What is the relationship between a 9-point Mediterranean diet score and commute time to the grocery store for consumers in the United States?

NHANES Report

NTR 555 Dr. Tangney

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Research Questions

1. How accordant are United States citizens to Mediterranean dietary pattern from the years of 2009-2010?
2. What is the relationship between a 9-point Mediterranean diet score and commute time to the grocery store for consumers in the United States?

Objectives

1. Determine the 9-point Mediterranean Diet scores based on the Martinez-Gonzalez dietary screener of the US adult population in NHANES 2009-2010 (Martinez-Gonzalez, 2004).
2. Determine the commute time in minutes to the grocery for the US adult population in NHANES 2009-2010.
3. Describe the attributes of those with a shorter one-way commute time (less than or equal to 10 minutes) and those with a longer commute time (>10 minutes) for the US adult population in NHANES 2009-2010.

Introduction

There is increasing evidence that the Mediterranean dietary pattern is a healthful diet to prevent chronic diseases, such as cardiovascular diseases and diseases associated with neurodegenerative decline. (Estruch 2013, Lourida, 2013). A major component of the Mediterranean diet is that foods are minimally processed. In fact, most of the components of the Mediterranean diet include fresh products, such as fresh fruits and vegetables. Thus, the act of grocery store shopping is an inherent, rarely discussed element of the Mediterranean dietary pattern.

There are several issues that may contribute to a lack of a healthy dietary pattern at the

junction of the grocery store. Firstly, the number of physical grocery stores present in an area/neighborhood may be a barrier to a healthful dietary pattern. By linking supermarket locations with the addresses of residential homes, it has been found in several studies that, compared to the poorest neighborhoods, a larger proportion of food stores are located in wealthier neighborhoods (Boone 2011; Mordland, 2002; Zenk 2005).

However, findings by Boone et al. in the Coronary Artery Risk Development in Young Adults (CARDIA) Study suggest that adding neighborhood supermarkets may have little benefit to overall diet quality. This is because no significant assoiation between supermarkets/grocery store availability and a healthy diet. The CARDIA study was prospective cohort study with 5,115 participants aged 18-30 year that were followed from 1985 – 2001. Participants were recruited from the cities of Birmingham, AL; Chicago, IL; Minneapolis, MN; and Oakland, CA. A Geographic Information System (GIS) was used to link neighborhood food resources with U.S. Census today to participant residential locations four times throughout the study (years 0, 7, 10, and 15) from geocoded home addresses. Food resources were categorized as being within 1 km, 1–2.9, 3– 4.9, and 5–8.05 km of each participant's home. Additionally, consumption of fast food consumption and frequency of fast food locations were determined.

These data were compared to overall diet quality, as determined by an interview-obtained diet history compared to the Diet Quality Index (DQI). The researchers created a conditional regression models using fast food consumption, supermarket availability, and diet quality. It was found that fast food consumption was related low-income men, but greater supermarket availability was generally unrelated to diet quality. (Boone 2011).

Secondly, a barrier to healthful eating in the context of grocery stores may be related to factors other than food or location. The barriers may be associated with education of consumers at the localized, point-of-sale level. Ard et al. demonstrated using a survey employed in 44 groceries stores across the in Birmingham, Alabama area that it is not always the availability for the fruit and vegetables that determine purchase. Other mental and educational barriers may play a part, such as preparation knowledge and familiarity of the products. Additionally, consumers may lack knowledge on the nutritional benefits of such foods (Ard 2010).

A final barrier may be the quality or variety of food offered, particularly in an urban environment. Morland et al. determined in 2006 using a cross-sectional observational study design that in Brooklyn, NY, a lower proportion of predominantly black neighborhoods carried fresh produce with the exception of bananas, potatoes, okra, and yucca. Using a similar design, Zenk et al. found in Detroit, MI that mean quality fresh produce was significantly lower in impoverished, predominantly African American neighborhoods. However, designs of the previously mentioned studies were with limitations. They have low power, data were collected at only one point in time with populations from only one city, and data were not compared to health criteria (Morland, 2006, Zenk 2002).

There are many facets to the rise in chronic disease. Indeed, food and consumerism is a large part of this, and the need to create a healthier diet pattern to replace the “Western” diet. It has been illustrated in several studies that a Mediterranean diet pattern is a healthful one (Estruch 2013, Lourida, 2013, Trichopoulou 1995). However, little research has been done on a Mediterranean diet pattern in the United States sample population, especially in terms of grocery store availability. Therefore, the objective of this study was to determine relationship between a

9-point Mediterranean diet score and commute time to the grocery store for consumers in the United States.

