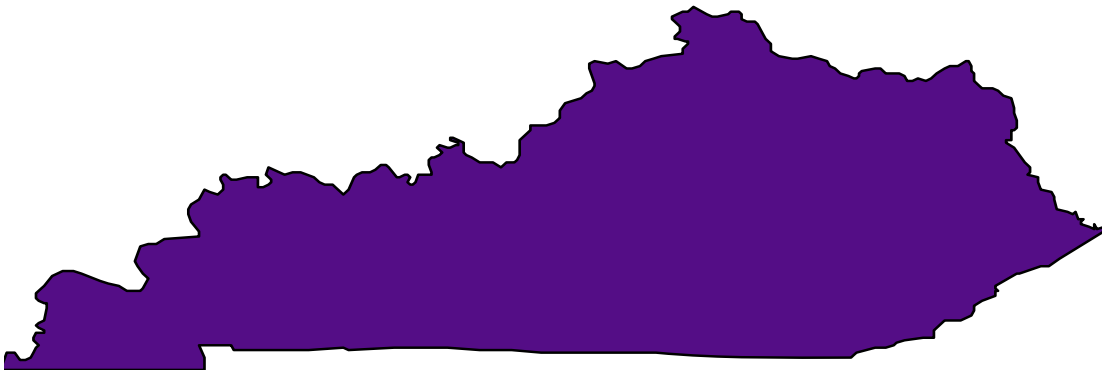


Kentucky's Childhood Lead Poisoning Targeted Screening Plan

February 2006

Kentucky Childhood Lead Poisoning Prevention Program
Maternal and Child Health Branch
Division of Adult and Child Health Improvement
Kentucky Department for Public Health
Cabinet for Health and Family Services



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Introduction

Lead poisoning is the most common environmental health threat to children in the United States and in Kentucky. The Centers for Disease Control and Prevention provides federal recommendations for childhood lead screening. The current recommendations *Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials*, published November 1997, encouraged state and local public health agencies to develop childhood lead poisoning screening plans that reflect local conditions.

Kentucky Lead Poisoning Screening Plan

- **Using a blood lead test, all children at ages 12 and 24 months living in targeted zipcodes should be screened for lead poisoning. Children 36 – 72 months of age should be tested if they have not been previously tested.**
- **Using a blood lead test, all children enrolled in Medicaid or Passport at 12 and 24 months should be screened for lead poisoning regardless of zipcode. Children 36 – 72 months of age should be tested if they have not been tested previously.**
- **For children not living in a targeted zipcode area, health care providers should conduct a personal risk assessment questionnaire in order to determine if those children are at risk for lead poisoning.**
- **For pregnant women living in Kentucky, health care providers should conduct a verbal risk assessment to determine if these women and their unborn children are at risk for lead poisoning.**

Background on Targeted Screening

In 1991, the Centers for Disease Control and Prevention (CDC) essentially recommended universal screening for children 12 – 72 months of age. However, a 1994 national survey indicated that only about one-fourth of young children had been screened for lead poisoning and only about one-third of poor children, who are at higher risk of lead exposure than other children, had been screened. In 1997, CDC revised its recommendations and provided state and local health officials comprehensive guidance for developing a screening plan based on local data and community input.

The 1997 CDC guidance recommended that local blood lead data, housing data, demographic data on children and data on the presence of other sources of lead exposure to determine the state screening recommendations. Also, the CDC guidance recommends geographic analysis of the data in order to identify children who live in areas where the likelihood of lead exposure is high. The goal of the revised CDC screening recommendations is to ensure that children at risk for lead exposure are tested. CDC recommends targeted screening in states or communities where less than 12% of children have lead poisoning and where less than 27% of the housing stock was built pre-1950. The following figure illustrates the CDC guidelines for determining an appropriate screening for each state or community. In 2004, CDC recommended that Kentucky’s Childhood Lead Poisoning Prevention Program develop a statewide targeted screening plan as part of its cooperative agreement.

Figure 1 CDC guidelines for determining an appropriate screening

% Children (age 1-3), with BLLs \geq10 μg/dL	% Housing built before 1950	Recommended Screening
\geq 12%	----	Universal
<12%	\geq 27%	Universal
3 – 12%	<27%	Targeted
<3%	<27%	Other
Unknown	<27%	Universal
Unknown	\geq 27%	Targeted

Lead Poisoning Effects

Childhood lead poisoning is a major preventable environmental health problem. Children can be exposed to lead from many sources, such as paint, paint dust, contaminated soil, water, and parental occupations. Additionally, lead has several routes of exposure; it can be inhaled, ingested, and absorbed through the skin. The primary route of exposure for most children is ingestion which mostly occurs during normal teething and playing activities.

Childhood lead poisoning adversely affects nearly all organs in the body, especially the developing brain and nervous system of children under the age of 6 years. Shortly after lead enters the body; it travels in the blood to the soft tissues liver, kidneys, lungs, brain, spleen, muscles and heart. After several weeks, the body will begin to store the lead in the bones and teeth (the body confuses lead with calcium). About 99% of the lead taken into the body of an adult will leave in the waste (urine, feces, hair/nail growth and sweat), but only about 32% will be eliminated from a child's body.

The damage caused by lead poisoning depends on the amount and how long lead stays in the body. Lead levels in the body are measured in micrograms per deciliter (ug/dL). The lead levels listed below show the lowest amount of lead that research has found damage to occur for children:

10 ug/dL	Child will have learning disabilities; impaired growth; IQ decline and some hearing loss.
20 ug/dL	Interference with ability to make red blood cells.
30 ug/dL	Less ability to use vitamin D; higher blood pressure and hearing loss.
40 ug/dL	Less ability to make red blood cells; nerve problems develop (decreased sensation, less ability to move quickly, kidney damage).
60 ug/dL	Stomach aches/cramps.
70 ug/dL	Mental retardation.
90 ug/dL	Seizures, coma, kidney damage and anemia.
≥ 130 ug/dL	Seizures, coma and death.

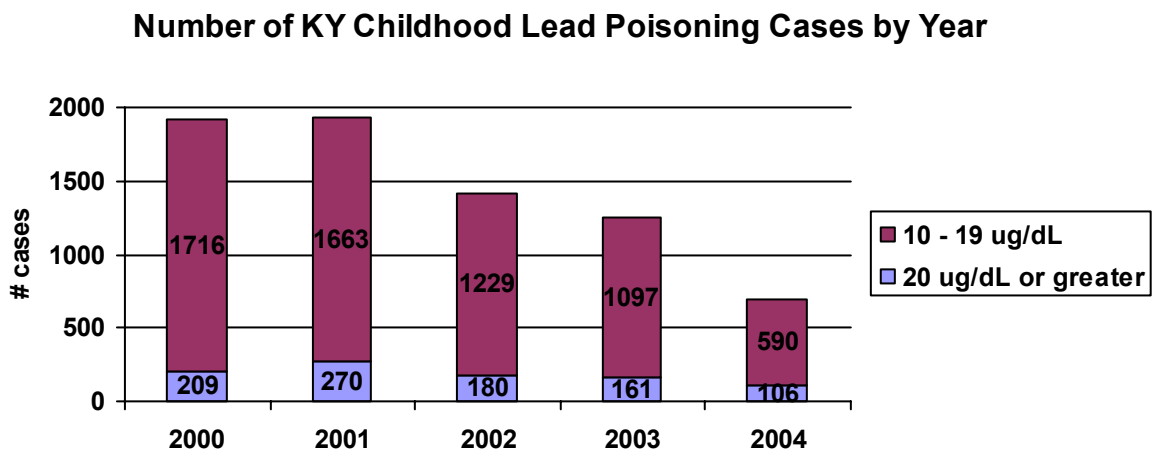
The definition of lead poisoning varies. In Kentucky a child is considered to be lead poisoned at a blood lead level of 20ug/dL or greater, while CDC has determined that a blood lead result of 10ug/dL or greater to be a level of concern. The level of concern (10ug/dL) is considered by the CDC to be a level where lasting health effects become significant. Furthermore, at this level, CDC recommends action to be taken to keep the blood lead level from increasing. Although, Kentucky considers a child to be lead poisoned at 20ug/dL or greater, Kentucky follows CDC recommendations and begins case management and intervention efforts at 10ug/dL or greater.

