4-1-2016

Detroit Health Department: Lead Report 2016

Abdul El-Sayed
Detroit Health Department

Alex B. Hill
Wayne State University, Detroit, MI, alexbhill@wayne.edu

Haifa Haroon
Detroit Health Department

Detroit Health Department

LEAD REPORT

2016

Dr. Abdul El-Sayed, MD, DPhil
Executive Director & Health Officer

Alex B. Hill, MA
Epidemiologist

Haifa Haroon, MPH
Epidemiologist

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Suggested Report Citation

Detroit Health Department. Lead Report 2016. Detroit, MI: City of Detroit; April 2016.

Note: Corrected on May 2, 2016. Previous version had minor errors. Analysis was based on reported lead testing rather than unique cases.

What the Numbers Show

The number of elevated blood lead level (EBLL ≥5 µg/dL) tests in the City of Detroit is dropping. Since 2009, the number of tests for children under the age of 6 who have EBLLs has decreased by more than 50% (*Figure 1*). However, Detroit and Wayne County make up almost 30% of all children tested for lead poisoning in Michigan and children in Detroit are twice as likely to have EBLLs state-wide (MDHHS, 2016). Detroit's EBLL numbers have continued to decrease as a result of various efforts, such as the removal of blighted homes, abatement of homes with lead, and the continued education outreach conducted by the Detroit Health Department's Lead Team.

