FOOD for EVERY CHILD

THE NEED FOR MORE SUPERMARKETS IN MASSACHUSETTS
ACKNOWLEDGEMENTS

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MASSACHUSETTS must address the significant need for supermarkets and fresh food resources in many of its communities. Many factors have led supermarkets to disinvest from lower-income communities across the Commonwealth, leading to a public health crisis. The Food Trust researched and wrote Food for Every Child: The Need for More Supermarkets in Massachusetts to document these findings and to ensure that all children and their families live in communities that have access to healthy and affordable food. This goal can be achieved by encouraging the development of supermarkets in underserved communities.

Despite being one of the most affluent states in the nation, Massachusetts has fewer supermarkets per capita than almost any other state. Some cities, including Boston, Springfield and Brockton, have as much as 30 percent fewer per capita supermarkets compared to national averages. In Lowell and Fitchburg, the number of supermarkets would need to double to adequately serve the population. The problem is statewide; when measured against the national rate of per capita supermarkets, Massachusetts has 141 too few.¹

In addition to having too few supermarkets, existing supermarkets are unevenly distributed across the state, and lower-income communities are categorically underserved in respect to supermarket access. The situation in Massachusetts is not unique; a nationwide study of over 28,000 ZIP codes found that low-income ZIP codes have 25 percent fewer per capita supermarkets than middle-income ZIP codes.²

The lack of access to affordable and nutritious food has a negative impact on the health of children and families. A growing body of research indicates that people who live in communities without a supermarket suffer from disproportionately high rates of obesity, diabetes and other diet-related health problems. In contrast, when people live in a community with a supermarket, they tend to eat more servings of fruits and vegetables and are more likely to maintain a healthy weight.³

Increasing the availability of nutritious and affordable food in communities with high rates of diet-related diseases does not guarantee a reduction in the incidence of these diseases. However if barriers to supermarket access can be removed, people in these communities can more easily obtain an adequate diet. Furthermore, the development of new supermarkets sparks economic revitalization and brings jobs into communities that need them most.

Through mapping, this study concludes that many communities in Massachusetts with poor supermarket access also have a high incidence of diet-related deaths. Access to supermarkets is a key factor in the health and development of a community.

We call upon state and local governments to take the lead in developing a public-private response to this problem. While not a situation of any one sector’s making, it is in the interest of the entire community to solve this problem, a fact made all the more evident by the estimated $1.8 billion that Massachusetts spends each year treating obesity-related diseases.⁴ Solutions that have proven successful elsewhere in the country, such as Pennsylvania’s Fresh Food Financing Initiative, have included:

- Convening leaders from business, government, public health, economic development and civic sectors to develop a strategy to establish more supermarkets in lower- and moderate-income communities.
- Strategic investments with public funds to reduce the risks associated with the development of more supermarkets in lower- and moderate-income communities.
Despite being one of the wealthiest states in the nation, Massachusetts has fewer supermarkets per capita than almost any state in the country ranking third lowest nationwide.  

This shortage of supermarkets means that residents, particularly those in lower-income communities, must travel out of their neighborhoods to reach the nearest store that sells fresh produce and other foods necessary to maintain a healthy diet.

Lower-income residents in Massachusetts are likely to suffer from obesity and other diet-related health problems at rates significantly higher than those of the population as a whole. For children, the situation is particularly alarming. Recent data indicates that a staggering one-third of Massachusetts schoolchildren are overweight or obese by the time they reach first grade.
Many lower-income families in Massachusetts have limited funds with which to purchase healthy foods. Recent increases in the cost of food place further strain on these limited resources. These families are also likely to have few, if any, places in their communities in which to shop for reasonably priced, nutritious foods. Massachusetts’ supermarket deficit could be eased and diet-related health problems decreased by embracing an initiative to build more supermarkets in lower-income communities, resulting in improved health of children and families.

Such an investment would have positive economic impacts as well. Supermarkets create jobs and revitalize communities, serving as retail anchors and sparking complementary development nearby.

The Food Trust wrote Food for Every Child: The Need for More Supermarkets in Massachusetts to ensure that all children live in communities that have access to nutritious and affordable food. This report is designed, in part, to stimulate a process which will result in the development of supermarkets and other healthy food retail markets in lower-income communities. To achieve that goal, this study outlines the extent and implications of the supermarket shortage by identifying the gaps in food availability and the relationship between supermarket access, diet-related diseases and neighborhood income levels.

