Journal of Agricultural and Applied Economics, 44,4(November 2012):491–500

The Effect of Distance and Cost on Fruit and Vegetable Consumption in Rural Texas

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Fruit and vegetable consumption is associated with improved health outcomes, yet there is limited understanding of the impact of cost and accessibility on fruit and vegetable intake in rural settings. This study examines the relationship between the consumption of fruits and vegetables and their cost and accessibility among blacks and non-Hispanic whites in a rural area. Individual characteristics from a 2006 mail survey (n = 1,510) were combined with store locations and price information from a 2006 ground-truthed census of retail outlets. The mail survey covered seven counties in central Texas with 38 supermarkets/grocery stores. Blacks tended to live closer to a supermarket or grocery store, but they were only slightly more likely than whites to consume two or more servings of fruit daily and much less likely to consume three or more servings of vegetables. Multivariate probit regression analysis revealed that neither access nor cost was related to fruit or vegetable consumption among white respondents. Among blacks, cost was also not associated with consumption. In contrast to whites, however, each additional mile was associated with a three percentage point decline in the probability of consuming two or more servings of fruit daily and a 1.8 percentage point decline in the probability of consuming three or more vegetable servings.

Key Words: food access, affordability, supermarkets, grocery stores, fruit and vegetable intake, racial disparities, rural

JEL Classifications: I12, I14, Q00, R10

Fruit and vegetable consumption is an important component of a healthy diet that has been associated with the reduction of some cancers and cardiovascular disease (Bazzano et al., 2002; WHO, 1990). Researchers and policymakers have therefore become increasingly interested in the availability, accessibility, and affordability of healthy food items, particularly in

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This research was supported in part with funding from the National Institutes of Health (NIH)/National Center on Minority Health and Health Disparities (#5P20MD002295) and by Cooperative Agreement #1U48DP001924 from the Centers for Disease Control and Prevention (CDC), Prevention Research Centers Program through Core Research Project and Special Interest Project Nutrition and Obesity Policy Research and Evaluation Network, and The Program for Research in Nutrition and Health Disparities. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the CDC.

historically disadvantaged populations. This trichotomy serves to organize the following sets of issues that determine consumption levels: do stores offer items for sale (availability); where are these stores located and do individuals have reliable means of transportation to reach them (accessibility); how expensive are these items and do household have the economic means to purchase them (affordability)?

Healthy food items such as fruits and vegetables often are not easily accessible to low-income households, to households composed of racial and ethnic minorities, or to rural residents because stores are less likely to operate in areas comprised of such individuals (Ball, Timperio, and Crawford, 2009; Dean and Sharkey, 2011; Dubowitz et al., 2008; Sharkey and Horel, 2008; Zenk et al., 2005). In addition, fresh fruits and vegetables tend to be less affordable because stores that do operate in these areas often charge higher prices while residents have less disposable income (Ard et al., 2007; Ball, Timperio, and Crawford, 2009; Block and Kouba, 2006; Dunn et al., 2010; Liese et al., 2007). Because lower prices and higher income have been associated with increased consumption of fruits and vegetables (Durham and Eales, 2006; Powell, Zhao, and Wang, 2009), differences in the affordability and accessibility of healthy food options may help explain disparities in dietary intake and diet-related health conditions among racial, ethnic, and socioeconomic groups in the United States.

Previous studies examining the influence of affordability and/or accessibility on consumption of fruits and vegetables have used large national data sets (Dubowitz et al., 2008; Powell, Zhao, and Wang, 2009; Rose and Richards, 2004) or focused primarily on urban areas such as Detroit, MI (Zenk et al., 2009); Birmingham, AL (Ard et al., 2007); Minneapolis, MN (Morland, Wing, and Diez-Roux, 2002); and New Orleans, LA (Bodor et al., 2008). Although qualitative research in rural communities has considered the role of distance and cost on the consumption of fruits and vegetables (Smith and Morton, 2009), the lack of quantitative analysis means that very little is known about how affordability and accessibility affect consumption of fruits and vegetables in rural populations.

In this article, we combine individual-level information on demographic attributes, socioeconomic status, and eating behavior for residents of a large predominantly rural region of Texas with comprehensive data on food prices from an on-site census of area stores to investigate the relationship between consumption of fruits and vegetables and important aspects of affordability and accessibility. Specifically, we consider how weekly consumption of fruit and vegetable items varies with distance to the nearest supermarket or grocery store, the cost of purchasing the weekly recommended amount of fruits and vegetables from the USDA Thrifty Food Plan (TFP) guidelines (Carlson et al., 2007), and household income.

