Background
Racial and ethnic disparities in consumption of healthful foods exist among the major racial groups in US. Lower rates of fruits and vegetable consumption have been documented for African Americans, and Hispanics compared to whites (Blanc et al, 2007; National Center for Chronic Disease Prevention, 2007). Given the beneficial effects of fruits and vegetables consumption on many diseases including obesity, cancers and cardiovascular diseases, and the disparities in the disease conditions along racial and ethnic lines, it is important to understand the influences on fruit and vegetable consumption. The food environment characterized by the numbers and types of food stores and eating places influence shopping alternatives for consumers. The differential distribution of the food sources and the availabilities of healthy food within communities would potentially contribute to health disparities within communities.

Objective of Study
To examine neighborhood disparities in the ability of food retail outlet types, and healthy food availability among residential racial lines in Guilford County, NC.

Data Description
Data on availability of food items from a market basket survey conducted in 2010 Guilford County, NC, were used to conduct comparisons of food availability in the four different store types: supermarkets, small grocery stores, convenience and convenience/gas combo stores, and other ethnic stores. To assess whether food availability differed by area racial composition, we created three categories of races based on the predominance of whites, and African American within zip codes where surveyed stores were located in the county. Predominantly white ZIP codes with 60% or higher whites, predominantly black was defined as ZIP codes with less than 40% whites and greater than 50% African American, and mixed race codes were defined as ZIP codes with less than 25% blacks, and whites ranging between 40% and 59%. The average racial composition of Guilford county is whites 62.29%, African American 33.95%, Asian 2.11%, Hispanic 3.5%, and others 3.16% (U.S. Census Bureau, 2000).

Model Specification
Given that the outcome variables store types and, food items availability were measured as count data, we employed Poisson regression with robust error variance to evaluate the relationship between store, and food availability and area racial distribution. Prevalence, adjusted prevalence ratios and confidence intervals were calculated using STATA 11 program. The reference category is white.

Poisson Regression Model

\[
\Pr(Y_i = y_i) = e^{-\lambda_i} \frac{\lambda_i^{y_i}}{y_i!}, \quad y_i = 0, 1, 2, \ldots
\]

Where \(\lambda_i = \beta^{x_i}\) and \(E[y_i | x_i] = \lambda_i = e^{\beta x_i} = \text{Var}[y_i | x_i]\).

\[
\frac{\text{d}E[y_i | x_i]}{\text{d}x_i} = \lambda_i \beta_i
\]

Results
Compared to white areas, African American areas were less likely to have larger food store types like supermarkets and grocery stores (Table 1). Furthermore, predominantly mixed races areas were less likely to have supermarketa than white areas. Smaller food stores were more likely to be found in African American and Mixed race area neighborhoods than in white areas.

Table 1 shows the availability of fruits and vegetables by neighborhood racial segregation. Stores located in white neighborhoods were more likely to carry all fresh fruits and vegetables items than in African American areas. All fresh fruits items surveyed were carried in at least 40% of stores located in predominantly white neighborhoods compared to at least 19% of stores in African American and racially mixed neighborhoods. Stores located in African American areas were less likely to carry fresh fruit in all cases than in White neighborhoods. For a few items, apples, melons and watermelon racially mixed areas were more likely to carry them than white and African American neighborhoods. Availability of fresh vegetables was higher in white area stores compared with both African American and racially mixed areas.

Table 3 shows the availability of dairy products, breads and other products. White area stores were three times more likely to have 1% low fat milk than racially mixed areas, and two times more likely than African American areas. Both predominantly African American and mixed race area stores were less likely to carry whole wheat breads than white areas. Starchy food items like spaghetti, and white rice were carried more in minority neighborhood stores.

Table 2. Availability of dairy products (fresh and dry) and bread and other products (fresh and dry) by neighborhood type

Conclusion and Recommendations
Our results point to the existence of disparities in the distribution of store types and food availability along racial segregation of neighborhood in Guilford County. African American neighborhoods significantly lacked supermarkets and larger stores that are associated with healthy food availabilities. The lowest availabilities of fruits and vegetables and low fat milk found in African American neighborhood stores is affirmation of the racial disparities in store availability. These findings are of public health concern as lower availability of healthful foods in one’s locality may influence the consumption of these foods by residents in these localities and impact health negatively.


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 disparities in retail store and fruit and vegetable access by area racial segregation

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\[
\ln L = \sum_i \{-\lambda_i - y_i \ln \lambda_i - \ln y_i!\}
\]

\[
\frac{\text{d}L}{\text{d}\beta} = \sum_i [x_i e^{x_i \beta} - y_i] = 0
\]

\[
P_{RT} = \frac{1 + \exp(-\beta_0 - \beta_1 X_i)}{1 + \exp(-\beta_0 - \beta_1 X_i) + 1 + \exp(-\beta_2 - \beta_3 X_i) + \cdots + 1 + \exp(-\beta_k - \beta_{k+1} X_i)}
\]