The Food Environment and Home Cooking

An analysis of NHANES 2007-2008 Consumer Behavior Data

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Introduction

Cross-sectional analysis of 2007-2008 NHANES data shows that Americans reported cooking an average of five dinners per week, however, home dinner preparation habits varied substantially with socioeconomic status and race/ethnicity.[1] Lower household wealth and educational attainment were associated with a higher likelihood of either always or never cooking dinner at home, while wealthier, more educated households were more likely to sometimes cook dinner at home. A person's likelihood of cooking at home is likely also determined in part by age. A cross-sectional analysis of young adults found that food preparation was not performed by the majority of young adults even weekly.[2] Given the established relationship between home-cooking and diet quality, this is an important link to study further.

Among a nationally representative sample of adults in the United States, to what extent is the time it takes to travel to the grocery store associated with the frequency of cooking dinner at home?

Why study this relationship?

Home-prepared meals are associated with better diet quality and better adherence to dietary guidelines.

- Young adults who report frequently preparing food at home are more likely to meet dietary objectives for fat, calcium, fruit, vegetable, and whole-grain consumption.[2]
- Frequent cooking is associated with lower energy intake and with lower consumption of sugar and fat.[3]
- Frequent cooking has been shown to be associated with higher HEI-2010 and reduced per capita food expenditures overall.[4]

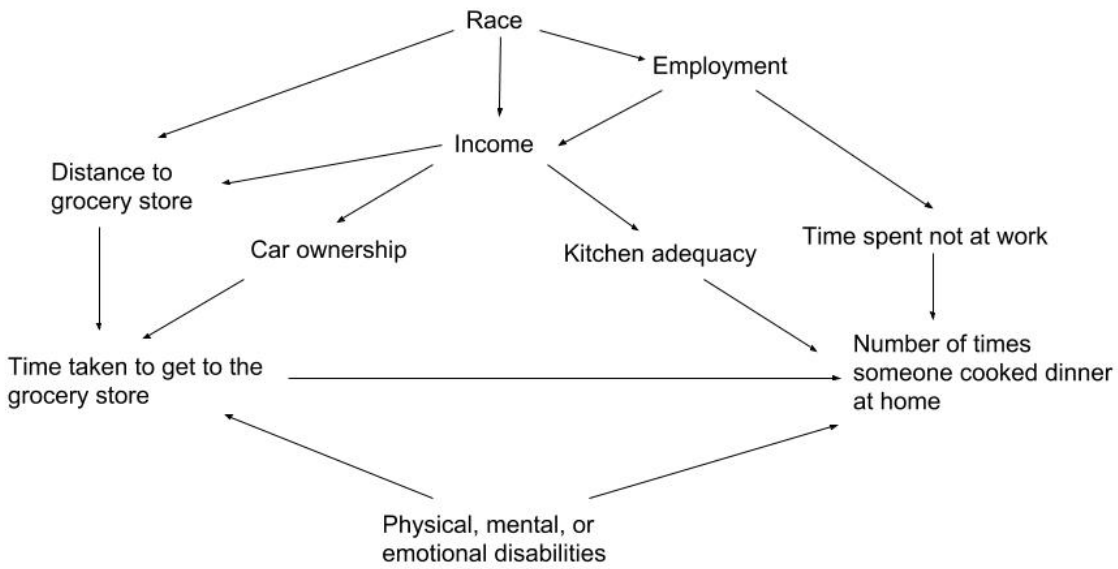

Figure 1: Directed acyclic graph of covariates

Methods

Study population

The National Health and Nutrition Examination Survey (NHANES) is a nationally representative, cross-sectional data set collected by the National Center for Health Statistics (NCHS), part of the Centers for Disease Control and Prevention (CDC). NHANES data from 2007 and 2008 were pooled for this analysis. The sample is representative of the US civilian, non-institutionalized population. An average of 1.6 individuals are included from each household. To perform a complete case analysis, a sample population (n=2,437) was created that excluded individuals younger than 18 years old at the time of the interview, and any observations that had missing data for the exposure, outcome, or potential confounders. Because NHANES uses a complex weighted survey design, 2-year survey weights provided by NCHS were applied to the study sample.