Methods

Data Collection

Data from the 2009-2010 National Health and Nutrition Examination Survey (NHANES) dataset were analyzed in this study. NHANES is a national-represented survey of the United States population that combines questionnaires, physical examinations, and laboratory assessments. Nutrient intake was used from the following NHANES data files: dietary screener questionnaire, alcohol use questionnaire, dietary interview: total nutrient intakes -- first day, dietary interview: individual foods -- first day nutrient intake. These dietary intake instruments were used to estimate intake of certain foods/nutrients, and create a Mediterranean Diet Score (Med. diet score) emulating the Martinez-Gonzalez et al. 9-item Mediterranean Diet Screener. It should be noted that every participant was assigned a score even if they had components missing. If a component was missing a food or beverage component, the score for that particular component became a zero. This was done to conserve sample size (Martinez-Gonzalez, 2004).

Other files that were obtained for analysis include the consumer questionnaire and the demographic file. These files were used to assess the association between a Mediterranean diet and commute time (in minutes, one-way) to the grocery store, and to describe the population within these parameters.

Subjects

The sample was split by those who had a commute time less than or equal to ten minutes and a commute time of greater than ten minutes. Those who were less than 20 years old were also excluded from the sample. Finally, there were some subject discrepancies between the time-to-store variable and the Med. Diet score. That is, individuals who completed the food-related questionnaires (Dietary Interview First Day and Dietary Screener Questionnaire) did not necessary complete the grocery store questionnaire (Consumer Behavior Questionnaire). Thus, a total of 5,959 participants were included for analysis. Please see Appendix A for more detailed information of the variables used within the questionnaires.

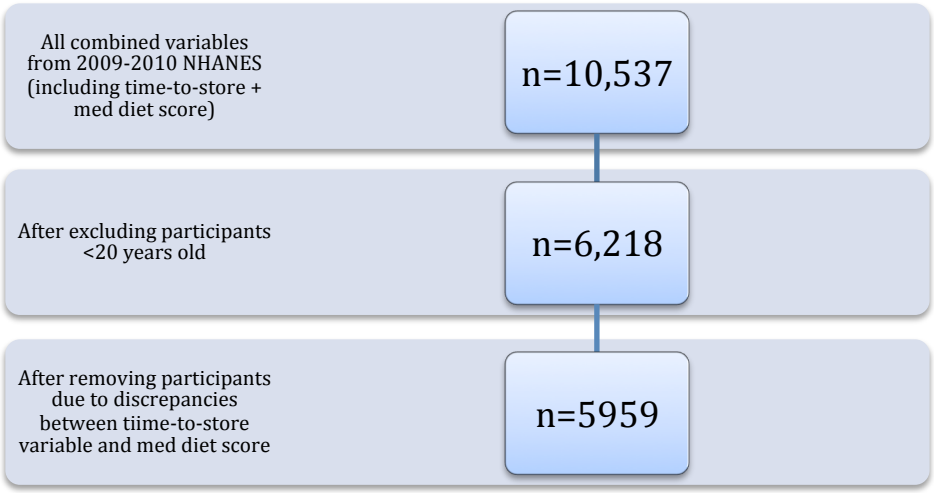

Figure 1. Population Schematic

Variable Measures

Accordance to a Mediterranean diet pattern was measured using a 9-item screener emulating the Martinez Gonzalez 9-item Mediterranean diet screener (Martinez-Gonzalez, 2004). Cutoffs and dietary components were based largely based on this screener, with some

changes. Changes were made largely due to constraints within the NHANES datasets. For instance, there is no question asking about wine consumption specifically in 2009-2010 NHANES dataset. Thus, the variable of alcohol consumption was used instead. These changes are illustrated in Table 1.

Time-to-store was assessed dichotomized into less than or equal to ten minutes (n=3555) and greater than ten minutes (2404) because ten minutes was the median response for this non-normally distributed variable. A complete list of variables is provided in Appendix A.

Table 1: Mediterranean diet scoring systems for the Martinez-Gonzalez 9-item Screener[1] and the corresponding NHANES-derived 9-item screener

9-item Screener[1]	Variables from NHANES	Score
1. Olive oil (≥ 1 spoon/day)	Mono/sat. fat ratio (≥ 1.6gm)[4]	+1
2. Fruit (≥ 1 serving/day)	Fruit, not including juices (≥ 1 serving/day)	+1
3. Vegetable or salad (≥ 1 serving/day)	Leafy salad + other vegetables (≥ 1 serving/day)	+1
4. Fruit (≥ 1 serving/day) *and* (≥ 1 serving/day)[2]	Fruit (≥ 1 serving/day) *and* (≥ 1 serving/day)[1]	+1
5. Legumes (≥ 2 serving/week)	Beans (≥ 2 serving/week)	+1
6. Fish (≥ 3 serving/week)	Fish (≥ 3 serving/week)[5]	+1
7. Wine (≥ 1 glass/day)	Alcohol (≥ 1 serving/day)[6]	+1
8. Meat (< 1 serving/day)	Red Meat (< 1 serving/day)	+1
9. [White bread (< 1/day) *and* rice (< 1/week)] *or* whole-grain bread (> 5 servings/week)[3]	Whole grain bread + cooked whole grains (≥ 5 servings/week)[7]	+1