By using a sample of respondents from a predominantly rural area, the subsequent analysis fills an important gap in the literature. Because the study area is economically and racially diverse, it is also possible to explore how the relationships among consumption, affordability, and accessibility differ by race, contributing to an understanding of racial disparities in health behaviors. In addition, our use of ground-based information on store locations and prices allows us to calculate distance and cost measures that are household-specific rather than relying on neighborhood-level (e.g. zip code of Census tract/block group) aggregates.

Before proceeding, it is worth briefly discussing how the present study differs from the typical estimation of demand elasticities, a long-standing empirical exercise in agricultural economics. Demand elasticities are the relationship between the price paid for goods and the amounts purchased. In this study, we are interested in the relationship between the price charged for goods at a particular subset of stores and the amount consumed. If consumers do not shop exclusively at stores nearest their residence, the former may differ from the latter. Thus, the estimated relationship between "price" and consumption may differ because the price definition differs (price paid vs. price charged at a particular location). For policy purposes, this difference is critically important. Subsidizing the price of healthy food items at stores in disadvantaged neighborhoods may not be an efficient use of resources if most residents continue to shop at stores outside their neighborhood. The usual own-price elasticity would mislead policymakers by overstating the expected impact of such subsidies.

Methods

Setting

Data for this study come from the seven contiguous counties of the Brazos Valley region (Brazos, Burleson, Grimes, Leon, Madison, Robertson, and Washington), which is located between the Dallas and Houston metropolitan areas and is home to nearly 300,000 residents. Six of the counties (Burleson, Grimes, Leon, Madison, Robertson, and Washington) are predominantly rural, each with a population density below 100 persons per square mile and population centers that are relatively small, e.g. Buffalo (population, 1,804); Brenham (13,507); Caldwell (3,449); Centreville (903); Hearne (4,690); and Madisonville (4,159). Brazos County includes the adjoining cities of College Station and Bryan. This area exhibits socioeconomic diversity; in 2009, median household income ranged from $32,900 in Madison County to $42,200 in Washington County compared with the median state income level of $48,200. Blacks are well represented with 16.5% reporting black race in comparison with the state mean of 11.5%.

Brazos Valley Community Health Assessment

The Brazos Valley Community Health Assessment (BVHA) was a mail survey sent to households in the Brazos Valley region of central Texas in 2006; households were recruited by a professional survey company through random digit dialing (Prochaska et al., 2006). It is worth noting that rural areas were targeted so that even within Brazos County, the largest group of respondents lives in Census tract one with a population density of 46/square mile. Respondents to the BVHA were asked to provide their age, gender, race/ethnicity (white, black, Hispanic, other), marital status, number of children in the household, and highest level of completed education. Respondents were asked to indicate annual household income by selecting one of 16 intervals. Midpoints of these intervals were used to define a continuous income variable. Reports in the highest interval—greater than $80,000—were assigned a value of $100,000 (results were robust to this choice). The BVHA also used a validated self-report, two-item screener to ask respondents about their typical frequency of fruit and vegetable consumption (Resnicow et al., 2000). Six options were provided: zero times per day, once per day, twice per day, three to four times per day, five to six times per day, and more than six times per day.

Brazos Valley Food Environment Project

As part of the Brazos Valley Food Environment Project (BVFEP), trained observers enumerated all food stores and food-service places by driving all interstates, U.S. highways, Texas state highways, Texas farm-to-market roads, and other major thoroughfares to locate all stores that could sell food items. The BVFEP used ground-truthing methods in a two-stage approach between September 2006 and June 2007 to determine the location of all food stores and the availability of fresh produce, identifying two supercenters, 22 supermarkets, and 14 grocery stores. Investigators entered all food stores with an extensive list of food items on a tally sheet to catalogue which items were sold and at what price (Bustillos et al., 2009). This list of food items included varieties of fresh, frozen, and canned fruits and vegetables along with several types of fruit juice. Prices were standardized to a per-weight measure, i.e. price per pound. In cases in which in-store prices were recorded as a per-item price (e.g. price per head of lettuce, price per apple), per-pound prices were calculated using the average physical weights from the National Nutrient Database for Standard Reference (USDA, ARS). When a store failed to sell an item on the food inventory, its price was imputed as the mean observed value from the other stores that did sell the item. Despite the extensive list of fruit and vegetables types, imputation was only necessary for 20% of the items. For example, the prices of apples and lettuce were available for 96% of stores. Only the prices of less commonly purchased items (peaches, pears, corn, and green beans) were available from less than two-thirds of stores and all types were available in at least 50% of stores.

