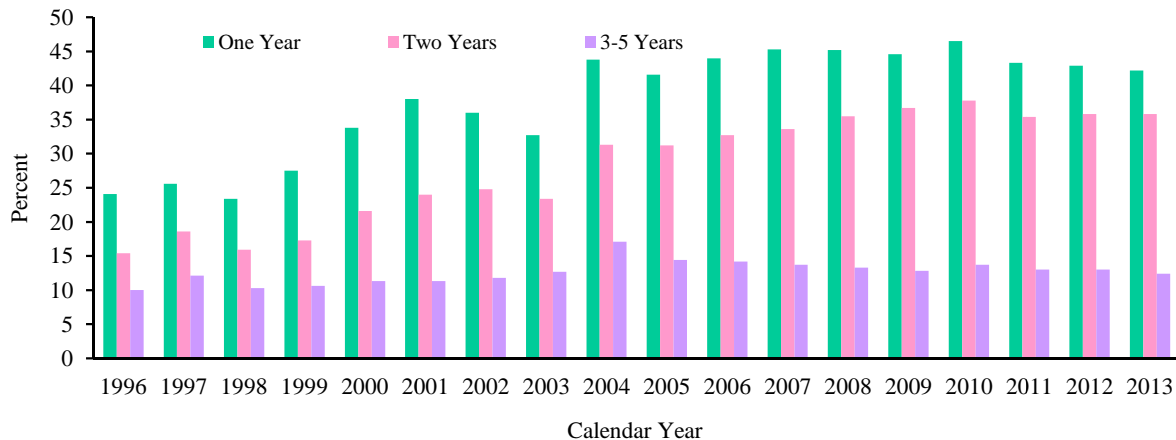
Percent of Children 0-72 Months with Blood Lead Levels ≥ 10 $\mu\text{g/dL}$ in 2013 and Age of the Housing



Secondary Prevention Testing: The second element of the State Elimination Plan is to identify children who may be at risk of lead exposure, so that preventive action can be implemented. Children ages one and two, because of their mouthing behavior, are most likely to be exposed to lead. To that end, the State of Maryland requires that children at ages one and two years be tested. The percentage of one and two year old children tested for lead has increased substantially since 2004. (See Figure Six.)

Figure Six

Percent of Children One and Two Years Old Tested for Lead vs. Children of Other Ages



Furthermore, children living in “at-risk” areas, or areas with a high proportion of pre-1950 housing units, are more likely to be exposed to lead than children living in other areas. The State has a targeted plan that identifies “At-Risk” areas. Universal blood lead testing applies to Baltimore City children (City Ordinance 20 effective July 2000). Table Three presents blood lead testing in the At-Risk and Not At-Risk areas of the state. At-risk area includes Baltimore City and Allegany,

Caroline, Dorchester, Frederick, Garrett, Somerset, Washington, Wicomico, and Worcester counties.

Table Three
Blood Lead Testing and Blood Lead Level of 5-9 and ≥ 10 $\mu\text{g}/\text{dL}$
In At-Risk and Not At-Risk Areas in 2013

Area	Population	Children Tested		Children with BLL 5-9 $\mu\text{g}/\text{dL}$		Children with BLL ≥ 10 $\mu\text{g}/\text{dL}$	
		Number	Percent	Number	Percent	Number	Percent
At-Risk	119,131	30,632	25.7	1,376	4.5	257	0.8
Not At-Risk	399,734	79,442	19.9	874	1.1	113	0.1
Statewide*	518,865	110,082	21.2	2,251	2.0	371	0.3

* Statewide numbers include county unknown and out of state cases

Another at risk population for lead poisoning is children enrolled in Maryland’s Medical Assistance Program. MDE provides childhood blood lead data to the Office of Medicaid Administration of the Maryland Department of Health and Mental Hygiene (DHMH). Childhood blood lead data is provided quarterly and annually, to be matched with the list of children enlisted in the state’s Medical Assistance Program. Based on data provided, DHMH prepares and distributes an annual report of blood lead testing of children under Maryland’s Medicaid Program.

Tertiary Prevention: Maryland’s Lead Poisoning Prevention Program has well-established case management guidelines and environmental investigation protocols for follow-up of children with elevated blood lead levels (Tables Four and Five). A venous blood lead test of ≥ 10 $\mu\text{g}/\text{dL}$ initiates case management and an environmental investigation. Currently, one venous or two capillary blood lead tests of ≥ 10 $\mu\text{g}/\text{dL}$ trigger the Notice of Elevated Blood Lead Level (Notice of EBL) to be sent to the owner of a Pre-1950 residential dwelling unit (Affected Property). Under the “Reduction of Lead Risk in Housing Act,” an owner who receives a Notice of EBL is required to perform specific lead risk reduction treatments to limit further exposure to a child. Furthermore, effective June 1, 2012 the Department, health departments, or other local jurisdictions have the authority to order abatements in response to an investigation report of a child with an elevated blood lead level.

