**Activity 2.2**

Collect the Lead Screening Homework.

Activity 2.2 has two parts intended to familiarize students with community differences in Boston. Boston is the chosen location because there is a significant amount of housing stock built before 1950, industrial activity in communities, and noteworthy socioeconomic differences between neighborhoods.

The first part of class is an analysis of data done individually by each student that should take approximately 30 minutes. They will use the information provided in **Activity 2.2 Necessary Data** to complete a chart and respond to questions in **Activity 2.2 Student Materials** about community level data in Boston.

The second section (approximately 15 minutes of class time) will be spent discussing the various social determinants that may be used to predict eBLLs.

As the class period is coming to an end, pose the following reflective question: We have spent time discussing blood lead levels in the human body and lead distributions within communities. What other methods could be used to evaluate lead exposures for children or in neighborhoods?

**Teaching Tips**

* Census data are available for anywhere in the country. The user interface for the US Census Bureau is *American FactFinder* (www.factfinder.census.gov). Most communities do not have the expertise or resources to organize and map these data, especially as these data correlate to health outcome data, such as the incidence eBLLs. Consequently, we have chosen to use Boston, MA, as a case study. If you would like to use another city or community, feel free to do so.
* Many of the data for Class 4 were taken from the Massachusetts Department of Public Health, or from the Boston Redevelopment Authority, [www.bostonredevelopmentauthority.org](http://www.bostonredevelopmentauthority.org/) . Data relating childrens’ blood lead levels >5µg/dL according to census tract, and lead inspections are current to 2013. More up-to-date information may be available from the Department of Environmental Health, MA Department of Public Health.
* The Boston Redevelopment Authority site has also compiled a number of additional resources and maps, including some that evaluate factors we did not explore during this class period. For instructors with particular interest of this community or looking at lead in their own community, please see the site for further information.

*The following items are included below:*

* Instructions for the Part 1 individual work
* Class discussion questions with possible responses for the second section
* Optional reflection assignment

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***Part 1: Individual work with maps (30 minutes)***

The first portion of class is a mapping exercise designed to familiarize students with demographic data available from the US Census and other government sources, and to show them how these data might be used to better characterize risk factors associated with elevated blood lead levels in young children**.** Because the exercise focuses on lead incidents in Boston, MA, the demographic data is taken from Boston. However, it should be possible to use a similar approach to access demographic data in other areas.

Students are asked to use GIS maps to characterize communities in terms of a number of demographic factors, including housing characteristics, population density, housing stock, open space in a community, and commercial/industrial activity within communities. By completing the worksheet and associated questions, they should begin to see patterns across different communities that may suggest possible risk factors for children developing elevated BLLs. They are then provided with information that identifies areas where significant numbers of children are found to have BLLs in excess of 5μg/dL. At the end of this portion, they should both understand the close relationship between lead and housing, and begin to consider other socio-economic disparities that may contribute to the differences in environmental exposure.

*Students need the following materials for this section:*

* Activity 2.2 Student Materials
* Activity 2.2 Necessary Data

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***Activity 2.2 Student Materials with Responses***

Using the multiple graphs provided, fill in the supplementary chart and answer the following questions.

1. Examine the pie chart that identifies neighborhoods with childhood BLLs > 5 ug/dL. In which three neighborhoods are the majority of incident cases found? Indicate these neighborhoods in the table. In which neighborhoods is there little or no prevalence? Indicate these in the table.

2. The neighborhoods can further be broken down into census tracts and used for a variety of demographic purposes. Examine the census tract map relating elevated BLLs according to census tract. In those neighborhoods where BLLs are elevated, are there several census tracts that stand out? Are there census tracts in any other neighborhoods? In those tracts where BLLs are not elevated, do you see any patterns? Briefly describe (in a sentence or two) what you observe.

3. Is there a correlation between the percentage of families below poverty level and the incidence of childhood eBLLs? What additional information would you want to be more confident about your response?

*Yes, there is a correlation. People in the median quintile are being screened with eBLLs. Kids living in higher poverty communities don’t have the resources to get screened and there is no political will to get them screened. It may be necessary to know physician awareness, where and how kids go for well visits. Access to care and the inspection rates would be interesting to know in high-risk areas.*

4. Where would you recommend educational outreach to families? What message would you include in these efforts?

*I would recommend educational programs to families in older homes, high incidence, and families with enough means to care about lead and have the appropriate economic resources.*

5. Is there a correlation between percent minority and percent incidence of childhood eBLLs? Is there any other additional information you might want to know?