Lead Poisoning in Kentucky

The Kentucky Cabinet for Health and Family Services (KCHFS) Childhood Lead Poisoning Prevention Program (CLPPP) maintains the lead exposure surveillance system for Kentucky. In addition, CLPPP is responsible for primary prevention activities, case management, and investigation of cases with elevated blood lead levels and community education and awareness.

Laboratories and health care providers reported 696 children (<72 months old) with lead poisoning ($\geq 10 \mu\text{g/dL}$) in 2004. Figure 2 illustrates the number of childhood lead poisoning cases for 2000 – 2004 based on surveillance data. Please note that selection bias and differential reporting bias are major weaknesses of surveillance data. In 2004, 85% of the childhood cases were in the lower ranges of lead poisoning (10 – 19 $\mu\text{g/dL}$) compared to 87% in 2003. In 2004, the remaining 15% of cases were in the moderate to severe range ($\geq 20 \mu\text{g/dL}$) versus 13% in 2003. Thus, slightly more KY childhood lead poisoning cases in 2004 were in the moderate to severe range of lead poisoning compared to 2003.

Figure 2



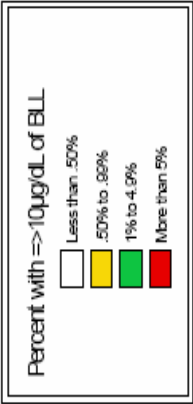
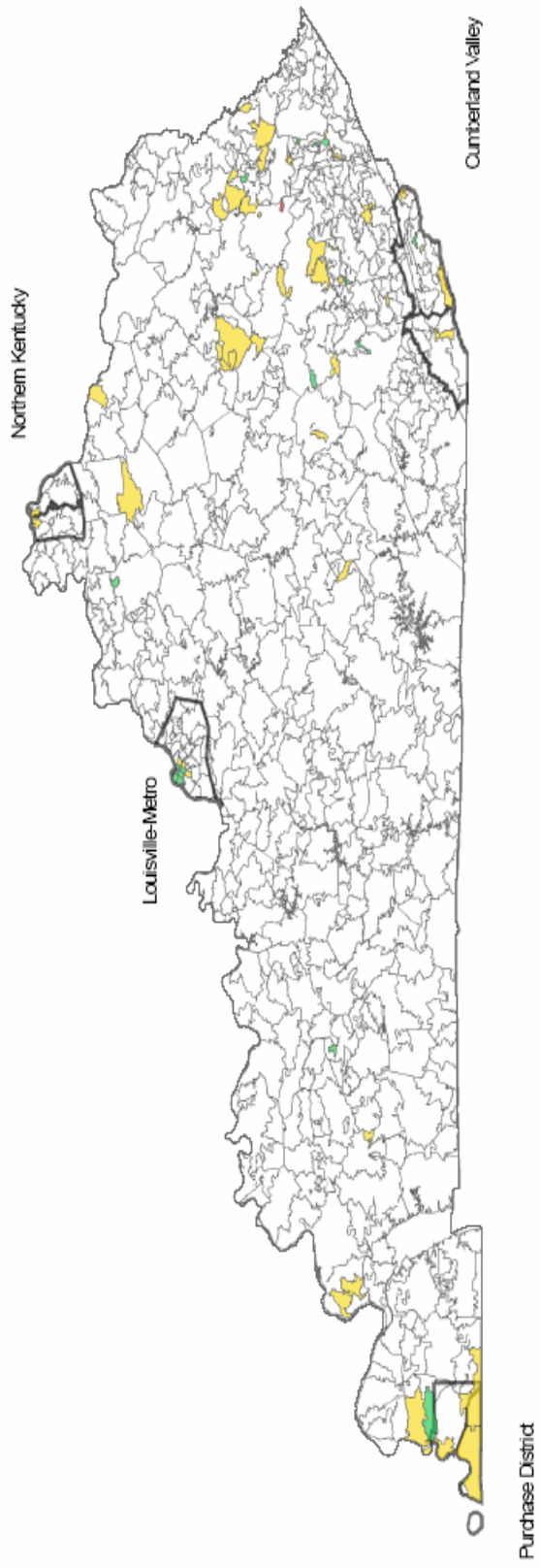
In 2004, 53% of the childhood lead poisoning cases were males compared to 55% in 2003. Additionally, according to blood lead surveillance data in 2004 56% of the lead poisoning cases were Medicaid enrolled compared to 63% in 2003. Also, 54% of all lead poisoning cases in 2004 were among whites compared to 55% in 2003.

Lead Poisoning Exposure

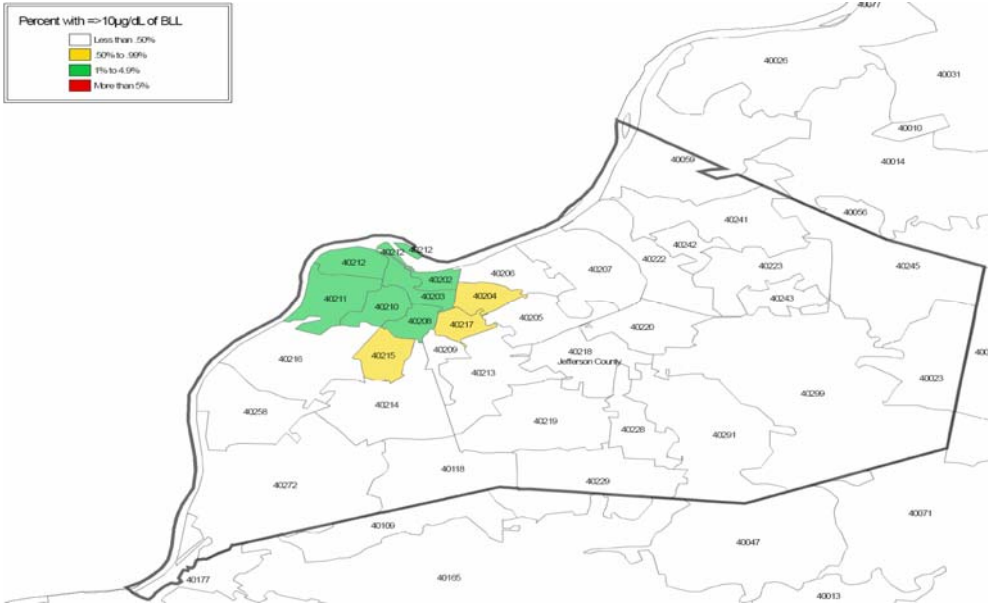
The most common sources of lead exposure for children are lead paint, interior dust and exterior soil or dust. In 1978, the addition of lead in paint was banned; however 78% of housing structures contain some leaded paint.² Additionally, the amount of lead in paint is greater in houses built prior 1950. For instance, in houses built before 1940, 90% of the houses have paint containing more than 1mg/cm^2 of lead compared with 62% of dwellings built from 1960 to 1979. The National Health and Nutrition and Examination Survey (NHANES III) confirmed the relationship between housing age and blood lead levels.³ CDC recommends that the focus should be on housing built pre-1950 since it poses the greatest risk exposure. Additionally, epidemiological studies indicate that low-income children

living in older homes have higher rates of lead poisoning compared with middle income children living in older homes. In the US, 27% of housing was built prior 1950. In KY, 19% of the housing stock was built before 1950. Other common sources of exposure are parental occupations, folk remedies, and food/food container (tamarind candy, lead glazed ceramics).

