

Time Spent on Home Food Preparation and Indicators of Healthy Eating

Pablo Monsivais, PhD, MPH, Anju Aggarwal, PhD, MS, Adam Drewnowski, PhD, MA

Background: The amount of time spent on food preparation and cooking may have implications for diet quality and health. However, little is known about how food-related time use relates to food consumption and spending, either at restaurants or for food consumed at home.

Purpose: To quantitatively assess the associations among the amount of time habitually spent on food preparation and patterns of self-reported food consumption, food spending, and frequency of restaurant use.

Methods: This was a cross-sectional study of 1,319 adults in a population-based survey conducted in 2008–2009. The sample was stratified into those who spent < 1 hour/day, 1–2 hours/day, and > 2 hours/day on food preparation and cleanup. Descriptive statistics and multivariable regression models examined differences between time-use groups. Analyses were conducted in 2011–2013.

Results: Individuals who spent the least amount of time on food preparation tended to be working adults who placed a high priority on convenience. Greater amount of time spent on home food preparation was associated with indicators of higher diet quality, including significantly more frequent intake of vegetables, salads, fruits, and fruit juices. Spending < 1 hour/day on food preparation was associated with significantly more money spent on food away from home and more frequent use of fast food restaurants compared to those who spent more time on food preparation.

Conclusions: The findings indicate that time might be an essential ingredient in the production of healthier eating habits among adults. Further research should investigate the determinants of spending time on food preparation.

(Am J Prev Med 2014;47(6):796–802) © 2014 American Journal of Preventive Medicine. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Introduction

Food preparation habits and skills have been associated with healthier dietary intakes. In one study,¹ young adults who regularly prepared food consumed fast food less frequently and were more likely to meet dietary recommendations. Another study² found that families purchased a greater variety of vegetables on a regular basis when the main food preparer had confidence in preparing these foods. In a third study,³ women who planned meals ahead of time and enjoyed trying new recipes were more likely to consume two or

more servings of fruit per day whereas women who found cooking to be a chore and spent little time cooking were less likely to consume fruit. However, recent surveys from the U.S. have revealed that time spent on cooking and food preparation has declined substantially since the 1960s, with Americans currently spending an estimated 33 minutes per day on food preparation and cleanup.⁴

Limited time available for cooking may be one of the barriers to the adoption of more healthy diets. Time scarcity was prevalent among working parents earning low wages in the U.S. Even those parents who valued healthy family meals often served their children foods that were fast and easy to prepare,⁵ including hot dogs, pizza, and macaroni and cheese.⁶ Research on low- and middle-income working parents showed that they coped with time pressures by relying more on takeout and restaurant meals and basing family meals on prepared entrees and other quick options.⁷ Lack of time was the leading barrier to adopting dietary guidance cited by European adults.⁸

The need for convenience may also be at odds with recommended meal plans that are optimized for

From the School of Public Health (Monsivais, Aggarwal, Drewnowski), University of Washington, Seattle, Washington; and Centre for Diet and Activity Research (Monsivais), University of Cambridge, Cambridge, United Kingdom

Address correspondence to: Pablo Monsivais, PhD, MPH, Centre for Diet and Activity Research and Medical Research Council Epidemiology Unit, University of Cambridge School of Clinical Medicine, Box 285 Institute of Metabolic Science, Cambridge, United Kingdom, CB2 0QQ. E-mail: pm491@medschl.cam.ac.uk.

0749-3797/\$36.00

<http://dx.doi.org/10.1016/j.amepre.2014.07.033>

nutrition and affordability. Economic analyses^{9,10} of the U.S. Department of Agriculture's (USDA's) Thrifty Food Plan have found that these nutritious, low-cost meal plans were time-intensive to prepare and much more costly when time was explicitly accounted for. Other analyses¹¹ indicate that for single-headed households, time was a greater constraint than money in achieving the Thrifty Food Plan's dietary targets.

More research is needed to understand how time availability figures into the preparation and consumption of healthy diets, but relatively few studies have accounted for time use generally or food-related time use in particular. The purpose of this study was to quantitatively explore the interplay between food-related time use, restaurant use, and indicators of a healthy diet. Further, little is known about the associations between time spent on cooking and food spending. The present study analyzed data from a population-based study of adults to test the hypothesis that more time spent preparing, cooking, and cleaning up from meals at home would be associated with healthier patterns of food consumption and fewer meals consumed away from home.

