

UNIVERSITY OF TENNESSEE KNOXVILLE

Food Equity in Knox County

2008 Community Assessment

Public Health Nutrition Graduate Program

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Manasi Barot, Amanda Brokaw, Andrew Carberry, Laura Dotson, Claudia Favre, Lisa Fuller, Derek Grabert, Marcia Grimes, Karen Lacey, Lusi Martin, Tegan Medico, Whitney Merola, Elizabeth Miller, Briana Presper, Bethany Rohling

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Chapter 1: Introduction

1.1 Background

Identifying household food security and hunger in the United States became a national imperative with the passing of the National Nutrition and Related Research Act of 1990. Stipulations within the Act’s Ten Year Comprehensive Plan for the National Nutrition Monitoring and Related Research Program gave way for the standardized definitions and official recognition of the terms *food security*, *food insecurity*, and *hunger* to describe access to food. These terms were used extensively by government bodies and researchers until the United States Department of Agriculture revised the language in 2006 (Table 1.1) to make the labels more objective. In addition, the plan included creating an instrument to gauge the extent of food insecurity in the home, a task accomplished by the Federal Food Security Measurement Program¹.

Table 1.1. USDA Food Security Labels and Definitions

Category	Classifications		Definition
	Old Term	New Term	
Food Security	Food Security	High Food Security	No reported indications of food-access problems or limitations
		Marginal Food Security	One or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake
Food Insecurity	Food Insecurity Without Hunger	Low Food Security	Reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake
	Food Insecurity With Hunger	Very Low Food Security	Reports of multiple indications of disrupted eating patterns and reduced food intake

Nearly a decade after this movement began, research efforts have adopted a new dimension of the food landscape by focusing on food security of whole communities in addition to that of households. These research efforts assess systems and environments rather than people; they acknowledge the challenges that social, geographical, institutional, and economic conditions may impart on the ability of families and individuals to obtain adequate, nutritious foods. Such conditions are reflected in the criteria for identifying community food insecurity presented in the United States Department of Agriculture’s Community Food Security Assessment Toolkit:

- *There are inadequate resources from which people can purchase foods.*
- *The available food purchasing resources are not accessible to all community members.*
- *The food available through the resources is not sufficient in quantity or variety.*
- *The food available is not competitively priced and thus is not affordable to all households.*

- *There are inadequate food assistance resources to help low-income people purchase foods at retail markets.*
- *There are no local food production resources.*
- *Locally produced food is not available to community members.*
- *There is no support for local food production resources.*
- *There is any significant household food insecurity within the community¹.*

Depending on a given definition of “community,” a population or area may be quite heterogeneous in regards to food security. As access to food is a function of both availability and affordability, geographic and economic diversity within a community can lead to significant disparities in food security among community members.

Geography and income have become increasingly critical and interrelated determinants of food security. Because supermarkets stock all major food groups, specifically a variety of fruits and vegetables, at a relatively low cost, the presence or absence of a nearby supermarket is the prevailing standard for whether a region is considered to be a “food desert,” an area lacking sufficient food resources to maintain a healthy diet. The post-World War II efflux of the middle class from urban to suburban areas fueled the proliferation of supermarkets in suburban areas as food retailers pursued the profitable clientele, ample land on which to build, and fewer zoning and parking challenges. The result over time has been a transition from small and scattered independently-owned grocery stores to predominantly large suburban chain supermarkets^{2,3}. Hence, food deserts may be found in both scantily populated rural and densely populated urban areas. Several studies have demonstrated such food deserts to be comprised of low-income neighborhoods^{4,5,6}.

In absence of supermarkets, the prevailing food sources in food deserts include convenience stores, small grocery stores, and restaurants. Though a study by Short et.al on small urban food retailers in the San Francisco Bay area found that several of these retailers did offer a variety of healthy foods at a low cost, many of these retailers targeted a specific ethnicity and were not evenly distributed geographically². Moreover, the lower income level of their customer base suggests that that the price of foods at these stores may not be affordable in reality even though they are comparable to other food retailers. Thus, the extent to which similar networks of small grocery stores meet the criteria for community food security is difficult to ascertain. In general, it is more expensive to purchase healthy foods at smaller food outlets. In this way, an additional financial burden on residents of food deserts exists. Physical barriers to food access can exacerbate financial barriers.

Many of these smaller outlets do not contribute substantially to community food security because they offer reduced variety and poorer quality foods⁷. Fast food restaurants, though not necessarily more expensive than supermarkets, are an example of a small food outlet that presents significant challenges to obtaining a healthy diet because of the poor nutrient composition and high energy density of menu items and the convenience with which they can be obtained. As supermarkets have followed a relatively wealthier customer base, the fast food industry seems to follow a lower-income customer base^{8,9,3}. Fast food restaurants may be more prevalent in less affluent areas due to lower rent rates, availability of cheap labor, the potentially greater social acceptance of fast food than in more affluent neighborhoods, and the potentially weaker power of residents to impact political processes that enact zoning regulations¹⁰.

Further compounding the multifaceted problem of food inequity is evidence of a racial component. Several studies have revealed a disproportionate distribution of both supermarkets and fast food restaurants in minority neighborhoods such that fewer supermarkets and more fast food restaurants exist in minority neighborhoods than in majority neighborhoods^{10,7,5,6}. In the study by Raja et al., this association was independent of income.

Evidence cited in the Department of Health and Human Service's *Healthy People 2010* reveals that chronic diseases affect several minority groups disproportionately in the United States, underscoring the importance of assessing food equity in communities. Likewise, evidence that neighborhoods with supermarket accessibility have lower rates of obesity and hypertension suggests a specific relationship between food equity and health disparities with respect to income and race^{5,11,6}.

Obesity may be a chief mediator of this relationship. Obesity is a co-morbidity for a majority of the leading causes of death, and the paradox of high obesity rates among people with lower incomes is well-documented^{12,13}. High-income groups (>130% of federal poverty level) have lower rates of obesity and higher rates of healthy weight than low income (<130% federal poverty level) individuals. Because obesity is a risk factor for heart disease and type II diabetes, two of the leading causes of death in the U.S., it is not surprising that there are documented health disparities between income groups for heart disease and diabetes, as well¹⁴. The rate of diabetes among the top income tier of adults (>400% FPL) is half that of the lowest tier (<100% FPL), while heart disease is fifty percent higher in the low-income tier¹⁵.

Obesity rates differ among racial groups, as well: Hispanic and African American groups have a smaller percentage of individuals at a healthy weight and a larger percentage of obesity relative to whites¹³. Moreover, African Americans have higher rates of heart disease, cancer and diabetes than whites, and the death rate from heart disease is 40% higher for African Americans than that of whites¹⁴. Hispanics, on average, have higher blood pressure and almost twice the risk of dying from diabetes as non-Hispanic whites¹⁴.

The foundation of health disparities is complex. Demographic categories such as gender, race or ethnicity, education or income, disability, geographic location, and sexual orientation can overlap, and the presence of one or multiple risk factors (e.g. obesity, tobacco use, environmental quality, access to health care) can compound risk and confound reasons why the disparities develop. Thus, in an effort to make sense of substandard health trends, it is important to investigate many possibilities and angles—from the individual to the system. The possibility that food inequities cultivated by a faulty system ultimately impact the individual is the basis of this assessment.

1.2 Goals and Objectives

Data and analyses collected on the food environment in Knox County, Tennessee, address the following goals and objectives:

- A. Describe the people and geography of Knox County
 - a. Collect and analyze secondary demographic data by sector on total population, gender, age, race, education, income, and employment.
 - b. Compare Knox County demographics to countywide and statewide figures.
 - c. Assess health status of Knox County residents using secondary morbidity and mortality data.
 - d. Identify pertinent trends using available Sector Plans of the Knoxville-Knox County Metropolitan Planning Commission.

- B. Identify possible food inequities in Knox County.
 - a. Assess food resource availability by evaluating quantitative data on the total numbers and types of food resources in relation to demographic features of each of the twelve sectors of Knox County.
 - b. Assess food resource availability and affordability by conducting market basket surveys on three food resources in each of the twelve sectors of Knox County.
 - c. Assess food resource accessibility by evaluating the spatial arrangement of food destinations as indicated by Geographic Information System (GIS)-generated maps in relation to demographic features and transportation resources of each of the twelve sectors of Knox County.
 - d. Compare food resource data with health status indicators.

- C. Establish priorities to improve the food environment of Knox County.
 - a. Assess availability of and participation in food assistance and distribution programs.
 - b. Evaluate results in relation to morbidity and mortality data.

- D. Provide recommendations for policy and program initiatives, if applicable, and for further research.

Chapter 2: Methods

2.1 Research Design

Each of Knox County's 12 planning sectors were independently researched by sub-committees and compared to the county as a whole with regard to sector demographics, food availability, food affordability, and food accessibility. Demographics were charted according to an edited version of the Population Profile Worksheet outline by *Moving to the Future*, an online planning resource from the Association of State and Territorial Public Health and Nutrition Directors which provides instruction on conducting a community assessment (Appendix A)¹⁶. Additionally, sector demographic characteristics were compared to state and national figures. The overall health status of Knox County was assessed based on published morbidity and mortality data. Food resource availability, affordability and accessibility were assessed using demographic data, market basket survey, transportation analysis and photography. For the purpose of our assessment, *food availability* is defined as the presence of a food store in a sector, and *food accessibility* is defined as the ability to obtain food. From this data, food equity was assessed in each of the 12 sectors of Knox County: Central City, East City, North City, Northwest City, South City, West City, East County, North County, Northeast County, South County, and Southwest County.

2.2 Data Sources

The Knoxville-Knox County Metropolitan Planning Commission (MPC) website, (<http://www.knoxmpc.org>), provided the demographic and geographic information used in this assessment^{17, 18}. Figures related to total population, gender, age, income, poverty, employment, race/ethnicity, education and language spoken were used. Information acquired was based on census tract data from the 2000 Census.

Health information about Knox County includes selected statistics from the Tennessee Department of Health's online Comprehensive Tennessee Health Data Listings publications, including the Tennessee Vital Statistics Summary 2006. Additional information was obtained from the Centers for Disease Control's National Vital Statistics Report and the Behavioral Risk Factor Surveillance System.

The Knoxville MPC used the National American Industry Classification System (NAICS) six-digit business codes to categorize and count retail food resources in Knox County. The NAICS codes were determined by the business lines that contribute the largest portion of their total revenue. The retail food resources studied in this assessment include the following categories and definitions according to the U.S. Census Bureau:

Grocery/Supermarkets: "...primarily engaged in retailing a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Included in this industry are delicatessen-type establishments primarily engaged in retailing a general line of food¹⁹."

Secondary Food Retailers: "...retailing prescription or nonprescription drugs and medicines. Cross-References. Establishments primarily engaged in-- Retailing food supplement products¹⁹".

Convenience Stores: "... comprises establishments engaged in retailing automotive fuels (e.g., diesel fuel, gasohol, gasoline) in combination with convenience store or food mart items. These establishments can either be in a convenience store (i.e., food mart) setting or a gasoline station setting. These establishments may also provide automotive repair services¹⁹."

Beer/Wine/Liquor Stores: "...comprises establishments primarily engaged in retailing packaged alcoholic beverages, such as ale, beer, wine, and liquor¹⁹."

Restaurants:

Limited service restaurants: "...comprises establishments primarily engaged in providing food services (except snack and nonalcoholic beverage bars) where patrons generally order or select items and pay before eating. Food and drink may be consumed on premises, taken out, or delivered to the customers' location. Some establishments in this industry may provide these food services in combination with selling alcoholic beverages¹⁹."

Full service restaurants: "... industry comprises establishments primarily engaged in providing food services to patrons who order and are served while seated (i.e., waiter/waitress services) and pay after eating. These establishments may provide this type of food services to patrons in combination with selling alcoholic beverages, providing carry out services, or presenting live nontheatrical entertainment¹⁹."

Snacks & Nonalcoholic Beverages: "...comprises establishments primarily engaged in (1) preparing and/or serving a specialty snack, such as ice cream, frozen yogurt, cookies, or popcorn or (2) serving nonalcoholic beverages, such as coffee, juices, or sodas for consumption on or near the premises. These establishments may carry and sell a combination of snack, nonalcoholic beverage, and other related products (e.g., coffee beans, mugs, coffee makers) but generally promote and sell a unique snack or nonalcoholic beverage¹⁹."

Cafeterias: "...comprises establishments, known as cafeterias, buffets, or grill buffets, primarily engaged in preparing and serving meals for immediate consumption using cafeteria-style or buffet serving equipment, such as steam tables, refrigerated areas, display grills, and self-service nonalcoholic beverage dispensing equipment. Patrons select from food and drink items on display in a continuous cafeteria line or from buffet stations¹⁹."

Markets (Meat/Seafood/Fruit/Vegetable/Bakeries):

Meat Markets: "...industry comprises establishments primarily engaged in retailing fresh, frozen, or cured meats and poultry. Delicatessen-type establishments primarily engaged in retailing fresh meat are included in this industry¹⁹."

Fish and Seafood Markets: "...comprises establishments primarily engaged in retailing fresh, frozen, or cured fish and seafood products¹⁹."

Fruit and Vegetable Markets: "...comprises establishments primarily engaged in retailing fresh fruits and vegetables¹⁹."

Baked Goods Stores: "...comprises establishments primarily engaged in retailing baked goods not for immediate consumption and not made on the premises¹⁹."

Using geographic information systems (GIS) technology, the MPC applied these codes to generate maps pinpointing the locations of the different types of retail food resources in each sector of Knox County (Appendix B).

Additional food resources are provided to the community through emergency food sources. A list of eighty emergency food sources (Appendix C) in Knox County was provided by the Knoxville-Knox County Community Action Committee. Emergency food resources include charitable food distribution sites such as food pantries and soup kitchens. The total number of emergency food resources was narrowed for the purposes of this assessment to those that provide services at least once per week. This restriction reduced the number of pantries to forty-seven. Addresses of these resources were plotted on a map using the Google Maps application.

Market basket surveys conducted in this assessment were based on the United States Department of Agriculture (USDA) Thrifty Food Plan (TFP). The USDA's TFP is representative of the amount and types of food estimated to meet nutrient needs of a family of four for one week²⁰. Recognized by the USDA as an effective method in assessing food equity in terms of availability and affordability of food, market basket research involves determining the total of an average grocery bill. The list of foods surveyed is included as Appendix D, along with an example of the form used by the assessment team to conduct individual a market basket surveys. Members of the assessment team used this form to record prices and amounts of specific foods in selected food retail stores. In following USDA recommendations for market basket research, items were chosen based on the lowest price available for a standardized amount. A total of three market basket samples were taken from each sector. Locations for these surveys were based on categorical information from the MPC and included one of each of the following: grocery/supermarkets, secondary food retailers, convenience stores, or as available in the sector.

2.3 Data Analysis

Data collected from the Market Basket Surveys was analyzed to establish food availability and food affordability. All three surveys from each sector were averaged to estimate the sector's Average Market Basket Price (AMBP), as well as determine the average cost of particular food groups. Foods not available and out of stock items were taken into account. Individual item prices within each sector were averaged to account for missing items. This data was compared between sectors and against demographic characteristics to examine potential food inequities.

The mean family income was used to assess wealth within each sector. Sectors were compared to each other to determine possible relationships between demographic characteristics and food resource affordability and availability. Additionally, mean family income was compared to each sector's AMBP, fruit and vegetable cost, and meat and dairy cost to examine

relationships. Also, AMBP was compared to population size and number food stores to evaluate food equity.