[1] Martinez-Gonzalez, 2004
[2] One point is added when ≥ 1 serving/day or both fruit and vegetables is consumed
[3] One point is added when either consumption of both white bread and rice is low or when consumption of whole-grain bread is high
[4] Based on median for Greek population (Tricholopoulous, 1995)
[5] Types of fish included: tuna, bass, catfish, cod, flatfish, haddock, mackerel, perch, pike, Pollock, porgy, salmon, sardines, sea bass, swordfish, trout, walleye, other fish, other unknown fish
[6] A score of "1" was given if participants drank 7 or more drinks in a week, 28 or more drinks in a month, or 365 or more drinks in a year
[7] Liberalized this variable because according to the Whole Grain Council," Yet consumption lags far behind these recommendations. For example, the average American eats less than one daily serving of whole grains, and some studies show that over 40% of Americans never eat whole grains at all." (How much is Enough, 2013)

Statistical Tests

Frequencies were used to assess the following demographic characteristics of the sample: gender, age, race, BMI, poverty income ratio (PIR) tertiles, education level. Sample count and percentage were used for analysis of these variables. Age, BMI, PIR, and Mediterranean diet score were analyzed using median and IQR because these variables were non-normally distributed.

All variables were analyzed against the dichotomized time-to-store variable, where participants fell into either the less than or equal to ten minutes group (n=3555) or the greater than ten minutes group (2404). Analysis was performed in this manner because this is the median response. The equal sign was assigned to the first group to make the sample sizes on both sides of the dichotomy more even. It should be noted that approximately 30% of the entire population answered 10 minutes as commute time to the grocery store.

Chi-square tests were used to determine differences between dichotomized time-to-store variable and gender, race, education level, and PIR tertiles. Because of non-normally distribution of all variables, non-parametric tests were used to assess differences between variables. Mann-Whitney U tests were used to determine the differences between dichotomized time-to-store variable and age, BMI, PIR, and Med. Diet score. Finally, Spearman's Rho coefficient correlations were used to examine the relationship between the nine components of the Med. diet scoring system and total Mediterranean diet score. Significance for all statistical tests were set as $p<0.05$.

Results

A Chi Square analysis was conducted to examine whether there was a difference in gender, race, tertiles of PIR, and education level in those with a commute time of ten minutes or under (n=3555) compared to those commute time of ten or more minutes (n=2404). It was found race/ethnicity, tertiles of PIR, and education level were statistically significantly different between the participants divided between the dichotomized time-to-store variable. The complete table and corresponding figures can be found in Appendix B, Table 3.

A Mann-Whitney U was conducted to examine whether there was a difference in the time-to-store variable and age, BMI, PIR, and Mediterranean Diet score. These variables were not normally distributed for either group. A Mann-Whitney U test revealed a significant difference between age, BMI, PIR; however, there was no difference found for Mediterranean diet score. The differences in age and BMI were not practically and clinically different; however, the difference in PIR was both statistically and practically significant. The Mann-Whitney U revealed a significant difference in PIR between those with a travel time of ten or less minutes (mdn 2.18, IQR:1.11-4.16) and those with a travel time greater than ten minutes (mdn 1.72, IQR: 0.98, 3.47), $U=3149522.5$, $z = -6.542$, $p < 0.001$, $r = -0.089$ representing a very small effect size.

Finally, using a Spearman's Rho coefficient correlations, it was found that there was a statistically significant relationship between many of the components of the total Med. diet score and the 9 individual components of the score. Most notably, fruits and vegetables had the larger impact on the total score, while red meat + processed meat and mono/sat. fat ratio had the smaller impact on the total score. These results were significant for both sides of the dichotomized time-to-store variable. The complete table can be found in Appendix C.

Discussion

The first object was to determine the 9-item Mediterranean Diet score to estimate accordance to a Mediterranean diet pattern. It was found that the population had a median of 2 out of 9. This score is small, and offers no benefit in terms of cardiovascular protect. This is because Martinez-Gonzalez did not begin to see a dose-response relationship between overall score on their 9-item screener and relative risk of myocardial infarction until a score higher than 4 (Martinez-Gonzalez, 2004).