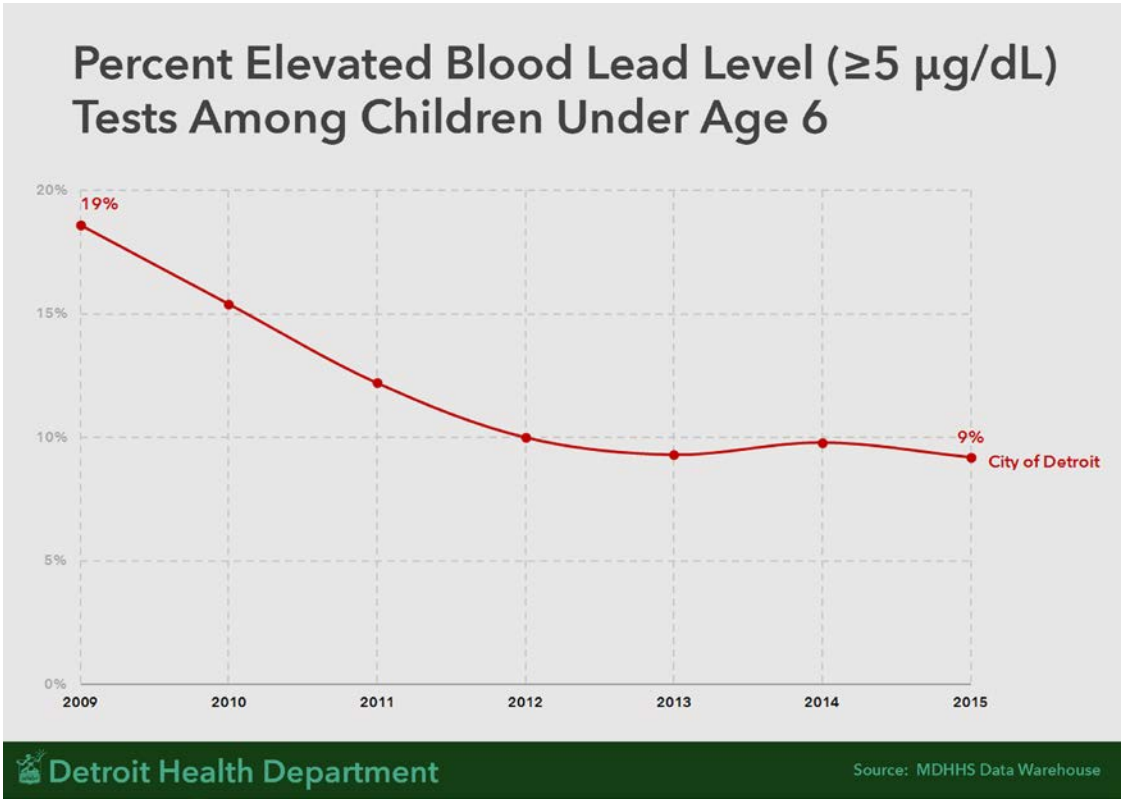

Figure 1

The Challenge

Although Detroit's EBLL numbers have dropped, the City still has a lead poisoning rate that is twice the 2014 Michigan statewide average of 3.5% (MDHHS, 2016). The influence of lead poisoning on long-term development among children is significant. Even low levels of lead exposure have been linked with behavioral and learning challenges (Zhang et al., 2013).

In the United States, as in Detroit, housing is the most common source for lead exposure to occur. This usually happens in houses built before 1978 due to the lead-based paint that was used at the time. Lead exposure in homes is estimated to account for 70% of all lead poisonings in the United States (Jacobs et al., 2013). Studies have linked lead exposure and vacant housing to increases in mental illness and crime (Ellen et al., 2011; Garvin et al., 2012). In Detroit, 93% of housing carries a high risk of causing lead poisoning (MDHHS, 2016).

Are Detroit's Numbers Actually Going Down?

The Epidemiology team at the Detroit Health Department rigorously stress-tested Detroit's lead numbers. The findings suggest a true decline in EBLL levels rather than a decrease in lead testing or a change in the characteristics of the children who are being tested. (See *Appendix* for additional analysis).

Comparing Michigan Cities

Detroit is one of several cities in Michigan with high EBLL numbers among children under the age of 6.