Table Four
Blood Lead Diagnostic and Follow-Up: Confirmation of a Capillary Blood Lead Test

BLL ($\mu\text{g}/\text{dL}$)	Confirm with venous blood lead test within:
< Reference value ¹	Routine blood lead test according to protocol
\geq Reference value - 9	3 months
10 – 19	1 month ²
20 – 44	1 week to 1 month ²
45 – 59	48 hours
60-69	24 hours
≥ 70	Immediately as an emergency lab test

1. At the time of this writing, the CDC defined “Reference value” as a blood lead level of < 5 $\mu\text{g}/\text{dL}$.
2. The higher the BLL, the more urgent the need for confirmatory testing.

Table Five
Blood Lead Diagnostic and Follow-Up: Follow-Up for Venous Blood Lead Testing¹

BLL (µg/dL) Venous	Early follow-up (First 2-4 tests after identification)	Late follow-up (After BLL begins to decline)
< Reference value ²	Routine blood lead test according to protocol	
≥ Reference - 9	3 months	6 – 9 months
10 - 19	1 - 3 months ³	3 – 6 months
20 - 24	1 - 3 months ³	1 – 3 months
25 - 44	2 weeks – 1 month	1 month
≥45	As soon as possible	Chelation with subsequent follow-up

1. Seasonal variations of BLLs exist and may be more apparent in colder climate areas. Greater exposure in the summer months may necessitate more frequent follow-up.
2. At the time of this writing, the CDC defined “Reference value” as a blood lead level of <5 µg/dL.
3. Some case managers or health care providers may choose to repeat blood lead tests on all new patients within a month to ensure that their BLL level is not rising more quickly than anticipated.

Tables adapted from: *Centers for Disease Control and Prevention:*

- a. *Managing Elevated Blood Lead Levels Among Children: Recommendations from the Advisory Committee on Childhood Lead Poisoning Prevention. Atlanta: CDC, 2002.*
- b. *Low Level Exposure Harms Children: A Renewed Call for Primary Prevention. Report of the Advisory Committee on Childhood Lead Poisoning Prevention, January 2012.*

Educational Burden of Childhood Lead Exposure

Childhood lead exposure at early ages (before age 5) may adversely affect a child’s neurobehavioral development and as such the child’s later educational achievements. The effect may not show up until the child enters school (kindergarten). Such effects have become more of concern since the CDC reduced the blood lead level of concern to 5 µg/dL. Table Six presents the extent of the history of blood lead levels of 5-9 and ≥10 µg/dL among children who were at kindergarten age on September 1, 2013. Statewide, about 3,000 (4.4%) of the children had a history of a BLL ≥5 µg/dL when they entered kindergarten in 2013.

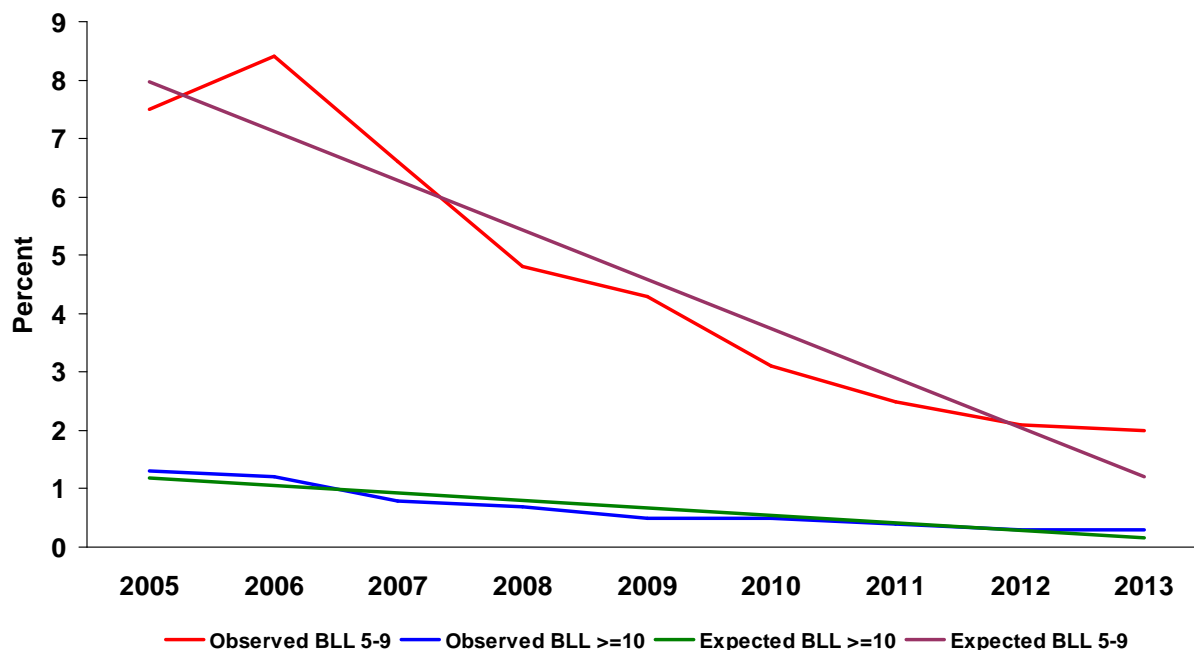
Table Six
Blood Lead Testing and Childhood Lead Exposure of Kindergarten Population

