

Health of Boston's Children

Child Health Assessment Mapping Project



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Health of Boston's Children

Child Health Assessment Mapping Project

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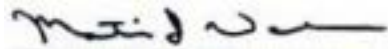
Health of Boston's Children: Child Health Assessment Mapping Project
Boston Public Health Commission, Research and Evaluation Office
Boston, Massachusetts, 2015

Foreword

From Mattapan to Charlestown and in between, each of Boston's neighborhoods has its own unique character and history; each reflects a unique part of Boston's story as a vibrant, changing city. And each neighborhood is home to families with diverse roots but a common goal of raising healthy, happy children. The health and well-being of our children depends on access to healthy homes, schools, and communities. All of Boston's children deserve the opportunity to grow and thrive in a home and community environment that is healthy and safe.

With support from Boston Children's Hospital, this report focuses on aspects of Boston's neighborhoods that contribute to or detract from a nurturing and healthy environment for children and families. The information it provides will be used by city agencies, community organizations, and health care institutions that are seeking to build on community strengths and combat challenges to our communities.

In addition to the data presented through maps, the Child Health Assessment Mapping Project (CHAMP) undertook a pilot initiative to involve youth of Boston neighborhoods in research. Youth from three Boston communities were trained to gather information on community features that impact residents on a daily basis. In addition to piloting a new method of data collection, the project provided youth with experience as researchers and insight into the issues that confront their families and neighbors in their neighborhoods. Like the Neighborhood Engagement Walks (NEW) initiative now being undertaken by the Mayor's Office of Neighborhood Services (ONS), CHAMP reflects the city's commitment to identifying and providing tools for addressing the needs of Boston's neighborhoods.



Martin J. Walsh
Mayor, City of Boston

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During the summer of 2012 and spring of 2013, staff and youth from three Boston community organizations, Madison Park Development Corporation, Project RIGHT, Inc, and Sociedad Latina, participated in CHAMP neighborhood assessments in Dudley Square, Grove Hall, and Mission Hill respectively. Key partners at these organizations were Kevin Johnson and Angela Kelly (Madison Park Development Corporation); Jessie Alvira, Martin Booth, and Michael Kozu (Project RIGHT), and Lydia Emmons and Melissa Luna (Sociedad Latina); as well as graduate students Daniella Dominguez, MPH; Olufunke Oladejo, MD, MPH; Michael Parks, MPH; Abiodun Salako, MD, MPH; and Alexander Su, MPH, who helped guide participant youth through the data collection process. Youth employed by these organizations to work on CHAMP were: A.J. Barros, Monique Blocker, Shirelle Cedeno, Jose Colón, Dylan Mitchell, Stephanie Morales, Tatiana Morales, David Myers Jr., Sonya Nesbitt, Shanteah Norfleet, Amira Patterson, Raymón Pullum, Dony Resende, Carla Soares, Wilmer Quiñones, Krystian Seymour, Binyam Sirmollo, Charles Slayden, Tiffany Velasquez, and Amelia Vargas. Without their insight, talent, and considerable effort, we would not have been able to assess the availability, cost, and quality of healthy and unhealthy foods in these communities, nor would we have had the opportunity to pilot a process to assess elements of the built environment that impact health and quality of life among children and families in these communities.

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Introduction

Welcome to *Health of Boston's Children: Child Health Assessment Mapping Project* (CHAMP)! This report presents results of a study of the environments in which Boston children live, learn, play, and grow using citywide maps, community-specific data, and research literature. We have increasingly learned that the environment a child confronts in early life, including his or her social environment, may have lifelong impact. Thus, a look at Boston as an environment for growing children gives us a glimpse into the long-term health and well-being of the city's youngest residents. It draws on multiple data sources, including the U.S. Decennial Census, American Community Survey, and data from multiple city and statewide agencies, to characterize the environments encountered by Boston children, neighborhood by neighborhood.

A previous report of the Health of Boston's Children series, *Health of Boston's Children: Parent and Caregiver Perspectives*, features a section highlighting the impact of social determinants of health on child health outcomes as a whole and as a cause of health inequities across racial and ethnic groups. As we explained in that report, health equity is the opportunity to achieve one's full health potential regardless of social position or socially defined circumstances. Health inequities are differences in health outcomes across social groups that are systemic, avoidable, unfair, and rooted in social and economic inequality. The evidence we presented in that section directly applies to the data we present in *Health of Boston's Children: Child Health Assessment Mapping Project*, which additionally contribute to our understanding of social determinants of health and health equity in Boston. In compiling the data for this report, we noticed the wide presence of community assets throughout most of Boston's neighborhoods, including access to green space; access to community centers, YMCAs and Boys and Girls Clubs; and high levels of street connectivity. These features represent a strong structural foundation that undoubtedly contributes to vibrant communities and healthy living for children and families throughout Boston. The data we present here also show the presence of risks, often but not always concentrated in certain neighborhoods, which detract from the opportunities that residents in many communities have to thrive. Most often, the neighborhoods experiencing the greatest risk coincide with those that have higher rates of children living in poverty and the greatest concentrations of Black and Latino residents. We hope that this report can serve as a tool for city agencies, organizations, and institutions seeking to eliminate these risks so that children in all neighborhoods of Boston can fully benefit from positive aspects of their communities and homes to achieve optimal health and well-being.

CHAMP is one part of the three-part Boston Child Health Study conducted as a collaboration between the Boston Public Health Commission and Boston Children's Hospital. The study as a whole aims to provide information about child health from multiple perspectives in order to inform Boston policies and programs at the community and citywide level. The two other parts of the study are the Boston Survey of Children's Health (completed), and a Medicaid Claims Data Analysis (pending). Together, the three parts of the study will provide insight into the health of children living in Boston; the survey from a parent perspective, CHAMP from an environmental perspective, and the Medicaid analysis, based on children's use of the health care system. As a whole, the study fills important gaps in our knowledge of Boston children's health. It provides first-time data at the citywide level, and where feasible, for specific demographic and neighborhood subpopulations. It also provides information about children of all ages; past studies have focused on infancy, early childhood, or adolescence, but have left gaps in our knowledge about primary school-aged children. The Boston Child Health Study fills that gap, and in the present report, it provides information about the neighborhoods which provide the context for growth, development and health of Boston's children. Findings from the Boston Survey of Children's Health were released in October, 2013 in the first report of the Boston Child Health Study series, *Health of Boston's Children: Parent and Caregiver Perspectives*. The present report was released in July, 2015. The final report in the series will be completed in 2016.

Executive Summary

The Child Health Assessment Mapping Project (CHAMP) report provides information on the environments in which Boston’s children and families live, learn, and play. These environments differ from neighborhood to neighborhood in many ways that can affect health. In some cases, the impact of a particular neighborhood characteristic is straightforward—growing up in an environment with a high level of street violence creates stress that takes a toll on the health of residents regardless of other neighborhood attributes. In other cases, differences may have variable impact on health across neighborhoods. For example, some neighborhoods with limited open space are largely made up of single-family dwellings with their own lawns and gardens in which children can play, while in other neighborhoods the lack of parks may deprive children of any access to green space.

When social conditions have an impact on health status, public health experts refer to them as “social determinants,” distinguishing them from individual factors like genetics that shape individual health. Because some differences between neighborhoods align decisively with neighborhood demographics, meaning that children of different income groups or racial and ethnic groups encounter sharply different social determinants, this report provides information that readers can use to understand health inequities in Boston—differences in health status that are systemic, avoidable, and unfair—experienced by different groups within Boston’s child population. Readers can use this information to inform and drive discussion, to promote further research, and to shape program and policy initiatives. Below are summaries of the key findings presented in each chapter of this report.

Chapter I - Who are Boston’s children and families?

This chapter provides demographic and socioeconomic information on Boston’s neighborhoods, providing context for child and family health indicators presented in subsequent sections.

Boston’s Child Population: Basic Demographics

- According to 2010 U.S. Census data, children made up more than 20% of the population in many of Boston’s neighborhoods. The neighborhoods where a high percentage of the population was children were: East Boston, Hyde Park, Mattapan, Roslindale, Roxbury, North Dorchester, and South Dorchester.
- The age distribution of the child population varied by neighborhood. Children ages 15-17 made up much smaller proportions of the child population in the Back Bay and Charlestown than other neighborhoods, for example, while Mattapan and Hyde Park had higher than average proportions of children ages 15-17.
- According to 2010 U.S. Census data, Boston was highly segregated with a little over three-quarters of the population living in census tracts where one racial or ethnic group constituted a majority of residents. Neighborhoods where Black and Latino residents constituted a majority in many census tracts were also neighborhoods where a high percentage of the population was children.
- The majority of people in all Boston neighborhoods lived in homes in which English was the primary language spoken except for East Boston, where the majority of people spoke primarily Spanish or Spanish Creole at home.

Boston’s Child Population: Income and Poverty

- Child poverty status varied widely across Boston, with some neighborhoods having relatively low percentages of children living in poverty, such as Hyde Park with 13% of children living in poverty, and others with more than 40% of children living in poverty (Roxbury, South Boston, and Charlestown).

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- Within Boston neighborhoods, median household income varied widely. Allston/Brighton, Fenway, Mattapan, North Dorchester, and Roxbury all had large areas with median household income lower than Boston as a whole. By contrast, the Back Bay, Charlestown, South Boston, Jamaica Plain, West Roxbury, and Roslindale had large areas where the median household income was higher than Boston as a whole.
- Roxbury, North Dorchester, and Mattapan had percentages of single-parent households significantly above the Boston average. These neighborhoods were also among the neighborhoods with the lowest median household income.

Boston's Child Population: Neighborhood Education and Employment

- Adult educational attainment varied sharply across Boston neighborhoods for the years 2008-2012 combined. East Boston had over seven times the percentage of adults ages 25 and over with less than a high school education than the Back Bay.
- Unemployment rates among Boston residents ages 16 and over peaked in 2010 at 12.9% but returned close to 2005 levels in 2012 at 9.6%.
- Unemployment rates for the years 2008-2012 combined were highest in North Dorchester, Mattapan, Roxbury, and South Dorchester.

Chapter II - How do families meet basic needs: what resources are available to families raising children in Boston neighborhoods?

This chapter focuses on housing, food access, health care access, and availability of childcare, preschool and pre-k, and schools, which are all fundamental to children's health and well-being.

Housing

- Over 66% of occupied housing units in Boston were occupied by renters in 2010. Allston/Brighton, Fenway, Roxbury, East Boston, and North Dorchester had multiple census tracts where more than 75% of occupied housing units were renter-occupied.
- The major impact of the 2008-2009 housing crisis was felt most notably in South Dorchester, Hyde Park, Mattapan, and North Dorchester as evidenced by higher rates and numbers of foreclosure petitions than other neighborhoods in Boston, especially at the peak of the crisis in 2008 and 2009.
- Almost half of renter-occupied households in Boston paid 30% or more of gross income in rent for the years 2008-2012 combined.
- In 2012, median rent in Boston was nearly \$1,500 for residents who moved into their unit between 2010 and 2012. This was compared to the national median gross rent in 2011 of \$871.¹
- In Boston from 2010-2013, the percentage of homeless children consistently made up roughly 30% of the total homeless population. The number of Boston homeless children being sheltered in communities outside of Boston increased more than four-fold between 2011 and 2013.

Access to Healthy Foods

- Food pantries and soup kitchens were concentrated in several Boston neighborhoods while others, most notably Charlestown and South Boston, had few safety-net food resources.

¹ Flanagan, C. & Schwartz, M. (2013, April). Rental Housing Market Condition Measures: A Comparison of U.S. Metropolitan Areas from 2009 to 2011. Retrieved from <http://www.census.gov/prod/2013pubs/acsbr11-07.pdf>

- Many Boston neighborhoods, including East Boston, Mattapan, and portions of North and South Dorchester, lacked convenient access to full-size grocery stores. Just over 60% of Boston households had access to a vehicle for the years 2008-2012 combined. Neighborhoods with lower vehicle access tended to have a greater supermarket presence.
- Every neighborhood in Boston had at least one farmers' market in 2013, most of which accepted SNAP benefits (food stamps).

Access to Health Care

- Approximately 50% of insured Boston children were covered by MassHealth, the Medicaid program for Massachusetts. East Boston, North Dorchester, and Mattapan had MassHealth enrollment rates for children that were significantly higher than Boston overall.
- Boston's extensive network of community health centers provides pediatric primary and behavioral health care in most neighborhoods. Fenway, Hyde Park, and West Roxbury are the only neighborhoods without community health centers that provided pediatric primary or behavioral health care.
- The Health Care and Social Assistance Sector was the largest employer in Boston in 2011. 18.0% of Boston residents were employed in this industry in and outside of Boston in 2008-2012 combined. Residents of Roxbury, North Dorchester, and neighborhoods to their south were employed within the Health Care and Social Assistance Sector at a significantly higher rate than neighborhoods north of Roxbury and North Dorchester.

Access to Childcare and Schools

- Licensed childcare providers were found throughout Boston but were especially concentrated in areas with high child population density. Publicly-funded preschool programs—Head Start or pre-kindergarten located at public schools—were primarily concentrated in neighborhoods with higher percentages of Black and Latino children.
- The capacity of the city's childcare resources varied across Boston. Mattapan, Roxbury, Fenway, and the South End had between 77 and 90 slots per 100 children ages 0-4, whereas East Boston, Charlestown, Hyde Park, and North Dorchester had 48 or fewer slots per 100 children ages 0-4.
- Boston families had access to afterschool programs run by the Boston Public Schools, the Boston Public Library, and community organizations. These programs were concentrated in neighborhoods with high child populations, including East Boston, Roxbury, and North Dorchester.

Chapter III - What environmental factors pose risks to children?

This chapter presents data on aspects of the psychosocial and physical environments that may expose children to risks that impact child development, health, and well-being.

Risks in the Psychosocial Environment

- Boston experienced approximately 83 violent crimes per 10,000 residents in 2011. However, the number of violent crimes varied not only by neighborhood but also by census tract. Parts of North Dorchester, Roxbury, and the South End, for example, experienced fewer violent crimes than the Boston average while other census tracts in the same neighborhoods were well above the Boston average.

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- In 2011, there were 63 homicides reported in Boston. These deaths were concentrated in Roxbury, North Dorchester, South Dorchester, and Mattapan, which were neighborhoods where a high percentage of the population was children. These neighborhoods also had higher rates of unemployment and higher percentages of adults with less than a high school education than Boston overall.
- Property crime rates in 2011 were highest in the Back Bay, Fenway, and the South End, most likely reflecting higher rates of commercial burglary.
- The rates of substantiated child maltreatment in Boston were higher in North Dorchester, Roxbury, and South Dorchester than in other neighborhoods.
- Increased presence of liquor stores exposes children and adolescents to greater risk of underage drinking and child maltreatment. South Boston, Roslindale, and the Back Bay included census tracts with the most liquor stores per capita.

Risks in the Physical Environment

- Children in many neighborhoods of Boston, including Charlestown, the Back Bay, the South End, and Allston/Brighton, were exposed to both air and noise pollution from roadways that had more than 50,000 vehicles per day on average.
- According to the Logan Airport Health Study released in 2014 by the Massachusetts Department of Public Health, exposures to air pollution from Boston Logan Airport-related operations were greatest in East Boston, followed by Charlestown, the Back Bay, the South End, and South Boston.
- Oil and/or hazardous material sites were concentrated in pockets of Roxbury and South Boston. The majority of all sites had been remediated by 2014 and no longer posed a significant risk to human health.

Child Mortality

- As is typical in the U.S., child mortality rates were relatively low in Boston compared to adult mortality rates. Again, as is typical, mortality rates were highest in the first year of life. For age groups less than 1 year and 10-17 years, child mortality rates were more than twice as high among Boston's Black children as among any other racial or ethnic group.

Chapter IV - What environmental factors contribute to community quality of life?

This chapter presents data describing aspects of children's environments that contribute to quality of life, including opportunities for physical activity.

Community Connectivity

- Community connectivity, the ease of reaching destinations within a community, can increase the likelihood that residents will walk or bike to destinations. Most census tracts in Boston were highly ranked for number of intersections per square mile, with several neighborhoods, particularly those north of Roslindale and Mattapan, having the highest ranking based on criteria from the U.S. Environmental Protection Agency.
- In Boston, open space accounted for over 13% of total land in 2012, compared to less than 10% in cities nationally. While Boston did have many parks, the amount of open space varied widely between neighborhoods. For example, more than one quarter of Hyde Park's land area was devoted to open space while less than 5% of the land area of the South End, Roslindale, Mattapan, and Charlestown was devoted to open space.

- Street trees – trees planted in and around public walkways and roadways – play an important role in improving neighborhood aesthetics and providing a barrier between sidewalks and roads. Based on data from 2007, street trees in Boston were concentrated in the Back Bay, Fenway, and the South End.

Access to Places for Physical Activity and Community Resources

- Roughly half of Boston families with children were in walking distance to a community center, YMCA, or Boys and Girls Club. Charlestown, the South End, and South Boston had the highest percentage of families with children in walking distance to a community center, YMCA, or Boys and Girls Club.
- Access to community programs is especially important for children with special health care needs. Lack of programs for this population leaves families with children with special health care needs in Roslindale, Mattapan, South Dorchester, and East Boston with few nearby options to address their children's physical activity, social, and other developmental needs.

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Data Sources and Methods

The Health of Boston's Children: Child Health Assessment Mapping Project (CHAMP) uses data from multiple sources to provide a breadth of information about child health across the city. Below is a list of data sources, which are also included below individual figures throughout this report. Depending on the nature of the data and the source, data were sent directly to Boston Public Health Commission (BPHC) staff for analysis and use in this report, gathered by BPHC staff from online searchable databases, or downloaded from sources that have made certain data widely available or available to partnering agencies and organizations.

Data Sources

American Community Survey, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, U.S. Census Bureau
Archdiocese of Boston
Association of Independent Schools in New England
Boston After School & Beyond
Boston Police Department
Boston Public Health Commission
Boston Public Library
Boston Public Schools
Boston Redevelopment Authority
Boston Survey of Children's Health
Decennial Census 2010, U.S. Census Bureau
Department of Innovation and Technology, City of Boston
Department of Neighborhood Development, City of Boston
Emergency Shelter Commission, Boston Public Health Commission
Eunice Kennedy Shriver Center at the University of Massachusetts
Family TIES of Massachusetts Publication: "Directory of Resources for Families of Children and Youth with Special Needs"
Massachusetts Alcoholic Beverages Control Commission
Massachusetts Charter Public School Association
Massachusetts Department of Children and Families
Massachusetts Department of Conservation and Recreation
Massachusetts Department of Early Education and Care
Massachusetts Department of Environmental Protection
Massachusetts Department of Public Health
Massachusetts League of Community Health Centers
MassGIS
Massachusetts Port Authority
National Parochial School Association
New England Association of Schools and Colleges

Nutrition Environment Measures Survey in Stores

Chapter II of this report presents data from a community assessment that was completed during the summer of 2012 in three Boston neighborhoods, Mission Hill, Dudley Square, and Grove Hall, using the Nutrition Environment Measures Survey in Stores (NEMS-S). The NEMS-S uses 10 measures to assess the cost and availability of healthy food products (such as milk, fresh fruits and vegetables, and whole grain bread) and has been demonstrated to have a high degree of reliability in showing differences across

neighborhoods.¹ The NEMS-S is available at <http://appliedresearch.cancer.gov/mfe/instruments/glanz-nutrition-environment-measures-survey-in>.

Oil and/or Hazardous Material Sites

To create Figure 3.8 we used data provided by the Massachusetts Department of Environmental Protection (MDEP) on all suspected and confirmed oil and/or hazardous sites in Boston. In consultation with MDEP, the dataset was narrowed according to level of risk posed to the public. Sites that were contaminated with oil and/or hazardous material above a level of non-significant risk are included in the Figure. Compliance codes designated by MDEP were used to categorize included sites: Tier 1 sites are those which historically posed an imminent hazard requiring immediate response, while those we identify as Tier 2 sites had not been fully evaluated or remediated and were classified as “Further assessment and cleanup required”. Those designated “Response Action Outcome” sites had been temporarily cleaned and were to be monitored every five years until a more permanent solution was achieved; they are classified as “No substantial hazard but monitoring required”. All sites with Activity Use Limitations were included in the figure regardless of their compliance status and were classified as “No significant risk with activity and use limitation”. Sites with all other compliance codes were omitted.

¹ Cavanaugh, E., Mallya, G., Brensinger, C., Tierney, A., Glanz, K. (2013) Nutrition Environments in Corner Stores in Philadelphia. *Preventive Medicine*, 56 (2):149-151.

Notes to Readers

This section is a compilation of answers to questions readers may have as they review this report.

What is the difference between census data and survey data?

A census is a count of all events that occur in a population and, therefore, represents the true frequency of events rather than an estimate. Survey data used to generate population estimates, on the other hand, are collected by gathering information from a randomly selected subset, or sample, of the population. This information is then statistically adjusted to generate an estimate of the true frequency within the general population. Collecting survey data is common because it is less resource-intensive than collecting complete and accurate census data. An example of census data presented in this report is the U.S. decennial census, while an example of survey data is the American Community Survey. In most cases where American Community Survey data is presented in this report, data is combined across multiple years to generate greater sample size and statistical reliability.

Projecting statistical estimates from survey data onto an entire population requires acknowledging a degree of uncertainty about how well the sample data reflects the true frequency of events or characteristics of the entire population. This degree of uncertainty is often quantified and referred to as the “margin of error” and described with a “confidence interval” in order to emphasize that the true frequency exists within a range of values. In this report, confidence intervals with 95% certainty are reported.

When using survey data, how do statisticians decide if there is a real difference between two populations?

As introduced in the previous question’s answer, survey data drawn from a randomly selected subset, or sample, of the population are used to generate point estimates, or percentages, for the population.

Confidence intervals present a range of values around the point estimate that describe how precise the point estimate is. To determine whether two point estimates differ significantly from each other, the confidence intervals surrounding each estimate can be compared. If the confidence intervals overlap, then we cannot say with 95% certainty that the two estimates differ significantly. If the confidence intervals do not overlap, then we can say with 95% certainty that one estimate is higher or lower than the other. This determination is often referred to as “statistical significance”. In this report, when the text refers to estimates as “higher” or “lower” than each other, it means that these estimates are statistically different from each other with 95% certainty. When the text refers to estimates as “similar” or with no difference, it means that the estimates are not found to be statistically different from each other with 95% certainty.

Making a determination about whether these differences are important, or meaningful, includes interpreting the social context in which this data is collected and accounting for changes in how data are categorized or reported as well as city or statewide programs that may have affected the occurrence of events.

As a note, in some cases where confidence intervals slightly overlap, other statistical tests that are not used for this report could demonstrate statistically significant differences.

What does the term “data insufficient for analysis” mean?

For survey data, the phrase “data insufficient for analysis” is used in various map legends and notes beneath tables in the report when the stratification of survey data by population groups results in a sample size that is too small to calculate reliable point estimates.

How do we determine racial and ethnic designations?

All racial and ethnic designations in this report are self-reported and presented according to U.S. Census Bureau definitions. Several cautions should be kept in mind when using data reported by race and ethnicity. Race and ethnicity are social constructions, not biological facts. There is often more genetic variation between people who define themselves as members of the same race than between members of different races. In addition, the meanings of these designations are highly subject to historical, cultural, and political forces. Not only do these designations change over time, but there is also a very subjective element that influences who is considered a member of one group or another. For example, the term “Black” includes people describing themselves as African American, African, or Caribbean, groups with distinct histories and differing health risks.

Nevertheless, racial designations are useful in that they are nearly universally used by people in the United States to describe themselves, and they allow us to identify and address health inequities that exist across racial and ethnic groups.

Since Latinos can be of any race, the U.S. Census Bureau and other data sources often report Latinos within the race categories. However, because Latino residents represent a large percentage of the general population and may face many of the challenges associated with racial distinctions, in this report Latino respondents are separated from other racial and ethnic groups and included as their own category, which is consistent with commonly accepted federal standards.

How do we define neighborhood boundaries in this report?

Boston is made up of 17 neighborhoods, which include Allston/Brighton, the Back Bay, Charlestown, Chinatown, East Boston, Fenway, Hyde Park, Jamaica Plain, Mattapan, North Dorchester, the North End, Roslindale, Roxbury, South Boston, South Dorchester, the South End, and West Roxbury. In this report, Chinatown is included as part of the South End, and Beacon Hill, Downtown, the North End, and the West End are included as part of the Back Bay. Each of Boston’s neighborhoods is distinct in its history, character, and demographics.

Neighborhood boundaries can be defined in a number of ways. In this report, census tracts are generally used to identify neighborhood boundaries, as most of the population-level data presented are from the U.S. Census Bureau. Where data were only available at the zip code level, such as Figure 3.4 (Prevalence of Child Maltreatment Cases by Neighborhood, Boston, 2012), this is noted beneath the figure.

BOSTON NEIGHBORHOOD ABBREVIATIONS KEY: A/B=Allston/Brighton, BB=the Back Bay (includes Beacon Hill, Downtown, the North End, and the West End), CH=Charlestown, EB=East Boston, FW=Fenway, HP=Hyde Park, JP=Jamaica Plain, MT=Mattapan, ND=North Dorchester, RS=Roslindale, RX=Roxbury, SB=South Boston, SD=South Dorchester, SE=the South End (includes Chinatown), and WR=West Roxbury

How do we define poverty?

The poverty definition used for data presented in poverty-related charts in this report is that of the U.S. Census Bureau. Poverty estimates for Boston neighborhoods are derived from the American Community Survey.

The U.S. Census Bureau’s definition of poverty is characterized by a series of “poverty thresholds” which specify pre-tax monetary income maximums in dollars an individual or family can earn in a given year

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and still be declared in poverty. This definition is based on same household of residence and takes into account family size and whether or not any members are over age 65. It also takes into account the number of children under age 18. It does not include any income that may have been generated through federal financial assistance programs, capital gains, or from children under age 15. Foster children are not included in the calculations.

Since 1969, poverty thresholds have been modified to account for inflation according to rates specified by the Consumer Price Index. Poverty thresholds are not adjusted for regional differences in income. Poverty status is not defined for the following persons and, therefore, these persons are excluded from poverty calculations: unrelated individuals living in a household who are under age 15, people living in college dormitories, and people living in institutional group quarters (e.g., correctional facilities, nursing facilities/skilled nursing facilities, in-patient hospice facilities, group homes for juveniles).

What is the Boston Survey of Children's Health?

In the text of this report you will see references to the Boston Survey of Children's Health (BSCH). The BSCH was a random-digit-dial phone survey of adult parents and caregivers of children ages 0-17 conducted by the Boston Public Health Commission. The survey was implemented from April 2012 through October 2012. The survey questionnaire and methodology were modeled after the National Survey of Children's Health (NSCH) to allow for comparison with national and Massachusetts data. The BSCH was developed by integrating the 2011-2012 NSCH questionnaire with additional questions identified by key stakeholders.

Additional information and selected findings from the BSCH can be found in the first report of the Health of Boston's Children series, *Health of Boston's Children: Parent and Caregiver Perspectives*, available online at www.bphc.org.



Who are Boston's children and families?

Chapter 1 Where families and children live within Boston, as within other cities, largely aligns with their race or ethnicity and their socioeconomic status. Where families live largely determines how well the environment supports the health of their children. Chapter 1 of the Child Health Assessment Mapping Project (CHAMP) report focuses on the demographic and socioeconomic characteristics of Boston's neighborhoods, providing context for the child and family health indicators presented and discussed in subsequent chapters of the report. Section 1 provides basic statistics on the child population and demographic breakdown by neighborhood. The second section focuses on income and poverty among children and families in Boston, and the third section presents data on education and employment.

Boston's Child Population

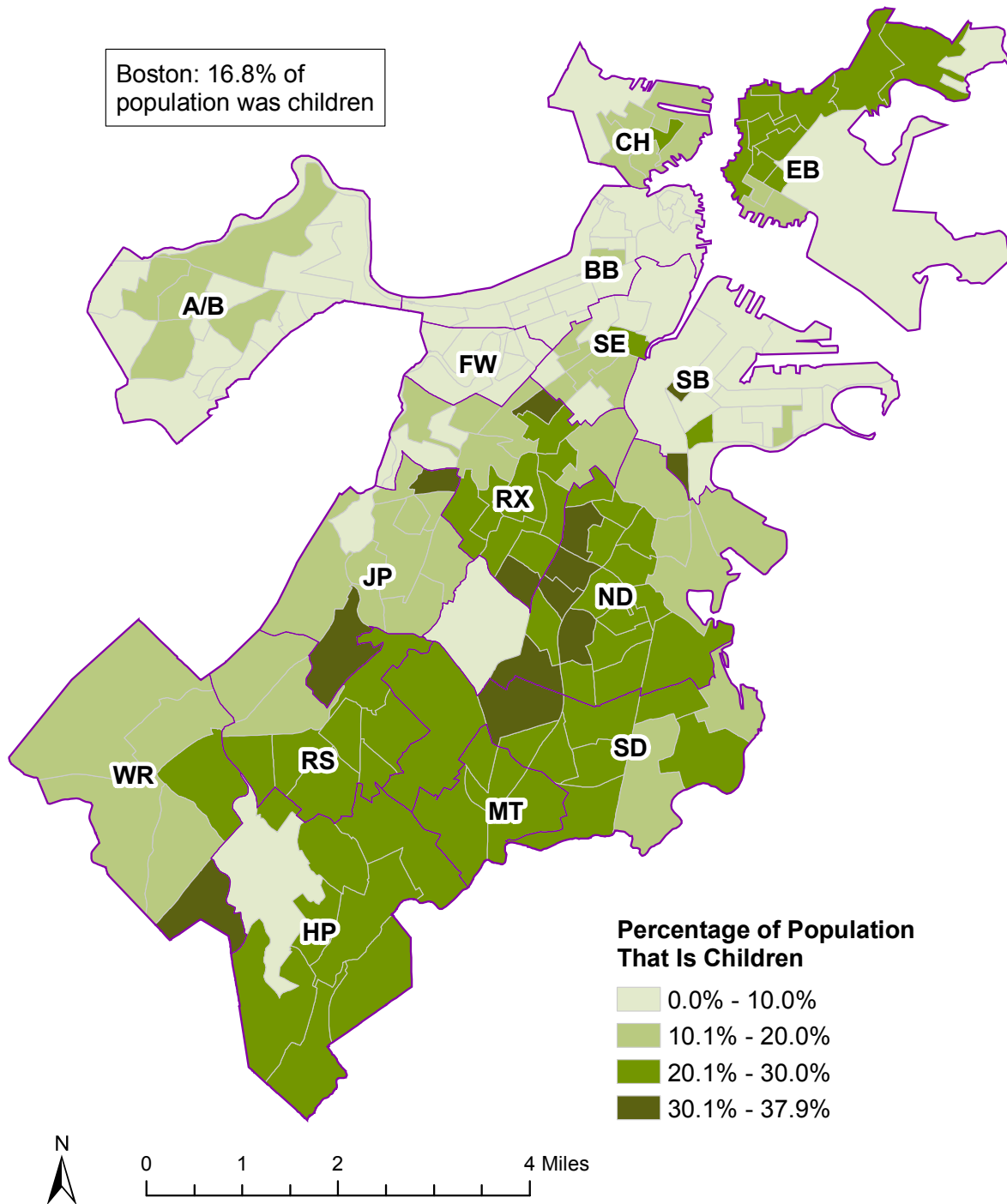
This section presents basic demographic information on child residents of Boston neighborhoods: how many there are, how old they are, and what proportion of the total population they comprise, then follows with data on race, ethnicity, and languages spoken across Boston neighborhoods. In combination with the subsequent sections on income, poverty and on education and employment, it is intended to provide context for data presented throughout the report.

Figure 1.1 illustrates what percentage of the population is children in Boston's neighborhoods. In North Dorchester, South Dorchester, Roxbury, Mattapan, Roslindale, Hyde Park, and East Boston during 2010, most census tracts included a child population of at least 20%. Figures 1.2 and 1.3 present the age distribution of children in each Boston neighborhood and the average age of children by neighborhood. Based on 2010 Census data some neighborhoods, most notably the Back Bay, Charlestown, and the South End, were home primarily to very young children, while Hyde Park, Roxbury, Mattapan, and North and South Dorchester had higher proportions of older children. Neighborhoods with higher proportions of older children may reflect in-migration of older children from outside of Boston, a lower percentage of families leaving as children reach school age, or both. As subsequent sections indicate, the neighborhoods with higher proportions of older children tend to be those with high proportions of low-income families and families of color.

