Department of the Environment

Childhood Blood Lead Surveillance in Maryland

Annual Report 2012

Lead Poisoning Prevention Program

MARYLAND DEPARTMENT OF THE ENVIRONMENT
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MARYLAND CHILDHOOD LEAD REGISTRY

ANNUAL SURVEILLANCE REPORT 2012

EXECUTIVE SUMMARY

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

Since 1995, the CLR has released a comprehensive annual report on statewide childhood blood lead testing. This current report presents the childhood blood lead test results for calendar year (CY) 2012. All numbers are 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. With few exceptions all numbers referred to children 0-72 months of age.

Maryland CY 2012 Surveillance Highlights:

Statewide

- During Calendar Year ("CY") 2012 a total of 110,539 (21.7%) children were tested out of 509,885 children 0-72 months of age; as identified in the Maryland census population for 2010. This in an **increase** of 1,005 children tested over the "CY"11 for children tested 109,534 (21.9%) out of a population of 500,702. 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 1 and 2 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 "Risk Assessment Questionnaire" conducted on children up to age six years of age, as required.

- Of those 110,539 children tested, 364 (0.3%) were identified with a blood lead level ≥10 µg/dL (Prevalence). This was a **decrease** of 88 Prevalence cases compared to 452 (0.4%) during "CY"11.

- Of the 364 children identified with a blood lead level ≥10 µg/dL, 255 (0.2%) were indentified with their first venous or capillary blood lead level ≥ 10 µg/dL (Incidence). This resulted in a **decrease** of 87 Incidence cases compared to 342 (0.3%) in "CY"11.

- Of the 255 incident cases statewide, a total of 236 cases met the criteria for medical and environmental case management (Confirmed Case). This was a **decrease** of 56 Confirmed Cases compared to the "CY"11 total of 292.

- In 2012, 1,792 children had their first venous or capillary blood lead level of 5-9 µg/dL compared to 2,129 children in 2011.

- The highest testing rates for children 0-72 months were found in jurisdictions that require testing of all children at age 1 and 2 years. These include: Somerset County (34.3%), Baltimore City (33%), Allegany County (27.2%), and Worcester County (26.4%).

Baltimore City

- During Calendar Year "CY" 2012 a total of 18,717 (33%) children were tested out of 56,701 children 0-72 months of age; as identified in the Maryland census population for 2010. This was a **decrease** of 332 children tested compared to "CY"11 where 19,049 (34.2%) children were tested out of a population of 55,681.

- Of those 18,717 children tested in "CY"12; 219 (1.2%) were identified with a venous or capillary blood lead level ≥10 µg/dL (Prevalence). This was a **decrease** of 39 Prevalence cases compared to 258 (1.4%) during "CY"11.

- Children identified with a first time (Incidence) venous or capillary blood lead level ≥ 10 µg/dL during "CY"12 totaled 148 (0.8%). This was a **decrease** of 34 Incidence cases compared to 182 (1.0%) in "CY"11.

- In Baltimore City, 144 children with a first venous blood lead level ≥ 10 µg/dL (Confirmed Case) received medical and environmental case management. This was an **increase** of 14 Confirmed cases over "CY" 2011 where 130 children were identified.

- Of the 144 Confirmed Cases approximately 98 (68%) of these cases children were living in a pre-1950 residential rental dwelling "Affected Property". In the remaining 46 cases, 1 (1%) children were living in a post 1949 residential rental dwelling and 45 (31%) were living in an owner occupied property ("Non-Affected").

Maryland Counties (0utside of Baltimore City)

- In Maryland Counties, during Calendar Year "CY" 2012 a total of 91,822 (20%) children were tested out of 453,184 children 0-72 months of age; as identified in the Maryland census population for 2010. This was an **increase** of 1,337 children tested compared to "CY"11 where 90,485 (20%) children were tested out of a population of 445,021.

- Of those 91,822 children tested in "CY"12; 145 (0.2%) were identified with a venous or capillary blood lead level ≥10 µg/dL (Prevalence). This was a **decrease** of 49 Prevalence cases compared to 194 (0.2%) during "CY"11.

- Children identified with a first time (Incidence) venous or capillary blood lead level ≥ 10 µg/dL during "CY"12 totaled 107 (0.1%). This was a **decrease** of 53 Incidence cases compared to 160 (1.0%) in "CY"11.

- In Maryland Counties, 92 children with the first venous blood lead level ≥ 10 µg/dL (Confirmed Case) received medical and environmental case management. This was a **decrease** of 70 Confirmed cases over "CY" 2011 where 162 children were identified.

- Of the 92 Confirmed Cases approximately 15 (16%) of these cases children were living in a pre-1950 residential rental dwelling ("Affected Property"). In the remaining 77 cases, 37 (40%) children were living in a post 1949 residential rental dwelling and 40 (44%) were living in an owner occupied property ("Non-Affected").

- In 2012, CLR received blood lead reports from 40 laboratories nationwide. Number of reports for the whole year varied from as low as 2 from one laboratory to more than 68,000 from another laboratory. More than 84% of reports however are from three major laboratories. These and five other laboratories sent their reports electronically (90.8%). The average reporting time, from the time sample is drawn to the time the result enters the CLR database is about 6 days. The average time for elevated blood lead results (≥10 µg/dL) is approximately 30 hours.

LEAD NEWS

"Targeting Plan Evaluated"

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" ("Targeting Plan"), children are required to have a blood lead test at ages 1 and 2 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 "Risk Assessment Questionnaire" conducted on children up to age six years of age, as required. Currently the Targeting Plan is being re-evaluated by MDE and the Maryland Department of Health and Mental Hygiene.

"Funding Loss"

With the loss of the Center for Disease Control ("CDC") funding, MDE continues to be able to provide oversight of medical case management. The Department also continues to perform environmental investigations when a child is diagnosed with a blood lead level of ≥10 µg/dL or greater. During 2012 MDE restored the funding, once provided by a pass through grant from CDC to MDE, to Wicomico County and the Baltimore City Health Department.

"Universe of Affected Properties to Increase in 2015"

On January 1, 2015 Maryland will be expanding the universe of Affected Properties under the Environment Article Title 6, Subtitle 8 to also include residential rental dwelling units built 1950-1978. 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.

"Owners of Affected Properties Required Meeting a Higher Standard"

Effective January 1, 2012 an owner subject to Maryland Lead Laws, is required to meet a more stringent standard when a child living in their rental property is diagnosed with a blood lead level of ≥10 µg/dL or greater. Currently, MDE regulates pre-1950 residential rental properties ("Affected Properties").

When an owner receives a Notice of Elevated Blood Lead Level or Notice of Defect on their Affected Property they are now required to meet the Modified Risk Reduction Standard. The standard requires dust testing and nine treatments followed by a visual inspection. The treatment must be performed and signed-off on by an accredited MDE lead supervisor.

Once completed, a visual inspection, treatment verification and dust samples are performed by an Accredited MDE inspector. Upon passing the inspection the owner will receive a certificate indicating that they met the Modified Risk Reduction Standard.

