FOOD for EVERY CHILD
THE NEED FOR MORE SUPERMARKETS IN TENNESSEE
ACKNOWLEDGEMENTS

This report was prepared by Ellen Holtzman and Miriam Manon of The Food Trust and David Treering, GIS Specialist at Loyola University. Photographs by Ryan Donnell. It was published in April 2011. This report was made possible by grants from the Robert Wood Johnson Foundation.
TENNESSEE 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 state, leading to a public health crisis. The Food Trust researched and wrote *Food for Every Child: The Need for More Supermarkets in Tennessee* 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 their growing populations, many communities in Tennessee have too few supermarkets. Large areas of Nashville and Memphis are underserved, and many residents have to travel long distances to purchase foods necessary to maintain a healthy diet. The situation in these cities is representative of a statewide problem impacting families in both urban and rural areas in Tennessee.

This report demonstrates that supermarkets in Tennessee are unevenly distributed, and lower-income communities are categorically underserved with respect to supermarket access. The situation in Tennessee 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.

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.

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. If barriers to supermarket access can be removed, however, 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 neighborhoods in Memphis and Nashville 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.

Nearly one million Tennesse residents, including more than 200,000 children, live in lower-income communities underserved by supermarkets.

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 Tennessee spends each year treating obesity-related diseases.

Solutions that have proven successful elsewhere in the country, such as Pennsylvania’s Fresh Food Financing Initiative, have included:

- Convening leaders from the 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 having growing populations, many communities in Tennessee, including large areas of both Nashville and Memphis, have few supermarkets and there are many neighborhoods where none exist.

The shortage of supermarkets means that residents, particularly those in lower-income neighborhoods and rural areas, must travel out of their neighborhoods to reach the nearest store that sells fresh produce and other foods necessary to maintain a healthy diet. Nearly one million Tennessee residents, including more than 200,000 children, live in lower-income communities underserved by supermarkets.
Rates of childhood obesity in Tennessee are among the highest in the country. According to recent data, 36.5 percent of Tennessee children ages 10 to 17 are overweight or obese, the fifth highest obesity rate nationwide. Lower-income residents in Tennessee 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. A staggering 29 percent of low-income children are already overweight or obese in their preschool years, ages two to five.

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 underserved areas would reduce the rate of childhood obesity in the United States. They also suggest that state and local governments should create incentive programs to attract supermarkets to these neglected neighborhoods.

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 Tennessee 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 underserved communities. To achieve that goal, this study identifies the gaps in food availability and highlights 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 and the Tennessee Obesity Taskforce. Despite this considerable progress, this report demonstrates that there is still more work to be done in both Nashville and Memphis, as well as at the state level, to ensure that all residents have convenient access to stores selling fresh and affordable food. 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 state.

More than one-third of Tennessee children are overweight or obese, the fifth highest obesity rate nationwide.

At the same time, many families in Tennessee have few, if any, places in their neighborhoods in which to shop for reasonably priced, nutritious foods. This problem is impacting rural communities as well, where residents often have to travel long distances to reach the nearest food store. Tennessee’s supermarket deficit could be eased and diet-related health problems decreased by embracing an initiative to build more supermarkets and other healthy food markets in underserved communities, resulting in improved health of children and families.

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 Tennessee 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. 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 3,820 diet-related deaths were mapped, including 1,398 in Nashville and 2,442 in Memphis. 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 Tennessee were analyzed, so no comparisons were made with rates outside of the state.

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More than one-third of Tennessee children are overweight or obese, the fifth highest obesity rate nationwide.
Access to nutritious food is not evenly distributed in Tennessee. Many people have to travel excessive distances to buy food at a supermarket.

- The uneven distribution of supermarkets is a serious problem in Tennessee. This situation is reflected at the local level in Nashville and Memphis. In both cities, there are large areas with few supermarkets, and many neighborhoods where none exist.

**KEY FINDINGS**

**MAP 1A/B: Weekly Sales Volume for Supermarkets** shows the location of 76 stores in Nashville and 54 stores in Memphis 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 features supermarkets in Nashville and the concentration of sales across the city. Areas best served by supermarkets include Belle Meade, Green Hills, Franklin and parts of downtown. Supermarkets are especially sparse in North Nashville near Charlotte Pike, in South Nashville’s Edgehill neighborhood and Caycee Homes in East Nashville.

Map 1B shows that supermarkets in Memphis are also unevenly distributed. Many people must travel considerable distances to buy food at supermarkets in the few neighborhoods where supermarkets are easily accessible. Supermarkets are especially concentrated in East Memphis, Germantown and Cordova.

**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. Neighborhoods with greater than average supermarket sales relative to total population are shown in yellow and brown tones. In these neighborhoods, 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.

In Nashville, supermarkets are especially sparse in North Nashville near Charlotte Pike, in South Nashville’s Edgehill neighborhood and Caycee Homes in East Nashville.
The uneven distribution of supermarkets in Tennessee leaves a disproportionate number of lower-income people without access to nutritious food.

- This problem is impacting families across the state. Nearly one million Tennessee residents, including more than 200,000 children, live in lower-income communities underserved by supermarkets.\(^\text{10}\)

MAP 3A/B: Supermarket Sales and Income shows the distribution of supermarket sales and the distribution of income throughout Nashville and Memphis. 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 neighborhoods 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.