Figure 1.4 presents data on the racial and ethnic makeup of the child population in each Boston neighborhood in 2010. It is worth noting that this may differ from the racial and ethnic makeup of neighborhood populations as a whole. Some neighborhoods may have higher percentages of White residents among the elderly, for example, making the overall neighborhood profile different from that of children. In 2010, eight of Boston's 15 neighborhoods had more than 50% of children of a single racial or ethnic group, indicating a high level of segregation among families raising children. Figure 1.5 presents areas of racial and ethnic concentrations among all Boston residents at the census tract level.

Figures 1.6 and 1.7 address the languages spoken by families raising children in Boston neighborhoods. Growing up in a household in which parents have "Limited English Proficiency" (LEP), an inability to communicate effectively in English because it is not their primary language and they have not yet developed fluency in English [1], or a household which is "linguistically isolated," meaning a home in which no household member ages 14 and over speaks English well [2], are associated with lack of insurance coverage and less access to and use of needed medical care [3, 4]. In Boston, the majority of individuals live in homes in which English is the primary language; however, some neighborhoods have higher proportions of Spanish-, Chinese-, and French-Creole-speaking and/or linguistically isolated households than others. East Boston is the neighborhood with the highest percentage of linguistically isolated households in Boston.

Figure 1.1 Percentage of Population That Is Children by Census Tract, Boston, 2010



DATA SOURCE: Decennial Census 2010, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 1.2 Age Distribution of Children by Neighborhood, Ages 0-17, Boston, 2010

Neighborhood	Total Children	Ages 0-2		Ages 3-5		Ages 6-8		Ages 9-11		Ages 12-14		Ages 15-17		Percent Difference (Ages 15-17 vs. Ages 0-2)
		#	%	#	%	#	%	#	%	#	%	#	%	
BOSTON	103,710	20,385	20%	17,704	17%	15,843	15%	15,858	15%	15,976	15%	17,944	17%	-12%
Allston/Brighton	5,430	1,443	27%	981	18%	748	14%	714	13%	697	13%	847	16%	-41%
Back Bay*	2,595	923	36%	542	21%	370	14%	292	11%	225	9%	243	9%	-74%
Charlestown	2,685	718	27%	528	20%	431	16%	361	13%	347	13%	300	11%	-58%
East Boston	9,025	1,885	21%	1,768	20%	1,410	16%	1,374	15%	1,192	13%	1,396	15%	-26%
Fenway	804	250	31%	130	16%	98	12%	92	11%	81	10%	153	19%	-39%
Hyde Park	8,131	1,241	15%	1,282	16%	1,235	15%	1,369	17%	1,431	18%	1,573	19%	27%
Jamaica Plain	5,036	1,210	24%	885	18%	758	15%	703	14%	728	14%	752	15%	-38%
Mattapan	4,550	704	15%	705	15%	705	15%	743	16%	792	17%	901	20%	28%
North Dorchester	20,982	3,484	17%	3,383	16%	3,220	15%	3,361	16%	3,501	17%	4,033	19%	16%
Roslindale	6,744	1,276	19%	1,159	17%	1,001	15%	1,080	16%	1,070	16%	1,158	17%	-9%
Roxbury	12,259	2,049	17%	1,995	16%	1,886	15%	1,971	16%	2,025	17%	2,333	19%	14%
South Boston	4,515	966	21%	766	17%	678	15%	671	15%	673	15%	761	17%	-21%
South Dorchester	10,631	1,775	17%	1,719	16%	1,729	16%	1,653	16%	1,765	17%	1,990	19%	12%
South End†	4,512	1,216	27%	783	17%	647	14%	606	13%	620	14%	640	14%	-47%
West Roxbury	5,806	1,241	21%	1,078	19%	927	16%	867	15%	829	14%	864	15%	-30%

* Includes Beacon Hill, Downtown, the North End, and the West End

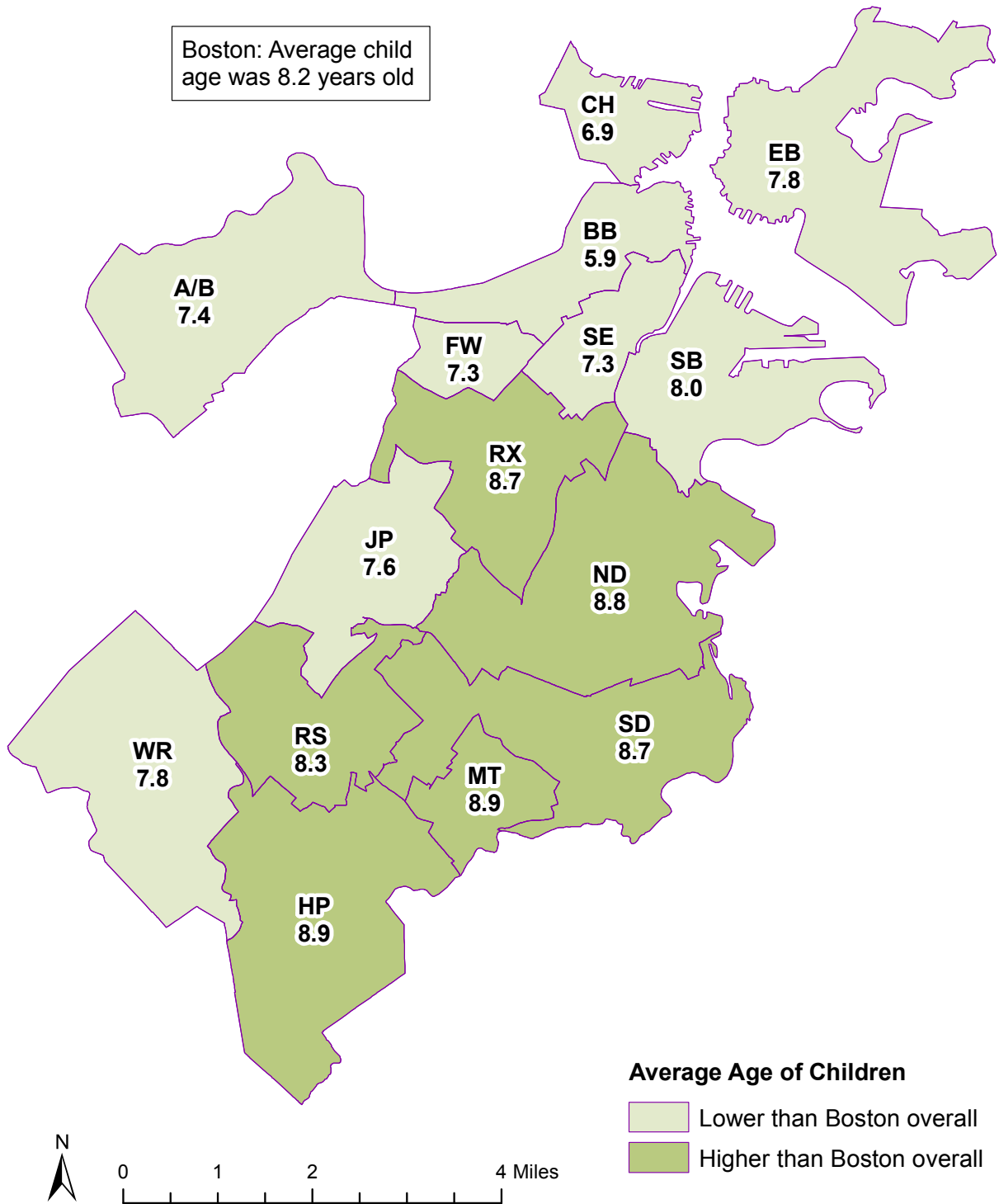
† Includes Chinatown

DATA SOURCE: Decennial Census 2010, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 1.2 shows the age distribution of children living in each of Boston's neighborhoods based on 2010 Census data. The last column compares the proportion of the population in the oldest child group to the proportion in the youngest. In the city as a whole, we see that in 2010, older children made-up 12% less of the population than younger children did, which may imply either a recent influx of families with young children and/or that some families leave the city as their children grow up. In some neighborhoods, notably the Back Bay, Charlestown, and the South End, younger children outnumbered older children. By contrast, Hyde Park, Roxbury, Mattapan, and North and South Dorchester showed higher percentages of older children compared to younger children.

Figure 1.3 Average Age of Children by Neighborhood, Boston, 2010



DATA SOURCE: Decennial Census 2010, U.S. Census Bureau
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 1.4 Child Population by Racial and Ethnic Group and Neighborhood, Ages 0-17, Boston, 2010

Neighborhood	Total Population	Asian		Black		Latino		White		Other Race*		Two or More Races	
		Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
BOSTON	103,710	7,138	6.9%	34,431	33.2%	31,209	30.1%	23,923	23.1%	2,790	2.7%	4,219	4.1%
Allston/Brighton	5,430	983	18.1%	507	9.3%	1,351	24.9%	2,149	39.6%	180	3.3%	260	4.8%
Back Bay†	2,595	184	7.1%	76	2.9%	172	6.6%	2,000	77.1%	27	1.0%	136	5.2%
Charlestown	2,685	271	10.1%	274	10.2%	618	23.0%	1,402	52.2%	37	1.4%	83	3.1%
East Boston	9,025	297	3.3%	333	3.7%	6,039	66.9%	2,033	22.5%	137	1.5%	186	2.1%
Fenway	804	85	10.6%	195	24.3%	269	33.5%	209	26.0%	2	0.2%	44	5.5%
Hyde Park	8,131	119	1.5%	4,094	50.4%	2,304	28.3%	1,188	14.6%	132	1.6%	294	3.6%
Jamaica Plain	5,036	176	3.5%	819	16.3%	2,004	39.8%	1,709	33.9%	53	1.1%	275	5.5%
Mattapan	4,550	16	0.4%	3,466	76.2%	852	18.7%	43	0.9%	36	0.8%	137	3.0%
North Dorchester	20,982	1,842	8.8%	9,521	45.4%	5,528	26.3%	1,524	7.3%	1,460	7.0%	1,107	5.3%
Roslindale	6,744	214	3.2%	1,327	19.7%	2,238	33.2%	2,538	37.6%	91	1.3%	336	5.0%
Roxbury	12,259	335	2.7%	5,992	48.9%	4,907	40.0%	401	3.3%	261	2.1%	363	3.0%
South Boston	4,515	312	6.9%	572	12.7%	1,181	26.2%	2,266	50.2%	50	1.1%	134	3.0%
South Dorchester	10,631	708	6.7%	5,413	50.9%	1,888	17.8%	1,966	18.5%	251	2.4%	405	3.8%
South End‡	4,512	1,140	25.3%	871	19.3%	1,062	23.5%	1,182	26.2%	39	0.9%	218	4.8%
West Roxbury	5,806	455	7.8%	971	16.7%	792	13.6%	3,313	57.1%	34	0.6%	241	4.2%

* Includes American Indians/Alaskan Natives and Some Other Races as defined by the U.S. Census Bureau

† Includes Beacon Hill, Downtown, the North End, and the West End

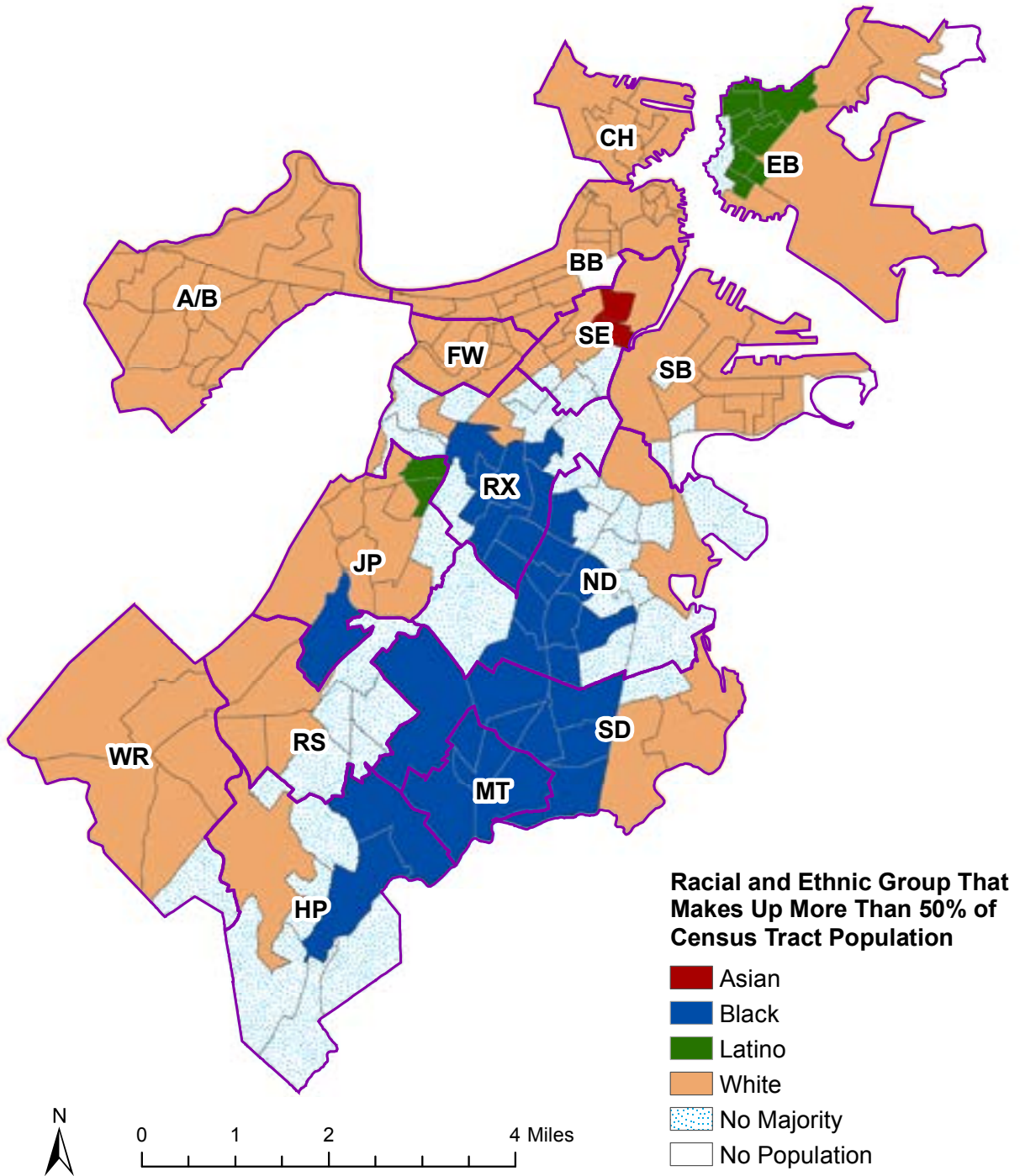
‡ Includes Chinatown

DATA SOURCE: Decennial Census 2010, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 1.4 shows the child population by racial and ethnic group in each of Boston's neighborhoods. Based on 2010 Census data, a majority of children in the Back Bay, Charlestown, and West Roxbury were White; a majority of children in Hyde Park, Mattapan, and South Dorchester were Black; and a substantial majority of children in East Boston were Latino. The South End had the city's most diverse child population, with the percentage of children who were Asian, Black, Latino, or White falling between 19 and 26%. These data do not reflect levels of racial and ethnic segregation within sub-neighborhoods. In several neighborhoods, racial and ethnic populations tended to be clustered in specific communities within the larger neighborhood.

Figure 1.5 Population by Racial and Ethnic Group Concentration by Census Tract, Boston, 2010



DATA SOURCE: Decennial Census 2010, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 1.6 Language Spoken at Home (Individuals Ages 5 and Over) by Neighborhood, Boston, 2008-2012 Combined

Neighborhood	English	Spanish or Spanish Creole	Chinese	French Creole	Portuguese or Portuguese Creole	Vietnamese	French, Patois, or Cajun	Russian	Italian	Arabic	Other Indo-European Languages	Korean	Greek	German	Polish
BOSTON	63.9	15.4	3.9	3.7	1.9	2.0	1.5	0.9	0.8	0.6	0.5	0.4	0.4	0.3	0.3
Allston/Brighton	66.7	8.7	7.4	*	2.3	*	0.9	4.3	0.7	*	*	1.2	*	*	*
Back Bay†	80.2	4.6	3.4	*	*	*	1.9	*	1.6	0.6	*	0.6	0.6	*	*
Charlestown	79.9	7.4	5.6	*	*	*	*	*	*	*	*	*	*	*	*
East Boston	31.5	53.0	1.5	*	2.7	1.6	*	*	4.3	2.0	*	*	*	*	*
Fenway	71.6	6.1	6.2	0.6	1.3	*	1.3	1.5	*	1.1	*	1.8	*	0.8	*
Hyde Park	60.4	17.6	*	13.5	*	*	*	*	1.4	*	*	*	*	*	*
Jamaica Plain	65.6	21.2	2.1	*	*	*	1.9	*	*	*	*	*	*	*	*
Mattapan	62.4	11.9	*	17.9	*	*	4.9	*	*	*	*	*	*	*	*
North Dorchester	51.2	18.0	1.3	8.4	5.5	9.0	1.3	*	*	*	0.8	*	*	*	0.8
Roslindale	62.4	19.4	1.1	5.5	*	*	1.0	*	0.9	*	*	*	*	*	*
Roxbury	61.9	21.0	3.0	2.9	1.3	*	0.9	0.6	0.0	*	*	*	*	*	*
South Boston	82.0	7.7	2.6	*	*	*	0.7	*	*	*	*	*	*	*	*
South Dorchester	68.9	11.0	*	5.2	*	6.4	3.0	*	*	*	*	*	*	*	*
South End‡	61.8	9.3	17.2	1.1	*	*	1.3	*	*	*	*	0.7	*	*	*
West Roxbury	73.2	9.3	4.1	1.6	*	*	0.9	*	*	*	*	*	*	*	*

*Insufficient sample size

†Includes Beacon Hill, Downtown, the North End, and the West End

‡Includes Chinatown

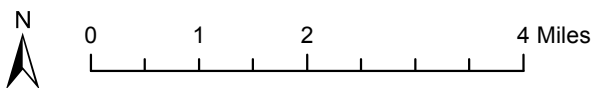
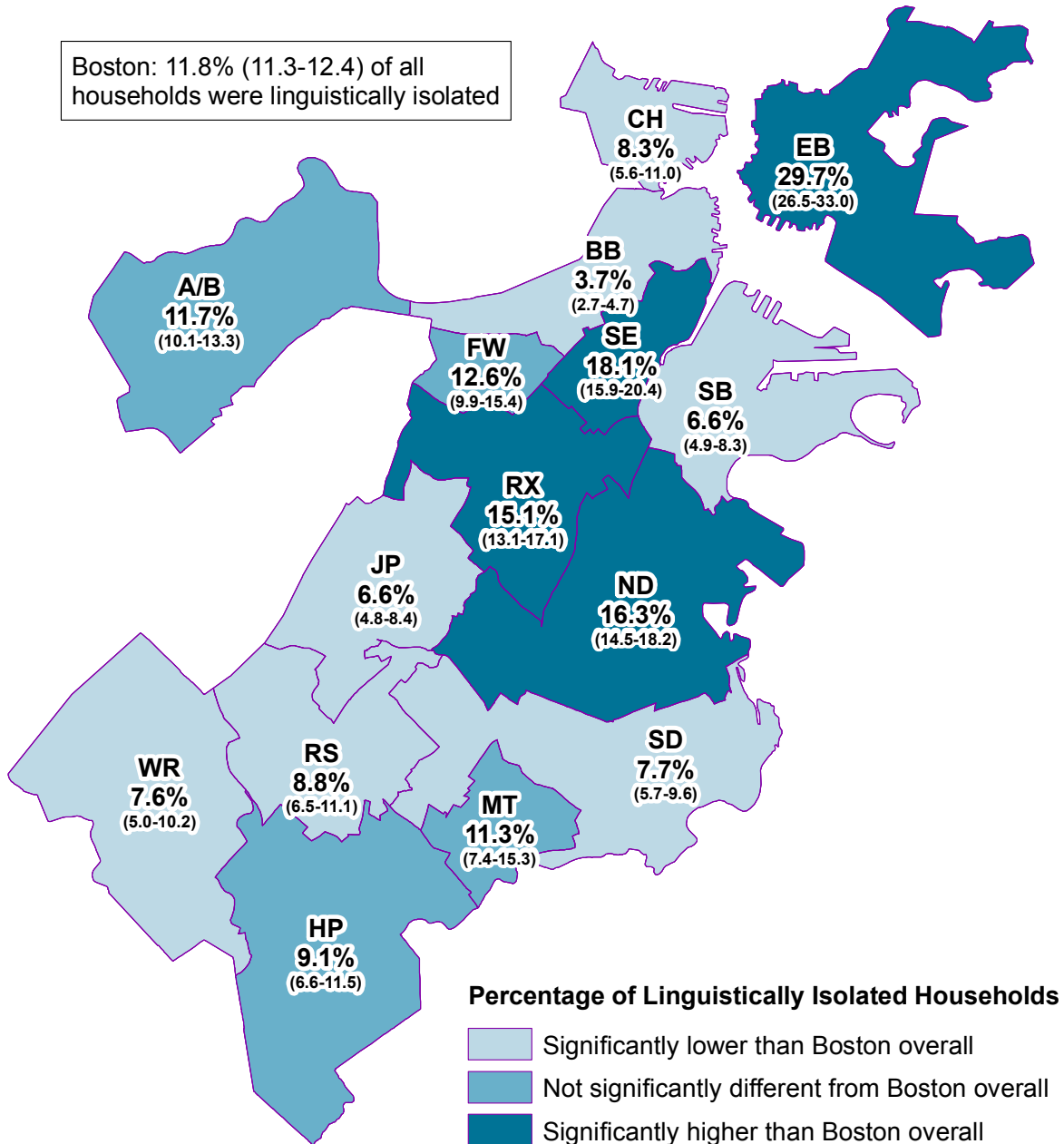
NOTES: This table only specifies the languages spoken by the population with sufficient sample size in the neighborhood.

DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 1.6 shows the distribution of language spoken at home by individuals ages 5 and over. During the years 2008-2012 combined, English was the most common language spoken at home and was the language spoken at home by the majority of individuals in every neighborhood except East Boston.

Figure 1.7 Linguistically Isolated Households* by Neighborhood, Boston, 2008-2012 Combined



* The denominator is all households

NOTE: A linguistically isolated household is defined as a household in which no one in the household ages 14 and over speaks English only or speaks English very well.

DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Income and Poverty

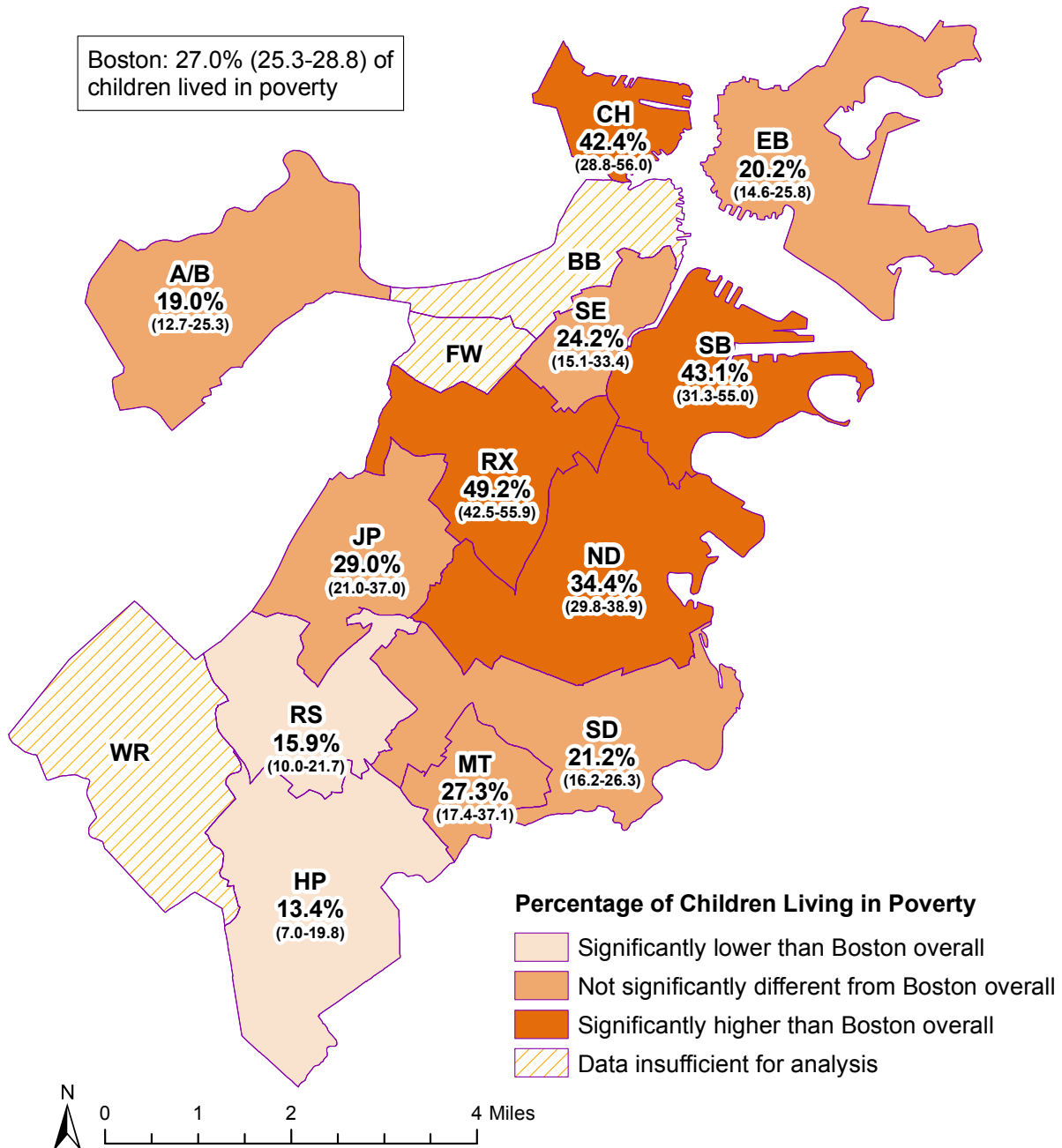
Family income and poverty have a direct impact on a family's health and well-being [5-7]. Low income and poverty are associated with higher incidence of a wide range of medical conditions, including cardiovascular disease [8, 9], diabetes [10], cancer [11], kidney disease [12], and mental health diagnoses [10, 13]. Elevated mortality rates among low-income individuals with a given condition may reflect inequality in the management and treatment of these conditions as well [14, 15]. Children from families with lower income are more likely to be overweight and obese [16-18], be less active [19, 20], have a larger number of school absences [21, 22], and drop out of school [5, 23] than children from families with higher income. The impact of early poverty does not end with childhood. Studies have demonstrated an association between poverty in childhood and adult obesity, psychological distress, and self-reported poor health (24, 25, 26, 27). Figures 1.8 through 1.10 present data on different elements of income and poverty across Boston neighborhoods.

Figure 1.8 presents the percentages of children living below the Federal Poverty Level by neighborhood using data for the years 2008-2012 combined. More than a third of children in South Boston, Charlestown, North Dorchester, and Roxbury lived in families with incomes below the Federal Poverty Level. Child poverty rates could not be calculated for Fenway, the Back Bay, or West Roxbury because the low number of families in poverty in these neighborhoods makes statistical analysis unreliable.

Figure 1.9 looks at a different parameter of income—the median income of families in a community. The median is the income figure in the middle of the population—50% of families have incomes above the median and 50% have incomes below. The story here is slightly different from that told by Figure 1.8, as it would be possible for a community to have very few families living below the Federal Poverty Level, but relatively low median income, if most people in the community had incomes above the Federal Poverty Level but not by too much. The data used in Figure 1.9 are available on a census-tract level, enabling us to look more closely at patterns within neighborhoods. Using data for years 2008-2012 combined, the figure reveals that some neighborhoods with relatively low poverty (e.g., Allston/Brighton) had pockets with very low median income, likely due to the higher concentration of college students in the area, while some neighborhoods with high poverty (e.g., Roxbury), had areas with median income equivalent to Boston as a whole.

Single-parent households, the vast majority of which are led by women, are much more likely to have incomes below the Federal Poverty Level, both because they have only one potential wage earner and because women, on average, earn less than men [28]. Children who grow up in single-parent households are at greater risk of a range of adverse physical and mental health outcomes [28]. Although lower socioeconomic status accounts for a portion of the health disparity for these children, higher rates of adverse health outcomes remain even after controlling for socioeconomic and demographic factors [29]. Figure 1.10 presents the percentage of children living in single-parent families by Boston neighborhood based on data for the years 2008-2012 combined. Some of the more affluent neighborhoods, such as the Back Bay, had rates that were about one-third of the overall rate in Boston, while other neighborhoods had rates well above the city average.

Figure 1.8 Percentage of Children* Living in Poverty by Neighborhood, Boston, 2008-2012 Combined



* The denominator is related children

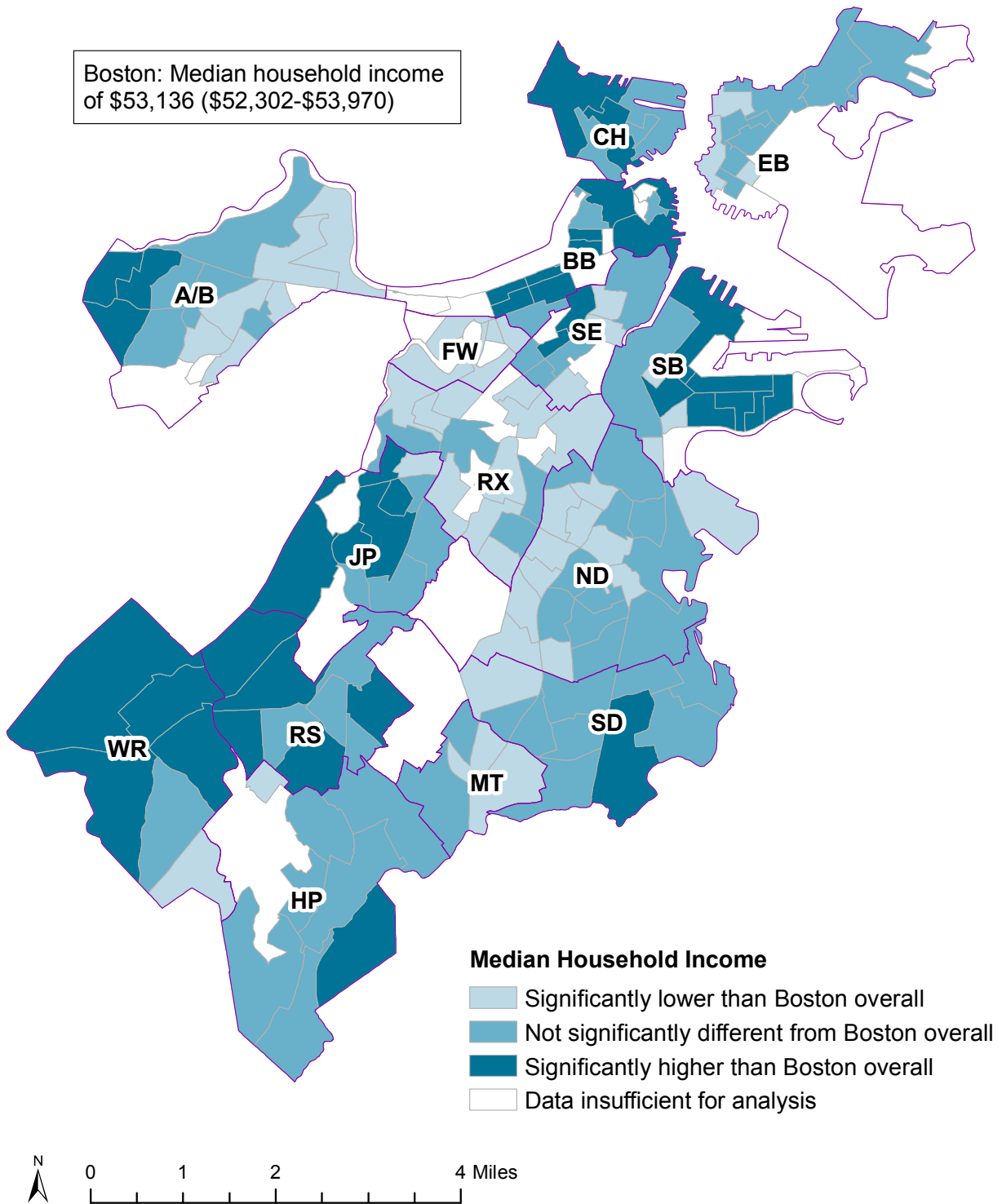
NOTES: "Related children" is a U.S. Census term that includes all children in a household under age 18, regardless of marital status, who are related to the householder. In most cases, a householder is a person in whose name the home is owned, being bought, or rented.

DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 1.9 Median Household Income by Census Tract, Boston, 2008-2012 Combined



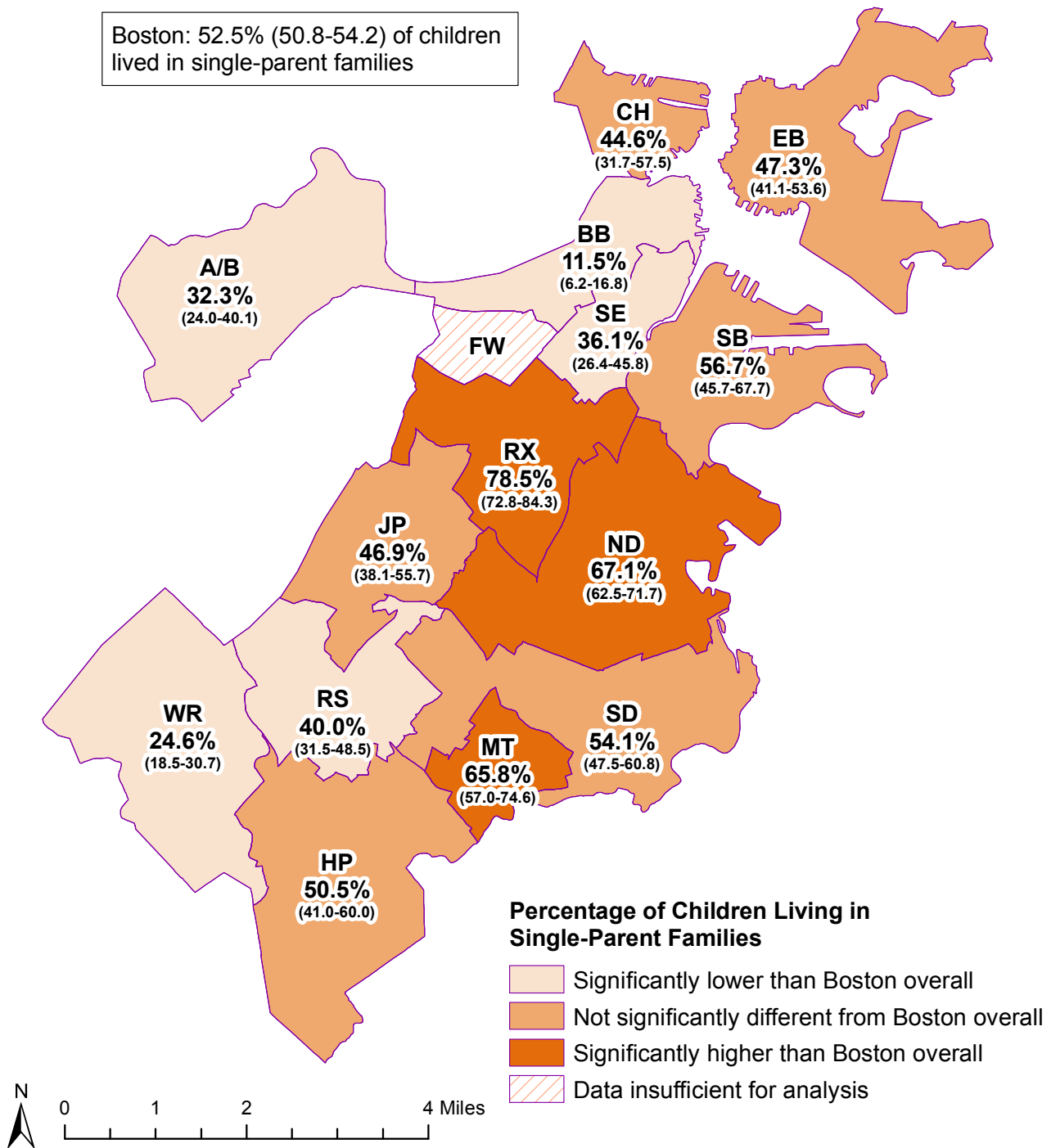
NOTES: Census tracts have been excluded where they include a population of less than 100 people, a population of less than 100 children, or fewer than 40 housing units. Median household income was calculated based on reported household income during the 12 months prior to the survey.

DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 1.10 Percentage of Children* Living in Single-Parent Families by Neighborhood, Boston, 2008-2012 Combined



* The denominator is own children

NOTES: An "own child" is a U.S. Census term for a child under age 18 who is related to the householder by birth, marriage (a stepchild), or adoption and has never been married. In most cases, a householder is a person in whose name the home is owned, being bought, or rented.

DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

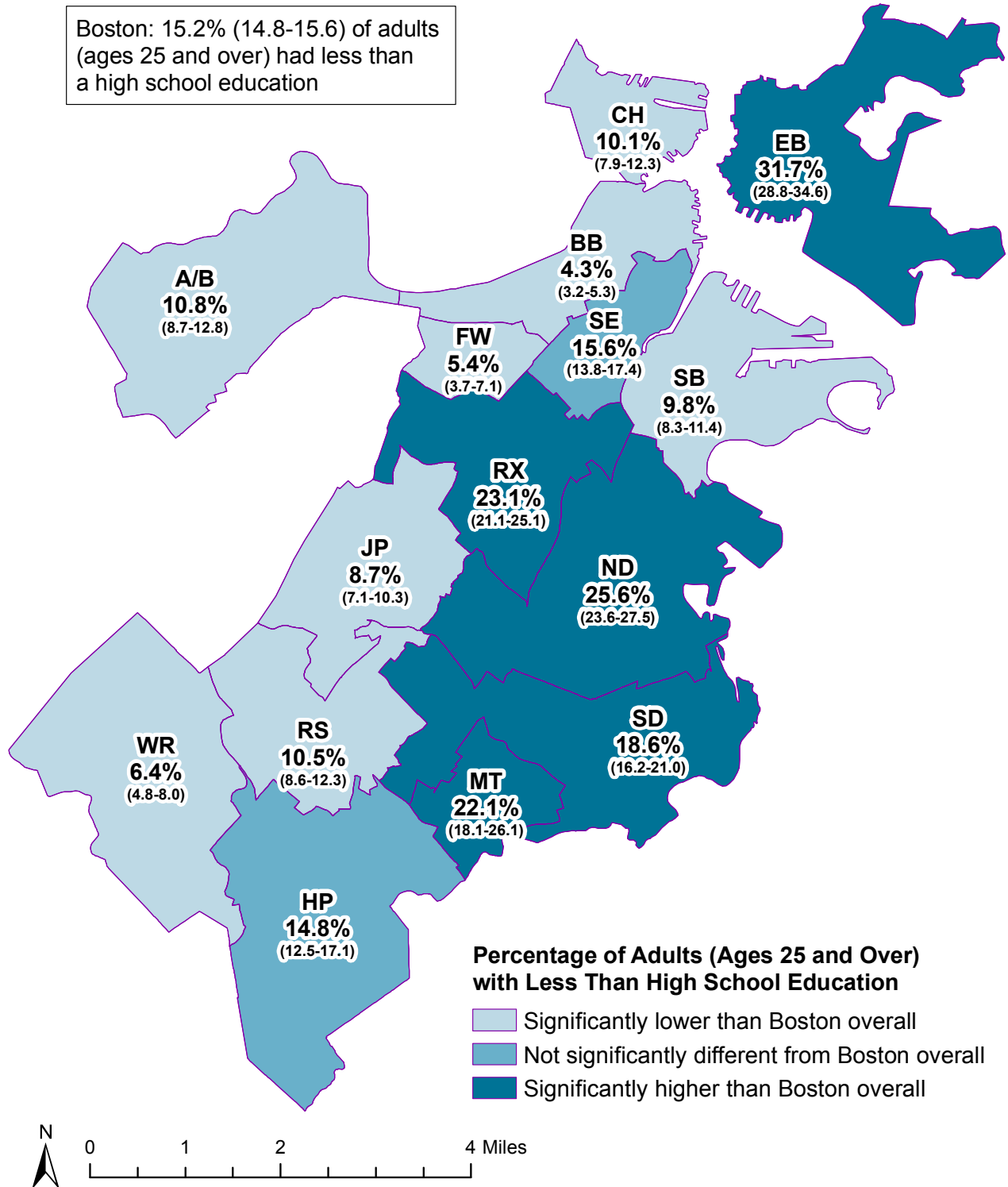
MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Health of Boston's Children

Education and Employment

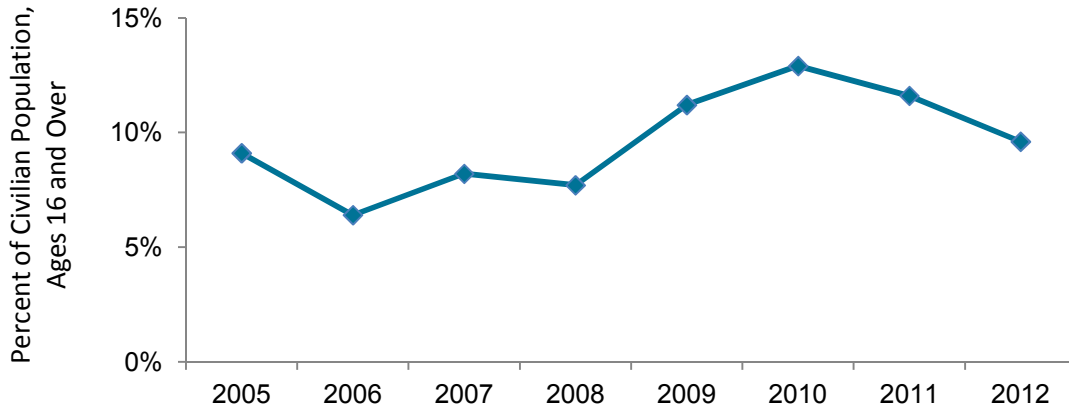
Parent educational level is associated with a child's health status and future educational and occupational status [30, 31]. In part, the impact of a parent's level of education on child health may reflect the relationship between education and both employment options and economic stability [32]. The employment status of parents is related to child health in that parents who are employed have the money to provide children with resources that promote healthy living. Furthermore, unemployment and associated hardship are associated with family stress, which is, in itself, a predictor of long-term adverse health outcomes for children [33, 34]. Figure 1.11 presents the percentage of adults with less than a high school education by Boston neighborhood. For the years 2008-2012 combined, some of the more affluent neighborhoods, such as the Back Bay, had rates that were about one-third the overall rate in Boston, while other neighborhoods had rates well above the city average. Figures 1.12 and 1.13 present the unemployment rate in Boston over time and by Boston neighborhood, respectively. Unemployment rates were highest in Mattapan, Roxbury, and North and South Dorchester for 2008-2012 combined.

Figure 1.11 Percentage of Adults (Ages 25 and Over) with Less Than High School Education by Neighborhood, Boston, 2008-2012 Combined



DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

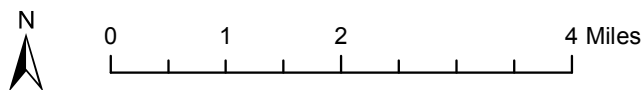
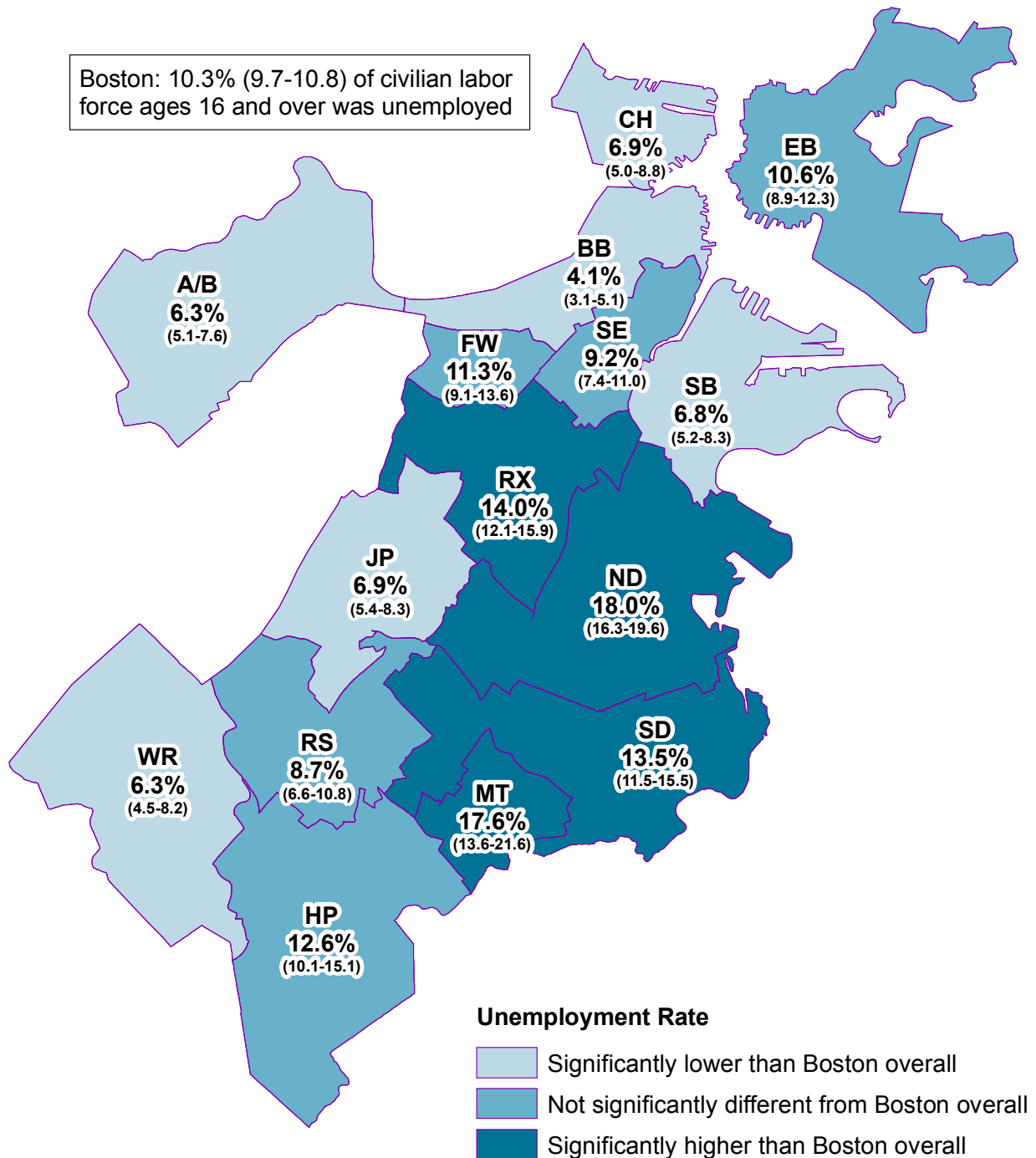
Figure 1.12 Unemployment Rate by Year, Boston, 2005-2012



Year	Unemployment Rate
2005	9.1% (7.9-10.3)
2006	6.4% (5.6-7.2)
2007	8.2% (7.0-9.4)
2008	7.7% (6.6-8.8)
2009	11.2% (9.8-12.6)
2010	12.9% (11.8-14.0)
2011	11.6% (10.4-12.8)
2012	9.6% (8.6-10.6)

DATA SOURCE: American Community Survey, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 1.13 Unemployment Rate by Neighborhood, Boston, 2008-2012 Combined



NOTE: The unemployment rate represents the number of unemployed people as a percentage of the civilian labor force ages 16 and over.

DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

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Who are Boston's children and families?

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How do families meet basic needs: what resources are available to families raising children in Boston neighborhoods?

Chapter 2 In this chapter we look at how families raising children in Boston address basic needs. We focus on housing, food access, health care access, and availability of childcare and schools - all of which are fundamental to children's health and well-being.

Housing

Housing quality and security are critical factors in children's development, their social and emotional health, and their success in school [1]. Housing insecurity, which may be experienced as high housing costs relative to household income, frequent moves due to inability to pay monthly rent or mortgage bills or even eviction, and frank homelessness, are associated with poor health and developmental risk in young children [2, 3]. Housing insecurity and homelessness are associated with increased psychological and emotional distress in families, disruption of parental-child relationships, and impairment of social development in children [4-7]. Homelessness of mothers in particular has also been linked to low birth weight and premature births, even when controlling for use of prenatal care [8]. Poor housing conditions may expose children to air and noise pollution, pests, structural dangers, and lead and other toxic substances. Research ties poor housing quality to increased rates of asthma, allergies, infectious diseases, injuries, and mental health conditions including anxiety and depression [9, 10].

Home ownership, as compared to renting, has been linked to better school performance and lower frequency of behavioral problems in children and to higher levels of personal satisfaction and better overall physical and psychological health in adults [11-14]. Studies do not clearly indicate, however, whether these outcomes reflect some inherent advantage to ownership or the relatively low frequency of moves and longer duration of average residence among families who own and neighborhoods with high levels of home ownership [15-17]. The ownership advantage could also be due to the opportunity to build equity conferred by sustained home ownership. For many families, the home is the principal asset, and as wealth is passed down through generations, home ownership is a channel for social mobility.

A family's ability to own a home or accumulate equity in a home may be limited by poverty and/or discrimination based on race, ethnicity, or other factors. As a result, home ownership and its advantages are not evenly distributed across racial, ethnic, and income groups [18, 19]. Research documents housing inequality among racial and ethnic groups in the United States even after controlling for age, income, education, and immigration status [20]. This inequity has its roots in discriminatory policies in place prior to passage of the Fair Housing Act in 1968, but is maintained at present by inequitable local policies and practices and by the unequal distribution of resources among groups [21]. According to the 2012 Boston Survey of Children's Health, in Boston, almost 78% of White children lived in homes owned by a parent or caregiver compared with about 30% of Black children, 22% of Latino children, and 44% of Asian children at the time of the survey [22]. Figure 2.1 presents the percentage of renter-occupied units by Boston census tract. We provide data at the census tract level to show variations in renter occupancy within neighborhoods. In 2010, South Dorchester, for example, contained some census tracts with fewer than 50% renters while one had more than 75% renters. West Roxbury had much lower percentages of renter-occupied housing units than the city overall. This may have been due to the fact, however, that the majority of housing units in these neighborhoods were single-family houses.

Although owning a home can be a means of accumulating wealth, for many families, homeownership has created enormous and lasting financial burdens. Leading up to the housing crisis of 2008 and 2009, changes in the financial system spurred a large increase in homeownership among low-income households [23]. Low-income or high-risk loan applicants had previously been denied home loans, but once banks and other lending institutions were allowed to charge higher interest rates to reduce their own potential risk, they invested heavily in high-cost loans to low-income borrowers. These subprime mortgages were targeted especially to Black and Latino applicants, including those qualified for regular mortgages, resulting in disproportionate rates of foreclosures among Black and Latino mortgage holders compared with White mortgage holders [21, 24]. Figure 2.2 shows numbers and rates of foreclosure petitions in Boston's neighborhoods from 2008 through 2013. All of Boston was impacted by the foreclosure crisis, but the extent to which different neighborhoods were affected depended on the proportion of the population that matched subprime lending criteria, among other factors.

How do families meet basic needs?

Affordability is also a major struggle for many families who rent their homes, especially in urban areas. A recent study by the Joint Center for Housing Studies of Harvard University found that, in 2011, for the 11.8 million low-income renter households across the United States (defined as households earning less than 30% of median income for their metropolitan area), there were only 6.9 million affordable housing units available at that income cutoff [25]. This was a shortfall of 4.9 million units [25]. As median rent in Boston increases, more and more families are spending above the 30% of household income standard for housing affordability [26]. The more a family spends on rent, the less they are able to spend on food, childcare, health care, utilities, and transportation [27]. Transitional Aid for Families with Dependent Children (TAFDC), the federal program that provides cash assistance to families, is not adequate to fill this gap. Although hardship (defined as difficulty meeting basic needs, such as missing rent or mortgage payments, having utilities cut off, or not seeing a doctor when needed) increased between 2005 and 2011, TAFDC maximum monthly benefit levels in Massachusetts remained stagnant during this time period and into 2013 [28, 29]. Along with the declining dollar value of benefits in the past decade, eligibility rules have tightened in Massachusetts, leaving more of the poorest families with less ability to meet their basic needs [30]. In 2013, TAFDC benefit levels only covered 49.4% of fair-market rent in Massachusetts, having decreased from 66.2% in 2000 [31]. At least one study found that infants and toddlers in families that experienced hardship in the areas of housing, food, and energy security were more likely than children that experienced no hardship to be in fair or poor health and less likely to meet the study definition of child wellness [32].

In addition to the direct effects of lack of affordable housing on child health, low-income renter families are more likely than better-off families to fall behind on rent, be evicted, accept substandard housing, have difficulty locating or be unable to locate suitable housing alternatives, and ultimately experience periods of homelessness [33-35]. As a result, some low-income families may need to move to new communities and communities less central to employment opportunities, schools, and social support [34, 36, 37]. Figure 2.3 presents renter-occupied households paying at least 30% of income towards rent by Boston neighborhood and Figure 2.4 presents median gross rent by the decade the renter moved in to the unit since 1970. In Boston, nearly half of all households spent 30% or more of gross income on rent (Figure 2.3), with median rents costing approximately \$1,500 per month for residents who moved into their units between 2010 and 2012 (Figure 2.4).

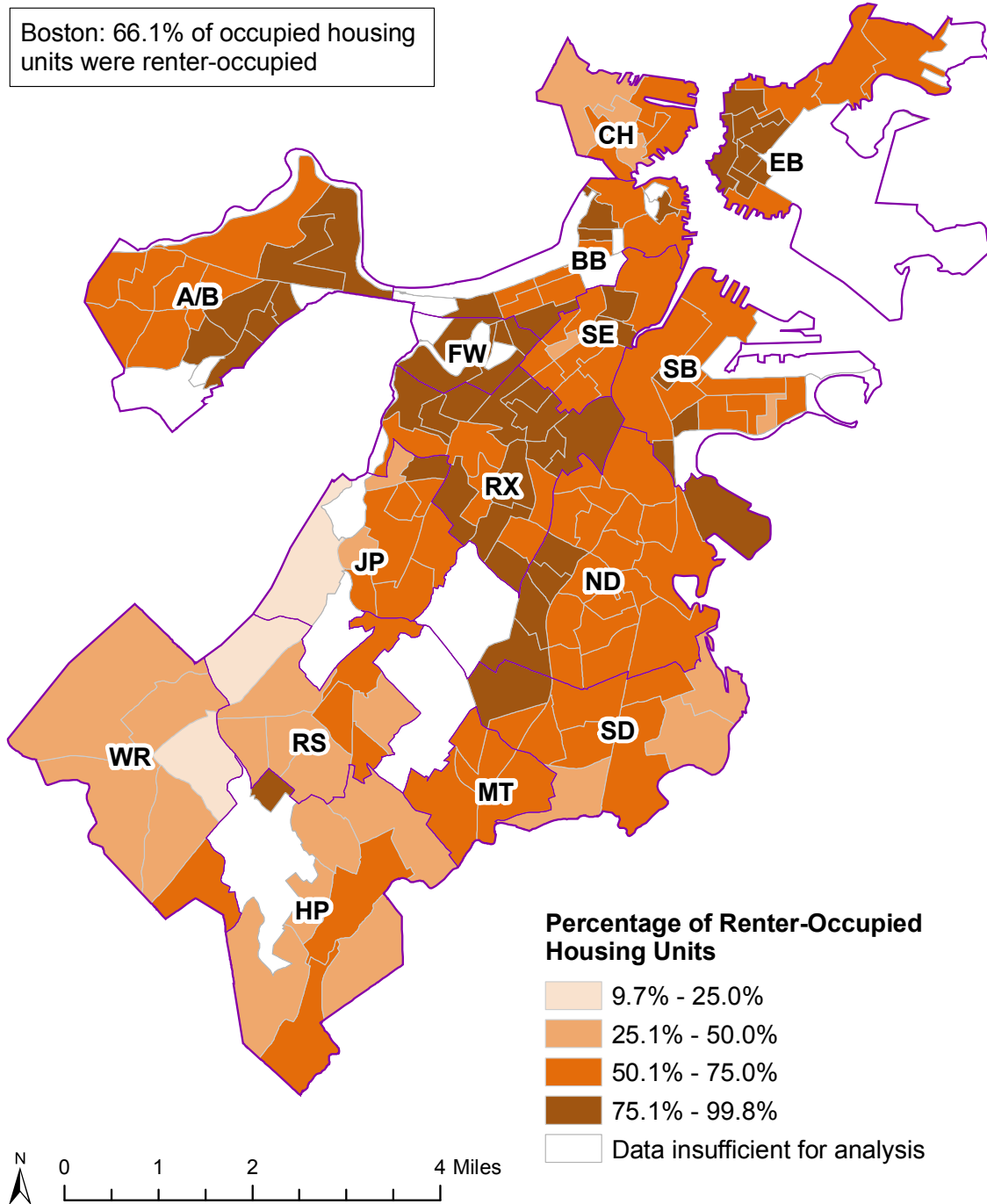
Homelessness and housing instability – whether due to foreclosure, lack of affordable housing, or other causes – affect children’s social and behavioral development [3]. In 2012, 24.4% of children under age 18 in Boston had moved three or more times since birth, and of those who had moved three or more times, a higher percentage were in fair or poor health (as opposed to excellent, very good, or good health) than children with more stable housing histories [22]. Housing insecurity, particularly during the school year, have been associated with greater risk of school failure and behavioral problems, greater likelihood of food and energy insecurity, and increased rates of hospital emergency room visits and hospitalizations in children, with the most dramatic impact among homeless children [3, 38-41].

Families that become homeless in Massachusetts may start out by staying with family or friends, but many ultimately enter the state’s Department of Housing and Community Development Emergency Assistance Shelter Program until they are able to secure subsidized housing units or other more permanent living arrangements [42, 43]. When Emergency Assistance shelters reach capacity, homeless families are housed in motels, often outside of the cities they come from and far from their support networks. The population of homeless children also includes runaway and “throwaway” youth (a term used for youth who are unwanted or rejected by their families), many of whom are marginalized due to racism, homophobia, and abusive family situations [44, 45]. These youth are acutely vulnerable to exploitation, exposure to violence and assault, and death [46]. Because they are transient, often

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unenrolled in school systems, and leery about shelters, traditional services, and adults in general, providing health and social services to them poses special challenges [47]. These same characteristics result in homeless youth being undercounted in needs assessments, further compromising the ability of systems to respond to their needs [47]. Figure 2.5 presents counts of the total number of homeless individuals and homeless children in Boston from 2009 through 2013. Over that period of time, homeless children made up 25% to 30% of the total homeless population in Boston. Figure 2.6 presents counts of homeless children sheltered in Boston and children whose last residence was Boston who were sheltered outside the city from 2009 through 2013.

**Figure 2.1 Renter-Occupied Housing Units*
by Census Tract, Boston, 2010**



* The denominator is total occupied housing units

NOTE: Census tracts have been excluded where they include a population of less than 100 people, a population of less than 100 children, or fewer than 40 housing units.

DATA SOURCE: Decennial Census 2010, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.2 Foreclosure Petitions by Neighborhood, Boston, 2008-2013

Neighborhood	2008		2009		2010		2011		2012		2013		Total Foreclosure Petitions	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
BOSTON	1,899	1.7%	2,172	1.9%	1,541	1.3%	732	0.6%	890	0.7%	232	0.2%	7,466	
Allston/Brighton	60	0.5%	93	0.7%	67	0.5%	29	0.2%	31	0.2%	7	0.1%	287	
Back Bay*	36	0.3%	50	0.5%	51	0.5%	17	0.2%	37	0.3%	5	0.0%	196	
Charlestown	26	0.6%	22	0.5%	25	0.5%	10	0.2%	11	0.2%	1	0.0%	95	
East Boston	185	3.3%	164	2.9%	113	2.0%	53	0.9%	61	1.1%	14	0.2%	590	
Fenway	9	0.2%	23	0.4%	20	0.4%	10	0.2%	13	0.2%	2	0.0%	77	
Hyde Park	156	2.6%	189	3.1%	140	2.3%	81	1.3%	103	1.7%	32	0.4%	701	
Jamaica Plain	70	0.9%	92	1.2%	75	0.9%	23	0.3%	29	0.4%	9	0.1%	298	
Mattapan	183	3.9%	196	4.2%	132	2.8%	72	1.5%	90	1.9%	26	0.7%	699	
North Dorchester	276	3.7%	324	4.3%	212	2.8%	92	1.2%	108	1.4%	24	0.3%	1,036	
Rosindale	108	3.1%	149	4.2%	96	2.6%	53	1.4%	58	1.5%	13	0.3%	477	
Roxbury	155	2.1%	137	2.0%	91	1.3%	63	0.9%	54	0.8%	12	0.2%	512	
South Boston	97	2.3%	93	2.2%	86	2.0%	34	0.8%	45	1.1%	8	0.2%	363	
South Dorchester	462	5.5%	531	6.1%	324	3.6%	141	1.5%	177	1.9%	55	0.6%	1,690	
South End†	22	0.2%	40	0.3%	43	0.3%	18	0.1%	23	0.2%	7	0.1%	153	
West Roxbury	54	0.9%	69	1.1%	66	1.0%	36	0.6%	50	0.8%	17	0.3%	292	

* Includes Beacon Hill, Downtown, the North End, and the West End

† Includes Chinatown

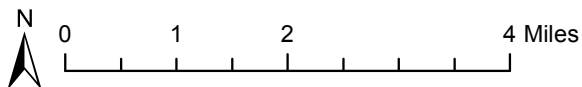
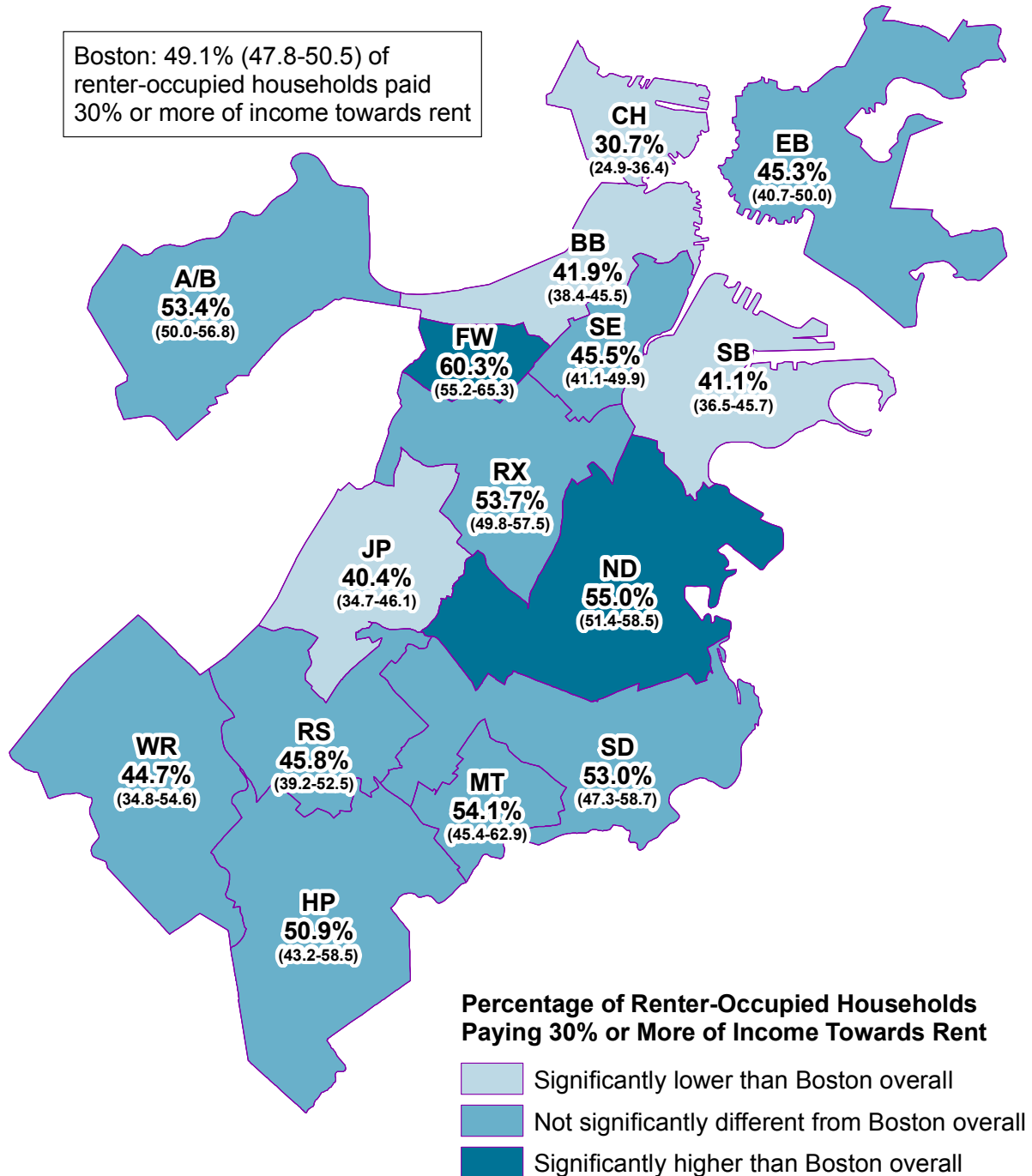
NOTES: The neighborhood definitions are based on zip codes. Rates are the number of foreclosure petitions for single-family homes, condominiums, and 2-3 unit apartment buildings in each neighborhood divided by the total number of residential properties. A residential property is a single-family home, condominium, or a 2-3 unit apartment building. Residential properties with 4 or more units and one owner are excluded.