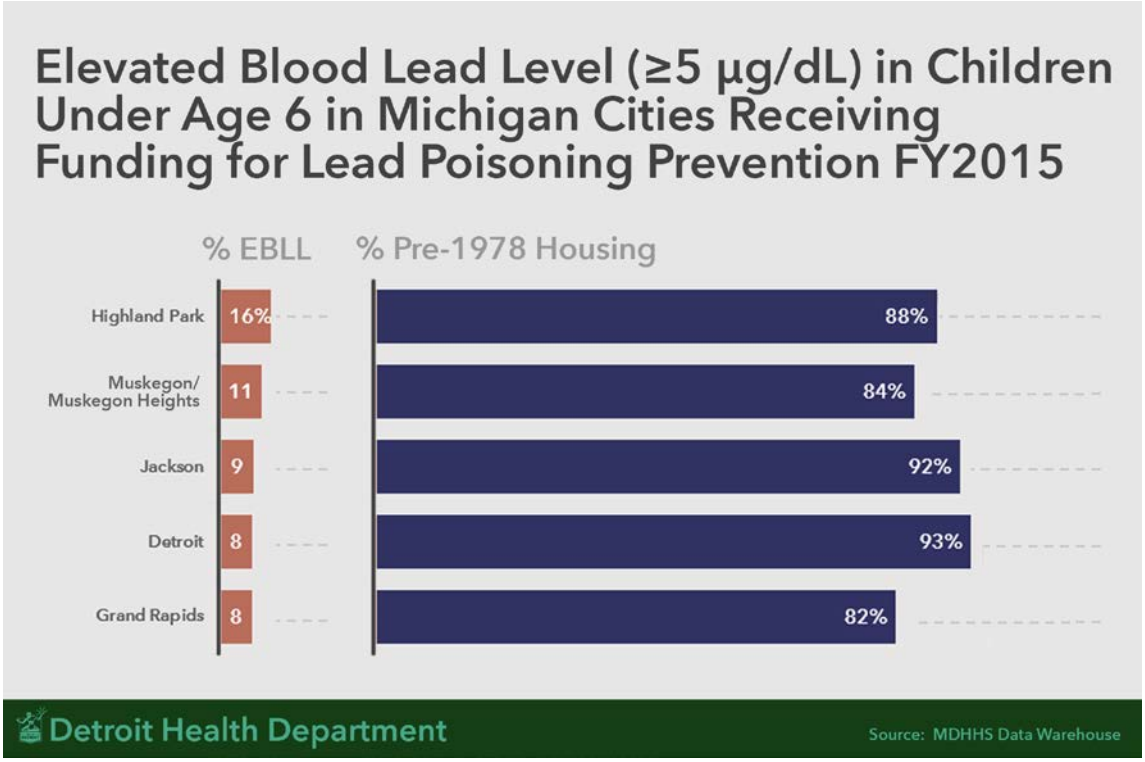

Figure 2

Nationally, only 27 states report their lead poisoning data to the Centers for Disease Control (CDC) in 2014. According to CDC reports, Pennsylvania and Illinois have higher rates of lead poisoned children than the Michigan 2014 statewide average.

Geographic Burden

Each area of Detroit is impacted differently by lead exposure and poisoning. Some areas of the city have higher lead exposure risk than others. In particular, the zipcodes that have higher lead exposure likelihoods are 48202, 48203, 48204, 48206, 48207, 48208, 48211, 48212, 48213, 48214, 48215, and 48238 (*Figure 3*).