Confirmed Cases and Property Type by Jurisdiction

Table One
Lead Poisoning Prevention Program: Childhood Lead Registry
Property Status of New Cases ≥ 10 µg/dL for Calendar Year 2012
By Jurisdiction

County	Number Properties	Owner-Occupied		Affected Property		Non-affected Property	
		Number	Percent	Number	Percent	Number	Percent
Allegany	5	0	0%	3	60%	2	40%
Anne Arundel	4	2	50%	0	0%	2	50%
Baltimore	24	10	42%	1	4%	13	54%
Baltimore City	**144**	**45**	**31%**	***98**	**68%**	**1**	**1%**
Calvert	1	1	100%	0	0%	0	0%
Caroline	2	2	100%	0	0%	0	0%
Carroll	0	0	0%	0	0%	0	0%
Cecil	0	0	0%	0	0%	0	0%
Charles	3	3	100%	0	0%	0	0%
Dorchester	1	1	100%	0	0%	0	0%
Frederick	3	3	100%	0	0%	0	0%
Garrett	0	0	0%	0	0%	0	0%
Harford	5	2	40%	2	40%	1	10%
Howard	4	1	25%	0	0%	3	75%
Kent	2	1	50%	1	50%	0	0%
Montgomery	11	6	55%	0	0%	5	45%
Prince George's	16	6	38%	4	24%	6	38%
Queen Anne's	1	0	0%	0	0%	1	100%
Saint Mary's	1	1	100%	0	0%	0	0%
Somerset	1	0	0%	1	100%	0	0%
Talbot	2	0	0%	2	100%	0	0%
Washington	0	0	0%	0	0%	0	0%
Wicomico	4	1	25%	1	25%	2	50%
Worcester	2	0	0%	0	0%	2	100%
Counties' Total	*92*	*40*	*44%*	*15*	*16%*	*37*	*40%*
Statewide	**236**	**85**	**36%**	**113**	**48%**	**38**	**16%**

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

Statistical Report

In calendar year 2012, a total of 110,539 children 0-72 months were tested for lead exposure statewide. Table One provides a summary of statewide statistics of blood lead testing in 2012.

Table Two
Calendar Year (CY) 2012 Statistical Report[1]

Item	Number	Percent (%)
All Children		
Number of tests	127,735	
Number of children	122,799	
Children 0-72 Months		
Number of tests	115,210	
Number of children	110,539	100.0
Age		
Under One	10,115	9.2
One Year	37,114	33.6
Two Years	30,721	27.8
Three Years	12,094	10.9
Four Years	11,967	10.8
Five Years	8,498	7.7
Sex		
Female	54,069	48.9
Male	56,036	50.7
Undetermined	434	0.4
Highest Blood Lead Level (µg/dL)		
≤4	107,800	97.5
5-9	2,375	2.1
10-14	233	0.2
15-19	81	0.1
≥20	50	0.1
Mean BLL (Geometric mean)	1.40	
Blood Specimen		
Capillary	19,397	17.5
Venous	78,384	70.9
Undetermined[2]	12,783	11.6

1. For detailed analysis and breakdown of numbers refer to Supplementary Data Tables 1-5.
2. In supplementary data tables blood tests with sample type unknown were counted as capillary.

Findings

Childhood lead exposure further declined, both in the extent and the severity from 2011 to 2012 (Figures One & Two).

Figure One
Number of Children 0-72 Months Tested for Lead and Number Reported to Have Blood Lead Level ≥10 µg/dL: 1995-2012

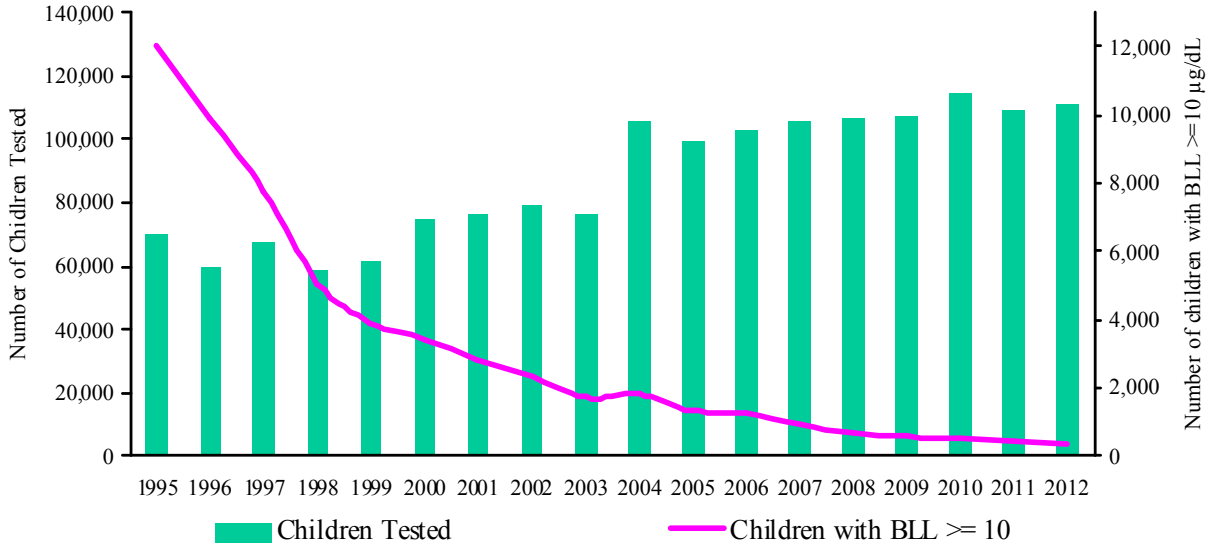
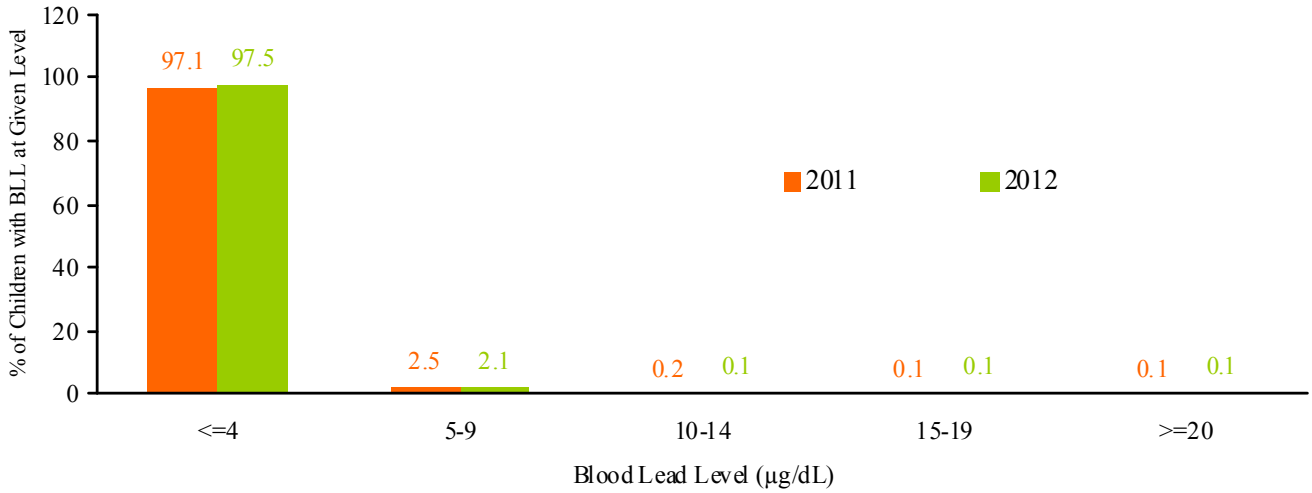


Figure Two
Blood Lead Distribution of Children 0-72 Months Tested for Lead in 2011 and 2012



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

Figure Three

Percent of Children 0-72 Months Tested for Lead with the Highest Blood lead Level of 5-9 µg/dL: 2000-2012

Table Three (page 8) provides the breakdown of blood lead testing and the status of children with respect to lead exposure by jurisdiction in 2012.