County	Number of Children Tested	BLL 5-9 $\mu\text{g/dL}$		BLL ≥ 10 $\mu\text{g/dL}$		Projected Kindergarten Population on in 2013 ¹	Projected Number of Kindergarteners with History of BLL 5-9 in 2013	Projected Number of Kindergarteners with History of BLL ≥ 10 in 2013
		Number	Percent	Number	Percent			
Allegany	756	52	6.9	7	0.9	645	44	6
Anne Arundel	5,337	74	1.4	11	0.2	6,384	89	13
Baltimore	11,163	401	3.6	23	0.2	7,349	264	15
Baltimore City	9,195	1,036	11.3	207	2.3	8,603	969	194
Calvert	596	21	3.5	1	0.2	1,053	37	2
Caroline	548	30	5.5	5	0.9	462	25	4
Carroll	964	29	3.0	5	0.5	1,757	53	9
Cecil	949	33	3.5	1	0.1	1,140	40	1
Charles	1,377	21	1.5	2	0.1	1,768	27	3
Dorchester	470	35	7.4	2	0.4	406	30	2
Frederick	2,479	40	1.6	6	0.2	2,962	48	7
Garrett	287	15	5.2	1	0.3	263	14	1
Harford	2,267	48	2.1	6	0.3	2,817	60	7
Howard	1,694	23	1.4	3	0.2	3,732	51	7
Kent	227	7	3.1	1	0.4	161	5	1
Montgomery	12,385	190	1.5	25	0.2	11,912	183	24
Prince George's	12,522	312	2.5	39	0.3	10,260	256	32
Queen Anne's	376	10	2.7	3	0.8	544	14	4
Saint Mary's	1,115	38	3.4	4	0.4	1,342	46	5
Somerset	314	10	3.2	1	0.3	235	7	1
Talbot	411	20	4.9	6	1.5	359	17	5
Washington	1,814	189	10.4	7	0.4	1,679	175	6
Wicomico	1,378	50	3.6	7	0.5	1,233	45	6
Worcester	557	15	2.7	1	0.2	482	13	1
Total	69,181	2,699	3.9	374	0.5	67,548	2,512	356

Trends of Blood Lead Levels of 5-9 and ≥ 10 $\mu\text{g/dL}$

The CDC adoption of a blood lead level of 5 $\mu\text{g/dL}$ as the “Reference Value” raised the issue of follow up and case management protocol for children with blood lead levels of 5-9 $\mu\text{g/dL}$. The Department is currently working with the Department of Health and Mental Hygiene to establish follow-up testing and case management protocols. Figure Six presents the observed and the expected trend of blood lead levels of 5-9 $\mu\text{g/dL}$ for CY 2005-2013. The blood lead level of ≥ 10 $\mu\text{g/dL}$ shows a smooth and gradual drop over the years. This can be seen in consistency of the observed and the expected trends. Such consistency is not seen in the observed and the expected trends of blood lead levels of 5-9. This may be because a child with a blood lead level of 5-9 may exit this group due to a higher blood lead level and then re-enter it when his/her blood lead level drops.

Figure Six
Trend of Blood Lead Levels of 5-9 and ≥ 10 $\mu\text{g/dL}$: 2005-2013



Data Quality

The CLR is maintained in the “Systematic Tracking of Elevated Lead Levels And Remediation” (STELLAR) surveillance system obtained from the CDC Lead Poisoning Prevention Program. CLR staff makes all efforts to further improve data quality with respect to completeness, timeliness, and accuracy. Staff keep daily track of laboratory reporting to make sure laboratories are reporting all blood lead tests no later than biweekly. The law requires blood lead results of ≥ 20 $\mu\text{g/dL}$ to be reported (faxed) within 24 hours after the result is known. However, upon CLR request, laboratories agreed to report (fax) the result of all blood lead tests of ≥ 10 $\mu\text{g/dL}$ within 24 hours. For all blood lead tests ≥ 10 $\mu\text{g/dL}$, staff checks the completeness of the data, particularly with respect to the child’s and the parent or guardian’s name, address, and telephone number.