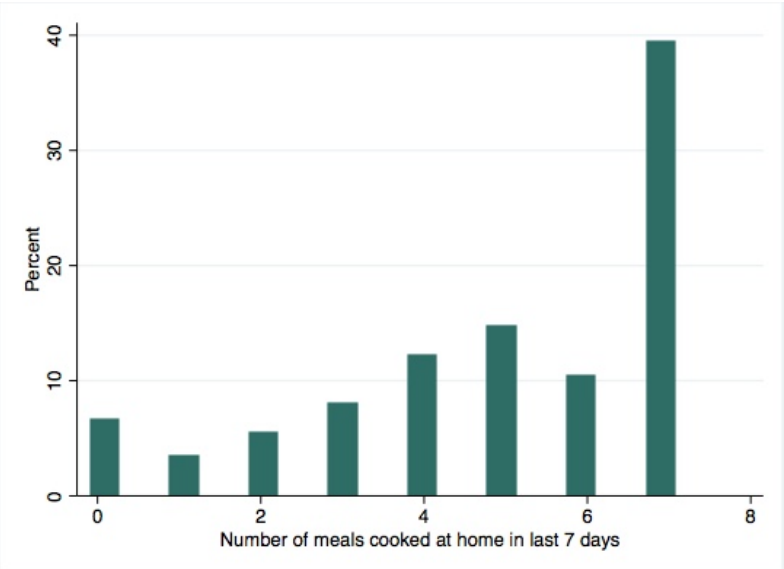

Figure 2: Histogram of number of meals cooked at home (n=2,437)

Variables and Analysis

The race/ethnicity variable was left as it was presented to survey participants, with 5 racial/ethnic categories to choose from, including an option for "Other/mixed race." The age and income:poverty ratio variables were transformed into a 5-part categorical variables. The bivariate relationship between exposure and outcome was assessed through linear regression. An assesment of the relationships between covariates as illustrated in figure 1 lead to race/ethnicity, income-to-poverty ratio, and disability status being selected as potential confounders. Thus, in the adjusted model (see table 2), all three potential confounders were controlled for in a multivariate regression. All analyses were performed using Stata 13.1.

Table 1: Sociodemographic characteristics, time to grocery store, and frequency of home dinner preparation; NHANES 2007–2008

	Mean minutes to grocery store ± SD	Mean dinners cooked at home in past week ± SD
Sample (n=2,437)	14.67 ±20.45	4.89 ±1.80
Gender		
Male	13.9 ±17.47	4.83 ±1.84
Female	14.5 ±18.5	4.94 ±1.76
Age		
18-29	12.5 ±12.6	4.53 ±1.80
30-39	14.57 ±18.82	4.99 ±1.65
40-49	13.86 ±16.62	4.97 ±1.55
50-59	14.64 ±14.92	4.93 ±1.59
>=60	16.305 ±27.68	5.01 ±2.38
Race/ethnicity		
Mexican-American	16.43 ±23.99	5.41 ±2.82
Other Hispanic	14.76 ±29.82	5.39 ±2.67
Non-hispanic white	13.64 ±11.51	4.84 ±1.37
Non-hispanic black	14.79 ±32.05	4.12 ±2.81
Other/mixed race	22.19 ±28.61	5.63 ±1.32
Income: poverty ratio		
1	14.2 ±.80	5.3 ±.12
2	16.9 ±1.44	5.1 ±.12
3	13.7 ±.97	4.8 ±.19
4	14.7 ±1.50	4.5 ±.15
5	13.2 ±.82	4.7 ±.10
Physical, mental, or emotional limitations		
Yes	16.07 ±18.63	4.60 ±1.75
No	14.22 ±17.99	4.89 ±1.79

Results

The Beta coefficient of the unadjusted model was significant (p<.001), as was the coefficient for the adjusted model (p=.001) at alpha=0.5. As the unadjusted and adjusted models are functionally the same, the relationship between the exposure and outcome does not appear to be significantly confounded by income:poverty ratio, disability status, or race/ethnicity. For every 10 additional minutes it takes to travel to the grocery store, the number of home-cooked dinners increased by approximately 9.2%.