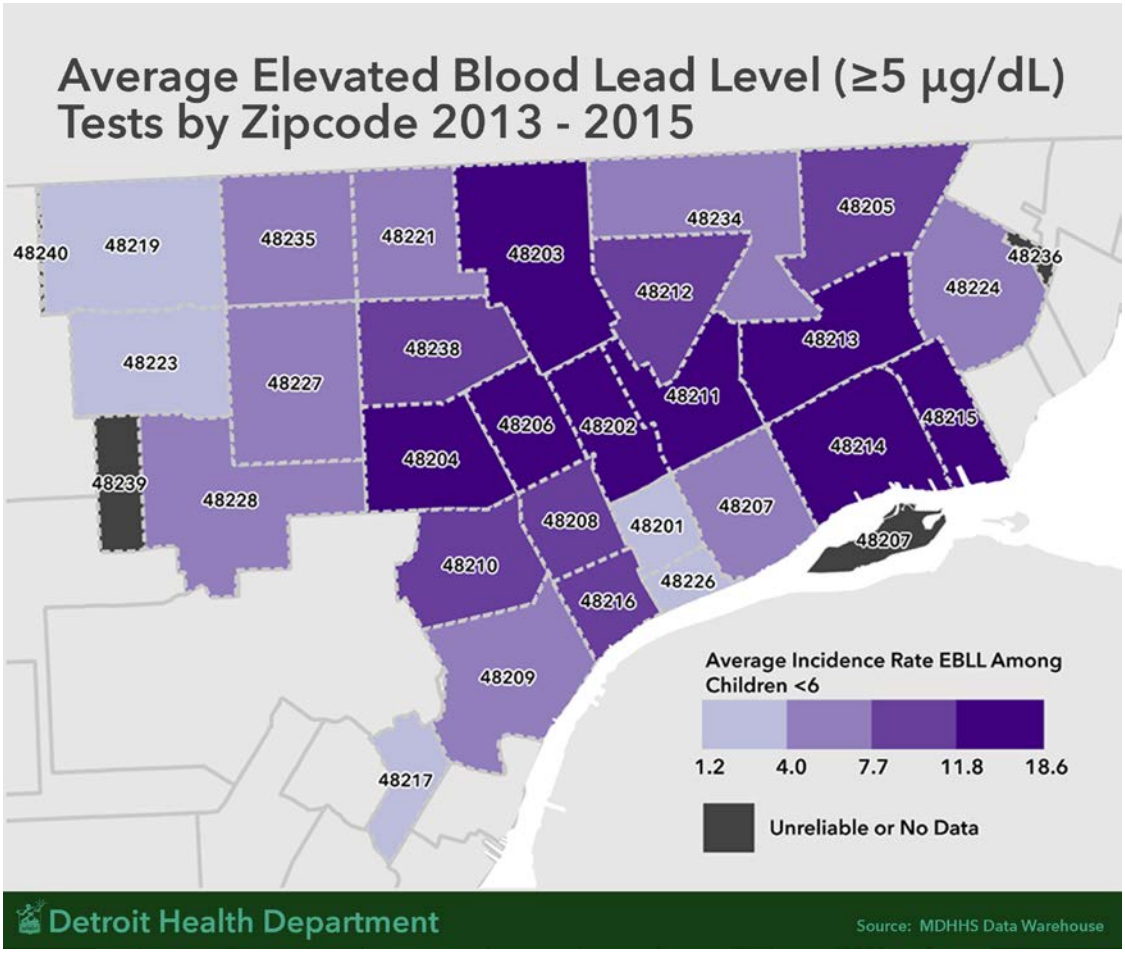

Figure 3

Importantly, most of these high risk zipcodes are the same areas where EBLLs are decreasing fastest (*Figure 4*).

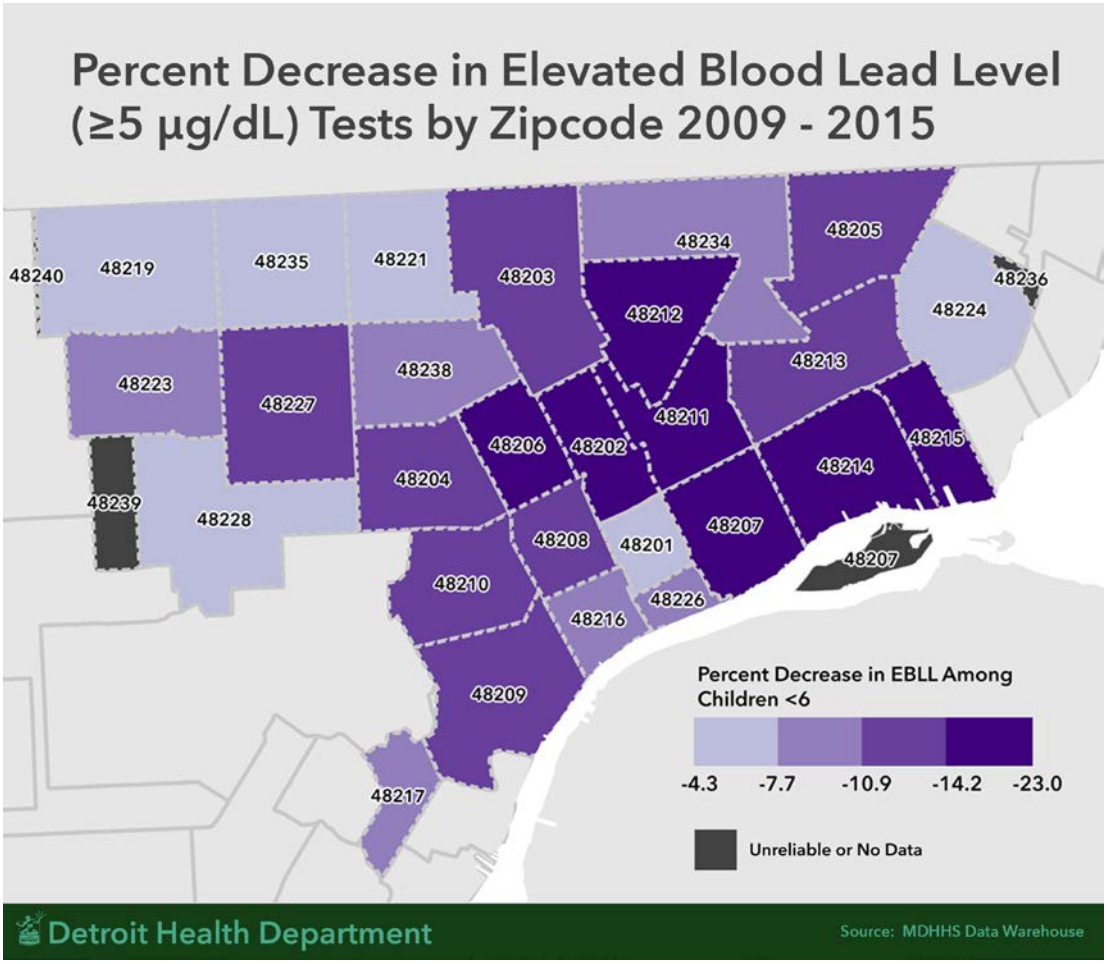

Figure 4

Appendix

The Epidemiology team stress-tested the lead levels in Detroit against two possible sources of bias.