Although the scores were low overall, it was still helpful to determine which components were contributing most to the total Med. diet score. It was found that the components related to fruits and vegetables (Fruits, Vegetables, Fruit + Vegetables) were most statistically significantly related to the total score, with Spearman's Rho correlation coefficients between 0.61-0.68 for those three components. Conversely, the components of Red+Processed Meat and Mono/Sat. Fat ratio components were least related to the total score, with Spearman's Rho inverse correlation coefficients between 0.14-0.17. It is not surprising that the participants struggled most with these components, as red and processed meats, and the conspicuous lack of foods containing monounsaturated fat (fish, nuts, olive oil, etc) are an innate part of a "Western" diet. In fact, none of the previously mentioned studies looking at the association between a healthy diet patterns and grocery stores used red meat, processed meat, or foods with monounsaturated fat as a measurement of a healthy dietary pattern.

The second objective was to determine the commute time in minutes to the grocery store for the US adult population. Several answers to the commute time question were frequently answered, such as 5 minutes (22.7%), 10 minutes, (30%), 15 minutes (17%), and 20 (10%). Limitations regarding these frequencies are discussed in the next section.

My final objective was to describe the attributes of those with a shorter one-way commute time (less than or equal to 10 minutes) and those with a longer commute time (>10 minutes) for the US adult population in NHANES 2009-2010. It was found using a Chi square analysis that the total Med. diet score is not related to the dichotomized time-to-store variable; however, there was a difference between race/ethnicity, PIR tertiles, and education level and the dichotomized time-to-store variables (all with a $p<0.001$). Participants who were white, slightly younger, were in a higher PIR tertiles, and had a greater education level were more likely reach grocery store in 10 or less minutes. These results are similar to results found by researchers in major U.S. cities, such as Brookly, NY and Detroit (Morland 2002, Morland 2006, Zenk 2005). However, it is not congruent with the CARDIA study, which is a large prospective cohort study that found mixed results when examining healthful dietary patterns and grocery store location.

Limitations

This study attempted to assess accordance to a Mediterranean diet in a representative Unites States Population, and then use that score to compare to time in minutes to the grocery store. Other demographic variables were analyzed on the subjects in order to describe the population, specifically in context of poverty income ratio highest education level. A major limitation is that the vague wording of the outcome variable NHANES question. The exact question on the Consumer Behavior Questionnaire was, “How much time does it usually take you to get to the grocery store for food shopping?”

Fortunately, the question instructions specified that if more than one person does the shopping, the answer should be answered for that person. However, type of commute was not specified,

and quality of foods was not ascertained. These variables may play an important role in healthful dietary patterns, as seen in the studies discussed during the introduction.

Another major limitation is the fact that the analyses were conducted on a dichotomized time-to-store variable. This cutoff was chosen because it was median; however, the frequency at which this number of minutes was chosen by nearly 30% of the population. In order to mitigate this effect, the equal sign was placed on the “10 or less” side of the dichotomy. This made the sample sizes more even in number (3555, 2404), but it cannot be overlooked that this makes the data less meaningful if a 60-second difference carries such weight statistically. However, this difference is likely not meaningful from a practical standpoint.

Reference

1. Anonymous **How much is Enough?** Internet: http://wholegrainscouncil.org/whole-grains-101/how-much-is-enough (accessed November/12 2014).

2. Ard JD, Perumean-Chaney S, Desmond R, Sutton B, Cox TL, Butsch WS, Allison DB, Franklin F, Baskin ML. Fruit and vegetable pricing by demographic factors in the Birmingham, Alabama, metropolitan area, 2004-2005. Prev Chronic Dis 2010;7:A78.

3. Boone-Heinonen J, Gordon-Larsen P, Kiefe CI, Shikany JM, Lewis CE, Popkin BM. Fast food restaurants and food stores: longitudinal associations with diet in young to middle-aged adults: the CARDIA study. Arch Intern Med 2011;171:1162-70.

4. Estruch R, Ros E, Salas-Salvado J, Covas MI, Corella D, Aros F, Gomez-Gracia E, Ruiz-Gutierrez V, Fiol M, Lapetra J, et al. Primary prevention of cardiovascular disease with a Mediterranean diet. N Engl J Med 2013;368:1279-90.

5. Lourida I, Soni M, Thompson-Coon J, Purandare N, Lang IA, Ukoumunne OC, Llewellyn DJ. Mediterranean diet, cognitive function, and dementia: a systematic review. Epidemiology 2013;24:479-89.