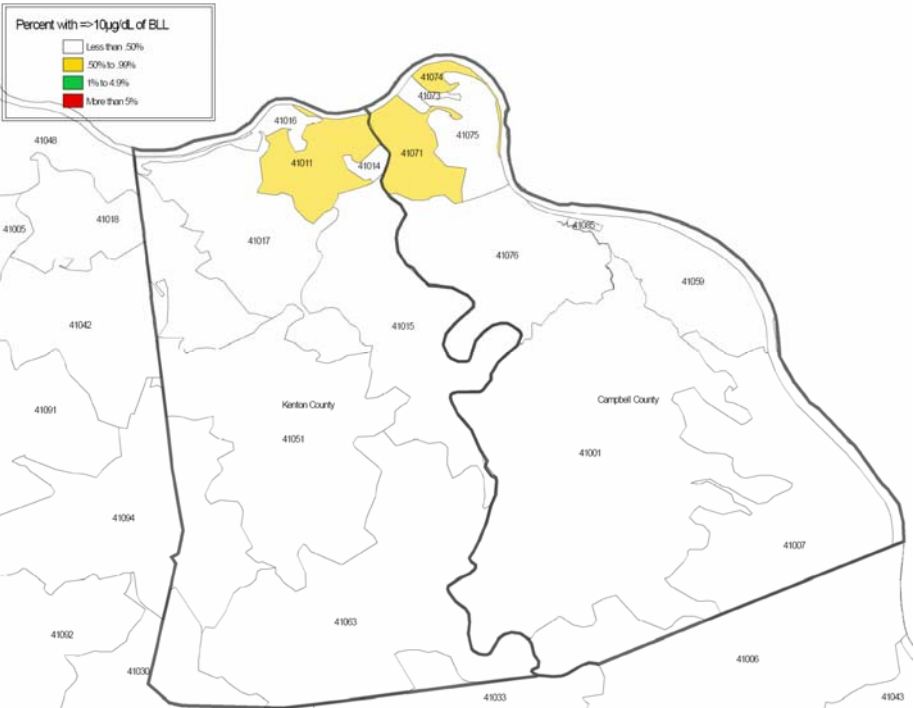
Kentucky Lead Poisoning Prevalence Rates (as a Percent) by Zipcode, Children <72 months Old, Who Had a Blood Lead Test (2000-2004)



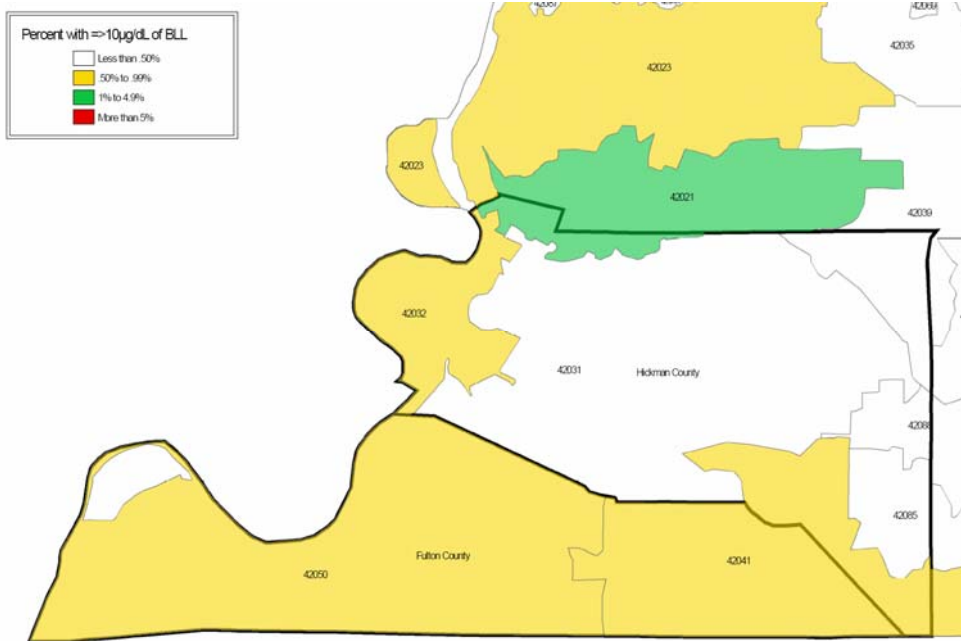
Louisville-Metro Lead Poisoning Prevalence Rates (as a Percent) by Zipcode, Children <72 Months Old, Who Had a Blood Lead Test (2000-2004)



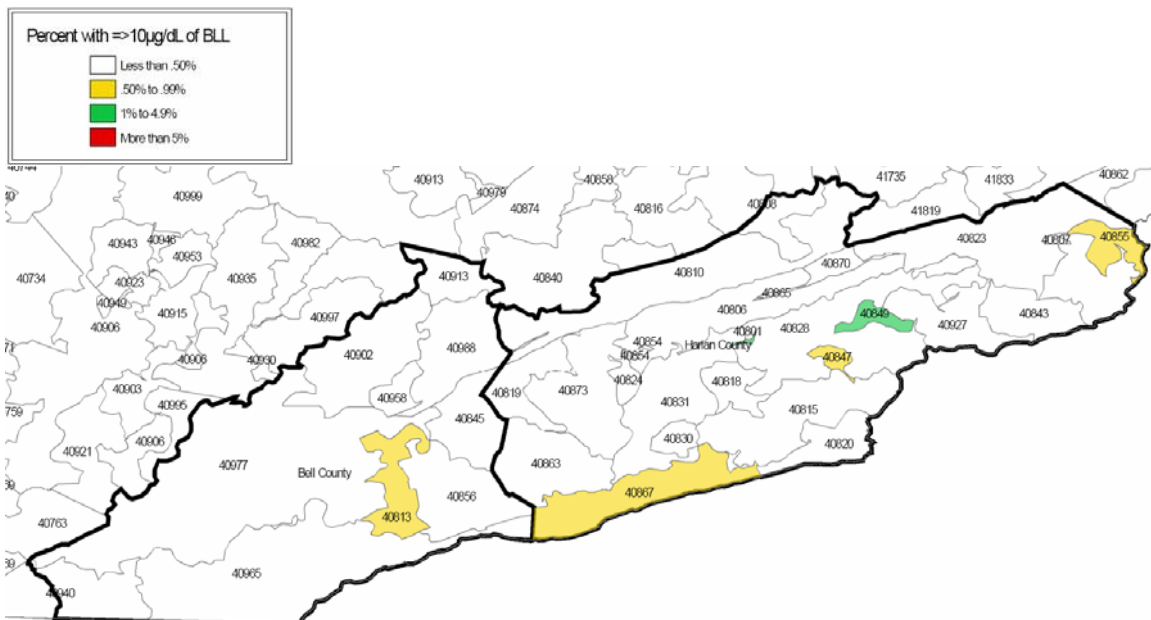
Northern Kentucky Lead Poisoning Prevalence Rates (as a Percent) by Zipcode, Children <72 Months Old, Who Had a Blood Lead Test (2000-2004)