Table Three

Blood Lead Testing of Children 0-72 Months by Jurisdiction in 2012[1]

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	4,853	1,320	27.2	14	1.1	40	3.0	54	4.1	4	0.3	8	0.6	12	0.9
Anne Arundel	48,260	8,338	17.3	10	0.1	64	0.8	74	0.9	0	0.0	5	0.1	5	0.1
Baltimore	67,225	16,329	24.3	28	0.2	174	1.1	202	1.2	8	0.0	26	0.2	34	0.2
Baltimore City	56,701	18,717	33.0	424	2.3	800	4.3	1,224	6.5	71	0.4	148	0.8	219	1.2
Calvert	7,159	715	10.0	0	0.0	7	1.0	7	1.0	0	0.0	1	0.1	1	0.1
Caroline	3,234	773	23.9	1	0.1	13	1.7	14	1.8	0	0.0	2	0.3	2	0.3
Carroll	13,047	1,247	9.6	9	0.7	18	1.4	27	2.2	3	0.2	1	0.1	4	0.3
Cecil	9,047	1,221	13.5	2	0.2	12	1.0	14	1.1	0	0.0	0	0.0	0	0.0
Charles	13,254	1,963	14.8	1	0.1	11	0.6	12	0.6	0	0.0	3	0.2	3	0.2
Dorchester	2,797	694	24.8	3	0.4	15	2.2	18	2.6	0	0.0	1	0.1	1	0.1
Frederick	20,976	3,039	14.5	3	0.1	23	0.8	26	0.9	4	0.1	3	0.1	7	0.2
Garrett	2,225	427	19.2	1	0.2	5	1.2	6	1.4	1	0.2	0	0.0	1	0.2
Harford	21,100	2,979	14.1	5	0.2	29	1.0	34	1.1	1	0.0	5	0.2	6	0.2
Howard	24,707	2,500	10.1	1	0.0	24	1.0	25	1.0	3	0.1	3	0.1	6	0.2
Kent	1,406	243	17.3	1	0.4	6	2.5	7	2.9	0	0.0	2	0.8	2	0.8
Montgomery	89,202	20,515	23.0	18	0.1	151	0.7	169	0.8	9	0.0	15	0.1	24	0.1
Prince George's	81,273	20,417	25.1	26	0.1	196	1.0	222	1.1	3	0.0	17	0.1	20	0.1
Queen Anne's	3,868	494	12.8	0	0.0	13	2.6	13	2.6	0	0.0	2	0.4	2	0.4
Saint Mary's	10,618	1,634	15.4	2	0.1	26	1.6	28	1.7	0	0.0	1	0.1	1	0.1
Somerset	1,774	608	34.3	5	0.8	13	2.1	18	3.0	0	0.0	2	0.3	2	0.3
Talbot	2,648	606	22.9	2	0.3	6	1.0	8	1.3	1	0.2	2	0.3	3	0.5
Washington	12,691	2,675	21.1	17	0.6	102	3.8	119	4.4	0	0.0	0	0.0	0	0.0
Wicomico	8,582	2,154	25.1	9	0.4	35	1.6	44	2.0	0	0.0	4	0.2	4	0.2
Worcester	3,240	856	26.4	1	0.1	6	0.7	7	0.8	0	0.0	2	0.2	2	0.2
County Unknown[7]		75		0		3		3		1		2		3	
Total	**509,885**	**110,539**	**21.7**	**583**	**0.5**	**1,792**	**1.6**	**2,375**	**2.1**	**109**	**0.1**	**255**	**0.2**	**364**	**0.3**

1. The table is based on the selection of the highest venous or the highest capillary in the absence of any venous test.
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 a history of a blood lead level of 5-9 µg/dL. These children may have carried over from 2011 or had a blood lead level of 5-9 µg/dL in previous years. Any child with a history of blood lead test of ≥10 µg/dL is not counted in this column
4. Children with the very first blood lead level of 5-9 µg/dL in 2012. These children were either not tested in the past or their blood lead levels were below 5 µg/dL. If a child had a blood lead test of ≥10 µg/dL in 2012 or in the past is not counted in this column.
5. Children with a history of a blood lead level ≥10 µg/dL. These children may have carried over from 2011 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 2011. 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.

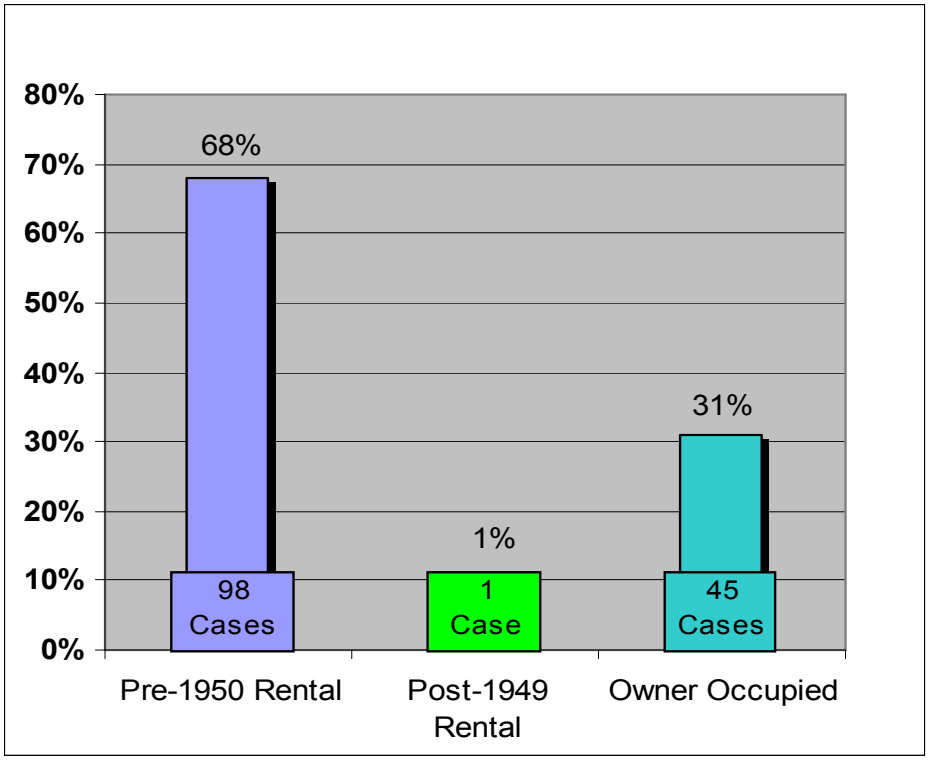
Statewide activities to reduce (eliminate) childhood lead poisoning

The State Elimination Plan calls for zero new cases of EBL. The plan focuses on primary prevention (removal and elimination of lead hazards prior to child access) 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.