In 2013, 89.7% of blood lead tests were reported to the CLR electronically. This is a drop of about one percentage in electronic reporting from 2012 (90.7%). The drop is due to the increase in number of clinics and establishments using hand held lead analyzers and reporting the results to the CLR in hard copy. Over the years, there has been a gradual increase in the use of hand held lead analyzers. This increase has not necessarily resulted in an increase in the number of blood lead tests, rather it has resulted from a shift in blood lead testing by laboratories to clinics (Table Seven). The average reporting time, from the time sample is drawn to time the result enters the CLR database, is approximately 6 days. The average time for elevated blood lead results (≥ 10 $\mu\text{g/dL}$) is approximately 30 hours.

Table Eight provides the summary reports for completeness of data as required by law. Completeness of data does not necessarily mean accuracy of the data.

Table Seven
Method of Blood Lead Reporting by Laboratories: 2010-2014

Lab Reporting	2010		2011		2012		2013		2014*	
	Number of		Number of		Number of		Number of		Number of	
	Labs	Reports	Labs	Reports	Labs	Reports	Labs	Reports	Labs	Reports
Electronic Report	8	115,878	9	113,824	8	115,940	8	113,952	8	24,477
Hard Copy	30	9,702	31	12,072	32	11,041	35	12,908	34	3,068
Total	38	125,580	40	125,896	40	126,981	43	126,860	42	27,545
Percent Electronic	92.3		90.4		91.3		89.8		88.9	
% of Children Tested	23.4		21.9		21.7		21.2		21.2	

* First quarter

Table Eight
Completeness of Data for 2013

Item	% Complete
Child's name	100.0
Date of Birth	99.8
Sex/Gender	99.6
Race	59.9
Parent/Guardian's name	59.4
Sample type	91.0
Test date	99.9
Blood lead level	100.0
Address (geocoded)	90.2
Telephone number	95.6

Blood Lead Laboratory Reporting Requirement

The amended law and regulations¹ of 2001 and 2002 require that:

1-The following demographic data for each child be included in each blood lead test reported:

- Date of Birth
- Sex
- Race
- Address
- Test date
- Sample type
- Blood lead level

2-Blood lead results $\geq 20 \mu\text{g/dL}$ be reported (faxed) within 24 hours after a result is known. All other results are to be reported every two weeks.

3-Reporting format complies with the format designed and provided by the CLR.

4-Data be provided electronically.

* Environment Article §6-303, Blood lead test reporting (COMAR 26.02.01, Blood lead test reporting)

Appendix A
Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2013

Age Group	Population of Children	Children Tested		Blood Lead Level 5-9 µg/dL						Blood Lead Level ≥10 µg/dL					
				Old Cases		New Cases		Total		Old Cases		New Cases		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Allegany County															
0-35 Months	2,491	1,059	42.5	9	0.8	36	3.4	45	4.2	1	0.1	2	0.2	3	0.3
36-72 Months	2,447	151	6.2	11	7.3	4	2.6	15	9.9	0	0.0	2	1.3	2	1.3
Total	4,938	1,210	24.5	20	1.7	40	3.3	60	5.0	1	0.1	4	0.3	5	0.4
Anne Arundel County															
0-35 Months	25,120	6,158	24.5	5	0.1	54	0.9	59	1.0	0	0.0	9	0.1	9	0.1
36-72 Months	23,989	2,136	8.9	4	0.2	14	0.7	18	0.8	0	0.0	1	0.0	1	0.0
Total	49,109	8,294	16.9	9	0.1	68	0.8	77	0.9	0	0.0	10	0.1	10	0.1
Baltimore County															
0-35 Months	34,934	12,852	36.8	15	0.1	150	1.2	165	1.3	3	0.0	22	0.2	25	0.2
36-72 Months	33,474	3,697	11.0	14	0.4	50	1.4	64	1.7	3	0.1	3	0.1	6	0.2
Total	68,408	16,549	24.2	29	0.2	200	1.2	229	1.4	6	0.0	25	0.2	31	0.2
Baltimore City															
0-35 Months	30,947	13,092	42.3	152	1.2	590	4.5	742	5.7	20	0.1	126	1.0	146	1.1
36-72 Months	26,745	5,443	20.4	234	4.3	154	2.8	388	7.1	29	0.5	44	0.8	73	1.3
Total	57,692	18,535	32.1	386	2.1	744	4.0	1,130	6.1	49	0.3	170	0.9	219	1.2
Calvert County															
0-35 Months	3,476	555	16.0	0	0.0	5	0.9	5	0.9	0	0.0	0	0.0	0	0.0
36-72 Months	3,810	80	2.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	7,286	635	8.7	0	0.0	5	0.8	5	0.8	0	0.0	0	0.0	0	0.0
Caroline County															
0-35 Months	1,624	564	34.7	3	0.5	9	1.6	12	2.1	0	0.0	5	0.9	5	0.9
36-72 Months	1,667	117	7.0	2	1.7	1	0.9	3	2.6	0	0.0	0	0.0	0	0.0
Total	3,291	681	20.7	5	0.7	10	1.5	15	2.2	0	0.0	5	0.7	5	0.7