6. Martinez-Gonzalez MA, Fernandez-Jarne E, Serrano-Martinez M, Wright M, Gomez-Gracia E. Development of a short dietary intake questionnaire for the quantitative estimation of adherence to a cardioprotective Mediterranean diet. Eur J Clin Nutr 2004;58:1550-2.

7. Morland K, Filomena S. Disparities in the availability of fruits and vegetables between racially segregated urban neighbourhoods. Public Health Nutr 2006;10:1481-9.

8. Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. Am J Prev Med 2002;22:23-9.

9. Trichopoulou A, Kouris-Blazos A, Wahlqvist ML, Gnardellis C, Lagiou P, Polychronopoulos E, Vassilakou T, Lipworth L, Trichopoulos D. Diet and overall survival in elderly people. BMJ 1995;311:1457-60.

10. Zenk SN, Schulz AJ, Israel BA, James SA, Bao S, Wilson ML. Fruit and vegetable access differs by community racial composition and socioeconomic position in Detroit, Michigan. Ethn Dis 2006;16:275-80.

11. Zenk SN, Schulz AJ, Israel BA, James SA, Bao S, Wilson ML. Neighborhood racial composition, neighborhood poverty, and the spatial accessibility of supermarkets in metropolitan Detroit. Am J Public Health 2005;95:660-7.

APPENDICES

Appendix A: Complete List of Variables

Mediterranean diet is defined:

Table 2 :NHANES variables used to produce 9-item Mediterranean screener based on Martinez-Gonzalez 9-item screener

9-item Screener[1]	Variables from NHANES	Score
1. Olive oil (≥ 1 spoon/day)	Mono/sat. fat ratio (≥ 1.6gm)[2]	*DR1IFF_F - Dietary Interview: Individual Foods -- First Day* • DR1IMFAT - Total monounsaturated fatty acids (gm) • DR1ISFAT - Total saturated fatty acids (gm)
2. Fruit (≥ 1 serving/day)	Fruit, not including juices (≥ 1 serving/day)	*DTQ_F - Dietary Screener Questionnaire* • DTD080Q - How often eat fruit? (quantity) Fresh, frozen or canned fruit, not including juices. • DTQ080U - How often eat fruit? (unit of measure—day, week, month)
3. Vegetable or salad (≥ 1 serving/day)	Leafy salad + other vegetables (≥ 1 serving/day)	*DTQ_F - Dietary Screener Questionnaire* • DTD090Q - How often eat leafy/lettuce salad? (quantity) Green or lettuce salad, with or without other vegetables • DTQ090U - How often eat leafy/lettuce salad? (unit of measure—day, week, month) • DTD130Q - How often eat other vegetables? (quantity) • DTQ130U - How often eat other vegetables? (unit of measure—day, week, month)
4. Fruit (≥ 1 serving/day) *and* (≥ 1 serving/day)[3]	Fruit (≥ 1 serving/day) *and* (≥ 1 serving/day)	If scored "1" for questions 2 & 3, participant gets 1 more point

5. Legumes (≥ 2 serving/week)	Beans (≥ 2 serving/week)	*DTQ_F - Dietary Screener Questionnaire* • DTD120Q - How often eat beans? (quantity) refried beans, baked beans, beans in soup, pork and beans, or any type of cooked dry beans • DTQ120U - How often eat beans? (unit of measure—day, week, month)
6. Fish (≥ 3 serving/week)	Fish (≥ 3 serving/week)[4]	*DR1TOT_F - Dietary Interview: Total Nutrient Intakes -- First Day* • DRD370B – Tuna eaten during past 30 days • DRD370BQ - # of times tuna eaten in past 30 days Other fish included were bass, catfish, cod, flatfish, haddock, mackerel, perch, pike, Pollock, porgy, salmon, sardines, sea bass, swordfish, trout, walleye, other fish, other unknown fish
7. Wine (≥ 1 glass/day)	Alcohol (≥ 1 serving/day)[5]	*ALQ_F - Alcohol Use* • ALQ120Q – How often drink alcohol over past 12 months • ALQ120U - # days drinks alcohol per week, month, year
8. Meat (< 1 serving/day)	Red Meat (< 1 serving/day)	*DTQ_F - Dietary Screener Questionnaire* • DTD170Q - How often eat red meat? (quantity) how often do you eat red meat, such as beef, pork, ham or sausage? Do not include chicken, turkey or seafood. • DTQ170U - How often eat red meat? (unit of measure—day, week, month) • DTD180Q - How often eat processed meat? (quantity) How often did you eat processed meat, such as bacon, lunch meats, or hot dogs? • DTQ180U - How often eat processed meat? (unit of measure—

		day, week, month)
9. [White bread (< 1/day) *and* rice (< 1/week)] *or* whole-grain bread (> 5 servings/week)[6]	Whole grain bread + cooked whole grains (≥ 5 servings/week)[7]	*DTQ_F - Dietary Screener Questionnaire* • DTD200Q - How often eat whole grain bread? (quantity)Whole grain bread, including toast, rolls and in sandwiches? Whole grain breads include whole wheat, rye, oatmeal, and pumpernickel • DTQ200U - How often eat whole grain bread? (unit of measure—day, week, month) • DTD210Q - How often eat cooked whole grains? (quantity) Brown rice or other cooked whole grains, such as bulgur, cracked, wheat, or millet? • DTQ210U - How often eat cooked whole grains? (unit of measure—day, week, month)