The types and locations of retail food resources as plotted on maps provided by the MPC were qualitatively evaluated for the presence of food deserts. Ratios of grocery/supermarkets to people were calculated for each sector. The outcomes of these evaluations were compared to the demographics of each sector to determine potential food inequities, specifically regarding income and race. The locations of emergency food resources were likewise compared to food availability and demographic data to determine if they are able to fill potential gaps in access to retail food resources.

Food accessibility was examined through transportation access and perceived safety of store fronts. Knoxville Area Transit (KAT) bus routes and fares were collected from the KAT website (<http://www.ci.knoxville.tn.us/kat/>)²¹. Additionally, researchers photographed storefronts (Appendix E) of retail food resources chosen for market basket surveys. Photographs were limited to storefronts so as not to violate research protocol. Images were evaluated to highlight potential inequities in access to safe, quality food retail facilities.

After collecting data and analyzing results of the food equity assessment, the assessment team employed Nominal Group Process to prioritize community needs and delineate areas for future research.

Chapter 3: Population

3.1 Demographics and Geography

Knox County

Knox County is located in the East Tennessee Region and covers 526 square miles. As of 2000, it was home to more than 382,000 people following a 14% population increase since 1990. Knoxville, the county seat, occupies 103.7 square miles and contributes 46% of the total county population. The majority of residents in Knox County are white (88%), and black residents make up (8.6%) of the total population. Per capita income in Knox County in 2006 was \$33,963, and 13% of the population, or approximately 46,000 people, were at or below the poverty level ^{17, 18}.

Selected demographic figures for Knox County from the 2000 Census are largely comparable to those of the state of Tennessee, but some unique differences exist. For example, the percentage of white residents in Knox County was approximately 8% greater than that of the state. In addition, Knox County contained slightly fewer families and individuals below the poverty level than the state average. Racial composition, average household size, average family size, unemployment rate, percentage of foreign-born individuals, languages spoken at home, and income levels were similar to those of Tennessee.

In 2000, there were eighty-six public schools located throughout Knox County and forty-six private and parochial schools. Additionally, a number of public and private four-year post-secondary institutions are located in Knox County, including The University of Tennessee in Knoxville. Of those aged twenty-five years and older, 83% had a high school diploma and 29% had a bachelor's degree.

At the time of the 2006 Census, nearly 217,890 workers were part of Knox County's available labor force, and the unemployment rate was 3.9% ²². Nearly a quarter of the Knox County employed labor force worked in the service industry, which includes education, health, and social services occupations. Other important industry employers include manufacturing, construction, transportation, communications, and warehousing operations. The University of Tennessee, Knox County Schools, Pellissippi State Technical Community College, five major hospitals, and many other medical complexes were Knox County's largest employers.

Traffic flow is a major concern for Knox County, as increased development has surpassed the carrying capacity of the county's existing roadways ^{17, 18}. Improvements in infrastructure currently seek to meet these needs. Public transportation via Knoxville Area Transit (KAT) is available on the county's major thoroughfares. Planned infrastructure improvements include expanding sidewalk networks and increasing bicycle paths.

Sectors

The above information describes Knox County as a whole, but considerable demographic and geographic differences exist within the region. Hence, Knox County is divided into twelve geographically and demographically homogenous planning sectors: East City, East County, Northeast County, South City, North City, North County, South County, Southwest County, West City, Central City, Northwest County, and Northwest City.

East City

The East City sector is an urban sector within Knoxville. As of 2000, 59.8% of East City residents were white, 37.6% were black, and 1.02% were Hispanic. Mean family income was \$43,472, and the prevailing industries for employment were education, transportation, manufacturing, and retail trade^{17, 18}.

The city consists primarily of single family homes due to land constraints and lack of vacant land, and has few opportunities for large-scale land development. However, physical development and use of the land for transportation opportunities and community facilities is a current focus. Priorities for future land use within the next 15 years include improving transportation and adding well-designed quality housing. Other plans focus on redeveloping commercial areas to better meet residents' needs^{17, 18}.

East County

The East County sector is a rural sector within Knox County. As of 2000, 96.3% of East County sector residents were white, 0.02% were black, and 0.95% were Hispanic. The mean family income was \$47, 506. The poverty rate was 10.4% at the time of the 2000 Census. The prevailing industries for employment were educational, health, and social services, followed by manufacturing and retail trade^{17, 18}.

The proposed 2010 land use goals are to establish a wide range of housing, commercial, and employment units to accommodate the growing population, while continuing to protect the historic district and natural regions within East County sectors. In addition, the East County sector is working to improve transportation network while emphasizing safety, efficiency, and protection of community resources such as parkways^{17, 18}.

Northeast County

The Northeast County sector is a rural area of Knox County. As of 2000, 95.1% of Northeast County sector residents were white, 3.6% were black, and 0.6% were Hispanic. The mean family income was \$49,608. The poverty rate at this time was 8.1%. The prevailing industries for employment were educational, health and social services, followed by manufacturing and retail trade^{17, 18}.

Two-thirds of the sector's 57,069 acres were for agricultural use, and 12% were rural residential areas. With an accelerating movement to expand residential development, the sector experienced a nearly 15% population growth between 1990 and 2000. In addition, pressures for commercial development increased as well^{17, 18}.

South City

South City is a small urban area of Knoxville. As of 2000, 89.7% of South City residents were white, 6.59% were black, and 1.52% were Hispanic. The mean family income was \$33,560. The poverty rate at this time was 15.9%. The prevailing industries for employment were sales, management, and health services^{17, 18}.

The sector experienced a 4.5% increase in total population between 1990 and 2000, including a 4.0% increase in minorities. Land used for residential development increased by 99 acres. Additionally, industrial space grew by 7% in the last decade^{17, 18}.

North City

North City is an urban sector within Knoxville. As of 2000, 93.7% of North City sector residents were white, 3.7% were black, and 1.3% were Hispanic. The mean family income was \$54,549. The poverty rate at this time was 6.9%. The prevailing industries for employment were sales, offices, and service^{17, 18}.

The majority of the sector's area is for residential use, and the population has been growing since 1999. The majority of recent housing developments are located on Tazewell Pike. Most of North City's office, commercial, and industrial sites are located on North Broadway^{17, 18}.

North County

North County is a suburban sector of Knox County. As of 2000, 97.6% of North County sector residents were white, 0.7% were black, and 0.6% were Hispanic. The mean family income was \$54,448. The poverty rate at this time was 4.5% and the unemployment rate was 4.1%. The prevailing industries for employment were management and professional, sales and office positions, and transportation and material moving^{17, 18}.

Additional North County Sector information is currently in development and unavailable through the Metropolitan Planning Commission.

South County

South County is a rural area of Knox County. As of 2000, 97.0% of South County sector residents were white, 1.45% were black, and 0.76% were Hispanic. The mean family income was \$59,193. The poverty rate at this time was 11%. Educational, health and social services followed by retail trade and manufacturing were the primary areas of employment for residents in this sector^{17, 18}.

Sixty percent of South County land was used for agriculture, forestry, or remained vacant. Agricultural use accounted for 59% of the proposed land development, while the only area with large commercial growth was a corridor along Governor John Sevier Highway. There was a small shift during the 1990's from agricultural production to residential use of land, but there has been little change since^{17, 18}.

Southwest County

Southwest County is a suburban sector in Knox County. It is one of the fastest growing sectors of Knox County. As of 2000, 94.7% of Southwest County sector residents were white, 2.3% were black, and 1.3% were Hispanic. The mean household income was \$105,503, the highest of all Knox County Sectors. The poverty rate at this time was 2.1%. The educational attainment of the sector population consisted of 96% high school graduates and nearly half with a college degree. The majority of residents in this sector were employed in management or professional services (55.5%)^{17, 18}.

Improved utilization of land, transportation and community facilities were focal points in development plans for Southwest County. Development of commercial and single family homes increased the need for expansion of transportation routes. The majority of residents commuted to work (90.2 %), while only 0.1 % used public transportation. Developments under construction were encouraged to build sidewalks due to poor connectivity and lack of sidewalks along the roadways^{17, 18}.

West City

The West City sector is an urban sector in Knoxville and the smallest of the twelve sectors of Knox County. As of 2000, 91.0% of West City sector residents were white, 4.0% were black, and 1.9% were Hispanic. The mean family income in West City was \$67,934. The poverty rate at this time was 3.1%. The majority of the residents in this sector were employed in management or professional services (51.3%) and sales and office positions (28.1%)^{17, 18}.

A large percentage of land use is occupied by residential areas. In addition, West City has become a popular shopping destination. Kingston Pike, Knoxville's "Commercial Corridor," runs through the heart of the sector. The 31 shopping centers located along this road, including West Town Mall, make up most of the 7% of commercial land use in the sector. Furthermore, as Kingston Pike and I-40 run parallel to each other, it has resulted in the construction of many (140) sit down and fast food restaurants in the area^{17, 18}.

Central City

Central City is an urban area located in downtown Knoxville. Central city was the most densely populated sector in the county according to the 2000 census data. This sector accounts for a large percentage of the county's minorities and low-income families. Nearly 45% of Knox County's African American population resides in this sector. The mean family income for the sector was \$32,961 and the poverty rate as of 2000 data was 29.7%^{17, 18}.

Ninety-five percent of Central City's land is developed. This development consists of 25% roads, 19.5 % single family residential units, 5.7% multifamily residential units, 4.7% Commercial usage, 5% education usage, and 4% public parks usage^{17, 18}.

Northwest County

Northwest County is a rural sector in Knoxville. As of 2000, 91.8% of Northwest County sector residents were white, 4.7% were black, and 1.4% were Hispanic. The mean family income was \$62,669. The poverty rate at this time was 6.5%. The prevailing industries for employment were management and professional services and sales and offices positions^{17, 18}.

Nearly half of the land in Northwest County sector is vacant or used for agricultural purposes. As a developing sector, Northwest County provided roughly 25% of the new households in Knox County over the last decade^{17, 18}.

Northwest City

The Northwest City sector is an urban area of Knoxville. According to the 2000 Census, 88.7% of Northwest City residents were white, 6.8% were black, and 1.5% were Hispanic. The mean family income at this time was \$53,180, and 7% of families were in poverty. The prevailing industries for employment were management and professional services and sales and offices positions^{17, 18}.

The sector has developed only 79% of its 10,568 acres; residential areas occupied 46% of this development. Northwest City's 15 year plan is to increase office areas. Additional goals are to improve community parks and greenways^{17, 18}.

Total Population

Total population of each sector ranged from 13,313 residents in East County to 62,864 residents in Northwest County (Figure 3.1.1) in 2000. East County, South City, and South County contained the fewest total numbers of people whereas the highest total numbers of people lived in Northwest, North, and Southwest Counties. Because the counties are different sizes, population densities may not coincide with the ranking for total population. All sectors had an approximately even breakdown of men and women.

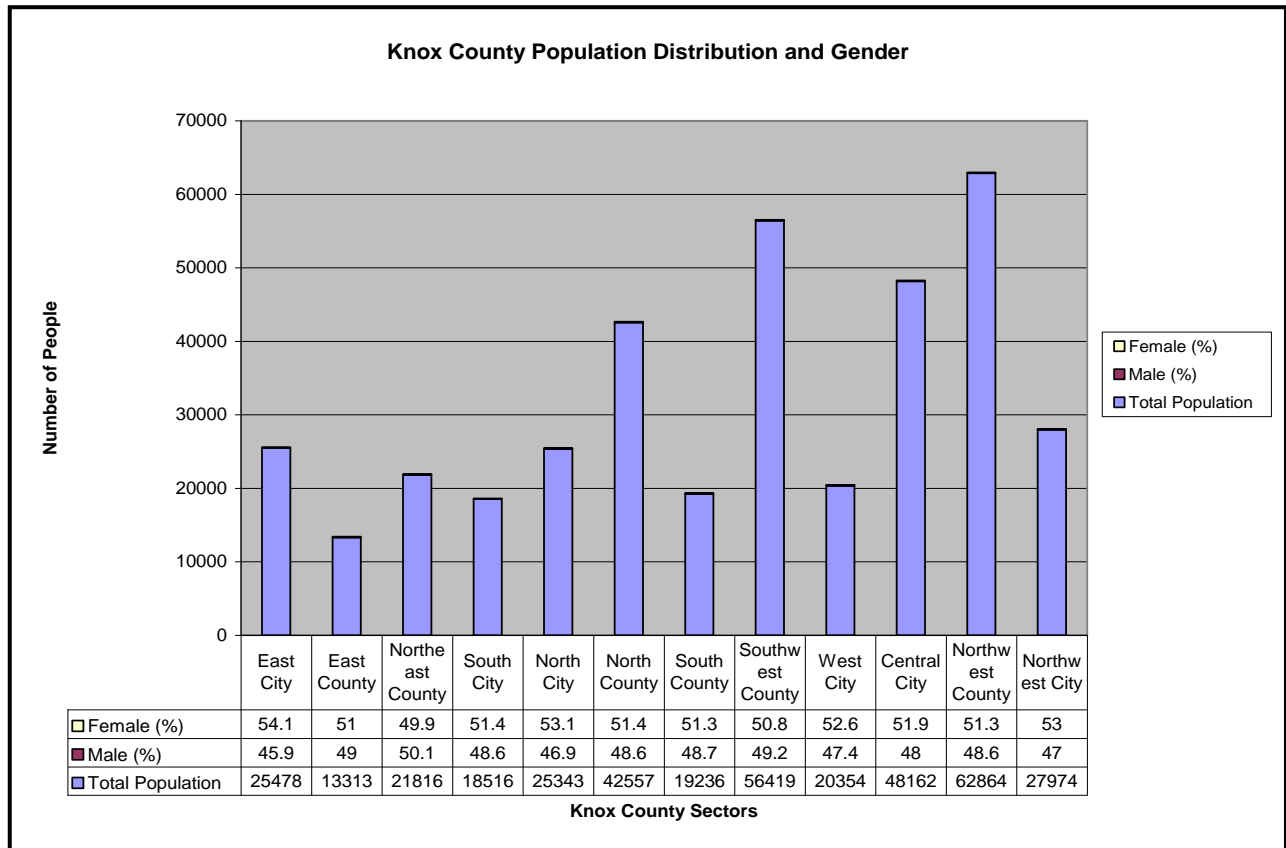


Figure 3.1.1. Total Population of Knox County Sectors ^{17, 18}.

Age

The distribution of age groups was comparable among the sectors (Figure 3.1.2) with the majority of people between the ages of twenty and fifty-nine years old. Northwest County had the highest percentage (13.9%) of youth up to nine years of age whereas East City has the highest percentage (23%) of those aged sixty years and above. Worth noting is that Central City contains the University of Tennessee, which has a student body of approximately 26,802, many of whom live in the areas surrounding the university. Students with out-of-state residency are not considered in the census data ²³.