This study builds on the excellent work undertaken over the past several years by a variety of government, private and civic leaders in Boston. Under the leadership of Mayor Thomas M. Menino, the City of Boston has been at the forefront of addressing this issue, successfully attracting over a dozen supermarkets back into the city over the past ten years, including several in lower- and moderate-income neighborhoods. Despite this considerable progress, this report demonstrates that there is still more work to be done both in Boston and at the state level to ensure that all residents have convenient access to stores selling fresh and affordable foods. The Food Trust is committed to building on this success and working with state and local leaders to improve supermarket access for residents across the Commonwealth.

One-third of Massachusetts schoolchildren are overweight or obese by the time they reach first grade.

A growing body of research demonstrates that access to supermarkets has a measurable impact on people’s diet and health outcomes. Both the Institute of Medicine and the Centers for Disease Control and Prevention have independently recommended that increasing the number of supermarkets in low-income neighborhoods would reduce the rate of obesity in the United States. They also suggest that state and local governments should create incentive programs to attract supermarkets to these neglected neighborhoods.9, 10

Methodology
To demonstrate which neighborhoods lack supermarkets, a geographical representation of food access, income and diet-related disease was created by mapping the locations of supermarket sales, income and diet-related mortality data. (See Appendix for more detail.) Retail sales data for supermarkets were obtained from Trade Dimensions. Diet-related mortality data for 2006 were provided by the Massachusetts Department of Public Health and demographic data were derived from the 2000 US Census.

A series of maps was created using Geographic Information Systems computer mapping software.7 Weekly sales volume at supermarkets was distributed over a one-mile radius to plot the concentration of sales and then divided by total population density and the average for weekly sales per person to calculate a ratio for weekly supermarket sales per person. The ratios were mapped; ratios greater than 1 represent high sales and ratios less than 1 represent low sales. Median household income was multiplied by the number of households to determine total income density. The term “lower income” in this report is used to define areas where households have less than median income, except when citing a separate study.

A total of 20,450 diet-related deaths were mapped across the state, including 1,398 in Boston. The ratio of deaths per total population was mapped. “High” diet-related mortality areas are defined as having diet-related death rates greater than the statewide average, and “low” areas have diet-related death rates lower than the statewide average. Only data for Massachusetts were analyzed, so no comparisons were made with rates outside of the state.
Access to nutritious food is not evenly distributed in Massachusetts. Many people have to travel excessive distances to buy food at a supermarket.

- The uneven distribution of supermarkets is a serious problem in Massachusetts. There are large areas of the state with few supermarkets, and many neighborhoods where none exist. This situation is reflected at the local level in Boston, where substantial gaps in neighborhood food availability exist.

MAP 1A/B: Weekly Sales Volume for Supermarkets shows the location of 590 stores throughout Massachusetts, including 52 in Boston, and the weekly sales volume at each store. The smaller red circles represent lower weekly sales volume; the larger red circles represent higher weekly sales volume. The gray shading shows how supermarket sales are distributed across each census tract. The darkest areas have the highest concentration of supermarket sales, whereas the light areas have the lowest sales, indicating that few or no supermarkets are located there.
Map 1A shows that supermarkets in Massachusetts are unevenly distributed. Supermarkets are highly concentrated along major highways and in suburban areas, while urban centers, as well as rural communities in Central and Western Massachusetts, are relatively underserved. This suggests that many people are traveling considerable distances to buy food at supermarkets in those areas where supermarkets are more easily accessible.

Map 1B features supermarkets in Boston and the concentration of sales across the city. Neighborhoods near downtown, including Alston-Brighton, Fenway, Back Bay and the South End, have the highest concentration of supermarkets and supermarket sales, along with retail centers such as the South Bay Plaza found along major thoroughfares. Neighborhoods with the fewest supermarkets include East Boston, Roxbury, Mattapan, Jamaica Plain and Roslindale.

**In Boston, neighborhoods with the fewest supermarkets include East Boston, Roxbury, Mattapan, Jamaica Plain and Roslindale.**

**MAP 2A/B: Supermarket Sales and Population**

shows that the amount of supermarket sales in a particular location does not seem to be associated with the population of that area. Communities with greater than average supermarket sales relative to total population are shown in yellow and brown tones. In these communities, people are either spending more than average in supermarkets, as might be the case in higher-income communities, or more people are buying groceries in these communities than the number of people who live there, indicating that people are traveling from outside the area to shop there.
The uneven distribution of supermarkets in Massachusetts leaves a disproportionate number of lower-income people without access to nutritious food.