DATA SOURCE: Department of Neighborhood Development, City of Boston, 2014

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

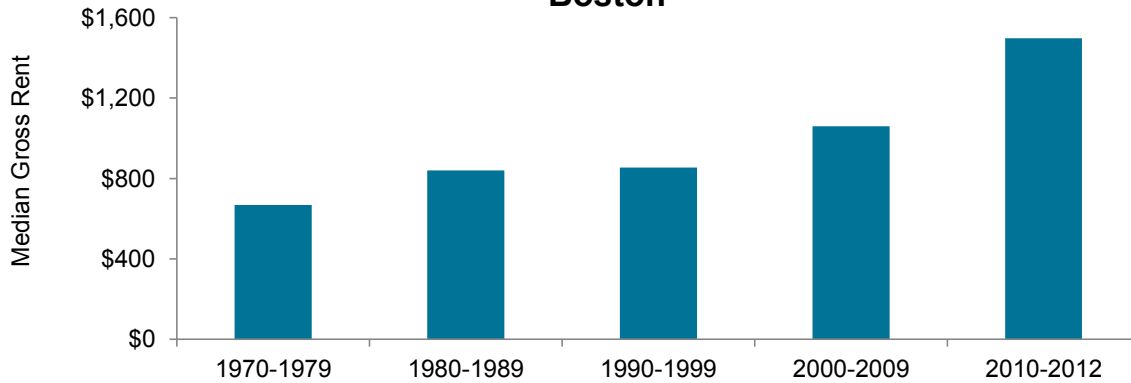
Figure 2.2 shows rates and counts of foreclosure petitions by neighborhood in Boston for 2008 through 2013. The highest rates of foreclosure petitions in Boston as a whole were in 2008 and 2009, with decreases in 2010, 2011, and 2013. During the peak of the foreclosure crisis in 2009, East Boston, Mattapan, North Dorchester, Rosindale and South Dorchester experienced the highest rates of foreclosure petitions.

Figure 2.3 Renter-Occupied Households* Paying 30% or More of Income Towards Rent by Neighborhood, Boston, 2008-2012 Combined



* The denominator is renter-occupied households.
 DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.4 Median Gross Rent in 2012 by Year Householder Moved into Unit, Boston

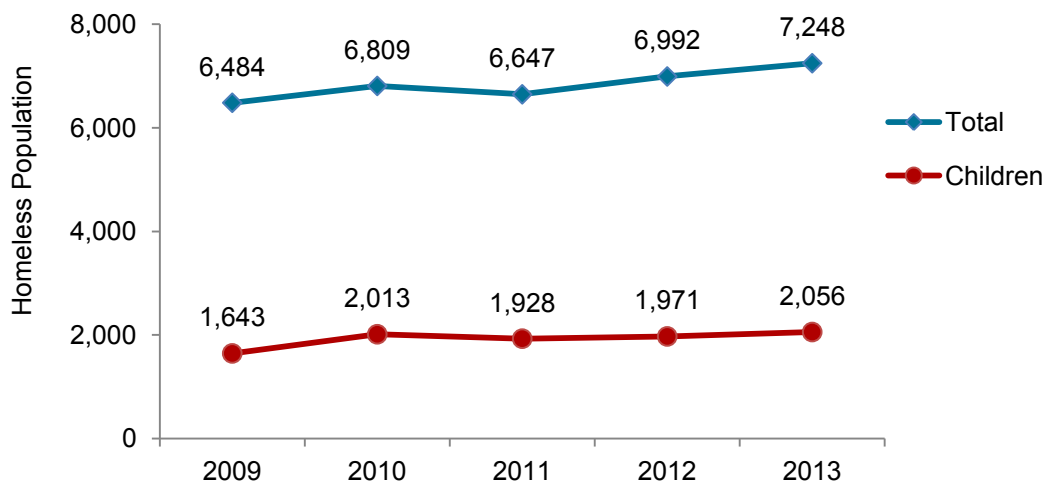


1970-1979	1980-1989	1990-1999	2000-2009	2010-2012
\$668	\$840	\$854	\$1,060	\$1,498
(445-891)	(606-1,074)	(744-964)	(1,003-1,117)	(1,436-1,560)

DATA SOURCE: American Community Survey, 2012, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 2.4 shows the median gross rent for Boston residents who moved into their current units between 1970 and 2012. Median rent for residents who moved into their units during 2010-2012 was \$1,498 per month, meaning that half of these renters paid less than \$1,498 while the other half paid more. This is compared to a median rent of \$668 for renters who moved into their current units between 1970 and 1979.

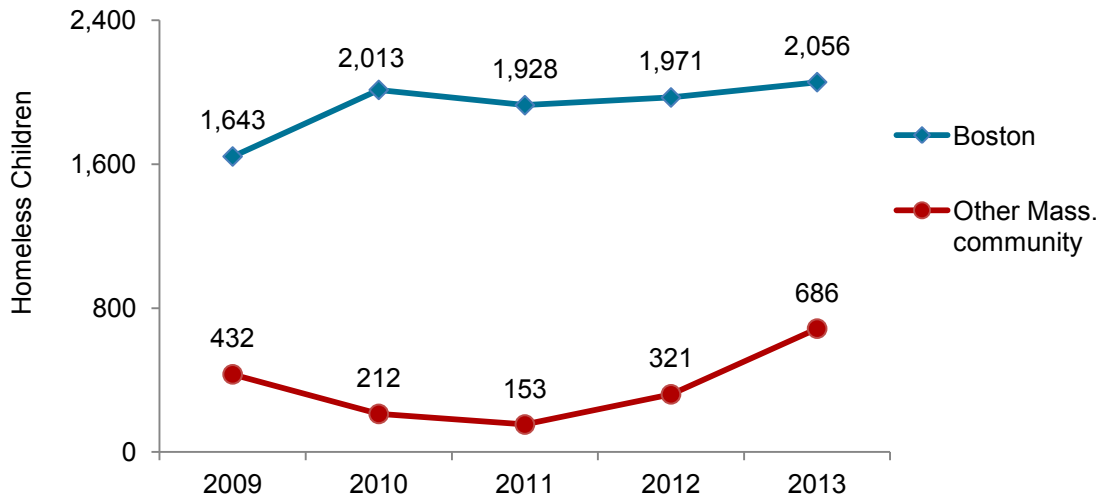
Figure 2.5 Homeless Population in Boston* by Year, 2009-2013



* Counts include individuals whose last residence was in Boston or in a community outside of Boston.
 DATA SOURCE: Emergency Shelter Commission, Boston Public Health Commission
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 2.5 shows counts of total homeless individuals and children in Boston from 2009 to 2013. During this time period, homeless children made up between 25% and 30% of the total homeless population in Boston.

Figure 2.6 Homeless Children by Shelter Community* and Year, 2009-2013



* Counts of children sheltered in Boston include children whose last residence was in Boston or in a community outside of Boston. Counts of children sheltered in other Massachusetts communities, however, only include children from Boston.

DATA SOURCE: Emergency Shelter Commission, Boston Public Health Commission

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 2.6 shows counts of homeless children by shelter community for the years 2009-2013. From 2011 through 2013, the number of homeless children sheltered in Boston, which includes children whose last community of residence was Boston or a community outside of Boston, steadily increased. During the same time period, the number of children from Boston sheltered outside of Boston increased more than four-fold. In addition to being homeless, these children faced the disruption of being entirely removed from the communities in which they last lived.

Access to Healthy Foods

Family access to healthy, varied food has a direct impact on eating behavior and risk of diet-related health problems [48]. Access to healthy foods is determined by families' ability to afford these foods, the availability of safety-net programs that help families purchase food, and the proximity of stores that stock fresh foods. Chapter I presented information on family income; in this section, we address availability of grocery stores and other food outlets as well as food safety net programs to meet the needs of low-income families across Boston neighborhoods.

Food insecurity – the inability to afford nutritionally adequate food for everybody in a household – affects families across the United States [49]. In 2012, over 14% of households in the United States experienced food insecurity, up from 11.9% in 2004 [50]. In Massachusetts, 16.5% of children live in food-insecure households [51]. These children are nearly twice as likely to be in fair or poor health and 30% more likely to be hospitalized than food-secure children [52]. Studies show that food insecurity in children, after controlling for family poverty, is associated with risk of overweight and obesity, impaired psychosocial functioning, increased likelihood of repeating a school grade, school suspension, and lower math scores [53-55].

A range of public benefit programs help to bridge the gap between family income and food costs for more than one in seven Americans [56]. In 2013, 78% of Boston Public School (BPS) students qualified for free or reduced-cost lunch based on family income status [57]. Given the widespread need, BPS recently implemented USDA's "Community Eligibility Option" which makes breakfast and lunch free to all students regardless of income [57]. The Summer Food Service Program, administered by the Massachusetts Department of Elementary and Secondary Education with help from the Child Nutrition Outreach Program at Project Bread, is an important source of meals for children on summer vacation [58]. The Supplemental Nutrition Assistance Program (SNAP), previously known as the Food Stamp Program, is the largest federal food assistance program (and arguably the largest public health program) in the U.S. SNAP provides eligible, low-income residents with assistance in purchasing food. Half of all Americans will use SNAP benefits at least once in their lifetime and participation for only six months has been shown to reduce food insecurity by 5-10% [59-61]. Despite the value of the SNAP program to millions of families, the program does not take into account geographic variability in cost of living, particularly food costs [62]. One recent study found that households of SNAP recipients living in areas with food costs in the top 15-20% were more likely to be food insecure than those living in areas that had the lowest food costs. This difference was largest among SNAP households with children [62]. For the poorest families, assistance comes nowhere close to adequately covering the most basic of needs. In 2013 in Massachusetts, a combination of TAFDC and SNAP benefits accounted for only 70.3% of the Federal Poverty Level, leaving a substantial gap for the poorest families [63]. This was a decline of 4% from 2011, as the current SNAP levels were cut in 2013 with the ending of the benefits of the 2009 Recovery Act [64].

Additional programs that help to alleviate food insecurity include local food pantries and soup kitchens, which provide emergency food assistance to residents in need, and the national Feeding America system, which actively supports food banks that supply these community-based outlets nationwide [65]. The Greater Boston Food Bank, located in the Newmarket section of Boston, plays this role for outlets throughout the city. According to the Boston Survey of Children's Health, 10.7% of Boston children resided in a household that had accessed emergency food from a church, food pantry, or food bank in the previous year [22]. Figure 2.7 presents food safety-net resources and the percentage of families with children living in poverty. These resources were concentrated in areas with the most need.

One-third of low-income households shop for groceries within a mile of where they live and one-third shop within 1-4 miles, indicating the importance of grocery stores within close proximity to where people live [66]. Low- and mixed-income neighborhoods have, on average, more than twice as many grocery

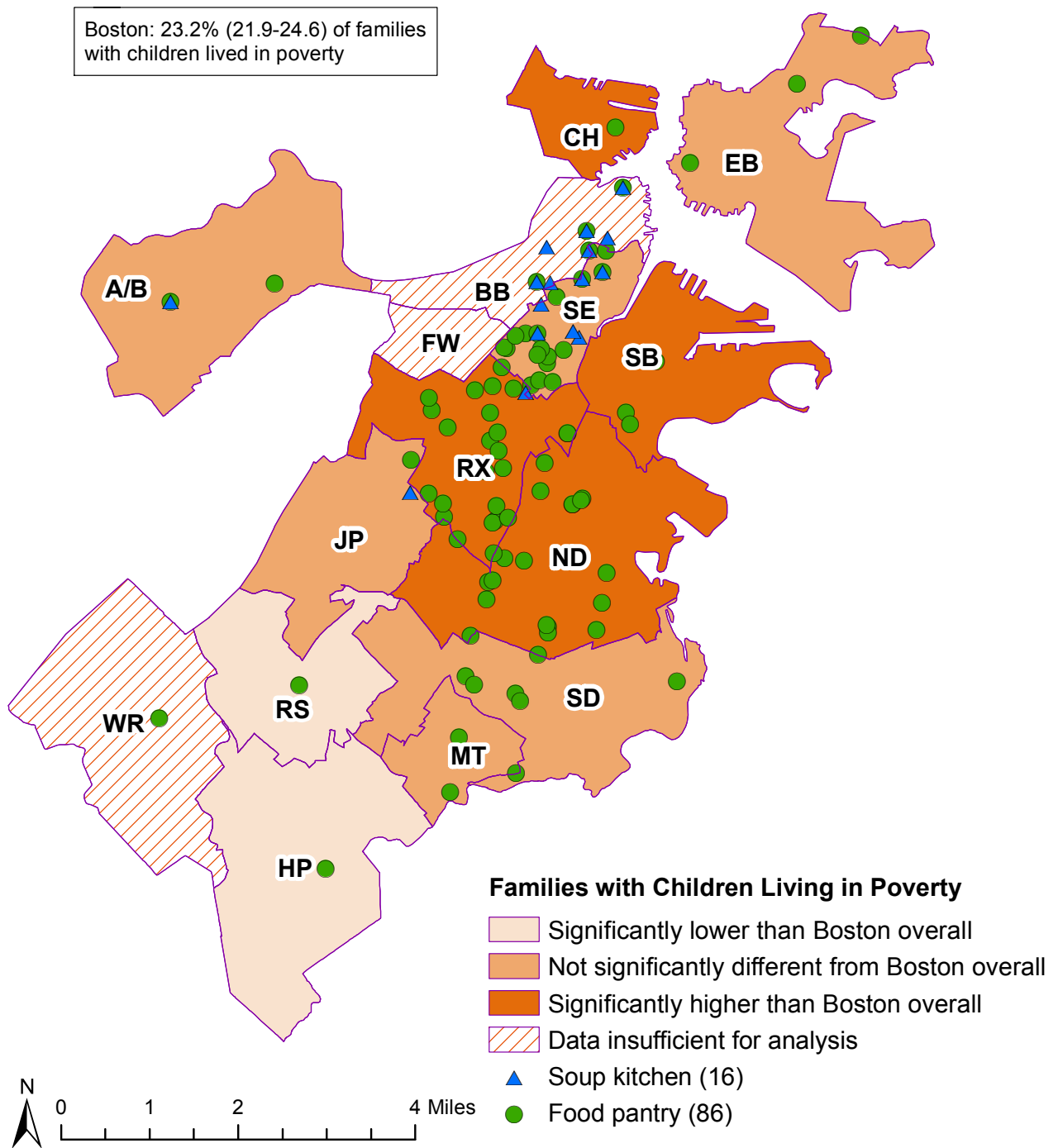
How do families meet basic needs?

stores as other neighborhoods. These stores are, however, typically smaller and less varied in the types and quality of food they carry compared to larger chain stores [66, 67]. Small, non-chain grocery stores and convenience stores have less shelf space for healthy products and are half as likely as chain supermarkets to sell a variety of fresh fruits and vegetables [69]. Those they do sell tend to be more expensive than at larger chain stores [69]. As research for this report, youth from Boston's Dudley Square, Grove Hall, and Mission Hill communities conducted street-by-street assessments of the availability, cost, and quality of food for sale in their communities. They found that the availability of healthy foods varied widely from community to community. For example, while low-fat and skim milk were available in most food stores in all three communities, fresh fruits were very limited. In Grove Hall and Mission Hill, the majority of food stores sold fewer than five varieties of fresh fruit [70].

According to a 2009 analysis completed by the U.S. Economic Research Service, nationally 93 percent of residents of low-income neighborhoods rely on family vehicles to do food shopping [71]. Thus, proximity to a supermarket and vehicle access are both relevant to healthy food access [72-75]. In urban areas, public transportation may provide greater access to healthy food, but affordability is still an issue for many [75]. Difficulty accessing supermarkets and healthy foods may also be compounded by individual characteristics, such as fears concerning neighborhoods safety or lack of time as a single parent or worker with multiple jobs [74]. Figure 2.8 presents location of supermarkets and the percentage of households with vehicles by Boston neighborhood. The neighborhoods with lower vehicle ownership than Boston as a whole during the years 2008-2012 combined, which included the South End, the Back Bay, Fenway, and Roxbury, tended to have several supermarket options. Although Mattapan and East Boston had rates of vehicle ownership comparable to Boston as a whole, each only had one supermarket. As a result, families in these neighborhoods may have limited access to healthy foods, causing them to either make do with the stores located nearest to them or travel to other parts of the city to seek lower prices and greater variety [76]. Among lower income families with fewer supermarkets close by, notably in parts of North and South Dorchester, even those who owned automobiles may have had to allocate a greater portion of income to travel to supermarkets than other families.

Farmers' markets are an emerging resource for alleviating food disparities, as they can increase access to fresh fruits and vegetables in neighborhoods without supermarkets. Bounty Bucks, a program run by the Boston Collaborative for Food and Fitness, provides a dollar-for-dollar match up to \$10 of SNAP benefits at participating farmers' markets. In 2013-2014, 21 of Boston's 26 farmers' markets participated in Bounty Bucks, which brought in over \$166,540 in sales [77]. Figure 2.9 presents the location of Boston farmers' markets, including those accepting SNAP benefits and Bounty Bucks, and the percentage of families with children in poverty. The majority of farmers' markets in Boston accepted SNAP and/or Bounty Bucks regardless of the percentage of families with children in poverty living in the neighborhood.

Figure 2.7 Food Safety-Net Resources and Percentage of Families with Children* Living in Poverty by Neighborhood, Boston, 2008-2012 Combined



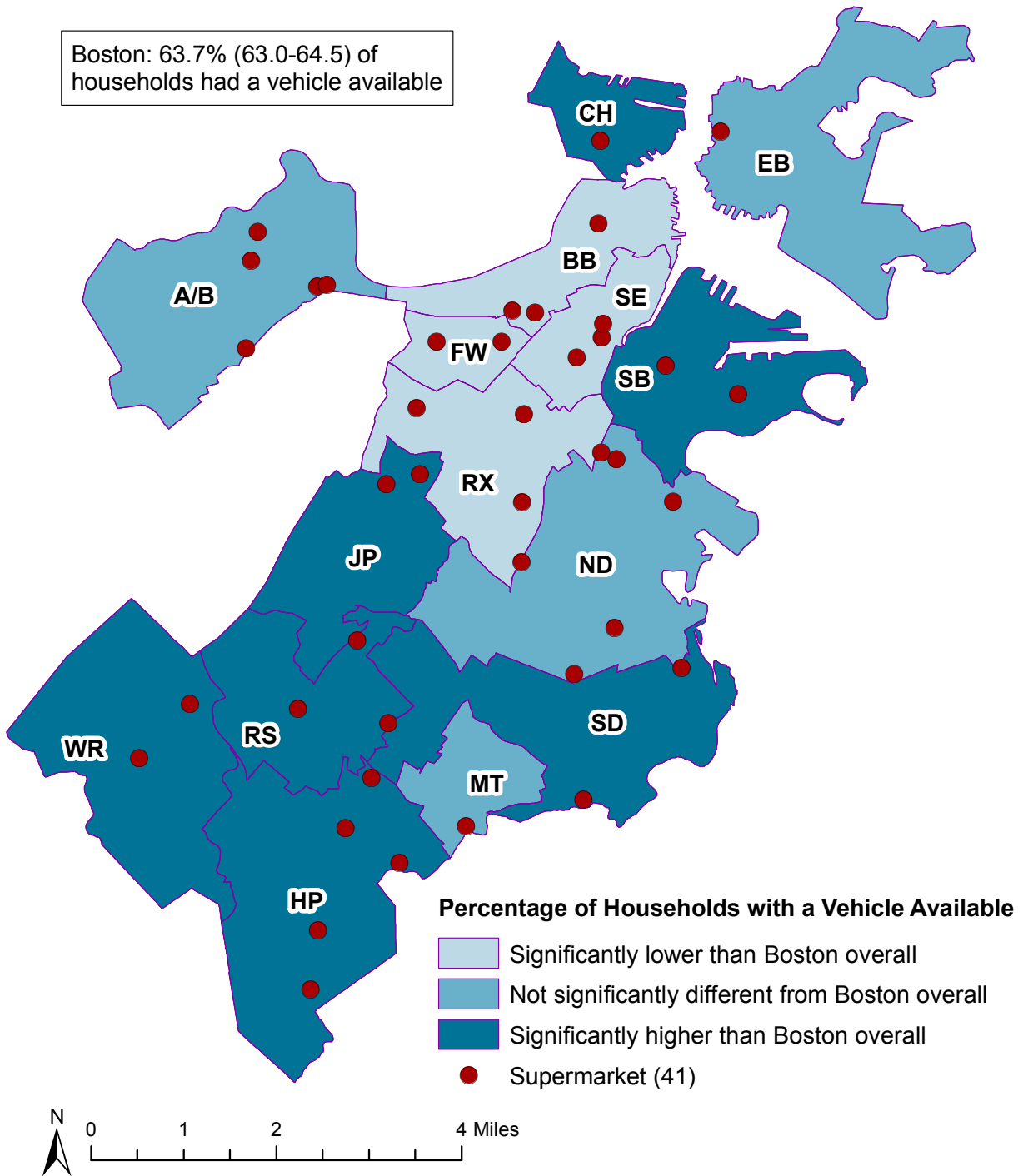
* The denominator is all families with children.

DATA SOURCES: Boston Redevelopment Authority, 2010; American Community Survey, 2008-2012, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

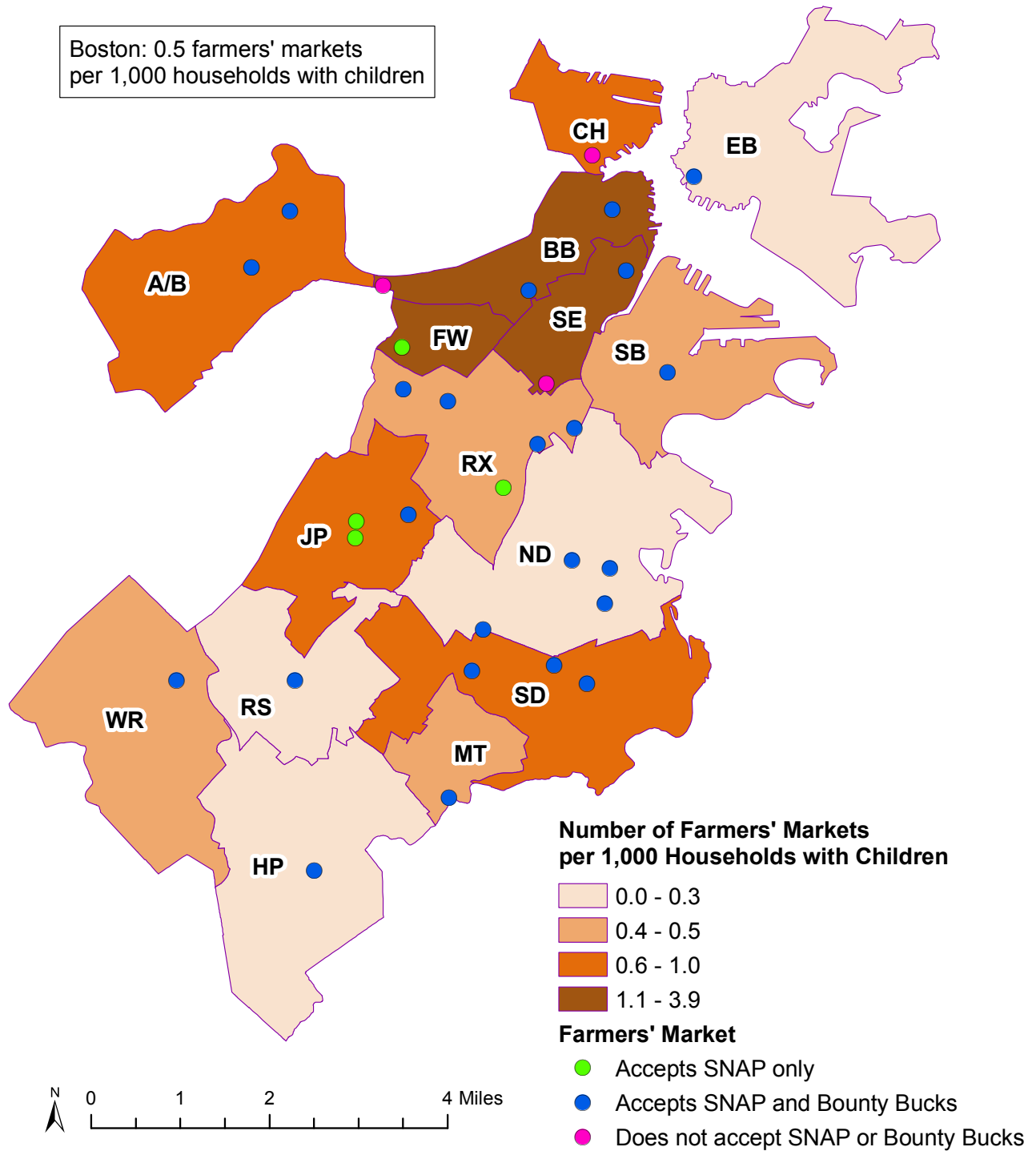
MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.8 Percentage of Households with a Vehicle and Location of Supermarkets by Neighborhood, Boston, 2013



NOTE: Supermarkets include stores with 7,000 square feet or more that carry a full range of all major grocery products, e.g., dairy, fresh fruits and vegetables, and meat products.
 DATA SOURCES: Boston Redevelopment Authority, 2013; American Community Survey, 2008-2012, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.9 Number of Farmers' Markets per 1,000 Households with Children, Boston, 2013



DATA SOURCES: Boston Redevelopment Authority, 2013; Decennial Census 2010, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Access to Health Care

Health care is important in preventing and treating illness and injury throughout life. For families raising children, the pediatric medical home can also be an important point of connection to a range of services, such as Early Intervention programs and the WIC nutrition program. Access to health care may vary depending on an individual or family's insurance status, socioeconomic status (controlling for insurance status), access to a personal car or public transportation, cultural familiarity and comfort with the U.S. health care system, and the presence or absence of linguistic barriers [78-81]. Practice location and accessibility for patients and communities influence continuity of care and, in many cases, the extent to which medical providers and other medical practice staff can learn about the histories and daily lives of patients within those communities [82]. These elements affect patients' and providers' ability to establish strong relationships, which are critical to effective primary care [82, 83]. Boston was home to one of the first two community health centers established in the U.S. in 1965; today, the city is home to 24 community health centers, which are federally qualified, federally qualified "Look-Alike", or hospital-affiliated. These health centers, along with the city's multiple hospitals, generally assure relative proximity to community-based care and are closely tied to community identity, especially in areas where these institutions employ large numbers of residents and are major drivers of the local economy. In this report, we look at health insurance coverage at the neighborhood level, the location of community health centers that provide pediatric primary and behavioral health care, and the percentage of Boston residents who work in what the U.S. Census Bureau terms the Health Care and Social Assistance sector in Boston neighborhoods.

In Boston, 96.4% of children have health insurance, lower than the Massachusetts rate of 99% but higher than the national rate of 94.5% [22]. Uninsured children are ten times more likely to have an unmet health care need than children with health insurance [84]. Children with health insurance are more likely to receive preventive care, including immunizations, and to be taken to the doctor when sick than children who lack coverage [85]. In addition, children with health insurance miss fewer days of school than children who lack coverage [86, 87]. MassHealth, the Medicaid program for Massachusetts, covers over 1.4 million residents - 19% of all adults and 40% of all children in the state [88]. The Children's Health Insurance Program (CHIP), which in Massachusetts is combined with the Medicaid program, provides insurance for children in families with incomes just above the threshold for MassHealth [89]. In Boston, approximately 50% of children are covered by MassHealth, though rates vary by neighborhood. Almost all other Boston children are privately insured through their parents' employment. Figure 2.10 presents insured children with MassHealth/Medicaid coverage by neighborhood. Since MassHealth eligibility is based on income, the neighborhoods with higher rates of MassHealth participation had higher percentages of children living in poverty. Mattapan, North Dorchester, and East Boston all had MassHealth participation rates that were significantly higher than Boston overall. In West Roxbury, the Back Bay, Jamaica Plain, and Roslindale, MassHealth enrollment was lower than in Boston overall, although there were children covered by MassHealth in every neighborhood of the city.