Appendix A
Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2013

Age Group	Population of Children	Children Tested		Blood Lead Level 5-9 µg/dL						Blood Lead Level ≥10 µg/dL					
				Old Cases		New Cases		Total		Old Cases		New Cases		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Carroll County															
0-35 Months	6,198	1,039	16.8	3	0.3	15	1.4	18	1.7	0	0.0	7	0.7	7	0.7
36-72 Months	7,081	283	4.0	2	0.7	2	0.7	4	1.4	2	0.7	0	0.0	2	0.7
Total	13,279	1,322	10.0	5	0.4	17	1.3	22	1.7	2	0.2	7	0.5	9	0.7
Cecil County															
0-35 Months	4,650	974	20.9	1	0.1	15	1.5	16	1.6	0	0.0	4	0.4	4	0.4
36-72 Months	4,557	529	11.6	1	0.2	4	0.8	5	0.9	0	0.0	0	0.0	0	0.0
Total	9,207	1,503	16.3	2	0.1	19	1.3	21	1.4	0	0.0	4	0.3	4	0.3
Charles County															
0-35 Months	6,789	1,667	24.6	1	0.1	19	1.1	20	1.2	1	0.1	2	0.1	3	0.2
36-72 Months	6,699	479	7.2	0	0.0	7	1.5	7	1.5	1	0.2	0	0.0	1	0.2
Total	13,488	2,146	15.9	1	0.0	26	1.2	27	1.3	2	0.1	2	0.1	4	0.2
Dorchester County															
0-35 Months	1,487	509	34.2	2	0.4	10	2.0	12	2.4	0	0.0	1	0.2	1	0.2
36-72 Months	1,360	167	12.3	0	0.0	3	1.8	3	1.8	0	0.0	0	0.0	0	0.0
Total	2,847	676	23.7	2	0.3	13	1.9	15	2.2	0	0.0	1	0.1	1	0.1
Frederick County															
0-35 Months	10,438	2,057	19.7	1	0.0	23	1.1	24	1.2	1	0.0	4	0.2	5	0.2
36-72 Months	10,909	916	8.4	1	0.1	2	0.2	3	0.3	2	0.2	1	0.1	3	0.3
Total	21,347	2,973	13.9	2	0.1	25	0.8	27	0.9	3	0.1	5	0.2	8	0.3
Garrett County															
0-35 Months	1,090	284	26.1	0	0.0	3	1.1	3	1.1	0	0.0	0	0.0	0	0.0
36-72 Months	1,175	117	10.0	1	0.9	4	3.4	5	4.3	0	0.0	0	0.0	0	0.0
Total	2,265	401	17.7	1	0.2	7	1.7	8	2.0	0	0.0	0	0.0	0	0.0

Appendix A
 Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2013, Continued

Age Group	Population of Children	Children Tested		Blood Lead Level 5-9 µg/dL						Blood Lead Level ≥10 µg/dL					
				Old Cases		New Cases		Total		Old Cases		New Cases		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Harford County															
0-35 Months	10,577	2,015	19.1	2	0.1	21	1.0	23	1.1	0	0.0	1	0.0	1	0.0
36-72 Months	10,896	839	7.7	3	0.4	8	1.0	11	1.3	0	0.0	0	0.0	0	0.0
Total	21,473	2,854	13.3	5	0.2	29	1.0	34	1.2	0	0.0	1	0.0	1	0.0
Howard County															
0-35 Months	12,264	1,788	14.6	2	0.1	17	1.0	19	1.1	0	0.0	2	0.1	2	0.1
36-72 Months	12,880	699	5.4	0	0.0	4	0.6	4	0.6	0	0.0	1	0.1	1	0.1
Total	25,144	2,487	9.9	2	0.1	21	0.8	23	0.9	0	0.0	3	0.1	3	0.1
Kent County															
0-35 Months	718	205	28.6	1	0.5	1	0.5	2	1.0	0	0.0	1	0.5	1	0.5
36-72 Months	713	57	8.0	0	0.0	2	3.5	2	3.5	0	0.0	0	0.0	0	0.0
Total	1,431	262	18.3	1	0.4	3	1.1	4	1.5	0	0.0	1	0.4	1	0.4
Montgomery County															
0-35 Months	46,016	14,135	30.7	8	0.1	113	0.8	121	0.9	0	0.0	18	0.1	18	0.1
36-72 Months	44,758	6,173	13.8	8	0.1	46	0.7	54	0.9	2	0.0	6	0.1	8	0.1
Total	90,774	20,308	22.4	16	0.1	159	0.8	175	0.9	2	0.0	24	0.1	26	0.1
Prince George's County															
0-35 Months	42,983	12,918	30.1	10	0.1	132	1.0	142	1.1	1	0.0	10	0.1	11	0.1
36-72 Months	39,717	7,520	18.9	11	0.1	69	0.9	80	1.1	0	0.0	2	0.0	2	0.0
Total	82,700	20,438	24.7	21	0.1	201	1.0	222	1.1	1	0.0	12	0.1	13	0.1
Queen Anne's County															
0-35 Months	1,914	333	17.4	2	0.6	3	0.9	5	1.5	0	0.0	2	0.6	2	0.6
36-72 Months	2,022	111	5.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	3,936	444	11.3	2	0.5	3	0.7	5	1.1	0	0.0	2	0.5	2	0.5