[1] Martinez-Gonzalez, 2004
[2]Based on median for Greek population (Tricholopoulous, 1995)
[3]One point is added when ≥ 1 serving/day or both fruit and vegetables is consumed
[4]Types of fish included: tuna, bass, catfish, cod, flatfish, haddock, mackerel, perch, pike, Pollock, porgy, salmon, sardines, sea bass, swordfish, trout, walleye, other fish, other unknown fish
[5]A score of "1" was given if participants drank 7 or more drinks in a week, 28 or more drinks in a month, or 365 or more drinks in a year
[6]One point is added when either consumption of both white bread and rice is low or when consumption of whole-grain bread is high
[7]Liberalized this variable because according to the Whole Grain Council," Yet consumption lags far behind these recommendations. For example, the average American eats less than one daily serving of whole grains, and some studies show that over 40% of Americans never eat whole grains at all." (How much is Enough, 2013)

Other variables:

CBQ_F - Consumer Behavior

- CBD150 – time to get to the grocery store in minutes
  - 77777 (refused) and 99999 (don't know) were omitted for analysis

Demographic variables:

- Age is defined by RIDAGEEYR = number of years
- Gender is defined by RIAGENDR = 1 – Male; 2 – Female
- Race is defined as RIDRETHI = 1 – Mexican American; 2 – Other Hispanic; 3 – Non-Hispanic White; 4 – Non-Hispanic Black; 5 – Other
- High level of education achieved is defined by DMDEDUC2 = 1 – <9th grade; 2 – 9-11th grade; 3 – High School/GED; 4 – Some College/Associates degree; 5 – College Graduate or above; Codes 7 (refused) and 9 (don't know) were analyzed as "unknown"
- INDFMPIR – poverty-income ratio = number from 0 – 5 where 5 are values greater than or equal to 5.00
- BMXBMI = BMI (kg/m^2)

Appendix B: Demographics

Percentage of Participants (%)

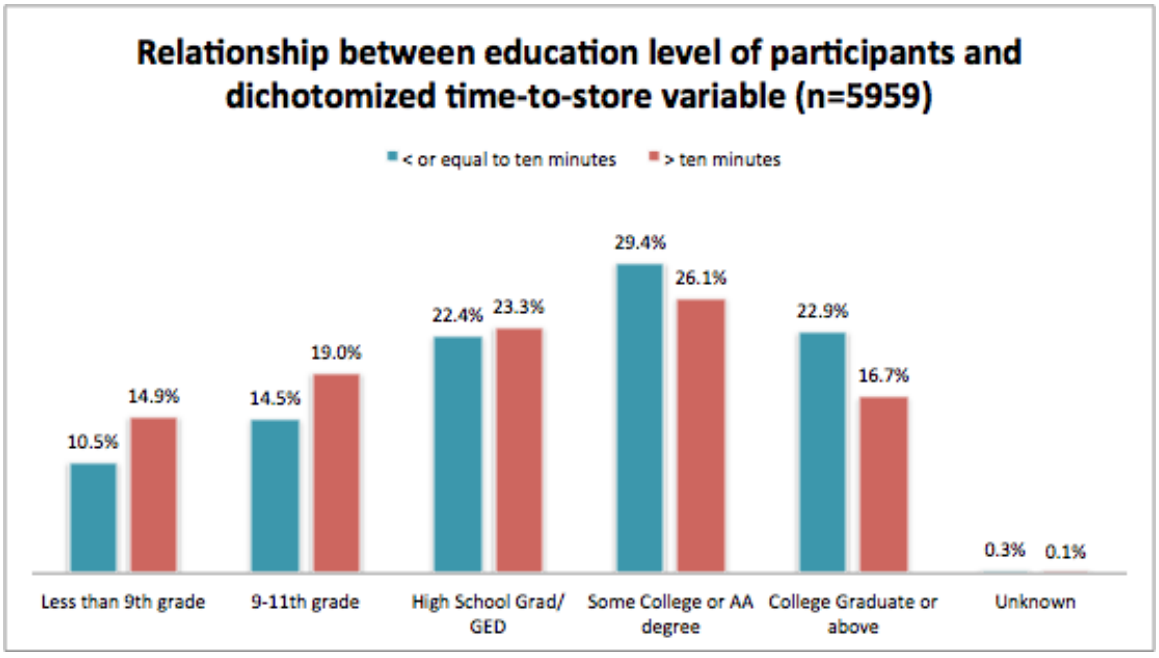

Figure 2: Relationship between education level of participants and dichotomized time-to-store variable (n=5959)