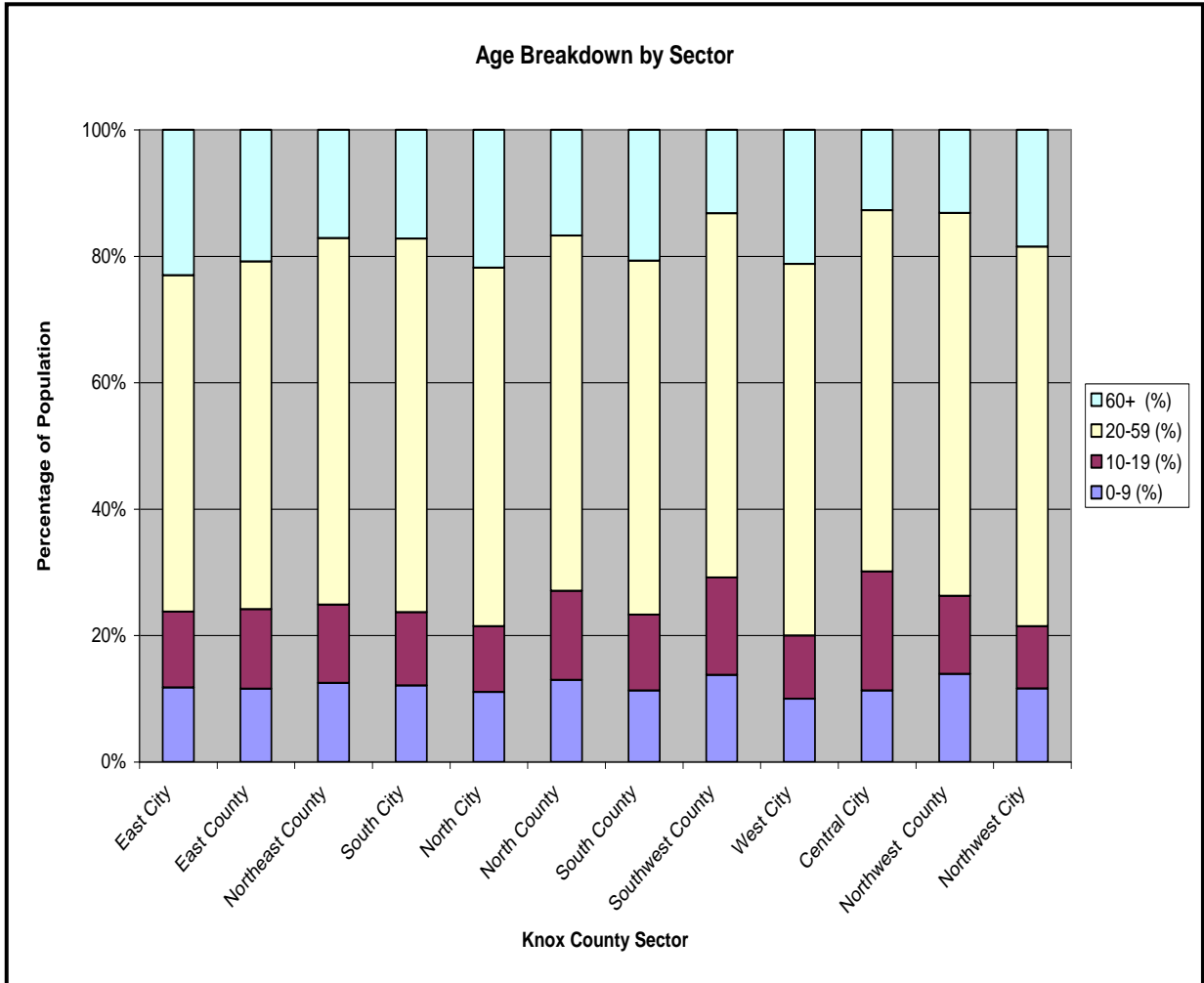


Figure 3.1.2. Age Distribution of Knox County Sectors^{17, 18}

Race and Ethnicity

Caucasians were the majority racial group in each of the sectors with North County representing the highest percentage (93.7%). The highest percentage (37.6%) of blacks was found in East City. West City had the highest percentage (4.85%) of other minorities, which include Hispanics, Asians, and Native Hawaiian and other Pacific Islanders. Northwest City has the highest percentage (2.5%) of American Indians and Alaska Natives (Figure 3.1.3).

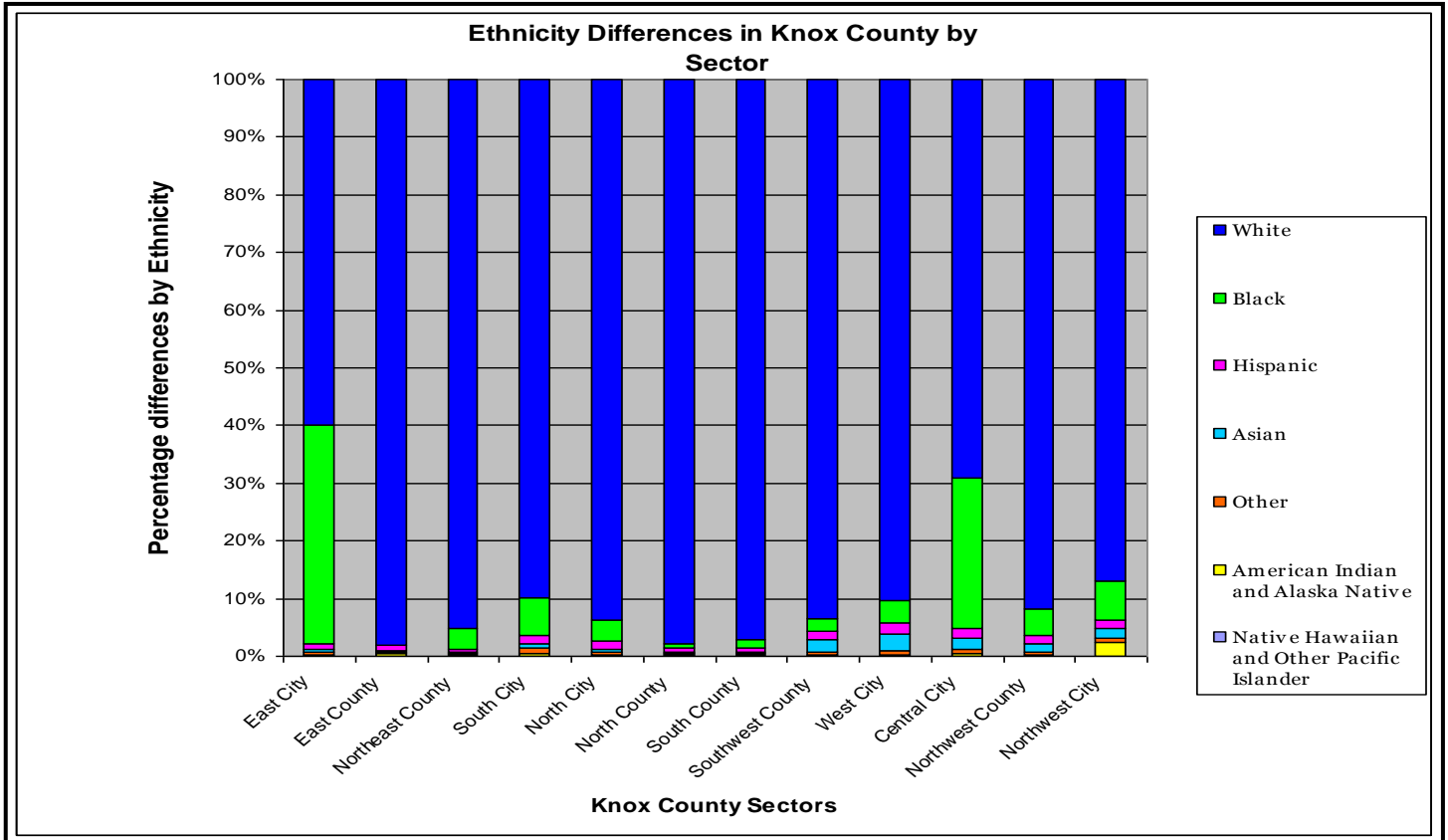


Figure 3.1.3. Race and Ethnicities of Knox County Sectors^{17, 18}

Family Income and Employment

The highest per capita, mean family income, and household income (Figure 3.1.4 and 3.1.5) were observed in the Southwest County and West City sectors; per capita income of these sectors was \$35,193 and \$34,077 and the mean family income was \$105,503 and \$67,934, respectively. At \$10,622 and \$15,945, respectively, Central City and South City had the lowest per capita income. These sectors also had the lowest mean family incomes: \$32,961 (Central City) and \$33,560 (South City). Expectedly, the Central and South City sectors contain the highest percentage of both families and individuals in poverty (Figure 3.1.6). These latter sectors have the greatest proportion of black residents, as well.