Appendix A
Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2013, Continued

Age Group	Population of Children	Children Tested		Blood Lead Level 5-9 µg/dL						Blood Lead Level ≥10 µg/dL					
				Old Cases		New Cases		Total		Old Cases		New Cases		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Saint Mary's County															
0-35 Months	5,371	1,286	23.9	0	0.0	14	1.1	14	1.1	0	0.0	0	0.0	0	0.0
36-72 Months	5,434	247	4.5	1	0.4	5	2.0	6	2.4	0	0.0	0	0.0	0	0.0
Total	10,805	1,533	14.2	1	0.1	19	1.2	20	1.3	0	0.0	0	0.0	0	0.0
Somerset County															
0-35 Months	950	391	41.2	0	0.0	2	0.5	2	0.5	0	0.0	4	1.0	4	1.0
36-72 Months	855	173	20.2	1	0.6	1	0.6	2	1.2	0	0.0	0	0.0	0	0.0
Total	1,805	564	31.2	1	0.2	3	0.5	4	0.7	0	0.0	4	0.7	4	0.7
Talbot County															
0-35 Months	1,365	562	41.2	0	0.0	9	1.6	9	1.6	0	0.0	7	1.2	7	1.2
36-72 Months	1,330	105	7.9	1	1.0	0	0.0	1	1.0	1	1.0	1	1.0	2	1.9
Total	2,695	667	24.8	1	0.1	9	1.3	10	1.5	1	0.1	8	1.2	9	1.3
Washington County															
0-35 Months	6,437	1,819	27.9	5	0.3	38	2.1	43	2.4	0	0.0	5	0.3	5	0.3
36-72 Months	6,478	895	13.7	3	0.3	13	1.5	16	1.8	0	0.0	2	0.2	2	0.2
Total	12,915	2,714	20.8	8	0.3	51	1.9	59	2.2	0	0.0	7	0.3	7	0.3
Wicomico County															
0-35 Months	4,494	1,595	35.5	3	0.2	30	1.9	33	2.1	0	0.0	4	0.3	4	0.3
36-72 Months	4,239	453	10.7	4	0.9	11	2.4	15	3.3	1	0.2	1	0.2	2	0.4
Total	8,733	2,048	23.5	7	0.3	41	2.0	48	2.3	1	0.0	5	0.2	6	0.3
Worcester County															
0-35 Months	1,675	641	38.3	0	0.0	7	1.1	7	1.1	0	0.0	3	0.5	3	0.5
36-72 Months	1,622	189	11.6	0	0.0	3	1.6	3	1.6	0	0.0	0	0.0	0	0.0
Total	3,297	830	25.2	0	0.0	10	1.2	10	1.2	0	0.0	3	0.4	3	0.4