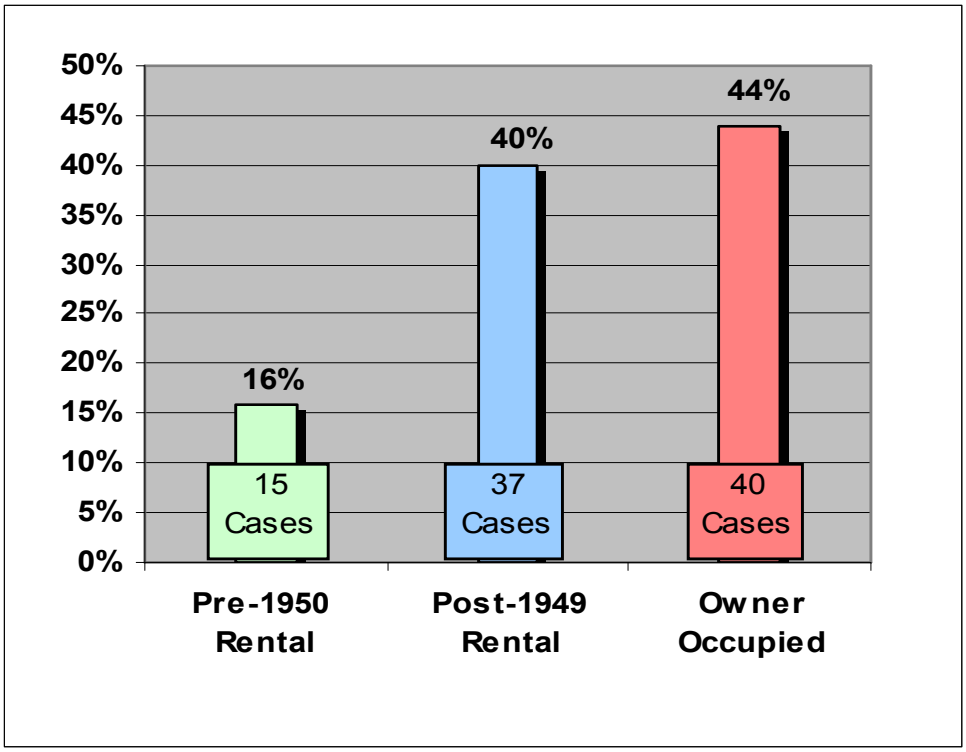
Primary Prevention: Much of the decline in blood lead levels is the result of implementation and enforcement of Maryland's "Reduction of Lead Risk in Housing Act" (Act). The Act requires owners of pre-1950 rental dwelling units (Affected Properties) to reduce the potential for child exposure to lead paint hazards by performing specific lead risk reduction treatments prior to each change in tenancy. The State Elimination Plan 2010 called for zero new cases of EBL. 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 reduction in children indentified with blood lead levels in compliant Affected Properties that have meet the required risk reduction standard required at change in tenancy.

Figures Four

Percent of Children 0-72 Months with Blood Lead Level ≥10 ug/dL in 2012 and Age of the Housing



Housing Type Statewide*
Confirmed Cases CY 2012
(92 Cases)



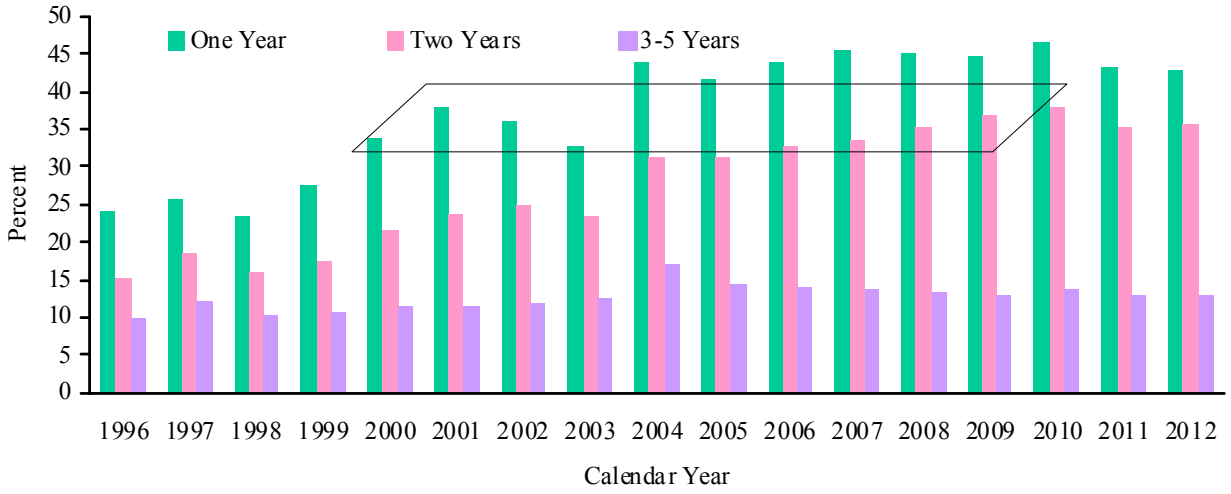
* Excluding Baltimore City

State laws and regulations with impact on childhood lead poisoning

- ✓ Requirements to perform lead hazard reduction at each turnover in rental housing built before 1950. [Environment Article (EA) §6-8]
- ✓ Outreach programs to parents, health care providers, and property owners, especially in at-risk areas. [EA§ 6-8, Health Article §18-106]
- ✓ The Department, health departments or other local jurisdictions effective June 1, 2012 have the authority to order abatements in response to an investigation report of a lead poisoned person at risk.

Secondary Prevention: The second element of the Elimination Plan is to identify children who may be at risk of lead exposure. In particular, children ages one and two years are more likely to be exposed to lead because of their hand to mouth behavior. Maryland requires that children at ages one and two years who are enrolled in the Medicaid, Early Periodic Screening, Diagnosis, and Treatment (EPSDT) Program or who currently live or have ever lived in one of Maryland's "at-risk" zip codes identified by the "Targeting Plan" should be tested. The percentage of one and two year old children tested for lead has increased substantially since 2004 (Figure Four).

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



Furthermore, children living in "at-risk" areas, areas with high proportion of pre 1950 housing units are more likely to be exposed to lead than children living in other areas. 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, Allegany, Caroline, Dorchester, Frederick, Garrett, Somerset, Washington, Wicomico, and Worcester counties.

Table Four
Blood Lead Testing and Blood Lead Level of 5-9 and ≥10 µg/dL in At-Risk and Not At-Risk Areas in 2012

		Children Tested		Children with BLL 5-9 µg/dL		Children with BLL ≥10 µg/dL	
Area	Population	Number	Percent	Number	Percent	Number	Percent
At-Risk	112,220	29,943	26.7	1,476	4.9	238	0.8
Not At-Risk	397,665	80,521	20.2	896	1.1	123	0.2
Statewide*	**509,885**	**110,539**	**21.7**	**2,375**	**2.1**	**364**	**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 Maryland Department of Health and Mental Hygiene, Office of Medicaid Administration (DHMH), on a quarterly and annual basis to be matched with a list of children enlisted in the states 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.

Identifying Children with Lead Exposure

The main goal in preventing childhood lead poisoning is to limit exposure. However, early detection is crucial when a child is identified with an elevated blood lead level. Because there are no specific clinical symptoms, a blood lead test is the most reliable technique to identify children with elevated blood lead levels.

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 level. A venous blood lead test ≥10 µg/dL initiates case management and an environmental investigation. Currently, one venous or two capillary blood lead tests ≥10 µg/dL triggers 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" (Act), an owner who receives a Notice of Elevated Blood Lead Level 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 lead poisoned person at risk. Tables Four and Five outline the State's protocol for diagnostic and follow up blood lead testing.

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

BLL (µg/dL)	Confirm with venous blood lead test within
≤9	Routine blood lead test according to protocol
10 –19	3 months
20 – 44	1 week to 1 month*
45 – 59	48 hours
60-69	24 hours
≥70	Immediately as an emergency lab test

* The higher the BLL, the more urgent the need for confirmatory testing.