- Massachusetts ranks among the lowest states in the nation for supermarket density (3rd lowest out of 50 states). Some cities, including Boston, Springfield and Brockton, have as much as 30 percent fewer per capita supermarkets compared to national averages. In Lowell and Fitchburg, the number of supermarkets would need to double to adequately serve the population.⁸

This shortage of supermarkets particularly impacts lower-income residents with limited resources to obtain an adequate diet.

**MAP 3A/B:** **Supermarket Sales and Income** shows the distribution of supermarket sales and the distribution of income throughout the state and city. Higher-income areas with higher supermarket sales have the best access to food resources and are indicated by the green areas of the map. In some lower-income areas, there are communities with higher than average supermarket sales volumes, as highlighted in blue. People in the areas shown in yellow have fewer supermarkets to shop at in...
their community. However, since these communities are higher-income and often have high car ownership rates, residents are likely able to drive to stores or to stop at small specialty food purveyors. The red areas represent lower-income communities that are not adequately served by supermarkets.

**MAP 4A/B: Low Supermarket Sales and Low Income** further highlights areas with low supermarket sales because there are few to no supermarkets located there. Since income is also lower in these areas, families face more difficulty traveling to the areas where supermarkets are concentrated, especially when public transit is not accessible or convenient.

Lower-income neighborhoods with insufficient supermarket access can be found in cities and towns across the Commonwealth, including in Springfield, Worcester, Lowell, Lawrence, Lynn, Brockton, Fall River and New Bedford. Rural communities in Western and Central Massachusetts, around the Orange-Athol and Pittsfield-North Adams areas, are also underserved by supermarkets.

In Boston, underserved neighborhoods are concentrated in Roxbury, Mattapan and parts of Dorchester, as well as in East Boston.

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KEY FINDINGS

There is a connection between lack of supermarkets and diet-related disease.

- The Food Trust and PolicyLink, a national research and advocacy organization, conducted a comprehensive literature review which found that studies overwhelmingly indicate that people living in communities without a supermarket suffer from disproportionately high rates of obesity and other related health issues, while people living in communities with a supermarket are more likely to maintain a healthy weight.9

One study, for example, found lower body mass index among adolescents who live near a supermarket.10 Another documented that fruit and vegetable intake increases as much as 32 percent for each additional supermarket in a community.11

MAP 5A/B: Income and Diet-Related Deaths shows diet-related mortality data by income in Massachusetts and Boston. The red areas indicate a higher than average rate of diet-related deaths occurring in lower-income areas. The yellow areas display higher rates of diet-related deaths occurring in higher-income areas. The blue and green areas have lower rates of diet-related deaths.
Diet-related diseases, such as hypertension, obesity and diabetes, create untold suffering and expense in families and communities. Heart disease and stroke account for more than one-third of deaths in Massachusetts, and overweight or obese adults are significantly more likely to suffer from these conditions. Diet-related deaths are associated with many factors, including the lack of access to a nutritionally adequate diet.

MAP 6A/B: Areas with Greatest Need displays lower-income communities where there are low supermarket sales and a high number of deaths due to diet-related disease. These areas have the greatest need for more supermarkets.

To provide affordable and nutritious food in these neighborhoods, and to address the high rates of obesity and other diet-related diseases, Massachusetts should encourage new supermarket development in lower-income areas where there are few supermarkets.

Increasing the availability of nutritious and affordable food in neighborhoods with high rates of diet-related diseases does not guarantee a reduction in their incidence. However, leading public health experts, including the Centers for Disease Control and Prevention and the Institute of Medicine, agree that it is a critical component of the fight against obesity.

Leading public health experts agree that increasing access to supermarkets in underserved communities is a critical component of the fight against obesity.
CONCLUSION

The lack of access to supermarkets is a problem in many communities in Massachusetts especially in lower-income areas where the incidence of obesity is alarmingly high.

The lack of supermarkets in many communities means that lower-income residents have to rely on corner and convenience stores with higher prices and often lower-quality foods or travel long distances to purchase nutritious foods. Diets that rely on food from convenience stores are often higher in sugar and fat, contributing to obesity and other diet-related disease.