Price Indices

Using the BVFEP data, the cost of 1 pound of fruit was calculated as the consumption-share weighted average price of the individual fruit items with consumption-shares based on per-capita loss-adjusted availability as estimated by the USDA (USDA, ERS). That is, we first multiply the price of each fruit by the proportion of all fruit consumption in the United States that comes from that type and then sum over all fruit types. The prices of more commonly consumed types therefore account for a greater proportion of the total price of fruit than less commonly consumed types. This is a common method of constructing prices of aggregate goods and is used by the USDA TFP (Carlson et al., 2007). The cost of 1 pound of fruit was multiplied by 24.5 pounds, the USDA TFP-recommended weekly consumption level for a representative family of two adults and two children, to generate weekly fruit cost. An analogous procedure was used to calculate weekly vegetable cost based on the TFP weekly recommended consumption level of 31.5 pounds for a representative family.

Assigning Cost

Combining respondent addresses from the BVHA and the positional coordinates (latitude and longitude) of food stores from the BVFEP, ESRI's Network Analysis Extension in ArcInfo 9.2 was used to determine the network distance to the nearest supermarket or grocery store. Because a store that is only slightly more distant from a residence may nevertheless sell goods at a much lower price, the closest store may not accurately reflect the shopping costs faced by the household. Thus, the catchment area for the set of nearby stores was defined as all stores no more than 1 mile farther away than the nearest store. The store in this set with the lowest total produce cost was then assigned to the respondent as the cheapest nearby store. For example, if the nearest store to a respondent was 6 miles away, the store with the lowest total produce (fruit plus vegetables) price index within 7 miles of the respondent was assigned to the respondent. The fruit and vegetable price indices for this store were then used in the statistical analysis. Alternative definitions were also examined, e.g. using the prices at the closest store or prices at the cheapest store no more than 2 miles farther than the nearest store, but this choice did not affect estimation results. Model selection statistics (Akaike Information Criterion and Bayesian Information Criterion) suggested a 1-mile buffer provided the best fit for the catchment area.

Statistical Analysis

The USDA MyPyramid nutritional guidelines recommend two to four servings of fruits per day and three to five servings of vegetables. Therefore, a probit regression of whether respondents reported consuming at least two servings of fruit was estimated with the following set of explanatory variables: distance to the cheapest nearby store, the weekly fruit price index at the cheapest nearby store, age, gender, indicator variables for being married and the presence of children in the household, the logarithm of household income, years of formal education, and an indicator variable for living in one of the six predominantly rural counties (i.e. variable equals 0 if the respondent resided in Brazos County or 1 if the respondent resided in another county). To examine differences by race, the regression analysis was undertaken separately for whites and blacks because previous work has shown that the influence of food environment in rural areas may vary by race/ethnicity (Dunn, Sharkey, and Horel, 2012). An analogous set of probit regressions for whether respondents reported consuming at least three servings of vegetables was also estimated. Results are reported as marginal effects at the mean.

Results

Descriptive statistics for the sample are reported in the first column of Table 1. As is often

Table 1. Descriptive Statistics by Race[a]

	Pooled	Whites	Blacks
Affordability and accessibility			
Distance to nearest store (miles)	4.48 ± 4.66	4.77 ± 4.69	2.62 ± 3.72**
Weekly fruit cost ($)[b]	20.12 ± 2.63	20.16 ± 2.58	20.03 ± 2.93
Weekly vegetable cost ($)[b]	28.13 ± 3.48	28.19 ± 3.49	28.21 ± 3.39
Socioeconomic characteristics			
Age (years)	52.1 ± 15.8	53.3 ± 15.6	47.0 ± 15.4**
Female (%)	0.733 ± 0.442	0.729 ± 0.445	0.812 ± 0.392**
Married (%)	0.65 ± 0.48	0.69 ± 0.46	0.36 ± 0.48**
Children in household (%)	0.36 ± 0.48	0.33 ± 0.47	0.54 ± 0.50**
Years of education	13.1 ± 2.1	13.4 ± 1.9	12.4 ± 2.1**
Household income ($)	48,638 ± 31,489	52,691 ± 31,342	24,206 ± 21,175**
Reside in rural Census tract (%)	0.67 ± 0.47	0.68 ± 0.47	0.66 ± 0.48
White (%)	0.789 ± 0.408		
Black (%)	0.099 ± 0.298		
No.	1,510	1,191	149

[a] Means ± standard deviation.