Table Six

Blood Lead Diagnostic and Follow-Up: **Follow-Up for Venous Blood Lead Testing**[1]

BLL (µg/dL)Venous	Early follow-up(First 2-4 tests after identification)	Late follow-up (After BLL begins to decline)
≤9	Routine blood lead test according to protocol	
10 - 14	3 months [2]	6 – 9 months
15 - 19	1 - 3 months [2]	3 – 6 months
20 - 24	1 - 3 months [2]	1 – 3 months
25 - 44	2 weeks – 1 month	1 month
≥45	As soon as possible	Chelation with subsequent follow-up

1. Seasonal variation of BLLs exists and may be more apparent in colder climate areas. Greater exposure in the summer months may necessitate more frequent follow-up.
2. 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. Managing Elevated Blood Lead Levels Among Children: Recommendations from the Advisory Committee on Childhood Lead Poisoning Prevention. Atlanta: CDC, 2002.*

Predictability of Blood Lead Level of 5-9 for BLL≥10

The CDC adoption of blood lead level of 5 µg/dL as "Reference Value" raised the issue of follow up and case management protocol for children with blood lead level 5-9 µg/dL. The state and local programs (including Maryland) are looking into this matter. In the meantime, it was of interest to find whether the blood lead level of 5-9 µg/dL can be an indicator of later blood lead level ≥10 µg/dL. We looked at this from two points of view: 1) whether children with the very first Blood lead level ≥10 µg/dL in 2012 had any previous blood lead test of 5-9 (retrospective view), and 2) whether children with the very first blood lead level of 5-9 in 2006 will have later BLL 10+ (prospective view)

Looking retrospectively, of children 0-72 months old tested for lead in 2012, 256 had the very first blood lead level ≥10 µg/dL. Of these, 149 children had no any blood lead test in the past. Of 107 children with previous blood lead test, in 79 (73.8%) children the blood lead level of previous blood lead test (with average of 17.2 months ago) was ≤4 µg/dL and in only 28 (26.2%) children the blood lead level of previous blood lead test (with average of 16.3 months ago) was 5-9 µg/dL.

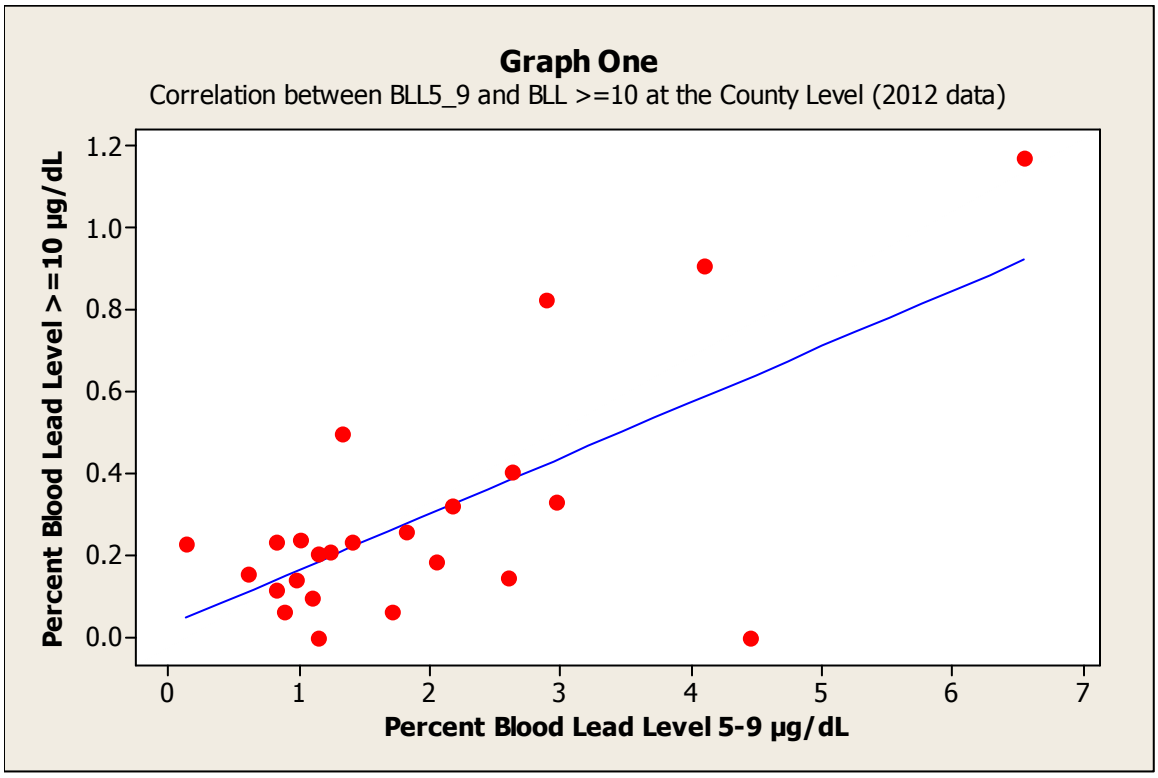
Looking prospectively, 6,896 children 0-72 months had the very first blood lead level 5-9 µg/dL in 2006. Of these children, only 3,183 (46.2%) had a later blood lead test. Table Five summarizes the history of blood lead test of these children.

Table Seven
History of blood lead test of children with blood lead level 5-9 µg/dL in 2006

Blood lead level of later up test	Children tested		Average blood lead level (µg/dL)	Time interval between the two tests (Months)
	Number	Percent		
≤4	2,346	73.7	2.3	22.8
5-9	746	23.4	6.2	15.6
≥10	91	2.9	13.8	14.3
Total	3,183	100.0	3.5	20.9

Limitations of data necessarily do not allow for concrete conclusion. However, the findings do not seem to support predictability of blood lead level 5-9 for future elevated blood lead level.

At the aggregate (county) level, however, there was highly significant correlation ($r = 0.683$, p value = 0.000) between percentage of blood lead level 5-9 and percentage of blood lead level ≥10 µg/dL (Graph One). But the correlation did not stand at the zip code level ($r = -0.016$, p vlaue = 0.705).



Data Quality

The CLR is maintained in the "Systematic Tracking of Elevated Lead Levels and Remediation" (STELLAR) surveillance system, obtained from 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 ≥20 µg/dL to be reported (fax) within 24 hours after result is known. However, upon CLR request, laboratories agreed to report (fax) the result of all blood lead test ≥10 µg/dL within 24 hours. For all blood lead tests ≥10 µg/dL, staff checks the completeness of data in particular with respect to child's and guardian's name, address, and telephone number.

In 2012, more than 90% of blood lead tests were reported to the registry electronically. 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 µg/dL) is approximately 30 hours.

Blood Lead Laboratory Reporting Requirement

The amended law and regulations* of 2001 and 2002 require that:

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

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

2-Blood lead results ≥20 µg/dL to be reported (fax) within 24 hours after result is known. All other results to be reported every two weeks.

3-Reporting format should comply with the format designed and provided by the Registry.

4-Data should be provided electronically.

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

Table Eight
Completeness of Data for 2012

ITEM	% Completed
Child's name[1]	100.0
Date of Birth[1]	100.0
Sex/Gender	99.6
Race	49.6
Guardian's name	52.7
Sample type	88.5
Blood lead level	100.0
Address (geocoded)	88.6
Telephone Number[2]	86.7

1. Reports with missing (wrong) name and/or date of birth are held by the program until they are corrected.
2. Quality control for telephone umber started in 2009.