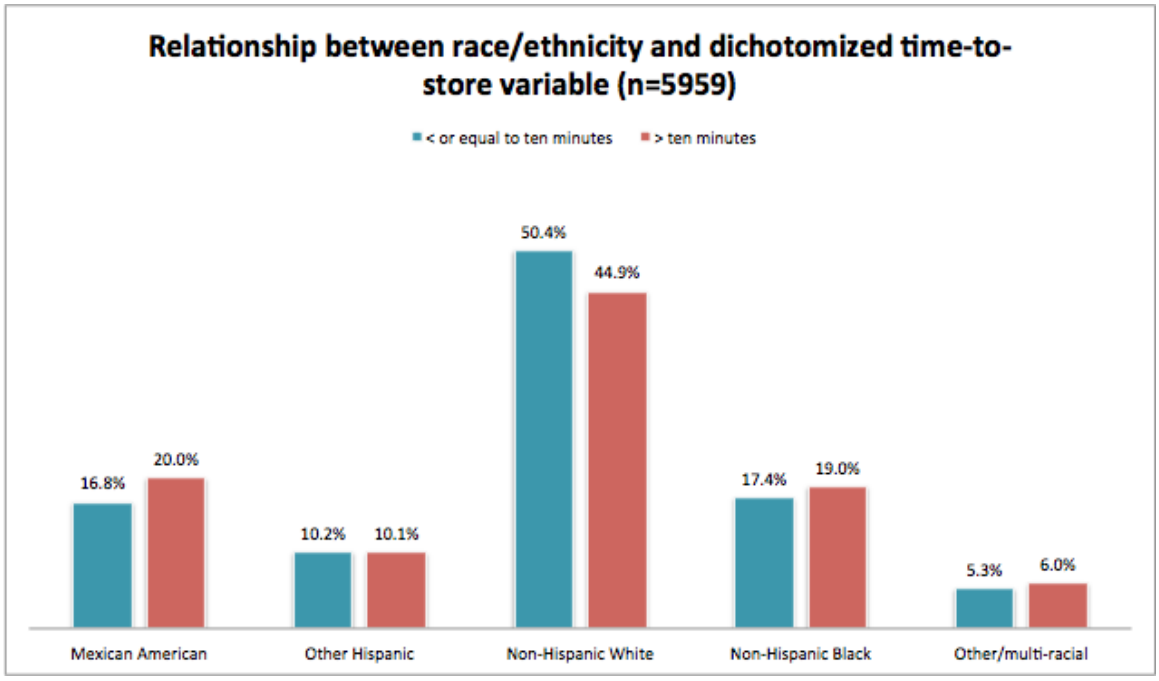

Figure 3: Relationship between race/ethnicity and dichotomized time-to-store variable (n=5959)