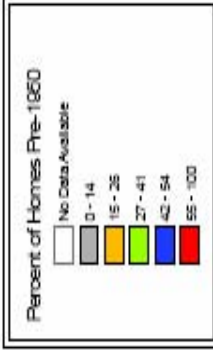
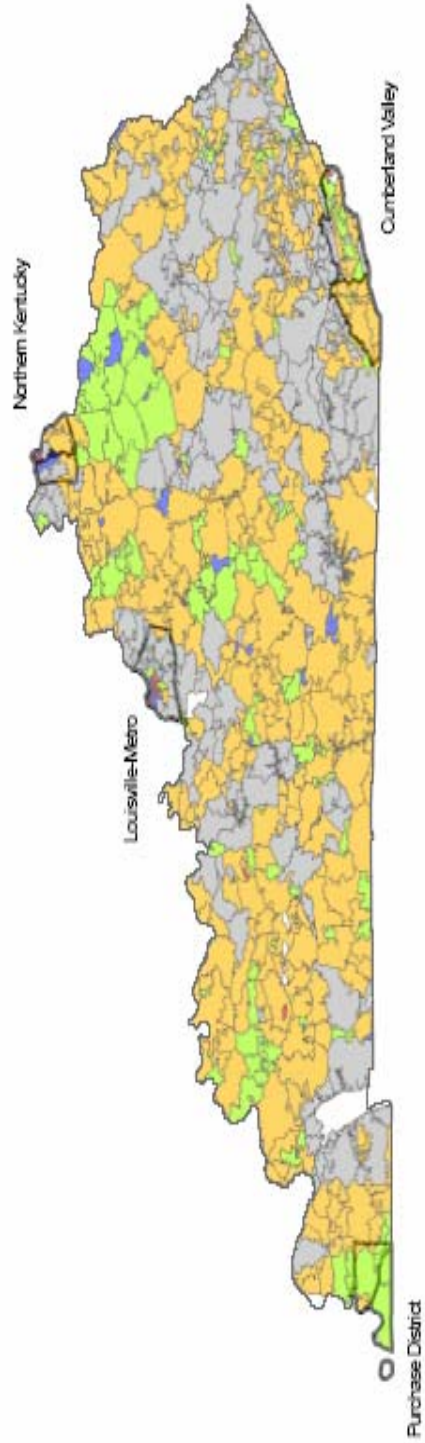
Purchase District Lead Poisoning Prevalence Rates (as a Percent) by Zipcode, Children <72 Months Old, Who Had a Blood Lead Test (2000-2004)



Cumberland Valley Lead Poisoning Prevalence Rates (as a Percent) by Zipcode, Children <72 Months Old, Who Had a Blood Lead Test (2000-2004)