Migration into New System

The Maryland Department of the Environment has partnered with the Maryland Department of Health and Mental Hygiene in evaluation of CDC's: "Healthy Homes and Lead Poisoning Surveillance System (HHLPSS)". Implementation of the HHLPSS database is currently being evaluated for its functionality and ability to meet the needs of the states Childhood Lead Registry.

Appendix A

Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2012

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	2,452	1,128	46.0	8	0.7	36	3.2	44	3.9	1	0.1	7	0.6	8	0.7
36-72 Months	2,401	192	8.0	6	3.1	4	2.1	10	5.2	3	1.6	1	0.5	4	2.1
Total	4,853	1,320	27.2	14	1.1	40	3.0	54	4.1	4	0.3	8	0.6	12	0.9
Anne Arundel County															
0-35 Months	24,728	6,025	24.4	6	0.1	52	0.9	58	1.0	0	0.0	3	0.0	3	0.0
36-72 Months	23,532	2,313	9.8	4	0.2	12	0.5	16	0.7	0	0.0	2	0.1	2	0.1
Total	48,260	8,338	17.3	10	0.1	64	0.8	74	0.9	0	0.0	5	0.1	5	0.1
Baltimore County															
0-35 Months	34,388	12,581	36.6	18	0.1	139	1.1	157	1.2	4	0.0	24	0.2	28	0.2
36-72 Months	32,836	3,748	11.4	10	0.3	35	0.9	45	1.2	4	0.1	2	0.1	6	0.2
Total	67,225	16,329	24.3	28	0.2	174	1.1	202	1.2	8	0.0	26	0.2	34	0.2
Baltimore City															
0-35 Months	30,465	13,246	43.5	151	1.1	627	4.7	778	5.9	36	0.3	112	0.8	148	1.1
36-72 Months	26,235	5,471	20.9	273	5.0	173	3.2	446	8.2	35	0.6	36	0.7	71	1.3
Total	56,701	18,717	33.0	424	2.3	800	4.3	1,224	6.5	71	0.4	148	0.8	219	1.2
Calvert County															
0-35 Months	3,422	584	17.1	0	0.0	3	0.5	3	0.5	0	0.0	1	0.2	1	0.2
36-72 Months	3,737	131	3.5	0	0.0	4	3.1	4	3.1	0	0.0	0	0.0	0	0.0
Total	7,159	715	10.0	0	0.0	7	1.0	7	1.0	0	0.0	1	0.1	1	0.1
Caroline County															
0-35 Months	1,599	616	38.5	0	0.0	10	1.6	10	1.6	0	0.0	2	0.3	2	0.3
36-72 Months	1,635	157	9.6	1	0.6	3	1.9	4	2.5	0	0.0	0	0.0	0	0.0
Total	3,234	773	23.9	1	0.1	13	1.7	14	1.8	0	0.0	2	0.3	2	0.3

Appendix A

Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2012

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	6,100	948	15.5	5	0.5	14	1.5	19	2.0	1	0.1	1	0.1	2	0.2
36-72 Months	6,946	299	4.3	4	1.3	4	1.3	8	2.7	2	0.7	0	0.0	2	0.7
Total	13,047	1,247	9.6	9	0.7	18	1.4	27	2.2	3	0.2	1	0.1	4	0.3
Cecil County															
0-35 Months	4,577	817	17.9	1	0.1	7	0.9	8	1.0	0	0.0	0	0.0	0	0.0
36-72 Months	4,470	404	9.0	1	0.2	5	1.2	6	1.5	0	0.0	0	0.0	0	0.0
Total	9,047	1,221	13.5	2	0.2	12	1.0	14	1.1	0	0.0	0	0.0	0	0.0
Charles County															
0-35 Months	6,682	1,440	21.5	1	0.1	10	0.7	11	0.8	0	0.0	1	0.1	1	0.1
36-72 Months	6,571	523	8.0	0	0.0	1	0.2	1	0.2	0	0.0	2	0.4	2	0.4
Total	13,254	1,963	14.8	1	0.1	11	0.6	12	0.6	0	0.0	3	0.2	3	0.2
Dorchester County															
0-35 Months	1,464	517	35.3	2	0.4	12	2.3	14	2.7	0	0.0	1	0.2	1	0.2
36-72 Months	1,334	177	13.3	1	0.6	3	1.7	4	2.3	0	0.0	0	0.0	0	0.0
Total	2,797	694	24.8	3	0.4	15	2.2	18	2.6	0	0.0	1	0.1	1	0.1
Frederick County															
0-35 Months	10,274	2,098	20.4	1	0.0	16	0.8	17	0.8	2	0.1	3	0.1	5	0.2
36-72 Months	10,702	941	8.8	2	0.2	7	0.7	9	1.0	2	0.2	0	0.0	2	0.2
Total	20,976	3,039	14.5	3	0.1	23	0.8	26	0.9	4	0.1	3	0.1	7	0.2
Garrett County															
0-35 Months	1,073	310	28.9	0	0.0	5	1.6	5	1.6	1	0.3	0	0.0	1	0.3
36-72 Months	1,152	117	10.2	1	0.9		0.0	1	0.9	0	0.0	0	0.0	0	0.0
Total	2,225	427	19.2	1	0.2	5	1.2	6	1.4	1	0.2	0	0.0	1	0.2

Appendix A

Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2012

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	10,412	2,043	19.6	3	0.1	20	1.0	23	1.1	1	0.0	3	0.1	4	0.2
36-72 Months	10,688	936	8.8	2	0.2	9	1.0	11	1.2	0	0.0	2	0.2	2	0.2
Total	21,100	2,979	14.1	5	0.2	29	1.0	34	1.1	1	0.0	5	0.2	6	0.2
Howard County															
0-35 Months	12,072	1,712	14.2	1	0.1	13	0.8	14	0.8	2	0.1	3	0.2	5	0.3
36-72 Months	12,635	788	6.2	0	0.0	11	1.4	11	1.4	1	0.1	0	0.0	1	0.1
Total	24,707	2,500	10.1	1	0.0	24	1.0	25	1.0	3	0.1	3	0.1	6	0.2
Kent County															
0-35 Months	707	189	26.8	1	0.5	5	2.6	6	3.2	0	0.0	1	0.5	1	0.5
36-72 Months	699	54	7.7	0	0.0	1	1.9	1	1.9	0	0.0	1	1.9	1	1.9
Total	1,406	243	17.3	1	0.4	6	2.5	7	2.9	0	0.0	2	0.8	2	0.8
Montgomery County															
0-35 Months	45,297	14,148	31.2	7	0.0	108	0.8	115	0.8	2	0.0	12	0.1	14	0.1
36-72 Months	43,905	6,367	14.5	11	0.2	43	0.7	54	0.8	7	0.1	3	0.0	10	0.2
Total	89,202	20,515	23.0	18	0.1	151	0.7	169	0.8	9	0.0	15	0.1	24	0.1
Prince George's County															
0-35 Months	42,313	12,805	30.3	8	0.1	114	0.9	122	1.0	2	0.0	11	0.1	13	0.1
36-72 Months	38,960	7,612	19.5	18	0.2	82	1.1	100	1.3	1	0.0	6	0.1	7	0.1
Total	81,273	20,417	25.1	26	0.1	196	1.0	222	1.1	3	0.0	17	0.1	20	0.1
Queen Anne's County															
0-35 Months	1,884	377	20.0	0	0.0	9	2.4	9	2.4	0	0.0	2	0.5	2	0.5
36-72 Months	1,984	117	5.9	0	0.0	4	3.4	4	3.4	0	0.0	0	0.0	0	0.0
Total	3,868	494	12.8	0	0.0	13	2.6	13	2.6	0	0.0	2	0.4	2	0.4