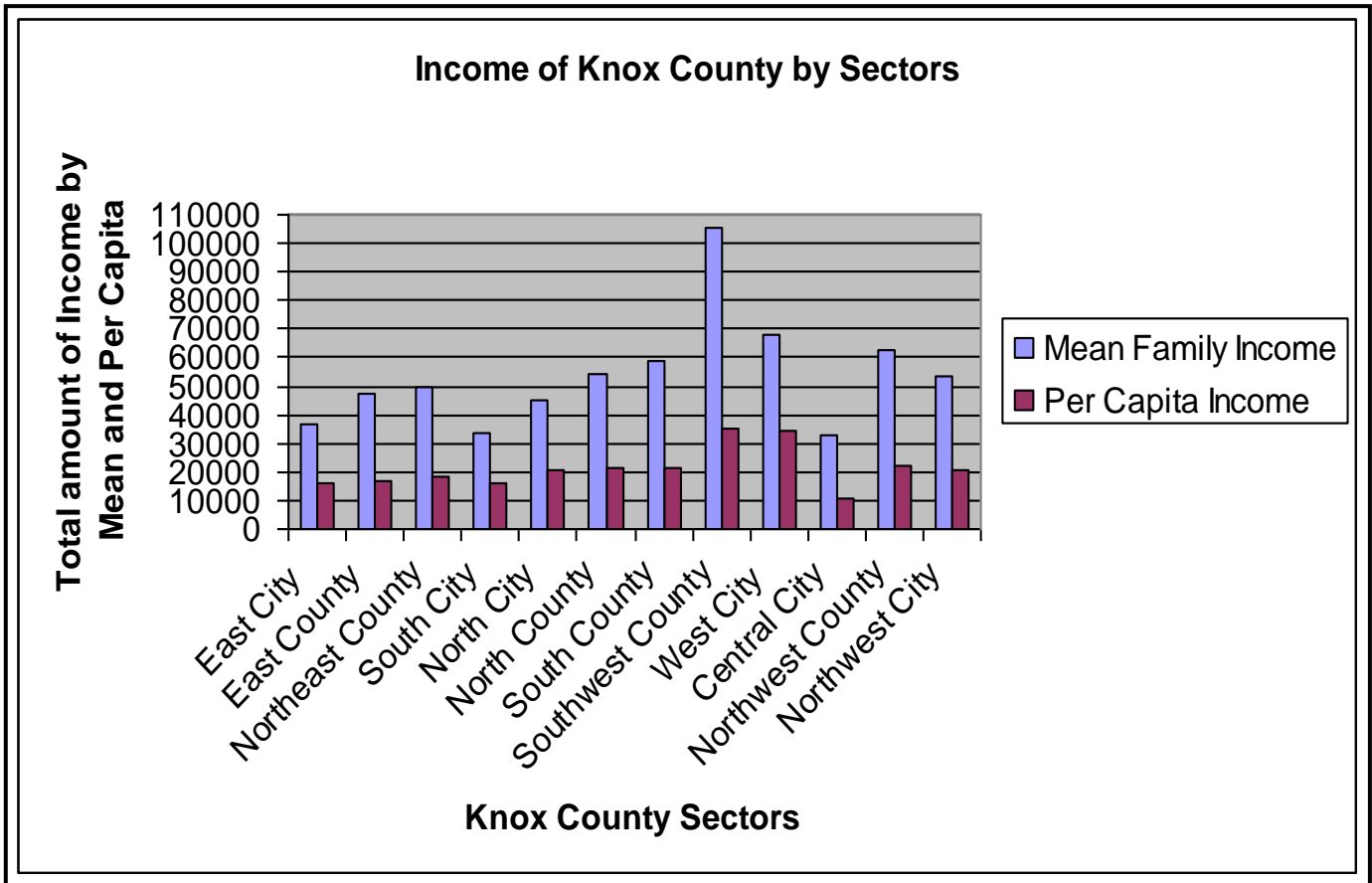


Figure 3.1.4. Per Capita and Mean Family Incomes in Knox County Sectors^{17, 18}

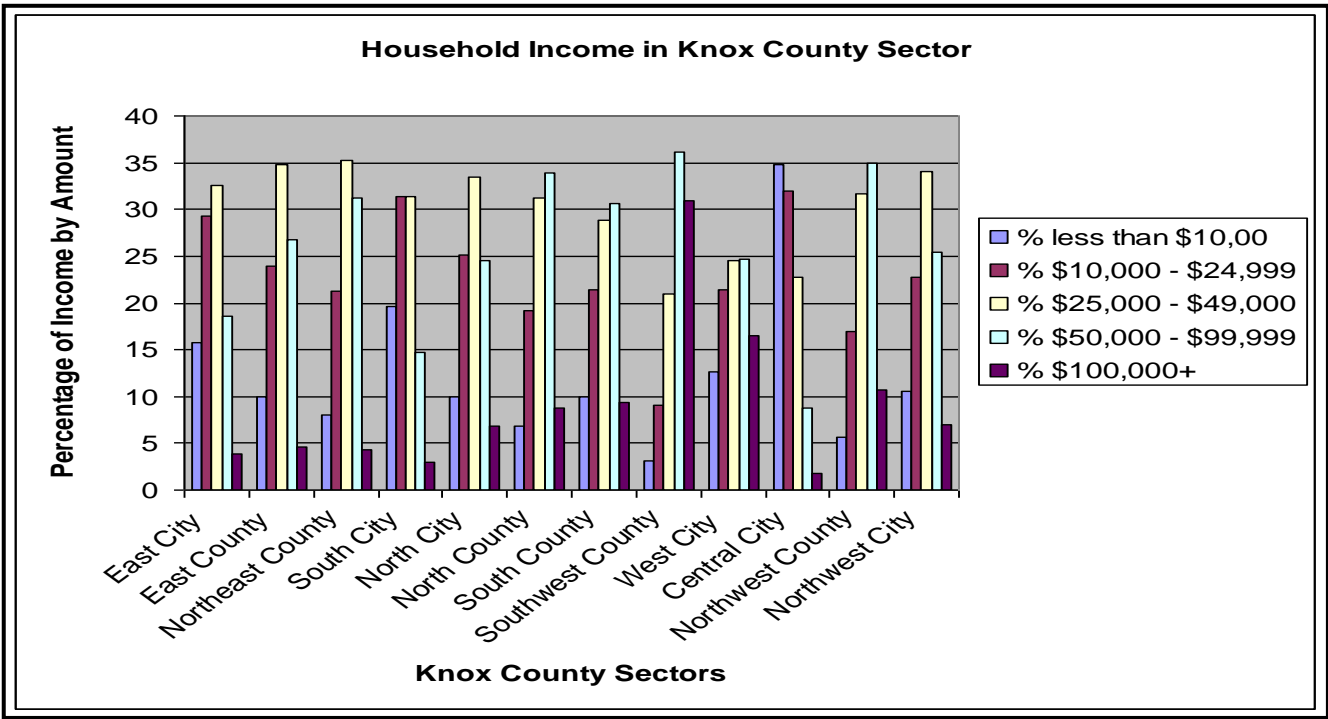


Figure 3.1.5. Household Income in Knox County Sectors^{17, 18}

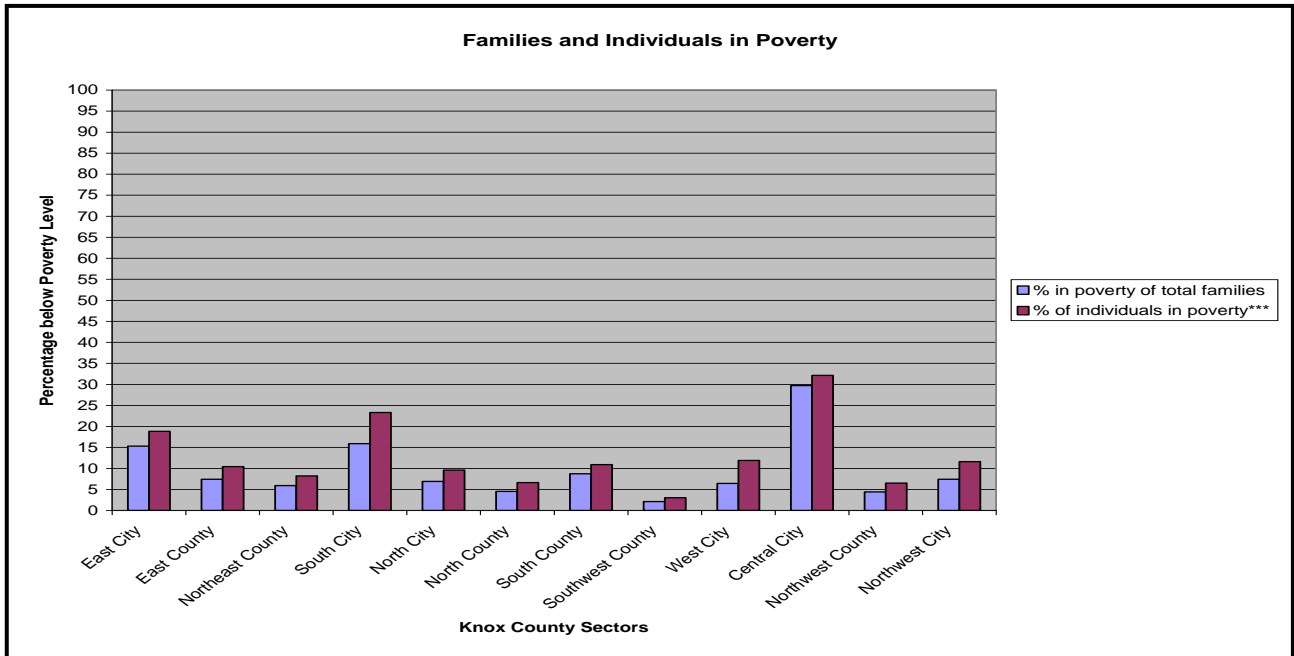


Figure 3.1.6. Families and Individuals in Poverty in Knox County Sectors^{17, 18}

The low per capita and mean family incomes observed in the Central City and South City sectors is likely the result of their high unemployment rates (Figure 3.1.7). The unemployment rates of Central City (11.6%) and South City (7.1%) exceeds those of all sectors in Knox County. In contrast, the two wealthiest sectors, Southwest County and West City, have the lowest unemployment rates at 2.8% and 3.1%, respectively. The unemployment rate for Tennessee is 7.2% and the United States is at 6.5%. (<http://www.bls.gov>, Bureau of Labor)

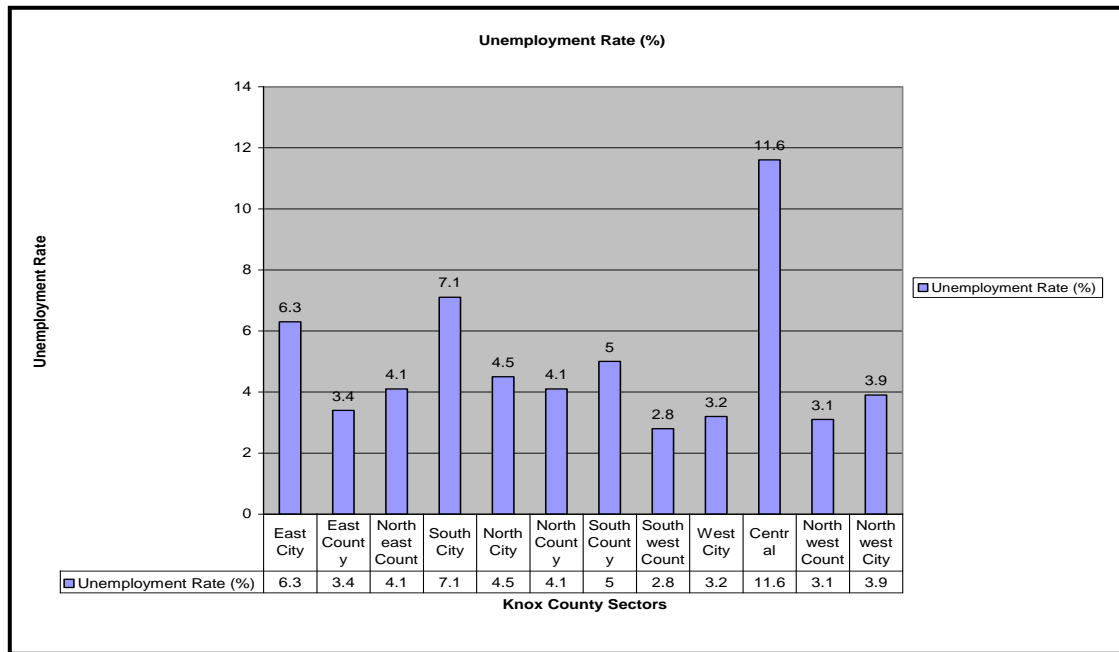


Figure 3.1.7. Unemployment Rates of Knox County Sectors^{17, 18}.

Education Level

The two sectors with the highest mean family income, Southwest County and West City had the highest educational levels. Southwest County (34.3%) and West City (28.6%) had the largest number of individuals of the population with a bachelor’s degree. In addition, Southwest County (21.5%) and West City (25%) contained the largest number of individuals with a graduate or professional degree.

The two sectors with the lowest mean family income, Central City and South City, also had the lowest educational levels; Central City had the highest percentage (12.7%) of people with an education level of less than 9th grade, while South City had the third highest percentage (7.6%) of this education level.

Language

English is the most commonly spoken language in Knox County. Approximately 95.5% of the total population spoke only English as of the year 2000. Among the sectors, West City had the lowest English speaking population at 92.1%. Approximately 7.8% of residents in the West City sector spoke a language other than English. This sector also had the highest

percentage (4.85%) of minorities. Southwest County follows with 6.0% speaking a language other than English. Central City (2.8%), West City (2.2%), and North City (2.0%) have the three highest rates of Spanish speaking individuals among the Knox County sectors. Northeast County (2.3%) and North County (2.4%) have the two lowest percentages of individuals speaking a language other than English. South County (1.0%), Northwest County (1.3%), and North County (1.2%) have the three lowest rates of Spanish speaking individuals in comparison to other Knox County sectors.

Household Characteristics

Northwest County contains the most households (25,557), followed by Southwest County (21, 222). Sectors with the fewest households are East County (5,311) and South County (7,800). West City and Southwest County both have a mean house value of greater than \$200,000. In contrast, Central City averages approximately \$58,000, which sets a difference of \$154,954 between the average house value in West City and that in Central City.

Homes in Central City are more likely to lack a telephone (Figure 3.1.8), complete plumbing (Figure 3.1.9), and/or a kitchen (Figure 3.1.10). Out of the 19,226 households in this sector, 1,394 (7.3%) did not have a telephone, 116 (0.6%) did not have complete plumbing, and 176 (0.9%) did not have a kitchen. Central City accounts for about a quarter of the total number of homes in Knox County that lack a kitchen facility. There is an average of 1.78 and a mode of 2.0 vehicles per household in Knox County. Southwest County and Northeast County have the highest average (2.1), whereas Central City has the lowest average (1.2) vehicles per household.

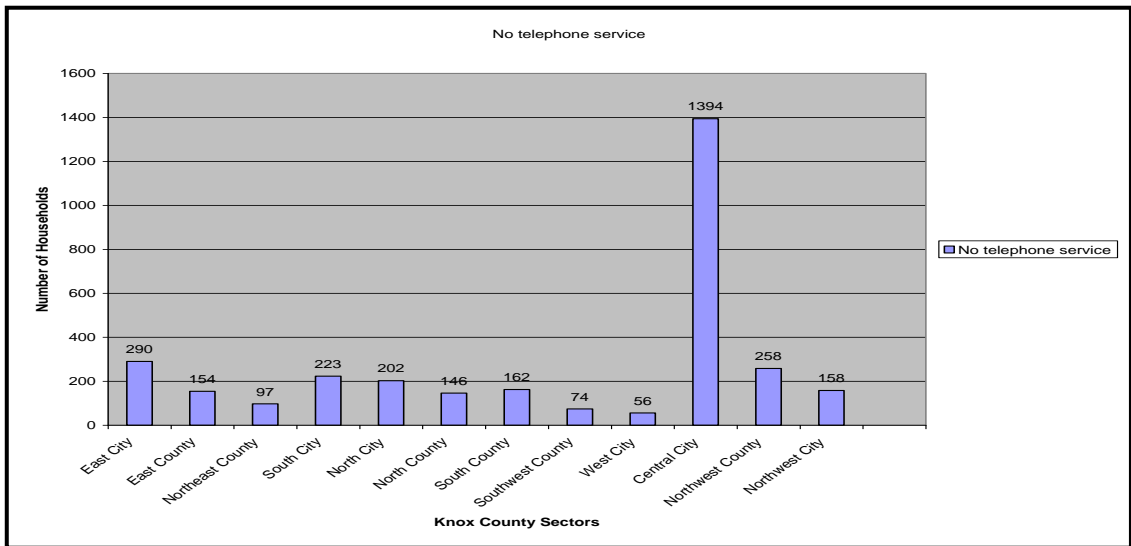


Figure 3.1.8. Households Lacking Telephone Service in Knox County Sectors^{17, 18}

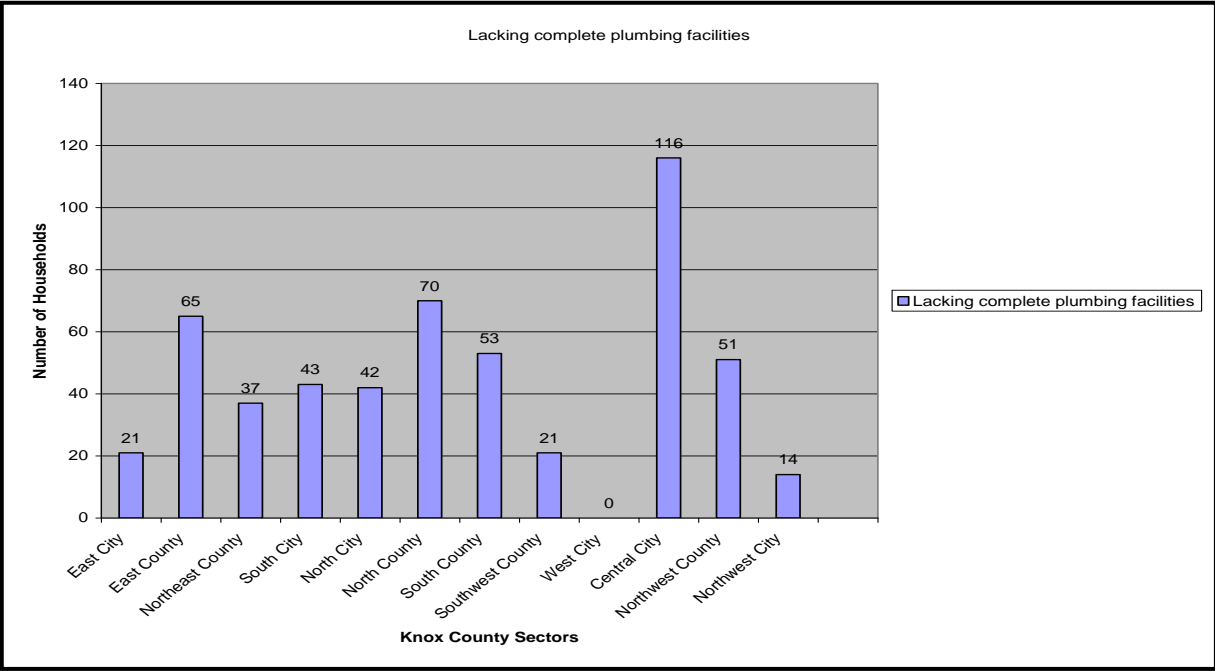


Figure 3.1.9. Households Lacking Complete Plumbing in Knox County Sectors^{17, 18}

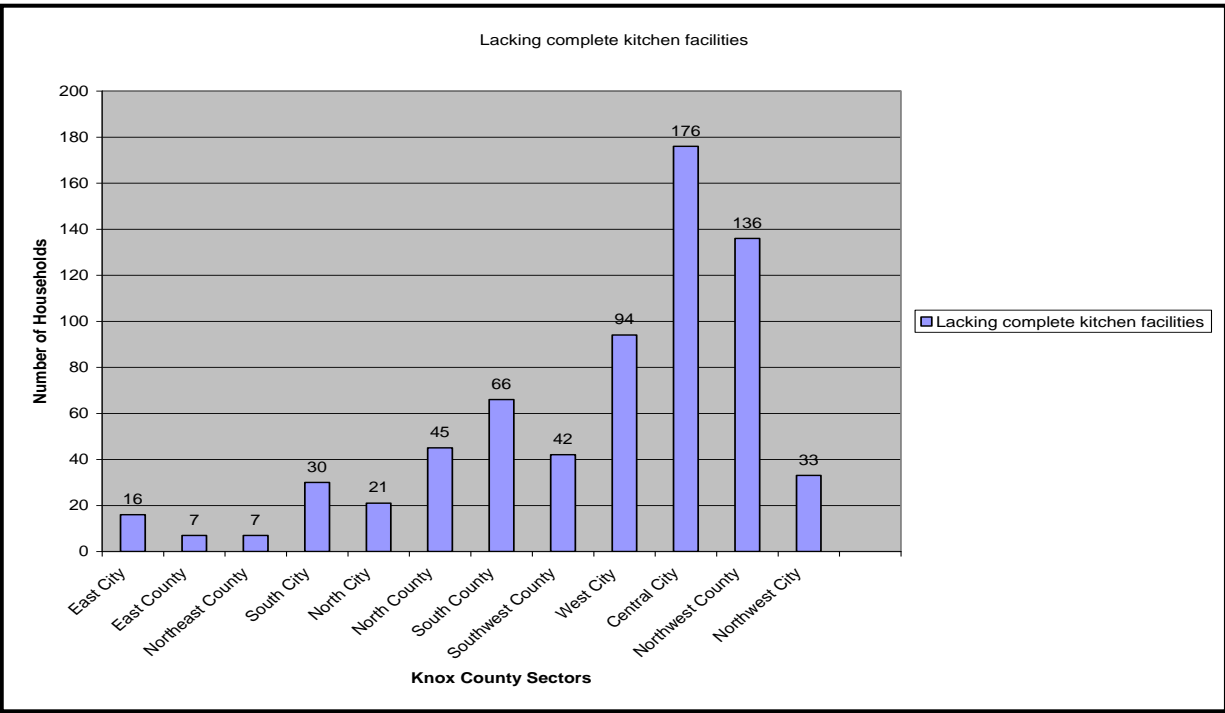


Figure 3.1.10. Households Lacking Complete Kitchen Facilities in Knox County Sectors^{17, 18}

3.2 Health Profile

Information on the morbidity, mortality, and incidence of nutrition-related risk factors for chronic disease such as overweight and obesity of residents in Knox County are important for assessing the health of the community in general, as well as to provide insight into the results of

food equity assessment. Unfortunately, such information is unavailable for the specific sectors of Knox County by which food access data is categorized. However, morbidity and mortality data for Knox County as a whole is available to compare the health status of Knox County residents to that of the state of Tennessee and the United States. The data presented on the health profile will be useful in establishing priorities and areas of needed improvements.