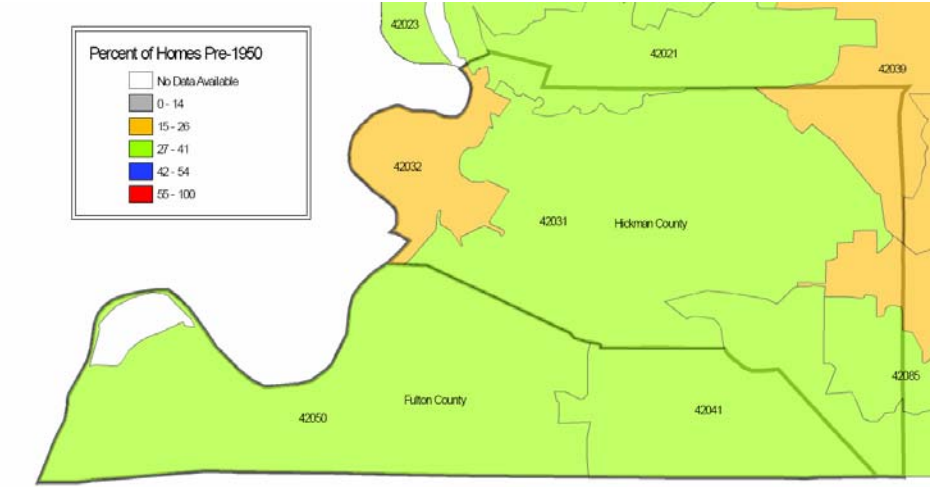


Percent of Pre-1950 Homes in Kentucky by Zipcode

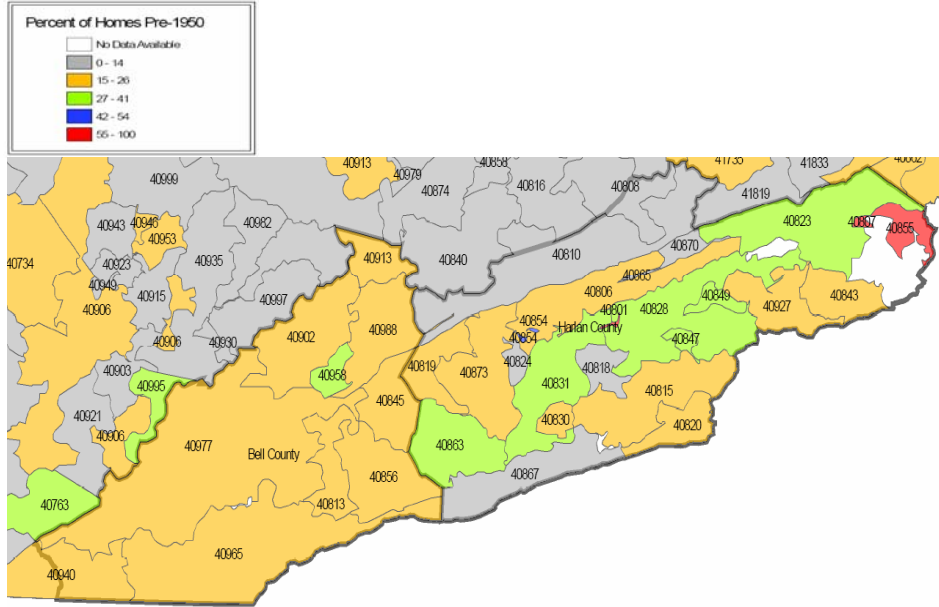


Data Based on 2000 US Census

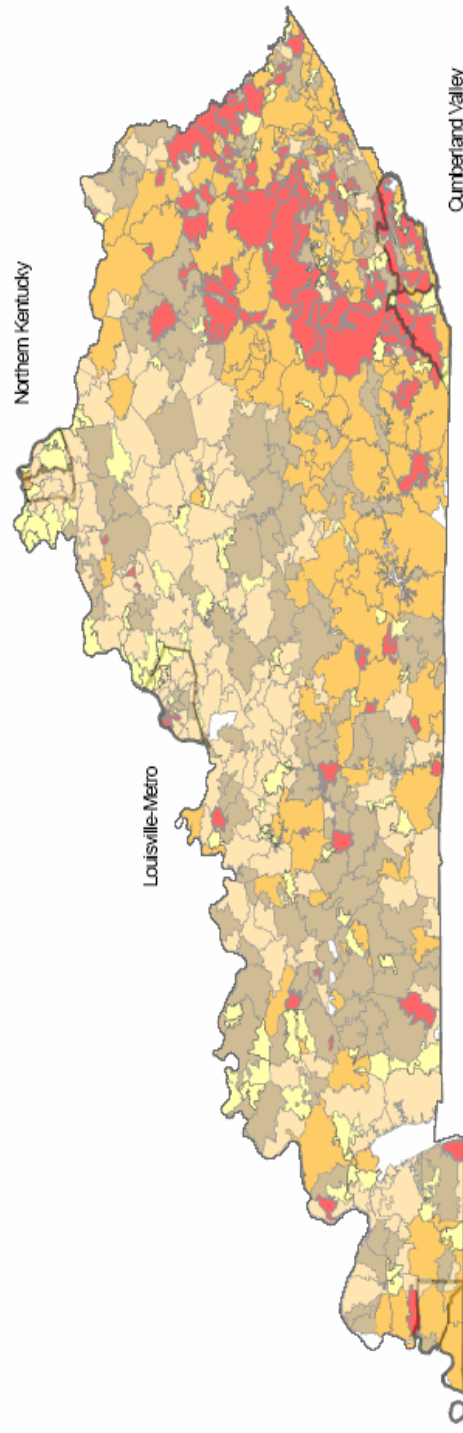
Purchase District Percent of Homes Pre-1950 by Zipcode



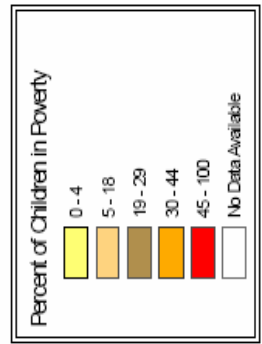
Cumberland Valley Percent of Homes Pre-1950 by Zipcode



Percent of Kentucky Children (<72 Months Old) Living Below the Poverty Level by Zipcode

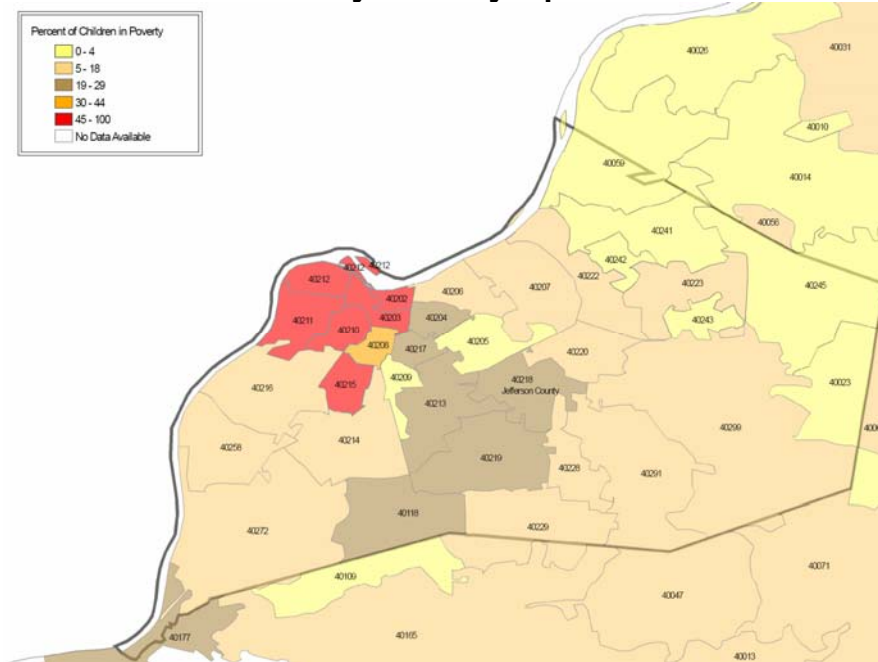


Purchase District

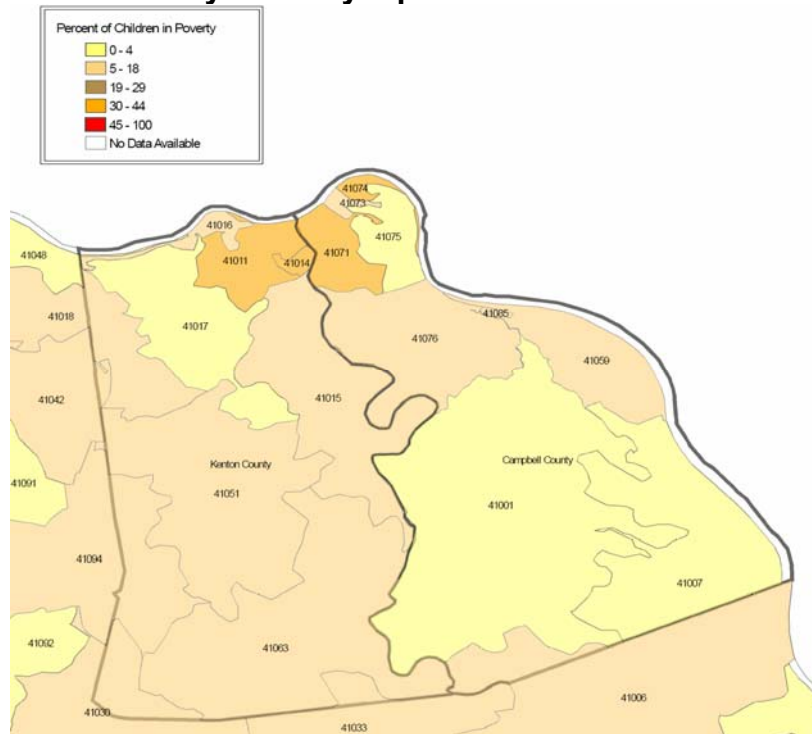


Data Based on 2000 US Census

Percent of Louisville-Metro Children (<72 Months Olds) Living Below the Poverty Level by Zipcode



Percent of Northern Kentucky Children (<72 Months Olds) Living Below the Poverty Level by Zipcode



Screening Thresholds

The Kentucky Childhood Lead Poisoning Prevention Program and the CLPPP Advisory Committee used lead poisoning prevalence rates, pre-1950 housing data, and poverty levels of children by zipcode to develop a Lead Poisoning Risk Index for each zipcode in Kentucky.

KY CLPPP and the Advisory Committee determined that the risk index should include housing age, prevalence data, and poverty levels of children. Additionally, consensus was reached that the housing data and the blood lead data should be weighted equally and weight heavier than the poverty data.

The formula used to develop the Lead Poisoning Risk Index is the following:

$$\text{LPRI} = \text{HI} + \text{PI} + \text{II}$$

LPRI	=	Lead Poisoning Risk Index
HI	=	Housing Index (percentage of pre-1950 by zipcode)
PI	=	Prevalence Index (percentage of children with lead poisoning by zipcode)
II	=	Income Index (percentage of children living in poverty by zipcode)

High Risk Zipcodes

The following table displays the results of the Kentucky Lead Poisoning Risk Index calculations. Zipcodes with a risk index score equal to or greater than 52.30 are considered to be at high risk for lead poisoning in Kentucky. Children living in these areas should have a blood lead test conducted.