In Nashville, underserved neighborhoods include Cayce Homes in East Nashville, Edgehill in South Nashville and area surrounding Charlotte Pike in North Nashville.

In Memphis, these lower-income neighborhoods with insufficient supermarket access include Binghampton, Sousville and Frayser.

Memphis and Nashville are not unique; local studies in Hamilton County and elsewhere have also documented that the region’s lower-income residents must travel out of their neighborhoods to purchase food at a grocery store or pay higher prices at stores with limited selection of fresh fruits and vegetables.¹¹

Lower-income neighborhoods with insufficient supermarket access in Memphis include Binghampton, Sousville and Frayser.
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.12

One study, for example, found lower body mass index among adolescents who live near a supermarket.13 Another documented that fruit and vegetable intake increases as much as 32 percent for each additional supermarket in a community.14

MAP 5A/B: Income and Diet-Related Deaths shows diet-related mortality data by income in Nashville and Memphis. 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 Tennessee, 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 neighborhoods 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. This problem also impacts families in rural communities in Tennessee where children suffer from particularly high rates of obesity and related health problems.

To provide affordable and nutritious food in these communities, and to address the high rates of obesity and other diet-related diseases, Tennessee 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 in the fight against obesity.
The lack of access to supermarkets is a problem in many communities in Tennessee especially in lower-income areas where the incidence of obesity is alarmingly high.

This lack of supermarkets in many communities means that 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.

Through mapping, this study shows that many lower-income communities in Tennessee have both poor supermarket access and a high incidence of diet-related deaths. This statewide problem is reflected at the local level in Nashville and Memphis where significant gaps in neighborhood food availability exist. More than one million Tennessee residents, including over 200,000 children, live in lower-income areas with poor supermarket access. This study demonstrates that this issue is related to significant health problems that adversely impact children and families across the state.
Tennessee must address the critical need for more supermarkets and other healthy food stores in many communities.

Access to supermarkets 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 state.

We recommend that state and local governments in Tennessee,

Convene leaders from the supermarket industry, government, public health, economic development and civic sectors to develop a strategy to develop 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

Tennessee citywide analysis of Memphis and Nashville was done at the census tract level of geography using interpolated rasters and density grids.

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 54 supermarkets in Memphis with an aggregate weekly sales volume of $21,230,000, and 76 supermarkets in Nashville with an aggregate weekly sales volume of $32,335,000. Stores were plotted using the latitude and longitude coordinates for each record and classified into two categories; above and below $150,000 in weekly sales volume. Values of sales density were used to classify the raster grid into the four categories shown in Map 1: Weekly Sales Volume for Supermarkets.

POPULATION

Population data for the Cities of Memphis and Nashville by census tract was retrieved from the US Census Bureau website (www.census.gov) for the year 2000 decennial census (Memphis total of 650,100 people; Nashville total of 545,524 people). Geographies with no population were removed from the analysis, as indicated on the maps.

SALES AND POPULATION

The density of weekly sales volume raster was divided by the density of total population raster. For Memphis, the result was then divided by $32.66 (the citywide ratio of sales to population: $21,230,000/650,100), and for Nashville, it was divided by $59.27 (the citywide ratio of sales to population: $32,335,000/545,524) to create an odds ratio for weekly supermarket sales per person. An odds ratio of 1 is equivalent to the citywide rate. Anything below 1 is below the citywide rate. An odds ratio of 2 means the rate is twice the citywide rate. This is used for Map 2: Supermarket Sales and Total Population.

INCOME

Median household income (Memphis: $32,285; Nashville: $39,629), number of households (Memphis: 250,721; Nashville: 239,528), and per capita income data were retrieved from the US Census Bureau website (www.census.gov) for the year 2000 decennial census. Median household income was multiplied by number of households, and the result was divided by total population to create an average per capita income (Memphis: $12,451.20; Nashville: $16,112.03). Local per capita income by census tract was divided by this number giving an income odds ratio above or below the citywide rate. The odds ratio was assigned to the census tract centroid and used to interpolate a grid that was reclassified to yield two distinct values, those below and those above the 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 Tennessee Department of Public Health provided mortality data for the specified list of ICD-10 codes for the year 2006. A total of 2,442 diet-related deaths for Memphis, and 1,398 deaths for Nashville were mapped to the census tract level. 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 citywide ratio of diet-related deaths to total population (Memphis: 2,442/650,100 = 0.003756, or 38 diet-related deaths per 10,000 people; Nashville: 1,398/589,141 = 0.002373, or 24 diet-related deaths per 10,000 people), to calculate an odds ratio. The odds ratio, assigned to the census tract centroid, was used to interpolate a grid that was reclassified to yield two distinct values, those below and those above the citywide rate.

DIET-RELATED DEATHS AND INCOME

The two 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 deaths and income odds ratios, which were used to classify Map 5: Income and Diet-related Deaths.

DIET-RELATED DEATHS, SALES AND INCOME

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.
Endnotes


9 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 v9.5.1or 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 Tennessee State Plane Mainland Zone.


11 Ochs Center for Metropolitan Studies (2009) Food Access and Price: A Spatial Analysis of Grocery Stores and Food Prices in the City of Chattanooga and Hamilton County.


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 neighborhoods, including the Healthy Corner Store Initiative and the Pennsylvania Fresh Food Financing Initiative, a public/private partnership which has sparked the development of 90 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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