[b] For fruit, this is the cost of purchasing 24.5 pounds of fruit, the USDA weekly recommended amount of fruits for a representative family of four. For vegetables, this is the cost of purchasing 31.5 pounds of vegetables, the USDA weekly recommended amount of vegetables for a representative family of four.

** and * denote statistically different means or proportions between whites and blacks from a two-sided *t* test at $p < 0.01$ and $p < 0.05$, respectively.

the case with randomized mail and telephone surveys, the majority of respondents to the BVHA are female. For comparison, 62.1% of respondents to the 2009 Behavioral Risk Factor Surveillance System (BRFSS) were female.

To explore differences between racial groups, the remaining columns of Table 1 report descriptive statistics for the subsample of whites and blacks, respectively.[1] Blacks, who comprise 46.7% of nonwhite respondents, are less likely to be married and exhibit a mean household income less than half that of whites. Although black respondents tend to be economically disadvantaged relative to whites, they typically reside closer to a supermarket or grocery store. For example, the mean distance to a grocery store or supermarket is 4.8 miles for whites but only 2.6 miles for blacks. In contrast, the cost index for the recommended weekly fruit consumption at the cheapest store within the catchment area is similar for whites and blacks: $20.16 compared with $20.03. Similarly, the cost index for recommended weekly vegetable consumption is $28.19 for whites compared with $28.21 for blacks.

The distribution of fruit and vegetable consumption by race is presented in Table 2. As documented by the Centers for Disease Control and Prevention, fruit and vegetable consumption falls far below the USDA-recommended levels for each of the racial/ethnic groups in the sample (Grimm et al., 2010). In our sample, 35.7% of whites and 36.5% of blacks consume at least two servings of fruit per day, which is comparable to the national average of 32.5% calculated using the 2009 BRFSS (Grimm et al., 2010). Although the distribution of fruit consumption among white respondents is similar

[1] Although the number of black observations is relatively small (10% of the total sample), as seen subsequently, it is sufficient to estimate a number of important statistically significant relationships. In contrast, Hispanics account for only 5% of the total sample and when we conduct the regression analysis over this sample, we cannot reject the null of the chi-squared tests. These results indicate that the sample size cannot support a separate empirical analysis for Hispanic respondents, preventing us from reasonably testing whether Hispanics should be pooled with whites or blacks. Thus, individuals reporting Hispanic ethnicity are omitted from the subsequent analysis. For similar reasons, individuals reporting other (6% of the sample) are also omitted.

Table 2. Distribution of Fruit and Vegetable Servings by Race

Servings per Day	Fruit		Vegetables	
	Whites	Blacks	Whites	Blacks
0	21.7	25.5	3.0	8.1**
1	42.6	37.9	28.5	31.5
2	23.5	21.4	39.0	41.6
3–4	11.0	13.1	26.4	15.4**
5–6	0.7	2.1	2.7	2.0
More than 6	0.5	0.0**	0.3	1.3
No.	1,183	145	1,184	149

Entries in each column are the proportion of individuals who report consuming the respective number of servings per day. Columns may not sum to 100 because of rounding.
**,* denote proportion among blacks statistically different from proportion among whites from a two-sided t test at $p < 0.01$ and $p < 0.05$, respectively.

to the distribution among blacks, there are statistically significant differences in the distribution of vegetable consumption. White respondents are more likely to consume at least three servings of vegetables per day, 29.5% vs. 18.8%, compared with a national average of 26.3% (Grimm et al., 2010).

Results from multivariate probit regression analysis of fruit consumption by race are reported in the first two columns of Table 3. Controlling for socioeconomic attributes, neither distance nor cost seems to play a role in the consumption decision for white respondents. In contrast, for blacks in our sample, every additional mile between their residence and the cheapest store within the catchment area decreases the probability of consuming at least two servings of fruit by 3.0 percentage points, a sizeable magnitude because only 36% of respondents currently consume two servings per day. The marginal effect of increasing the fruit cost index by $1 is also large and negative for the black subsample, although not statistically significant. A formal log ratio test rejects the null that whites and blacks should be pooled (LR = 9.8 $\sim\chi^2[15]$).