Zipcode	Risk Index	Number of Children <72 months
40355	149.10	10
41426	147.85	27
42762	141.00	4
42374	137.07	10
42759	135.80	31
40983	134.88	14
41855	131.45	20
40855	129.95	44
42047	126.75	4
41257	126.54	14
41762	126.00	7
41735	125.00	18
40203	123.49	2441
41730	123.00	15
40448	122.00	6
41464	119.04	10
40212	118.17	1706
40863	118.00	33
41651	117.00	39
42061	117.00	5
40763	116.31	93
40202	116.14	504
41775	116.00	16
41385	115.52	24
41014	114.28	594
40941	113.43	19
41778	113.21	22
42410	112.30	148
41835	111.32	65
41666	111.12	33
41833	108.40	15
42742	108.00	18
41817	108.00	56
42154	108.00	19
42715	107.46	21
42638	106.00	40
41632	106.00	47
42060	106.00	14
40508	103.04	1350
40211	102.95	2044
40208	102.05	828
41408	100.73	3
40210	100.10	1535
41549	100.00	18
42632	100.00	0

Zipcode	Risk Index	Number of Children <72 months
40982	98.13	122
41660	98.02	83
41074	97.70	606
40215	97.65	2598
41669	97.08	66
41254	96.00	100
41567	96.00	87
40204	95.69	852
41262	95.34	102
40828	95.25	425
41772	95.00	22
41016	94.05	521
41263	92.48	23
40217	91.54	864
41073	91.41	578
41606	91.14	34
41563	91.00	39
41759	90.00	47
41712	89.79	11
40988	89.00	16
41071	88.65	1905
41146	88.37	40
40007	88.32	29
41826	88.10	49
41844	88.08	73
42157	88.00	53
41267	86.46	147
41049	86.29	165
40995	86.00	17
41011	85.50	2260
41630	85.16	85
41228	85.13	60
41640	84.20	97
41203	83.71	51
41268	83.63	27
41238	83.57	33
40914	83.33	28
41260	82.35	57
41216	82.17	78
42463	81.68	4
41367	81.48	21
40807	81.34	9
42332	81.00	14
42153	81.00	40
41159	80.99	62
42729	80.00	147

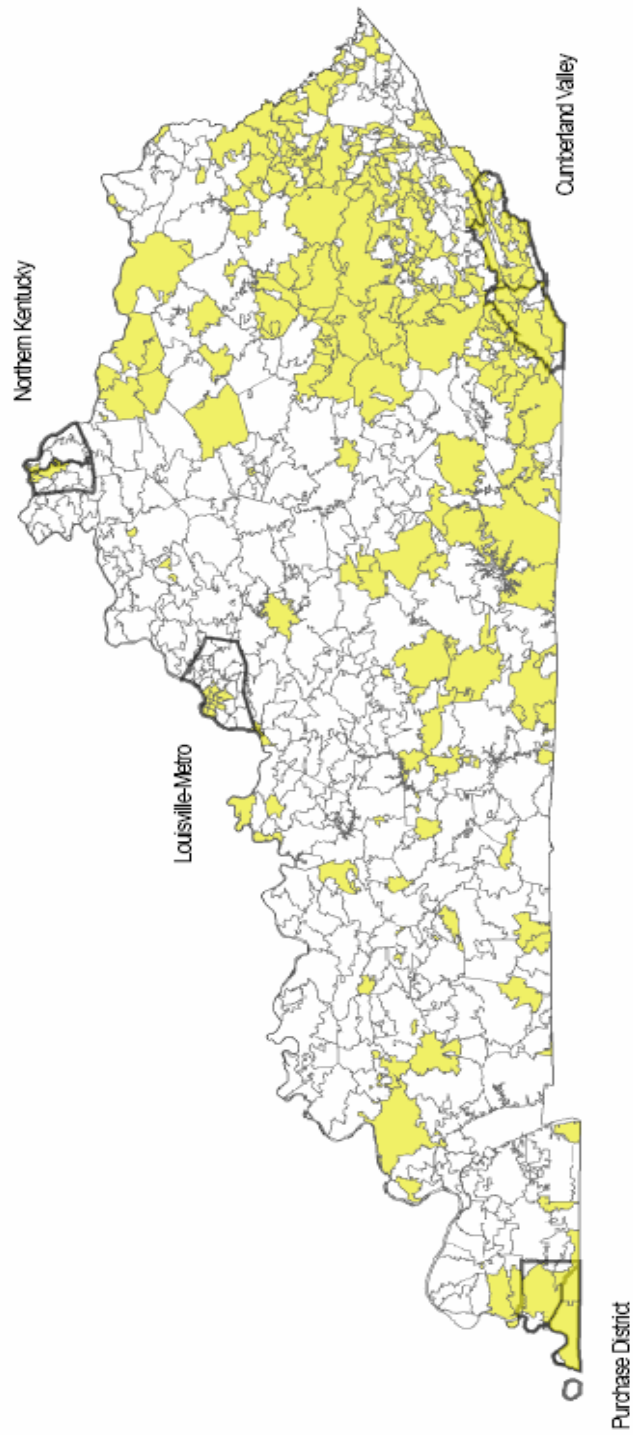
Zipcode	Risk Index	Number of Children <72 months
40815	79.46	101
41845	79.00	39
42371	79.00	30
41649	78.07	153
42021	78.05	156
41810	78.00	40
41255	77.44	45
41101	77.08	1379
42722	77.00	24
40823	76.38	377
41425	76.14	185
41834	76.00	47
40472	76.00	81
40310	76.00	47
41064	75.13	143
41365	75.00	20
41773	75.00	171
40831	74.18	379
42266	74.12	285
41250	73.31	78
42275	73.11	72
41751	73.00	13
40348	73.00	84
40801	72.31	11
42076	72.21	47
41537	72.12	283
41170	72.00	18
40486	71.00	171
41849	71.00	7
41240	70.17	443
40873	70.16	223
40977	70.16	732
41612	70.10	13
40176	70.00	155
40843	70.00	9
40209	69.49	7
41543	69.47	11
40387	69.17	131
42761	69.00	36
40009	69.00	105
40058	69.00	2
42050	68.61	243
41364	68.28	69
41056	68.27	1094
40902	68.26	94
42321	68.00	45

Zipcode	Risk Index	Number of Children <72 months
42403	68.00	0
42041	67.70	353
41819	67.46	27
41843	67.17	85
41553	67.09	245
42369	67.00	38
40346	66.72	97
41650	66.52	55
40830	66.35	20
41055	66.30	152
42528	66.27	112
40870	66.23	15
41740	66.16	59
42333	66.13	44
40972	66.13	131
41840	66.00	143
42023	65.50	132
40206	65.38	1195
40819	65.28	52
40759	65.15	244
41135	65.00	33
40953	65.00	49
41546	65.00	29
42160	65.00	135
40810	64.26	143
40958	64.24	43
41314	64.19	271
41230	64.04	837
40170	64.00	35
41317	63.64	18
41397	63.44	35
42031	63.42	199
41171	63.08	267
40845	63.00	55
42170	63.00	131
40903	62.20	122
40820	62.14	37
42450	62.11	380
42647	62.07	315
41339	62.00	879
40862	62.00	35
41839	62.00	66
40874	61.42	37
41607	61.25	23
41002	61.17	180
40205	61.17	1201