Mortality

The total mortality death rate in Knox County was 8.9 deaths per 1,000 of the population in 2006. This rate is slightly lower than the death rate for the state of Tennessee, yet slightly higher than the overall death rate in the United States (Table 3.2.1). Also, the death rates of both Caucasians and African Americans living in Knox County are higher than the national rates. A surprising finding comes from a comparison of the death rates of Caucasian and African Americans in Knox County, which reveals a lower death rate in among African Americans than their Caucasian counterparts. The total death rates of African Americans in United States are considerably higher than Caucasians ¹⁴.

Table 3.2.1 Death Rates in Knox County, Tennessee, and the United States, 2006

	Knox County		Tennessee		United States	
	Number	Rate*	Number	Rate*	Number	Rate*
Total Deaths	3,559	8.9	56,636	9.4	2,397,615	8.005
Caucasian	3,230	9.1	47,914	9.8	2,058,643	7.863
African American	314	8.8	8,439	8.3	287,315	10.273

*Rates per 1,000 ^{24, 25}

The top five causes of death in Knox County are the same for the Tennessee and the United States: heart disease, cancer, cerebrovascular disease, unintentional accidents and injuries, and diabetes (Table 3.2.2). The rates for heart disease and diabetes are lower in Knox County than nationwide. On the other hand, Knox County’s death rates from cancer, cerebrovascular disease, and unintentional accidents and injuries were higher than the respective national rates.

Table 3.2.2. Top 5 Causes of Death in Knox County, Tennessee, and the United States, 2006

	Knox County		Tennessee		United States		Healthy People 2010
	Number	Rate*	Number	Rate*	Number	Rate*	Rate*
Heart Disease	791	198.1	14582	242.8	629191	210.2	166
Cancer	810	202.9	13,007	216.6	560102	187.1	159.9
Cerebrovascular Disease	196	49.1	3399	56.6	137265	45.8	48
Unintentional Accidents and Injuries	227	56.9	3266	54.4	117748	39.3	N/A
Diabetes	95	23.8	1713	28.5	72507	24.2	45

*Death Rates per 100,000 ^{24, 25}

Morbidity

Data from the Behavioral Risk Factor Surveillance System (BRFSS) was used to compare morbidity of disease in Knox County, Tennessee, and the United States (Tables 3.2.3) The BRFSS is state-wide system used to collect information about behaviors individuals are engaged in that may put them at risk for developing chronic disease. The BRFSS collect data on these behaviors utilizing telephone survey interviews. Chronic conditions/diseases relevant to food equity include overweight and obesity, diabetes, cardiovascular disease, and hypertension. Perception of health is also included, as this factor may be impacted by food security status.

Table 3.2.3. Morbidity of Disease, 2006 BRFSS^{24, 25}

	Knox County (%)	Tennessee (%)	United States (%)	Healthy People 2010
Diabetes				
Have you ever been told by a doctor that you have diabetes?	10	10.7	7.5	0.25%
If yes, are you now taking insulin?	22.4	28.2	N/A	
Hypertension				
Have you ever been told by a doctor, nurse or other health professional that your blood pressure is high?	23.6	30.2	27.8	16%
If yes, are you taking medicine for your high blood pressure?	81.3	83.4	N/A	
Health Status				
Would you say your health is fair or poor?	15.4	18.8	14.7	N/A

The BRFSS report reveals that the estimated percentage of individuals with diabetes in Knox County is slightly lower than the state of Tennessee, yet much higher than the national rate. Hypertension rates in Knox County are lower than those of both the state and national rates. Hence, it is perhaps not unusual that fewer Knox County residents rate their health as only fair or poor than in Tennessee and the United States in general. However, Knox County is far from Healthy People 2010 goals for reducing the proportions of individuals affected with diabetes and hypertension. Therefore, among the numerous health problems that may be known in Knox County, diabetes and hypertension prevention still remains important.

In addition, overweight and obesity are risk factors for chronic diseases including diabetes and hypertension. It may be expected that overweight and obesity rates in Knox County are lower than those of Tennessee and the United States, as well (Table 3.2.4). However, like the differences between Knox County, Tennessee, and the United States in death rates and disease incidence, the difference in overweight and obesity is small. Healthy People 2010 goals aim for a target of 60% of individuals at a healthy weight, Knox County rates differ substantially with this goal with 60.4% of the population being overweight or obese. Thus, an absolute problem exists. Data showing the relationship between obesity and chronic disease in Knox County in 2002 (Figure 3.2.1) confirms the apparent problem of overweight and obesity in the community. Figure 3.2.2 highlights the relationship between obesity and physical inactivity and low fruit and vegetable intake. Since 2002, obesity rates have steadily increased, therefore increasing the risk of the development of obesity related chronic disease. Overweight and Obesity remains a health problem that needs continuous effort in order to improve health outcomes.

Table 3.2.4 Prevalence of Overweight and Obesity, 2006 BRFSS

	Knox County	Tennessee	United States	Healthy People 2010 Goal
Overweight BMI 25-29.9	N/A	36.7 %	36.6%	N/A
Obesity BMI 30.0-99.8	N/A	30.7%	26.3%	15%*
Overweight & Obesity BMI over 25.0	60.4%	67.4%	62.9 %	60%**

*Reduce the proportion of adults who are obese to this percentage

**Increase the proportion of individuals who are at a healthy weight to this percentage.

24, 25

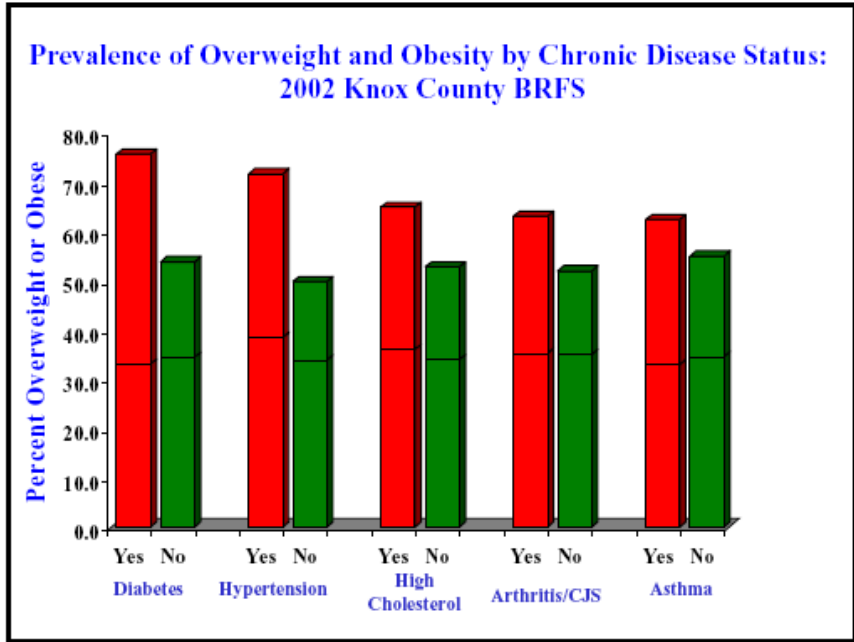


Figure 3.2.1. Prevalence of Overweight and Obesity by Chronic Disease Status²⁶

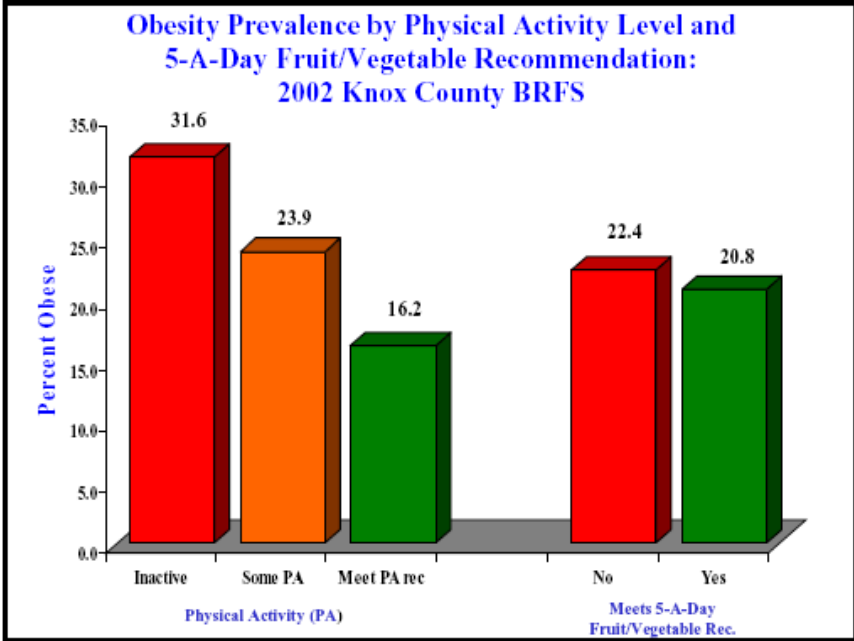


Figure 3.2.2. Obesity Prevalence by Physical Activity Level and 5-A-Day Fruits/Vegetables Recommendations²⁶

Chapter 4: Results

4.1 Retail Food Resources

Totals for each retail food resource are displayed in Table 4.1. Of the 1,290 retail food resources in Knox County, 61% are restaurants, 18% are convenience stores, 8% are supermarkets, 7% are secondary food retailers, 4% are beer/wine/liquor stores, and 3% are markets. Likewise, restaurants make up the largest portion of retail food resources in all sectors except Northeast County, which has more convenience stores than any other resource. In the sectors in which restaurants prevail, restaurants account for at least half of all retail food resources except East County where 46% of retail food resources are restaurants. All sectors have at least one market, but only three sectors have more than three: Southwest County, Central City, and West City.

Table 4.1. Retail Food Resources in Knox County Sectors^{17, 18}

Sector Name	Grocery/ Supermarket	Convenience Stores	Beer/ Wine/ Liquor Stores	Restaurants	Secondary Food Retailers	Markets (Meat/ Seafood/Fruit/ Vegetable/Bakeries)	Total
Central City	19	30	7	136	9	10	211
East City	10	16	4	49	8	1	88
North City	5	18	5	63	6	2	99
Northwest City	6	18	4	67	10	1	106
South City	6	12	2	33	5	3	61
West City	11	20	6	140	12	10	199
East County	6	15	1	21	2	1	46
North County	4	22	3	49	8	2	88
Northeast County	6	12		8	2		28
Northwest County	10	30	4	56	10	2	112
South County	3	10	3	21	3	1	41
Southwest County	11	32	9	139	15	5	211
Total	97	235	48	782	90	38	1290

Because supermarkets are considered the gold standard of retail food resource in providing a variety of quality nutritious foods, people per grocery/supermarket is displayed in Table 4.2. Apparent from this table is a very high person-to-supermarket ratio in North County that is nearly six times the lowest person-to-supermarket ratio found in West City. The latter sector also has the lowest person-to-resource ratio. Northeast County has the highest.

Table 4.2. People served by Grocery/Supermarkets and Total Retail Food Resources

Sector	People per Grocery/Supermarket	People per Retail Food Resource
Central City	2534	228
East City	2547	289
North City	5068	255
Northwest City	4662	263
South City	3086	303
West City	1850	102
East County	2218	289
North County	10,639	483
Northeast County	3636	779
Northwest County	6286	561
South County	6412	469
Southwest County	5129	267
Knox County Average	3713	279

17, 18

Maps of each sector showing the locations of the different retail food resources are located in Appendix A.

4.2 Market Basket Surveys

Sector Population and Average Market Basket Price

A comparison between sector population and average sector market basket price (ASMBP) does not suggest an association between the number of people living in area and the ASMBP (Figure 4.2.1). East County, which has the lowest population of all sectors, presents an ASMBP (\$159.92) at neither the highest nor the lowest margins of ASMBP of all the sectors. Northwest City, which has the highest population among the sectors, does present one of the lowest ASMBPs (\$141.97) of the all sectors, but there are indiscriminate differences in the ASMBPs of sectors with populations between those of East County and Northwest City.

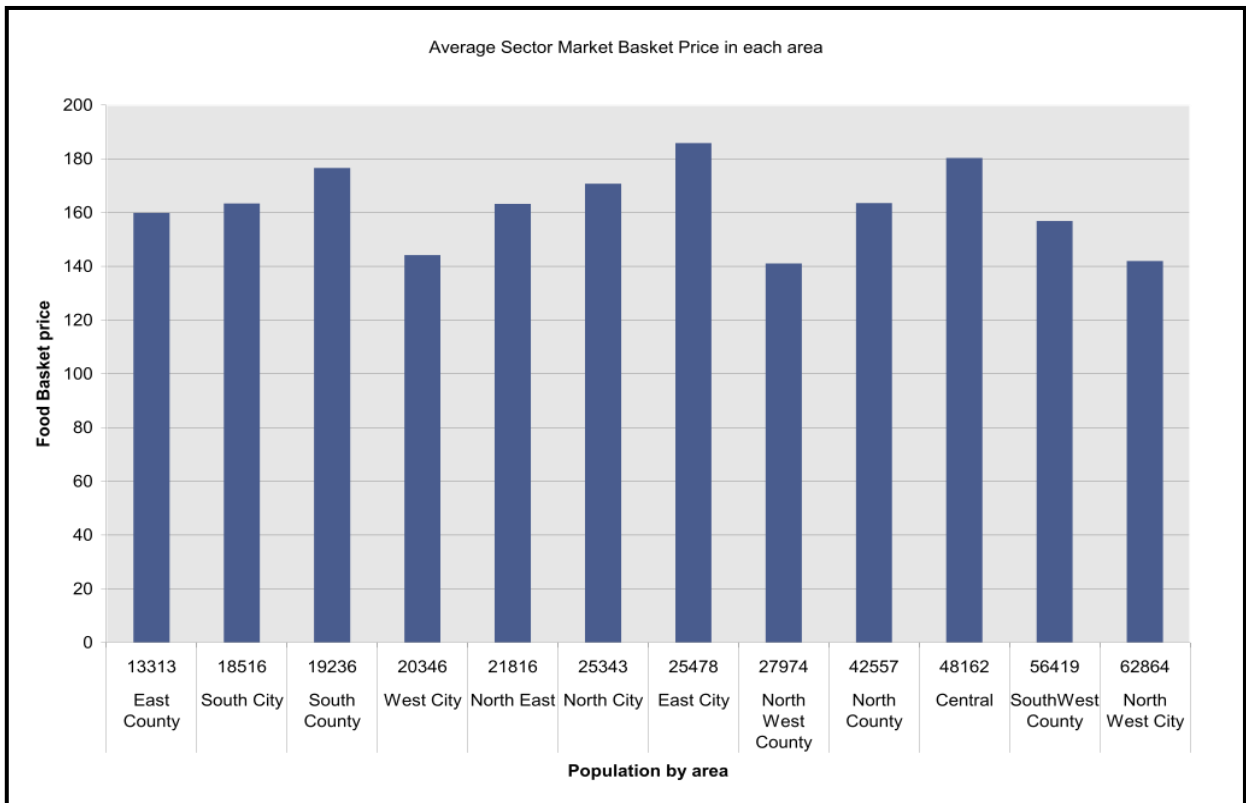


Figure 4.2.1. Average Market Basket Price Compared to Sector Population ^{17, 18}

Number of Sector Stores and Average Sector Market Basket Price

A comparison between the number of stores in each sector and average sector market basket price does not suggest an association between the number of people living in area and the ASMBP (Figure 4.2.2).