In addition to having health insurance, having a regular source of care – a pediatrician, family doctor, or nurse practitioner or physician's assistant within a pediatric practice - is associated with better health outcomes [90]. A regular source of care allows families to build trust in their provider, improves communication, and promotes quality of care [91]. Children generally make more frequent visits to the doctor than adults. The American Academy of Pediatrics recommends 10 well-child visits over the first two years of a child's life, in addition to any visits a child may need due to illness [92]. Choosing a pediatrician or other care provider near home or work eases some of the logistical burden of getting children to the doctor. A neighborhood practice can also help families find community-based resources relevant to child or family needs. Figure 2.11 presents the locations of federally qualified health centers (FQHCs), "Look-Alike" health centers, and hospital-affiliated community health centers that provided pediatric primary care and behavioral health care services. FQHCs, funded by Section 330 of the Public Health Service Act, are intended to increase quality, comprehensive health care services to underserved and vulnerable populations. These centers include community health centers and health centers providing services

Health of Boston's Children

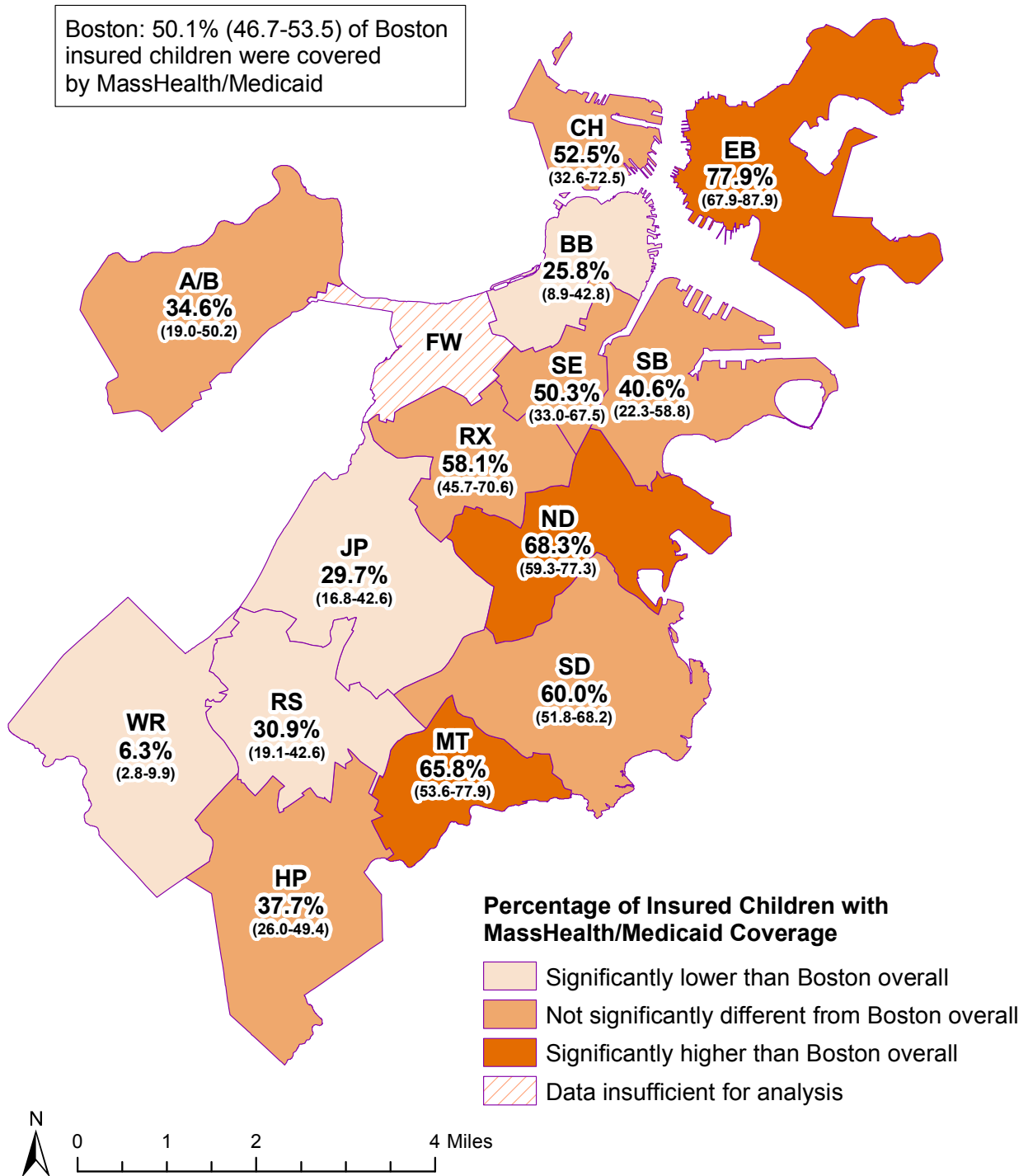
targeted to residents of public housing, migrants, and the homeless. Centers that do not receive federal funding under Section 330 but meet all eligibility requirements are designated as FQHC “Look-Alikes” [93]. Although they have not been awarded federal grant funding, FQHC “Look-Alikes” may receive many benefits given to FQHCs, such as enhanced Medicare and Medicaid reimbursements and drug pricing discounts, and provide services consistent with requirements expected of FQHCs [94]. Of Boston’s 24 community health centers, 21 provided pediatric primary care and 19 provided pediatric and/or adolescent behavioral health care services. Though Boston’s network of community health centers reached most neighborhoods of the city, proximity to pediatric primary care and behavioral health care did vary across neighborhoods.

A report in the *Journal of the American Medical Association* in 2012, drawing on the National Health Interview Survey, indicated that, for the first time, the five most common activity-limiting conditions in children were mental health conditions rather than physical conditions [95, 96]. In fact, one in five children in the United States has a diagnosable mental health disorder; however, only 20% of these children receive the services they need [97-99]. Access to mental health services for children requires: first, the identification of a mental health need, and second, the availability of resources to meet that need [100]. Pediatricians and family care doctors identify problems, act as a primary resource for parents with questions and concerns, provide preventive and primary mental health care, and, when necessary, refer children and families to other mental health and substance abuse resources in the community [101]. Having a strong connection between pediatric and mental health care can improve access to needed mental health services for many families [102]. This is crucial given the increasing importance of and need for preventive care to promote positive social and emotional development, even for children who do not have diagnosable mental health conditions [95]. For children that have a diagnosed mental health condition in Massachusetts, pediatricians have access to a service called the Massachusetts Child Psychiatry Access Project (MCPAP), which connects them (usually within 30 minutes) to a consulting child psychiatrist who can answer questions about the management of child mental health needs, refer them to local services, or conduct an acute consultation [103]. In Boston, some neighborhoods, most notably Mattapan, Hyde Park, Roslindale, and West Roxbury, are home to fewer community health center-based behavioral health care and primary care resources for children and adolescents than other neighborhoods.

In addition to providing necessary medical care and preventive services to Boston’s children and families, Health Care and Social Assistance is the largest industry employer of Boston residents, providing jobs to thousands of Boston’s parents [104]. The Health Care and Social Assistance sector is defined by the North American Industry Classification System (NAICS) to include ambulatory health care services, hospitals, nursing and residential care facilities, and social assistance services such as childcare and social work. In total, this sector employed just under 120,000 people in 2009, of which approximately 40,000 were residents of Boston [104, 105]¹. In 2011, hospitals alone employed 12.7% of the Boston workforce (Boston residents and non-residents combined) [106]. The Health Care and Social Assistance sector includes a broad range of occupations and income levels. For example, the median income for the census category of health care practitioners and technical workers (including physicians) in 2012 in Boston was \$55,000 whereas the median income for health care support workers was \$25,000 [107]. Employment in this sector has steadily grown in the last decade in Boston, increasing by approximately 30% between 2001 and 2011 [104]. Figure 2.12 presents the percentage of residents employed in the Health Care and Social Assistance sector by neighborhood.

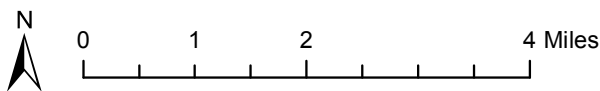
¹ After Health Care and Social Assistance, the sectors employing the largest numbers of workers living in Boston were Educational Services (12.3%), Accommodation and Food Services (10.1%), and Professional and Technical Services (10.1%). Source: Boston Redevelopment Authority, Research Division. (2013). *Boston’s Labor Force* [PowerPoint slides]. Retrieved July 11, 2014, from <http://www.bostonredevelopmentauthority.org/research-maps/research-publications/economy-jobs>

Figure 2.10 Children Enrolled in MassHealth/Medicaid as a Percentage of Insured Children by Neighborhood, Boston, 2012



NOTE: The neighborhood definitions are based on zip codes.
 DATA SOURCE: Boston Survey of Children's Health, 2012
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.11 Community Health Centers that Provide Pediatric Care, Boston, 2014



Community Health Centers

- 1 Bowdoin Street Health Center
- 2 Brookside Community Health Center
- 3 Charlestown HealthCare Center
- 4 Codman Square Health Center
- 5 Dimock Center
- 6 Dorchester House Multi-Service Center
- 7 East Boston Neighborhood Health Center
- 8 Greater Roslindale Medical & Dental Center*
- 9 Harvard Street Neighborhood Health Center
- 10 Joseph M. Smith Community Health Center
- 11 Martha Eliot Health Center
- 12 Mattapan Community Health Center*
- 13 Neponset Health Center
- 14 North End Waterfront Health
- 15 Sidney Borum, Jr., Health Center†
- 16 South Boston Community Health Center
- 17 South Cove Community Health Center
- 18 South End Community Health Center
- 19 Southern Jamaica Plain Health Center
- 20 Upham's Corner Health Center
- 21 Whittier Street Health Center

* Does not provide pediatric behavioral health care services

† Provides care only to adolescents ages 12-18 and young adults

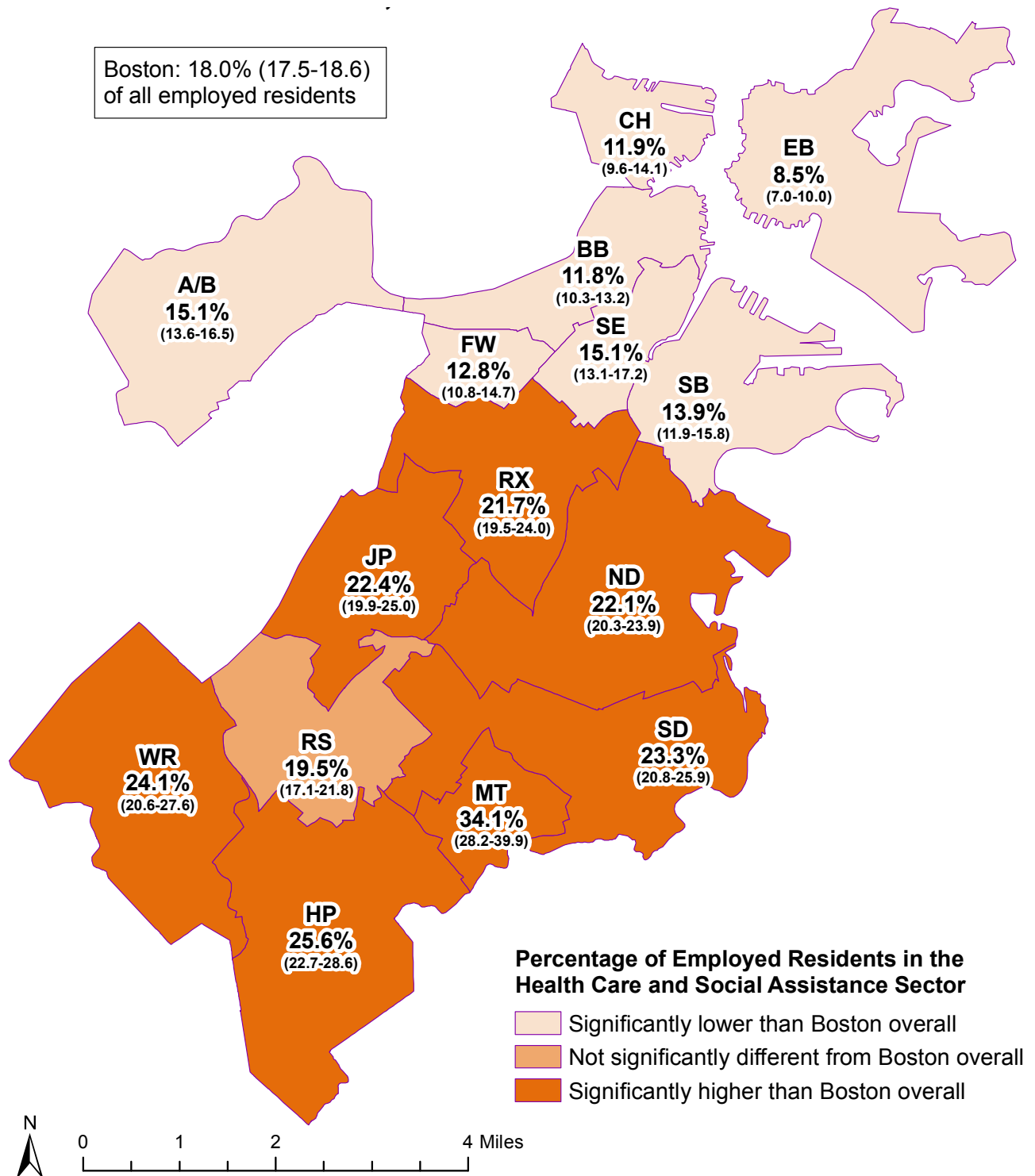
NOTE: Community health centers include Federally Qualified Health Centers (FQHCs), "Look-Alikes" (sites that meet all of the eligibility requirements to be a FQHC but do not receive the same federal grant funding), and hospital-affiliated sites.

DATA SOURCE: Boston Public Health Commission Research and Evaluation Office, October 2014

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.12 Percentage of Residents Employed in the Health Care and Social Assistance Sector by Neighborhood, Boston, 2008-2012 Combined



NOTE: The Health Care and Social Assistance Sector includes ambulatory health care services, hospitals, nursing and residential care facilities, and social assistance services such as childcare and social work. It is defined using the North American Industry Classification System (NAICS), the standard used by the U.S. Census Bureau to classify business establishments to collect, analyze, and publish statistical data related to the U.S. business economy.

DATA SOURCE: American Community Survey, 2008-2012, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Access to Childcare and Schools

For working parents of young children, childcare is a basic necessity; quality childcare and preschool are critical to their children's safety, health and development. For school-age children, quality education is critical to cognitive development and social and emotional well-being [108].

Parents and caregivers who work often struggle to find and retain high-quality, reliable, and affordable childcare. In Boston, over half of children ages five and under receive 10 or more hours per week of care from a non-relative [22]. The type of childcare to which a family has access and chooses may be dependent upon many factors, including income, language, immigration status, availability, affordability, and parent preference. The location of childcare relative to home or work is an important practical consideration for parents, and low-income communities tend to have fewer licensed childcare providers than middle- and high-income communities [109]. Given this scarcity, and the related fact that the average annual cost of licensed daycare in urban areas of Massachusetts is \$15,923 for an infant and \$11,937 for a 4-year-old child, childcare choices for low-income families with working parents may be driven by availability and affordability rather than preference [110]. In this report we use daycare licensure as a proxy for quality, recognizing that quality may vary widely across licensed providers. Figure 2.13 presents locations of center-based childcare and family childcare sites in relation to child population density (ages 0-3). Family childcare sites were scattered throughout the city and tended to be concentrated in areas with higher child population density. Many center-based childcare sites were concentrated in the South End and the Back Bay, which had relatively small child populations but were places where many parents from within and outside of Boston worked.

Research suggests that high-quality preschool programs have a significant and lasting impact on cognitive skills in children from low-income households [111]. The benefit for children from middle- and high-income families is less certain [112]. Using a nationally representative sample, the Early Childhood Longitudinal Study, Kindergarten Cohort, found that literacy skills among children from very low-income families were five years behind those of children from very high-income families by the 8th grade [113]. High-quality preschool programs in low-income areas can help to eliminate gaps in school readiness between children from low-income families and those from middle- and high-income families, shrinking the disparities in early childhood learning [114-116]. This impact has been shown to persist through 8th grade [114, 115]. Figure 2.14 presents preschools and pre-k programs in relation to child population density (ages 3-4).

Figure 2.15 presents childcare, preschool, and pre-k capacity for children ages 0-4 throughout Boston. In Boston, there were 56 licensed childcare (including center-based and family childcare), preschool, and pre-k slots per 100 children ages 0-4. Fenway, the South End, Mattapan, and Roxbury had the highest number of slots available relative to population of children ages 0-4. Although East Boston had among the largest neighborhood populations of children (see Figure 1.2) and an average child age lower than Boston overall (see Figure 1.3), it was in the lowest category for number of childcare, preschool, and pre-k slots relative to the population of children ages 0-4. Charlestown, North Dorchester, and Hyde Park also had lower childcare, preschool, and pre-k capacity relative to the population of children ages 0-4 than other Boston neighborhoods.

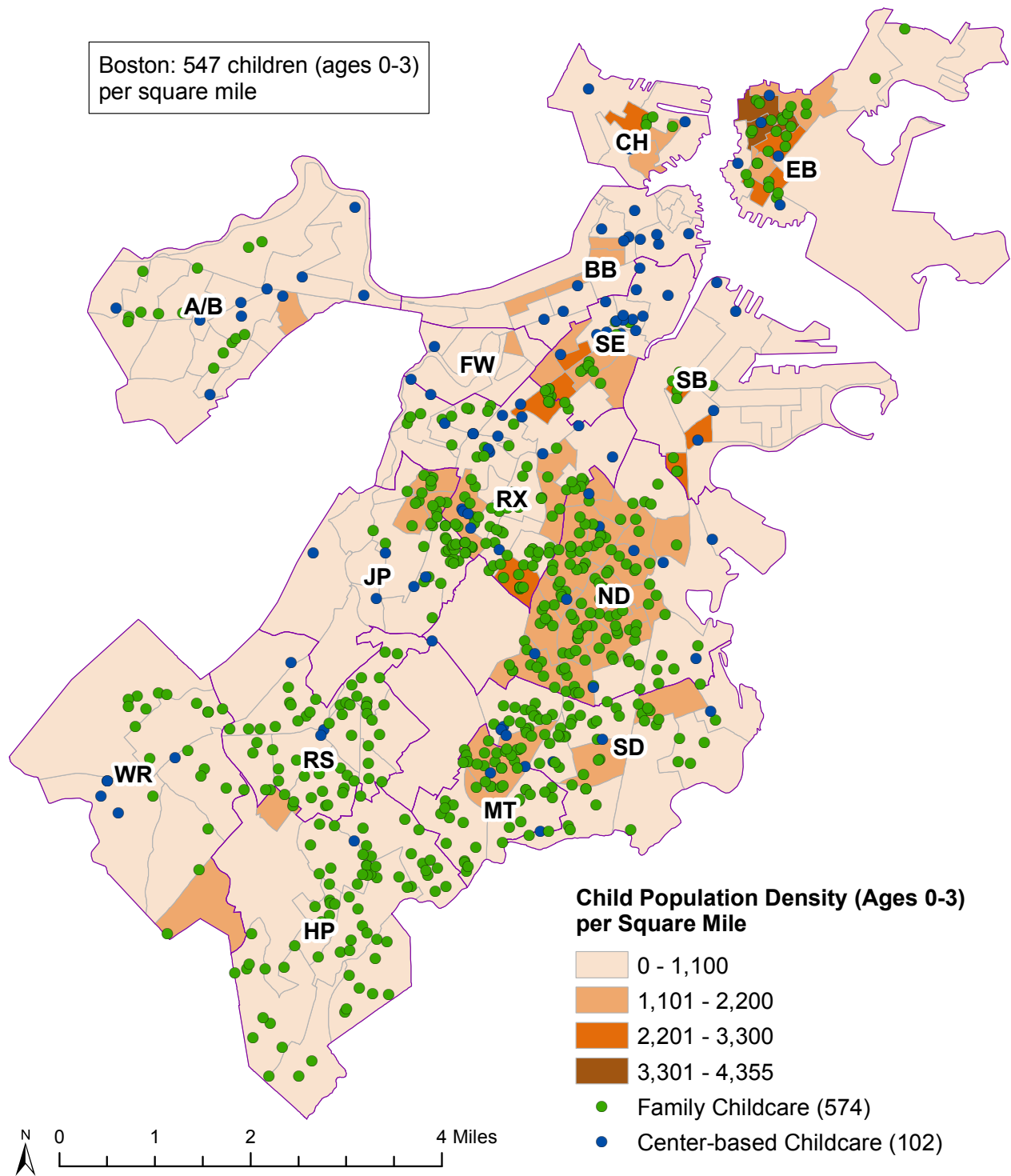
For many years, the Boston Public Schools (BPS) used a lottery system to assign students to schools, with minimal focus on assigning students to schools that were close to home. Starting in the 2014-2015 school year, BPS began to use a new home-based student assignment policy, giving every new student a list of schools within a one-mile radius of his or her home [117]. In some cases, additional schools were added to prevent gaps in access to higher-performing schools [117]. Now, students are placed at a school from the list according to parent preference, while also taking into account sibling attendance and special program needs [118]. Parents also have the option of requesting one of several citywide schools [117]. This change in policy will have a big impact on families, since over 70% of children in Boston attend a

How do families meet basic needs?

public school [22]. Figure 2.16 shows the locations of Boston K-8 schools in relation to child population density (ages 5-13) while Figure 2.17 shows the locations of Boston high schools in relation to child population density (ages 14-17). The new home-based assignment system does not affect high school students, who will continue to attend schools based on elementary school-to-middle school-to-high school feeder patterns and a citywide lottery [117].

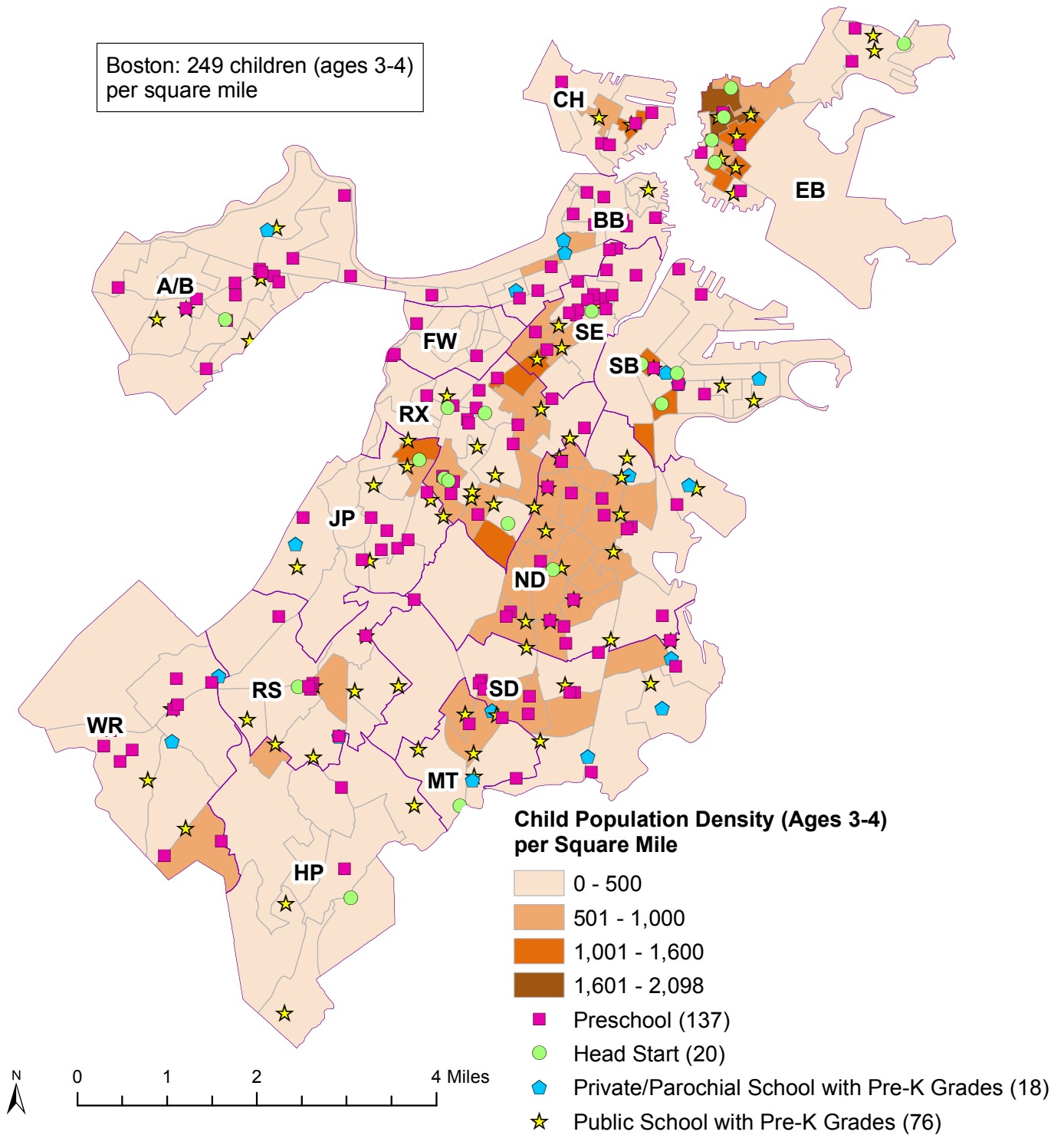
In addition to providing supervised, out-of-school-time coverage for working families, afterschool programs can provide educational enhancement, access to arts or sports programs, and opportunities for development of children's skills and social networks [119]. Participation in formal afterschool programs is lower among Boston children in lower-income families than those in higher-income families [120]. In 2011, the participation rate for children in households with incomes at or below the poverty line was 13.6%, whereas the rate for households with incomes above the poverty line was 19.9% [120]. Barriers to participation include participation fees, geographic inaccessibility, schedules that are incompatible with parents' hours of work, and negative parent perceptions of available programs [121]. Figure 2.18 presents free resources available to children after school in relation to child population density (ages 3-17). In Boston, families had access to public afterschool programs through the Boston Public Schools, public libraries, and other community- and city-funded organizations. Many programs were concentrated in neighborhoods with a higher population density of children ages 3-17, including East Boston, Roxbury, North Dorchester, and South Dorchester.

Figure 2.13 Licensed Childcare Providers and Child Population Density (Ages 0-3) by Census Tract, Boston, 2014



NOTE: Sites that are only available to children of employees of a particular industry or employer, sites that primarily or solely serve children with special health care needs, and sites that provide afterschool care are included.
 DATA SOURCES: Decennial Census 2010, U.S. Census Bureau; Massachusetts Department of Early Education and Care, March 2014
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.14 Preschool and Pre-K Sites and Child Population Density (Ages 3-4) by Census Tract, Boston, 2014



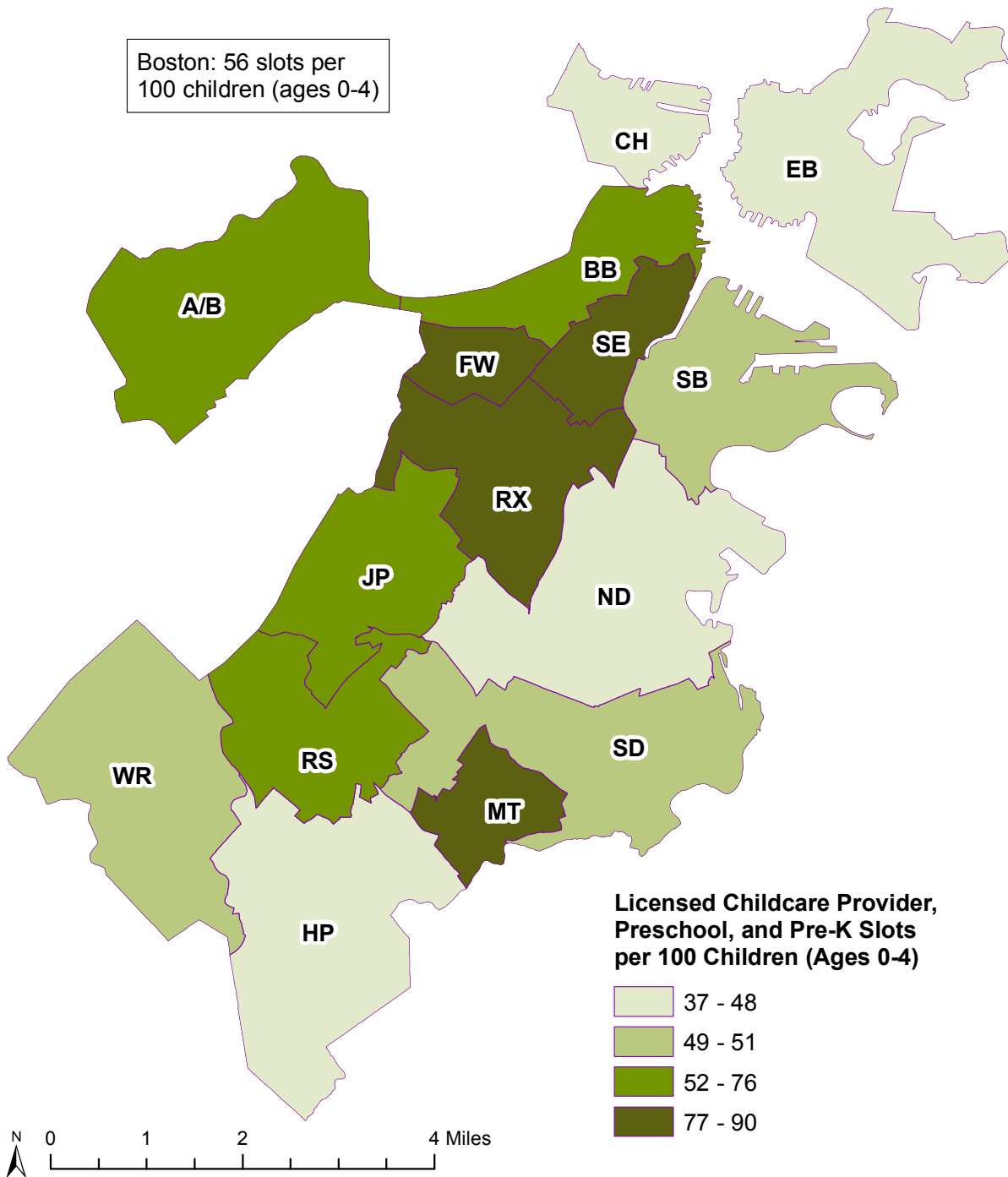
NOTE: Sites that are only available to children of employees of a particular industry or employer, sites that primarily or solely serve children with special health care needs, and sites that provide afterschool care are included.