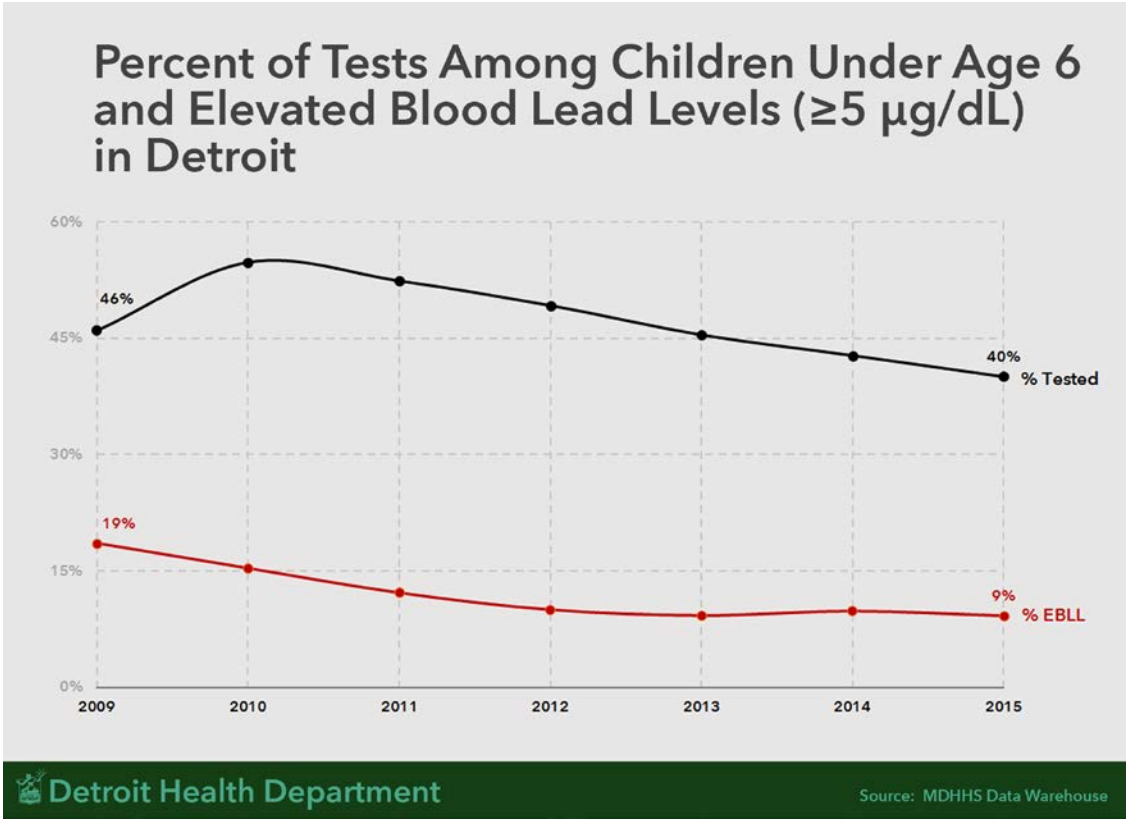

Figure 5

Possible Sources of Bias

1. Reduction in funding and lead testing
2. Selection of children tested for lead

Test 1

The first test for bias is that we are simply testing fewer children in Detroit, and that decrease is accounting for the decreasing prevalence. To test for this, we pegged the prevalence of EBLL to 2009 levels, and calculated the number of children who would have tested positive even at the 2009 baseline if the number of children tested had never decreased.

