National Center for Healthy Housing

Projecting the Burden of Childhood Lead Poisoning in Communities with Low Screening Rates

Technical Assistance Brief

Purpose: Even in states with laws requiring screening of all children for lead exposure, lead screening rates often vary widely. Given this variation, programs often wish to project prevalence rates and numbers of children with lead poisoning more accurately. The following process outlines the steps that programs can take to improve estimates of the prevalence or number of children with elevated blood lead levels.

Step 1

Determine whether the children currently being screened in the geographic area of interest (county, city, and/or target area) are representative* of the children in the area as a whole. Determine this by comparing demographic information on children screened with all children in the geographic area of interest, based the following variables that are readily available through the U.S. Census Bureau at http://factfinder2.census.gov:

- Age
- Race/ethnicity
- Foreign-born versus U.S.-born
- Poverty-to-income ratio (see attached Appendix) or another socioeconomic measure, such as family or household income

* *Without using statistical analysis there are no hard-and-fast rules as to what constitutes "similar" or "different." This method represents a basic example of things to consider, not* ***everything*** *one could or should consider. Even without statistical analysis, this comparison will allow you to identify potential differences or similarities and be transparent about your methods.*

Step 2

Once you have determined if the children being screened are demographically similar to or different from all children in the geographic area of interest, you will conduct your calculations following Step 2a (similar to) or 2b (different from) below as appropriate.

Step 2a

If the children being screened are demographically similar to all children in the area of interest:
First, calculate the prevalence rate for the area. Next, multiply this prevalence rate by the number of children under age six in the area of interest to project the number of children with elevated blood lead levels that would be identified in this area if universal screening were conducted. Finally, use this information to determine how many children are currently not being detected or served due to the lack of blood lead screening (Example 1).

Example 1

In 2010, 6,000 children under age six were screened for lead poisoning in *County X.* Seventy-eight of these children had confirmed blood lead levels (BLLs) ≥ 10 µg/dL, resulting in a countywide prevalence rate of 0.013 or 13.0 per 1,000 children.* The 6,000 children screened are representative of children under age six across the county. Therefore, if *County X* has a total of 25,000 children under age six, then the true number of children with blood lead levels ≥ 10 µg/dL in the county is estimated to be 325. This is calculated as follows:

1. ***Calculate the countywide prevalence rate.***
   Number of children with confirmed BLLs ≥ 10 µg/dL divided by the number of children screened:

   78 / 6,000 = 0.013

2. ***Calculate the projected number of children in County X with BLLs ≥ 10 µg/dL.***
   Prevalence rate multiplied by the total number of children in *County X:*

   0.013 X 25,000 = 325 children

3. ***Calculate the number of children in County X with BLLs ≥ 10 µg/dL not being detected.***
   Total number of projected children with BLLs ≥ 10 µg/dL minus the actual number of confirmed children with BLLs ≥ 10 µg/dL:

   325 - 78 = 247 children

Finding: If all children under the age of six had been tested in *County X* in 2010, an estimated total of 325 children under age six would have been identified with blood lead levels ≥ 10 µg/dL. This means that potentially 247 children are currently not being detected or served to reduce their exposures due to the lack of blood lead testing.

Step 2b

If the children being screened are demographically different from all children in the area of interest:
Adjustments to the numbers and prevalence rates by racial or ethnic group will be required to compensate for discrepancies in screened children before calculating how many children are currently not being detected or served due to the lack of blood lead screening. For example, if screening data demonstrate

* *When describing prevalence rate in writing, it is typically presented in an "xx per 1,000 children" format. However, when conducting calculations involving prevalence rate, the numeric representation 0.xxx is used.*

that black children are more than three times as likely than white children to have an elevated blood lead level, but black children are overrepresented in the children screened (e.g., they are 40% of the screened population but only 20% of the county population), then the data would need to be adjusted to correct for the over-screening of black children and the higher rates of lead poisoning identified.

First, calculate the prevalence rate for each racial or ethnic group in the area of interest. Next, multiply the group-specific prevalence rates by the number of children under age six in each racial or ethnic group to project the number of children with elevated blood lead levels that would be identified by racial or ethnic group in the area of interest if universal screening were conducted. Finally, use this information to determine how many children are currently not being detected or served due to the lack of blood lead screening (Example 2).*

Example 2

In 2010, 78 of 6,000 children in *County X* under age six screened for lead poisoning had confirmed blood lead levels greater than or equal to 10 µg/dL, yielding a countywide prevalence rate of 0.013 or 13.0 per 1,000 children.** However, the 6,000 children screened were not representative of the county's population of 25,000 children under age six. Black children represented 40% of those screened (2,400 children) but represent only 20% of the county's population of children under age six (5,000 children).