Analogous results for vegetable consumption are similar and reported in the next two columns. The marginal effects on distance and cost are exceptionally small and statistically insignificant for the white sample when controlling for other socioeconomic characteristics. For blacks, every additional mile between their residence and the cheapest store within the catchment area decreases the probability of consuming at least three servings of vegetables by 1.8 percentage points. The marginal effect of increasing the vegetable cost index is also negative, but again, not significant.

The association between individual characteristics and fruit and vegetable consumption also differs by race. Each additional year of formal education (controlling for age, gender, income, etc.), increases the probability of consuming at least two servings of fruit by 4.7 percentage points among whites. In contrast, the marginal effect on education is close to zero and statistically insignificant among blacks. This pattern is repeated for vegetable consumption, in which each additional year of education increases the probability of consuming at least three servings of vegetables by 2.1 percentage points among whites but does not have a statistically significant association among blacks. Although education has a stronger association with fruit and vegetable consumption for whites than for blacks, the marginal effect of additional household income on fruit consumption is almost four times larger for blacks. Increasing income by 10% for an black household is associated with a 1.6 percentage point increase in the probability of consuming at least two servings of fruit per day compared with only a 0.5 percentage point increase among whites.

It is worth noting that our estimation results are robust to numerous specification checks such as the following: the definition of the catchment area around the nearest store; including the cost of other food staples (the cost of purchasing a gallon milk, a dozen eggs and a loaf of bread) to compare relative prices of fruits and vegetables; and including a dummy variable for shopping at a grocery store.

Discussion

This article explored the determinants of fruit and vegetable consumption among a sample of white and black residents from a predominantly

Table 3. Marginal Effects from Probit Regressions on Fruit and Vegetable Consumption by Race[a]

	At Least Two Fruit Servings		At Least Three Vegetable Servings	
	Whites	Blacks	Whites	Blacks
Access and affordability				
Miles to least expensive nearest store[b]	−0.001	−0.030**	0.001	−0.018*
	(0.003)	(0.014)	(0.003)	(0.011)
Cost of weekly recommended consumption ($)[c]	0.000	−0.023	−0.003	−0.010
	(0.007)	(0.020)	(0.004)	(0.012)
Individual characteristics				
Age (years)	0.005***	0.001	0.003***	0.001
	(0.001)	(0.003)	(0.001)	(0.003)
Female[d]	0.197***	0.064	0.089***	0.086
	(0.029)	(0.117)	(0.029)	(0.068)
Married[d]	−0.015	−0.079	0.075**	0.042
	(0.037)	(0.118)	(0.032)	(0.090)
Children in household[d]	−0.013	0.032	−0.028	−0.004
	(0.038)	(0.103)	(0.035)	(0.077)
Years of education	0.047***	0.006	0.021***	−0.004
	(0.008)	(0.026)	(0.008)	(0.020)
Log of household income	0.045**	0.161*	0.045**	0.035
	(0.023)	(0.073)	(0.022)	(0.052)
Rural[d]	0.013	0.135	0.030	0.246*
	(0.060)	(0.162)	(0.045)	(0.101)
No.	1,183	138	1,184	149

[a] Each column reports the marginal effect (the percentage point change in the proportion of respondents who fall into a given response category) of a unit change in the explanatory variable from a multivariate probit regression that controls for all explanatory variables simultaneously, i.e. controlling for income, education, gender, etc. All regressions include dummy variables for county of residence. Standard errors in parentheses.

[b] Least expensive nearest store is defined as the supermarket or grocery store with the lowest combined cost of purchasing the weekly recommended amount of fruits and vegetables for a representative family of four (24.5 pounds of fruit and 31.5 pounds of vegetables) that is no more than 1 mile farther from the respondent's residence than the nearest store.

[c] For fruit, this is the cost of purchasing 24.5 pounds of fruit, the USDA weekly recommended amount of fruits for a representative family of four. For vegetables, this is the cost of purchasing 31.5 pounds of vegetables, the USDA weekly recommended amount of vegetables for a representative family of four.

[d] Dummy variables. The referent categories are male, not married, no children in household, resides in urban census tract.