The increased incidence of obesity and other diet-related diseases in lower-income communities suggests that the public sector needs to invest in supermarket development in these underserved areas to help combat these diseases. Such an investment would have positive economic impacts as well, since supermarkets bring jobs to communities that need them the most.

The public sector has a responsibility to help provide a nutritious food supply in underserved communities in order to safeguard public health and promote economic development. As supermarkets replaced earlier forms of food retailing, such as public markets, the public sector largely withdrew from food retailing. Supermarkets later left many communities, leaving large numbers of people without a stable food supply. At the same time, the incidence of obesity and other diet-related diseases increased in these communities.

These consequences are stark for people of lower incomes. People who live in lower-income areas without access to supermarkets suffer from diet-related deaths at a rate higher than that experienced by the population as a whole. Based on additional studies conducted by The Food Trust and others, access to fresh, affordable and nutritious food plays a role in determining what people eat.\textsuperscript{13, 14} People who can only access poor food choices eat poorly.

Massachusetts has too few supermarkets compared to national averages.\textsuperscript{15} Through mapping, this study shows that many lower-income communities in Massachusetts have both poor supermarket access and a high incidence of diet-related deaths. This problem is reflected at the local level in Boston where significant gaps in neighborhood food availability persist. This study demonstrates that this issue is related to significant health problems that adversely impact lower-income communities.
Massachusetts must address the critical need for more supermarkets in many communities.

The number of supermarkets in a neighborhood is a key factor contributing to the health and economic development of neighborhoods. People living in lower-income areas without access to supermarkets suffer from diet-related deaths at a rate higher than that experienced by the population as a whole. Through public investment, we can increase the number of supermarkets in underserved communities and improve the health of children and families across the Commonwealth.

We recommend that state and local governments in Massachusetts,

Convene leaders from the supermarket industry, government, public health, economic development and civic sectors to develop a strategy to create more supermarkets in lower-income communities.

A key element of this strategy is for state and local governments to create a grant and loan program to support local supermarket development projects in order to increase the availability of affordable and nutritious food in underserved areas.
GIS Methodology

All Massachusetts statewide analysis was at the census tract level of geography and is prefixed by A); all Boston citywide analysis was done at the census tract level using interpolated rasters and density grids and is prefixed by B).

SUPERMARKET SALES
Supermarkets in the 2009 Trade Dimensions retail database were included in the analysis of sales. For the purposes of this study, the definition of a supermarket is any store that has an SIC code of 541105 and an annual sales volume of greater than $2 million. There were 590 supermarkets in Massachusetts with an aggregate weekly sales volume of $254,377,000, and 52 supermarkets in Boston with an aggregate weekly sales volume of $19,015,000. Stores were plotted using the latitude and longitude coordinates for aggregate weekly sales volume of $19,015,000. Stores were included in the analysis of sales. For the purposes of this study, the definition of a supermarket is any store that has an SIC code of 541105 and an annual sales volume of greater than $2 million. There were 590 supermarkets in Massachusetts with an aggregate weekly sales volume of $254,377,000, and 52 supermarkets in Boston with an aggregate weekly sales volume of $19,015,000. Stores were plotted using the latitude and longitude coordinates for each record and then classified into two categories; above and below $150,000 in weekly sales volume. Values of sales density were used to classify the A) census tracts and B) raster grid into the four categories shown in Map 1: Weekly Sales Volume for Supermarkets.

POPULATION
Population data for the Commonwealth of Massachusetts and City of Boston by census tract was retrieved from the US Census Bureau website (www.census.gov) for the year 2000 decennial census (Massachusetts total of 6,349,097 people; Boston total of 589,141 people). Geographies with no population were removed from the analysis, as indicated on the maps.

SALES AND POPULATION
A) The weekly sales volume was divided by the total population of each ZIP code. The result was then divided by $59.72 (the statewide ratio of sales to population: $1,245,360,000/20,853,232) to create an odds ratio for weekly supermarket sales per person for Texas. B) The density of weekly sales volume raster was divided by the density of total population raster. The result was then divided by $37.95 (the citywide ratio of sales to population: $74,139,000/1,953,631) to create a “sales” odds ratio for weekly supermarket sales per person. An odds ratio of 1 is equivalent to the statewide/citywide rate. Anything below 1 is below the statewide/citywide rate. An odds ratio of 2 means the rate is twice the statewide/citywide rate. This is used for Map 2: Supermarket Sales and Total Population.