Additionally, in examining the prevalence rates by race in *County X*, local epidemiologists found that 18 of the 3,600 white children screened had confirmed blood lead levels greater than or equal to 10 µg/dL, yielding a prevalence rate of 5.0 per 1,000 children. Sixty of the 2,400 black children screened had confirmed blood lead levels greater than or equal to 10 µg/dL, yielding a prevalence rate of 25.0 per 1,000 children a rate five times that of white children. To account for both the over-representation of black children in the screened population and the higher rate of lead poisoning identified, you would use the following calculations:

Racial or Ethnic Group	Total Population under Age six in County X
White	20,000 children
Black	5,000 children

1. Calculate the prevalence rate among white children.
Number of white children with confirmed BLLs ≥10 µg/dL divided by the number of white children screened:

18 / 3,600 = 0.005

2. Calculate the projected number of white children with BLLs ≥ 10 µg/dL.
Prevalence rate for white children multiplied by the total number of white children in *County X:*

0.005 X 20,000 = 100 children

(continued)

* *For simplicity, Example 2 calculations assume two racial or ethnic groups in the area of interest. In application, the process and calculations would be repeated for each racial or ethnic group over- or underrepresented in the screening data for the area of interest.*

** *When describing prevalence rate in writing, it is typically presented in an "xx per 1,000 children" format. However, when conducting calculations involving prevalence rate, a numeric representation such as 0.025 must be used.*

Example 2 ***(continued)***

3. Calculate the prevalence rate among black children.
Number of black children with confirmed BLLs ≥ 10 µg/dL divided by the number of black children screened:

60 / 2,400 = 0.025

4. Calculate the projected number of black children with BLLs ≥ 10 µg/dL.
Prevalence rate for black children multiplied by the total number of black children in *County X:*

0.025 X 5,000 = 125 children

5. Calculate the total projected number of children in County X with BLLs ≥ 10 µg/dL.
Total number of projected white children with BLLs ≥ 10 µg/dL in *County X* plus the total number of projected black children with BLLs ≥ 10 µg/dL in *County X*:

100 + 125 = 225 children

6. Calculate the number of children in County X with BLLs ≥ 10 µg/dL not being detected.
Total number of projected children with BLLs ≥ 10 µg/dL minus the actual number of confirmed children with BLLs ≥ 10 µg/dL:

225 - 78 = 147 children

Finding: If all children under the age of six were tested, an estimated total of 225 children in *County X* under age six would be identified with blood lead levels ≥ 10 µg/dL in 2010. This means that potentially 147 (225-78) children are currently not being detected or served to reduce their exposures due to the lack of blood lead testing.

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Appendix
Calculating Income-to-Poverty Ratio

Step 1

Collect and download data from American Fact Finder.

1. Go to http://factfinder2.census.gov - the U.S. Census Bureau's American Fact Finder data site *(Note: Google Chrome Browser was used in developing these instructions.)*
2. Click on "Advanced Search" along the left side of the page. Then click "Show me all."
3. Click the light blue "Geographies" tab on the left side of the page. When the window appears, click "select a geographic type," then select "Census tract – 140" (the third choice under "State"). When the "State" menu appears in the window, select the state in which you are interested.
4. Select the specific county and geographic areas in which you are interested from their respective drop down menus (e.g., "All Census Tracts within [Name] County, [State]"). You may select multiple Census tracts at once by depressing the CTRL key while making your selections. Click the "Add to your selections" button at the bottom of the window. Once you have finished with your selections, click "Close" at the top right of the dialogue box.
5. In the yellow field near the top of the screen next to "Refine your search results" and below "topic or table name," type "B17022" and click "Go." Then check the box preceding the row with "Table, File or Document Title=RATIO OF INCOME TO POVERTY LEVEL IN THE PAST 12 MONTHS OF FAMILIES BY FAMILY TYPE BY PRESENCE OF RELATED CHILDREN UNDER 18 YEARS BY AGE OF RELATED CHILDREN" ***and*** "Dataset"="2012 ACS 5-year estimates." At the bottom of the screen, select "view."
6. Click "download." Select "Microsoft Excel (.xls)" then select "OK." Click "Download" to save the file to your computer when the dialogue box tells you that your file is complete.
7. Open the downloaded Excel file. Delete unnecessary rows/columns as appropriate.

Step 2

Calculate the percentage of homes with an income-to-poverty ratio under 1.3.

1. Scroll down to the rows entitled "Under 1.30."
2. For each census tract, divide the number "Under 1.30" by the "Total" to find the percent of homes with a poverty-to-income ratio less than 1.3.