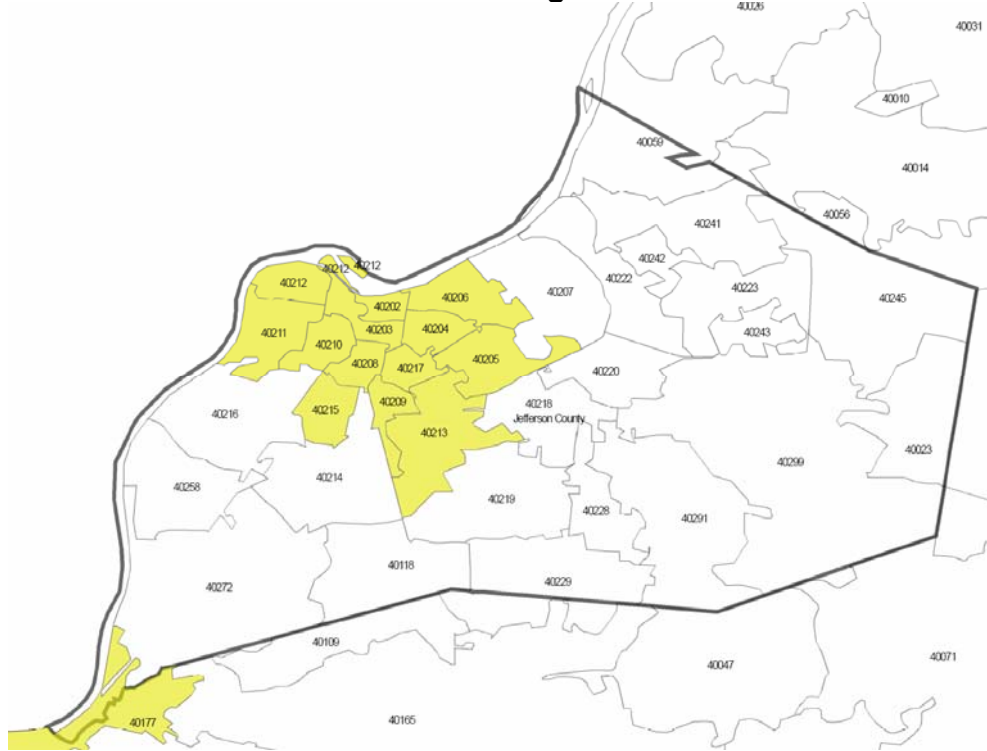
Zipcode	Risk Index	Number of Children <72 months
41701	61.05	1247
41524	61.00	37
40322	60.58	228
41636	60.39	168
42408	60.22	546
41822	60.20	195
42539	60.09	692
40155	60.08	134
40177	60.06	121
42129	60.03	586
42749	60.00	397
40935	59.15	240
40008	59.14	329
40771	59.11	177
41015	59.04	1869
42338	59.00	34
41179	58.27	565
41714	58.23	34
42040	58.20	47
40826	58.17	101
42653	58.13	301
40104	58.10	36
40854	58.10	71
40328	58.08	109
40336	58.05	995
40447	58.02	622
41421	58.00	19
42285	58.00	13
42140	58.00	107
42343	58.00	117
42254	58.00	38
41825	57.33	44
42602	57.31	687
40461	57.23	94
42204	57.17	49
41124	57.09	47
41004	57.07	309
41274	57.07	61
40997	57.00	43
41859	57.00	21
41555	57.00	23
41085	57.00	98
41465	56.44	1018
41332	56.38	242
42064	56.36	553
42501	56.14	1239

Zipcode	Risk Index	Number of Children <72 months
40313	56.05	176
42743	56.04	561
41564	56.00	121
41174	55.27	58
42633	55.26	1404
40769	55.16	1307
41615	55.15	167
41514	55.12	243
40734	55.09	364
40827	55.08	85
40858	55.00	37
41776	55.00	146
41569	55.00	0
41311	54.32	433
40213	54.27	1422
41224	54.09	462
42544	54.09	417
40374	54.06	121
41219	53.68	134
41265	53.53	150
41723	53.47	158
41635	53.46	212
41222	53.39	169
41301	53.32	454
41605	53.25	25
40361	53.17	1389
41653	53.14	822
40906	53.10	850
42553	53.07	266
42339	53.00	78
42265	53.00	125
41386	52.49	15
42167	52.37	575
41619	52.36	52

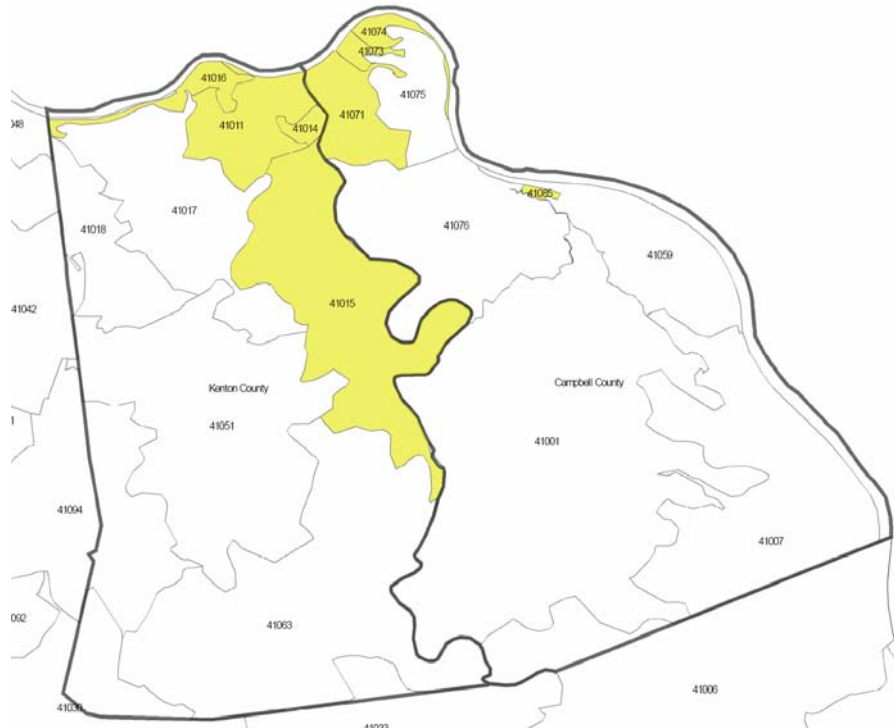
Kentucky Targeted Zipcodes for Childhood Lead Poisoning Screening



Louisville-Metro Targeted Zipcodes for Childhood Lead Poisoning Screening



Northern Kentucky Targeted Zipcodes for Childhood Lead Poisoning Screening



Conclusion

Lead poisoning is a common, preventable environmental health problem for children in the US and in Kentucky. In 1997, the Centers for Disease Control and Prevention recommended that state and local public health officials develop a targeted plan for blood lead screening.

The Kentucky Childhood Lead Poisoning Prevention Program and the Childhood Lead Poisoning Advisory Committee examined local data including local blood lead data, housing data, demographic data on children in order to determine the state screening recommendations. A statewide targeted screen was developed to focus state and local blood lead testing resources on the high-risk children in Kentucky. Furthermore, this plan supports and supplements the federal Medicaid mandated blood screening policy.

In order to reach the national goal of elimination of childhood lead poisoning in KY by 2010, statewide support from public health agencies, healthcare providers, Medicaid, insurance companies, non-profit organizations, universities and the community is crucial.

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Hertz-Picciotto, et al. "Patterns and Determinants of Blood Lead During Pregnancy." *American Journal of Epidemiology*. 2000; 152:829-837.

