Childhood Lead Exposure in the City of Cleveland: Why Point-in-Time Estimates Aren't Enough

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INTRODUCTION

Lead is a neurotoxin that is associated with cognitive deficits in children. There is no safe level of lead in a child's blood; adverse outcomes have been associated with blood lead levels well below the current public health threshold for concern (i.e., 5 µg/dL; Jusko et al., 2008; Bellinger, 2008).

Children living in low-income neighborhoods, children of color, and children whose families live in rental housing are at the greatest risk of exposure to lead (HUD, 2014).

According to CDC surveillance data, the percentage of children under the age of six with elevated blood lead levels (EBLL) in any given year has been declining since the late 1990's.

But, annual incidence estimates mask the prevalence of EBLL during the entire early childhood period; that is, the percentage of children who have ever had an EBLL between birth and kindergarten entry.

Unfortunately, prevalence data suggest far too many children are still arriving at kindergarten with a history of lead poisoning (McLaine et al., 2013).

This poster:

1. *presents cumulative lead exposure rates by birth cohort for children living in the City of Cleveland;*
2. *maps the percent of children lead poisoned by age 6 in each Cleveland neighborhood;*
3. *describes the association between blood lead levels and kindergarten readiness;*
4. *describes the association between blood lead levels and 3rd grade reading proficiency among children attending Cleveland Metropolitan School District*

METHOD

- *Used integrated administrative data maintained in the ChildHood Integrated Longitudinal Data (CHILD) System*
- *Began with children born between 2001-2008 who lived in Cleveland in 1st year of life (according to birth certificate, public assistance, home visiting, child welfare, subsidized child care, lead testing records) AND had at least one lead test before age 6*
  - *N= 41,757 (N for Figure 1)*
  - *17,567 children ALSO had a Kindergarten Readiness Assessment – Literacy (KRA-L) score (N for Figure 2)*
  - *9,470 children ALSO had a 3rd grade Ohio Achievement Assessment (OAA) Reading score*

RESULTS

1. *The percent of children with an EBLL >= 5 µg/dL by age 6 has decreased from 2001 – 2008; however, most recent data suggest 1 in 4 children are lead poisoned between birth and kindergarten entry (see Figure 1).*
2. *Data from the 2008 birth cohort indicate a disproportionate impact of lead on particular neighborhoods, with the preponderance of lead poisoned children living on the city's east side (see Map).*
3. *Children with an EBLL >=5 µg/dL demonstrated a lack of kindergarten readiness at rates higher than children without a lead poisoned history (see Figure 2).*
4. *1 in 2 children with an EBLL >=5 µg/dL failed the OAA 3rd grade reading assessment.*