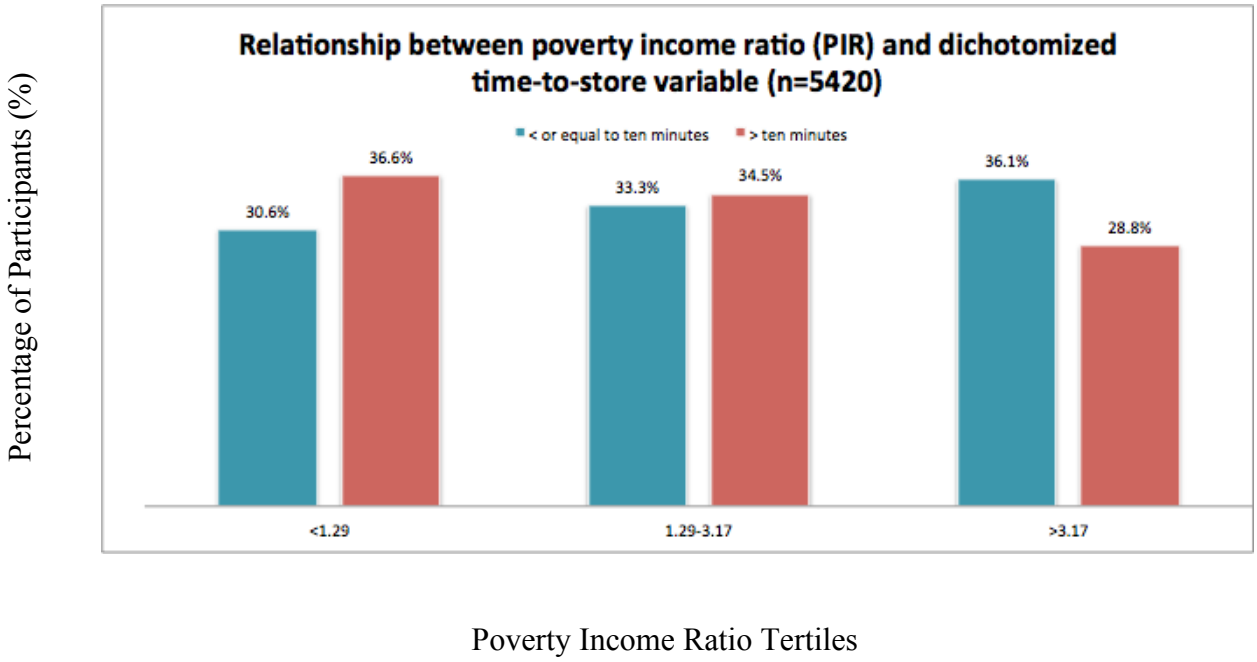

Figure 4:Relationship between poverty income ratio (PIR) and dichotomized time-to-store variable (n=5420)

Table 3: Demographic characteristics with corresponding descriptive statistics for 2009-2010 NHANES participants dichotomized by commute time in minutes to grocery store (n=5959)

Demographic characteristic	**Descriptive Statistics (n=5959)**			
	Total	**Time to Grocery Store (minutes)[1]**		
	n=5959	**Time-to-store ≤ 10 minutes (n=3555)**	**Time-to-store > 10 minutes (n=2404)**	**p-value**
Gender no. (%)				
Male	5959	1732(48.7)	1148 (47.8)	p=0.464
Female		1823(51.3)	1256(52.2)	
Age (yrs.) – median (IQR)	5959	48(34,63)	50(36,65)	p=0.004
Race – no. (%)				
Mexican American	5959	598(16.8)	482(20.0)	p<0.001
Other Hispanic		362(10.2)	243(10.1)	
White		1793(50.4)	1079(44.9)	
Black		619 (17.4)	456(19.0)	
Other/Multiracial		183 (5.1)	144(6.0)	
BMI (kg/m^2) – median (IQR)	5894	28.0(24.2,32.6)	28.4(24.9,32.6)	p=0.026
PIR tertiles (%)[2] – no. (%)				
< 129	5420	1000(30.6)	789(36.6)	p<0.001
129-317		1086(33.2)	744(34.5)	
> 317		1180(36.1)	621(28.8)	
PIR (%) – median (IQR)	5420	2.18 (1.11-4.16)	1.72 (0.98, 3.47)	p<0.001
Education Level				
Less Than 9th Grade	5959	374(10.5)	357(14.8)	p<0.001
9-11th Grade		517(14.5)	456(18.9)	
High School/GED		796(22.4)	560(23.2)	
Some College or AA		1044(29.3)	627(26)	
College Grad or above		813(22.8)	401(16.6)	
Unknown		11(0.30)	3(0.12)	
Med. Diet score – median (IQR)[3]	5959	2(1,3)	2(1,3)	p=0.211

[1]"How much time does it usually take you to get to the grocery store for food shopping?" Further instructions for the question specified that it should be answered based on the store you go to most often and about the person who does most of the shopping if more than one person goes to the store for food. Finally, the amount is the one-way amount of time in minutes.

[2]Family poverty income ratio as a percentage (<129, 129-317, >317)

[3]Based on Martinez-Gonzalez 9-item Mediterranean diet screener (Martinez-Gonzalez, 2004)

Appendix C: Mediterranean diet score

Table 4: Mediterranean Diet Components that correlated most strongly to total Mediterranean Diet Score (Vegetable, Fruit, Fruit+Vegetable) and least strongly to total Mediterranean Diet Score (Red Meat+Processed Meat, Fish) using Spearman's Rho correlation coefficients

	Time to store dichotomized	**Vegetable Score (1/0)**	**Fruit Score (1/0)**	**Fruit and Vegetable Score (1/0)**	**Red Meat + Processed Meat (1/0)**	**Fish Score (1/0)**
Total Med. Diet Score	< or equal 10 minutes	0.682	0.630	0.630	0.163	0.173
	> 10 minutes	0.649	0.638	0.612	0.147	0.161