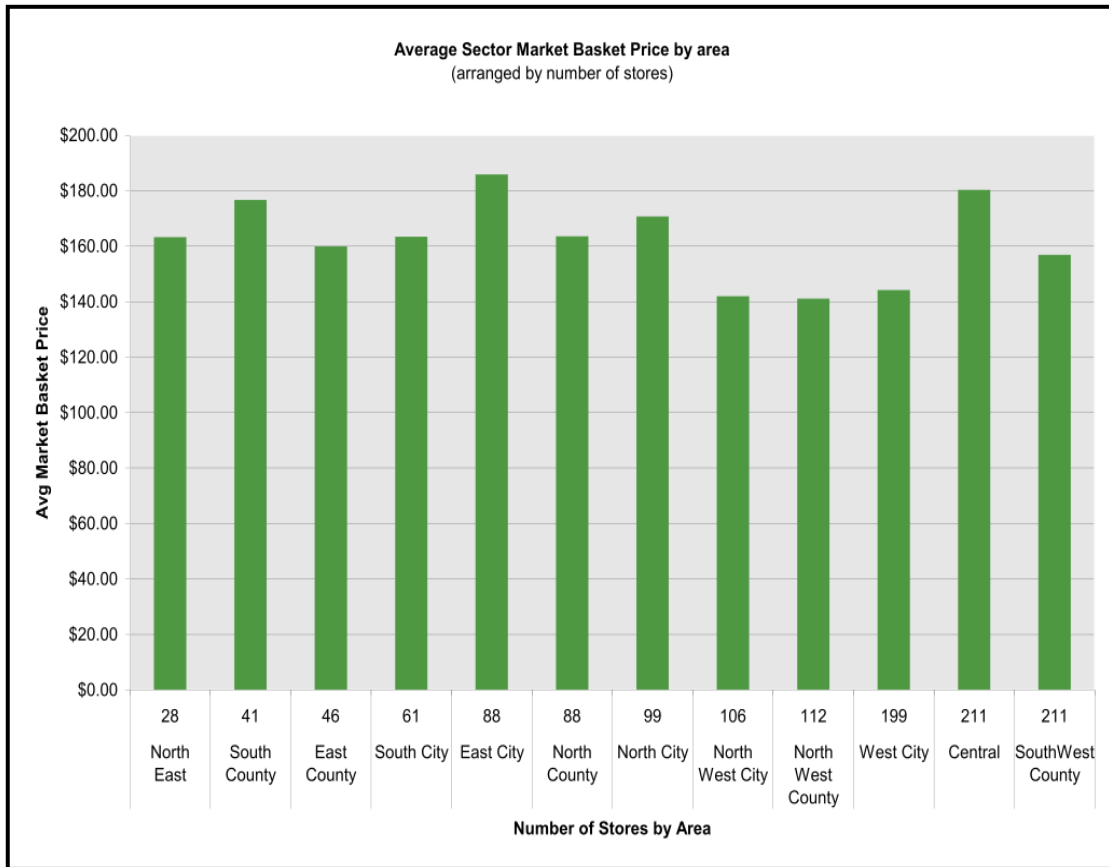


Figure 4.2.2. Average Market Basket Price Compared to Number of Stores by Sector ^{17, 18}

Average Food Group Costs by Sector

In comparing fruit and vegetable cost as a percentage of the ASMBP (Figure 4.2.3), vegetables make up a larger portion of the total value of the market basket. Among all the sectors, West City provides not only the lowest ASMBP but also fruits and vegetables at a lower percentage of the total market basket cost. In contrast, East City, South City and Central City provide a higher ASMBP and percent cost for fruits and vegetables.

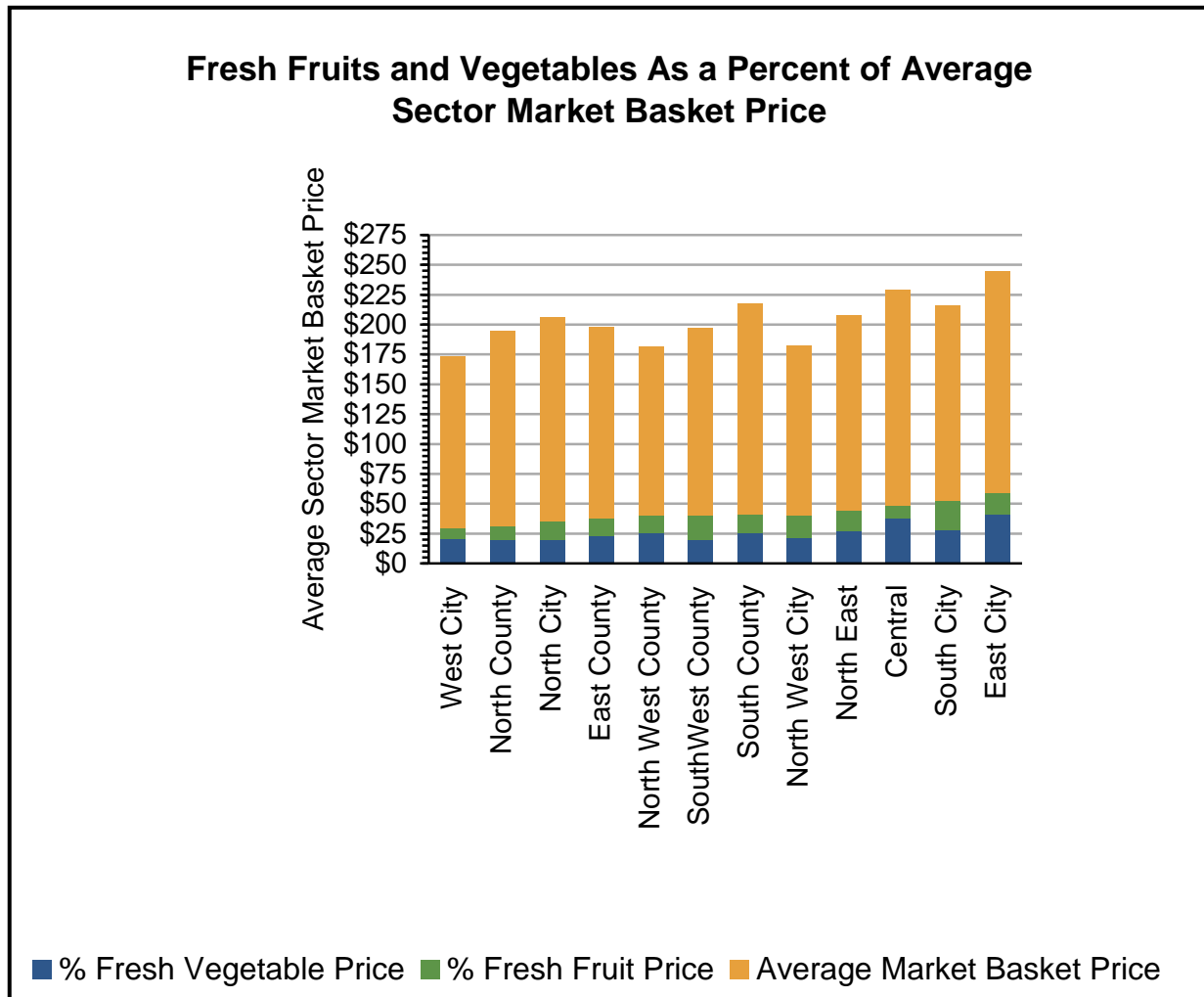


Figure 4.2.3. Fruit and Vegetable Cost by Sector

*Abstracted from Market Basket Research Data Conducted by UT Public Health Nutrition Students.

Converse to fruit and vegetable costs as a percentage of ASMBP, meat and dairy costs are highest in high income areas such as West City and lower in lower income areas such as South City and East City (Figure 4.2.4). However, Central City which has the lowest mean family income has a similar meat and dairy cost percentage to that of Southwest County which has the highest mean family income.

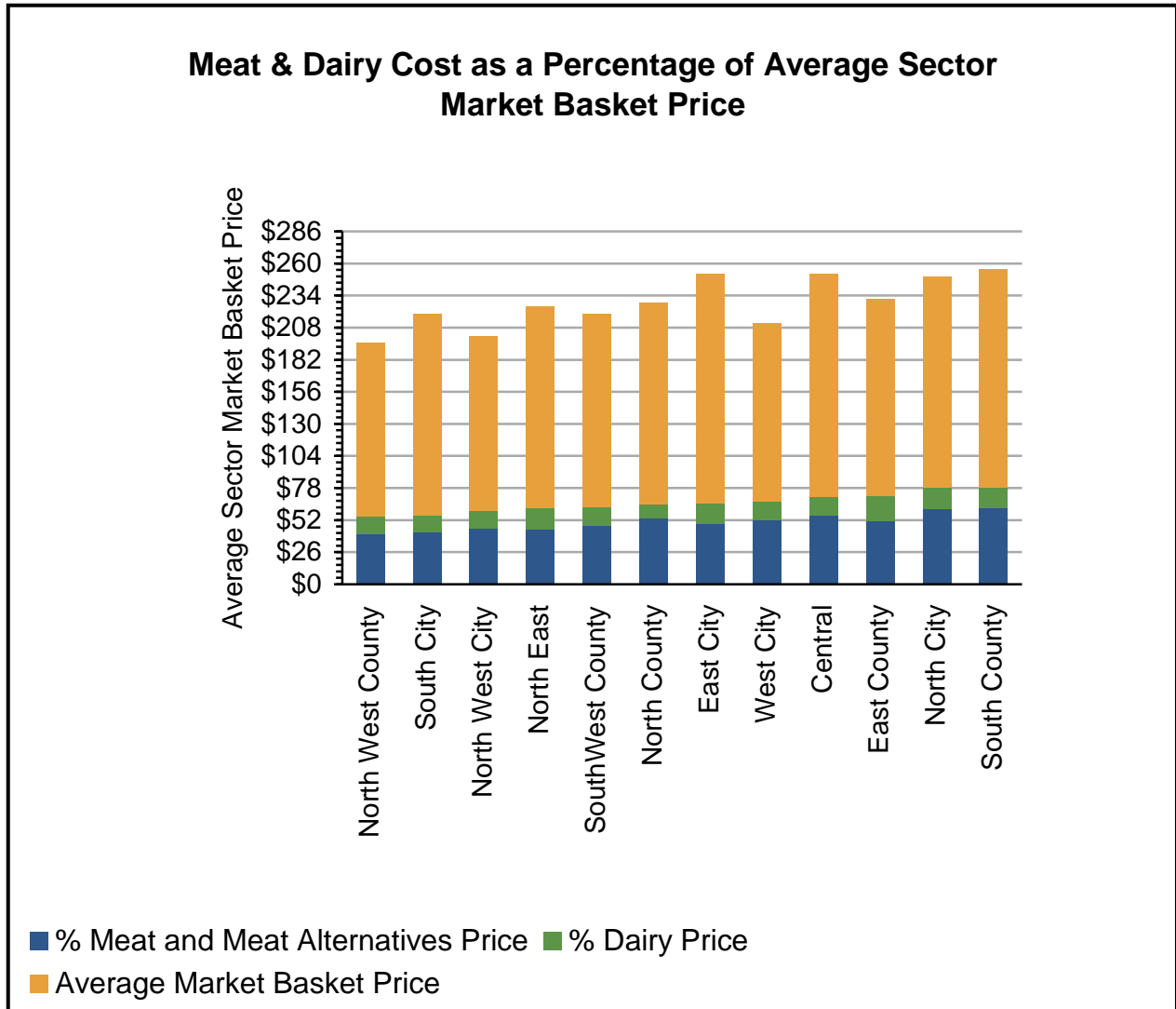


Figure 4.2.4. Meat and Dairy Cost by Sector

*Abstracted from Market Basket Research Data Conducted by UT Public Health Nutrition Students.

Mean Family Income and Average Sector Market Basket Price

Lower income areas seem to have higher average market basket prices (Figure 4.2.5). For instance, Central City has the lowest mean family income but the second highest average market basket price (\$180.30), while Southwest County has the highest mean family income, but a relatively low average market basket price (ASMBP) of \$156.87, which is more than a \$20 difference from the Central City’s ASMBP. In general, sectors that have a mean family income between \$50,000 and \$70,000 have lower average market basket prices than do sectors with a mean family income below \$50,000, creating a situation in which food costs comprise a larger portion of mean family income as mean family income declines (Figure 4.2.6).

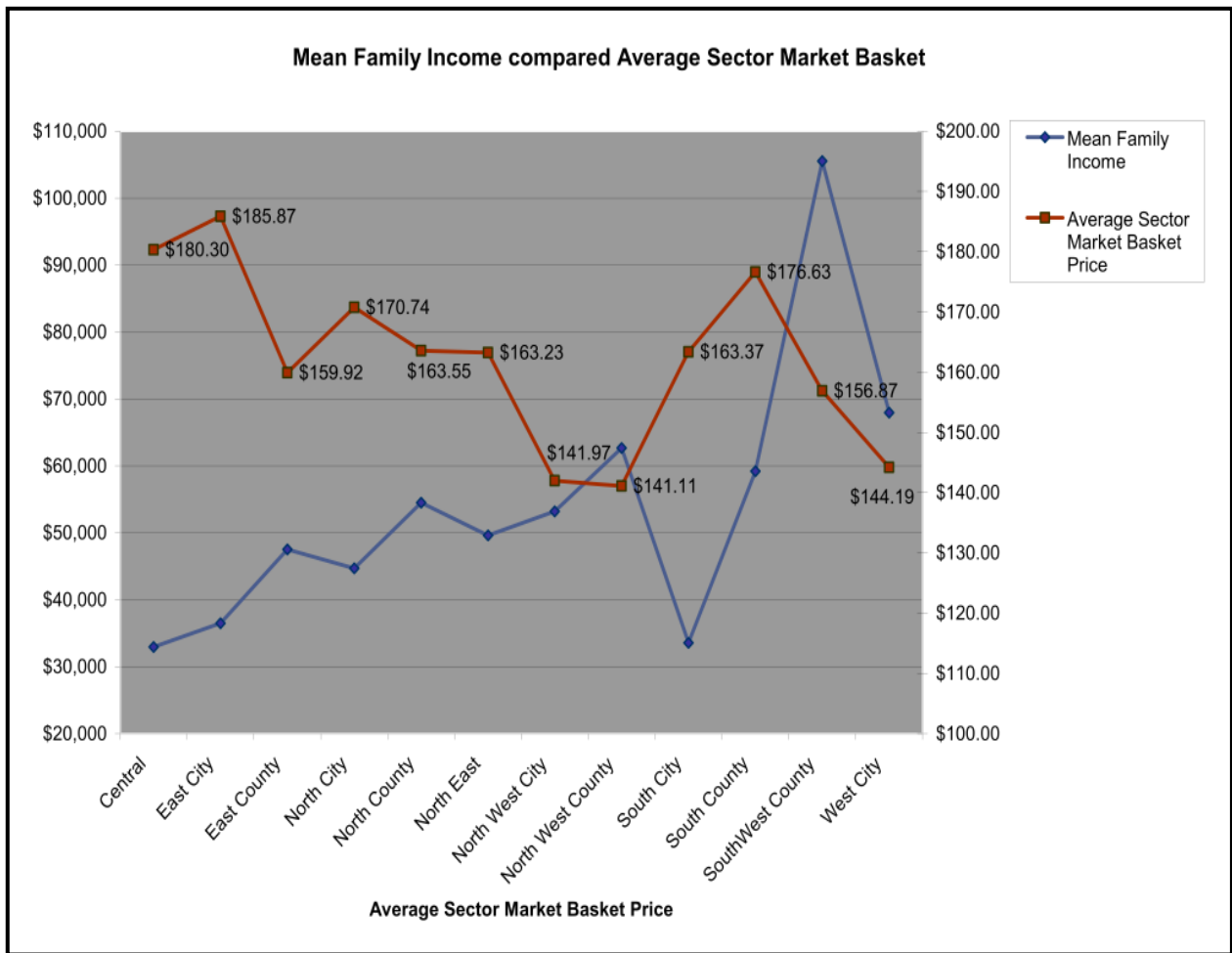


Figure 4.2.5. Mean Family Income Compared to Average Sector Market Basket

*Abstracted from Market Basket Research Data Conducted by UT Public Health Nutrition Students.