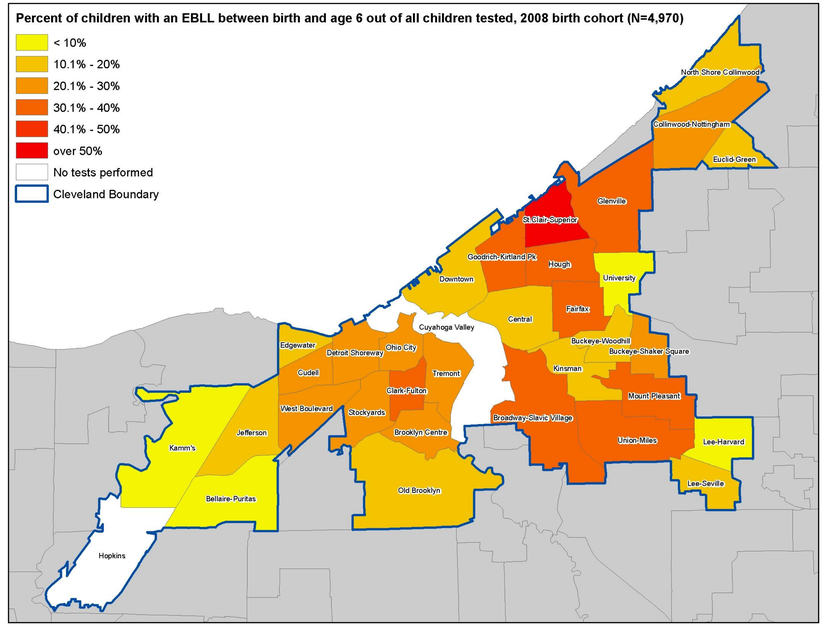
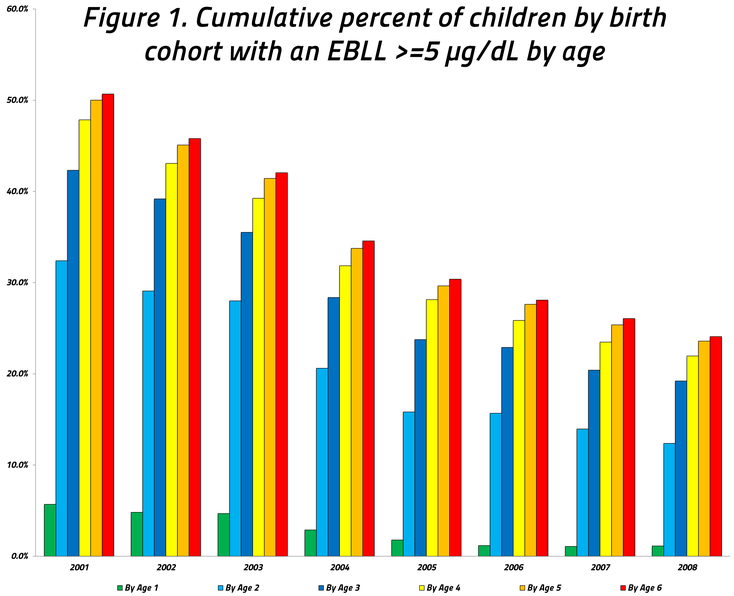
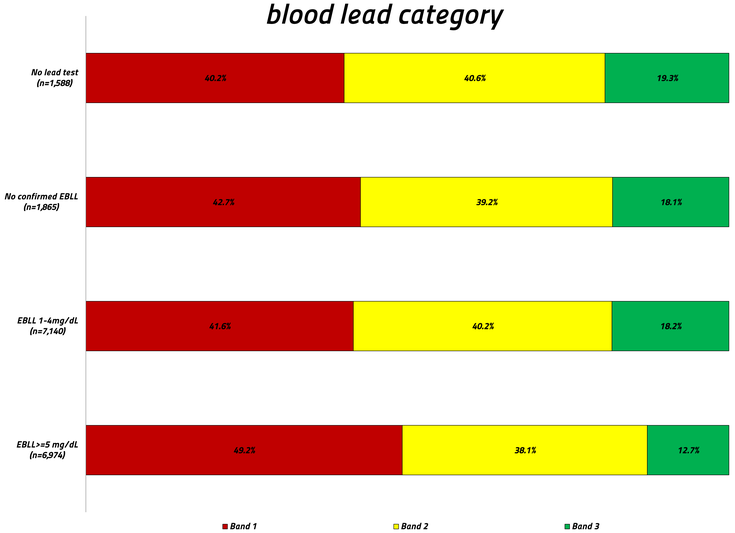


Figure 1. Cumulative percent of children by birth cohort with an EBLL >=5 µg/dL by age



Note. Sample sizes for each birth cohort range from 5,695 (2001) to 4,970 (2008)

Figure 2. Percent of children scoring in each KRA-L band by blood lead category



Note. Children scoring in Band 1 may be at serious risk of being unprepared for kindergarten. Children scoring in Band 2 may reflect some level of unpreparedness.

DISCUSSION

The number of children who are lead poisoned in a given year has been steadily declining; yet, as illustrated by this poster, these point-in-time incidence data should be interpreted with caution as longitudinal data demonstrate many more children are lead poisoned throughout the early childhood period.

Lead poisoning, though dispersed throughout the city, is concentrated in minority neighborhoods with high poverty rates. As a result, the burden of lead is greatest in communities with the fewest resources to deal with it.

While our data demonstrate a relationship between blood lead level and school readiness, more work is needed to disentangle the effect of poverty.

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