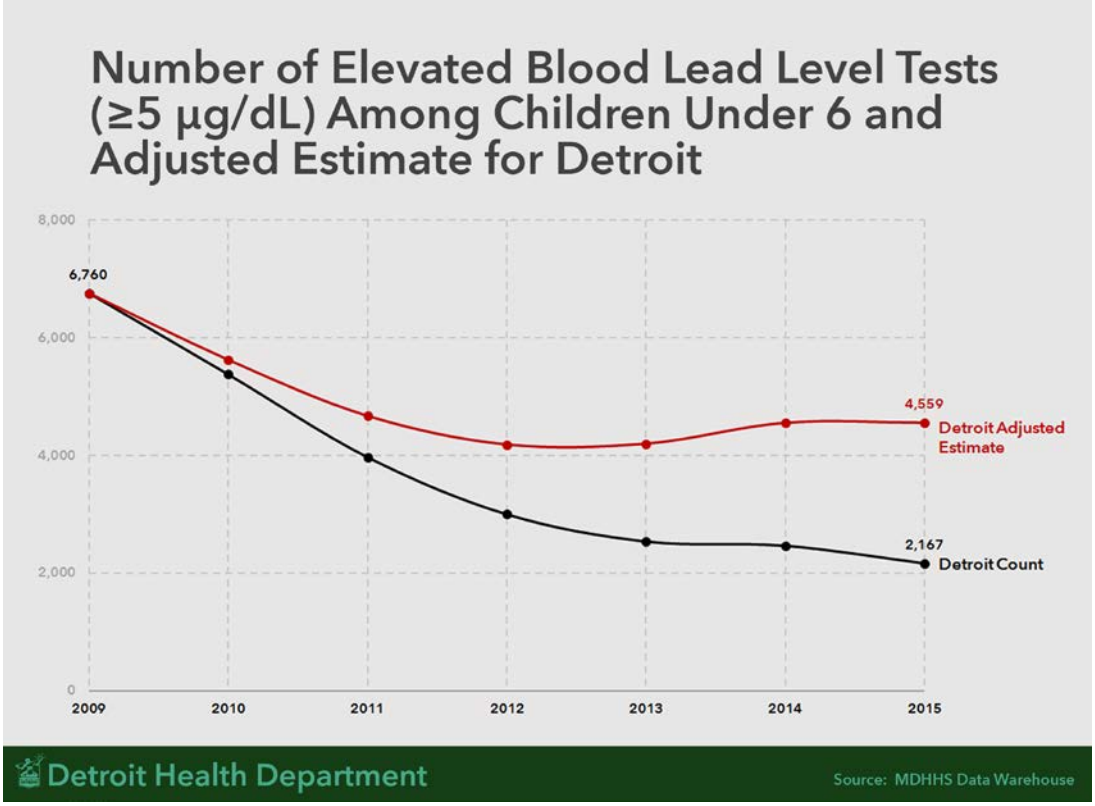

Figure 6

Figure 6 shows that even against these conservative assumptions, the EBLL prevalence decreased between 2009 - 2015. Adjusted estimates were calculated by adding the number of cases that would have occurred assuming the 2009 EBLL prevalence and testing prevalence did not change.

Test 2

The second test examines any selection bias that may account for the change in observed prevalence between 2009 – 2015. In this case the selection bias is the possibility that those children who were tested had a different prior probability of testing positive compared to their counterparts tested in the past.

To test this hypothesis, we first considered the distribution of EBLL by zipcodes prior to the period of decline focusing on 2006 - 2008 for this analysis. We considered whether or not the distribution of children tested from the upper third of highest burden zip codes declined with time. *Figure 7* shows that there was no substantial change in the distribution of the most burdensome zipcodes among those tested between 2009 - 2015.

We then considered whether or not the distribution of children on Medicaid (presumed to have a higher probability of EBLL compared to children on other insurance) changed over time.