Methods

Subjects

The Seattle Obesity Study was a population-based study of social determinants of diet and health.^{12,13} A stratified sampling scheme ensured adequate representation by income range and race/ethnicity. Following standard procedures, randomly generated telephone numbers were matched with residential addresses using commercial databases. A pre-notification letter was mailed out to alert potential participants that their household had been randomly selected by the University of Washington School of Public Health for a research study. Telephone calls were placed in the afternoons and evenings by trained, computer-assisted interviewers with up to 13 follow-up calls. Once the household was contacted, an adult member of the household was randomly selected to be the survey respondent.

Exclusion criteria were cell phone numbers, numbers that were not associated with a residence, no person aged ≥ 18 years living in the residence, residents away for the duration of the interviewing period, English language not spoken, and discordance between address data obtained from the vendor and self-reported by the respondent. Over the course of the study, 16,500 pre-notification letters were mailed out and 5,102 of these were ruled out as ineligible by the exclusion criteria.

Eligibility could not be confirmed for a large fraction of the sample (9,292/16,500=56%). Of the 2,420 confirmed residential households, 23 refused to participate and another 291 asked to be called back but were not later reached; thus, eligibility for these households could not be confirmed. Of the 2,106 confirmed eligible households, 105 terminated the interview midway or only partially completed the survey.

A 20-minute telephone survey was then administered to 2,001 participants to collect self-reported data on cooking and eating

habits; diet quality; and sociodemographic, lifestyle, and health measures. Data were collected in 2008–2009; the protocols were modeled on the Behavioral Risk Factors Surveillance System (BRFSS) surveys for Washington State^{14,15} and were approved by the University of Washington IRB.

Measures

The main independent variable of interest was time spent on activities related to food preparation. Specifically, all participants were asked the following open-ended question: *How many hours on average do you spend preparing, cooking, and cleaning up from meals each time?* Responses were recorded on a per-week basis. This time-use question is similar to one currently used in the Flexible Consumer Behavior Survey (FCBS) module administered to participants in the National Health and Nutrition Examination Survey (NHANES).¹⁶ Based on the distribution of responses, data were grouped into three time-use strata: <1 hour/day, 1–2 hours/day, >2 hours/day.

Food consumption, food spending, and restaurant use were the dependent variables of interest. Food consumption was measured by frequency of consumption of six food groups that reflected healthier and less-healthy intakes: fruit (excluding juice); green salad; vegetables other than salad or potatoes; fruit juice; sugar-sweetened beverages (including fruit drinks, soft drinks, and colas but excluding diet or sugar-free drinks); and sweetened grain-based snacks (including cookies and cakes).

These food groups were based on standard dietary questions used in the BRFSS: fruit, fruit juice, and vegetables, from the BRFSS core questionnaire¹⁷; sweet snacks, adapted from a module previously used to examine sources of fat¹⁸; and sugar-sweetened beverages, from state-specific BRFSS modules.¹⁹ Respondents were asked to report their frequency of consumption for each food, which was coded in number of times per week by the survey administrator.

Two estimates of self-reported, household-level food spending were examined: total weekly food spending when eating out (including restaurants, coffee shops, and fast food outlets) and food spending excluding eating out, which primarily represented food expenditures at supermarkets and grocery stores. These questions were adapted from the NHANES FCBS¹⁶ and were phrased as follows: *How much does your household spend on eating out in an average week, not including alcohol or tips?* and *Altogether, how much does your household spend on food in an average week, excluding eating out?* These household-level estimates were then divided by number of people in each household to obtain per-person weekly spending variables.

Restaurant use by the participant was documented by asking questions again based on the NHANES FCBS¹⁶: *When you eat out, how often you go to each type of restaurant?* Responses were recorded separately for full-service and fast food/quick-service restaurants. The five response options ranged from *never or less than twice a month* to *4+ times per week*. For analytic purposes, the variables were dichotomized into “once per week or more” versus “less than once per week.”

Socioeconomic variables were educational attainment and household income. Both variables were re-grouped to reduce the degrees of freedom in multivariable models and cut points for regroupings were driven by the distribution of the sample and a priori categories of interest. Six categories of education were re-coded into three

categories: high school or less, some college, and college graduate or higher. Household income groups were also combined into three categories: <\$50,000 per year, \$50,000–\$99,999, and ≥\$100,000.

Demographic variables of interest were age, gender, race/ethnicity, and household size. Smoking was used as a lifestyle indicator and was characterized as current smoker, former smoker, and never having smoked. Respondents' attitude toward convenience foods was captured using the following statement: *It is important to me that the foods I usually eat take little time to purchase, cook, and clean up.* Response options were on a 5-point Likert-type scale ranging from *strongly agree* to *strongly disagree* with a neutral midpoint of *neither agree nor disagree*.