DATA SOURCES: Decennial Census 2010, U.S. Census Bureau, American FactFinder; Massachusetts Department of Early Education and Care, March 2014; Archdiocese of Boston, April 2014; Association of Independent Schools in New England, April 2014; New England Association of Schools and Colleges, April 2014; Boston Public Schools, December 2014

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

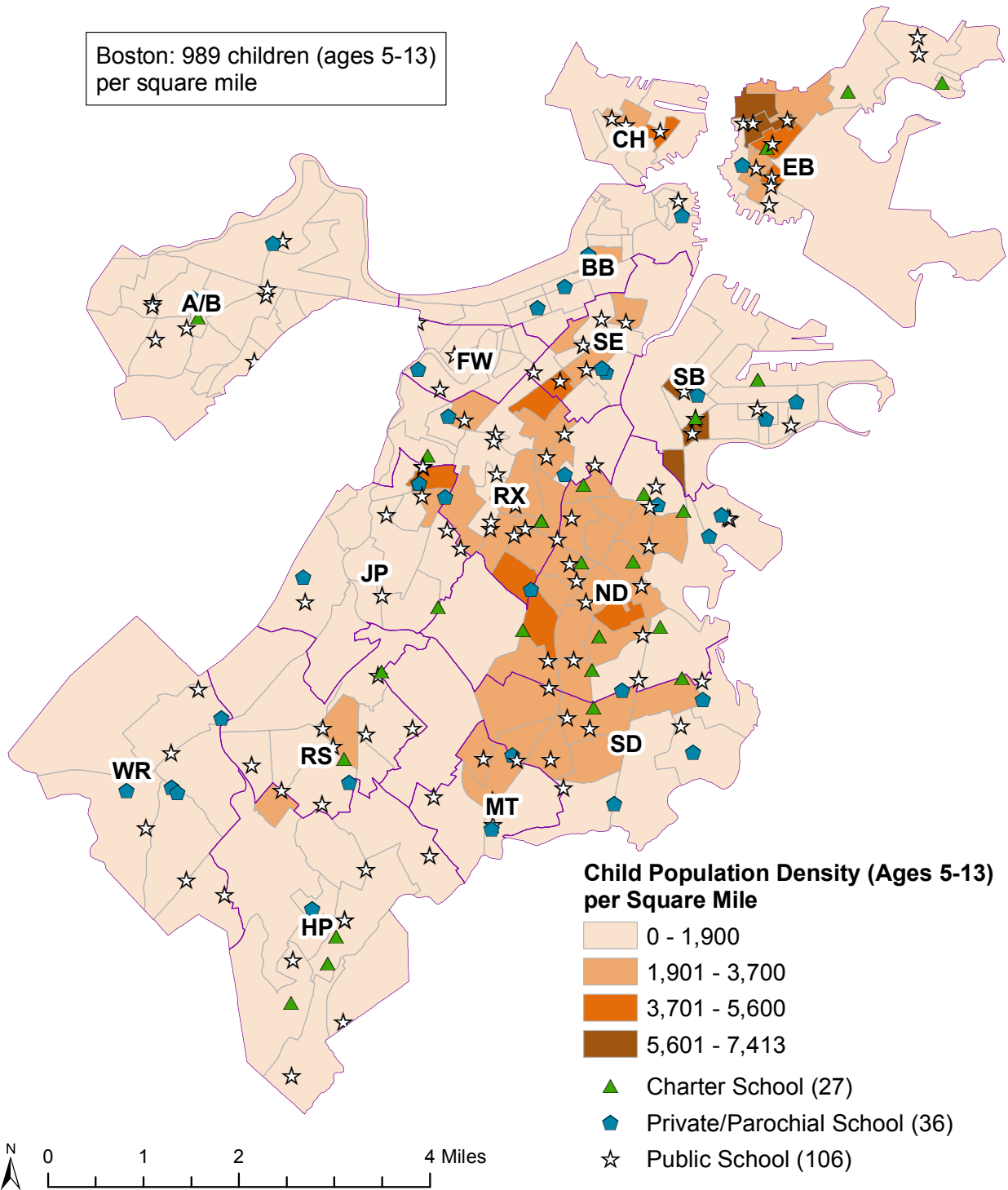
MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.15 Licensed Childcare Provider, Preschool, and Pre-K Capacity (Ages 0-4) by Neighborhood, Boston, 2014



NOTES: Sites that are only available to children of employees of a particular industry or employer, sites that primarily or solely serve children with special health care needs, and sites that provide afterschool care are included. The capacity data for family childcare providers may include children up to age 13 (without special needs) or age 16 (with special needs). Also, the capacity data for some center-based childcare providers and some preschools may include kindergarten-age and school-age children.
 DATA SOURCES: Decennial Census 2010, U.S. Census Bureau, American FactFinder; Massachusetts Department of Early Education and Care, March 2014; Archdiocese of Boston, April 2014; Association of Independent Schools in New England, April 2014; New England Association of Schools and Colleges, April 2014; Boston Public Schools, December 2014
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

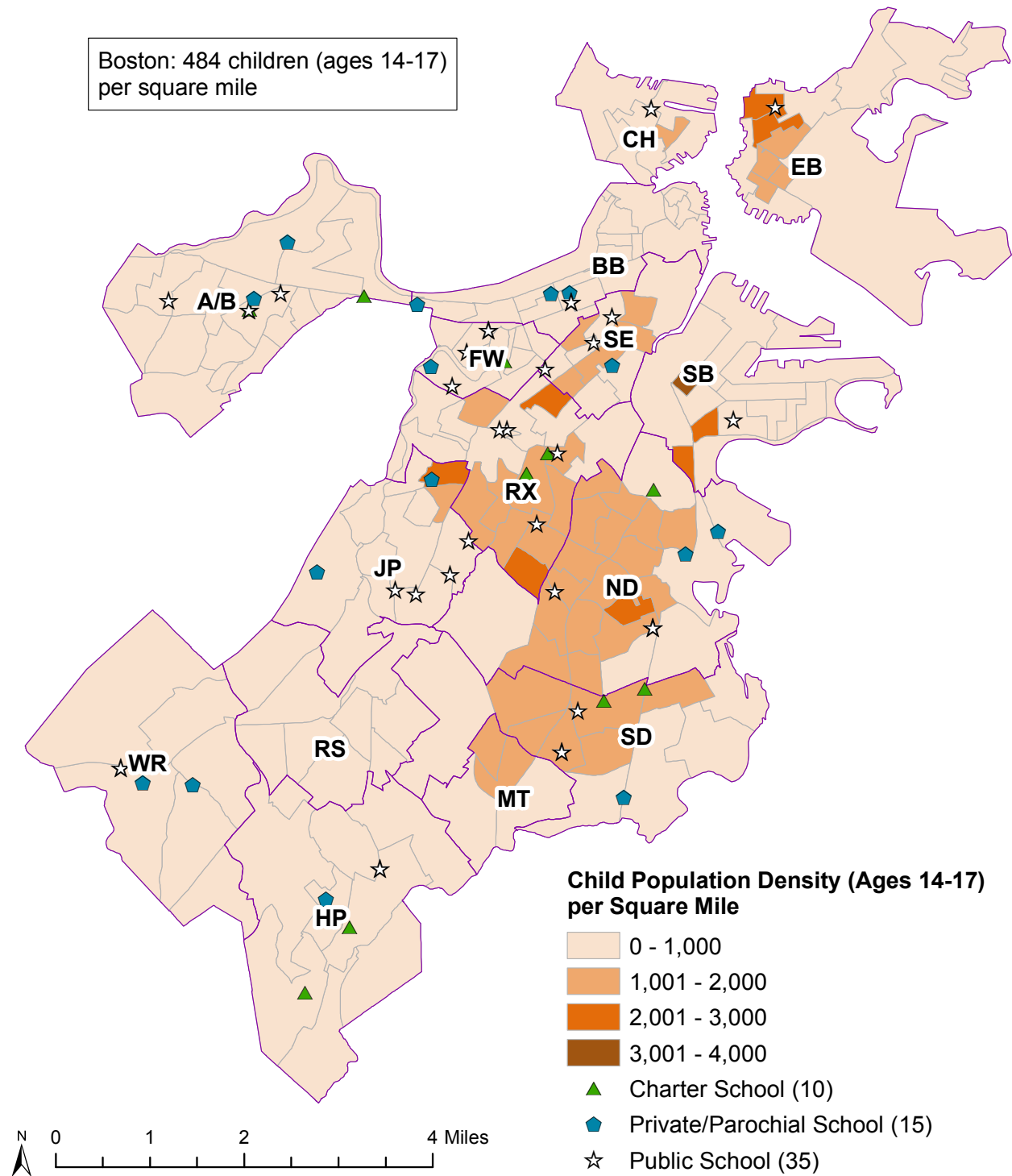
Figure 2.16 Schools Grades K-8 and Child Population Density (Ages 5-13) by Census Tract, Boston, 2014



DATA SOURCES: Decennial Census 2010, U.S. Census Bureau, American FactFinder; Archdiocese of Boston, April 2014; Mass Charter Public School Association, April 2014; National Parochial School Association, April 2014; Association of Independent Schools in New England, April 2014; Boston Public Schools, April 2014; New England Association of Schools and Colleges, April 2014

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

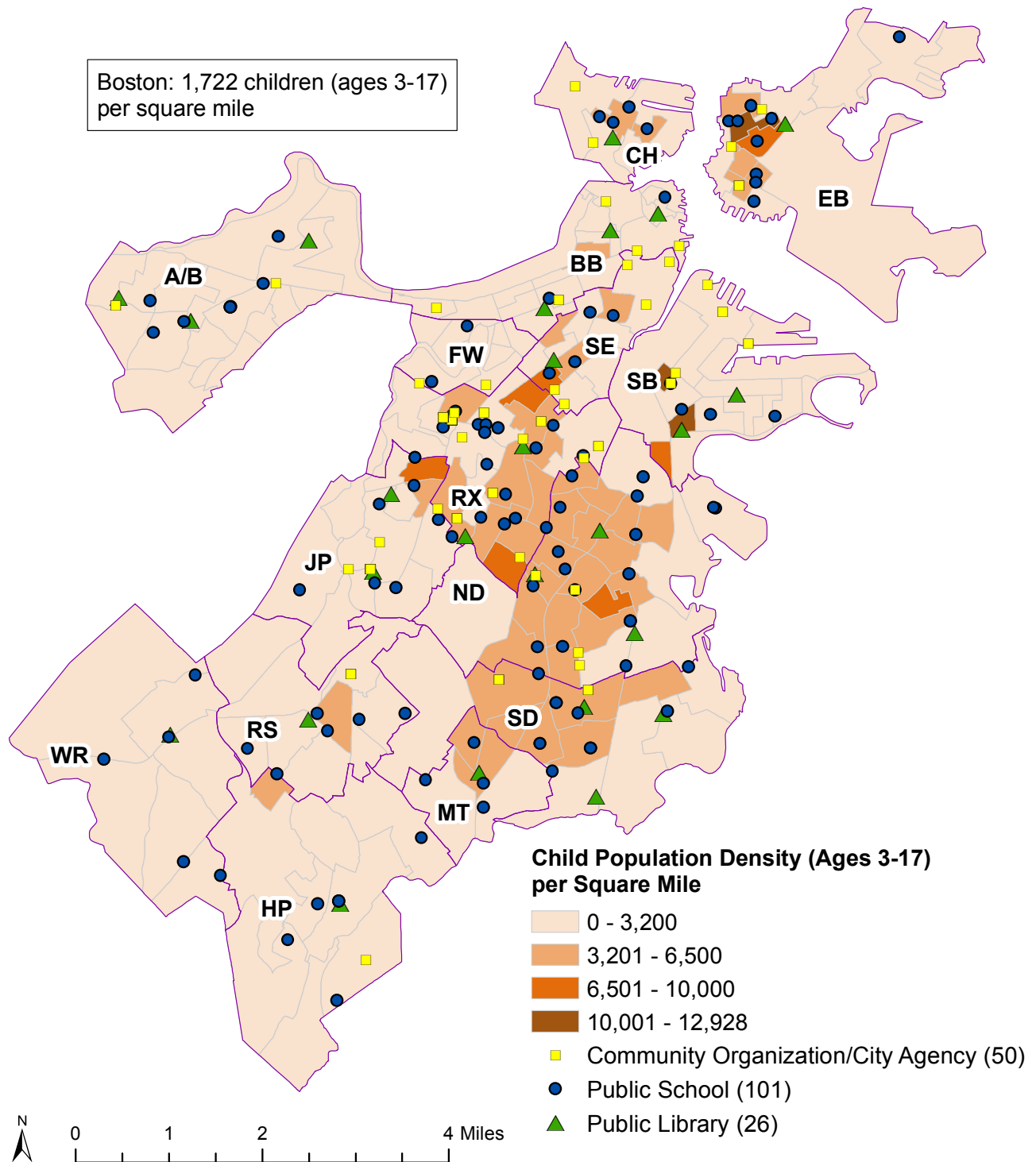
Figure 2.17 Schools Grades 9-12 and Child Population Density (Ages 14-17) by Census Tract, Boston, 2014



DATA SOURCES: Decennial Census 2010, U.S. Census Bureau, American FactFinder; Archdiocese of Boston, April 2014; Mass Charter Public School Association, April 2014; National Parochial School Association, April 2014; Association of Independent Schools in New England, April 2014; Boston Public Schools, April 2014; New England Association of Schools and Colleges, April 2014

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 2.18 Free Afterschool Programs and Child Population Density (Ages 3-17), Boston, 2014



DATA SOURCES: Department of Innovation & Technology (DoIT), City of Boston, 2012; Decennial Census 2010, U.S. Census Bureau; Boston After School & Beyond, March 2014; Boston Public Library, March 2014
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

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What factors in community and home environments pose risks to children?

Chapter 3 Rapid growth during childhood makes children especially vulnerable to harmful exposures at home and in their communities. Adverse exposures in childhood, when left unaddressed, may leave lasting effects into adulthood and across generations [1]. Adverse exposures may arise in a child's psychosocial environment, such as exposure to a high rate of community violence or family stress due to unemployment or financial hardship, or in a child's physical environment, such as exposure to air pollution or lead in paint. Poverty and racism impose a range of risks – both by constraining the environmental options open to families and by exposing children and families to social marginalization. These direct effects of inequality mean an increased likelihood of exposure to other risks. In fact, the psychosocial and physical environments are often intertwined. For example, racial discrimination may limit a family to housing of poor quality in an area with no green space and no safe place for children to play outdoors. These hazards in the physical environment may have psychosocial effects, such as family breakdown [2, 3]. This chapter focuses on specific risks, including violent crime, property crime, the presence of liquor stores, child maltreatment, and environmental pollutants. This chapter ends with data on child mortality in Boston.

Risks in the Psychosocial Environment

We use the term “psychosocial environment” to characterize social conditions that interact with and impact mental and physical health. The psychosocial environment becomes a source of risk when a child is confronted with experiences that diminish his or her sense of personal control or security and otherwise engender a view of the world as hostile, adversarial, or unsafe [4, 5]. The psychosocial environment can be a detriment to health through direct physical impact, as when a child is victimized by street crime or abuse and also through being a source of stress [6]. In this section, we look at violent crime, property crime, the presence of liquor stores, which has been associated with social disorder, and child maltreatment.

Increasingly, researchers have identified stress as the link between prolonged exposure to adverse experiences and negative health outcomes [5-7]. In manageable doses, stress is healthy—it provides the spark for learning a new skill and the single-mindedness and energy required to remove oneself from a dangerous situation. Stress adversely impacts health when experienced so repeatedly or with such intensity that a person’s ability to return to a neutral state is compromised. This type of stress, referred to as toxic stress, interferes with regular health and development [6-8]. When experienced by children, especially in the earliest stages of life (including in utero), the effects can be especially damaging, and in some cases, lasting [6, 8].

One source of toxic stress for children and families is community violence. Exposure to repeated and prolonged incidences of violence has been associated with developmental delays, increased aggressive behavior, depressive symptoms, PTSD, social cognition impairment, behavioral problems, and asthma [9-12]. Research also suggests that when women experience neighborhood violence during pregnancy, they are at increased risk of giving birth to babies with low birth weight [8]. According to the 2012 Boston Survey of Children’s Health, 16% of Boston children ages 0-17 had witnessed violence in their communities [13]. As presented in Figure 3.1, Boston residents as a whole experienced 83 violent crimes (defined here as homicide, rape and attempted rape, robbery, and aggravated assault) per 10,000 residents in 2011. Violent crime rates varied by neighborhood and within neighborhoods. For example, parts of North Dorchester experienced fewer violent crimes than the Boston average, while several census tracts in the neighborhood had significantly more reported violent crimes per 10,000 residents than the Boston average. Figure 3.2 shows rates and locations of homicides by neighborhood. As a whole during 2011, the neighborhoods of North Dorchester, South Dorchester, Mattapan, and Roxbury experienced violent crime and homicides at higher rates than other parts of the city.

Property crime in this report includes residential and commercial burglary, larceny, and automobile theft. The impact of property crime on children and youth is not well understood, although victims of property crime are not likely to experience trauma to the same degree as victims of violent crime [14]. Figure 3.3 presents reported property crimes per 1,000 residents in 2011. Contrary to public perception, property crime rates were higher in downtown areas of Boston than in other parts of the city, including neighborhoods with higher rates of violent crime. The higher rates may be a result of commercial burglary and shoplifting (a form of larceny) in downtown and surrounding areas.

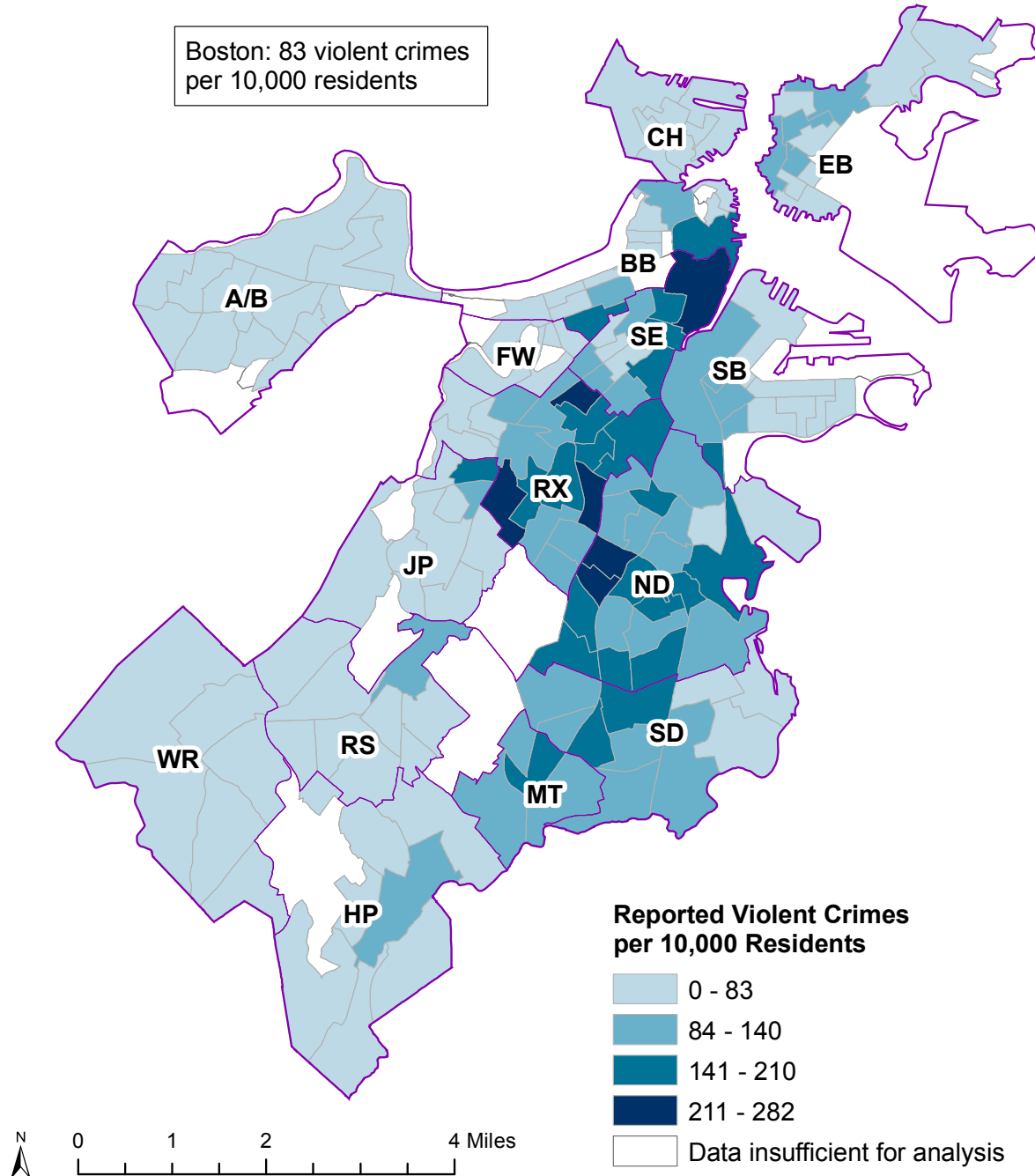
Children in home environments marred by abuse or neglect face a greater risk of morbidity and mortality in childhood and lasting negative health and psychosocial consequences into adulthood [15]. Contrary to common perceptions, which tend to focus on child abuse, 84% of child maltreatment reports in 2010 that were supported (confirmed) by the Massachusetts Department of Children and Families (DCF) after investigation were for neglect, as opposed to abuse [16]. Although the vast majority of parents living in poverty do not abuse or neglect their children, both abuse and neglect are more likely to be substantiated among families living in poverty [15]. Given that maltreatment reports are primarily for neglect as opposed to abuse, this could suggest that in some cases of neglect, poverty prevents parents from

What factors in community and home environments pose risks to children?

meeting children's basic needs. Correlates of poverty, including unemployment and substance abuse, may also elevate household stress to a point where children are at increased risk for abuse or neglect [17]. Although Black children are disproportionately represented in the child welfare system nationally, one statewide analysis in California found that when controlling for poverty, young maternal age, absent fathers, and poor child health, the rate of substantiated reports is actually lower among Blacks and Latinos than among Whites [18]. Figure 3.4 presents rates of supported allegations of child maltreatment in Boston neighborhoods. Several of the neighborhoods with child poverty rates significantly above the Boston average, including Roxbury, North Dorchester, and South Dorchester, also had the highest rates of substantiated child maltreatment.

In other chapters of this report, we note elements of community life that contribute to neighborhood cohesion and enhance child and family well-being. Community attributes may also place children at risk. One community risk that has been explored in the research literature is the presence of a high density of liquor stores, associated with underage drinking, increased alcohol use generally, and child maltreatment [19-22]. In addition to the increased risk to children resulting from wider availability of alcohol, the tobacco and liquor industries often target children in their marketing, for example, providing outlets with store placards and other advertising materials designed to be placed at eye level for children [23]. Figure 3.5 shows the number of establishments licensed to sell liquor for consumption off-premises per 10,000 residents by census tract. Many census tracts throughout Boston had more liquor stores than the Boston average, most notably in South Boston and Roslindale.

Figure 3.1 Reported Violent Crimes per 10,000 Residents by Census Tract, Boston, 2011



NOTES: Violent crimes include homicide, rape and attempted rape, robbery, and aggravated assault. Census tracts have been excluded where they include a population of less than 100 people, a population of less than 100 children, or fewer than 40 housing units.

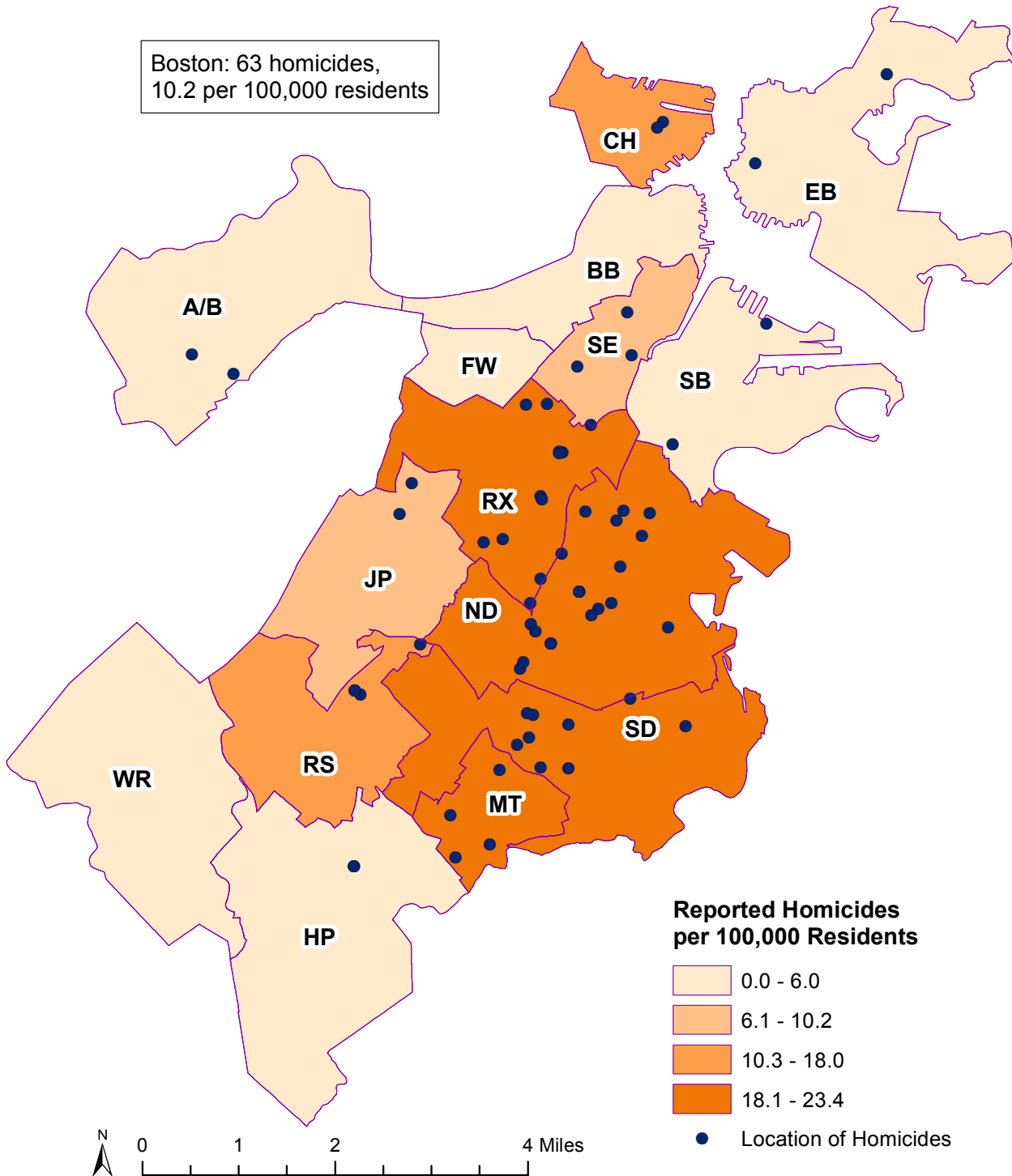
DATA SOURCES: Boston Police Department, 2011; Decennial Census 2010, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

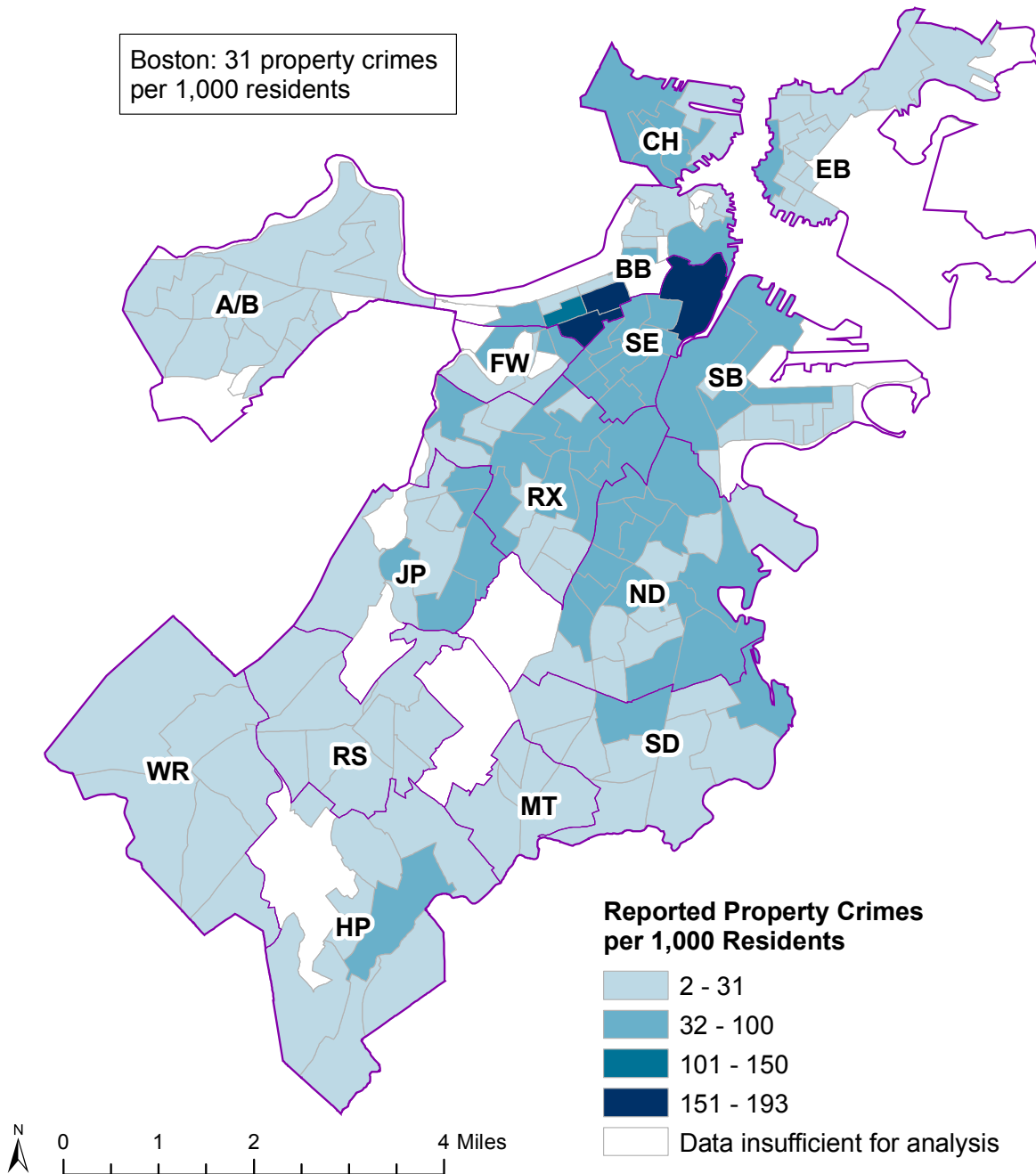
What factors in community and home environments pose risks to children?

Figure 3.2 Reported Homicide Locations and Homicide Rates by Neighborhood, Boston, 2011



DATA SOURCES: Boston Police Department, 2011; Decennial Census 2010, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 3.3 Reported Property Crimes per 1,000 Residents by Census Tract, Boston, 2011



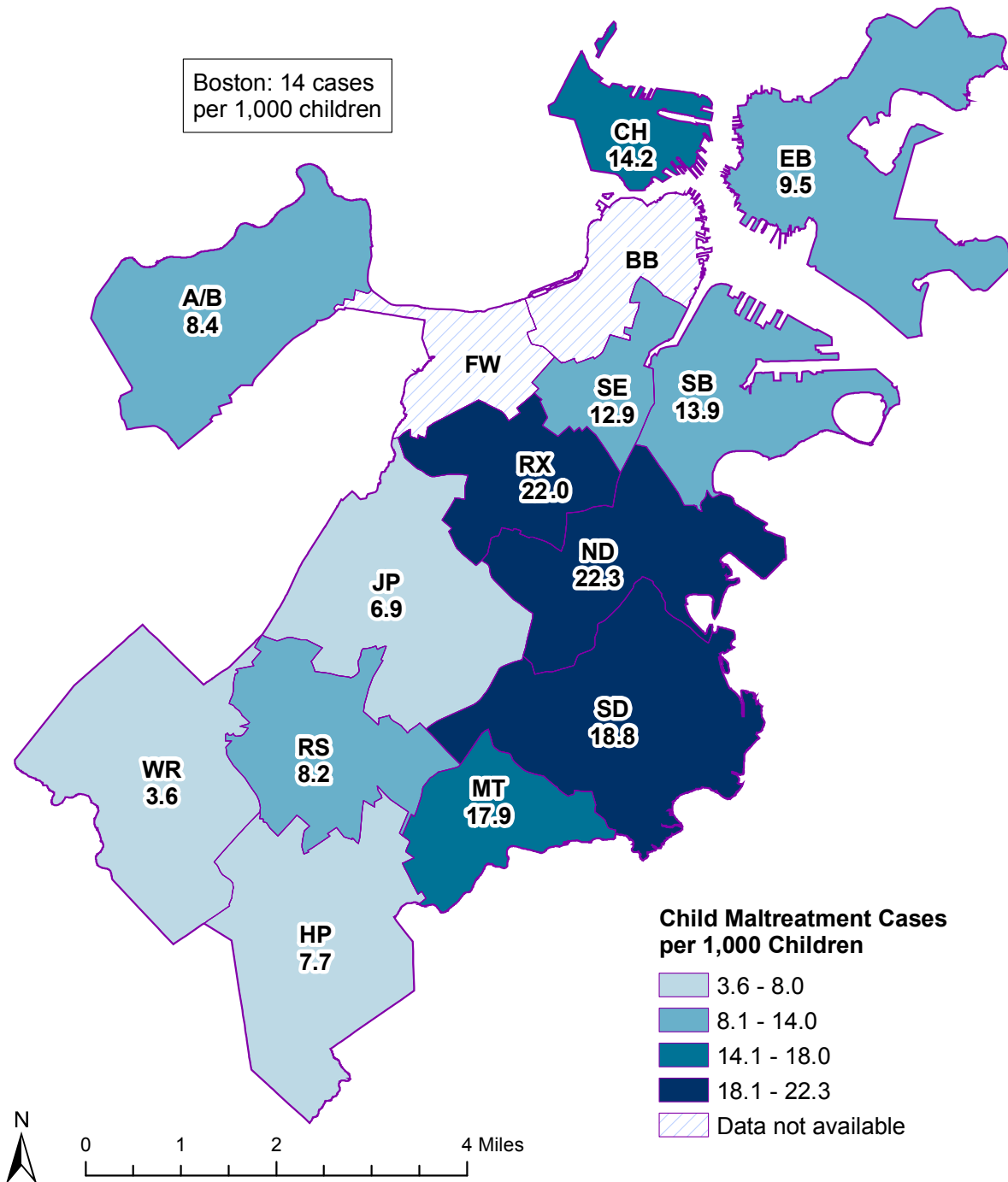
NOTES: Property crimes include residential and commercial burglary, larceny, and automobile theft. Census tracts have been excluded where they include a population of less than 100 people, a population of less than 100 children, or fewer than 40 housing units.