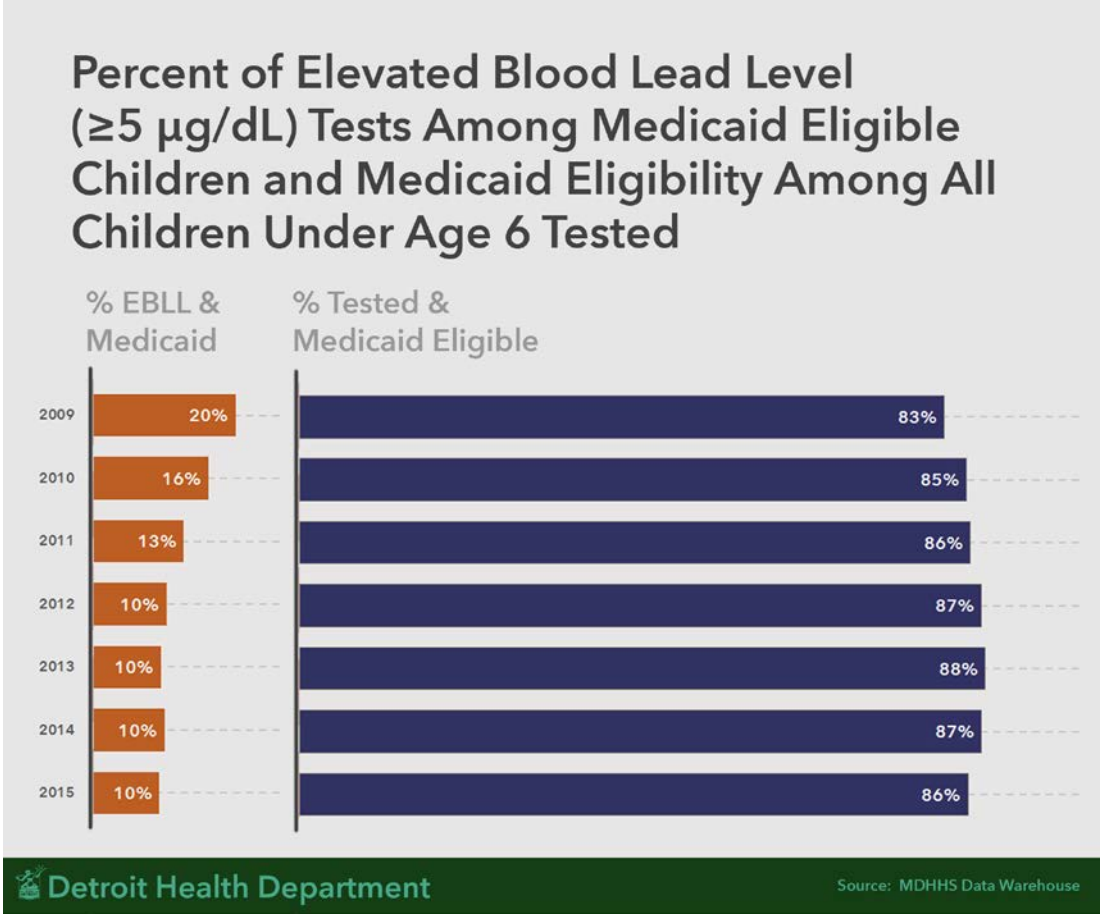

Figure 7

Figure 7 shows that there was no decrease in the proportion of children tested who were on Medicaid between 2009 - 2015. It also shows that the proportion of children on Medicaid coverage who had an EBLL decreased over time.