*Yes. Possible causes include poverty, access to health care, or discrimination, among others.*

6. Ethnic clustering is common in residential housing everywhere. In high-density urban neighborhoods, most units are rentals and turn-over is frequent. How might information about issues such as elevated BLLs be shared within members of ethnic clusters if there is a lot of turn-over? How might this information be shared between members of ethnic clusters? Would some of this “sharing” be lost over time or through translation? What impact might this have on addressing childhood lead toxicity and housing that contains lead?

*As populations change, there are likely language issues, which may have an impact. Also, the neighborhood communication structure, for example if 3 Irish kids are lead poisoned, news may travel to other tight Irish families but not African American families.*

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***Part 2: Discussion of findings (15 minutes)***

A class discussion after the students each analyze the maps individually will allow for any questions to be answered and further clarification.

1. Relationships between elevated BLLs and inspections:

*In two areas: North Dorchester and Roxbury/Mattapan, there is seemingly a correspondence between elevated BLLs and numbers of inspections. East Boston, with a very high number of elevated BLLs did not have as many inspections. Students should consider whether this is population related.*

2. Relationships between elevated BLLs and compliance:

*Compliance is mixed: generally higher where BLLs are elevated, but not universally. Although this unit does not focus on lead remediation, students might consider costs of remediation as a potential factor. Enforcement may be another factor. The maps are a “snapshot” of lead and compliance, but cannot establish temporal cause-effect relationships.*

3. Predictors of elevated BLLs and potential interrelationships:

*Although both poverty level and demographics for non-white/Hispanic both are associated with elevated BLLs, non-white/Hispanic demographics are more closely related. These issues are very closely related, however. Other factors include accuracy of reporting (for example, income in a specified area is often presented as range) and racial/ethnic identification. A number of demographic factors have not been included in the exercise, each one of which may provide additional information. This includes but is not limited to size of household, whether/whether not a child lives in a household with a single parent, and number of children under17 years of age. Other information that might be explored includes language spoken in the home, whether a child lives in multiple households, or the temporal relationship between an assessment of elevated BLL, the specified place of residence, or whether children with elevated BLLs are more likely to be in rental units rather than live in an owner-occupied home.*

4. Data for census tracts

*These data may be surprising since the ethnic composition, income range, and total population of one of the West Roxbury census tracts is similar to the make-up of the Dorchester census tract. However, a number of things are missing from these data that may be relevant. This includes home ownership vs. rental units (students could consider the information that was entered into the table they completed in class), size of household, age of children (not provided), land area, or commercial/industrial activity. They can access much of this information by going to the BRA website that they used for the in-class activity. Students might also consider the general demographics of the West Roxbury neighborhood vs. the Dorchester neighborhood. Would it, for example, be easier for a family in West Roxbury to obtain funding for lead remediation?*

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***Optional Reflection Assignment***

This is a follow up to the in-class activity, and allows for evaluation of greater environmental justice angles. If you incorporate this section in the module, all completed materials should be collected at the beginning of class 5 and assessed using the 50-point rubric.

Students will need the chart they completed in class to answer the following questions:

1) Referring to the table that you completed in class, indicate, from the neighborhoods you listed, which ones have larger numbers of census tracts with 26% or more of families below the poverty level. Also, indicate which of the neighborhoods that you identified have census tracts with 0-26% of families below the poverty level. Which census tracts have more children been identified as having elevated BLLs?

2) Using the map data for Non-White/Hispanic residents and elevated BLLs, identify neighborhoods with 40% or more Non-white/Hispanic residents. Identify these neighborhoods on the table that you completed in class.

3) Comparing both pieces of information, which seems to be the better “indicator” of elevated childhood BLLs? Are these findings interrelated? Are there any findings that surprise you? If so, explain in a sentence or two.

4) Below are 2010 census data for three census tracts in Boston. Census tract 920 is from South Dorchester, while census tracts 1304.02 and 1304.06, are both from West Roxbury. The prevalence of eBLLs in West Roxbury as a neighborhood, or even by census tracts, is relatively low. The prevalence of elevated BLLs in census tract 920 is high. Examine the data. Does any information present in these data challenge your earlier findings? Explain. What additional information would you like to have?

Tract Pop. African Am Housing Units #Rental Median Family Income or Income Range

1304.06 5107 43.60% 2192 NA\* $37,274-$53,433\*\*

1304.02 4637 4.46% 2196 138 $71,798

920 4945 58.30% 1693 198 $41,250

5) Write a 1-2 paragraph response describing what you perceive as some of the greatest risk factors for elevated BLLs, how these risk factors may interrelate, and other mitigating factors based on what you have seen from the in- and out-of-class exercises. What additional issues would you like to investigate? Do you think that other influences may mitigate the impact of certain risk factors? Defend your answer.