DATA SOURCES: Boston Police Department, 2011; Decennial Census 2010, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 3.4 Prevalence of Child Maltreatment Cases by Neighborhood, Boston, 2012



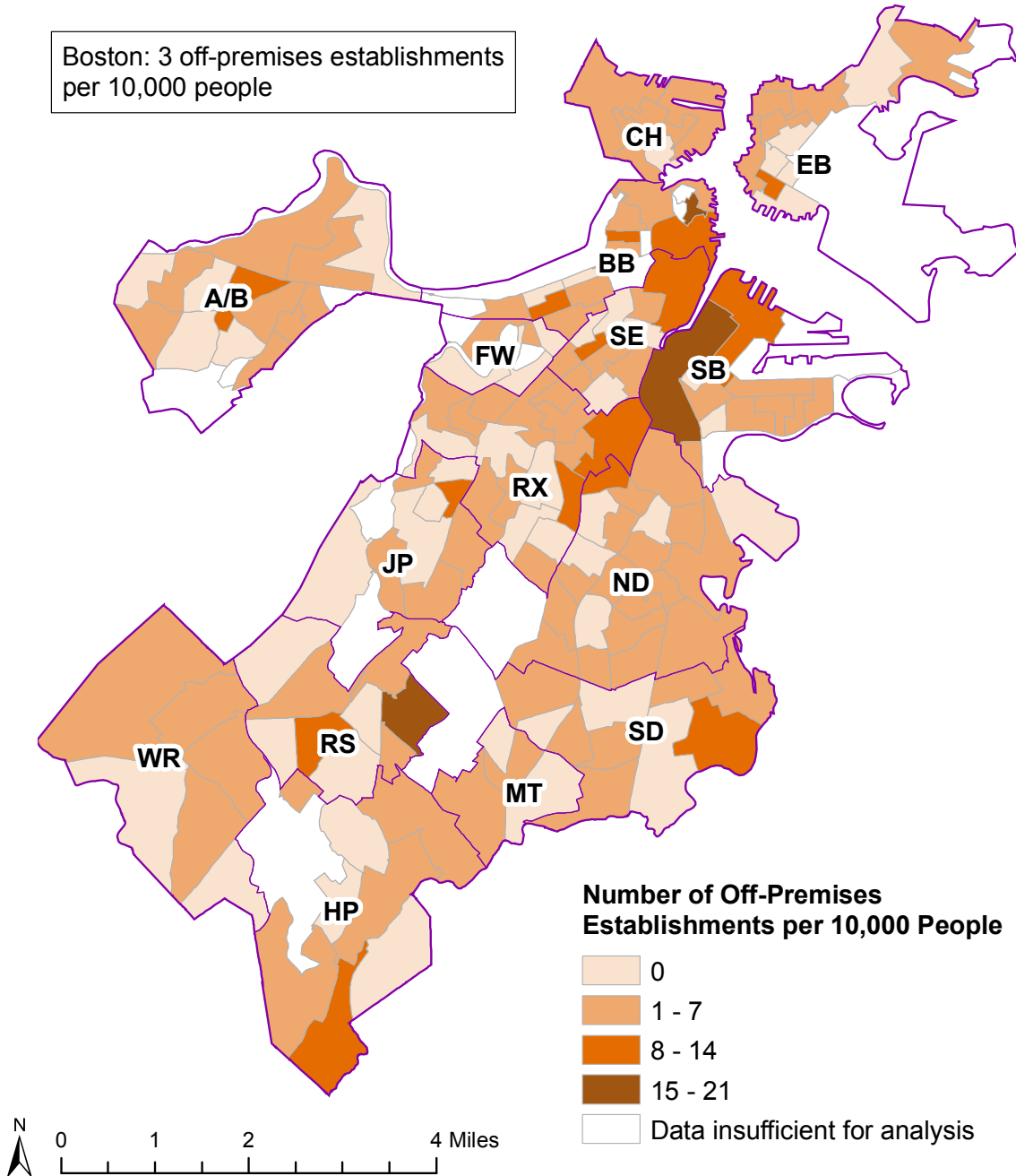
NOTES: Child maltreatment cases are unduplicated counts of children with supported allegations of abuse or neglect following an investigation. Children are counted only once regardless of the number of times they are the subject of an investigation. Eighty-four percent of supported maltreatment allegations are for neglect rather than abuse. The neighborhood definitions are based on zip codes.

DATA SOURCES: Massachusetts Department of Children and Families, 2012; Decennial Census 2010, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Figure 3.5 Establishments Licensed to Sell Liquor for Consumption Off-Premises per 10,000 People by Census Tract, Boston, 2012



NOTES: Off-premises establishments like liquor stores and some grocery stores sell alcohol to be consumed at a different location. Census tracts have been excluded where they include a population of less than 100 people, a population of less than 100 children, or fewer than 40 housing units.

DATA SOURCES: Massachusetts Alcoholic Beverages Control Commission, 2012; Decennial Census 2010, U.S. Census Bureau

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

What factors in community and home environments pose risks to children?

Risks in the Physical Environment

In this report, we use the term “physical environment” to refer to the tangible surroundings within which children live, learn, and play, both indoors and outdoors. Risks in the physical environment include chemical hazards, such as cigarette smoke or ozone in the air, and biological hazards, such as mold. Environmental scientists also include among “physical hazards”, radiation, noise, and unsafe structures in the built environment. Children are at particular risk of exposure to these hazards because of behaviors that are developmentally appropriate, such as frequently putting hands and objects in their mouths, and because their developing systems result in greater susceptibility than adults to a given level of exposure [24, 25]. As with psychosocial exposures discussed above, families of color and those living in poverty experience greater risk of exposure to hazards in the physical environment than higher income and White families [3]. In fact, it is important to highlight the interaction between the psychosocial risks discussed earlier in this report and the physical environmental exposures discussed here, because both types of risk so frequently arise in the same settings [26]. For example, homes that impose physical risks due to unrepaired structural features, poorly vented stoves, and the like, often cause family hardship associated with stress [5, 27, 28]. Thus, in reading material in this section about motor vehicle traffic, airport-related air pollution, and oil and hazardous materials sites, it is useful to keep in mind the extent to which these physical hazards coincide with sources of psychosocial stress and risk.

Air and noise pollution released by aircraft and automobiles are common exposures for families in urban environments. Air pollution from aircraft and motor vehicle emissions, such as particulate matter and nitrogen oxides, contributes to incidence of asthma in children, low birth weight, and infant mortality [29-32]. These risks are known to disproportionately impact low-income communities and communities of color, resulting from greater exposure that stems from living in marginalized areas [33-36]. One study published in 2014 showed a positive association between community-level poverty and the level of air pollution from motor vehicle traffic within Boston neighborhoods [33].

The most immediate hazard that road traffic poses to children, however, is the risk of injury due to collision. In fact, nationally, pedestrian injury is the leading cause of death for children and youth under age 24 [37]. Teens are at greatest risk, making up 55% of pedestrian deaths among children and youth. In the last five years, injuries among 16-19 year olds have increased 25%, speculated to result from more widespread use of handheld electronic devices and associated distractibility [37]. The risk of being injured by a moving vehicle is greater in urban areas where children are more likely to walk to school and other destinations than in suburban or rural areas [38]. Figure 3.6 shows the percentage of Boston census tracts within 100 meters of roads that have more than 50,000 vehicles per day on average.

The Logan Airport Health Study, released in May of 2014 by the Massachusetts Department of Public Health (MDPH), examined whether proximity to the airport increased the incidence of various health outcomes in children and in adults. Using 2005 data for emissions, weather, and airport activity, MDPH categorized geographic exposure to five primary airport-related air pollutants as low, medium, or high as shown in Figure 3.7. More than 8,000 people living within five miles of Boston Logan Airport were surveyed. After controlling for air pollutant exposures from other sources, occupational exposures, and demographic and health characteristics, residents in high exposure areas were more likely to experience respiratory symptoms than those living further away from the airport. Children living in the high exposure area were over three times as likely to wheeze and show symptoms of undiagnosed asthma as those living in the low exposure area. The number of adults with chronic obstructive pulmonary disease (COPD) was almost twice as high among those who had resided in the high exposure area for three or more years than in adults living in the area of low exposure. No significant associations were found between hearing-related outcomes or cardiovascular impacts and residential proximity to the airport. The lack of a significant association could reflect soundproofing measures implemented as part of MassPort’s noise abatement program in homes within close proximity to the airport. See reference 39 at the end of this chapter for the link to the complete Logan Airport Health Study report.

Health of Boston's Children

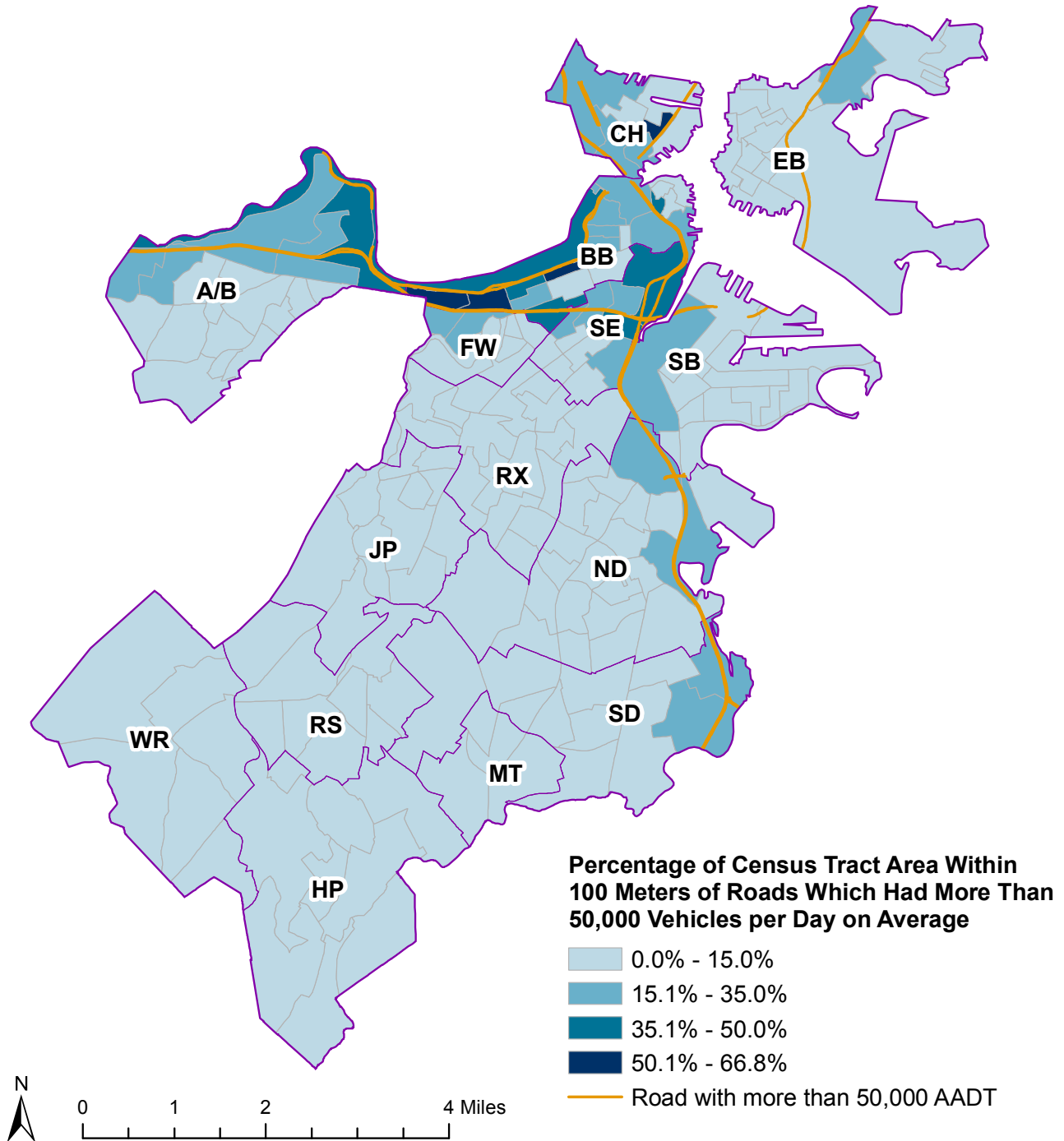
Noise is a significant part of living in any urban environment. Airport-related noise was not significantly linked to hearing effects among nearby residents in the Logan Airport Health Study; however, the impact on reading comprehension, episodic memory, and/or sustained focus among schoolchildren, which have all been inversely associated with airplane noise in other studies, was not evaluated [40-42]. Beyond airports, whether from busy roadways, day-to-day street activity, street or building construction, or loud neighbors, chronic exposure to noise has been associated with impaired learning and reading comprehension and raised blood pressure in children [44-46].

Another hazard of modern society is the release of toxic hydrocarbons and other hazardous materials into the environment. These hazardous materials, such as gasoline and chlorinated solvents, may leach into soil and groundwater, evaporate into the air, and spread to neighboring properties. Of particular concern are contaminated sites where children may be present and can be exposed to hazards. Health effects among exposed children can vary widely. Depending on the nature and extent of exposure, health effects range from nausea and anemia to neurodevelopmental effects and cancer [46-48]. Suspected spills or dumping can be reported to the Massachusetts Department of Environmental Protection (MDEP). MDEP has a remediation process to remove the environmental hazards that enable even abandoned commercial and industrial properties to safely undergo reuse and redevelopment without posing a public health risk [49].

Figure 3.8 presents four categories of oil and hazardous material sites in Boston. Remediation of contaminated sites can take several forms, many of which are mentioned here. Figure 3.8 includes sites that, at the time BPHC obtained the data: 1) posed no significant hazard with adherence to activity and use limitations, legal conditions that limit types of activity allowed on the site (e.g., prohibiting future use of the property for childcare programs, playgrounds, or residential housing), or require engineered barriers to limit exposure to contaminants remaining at the site; 2) posed no substantial hazard but require monitoring every five years until a more permanent solution is achieved to reach a level of no significant risk; 3) presented an imminent hazard and/or were within a drinking water source area; and 4) required further assessment and cleanup before the level of risk was fully understood. In many cases, remediation can be accomplished to the point where the contamination no longer poses a significant risk to human health and the property may be used for any purpose without any conditions necessary. Sites in this category are omitted from the map. See the methods section of this report for additional information on how sites were categorized.

What factors in community and home environments pose risks to children?

Figure 3.6 Percentage of Census Tract Area Within 100 Meters of Roads Which Had More Than 50,000 Vehicles per Day on Average, Boston, 2010



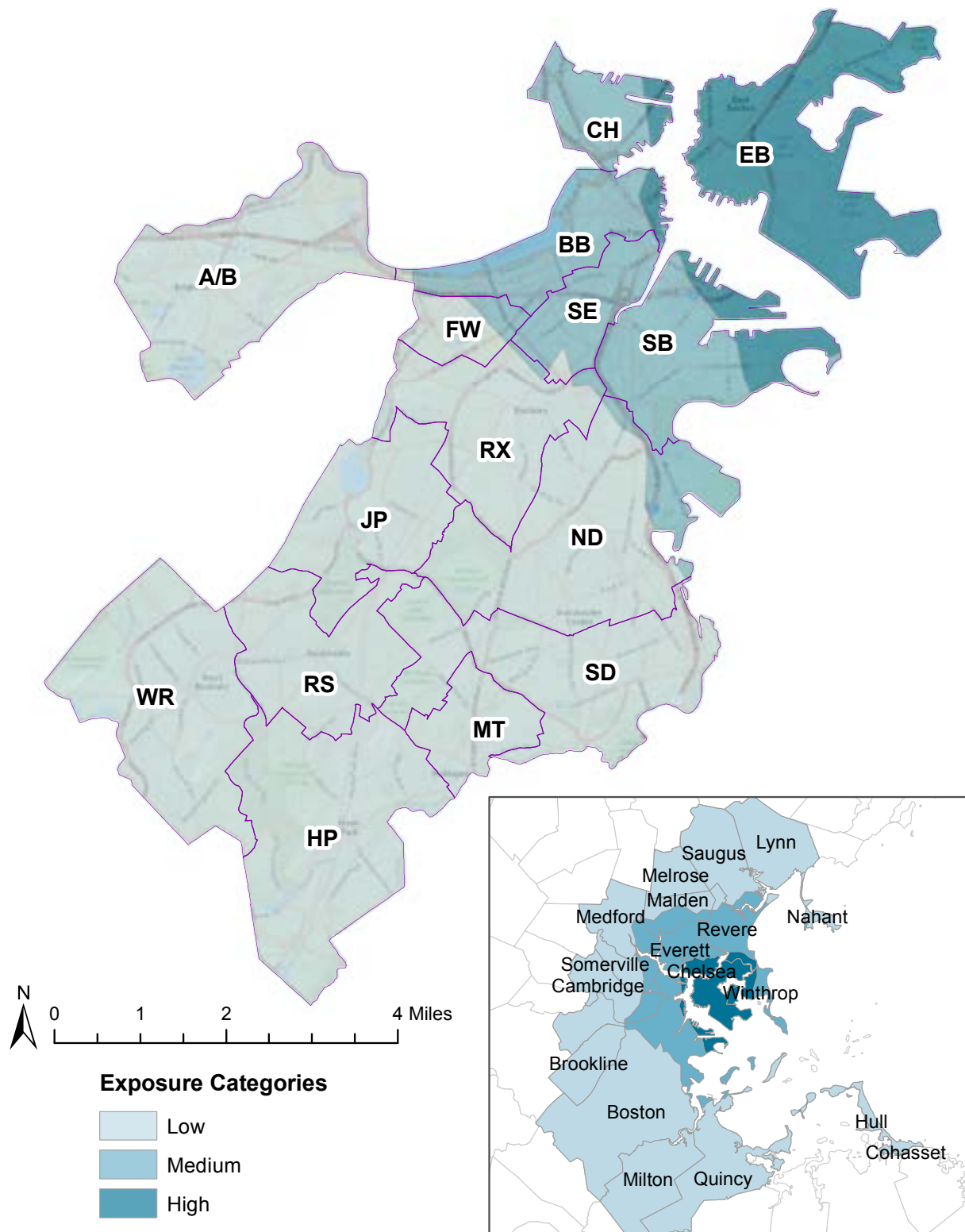
NOTES: Average vehicles per day is equivalent to annual average daily traffic (AADT), which is the total volume of vehicle traffic of a highway or road for a year divided by 365 days. AADT is a useful and simple measurement of how busy the road is.

DATA SOURCE: Department of Innovation & Technology (DoIT), City of Boston, 2010

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

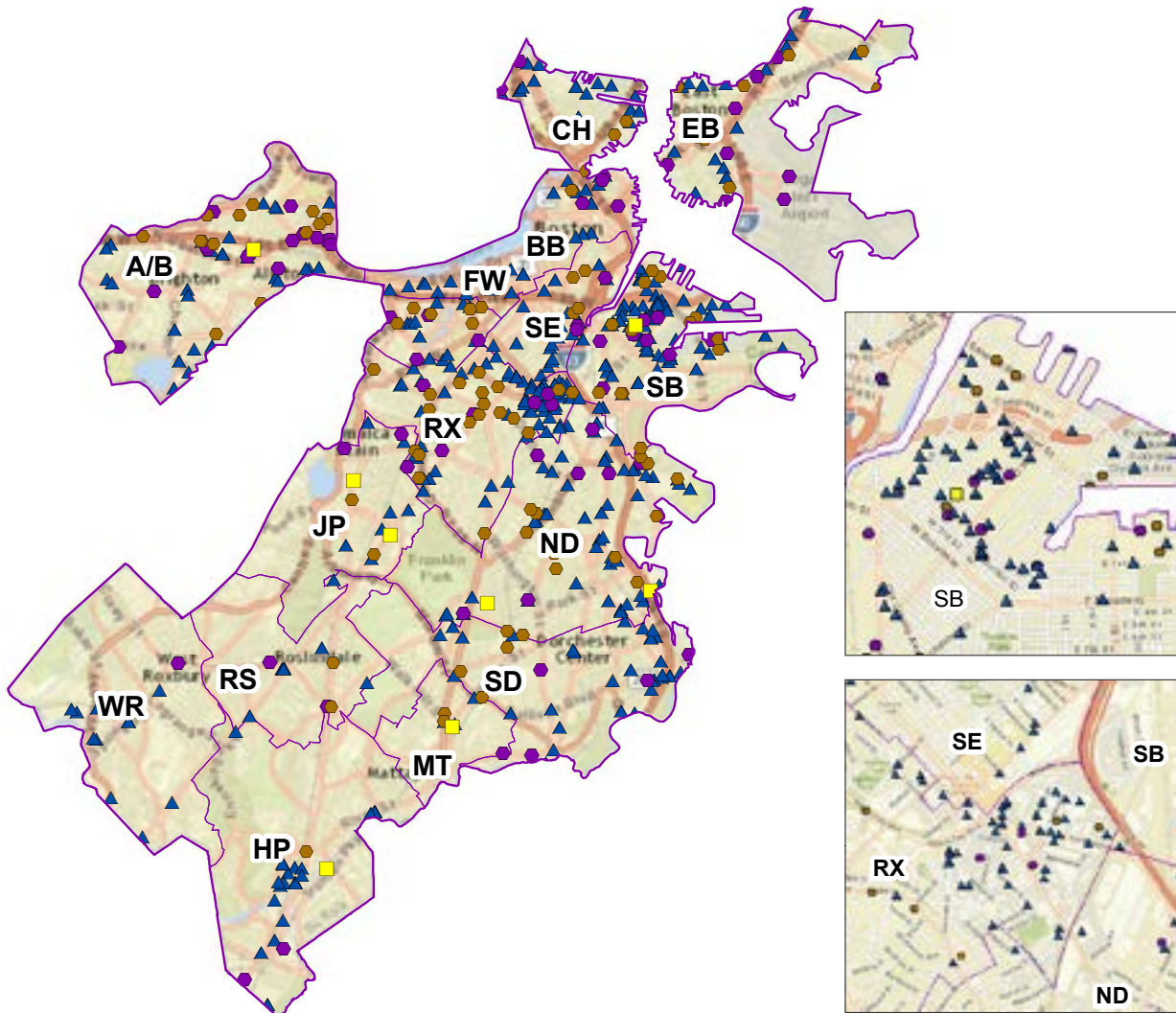
Figure 3.7 Logan Airport-Related Air Pollution, Boston and Greater Boston Area, 2005



DATA SOURCE: Logan Airport Health Study, Bureau of Environmental Health, Massachusetts Department of Public Health, May 2014
 DATA ANALYSIS: Bureau of Environmental Health, Massachusetts Department of Public Health, May 2014
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

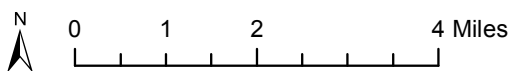
What factors in community and home environments pose risks to children?

Figure 3.8 Oil and/or Hazardous Material Sites, Boston, 2014



Classes of Oil and/or Hazardous Material Sites

- ▲ No significant risk with activity and use limitation (429)
- No substantial hazard but monitoring required (74)
- Imminent hazard and/or contamination found within a drinking water source area (9)
- Further assessment and cleanup required (105)



NOTES: Hazardous material is any material that constitutes a present or potential threat to human health, safety, or welfare or to the environment when improperly managed. Sites classified as “no significant risk with activity and use limitation” pose no significant risk to the public with adherence to activity and use limitations, legal conditions that limit types of activity allowed on a site (e.g., restricting future use of the property for day cares, playgrounds, or residential housing) or require engineered barriers to limit exposure to contaminants remaining at the site. Sites classified as “no substantial hazard but monitoring required” have been temporarily cleaned and must be re-assessed every five years until a permanent solution is determined to achieve a contamination level of “no significant risk”.
 DATA SOURCE: Department of Environmental Protection, Commonwealth of Massachusetts, October 2014
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

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Child Mortality

Fortunately, most children are healthy, and therefore child mortality rates are low, with relatively few children dying of any cause compared to adults. Across the United States, unintentional injury is the leading cause of death among children, followed by congenital impairments [50]. Figure 3.9 shows mortality rates for Boston from all causes of child death between 2007 and 2011. The data show that the mortality rate is highest for children in the <1 year age group and that the mortality rate drops sharply after infancy. Among children in the <1 year and 10-17 years age groups, the mortality rate of Black children is nearly three times the rate of White children.

Figure 3.9 All-Cause Mortality Rate* by Child Age and Racial and Ethnic Group, Boston, 2007-2011					
Age	BOSTON	Asian	Black	Latino	White
<1 yrs	641.3	550.5	1268.1	557.9	445.3
1-9 yrs	14.8	n<5	17.9	18.7	11.1
10-17 yrs	26.9	n<5	44.3	19.1	15.0

* Annualized 5-year mortality rate per 100,000 residents

DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

What factors in community and home environments pose risks to children?

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What environmental factors contribute to community quality of life?

Chapter 4 In the previous chapter we presented data on environmental risk factors that may be detrimental to child health. Here, we look at factors in the environment that contribute to community quality of life with a special emphasis on factors that facilitate or promote physical activity. We look at street connectivity, which is linked to community safety and cohesion and the ease with which families may access community resources. We also look at green space and other resources that promote physical activity and social interactions among children and families.

Community Connectivity

Connectivity, the extent to which a neighborhood is integrated by roads, sidewalks, and other structural elements, is associated with walkability and options for physical activity [1, 2]. In addition to the benefits to physical health, easy availability of resources such as stores, banks, schools, libraries, parks, and playgrounds, has been shown to enhance community engagement, perceived quality of life, and happiness of residents [3-5]. Open space and street trees, two additional features we examine in this section, contribute to a neighborhood's aesthetic appeal and are associated with health benefits, as they encourage physical activity by bringing people outdoors, reducing stress, and improving air quality [6-12].

Number of intersections per square mile is one measure city planners use to assess street connectivity. A greater number of intersections is associated with greater connectivity; fewer intersections is associated with fewer direct routes and fewer alternative routes to neighborhood destinations [13]. Greater street connectivity shortens travel distances and increases the likelihood that both adults and children will walk or bike to their regular destinations [14, 15]. In addition to its impact on activity levels, increased connectivity is associated with a lower incidence of traffic-related injuries [16]. Traditional Neighborhood Design (TND) is a neighborhood development concept that highlights the value of connectivity. It is based on the view that neighborhoods should be walkable, affordable, accessible, and distinctive [17]. In response to widespread development of single-use, automobile-oriented communities without individual character, TND emphasizes high-density, mixed-use neighborhoods that include parks, schools, and businesses within walking distance of homes; street systems that are suitable for cars, bicycles, and pedestrians; and streets with crosswalks and streetscaping [17]. The number of intersections per square mile is one element of TND for which the U.S. Environmental Protection Agency (EPA) developed a rating system. Figure 4.1 presents the number of intersections per square mile by census tract in Boston. Based on the EPA rating system, large sections of the city received low scores for number of intersections per square mile, including Roslindale, Mattapan, Hyde Park, and West Roxbury. Of course, in neighborhoods that received high scores, residents may be unable to take advantage of these positive neighborhood attributes when worries about safety keep them from the streets. Figure 3.1 in the previous chapter identifies areas of the city, including census tracts in North Dorchester, Roxbury and the South End, with high rates of violent crime.

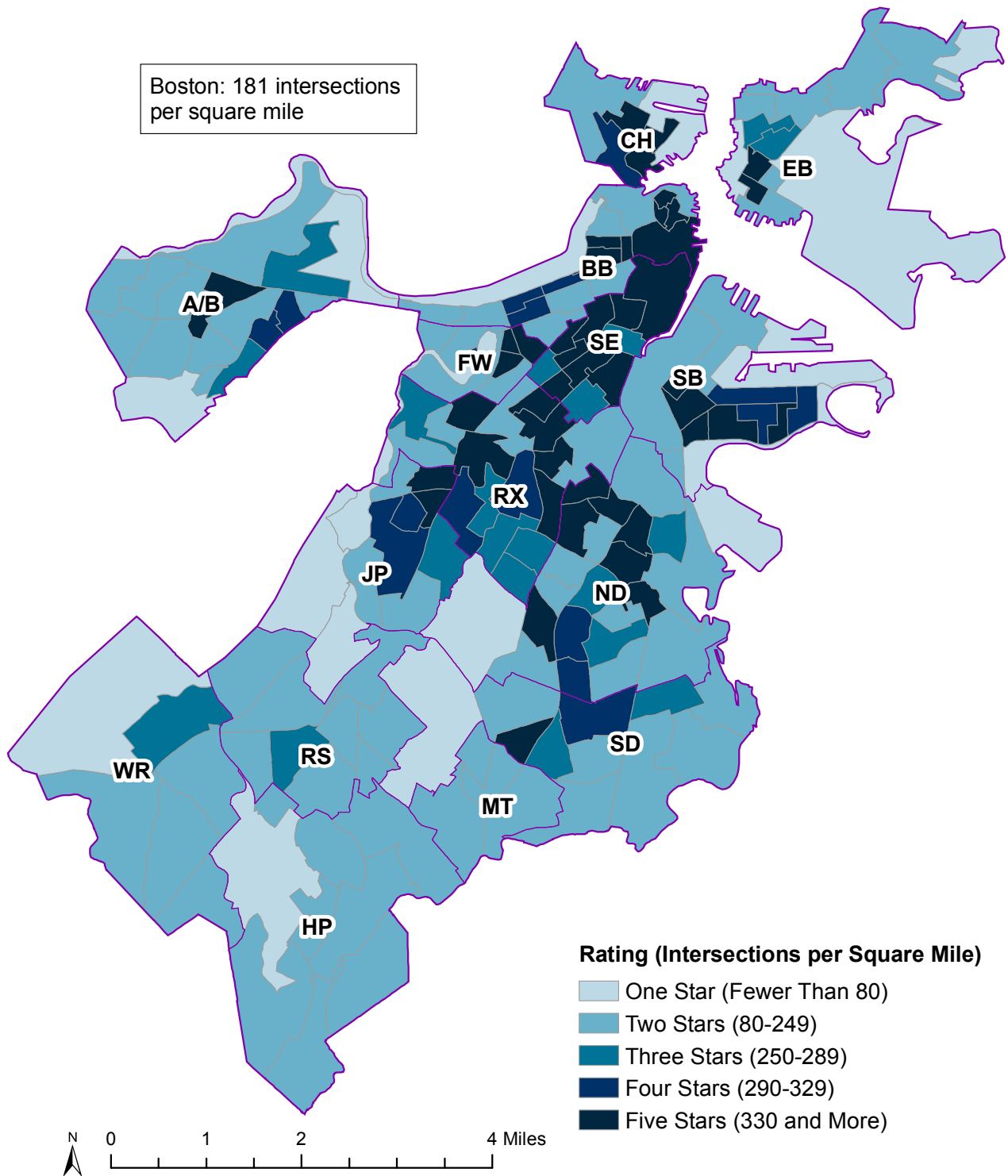
In addition to connectivity, the presence of open spaces has an impact on the health and well-being of neighborhood residents, leading many state, city, and community planning and conservation groups to prioritize access to and maintenance of open space in city planning [18-20]. The presence of open space is associated with increased walking and physical activity, and has been shown to improve residents' perceptions of their neighborhoods [21, 22]. Young children in urban neighborhoods with easy access to open outdoor spaces are more physically active than those with less access [23]. Urban green spaces are also associated with improved mental health and well-being among residents that live nearby [24]. The integration of outdoor green space into the built environment is part of Boston's strategic, citywide Open Space Plan [20]. Figure 4.2 presents the percent of land area that is open space in each Boston neighborhood, and Figure 4.3 presents areas of open space in relation to child population by neighborhood. On average, parks account for less than 10% of total land area in U.S. cities while in Boston they accounted for over 13% [25].

Street trees are trees planted in and around public walkways and roadways. They play an important role in improving a neighborhood's aesthetics, providing shade and other comfort elements, and making the neighborhood a desirable place in which to live, work, and spend leisure time. Whether densely concentrated or scattered along city streets, trees, like open space, are a primary aspect of what is termed "greenness" in some studies. Living in "greener" areas is inversely associated with overweight in children, likely due to increased levels of physical activity, and with asthma prevalence in early childhood [26-29]. Street trees also provide important environmental benefits, such as moderating the climate, filtering air pollution, and reducing noise pollution, and safety benefits, such as decreasing the likelihood

What environmental factors contribute to community quality of life?

of pedestrian injuries by creating a physical barrier between sidewalks and roadways [12, 30]. Figure 4.4 shows the number of street trees per square mile in Boston. The highest concentration of street trees was in the Back Bay and the South End.