INCOME
Median household income (Massachusetts: $50,502; Boston: $39,629) was multiplied by number of households, and the result was divided by total population to create an average per capita income (Massachusetts: $19,436.73; Boston: $16,112.03). Local per capita income by census tract was divided by this number giving an “income” odds ratio above or below the statewide/citywide rate. B) The odds ratio, assigned to the census tract centroid, was used to interpolate a grid, which was then reclassified to yield two distinct values, those below and those above the odds citywide rate.

SALES AND INCOME
The “sales” and “income” odds ratios were combined resulting in four distinct values which correspond to the four possible combinations of high and low odds ratios, which were used to classify Map 3: Supermarket Sales and Income and Map 4: Low Supermarket Sales and Low Income.

DIET-RELATED DEATHS
The Massachusetts Department of Public Health provided mortality data for the specified list of ICD-10 codes for the year 2006. A) A total of 20,450 diet-related deaths were mapped at the census tract level for Massachusetts, and B) a total of 1,398 deaths were mapped at the census tract level for Boston. The data were summarized based upon the census tract number to obtain a count of diet-related deaths per census tract.

DIET-RELATED DEATHS AND POPULATION
The total number of deaths attributed to each census tract was divided by the total population of that census tract. This result was divided by the statewide/citywide ratio of diet-related deaths to total population (Massachusetts: 20,450/6,349,097 = 0.003221, or 32 diet-related deaths per 10,000 people; Boston: 1,398/589,141 = 0.002373, or 24 diet-related deaths per 10,000 people), to calculate an odds ratio. A) A new binary field was created to store whether the census tract had a “deaths” odds ratio above or below the statewide rate. B) The odds ratio, assigned to the census tract centroid, was used to interpolate a grid, which was then reclassified to yield two distinct values, those below and those above the odds citywide rate.

DIET-RELATED DEATHS AND INCOME
The two A) binary fields and B) rasters of “deaths” and “income” odds ratios were combined through multiplication to calculate a new layer. This resulted in four distinct values which correspond to the four possible combinations of high and low odds ratios, which were used to classify Map 5: Income and Diet-related Deaths.

DIET-RELATED DEATHS, SALES AND INCOME
A) To combine all three variables, a new field was created and calculated by census tract as the product of deaths odds and the “Low Supermarket Sales and Low Income” variable. B) The two reclassified rasters of “deaths” and “Low Supermarket Sales and Low Income” variable were combined to create a new raster layer. These results were reclassified to only retain one value: High Deaths, Low Supermarket Sales and Low Income areas and mapped to produce Map 6: Areas with Greatest Need.
Ensuring That Everyone Has Access To Affordable, Nutritious Food

The Food Trust, a nonprofit founded in Philadelphia in 1992, strives to make healthy food available to all. Research has shown that lack of access to healthy food has a profound impact on food choices and, therefore, a profound impact on health.

For almost 20 years, The Food Trust has worked with neighborhoods, schools, grocers, farmers and policymakers to develop a comprehensive approach to improving the health of America’s children. The Food Trust’s innovative initiatives integrate nutrition education with increased availability of affordable, healthy foods.

This approach has been shown to reduce the incidence of childhood overweight; a study in the journal Pediatrics found that the agency’s School Nutrition Policy Initiative resulted in a 50 percent reduction in the incidence of overweight among Philadelphia school children.

The Food Trust is recognized as a regional and national leader in the prevention of childhood obesity and other diet-related diseases for this and other notable initiatives to increase food access in underserved neighborhood, including the Healthy Corner Store Initiative and the Pennsylvania Fresh Food Financing Initiative, a public/private partnership which has sparked the development of 88 fresh-food retail projects across Pennsylvania.

The Centers for Disease Control and Prevention honored the Fresh Food Financing Initiative in its Showcase of Innovative Policy and Environmental Strategies for Obesity Prevention and Control, and the program was named one of the Top 15 Innovations in American Government by Harvard University.

For more information or to order additional copies of this report, visit thefoodtrust.org or contact The Food Trust.

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Endnotes

7 All data was prepared in MS Excel and mapped in ArcGIS 9.3.1 or 10 with Spatial Analyst extension. Also used were ET GeoWizards v9.5.1 or v10 and Hawth’s Analysis Tools v3.27. The coordinate system and projection used during mapping and analysis were the North American Datum 1983 and Massachusetts State Plane Mainland Zone.