Table 2: Coefficients of unadjusted model, and model adjusted for income:poverty ratio, disability, and race/ethnicity

Model	Coefficient	95% Confidence Interval		p-value
Unadjusted	.0093734	.0048633	.0138835	<0.001
Adjusted	.009211	.0046754	.0137466	0.001

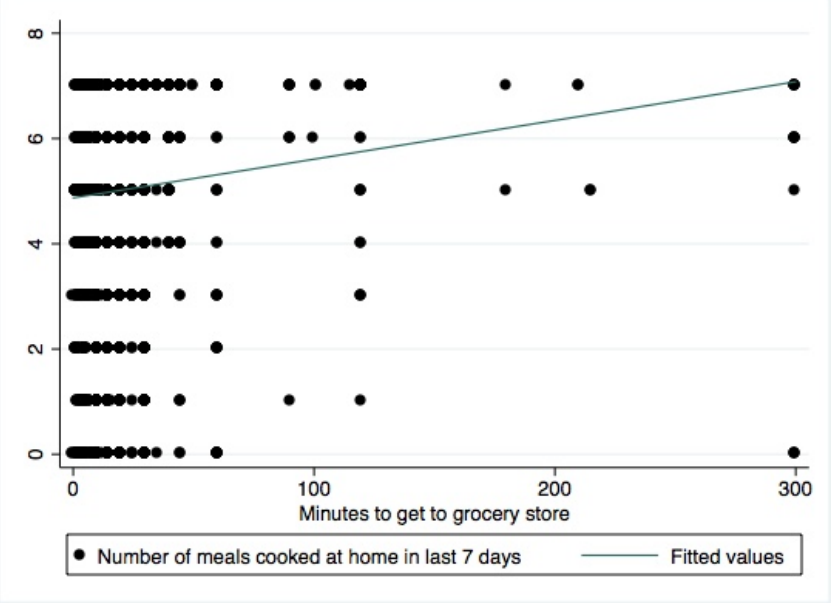

Figure 3: Scatterplot and fitted values line of number of meals cooked at home & minutes to grocery store (n=2,437)

Discussion

The results of this analysis generally contradict the existing literature on the association between food environment and home cooking habits. In the field of public health nutrition, the consensus seems to be that any barriers to accessing fresh food, be it distance, time, or affordability, should decrease the likelihood of cooking at home. This analysis suggests otherwise, as longer time to travel to the grocery store was associated with increased number of dinners cooked at home with statistical significance.

There are several possible explanations as to why these results contradict the existing literature. It may be that people who live farther from grocery stores stock up on ingredients for home cooking, and thus time is not a deterrent from cooking. Perhaps people who value cooking at home will obtain the necessary ingredients regardless of time it takes to get to the store. Low-income families are often advised to purchase and cook with bulk staple items (rice, dried beans, etc.), as they can be the basis of an inexpensive yet healthy diet. Relying on bulk staple items would allow for frequent cooking, yet infrequent trips to the grocery store, which may explain why time required to reach the store is not the primary determinant of cooking behaviors.

Future Directions

To further refine the measurement of perceived availability of food, surveys might include questions asking how people get to the store, whether or not they own a car, or other specific barriers to shopping, cooking, or eating at home. Furthermore, store audit tools might include less obvious components of accessibility – for instance, whether the surrounding area is pedestrian-friendly, the placement of food within stores, and the marketing of foods within and surrounding the stores.[5]

Limitations of epidemiologic method

- Unmeasured confounders include:
  - Urban/suburban/rural location
  - Household time constraints
  - Attitudes regarding the importance of home-cooked meals
- All variables based on self-report, thus there is potential for:
  - Recall bias
  - Social desirability bias, particularly regarding the outcome
  - Varying interpretations of the question, in particular the definition of cooking
  - Low reliability
- Neither exposure nor outcome measurement has been validated
- Data are observational and cross-sectional, thus it can be used only to observe associations, not to infer causality

Strengths of epidemiologic methods

- These relatively recent, nationally representative data are generalizable to the non-institutionalized US population.

References

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