**APPENDIX A
High-Risk Zipcodes by County**

Adair	42715	Elliott	41171		40855
	42742	Estill	40336		40863
	42761		40472		40870
Allen	42153	Fayette	40508		40873
Ballard	42060	Fleming	41049	Hart	42722
Barren	42140	Floyd	41605		42729
	42160		41606		42749
Bath	40374		41607	Henry	40007
Bell	40845		41612		40058
	40902		41615	Hickman	42031
	40958		41619	Hopkins	42408
	40977		41630		42410
	40988		41635	Jackson	40447
Bourbon	40348		41636		40486
	40361		41640	Jefferson	40202
Boyd	41101		41649		40203
Bracken	41002		41650		40204
	41004		41651		40205
Breathitt	41317		41653		40206
	41339		41660		40208
	41385		41666		40209
Breckinridge	40170	Fulton	41669		40210
Calloway	42076		42041		40211
Campbell	41071		42050		40212
	41073	Garrard	40461		40213
	41074	Graves	42040		40215
	41085		42061		40217
Carlisle	42021	Grayson	42762	Johnson	41216
	42023	Green	42743		41219
Carter	41146	Greenup	41174		41222
Casey	42528	Hardin	40155		41228
	42539		40177		41238
Christian	42266	Harlan	40801		41240
	42254		40807		41254
Clay	40914		40810		41255
	40941		40815		41257
	40972		40819		41260
	40983		40820		41263
Clinton	42602		40823		41265
Crittendon	42064		40828		41268
Cumberland	42759		40828		41274
Edmonson	42275		40830	Kenton	41011
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			40843		41015
			40854		

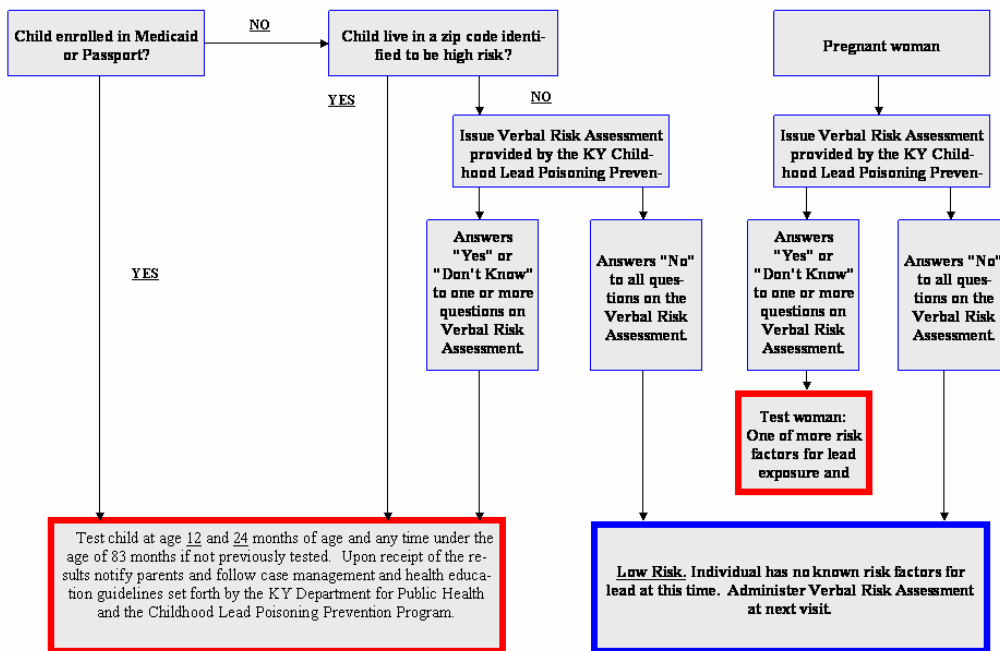
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	41740	
	41822	
	41843	
	41844	
	41759	
	41772	
	41817	
	41834	
	41839	
	41859	
	Knox	40734
		40771
	40903	
	40906	
	40935	
	40953	
	40982	
	40995	
	40997	
Lawrence	41124	
	41159	
	41230	
Lee	41311	
	41397	
Leslie	40827	
	40858	
	40874	
	41714	
	41730	
	41762	
	41775	
	41776	
Letcher	40826	
	40862	
	41537	
	41819	
	41825	
	41826	
	41833	
	41835	
	41855	
	41810	
	41840	
	41845	

	41849
Lewis	41135
	41170
	41179
Lincoln	40448
Livingston	42047
Logan	42265
McCreary	42647
	42653
	42638
McLean	42371
Magoffin	41426
	41464
	41465
	41632
Marion	40009
	40328
Martin	41203
	41224
	41250
	41262
	41267
Mason	41055
	41056
Meade	40104
	40176
Menifee	40322
	40346
	40387
Mercer	40310
Metcalfe	42129
	42154
Monroe	42167
	42157
Morgan	41408
	41421
	41425
Mulenburg	42374
	42321
	42332
	42339
Nelson	40008
Ohio	42333
	42338
	42343

	42369
Owen	40355
Owsley	41314
	41364
	41386
Perry	41367
	41701
	41712
	41723
	41778
	41735
	41751
	41773
Pike	41514
	41524
	41543
	41546
	41549
	41553
	41555
	41563
	41564
	41567
	41569
Pulaski	42501
	42544
	42553
Robertson	41064
Rowan	40313
Todd	42204
Warren	42170
Wayne	42633
	42632
Webster	42450
	42463
	42403
Whitley	40759
	40763
	40769
Wolfe	41301
	41332
	41365

APPENDIX B

KY CLPPP Screening Flow Chart



NOTE: According to the Centers for Medicare & Medicaid Services' Early and Periodic Screening, Diagnosis and Treatment (EPSDT) guidelines all EPSDT examinations must include a blood lead laboratory test for children at 12 and 24 months of age.

APPENDIX C
VERBAL RISK ASSESSMENT FOR LEAD POISONING: CHILDREN

Review each of these questions at each preventive health visit for all children ages 6 months to 6 years old.

1. Does child live in or visit a building built before 1978 with peeling/chipping paint or with recent or ongoing remodeling?
2. Does child have a brother/sister/playmate who has or did have lead poisoning?
3. Do you (or a family member) work on a farm; in a bridge, tunnel, or high construction area; with batteries; ammunition, or visit a firing range?
4. Do you use any folk remedies that may contain lead or use pottery or ceramic ware for cooking, eating, or drinking?

Document in the medical record at every visit that the assessment was done, any positive response(s) and action taken:

- If the verbal risk assessment is negative at each visit, a blood lead level test should be routinely done at 9–12 months of age and at 24 months of age.
- A positive or “don’t know” answer to any question on the risk assessment will warrant a blood test for lead poisoning beyond the routine periodicity schedule.

VERBAL RISK ASSESSMENT FOR LEAD POISONING: ADULTS

Review each of these questions at each preventive health visit for all patients 16 years of age or older.

1. Do you live in or visit a building built before 1978 with peeling/chipping paint or with recent or ongoing remodeling?
2. Do you have child, spouse or a coworker who has or did have lead poisoning?
3. Do you (or a family member) work on a farm; in a bridge, tunnel, or high construction area; with batteries; ammunition, or visit a firing range?
4. Do you use any folk remedies that may contain lead or use pottery or ceramic ware for cooking, eating, or drinking?

Document in the medical record at every visit that the assessment was done, any positive response(s) and action taken:

- A positive or “don’t know” answer to any question on the risk assessment will warrant a blood test for lead poisoning.