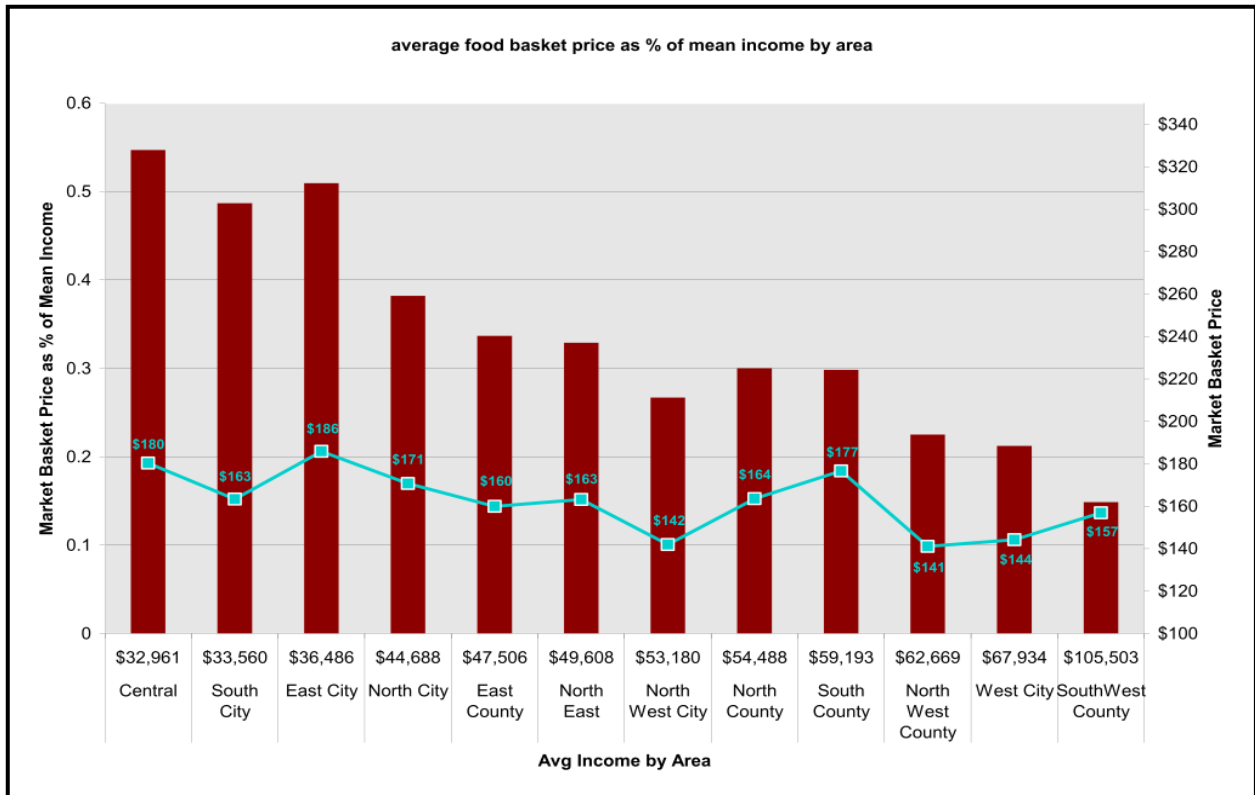


Figure 4.2.6. Average Market Basket Price as Percentage of Mean Family Income^{17, 18}

Race and Average Market Basket Price

East City and Central City are the sectors with the lowest mean family income, the highest percentages of black residents, and the highest ASMBPs among all the sectors in Knox County.

Despite these trends, food availability in a sector is difficult to ascertain based on population or income alone. Figure 4.2.7 classifies the sectors in relation to the average food availability. In addition, the figure highlights food accessibility in regards to income and population.

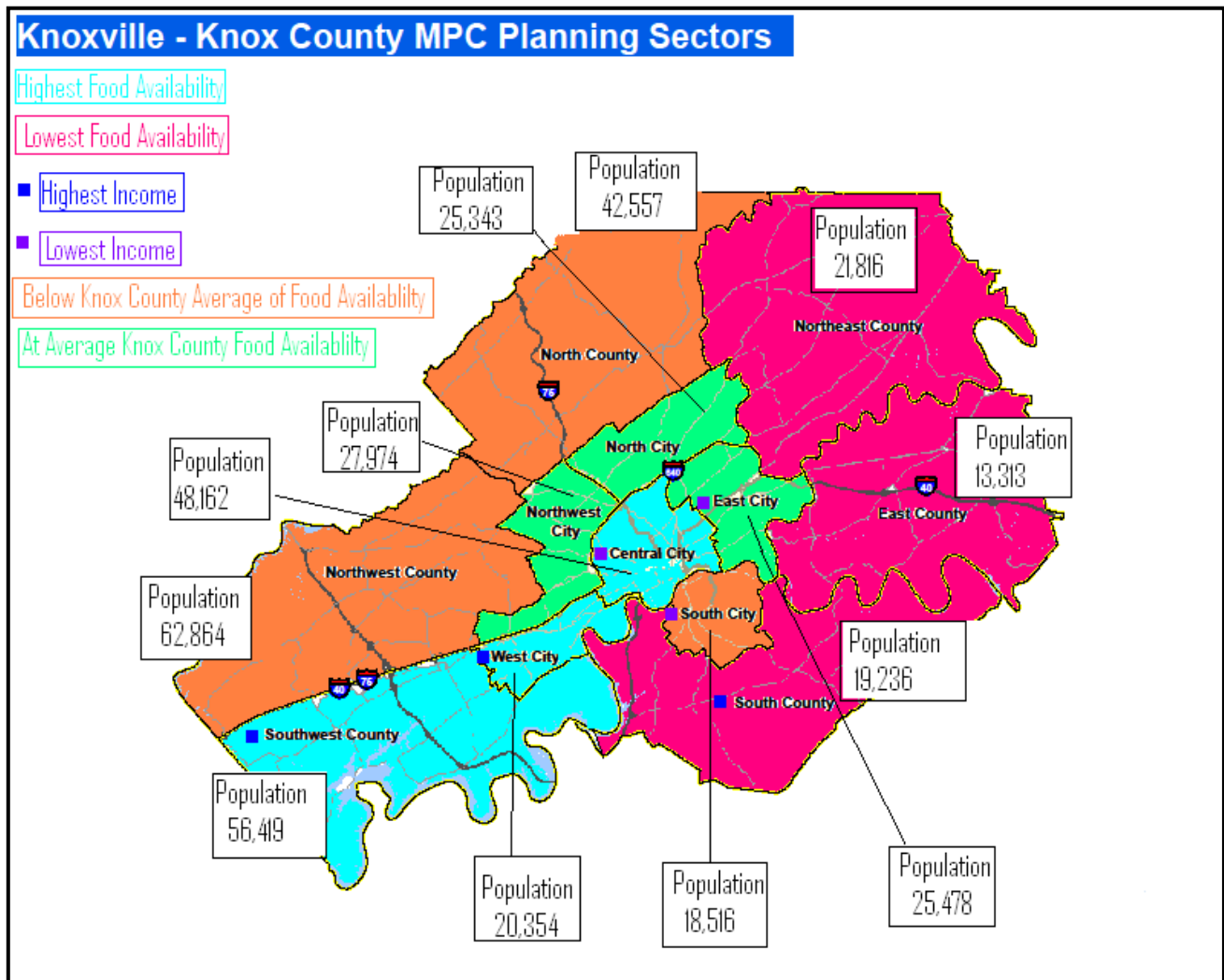


Figure 4.2.7. Food Availability and Income of Sectors^{17, 18}

4.3 Photographs

Photographs taken of the storefronts did not account for differences among the stores visited, as shown in Appendix C. The assessment team, however, subjectively found visible differences in appearance and food availability both inside and outside the stores visited at various sectors. These differences were not documented in this project as the assessment team was limited to photos of storefronts. Methods for documenting these differences are further discussed in the limitations section.

4.4 Emergency and Supplemental Food Resources

A variety of resources are available to residents of Knox County. Programs range from federal to local level, and span from food pantries to an urban demonstration farm. Many of the programs have specific criteria for participants such as income eligibility and/or age eligibility.

Food Pantries

Knox County contains eighty-seven food pantries. Largely operated by religious organizations, hours of operation range from once a month to five days a week. Many require proof of residency and identification because they serve only residents from the local area. Several pantries offer reduced cost or free clothing and furniture to recipients, as well. Maps showing the locations of food pantries throughout Knox County and in the downtown Knoxville area are located in Appendix C.

Knoxville-Knox County Community Action Committee

The Knoxville-Knox County Community Action Committee (CAC) is a public agency that serves to utilize existing programs to help low-income groups achieve self-sufficiently and live independently. Their motto is “Helping People Help Themselves.” There are four neighborhood CAC centers that offer access to many of the resources available, case management services, and referrals to other social services to those in need. Many of these programs target food access directly and indirectly ²⁷.

The CAC Homeward Bound Program is closely involved with the operations of Knoxville’s variety of food banks, soup kitchens, and transitional homes to serve the homeless. Programs such as Emergency Shelter Grant Program (ESG), Families in Need (FIN), Project Succeed, and many others, help secure food access by providing the homeless population greater housing stability and tools to achieve self-sufficiency. One transitional home is offering a three month culinary arts program that teaches cooking and meal planning while providing manpower to prepare meals for other homeless people ²⁸.

Additionally, the CAC administers several USDA-sponsored and other food distribution programs. One such program is the Commodity Program, in which the government buys national surplus and redistributes the food to low-income families, and the Summer Food Service Program that provides meals to children during the summer months who normally receive free or reduced price meals at school during the academic year. The Christmas Clearinghouse and the Empty Stocking Fund spans twenty counties in providing families with large food baskets and toys during the Christmas holiday season. The News Sentinel Milk Fund provides eligible participants with dietary supplements such as Ensure® and Pediasure® ²⁷.

Several programs work to ensure food access by promoting sustainable agriculture. There are three main urban agriculture programs: Beardsley Community Farm, the Green Thumb Program, and the Community Garden Program. The fundamental purpose of these programs is to provide land, seeds, plants, and fertilizer, and needed instruction to enable urban dwellers to grow their own food ²⁷.

Head Start

Head Start is a federal program designed for low-income children from three to five years of age and their families. The purpose of Head Start is to give children an early start in developing basic cognitive and social skills often impaired by poverty. Income eligibility qualifies participants to receive the service for free. Ten percent of a program’s participants may

be above the income eligibility requirements. The program is funded largely by the USDA, which reimburses programs based on how many meals are served. Head Start is part of the county bid system for receiving food from distribution centers. There are six center locations in the Knoxville area, and transportation is provided to promote involvement ²⁹.

Each child receives services at a given center five days per week. Many stay for a half day and receive either breakfast and lunch or lunch and snack. Other children stay for the full day. The meals are low in fat and sugar and follow other USDA regulated guidelines. Head Start accommodates children who require special diets ²⁹.

Office on Aging

The Office on Aging offers several services for the elderly, including Affordable Medicine Options for Seniors (AMOS), Computers for Homebound and Isolated Persons (CHIPS), Daily Living Center, and Mobile Meals, a prepared meal home delivery service ²⁷.

Beardsley Farm

Beardsley Farm is an urban demonstration farm and community garden. It is used to teach members of the community how to cultivate a successful and sustainable plot, and it provides community members with free space and materials to do so. Through its farming demonstrations and monthly tutorials, it trains community members with skills that ultimately help to meet their nutrition needs. Much of its yield is donated to charitable organizations such as Family Promise, Family Ministries, the Crisis Center, and the Lighthouse Project. The half-acre fenced in area and seven acres of community gardens and pastures are home to a green house, a barn, nine chickens, one rooster, two bee hives, several growing beds, and twenty-nine community plots ³⁰.

The community plots are given away annually on a first-come, first-serve basis. Each plot is approximately ten feet by ten feet and comes with a tool lending library, free seed, free water, and encouragement from staff and volunteers. Community members must agree that they will not use petroleum based pesticides, that they will not steal from other plots, and that they will help with the fall clean up. Every year they have a wide variety of participants ranging from a fifth grade class to a Burundi family to an elderly couple. The farm is located in a low income community and residents are strongly encouraged to participate ³⁰.

Emergency Food Helpers

The Emergency Food Helpers is a coalition of churches, Second Harvest Food Bank, and other private and public agencies serving those suffering from food insecurity. This organization presents the annual Hunger Hike, Federal Emergency Management Agency (FEMA), and the Filling Empty Bowls program. Their main goal is to raise awareness and to develop solutions based on the needs of the community ²⁷.

For the past eighteen years they have held a “Hunger Hike” to raise money for the various organizations in Knox County. Some of these agencies include Beardsley Farm, FISH, Love Kitchen, Inc., Second Harvest, and Western Heights Food Pantry. In 2008, the Hunger Hike raised nearly \$10,000. Ideally, the food banks will use the money raised to supply families with “food bags.” These bags have a standard set of nutritionally balanced foods to feed a family of four for three days in an economical way ²⁷.

In addition, Emergency Food Helpers receives grant money from the Federal Emergency Management Agency (FEMA). The food banks are eligible to receive money from FEMA grants (typically \$20,000) to create food bags ²⁷.

National School Lunch Program and National School Breakfast Program

The United States Department of Agriculture has a National School Lunch Program and a National School Breakfast Program. Income eligible families will receive free or reduced meal prices for their children. As of August 2008, breakfast now costs a \$1.50 and lunch costs \$2.25 in Knox County schools. There currently 53,176 – 54,000 students in Knox County school systems. A total of 64.1% of the student body purchases lunch from school on a daily basis, out of which 29.5% (15,714) pay full price, 29.1% (15,457) eat free, and 5.5% (2,918) purchase lunch at a reduced price ^{31,32}.

Second Harvest

Second Harvest is a non-profit food distribution agency that serves food banks in Knox County and the seventeen surrounding counties. Second Harvest acquires their food through donations and reduced price items in bulk and resells the food and produce for \$0.14 cents per pound. Several of the food items are free, such as fresh fruits and vegetables, so the average price is only five to seven cents per pound. Second Harvest serves over 100 agencies in the Knoxville area, which then serve approximately 125,000 people per month. Food assistance programs associated with Second Harvest include Food for Kids, Kids Café, Mobile Pantry, Rural Route, and Scoop ³³.