Appendix A

Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2012

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	5,287	1,340	25.3	2	0.1	24	1.8	26	1.9	0	0.0	0	0.0	0	0.0
36-72 Months	5,331	294	5.5	0	0.0	2	0.7	2	0.7	0	0.0	1	0.3	1	0.3
Total	10,618	1,634	15.4	2	0.1	26	1.6	28	1.7	0	0.0	1	0.1	1	0.1
Somerset County															
0-35 Months	935	403	43.1	4	1.0	6	1.5	10	2.5	0	0.0	1	0.2	1	0.2
36-72 Months	839	205	24.4	1	0.5	7	3.4	8	3.9	0	0.0	1	0.5	1	0.5
Total	1,774	608	34.3	5	0.8	13	2.1	18	3.0	0	0.0	2	0.3	2	0.3
Talbot County															
0-35 Months	1,343	507	37.7	1	0.2	5	1.0	6	1.2	1	0.2	1	0.2	2	0.4
36-72 Months	1,305	99	7.6	1	1.0	1	1.0	2	2.0	0	0.0	1	1.0	1	1.0
Total	2,648	606	22.9	2	0.3	6	1.0	8	1.3	1	0.2	2	0.3	3	0.5
Washington County															
0-35 Months	6,337	1,800	28.4	8	0.4	80	4.4	88	4.9	0	0.0	0	0.0	0	0.0
36-72 Months	6,354	875	13.8	9	1.0	22	2.5	31	3.5	0	0.0	0	0.0	0	0.0
Total	12,691	2,675	21.1	17	0.6	102	3.8	119	4.4	0	0.0	0	0.0	0	0.0
Wicomico County															
0-35 Months	4,424	1,654	37.4	4	0.2	26	1.6	30	1.8	0	0.0	2	0.1	2	0.1
36-72 Months	4,158	500	12.0	5	1.0	9	1.8	14	2.8	0	0.0	2	0.4	2	0.4
Total	8,582	2,154	25.1	9	0.4	35	1.6	44	2.0	0	0.0	4	0.2	4	0.2
Worcester County															
0-35 Months	1,648	644	39.1	0	0.0	3	0.5	3	0.5	0	0.0	1	0.2	1	0.2
36-72 Months	1,591	212	13.3	1	0.5	3	1.4	4	1.9	0	0.0	1	0.5	1	0.5
Total	3,240	856	26.4	1	0.1	6	0.7	7	0.8	0	0.0	2	0.2	2	0.2

Blood Lead Testing of Children 0-72 Months by Major Age Group and Jurisdiction in 2012

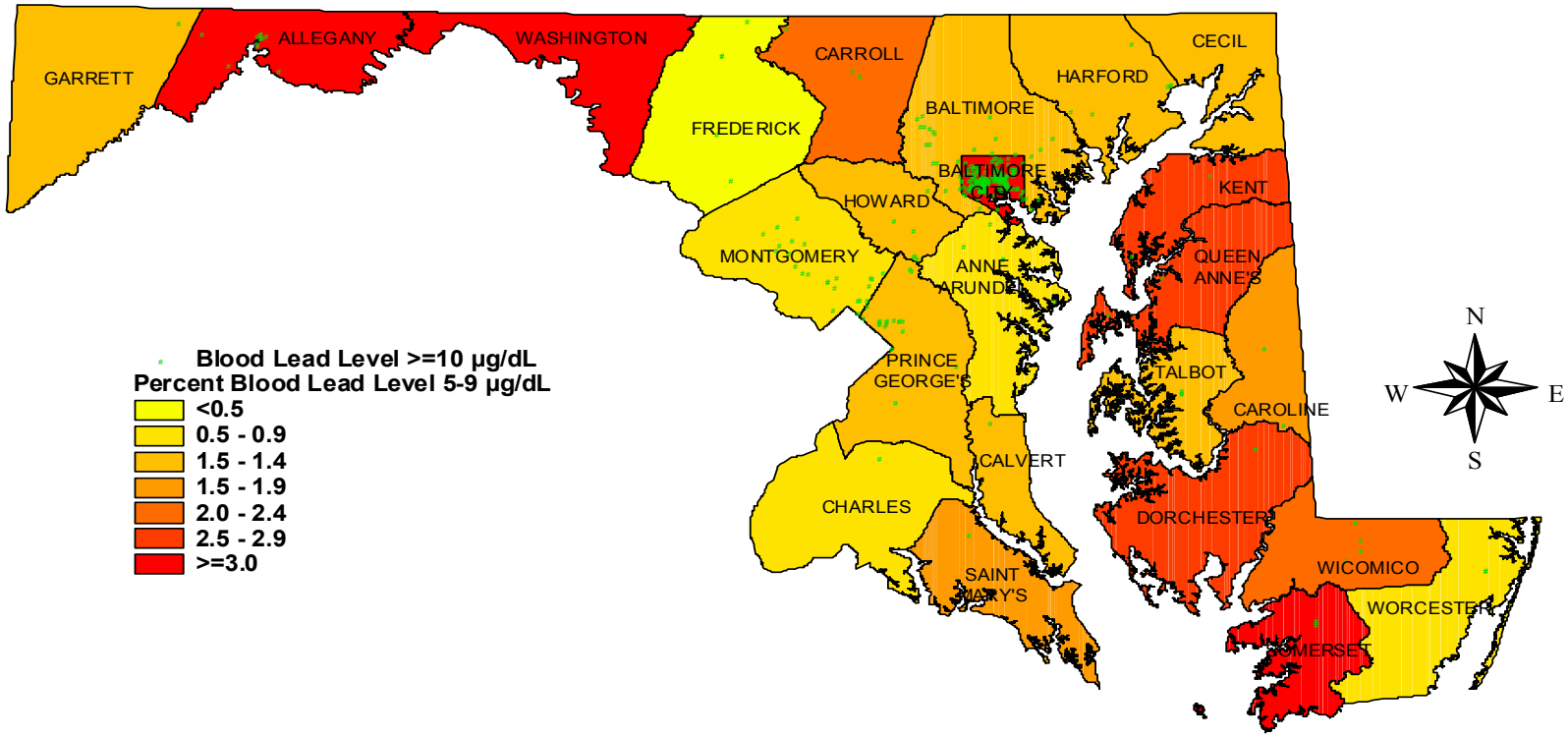
Age Group	Population of Children	Children Tested		Blood Lead Level 5-9 µg/dL						Blood Lead Level ≥10 µg/dL					
				Old Cases		New Cases		Total		Old Cases		New Cases		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
County Unknown															
0-35 Months		48				1		1		1				1	
36-72 Months		27				2		2				2		2	
Total		75				3		3		1		2		3	
Statewide															
0-35 Months	259,885	77,980	30.0	232	0.3	1,345	1.7	1,577	2.0	54	0.1	192	0.2	246	0.3
36-72 Months	250,000	32,559	13.0	351	1.1	447	1.4	798	2.5	55	0.2	63	0.2	118	0.4
Total	509,885	110,539	21.7	583	0.5	1,792	1.6	2,375	2.1	109	0.1	255	0.2	364	0.3