Appendix A
 Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2013, Continued

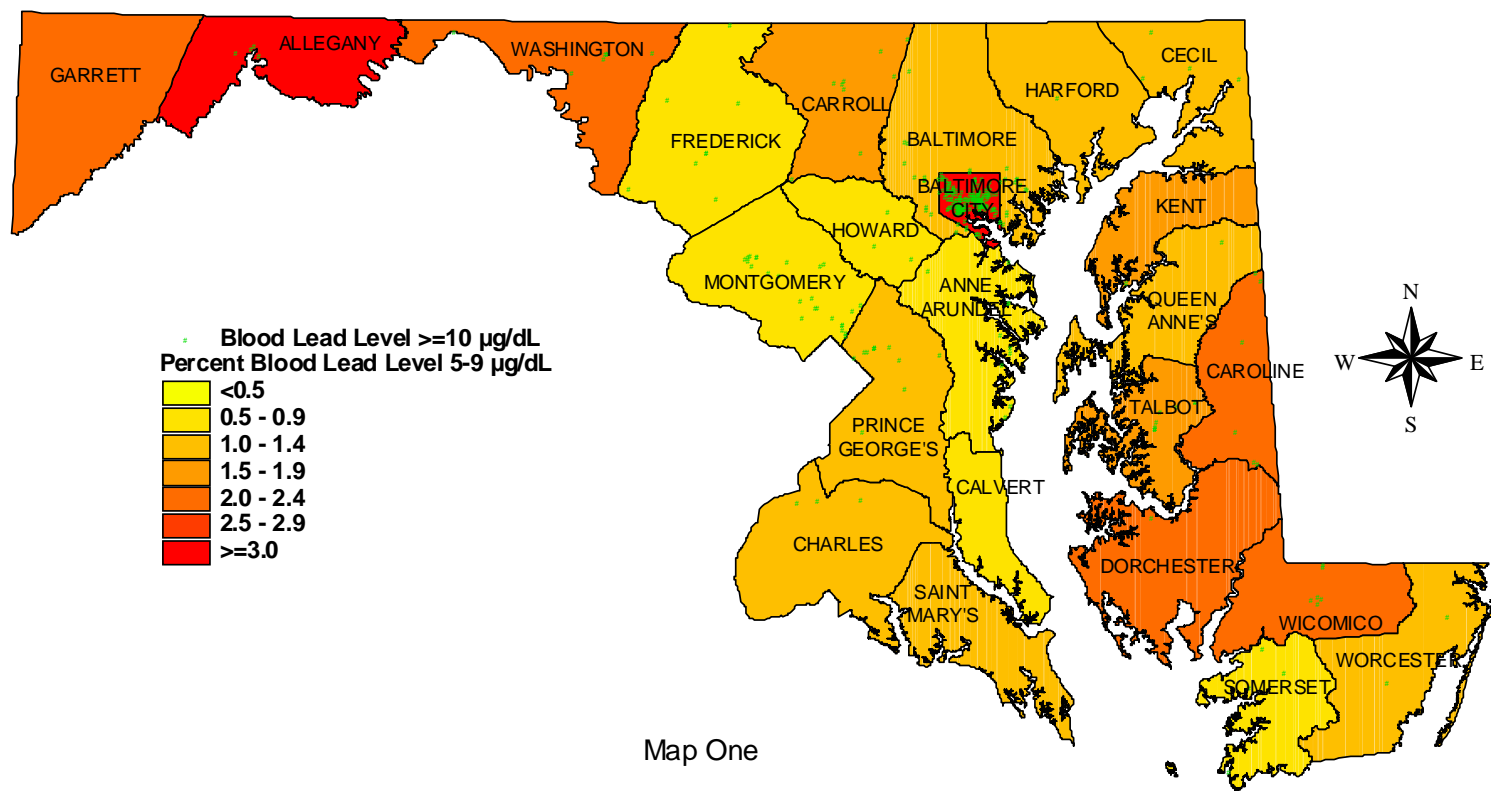
Age Group	Population of Children	Children Tested		Blood Lead Level 5-9 µg/dL						Blood Lead Level ≥10 µg/dL					
				Old Cases		New Cases		Total		Old Cases		New Cases		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
County Unknown															
0-35 Months		6				0		0				1		1	
36-72 Months		2				1		1				0		0	
Total		8				1		1				1		1	
Statewide															
0-35 Months	264,007	78,504	29.7	225	0.3	1,316	1.7	1,541	2.0	26	0.0	241	0.3	267	0.3
36-72 Months	254,858	31,578	12.4	302	1.0	408	1.3	710	2.2	41	0.1	64	0.2	105	0.3
Total	518,865	110,082	21.2	527	0.5	1,724	1.6	2,251	2.0	67	0.1	305	0.3	372	0.3

Appendix B
Blood Lead Testing of Children 0-72 Months, and Prevalence and Incidence of Blood Lead Level ≥ 10 $\mu\text{g/dL}$: 2006-2013

Calendar Year		Population	Blood Lead Tests		Prevalence		Incidence	
			Number	Percent	Number	Percent	Number	Percent
2006								
	Baltimore City	54,547	18,363	33.7	843	4.6	573	3.1
	Counties	408,784	84,611	20.7	431	0.5	363	0.4
	County Unknown		199		21		20	
	Statewide	463,331	103,173	22.3	1,295	1.2	956	0.9
2007								
	Baltimore City	55,142	17,670	32.0	624	3.5	435	2.5
	Counties	413,248	87,760	21.2	267	0.3	218	0.2
	County Unknown		278		1		1	
	Statewide	468,390	105,708	22.6	892	0.8	654	0.6
2008								
	Baltimore City	55,959	18,622	33.3	468	2.5	302	1.6
	Counties	418,941	87,830	21.0	245	0.3	187	0.2
	County Unknown		69		0		0	
	Statewide	474,900	106,521	22.4	713	0.7	489	0.5
2009								
	Baltimore City	56,431	19,043	33.7	347	1.8	214	1.1
	Counties	422,488	88,368	20.9	206	0.2	165	0.1
	County Unknown		5					
	Statewide	478,919	107,416	22.4	553	0.5	379	0.4
2010								
	Baltimore City	57,937	19,702	34.0	314	1.6	229	1.2
	Counties	433,661	94,650	21.8	217	0.2	170	0.2
	County Unknown		477		0		0	0.0
	Statewide	491,598	114,829	23.4	531	0.5	399	0.3
2011								
	Baltimore City	55,681	19,049	34.2	258	1.4	182	1.0
	Counties	445,021	90,481	20.3	194	0.2	160	0.2
	County Unknown		4		0		0	
	Statewide	500,702	109,534	21.9	452	0.4	342	0.4
2012								
	Baltimore City	56,701	18,717	33.0	219	1.2	148	0.8
	Counties	453,184	91,747	20.2	143	0.2	104	0.1
	County Unknown		75		2		3	
	Statewide	509,885	110,539	21.7	364	0.3	255	0.2
2013								
	Baltimore City	57,693	18,535	32.1	218	1.2	170	0.9
	Counties	461,172	91,539	19.8	152	0.2	134	0.1
	County Unknown		8		0		1	
	Statewide	518,865	110,082	21.2	370	0.3	305	0.3