Supplemental Nutrition Assistance Program (SNAP)

The SNAP, formerly known as the Food Stamp Program, is the USDA's largest nutrition assistance program. It is an entitlement program involving direct cash assistance for the purchase of food. In Tennessee, there were over 900,000 participants in April 2008. The Tennessee Nutrition and Consumer Education Program (TNCEP) targets SNAP eligible participants in both community and school settings with the goal of improving food choices of participants. Currently, staff visits participants once or twice per month in public housing sites, senior citizen community centers, mentally challenged adult homes, boys and girls clubs, and after-school programs ³⁴.

Supplemental Nutrition Program for Women, Infants and Children (WIC)

The Supplemental Nutrition Program for Women, Infants, and Children serves low-income pregnant or lactating women, infants, and children under five years of age that are at nutritional risk, making them eligible to receive food vouchers. WIC is a supplemental food program in which food instruments, formerly called vouchers, enable participants to obtain select food items. The Knox County WIC program serves 130 people per day, equaling approximately 2,500 people every month. The vouchers are valued at approximately five million dollars per year ³⁵.

Knoxville Area Transit (KAT)

The first buses were introduced in Knoxville in 1929. The system was renamed many times before being dubbed the Knoxville Area Transit (KAT) in 1989. There was a period of declining clientele but in 1995 KAT restructured the bus route and saw an increase in riders.

There are 27 bus routes available to riders with additional extended nights and Sunday routes. Please see the Appendix F for a KAT system map. Also included in KAT are the Knoxville Trolley Lines and the T, a public transportation system used by the University of Tennessee students. Please see the Appendix F for maps of the Knoxville Trolley Lines and the T²¹.

Current fares range from free to \$1.25 for adults. Monthly passes and semester passes for University of Tennessee students are also available for purchase. The Paratransit LIFT program is for passengers who meet ADA (American with Disabilities Act of 1990) criteria for para transit. “Eligibility generally is open to persons who fall into one of the following two categories: 1. Persons who are unable to utilize the fixed route system 2. Persons whose disability makes it impossible for them to travel to or from the nearest bus stop²¹.” In addition, KAT has a program called “Seniors Freedom” that enables passengers 65 years and older to ride for free. The passenger must present proof in the form of an ID, Medicare card, or a Seniors Freedom ID card at the time of riding. Several bus routes will take passengers to retail food resources, including food stores such as Food City, Kroger, and Wal-Mart. Kroger is on or near nine bus routes, Food City is on or near five bus routes, and Wal-Mart is on or near four bus routes²¹.

Chapter 5: Discussion

5.1 Factors Affecting Food Equity

This community assessment evaluated food equity based on the availability of grocery stores/supermarkets, convenience stores, restaurants, and to lesser extent, food pantries, in the twelve sectors of Knox County.

Mean income and poverty status contributed to differences in food equity. Northeast County and South County sectors have the lowest food availability based on total number of food stores (28 and 41 respectively) but have an average level of mean family income (\$49,608 and \$59,193 respectively). Thus, these rural areas of Knox County have less physical availability of food but have the means to purchase food. The urban areas of Knox County, specifically Central City, have the lowest mean family income and the highest percentage of families and individuals in poverty. However, Central City has the highest availability of food (211 food stores) and the second highest cost of food based on the market basket survey (\$180.00). For comparison, West City represents a high food availability sector with the second highest mean income, an average amount of individuals in poverty (10%) and the third lowest food cost (\$144.19). There is a paradox arising from high amounts of food stores and low income in urban sectors while in rural sectors there are fewer food stores and higher incomes^{17, 18}.

With the exception of Northeast County, restaurants were the major type of food outlet for all sectors with convenience stores being the second most abundant type. In Central City, the lowest income sector, restaurants and convenience stores were 9 times more abundant than grocery stores/supermarkets. In Southwest County, the highest income sector, restaurants and convenience stores were 15 times more abundant than grocery stores/supermarkets. The abundance of restaurants in each sector was a predictor of their usage in the community, but the extensiveness of usage is inconclusive.

Food pantries represented an additional food resource in Knox County and were assessed based on a food pantry map. The map showed a concentration of food pantries in the downtown regions of Knoxville which comprises Central City, South City, and East City sectors. This is indicative of the high rate of poverty and decreased income in these sectors. In addition, Northwest County, East County, and South County were highlighted as areas with low food availability, yet only South County appears to have a higher number of food pantries than other rural sectors. Thus, Northwest and East County sectors have low food availability combined with little assistance through food pantries, which could reduce their food access below South County and all other rural sectors even though availability is average. However, the contribution of food pantries as a major food resource was difficult to assess based on a physical representation alone. Additionally, the quality of food at these pantries was not researched. Although food pantries are integral to the community as a food resource, their relation to food equity was difficult to assess based on lack of scientific literature in this area.

Research focusing on the physical distribution of food sources is based on the notion that proximity is an integral determinant of food choice and eating behavior. Research that investigates the extent to which this notion is true reveals conflicting opinions about the relative importance of proximity and affordability of food sources versus social and cultural norms regarding food and eating, perceived access to and appropriateness of food sources, and perceived quality of food sources that certain groups exhibit^{35, 36}. Although food availability is easy to measure, food equity can not be assessed based on availability alone. Food acquisition has been researched but with conflicting results. Research demonstrates that low-income

individuals often purchase a lessened quality of produce but purchase higher amounts of energy dense foods such as meats, potatoes, and soft drinks^{37, 38}. Notwithstanding, a study by Andreyva et al. showed a greater availability of produce in low-income versus high-income neighborhoods³⁹. For example, Central City has 19 grocery stores/supermarkets and although food is available, the financial burdens on this sector may lead to less purchasing power of healthful foods^{17, 18}. Income is an easily identifiable component of food equity, but a range of other factors contribute.

Other integral components of food equity in this assessment included race, transportation, household characteristics, and personal choice. Clarke et al. performed a study on food choice and suggested that people's food choices are determined by a variety of factors including personal identification with food, unawareness of food stores, and opportunity cost of grocery shopping⁴⁰. Food choice is not extensively researched but could be a valuable predictor of food equity as well as health outcomes associated with certain consumption of food.

Race was identified as a demographic characteristic affecting food equity. East City and Central City had the greatest population of African-Americans and these sectors also had the lowest mean incomes. Thus, many African-Americans may have less financial means to purchase food. Certain food stores may be less available to African Americans. According to a study by Powell et al, supermarkets were less available in African American neighborhoods compared to white neighborhoods⁶. The largest Hispanic population was in West City, which has high income and high food availability; thus, it does not appear that the Hispanic race is a reasonable predictor of food equity in Knox County.

Household characteristics may contribute to food equity. Knox County has 673 homes^{17, 18} without a kitchen facility with Central City having the most households without a kitchen facility. A kitchen facility is defined as having a sink with running water, a stove, oven, or microwave, and a refrigerator⁴¹. Lack of a kitchen facility is another factor adversely affecting Central City. Without a refrigerator to keep food cold, food may become spoiled and have the potential for causing food poisoning. Without a stove, oven, or microwave a household is limited in its ability to cook food. A complete kitchen is essential to food equity and ensuring food safety. Lastly, without access to a kitchen, a household may be dependent on eating outside of the home.

Finally, the importance of transportation lies in the ability of people to access food. Transportation affects a person's opportunities and accessibility to healthy food choices. As discussed, Central City is a low income, low food availability sector, and has the lowest amount of vehicles per household at 1.2^{17, 18}. Thus, a greater majority of residents are pedestrians and rely on public transportation to access food. Knoxville Area Transit (KAT) provides low cost transportation and free transportation to children under 5 years old and individuals over 65 years. Many of the routes provide access to food outlets, but the extent that it serves populations in need of transit could not be determined from this assessment²¹. Without reliable personal or public transportation, individuals are limited to food stores within walking distance, which may increase utilization of convenience stores and restaurants over grocery stores/supermarkets. This conclusion is based on the high proportion of convenience stores and restaurants compared to grocery stores/supermarkets in all sectors. Sidewalks are adequate in downtown Knoxville, Fort Sanders, and areas of Old North Knoxville and East Knoxville. Thus, Central and East City have accessibility to sidewalks and could potentially use them to access food. Nevertheless, sidewalks have been identified by the MPC as a need for improvement throughout Knox County. The profusion of all of these factors affecting food equity makes it arduous to qualify specific factors as well as their interrelation.

5.2 Food Equity and Health Disparities

Adverse health outcomes related to food equity were not the focus of this study but should not be overlooked. Over the past two decades, food consumed away from home has continued to increase in popularity and availability leading to an increase in the proportion of food consumed outside the home which is often less healthful than food consumed in the home⁴². Research has found the distribution of food services in communities to be an important indicator of quality food consumption and health outcomes^{43, 44, 45}. Figure 5.2 shows that a poor diet can lead to food insecurity and secondary malnutrition outcomes. As quality of life diminishes, physical, emotional, and social well being are negatively affected⁴⁶.

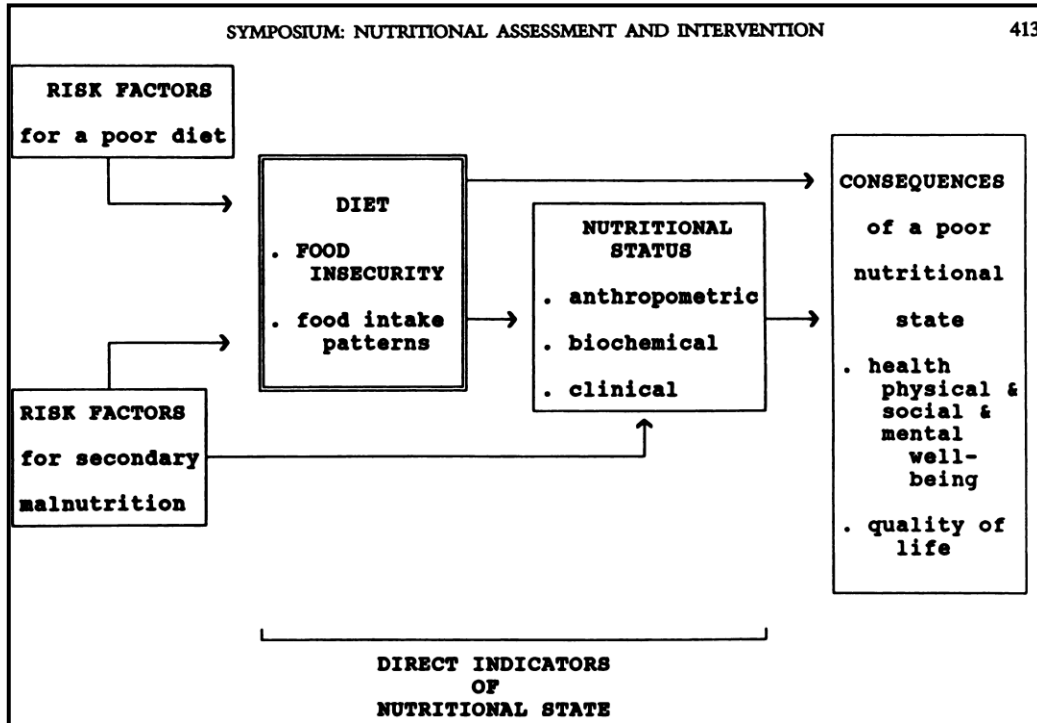


Figure 5.2. Nutrition Risk and Consequences⁴⁶

Additional research of food equity related to health disparities demonstrated that neighborhoods with supermarket accessibility had decreased rates of overweight and obesity^{5, 11, 47}. However, Morland et al.'s study indicated that neighborhoods with convenience stores *and* supermarkets had increased rates of obesity⁵. Thus convenience stores may counteract the healthful effects of grocery stores/supermarkets. With regard to fruit intake, a study by Timperio et al. showed access to fast food restaurants had a negative relationship to fruit consumption⁴⁸. In addition, a study by Rose et al. showed that supermarket accessibility resulted in increased fruit consumption⁴⁹. Research on vegetable intake in relation to food outlets was inconclusive. Research has shown that a diet low in fruits and vegetables is associated with adverse outcomes such as cardiovascular disease, hypertension, and diabetes, all co-morbidities with obesity⁵⁰. As of 2007, the prevalence of obesity statewide in Tennessee was 30.1%²⁵. Although obesity rates per sector were not available for comparison, the high concentration of convenience stores and restaurants in Knox County creates an unhealthy food environment which could promote obesity and its related co-morbidities.

Chapter 6: Limitations & Priorities

6.1 Limitations

Grocery stores/supermarkets are considered the same according to the Knoxville MPC data when a true difference between the two outlets may exist^{17,18}. According to a study in *Preventive Medicine*, chain supermarkets are found in significantly higher numbers in high income areas whereas non-chain supermarkets are found in higher numbers in low income areas⁶.

Furthermore, market basket survey data only accounted for grocery store/supermarkets, secondary stores, and convenience stores and did not include restaurants. The variety of food offered by each restaurant makes it difficult to standardize an effective data collection technique. Additionally, restaurants are coded as one entity according to MPC data commissions and do not account for fast food outlets^{17,18}. Further research needs to be conducted in relation to restaurants' contribution to food availability. Additionally, future community assessments may consider distinguishing the various restaurants that are within these communities by identifying which restaurants are fast foods versus sit down restaurants. As mentioned previously, the focus of this assessment was on food equity and not the health outcomes associated with food equity. Health outcomes related to different food restaurants, convenience stores, and grocery stores is relevant and should be addressed. Obesity is major health crisis related to poor nutrition and obesity rates should be researched more extensively throughout Knox County.

Further research should be conducted on food equity in comparison to kitchen facilities, transportation, and race affecting food equity. An additional avenue for research could include an analysis of individual and public transportation in and between sectors and food purveyor. This information could more accurately describe sectors with limited or single location concentration of food suppliers.

Due to time constraints, this community assessment was not able to interview key stakeholders and community members. This research method may offer important insight on the perceptions of food equity in the community.

Researchers felt that the photographs taken of the food retailers were not an accurate representation of the experience. Due to the limitation of only storefront photos, the environment of the area surrounding the store, as well as the condition inside, was not captured. Additionally, the photographs were taken by multiple researchers, with no technique specified, leading to inconsistency among photos. This further contributed to the inaccurate comparisons of food retailers.

Photovoice could be used in future assessments to provide a more realistic representation of inequalities; photovoice is a research methodology that provides the researcher with insight to the community members' outlook of food equity^{51,52}. Researchers provide cameras to community members who can then take photos of their community that show issues for improvement. Photos can then be shown to community leaders and policy makers to help them see the perspective of community members⁵³. Designating a sufficient amount of time for completion would allow for the utilization of all research methods for a successful community assessment.

6.2 Priorities

Community's needs based on Results:

1. There is a paradox of high availability and low affordability of food in low income and minority sectors.
2. Market Basket survey showed food prices are higher in low income and minority sectors compared to more affluent and primarily Caucasian sectors.
3. Restaurants and convenience stores represent the majority of food resources in every sector.

Future research needs:

1. Assess relationships of restaurants and restaurant type (fast food) to income, race, and obesity.
2. Assess the community's perception of their own food equity through key informant interviews and photovoice.
3. Assess the availability and accessibility of public transit services for those communities with limited household transportation.

Appendix

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