Appendix B
Blood Lead Testing of Children 0-72 Months: 2005-2012

Calendar			Blood Lead Tests		Prevalence		Incidence	
Year		Population	Number	Percent	Number	Percent	Number	Percent
2005								
	Baltimore City	53,626	17,943	33.5	854	4.8	534	3.0
	Counties	401,888	80,848	20.1	463	0.6	382	0.5
	County Unknown		357		14		0	
	Statewide	**455,514**	**99,148**	**21.8**	**1,331**	**1.3**	**916**	**0.9**
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**	**102,974**	**22.2**	**1,274**	**1.2**	**936**	**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**	**106,452**	**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	**468,390**	**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**

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Lead Poisoning Prevention Program

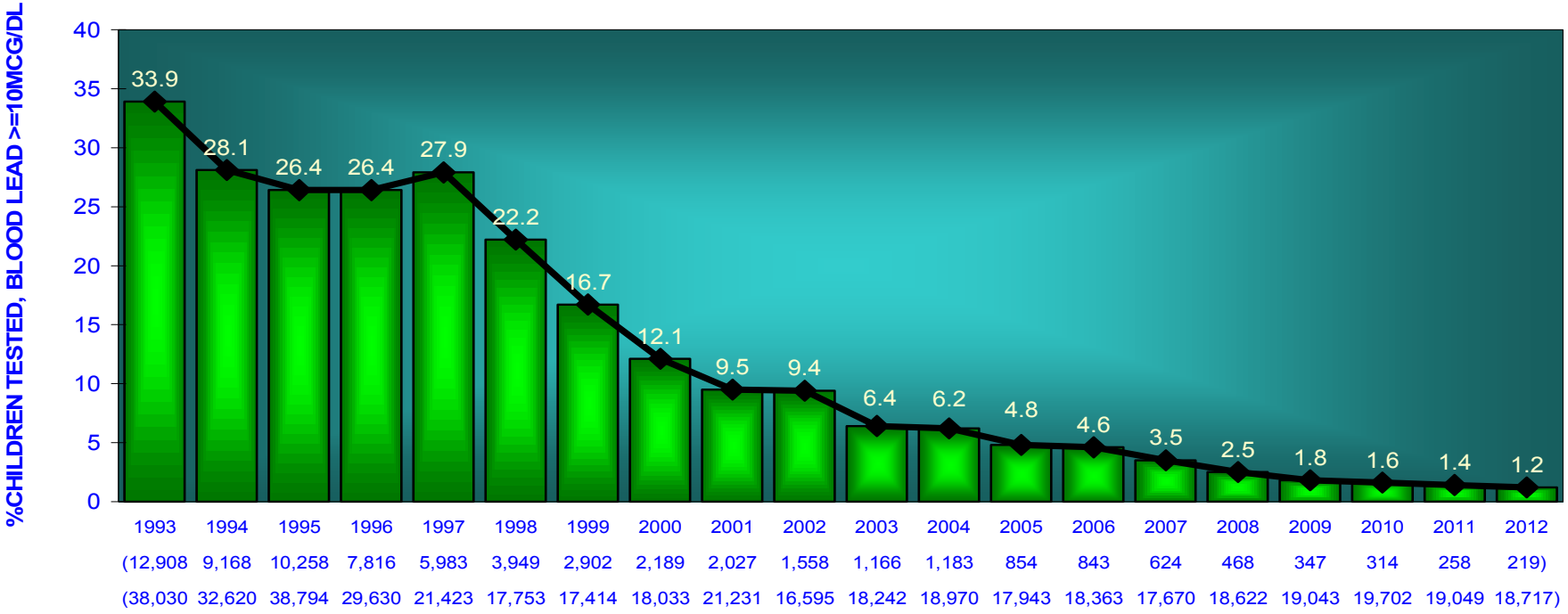
Percent of Children 0-72 Months with Blood Lead Level 5-9 µg/dL, and
Distribution of Children 0-72 Months with Blood Lead Level >=10 µg/dL
Childhood Blood Lead Surveillance: 2012



Map One

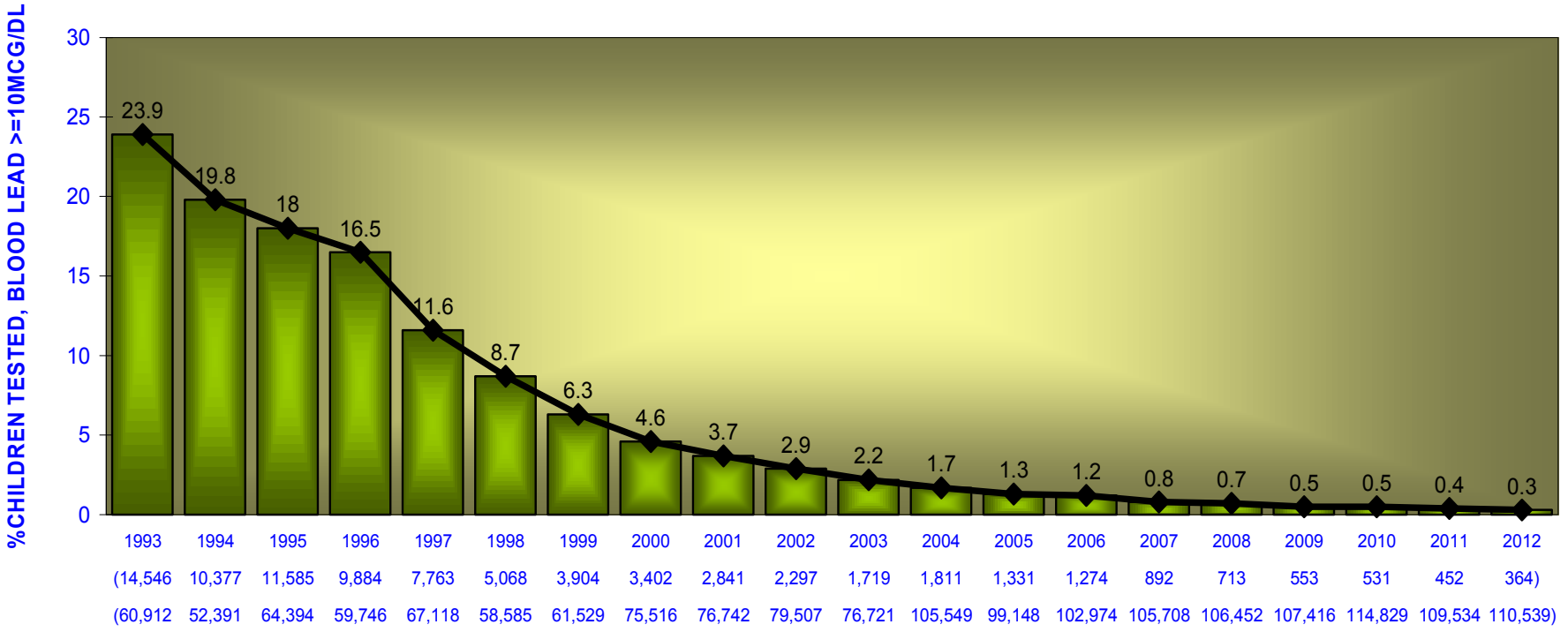
Appendix C

MARYLAND DEPARTMENT OF THE ENVIRONMENT
CHILDHOOD BLOOD LEAD SURVEILLANCE
BALTIMORE CITY 1993-2012



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

MARYLAND DEPARTMENT OF THE ENVIRONMENT
CHILDHOOD BLOOD LEAD SURVEILLANCE
STATEWIDE 1993-2012



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