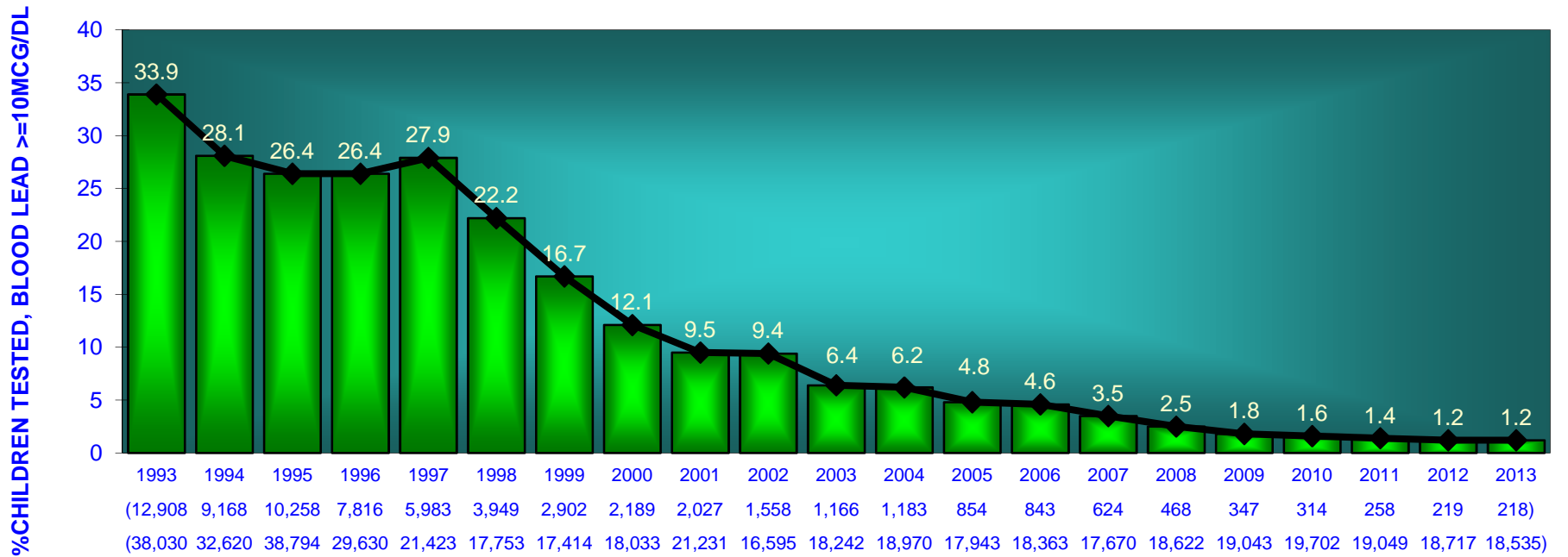
MARYLAND DEPARTMENT OF THE ENVIRONMENT Lead Poisoning Prevention Program

Percent of Children 0-72 Months with Blood Lead Level 5-9 $\mu\text{g}/\text{dL}$, and
Distribution of Children 0-72 Months with Blood Lead Level $\geq 10 \mu\text{g}/\text{dL}$
Childhood Blood Lead Surveillance: 2013



Appendix C

MARYLAND DEPARTMENT OF THE ENVIRONMENT CHILDHOOD BLOOD LEAD SURVEILLANCE BALTIMORE CITY 1993-2013



CALENDAR YEAR
(Number of Children with BLL ≥ 10mcg/dl)
(Number of Children Tested)



**MARYLAND DEPARTMENT OF THE ENVIRONMENT
CHILDHOOD BLOOD LEAD SURVEILLANCE
STATEWIDE 1993-2013**