***, ** and * denote statistically significant at $p < 0.01$, $p < 0.05$, and $p < 0.10$, respectively.

rural region of Texas with particular focus on aspects of the food environment and household characteristics associated with affordability and accessibility. Controlling for socioeconomic characteristics, neither distance to the cheapest store in the individual catchment area nor the cost of purchasing the weekly recommended consumption level at that store were related to fruit or vegetable consumption among white respondents. In contrast, every additional mile was associated with a 3.0 percentage point decline in the probability of consuming at least two servings of fruit per day among black respondents. Greater distance was also associated with a lower probability of consuming at least three servings of vegetables for blacks, although this relationship was weaker.

These results are broadly consistent with previous studies that documented a positive relationship between access and consumption in urban areas (Morland, Wing, and Diez-Roux, 2002; Zenk et al., 2005). Although a national analysis of nonmetropolitan (rural) areas reported no relationship between distance to a supermarket and consumption of fruits and vegetables, the analysis was not separated by race or ethnicity (Michimi and Wimberly, 2010). The results are also consistent with previous findings that accessibility was more salient for fruit than vegetable consumption.

For example, in a sample of U.S. Food Stamp Program participants, fruit consumption was also more responsive to supermarket access than was vegetable consumption (Rose and Richards, 2004).

Household income was positively associated with fruit and vegetable consumption among both whites and blacks in our sample. Higher income may not only directly influence consumption by expanding the budget set (better affordability), but also indirectly increase consumption when additional income is spent to improve transportation options (better accessibility), thereby reducing the influence of the local food environment on the shopping behavior of those with greater economic resources (Garasky, Morton, and Greder, 2006; Wright and Smith, 2008). Because the mean household income of whites in our sample is more than twice that of blacks, this could explain the stronger income effect among blacks (a factor of four with respect to fruit consumption). It could also explain the stronger effect of distance on fruit consumption than vegetable consumption, because the proportion of fresh consumption relative to total consumption is larger for the former and thus requires more frequent trips to maintain a household inventory.

It is therefore possible that car ownership explains many of our results, although this must be left to future research because questions about transportation were not included in the BVHA. The importance of car ownership is consistent with previous evidence suggesting that rural residents perceive convenience in shopping for fruits and vegetables as multidimensional, reflecting not only the distance-based proximity to home/work given available transportation but also temporal proximity and multitasking (Webber, Sobal, and Dollahite, 2010). Understanding how reliable transportation affects the shopping decision of rural households is clearly important for policy purposes. Of course, although greater access may cause greater consumption of healthy food items, it is also possible individuals who would normally consume higher amounts of fruits and vegetables choose to live closer to supermarkets or grocery stores. For example, it is possible that blacks chose to live closer to stores precisely because they lack adequate transportation.

In contrast to previous demand analyses that have estimated a negative own-price elasticity when using the price paid for items (Durham and Eales, 2006; Powell, Zhao, and Wang, 2009), the price at local nearby stores was not associated with consumption among whites. We did estimate a large negative relationship among blacks, but equally large standard errors prevent us from interpreting the results too strongly. Intuitively, individuals who reside in areas where food prices are high will respond by shopping farther from home if they possess the means to do so. We would thus expect the more affluent group to exhibit a weaker association between local price and consumption. However, without information about actual car ownership or location where individuals shop, we cannot test this hypothesis.

Despite the aforementioned data limitations (along with insufficient observations to separately analyze Hispanic respondents), the current analysis offers valuable improvements over previous work. First, information on the food environment and consumption behavior were collected during roughly the same period, whereas other studies sometimes have had sizable lags between data collection efforts. Second, access (e.g. distance to the nearest store) was calculated as network distance based on ground-truthed data, whereas other studies have used self-reported shopping distances. Third, previous studies included controls for the race/ethnicity of respondents and thus ignored the possibility that important relationships can vary across racial and ethnic group. Separating the analysis by race clearly reveals this to be the case for whites and blacks. Fourth, much of the existing literature focuses on urban areas, leaving much unknown about rural populations who currently face numerous public health challenges.

Conclusions

This study extends prior work by examining how the affordability and accessibility of fruits and vegetables influences consumption behavior among whites and blacks living in rural areas. Although blacks tend to live closer to supermarkets and grocery stores than do whites, distance appears to be a greater barrier to consumption for the former. Simply increasing the number of food stores may, however, have a limited effect on consumption if economically disadvantaged residents lack the means to commute from their residence. Hence, for rural families to be food-secure and meet nutrition guidelines, policymakers must focus on increasing access in meaningful ways that benefit disadvantaged groups.

[Received August 2011; Accepted April 2012.]

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