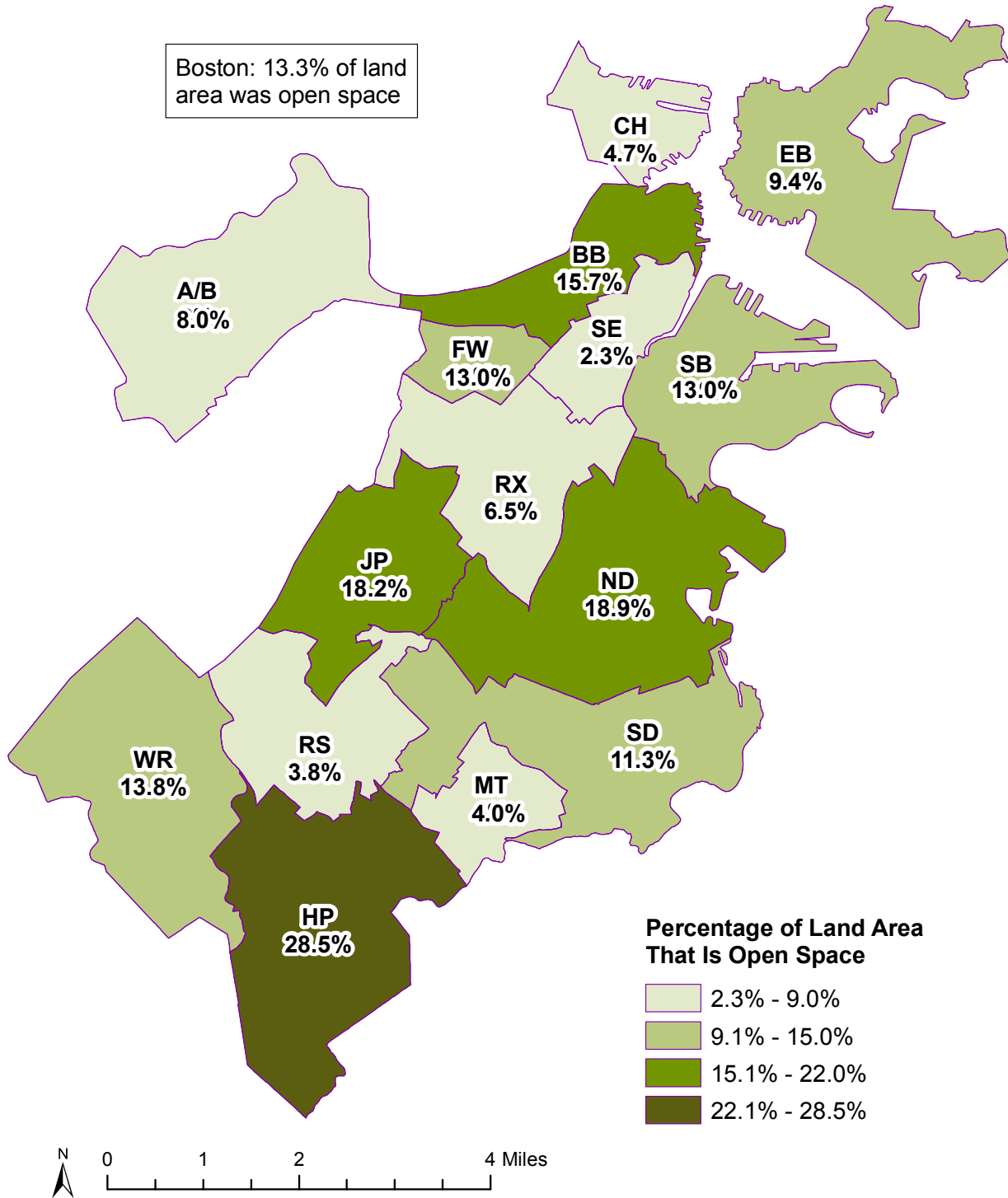
Figure 4.1 Number of Intersections per Square Mile by Census Tract, Boston, 2010



NOTE: Ratings are based on recommendations from the U.S. Environmental Protection Agency for neighborhood developments.
 DATA SOURCE: Department of Innovation & Technology (DoIT), City of Boston, 2010
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

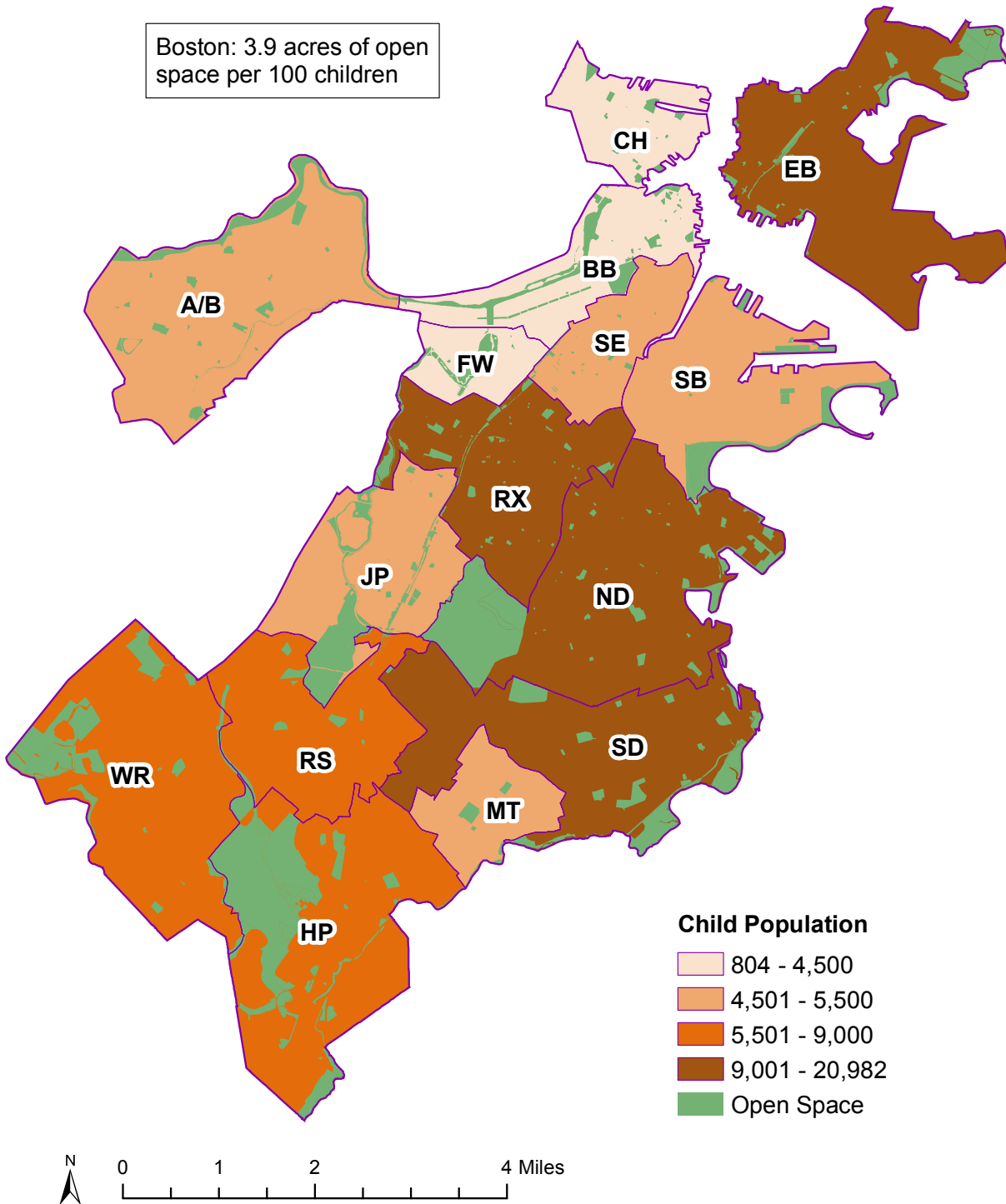
What environmental factors contribute to community quality of life?

Figure 4.2 Percentage of Land Area That Is Open Space by Neighborhood, Boston, 2012



NOTE: Open space includes publicly accessible areas of recreation and/or conservation.
 DATA SOURCE: MassGIS, March 2012
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

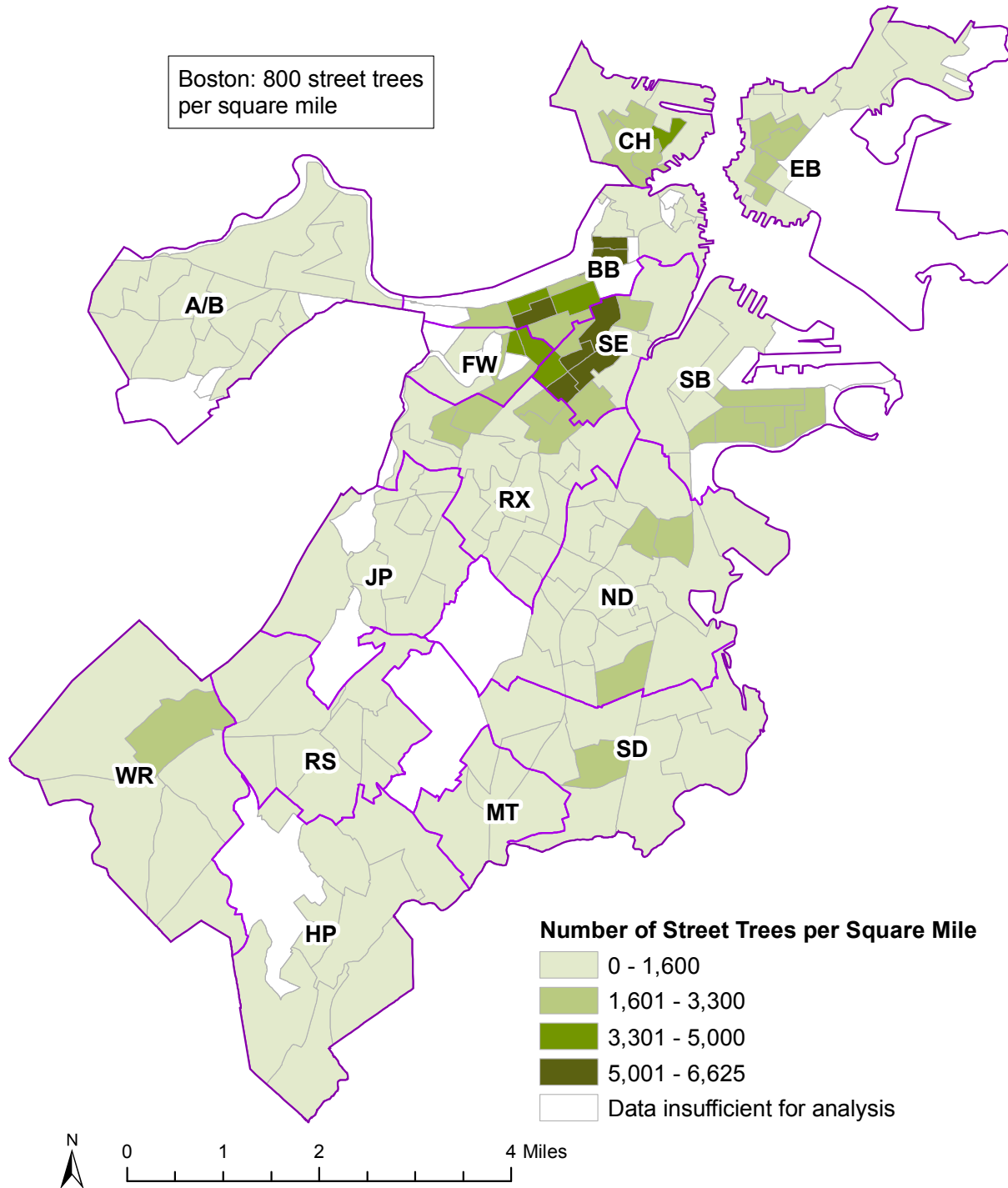
Figure 4.3 Open Space and Child Population by Neighborhood, Boston, 2012



NOTE: Open space includes publicly accessible areas of recreation and/or conservation.
 DATA SOURCES: Decennial Census 2010, U.S. Census Bureau; MassGIS, March 2012
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

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Figure 4.4 Number of Street Trees per Square Mile by Census Tract, Boston, 2007



NOTES: Street trees are trees planted in and around public walkways and roadways. Census tracts have been excluded where they include a population of less than 100 people, a population of less than 100 children, or fewer than 40 housing units.

DATA SOURCE: Department of Innovation & Technology (DoIT), City of Boston, 2007

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

Access to Places for Physical Activity and Community Resources

Physical activity is crucial for children's health. It builds healthy bones and muscles, reduces the risk of cardiovascular and other chronic disease, prevents depression and anxiety, and improves concentration and performance at school [31, 32]. In addition to direct health benefits, physical activity can offer opportunities for children to establish social ties [33]. Access to open space and facilities such as pools, skating rinks, and community centers is an important factor in the amount of time children engage in physical activity [23]. Despite its importance, many Boston children do not get enough regular physical activity. The U.S. Centers for Disease Control and Prevention (CDC) recommends that children get sixty minutes of physical activity each day. According to the 2012 Boston Survey of Children's Health (BSCH), about one-third (32.6%) of Boston children ages 6-17 engaged in physical activity that made them sweat or breathe hard for at least 20 minutes everyday [34]. Boston children face multiple barriers to meeting physical activity recommendations. For many, these may include lack of access to open space and recreational facilities that promote physical activity [35].

Although physical proximity is one element of access, research indicates that safety, aesthetics, and maintenance of sports facilities also affect utilization [23, 36]. Findings from the 2012 BSCH indicate that 26% of children in Boston lived in households where a parent or caregiver felt a child was unsafe in his or her neighborhood, which may be a barrier to children's use of outdoor space in some communities [34]. Extreme weather, experienced in Boston during both summer and winter, can also be a barrier, highlighting the importance of access to indoor as well as outdoor activities [37]. Figure 4.5 presents places for physical activity and child population by neighborhood in Boston. Children in all Boston neighborhoods had outdoor space or other resources for physical activity nearby. Whether children are able to make use of these resources may depend on factors beyond physical access, however, such as parent-perceived safety, and availability of indoor as well as outdoor activities.

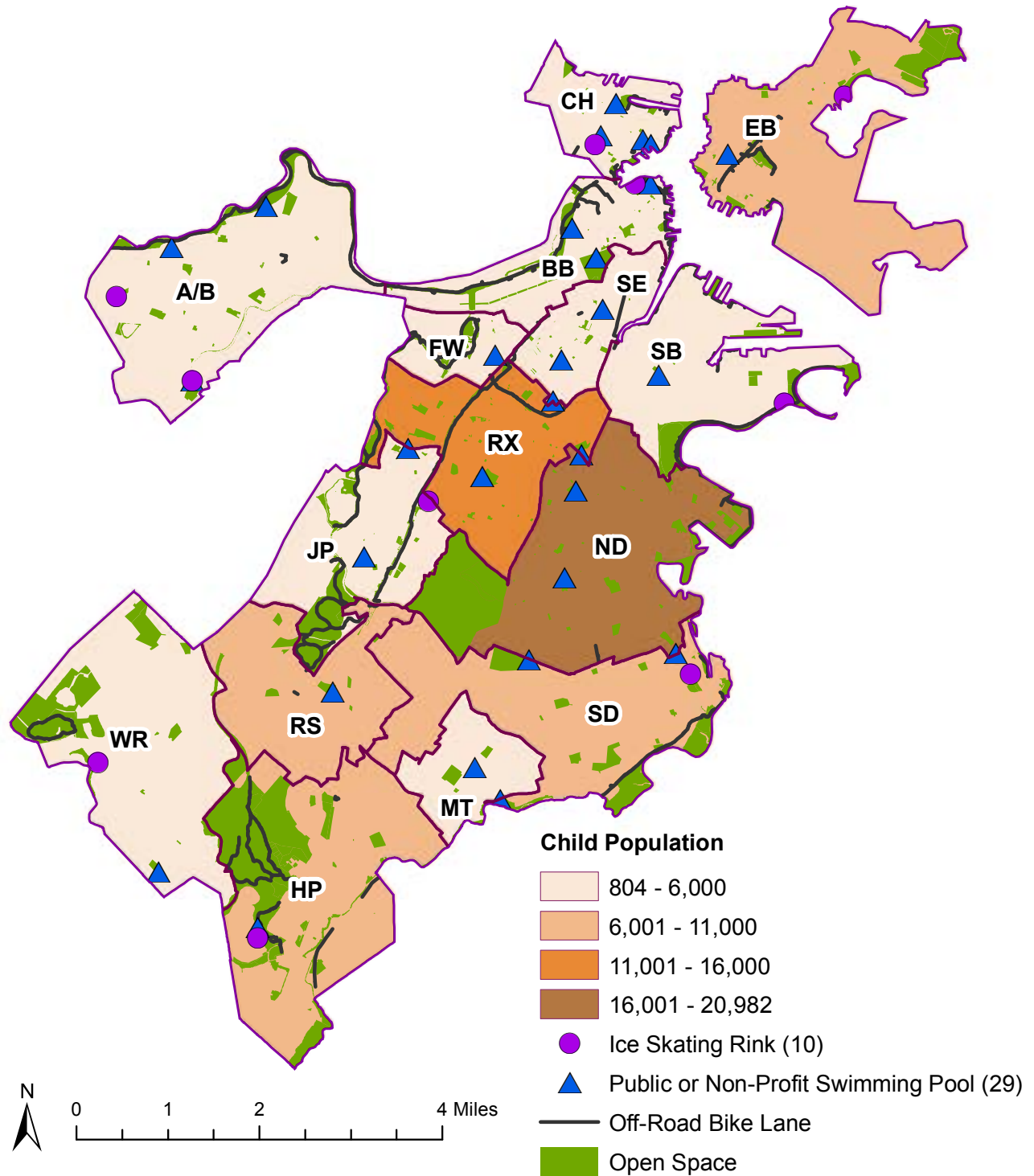
Community centers, YMCAs, and Boys and Girls Clubs host a range of programs in Boston, providing children and families with options for social participation and physical activity at little or no cost. In addition, many programs located at these sites improve youth outcomes and avert self-destructive behavior through skills development, relationship building, and sharing of information about issues that affect youth [38]. Figure 4.6 presents the estimated percentage of families with children within walking distance to community centers, YMCAs, and Boys and Girls Clubs in Boston neighborhoods, and Figure 4.7 shows the locations of community centers, YMCAs, and Boys and Girls Clubs in relation to child population. Access to these community recreational facilities within walking distance of families with children was limited in parts of the city, particularly in Hyde Park, West Roxbury, Jamaica Plain, and Allston/Brighton. This may have limited children's and families' ability to participate in physical activity and children's opportunities for social engagement and participation in positive programming. These facilities were most widely available in Charlestown, South End, and South Boston.

According to the 2012 BSCH, the percentage of children with special health care needs (CSHCN) that participated in sports or club activities after school or on weekends was lower than the percentage of children without special health care needs [34]. Research also indicates that CSHCN are less physically active than their peers [39-41]. People with disabilities are no different from others in that daily physical activity improves cardiovascular function, muscle fitness, ability to perform daily activities of life, and mental health [42]. Because CSHCN may have behavioral problems, emotional problems, and difficulties with verbal communication, and may suffer social isolation from their peers, participation in programs can be especially important among this population of children [43]. Art programs can provide CSHCN with outlets for non-verbal forms of communication, promote self-awareness and self-expression, and build social skills and relations [44-46]. Lack of programmatic resources – money, transportation, and oversight

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– and adaptive environments in the community, contribute to physical inactivity and lack of opportunities for social interaction and self expression among CSHCN [47]. Figure 4.8 presents community-based arts and recreation resources for CSHCN and their families based on the Family TIES of Massachusetts Directory of Resources for Families of Children and Youth with Special Needs, a guide that is developed and updated each year by and for parents of CSHCN. This map also includes resources listed on Disability.org and the Boston Navigator website [48]. Lack of programs for CSHCN leaves many families in the city with few avenues to address the physical activity, social, and other developmental needs of their children.

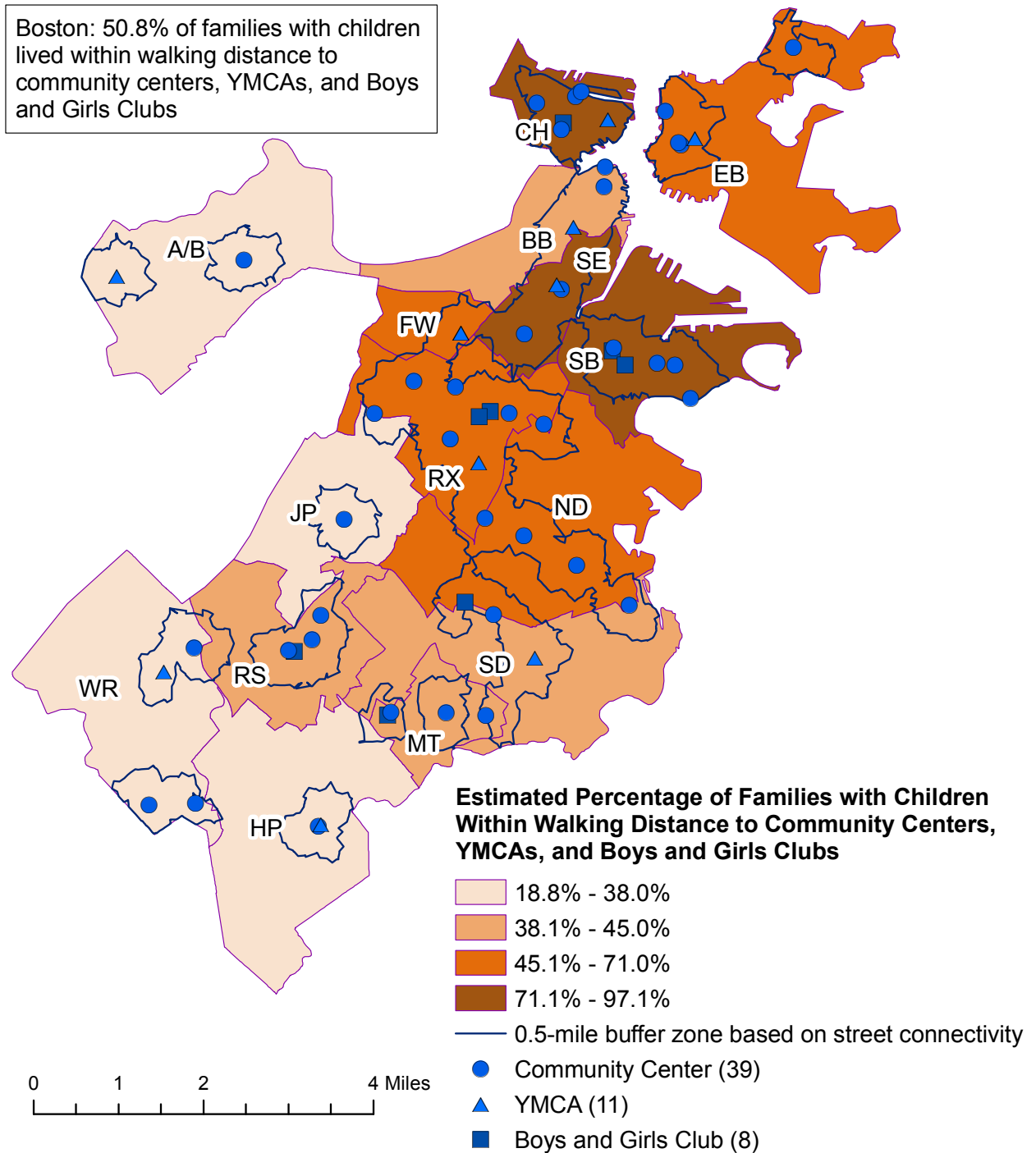
Figure 4.5 Places for Physical Activity and Child Population by Neighborhood, Boston, 2012



NOTE: Open space includes publicly accessible areas of recreation and/or conservation.
 DATA SOURCES: Boston Public Health Commission, 2012 (swimming pools); Decennial Census 2010, U.S. Census Bureau (child population); Department of Conservation and Recreation, Commonwealth of Massachusetts, February 2014 (skating rinks); Department of Innovation and Technology (DoIT), City of Boston, May 2012 (bike lanes); MassGIS, March 2012 (open space)
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

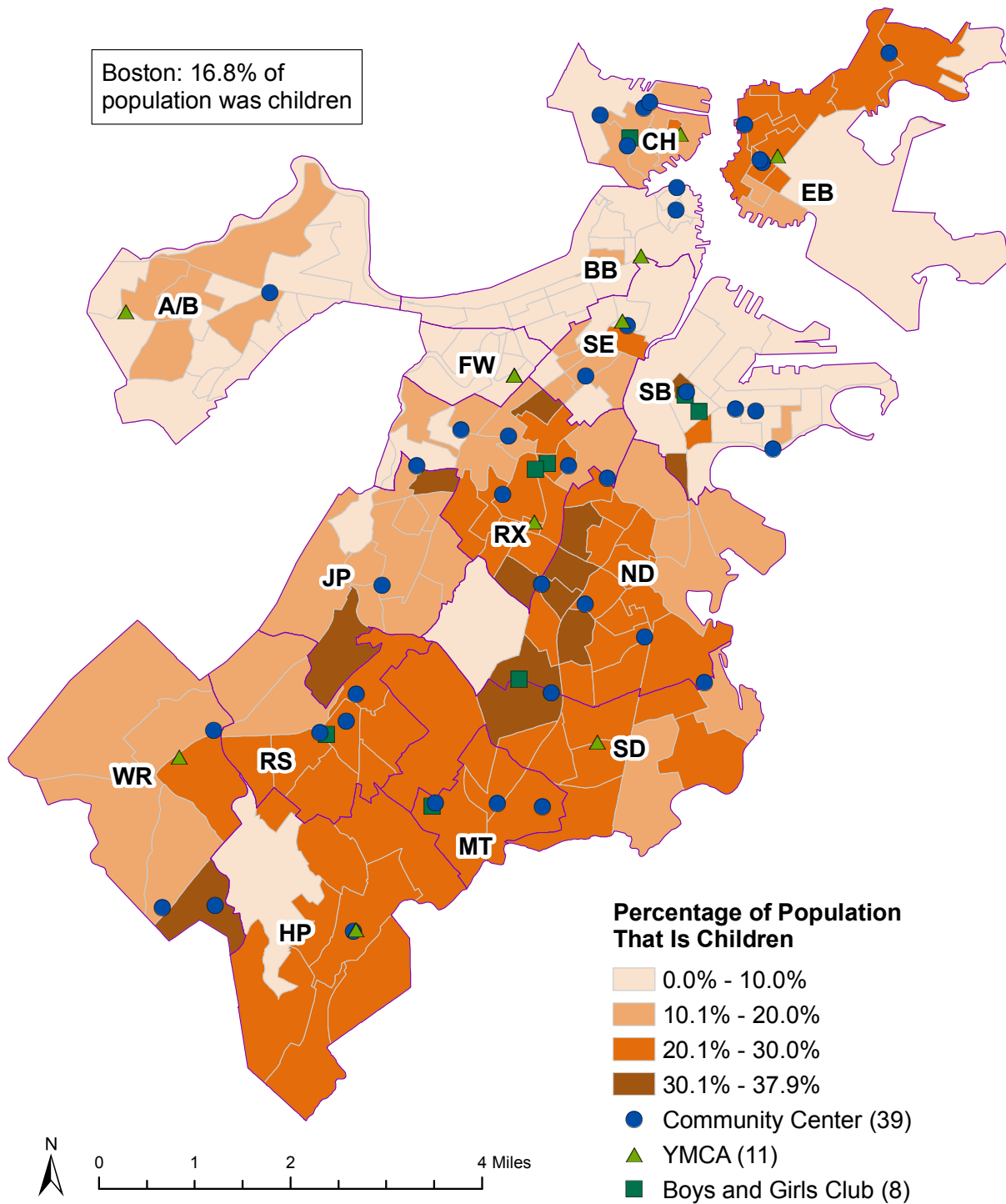
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Figure 4.6 Estimated Percentage of Families with Children Within Walking Distance (0.5 Miles) to Community Centers, YMCAs, and Boys and Girls Clubs, Boston, 2012



NOTES: Community centers are all centers administered through Boston Centers for Youth and Families. Estimates are based on the distribution of families with children at the block level in 2010 U.S. Census data. Families with children are assumed to be evenly distributed geographically within census blocks that intersect with the walking-distance-buffer zones. Street connectivity refers to the directness of links and the density of connections in a street network.
 DATA SOURCES: Department of Innovation & Technology (DoIT), City of Boston, 2012; Decennial Census 2010, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

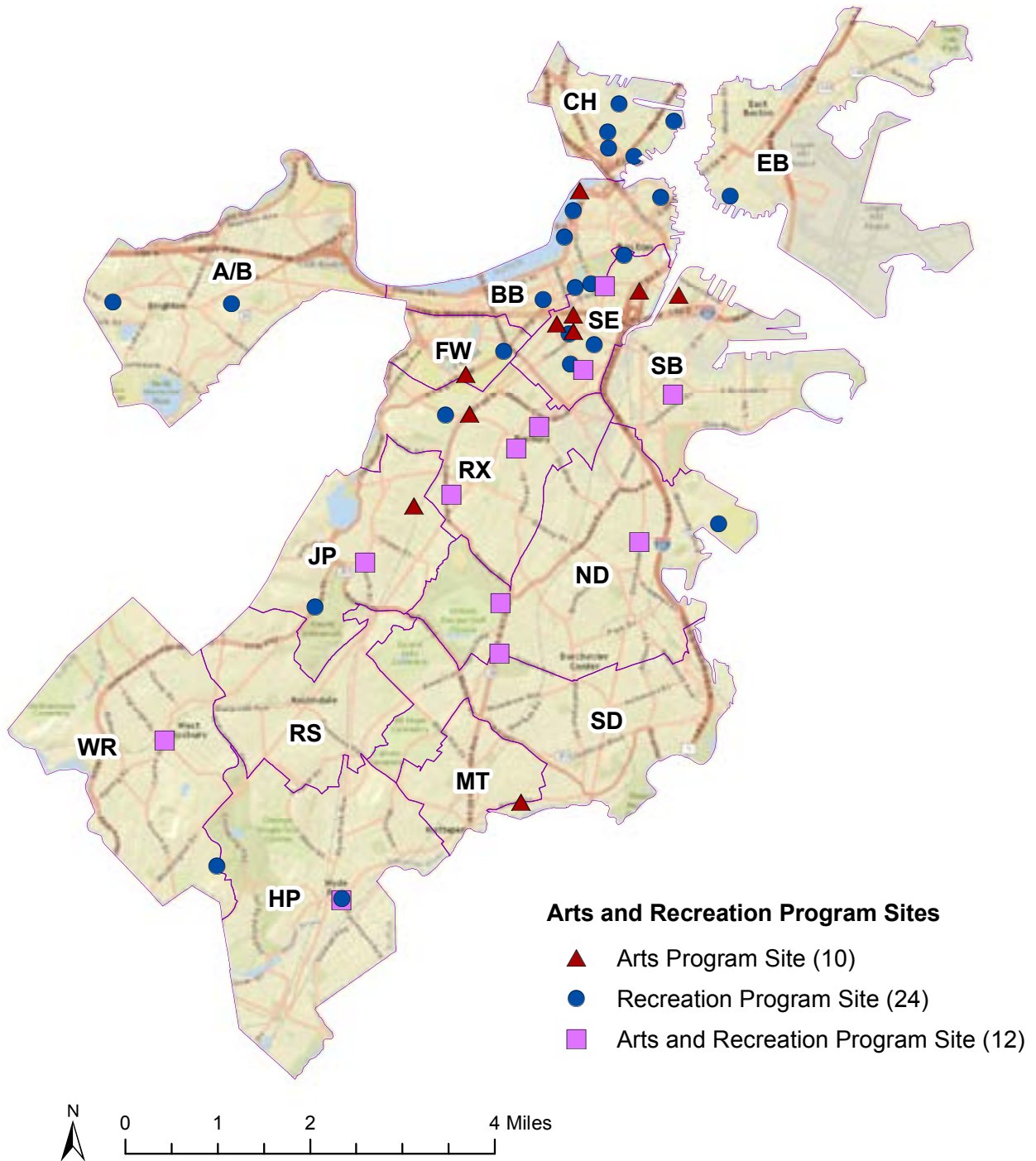
Figure 4.7 Community Centers, YMCAs, and Boys and Girls Clubs and Child Population by Census Tract, Boston, 2012



DATA SOURCE: Department of Innovation & Technology (DoIT), City of Boston, 2012; Decennial Census 2010, U.S. Census Bureau
 DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
 MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

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Figure 4.8 Arts and Recreation Resources for Children with Special Health Care Needs, Boston, 2014



DATA SOURCES: Arts and recreation programs from "Directory of Resources for Families of Children and Youth with Special Needs", Family TIES of Massachusetts, April 2014; Eunice Kennedy Shriver Center, University of Massachusetts Medical School, April 2014; Boston After School & Beyond, April 2014
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
MAP CREATED BY: Boston Public Health Commission Research and Evaluation Office

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