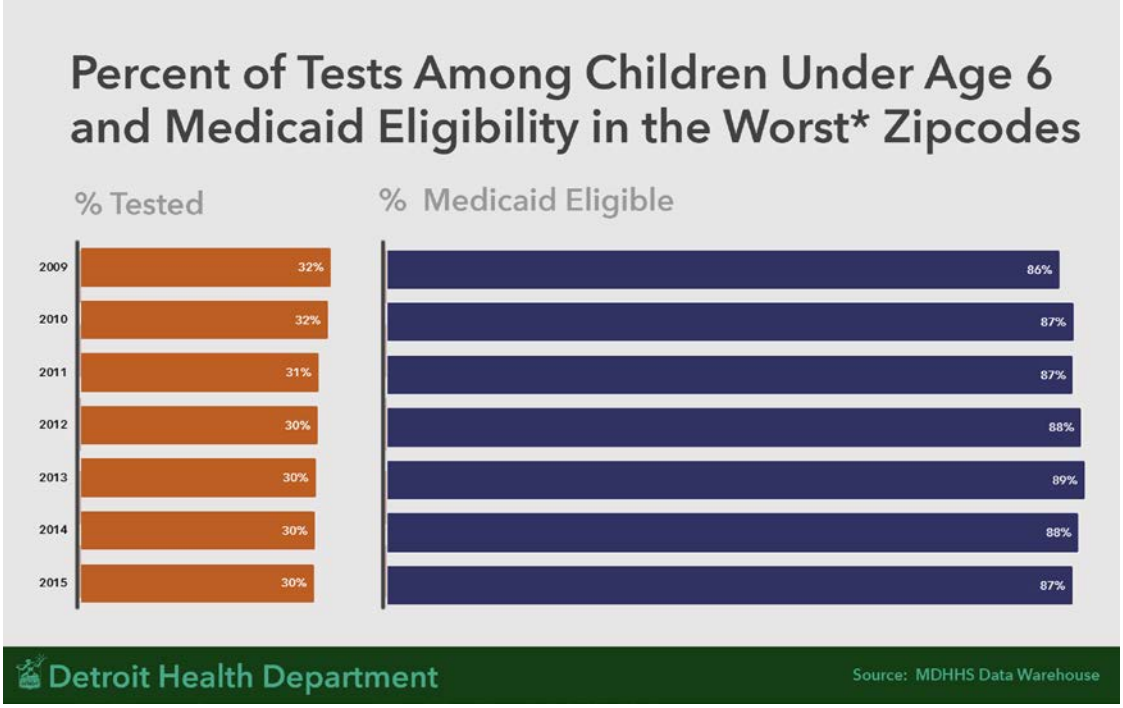

*Figure 8 (*Top third of zipcodes with the highest prevalence of EBLLs)*

Figure 8 suggests no substantial change in the proportion of children tested with the highest likelihood of having an EBLL.

Finally, we fit a logistic regression model (not shown) of the probability of EBLL between 2006 - 2008 by zip code burden and Medicaid. Using the parameters from this model, we then estimated the prior predicted probability of EBLL for every child tested between 2009 - 2015. We then considered whether the average predicted prior probability declined with time between 2009 - 2015.

Taken together, our findings suggest that there was a true decline in EBLL prevalence over time between 2009 - 2015.

References

Ellen, I. G., Lacoe, J., & Sharygin, C. A. (2013). Do foreclosures cause crime?. *Journal of Urban Economics*, *74*, 59-70.

Garvin, E., Branas, C., Keddem, S., Sellman, J., & Cannuscio, C. (2013). More than just an eyesore: local insights and solutions on vacant land and urban health. *Journal of Urban Health*, *90*(3), 412-426.

Jacobs, D. E., Cali, S., Welch, A., Catalin, B., Dixon, S. L., Evens, A., ... & Bartlett, J. (2013). Lead and Other Heavy Metals in Dust Fall from Single-Family Housing Demolition. *Public Health Reports*, *128*(6), 454.

Michigan Department of Health and Human Services (2016). "2014 Data Report on Blood Lead Testing and Elevated Levels." Lansing, MI: State of Michigan.

Zhang, N., Baker, H. W., Tufts, M., Raymond, R. E., Salihu, H., & Elliott, M. R. (2013). Early childhood lead exposure and academic achievement: evidence from Detroit public schools, 2008–2010. *American journal of public health*, *103*(3), e72-e77.

Contact Information

Detroit Health Department

313-876-4000 | **Fax** 313-877-9305

DetroitMI.gov/Health

Detroit Health Department

@DetHealth