Because this study explored time use in relation to food preparation and cooking, only main food providers (1,555/2,001=78% of the sample) were included in analyses. These participants were identified based this on an affirmative response to the following question: *In your household, are you the person who most often buys groceries and prepares meals?* Further restricting the analyses to those with complete data on dependent and independent variables and other covariates resulted in an analytic sample of 1,319 adults.

Statistical Analysis

Descriptive statistics were used to characterize the sociodemographic and attitudinal profile of three groups differing in food-related time use. Pearson chi-square tests and ANOVA were used to test for systematic differences in sociodemographic characteristics and attitudes by group. General linear models were used to provide covariate-adjusted means of food intake (servings per week) and spending (\$ per week), across the three time-use groups. Covariates in these models were the respondent's age, gender, race/ethnicity, educational attainment, income, and employment status.

Multivariable logistic regressions were used to analyze the likelihood of visiting restaurants once per week or more, adjusting for the same covariates used in the general linear models above. In all multivariable regressions, sensitivity analyses were conducted to examine the importance of marital status in the analyses. All analyses were conducted between 2011 and 2013 using SPSS, version 18.0, for Mac.

Results

The analytic sample of 1,319 was composed mostly of women (67.4%), which was a higher percentage than the full sample, where women comprised 61.7%. The mean age of the sample was 54 years overall, with women slightly older on average (54.6 years) than men (53.8 years). Most of the respondents described themselves as white (81.0%), with the rest made up of African American (7.5%); Asian (6.7%); Hispanic (2.7%); and other ethnic or racial groups (2.0%). About 16% of the sample (212/1,319) reported spending <1 hour/day on food preparation, cooking, and cleaning. Nearly 43% (566/1,319) of participants reported spending 1–2 hours/day and 41% (541/1,319) reported spending >2 hours/day on these tasks.

The sociodemographic profile and attitudes toward convenience in food choices across the three time-use groups are presented in Table 1. The group spending the greatest amount of time preparing, cooking, and cleaning up from meals (>2 hours/day) tended to be women, non-Hispanic whites, younger, and married as compared to the group spending the least amount of time in these activities (<1 hour/day). Moreover, those who spent more time on food-related behaviors tended to have higher household size and income but were less likely to be employed or self-employed. Notably, the importance of convenience in food choices was highest in the group spending the least amount of time in food behaviors ($p<0.001$). Smoking behaviors did not appear to vary systematically across the three groups ($p=0.744$).

Fruit and vegetable consumption was systematically and positively associated with food-related time use. Multiple linear regression models were used to estimate adjusted mean (SE) frequency of intake for six food groups. These analyses were adjusted for key sociodemographic variables: age, gender, race, employment status, education, and income. Table 2 shows that among those who spent the most time in meal-related behaviors, fruit (excluding juice) was consumed 8.4 times per week compared to 6.1 times per week for those in the lowest time-use group (p difference <0.001).

Similarly, vegetables (excluding green salads and potatoes) were consumed 13.6 times per week among the top group compared to 10.6 times per week in the bottom group (p difference <0.001). Fruit juice consumption also showed a positive but weaker association with food-related time use, and consumption of sweetened beverages and snacks showed no significant variation among the groups. Including marital status in these models did not alter the magnitude or significance of any of the associations.

Weekly food spending for meals and beverages away from home showed an inverse and significant association with meal-related time use, even after adjusting for covariates. The per-person expenditure in the lowest time-use group was >\$22/week whereas that in the highest group was approximately \$15/week ($p<0.001$). However, spending for food at home (including groceries) was not significantly associated with meal-related time use.

Food-related time use showed some association with frequency of restaurant use. Table 3 shows that the crude percentage of each time-use group visiting full-service restaurants at least once per week did not differ across groups, but visits to quick-service (i.e., fast food restaurants) appeared to differ systematically. Approximately 43% of those who spent <1 hour/day on food preparation visited quick-service restaurants once per week or

Table 1. Sociodemographic and attitudinal characteristics of three time-use groups, % unless otherwise noted

	Hours per day spent preparing, cooking, and cleaning up from meals			Total (n=1,319)	p-value ^a
	< 1 hour (n=212)	1–2 hours (n=566)	> 2 hours (n=541)		
Age (years, M)	56.6	53.8	54.0	54.4	0.046
Women	55.2	68.6	71.0	67.4	< 0.001
Married ^b	21.2	39.9	54.9	43.1	< 0.001
Non-Hispanic white	82.5	82.3	78.9	81.0	0.798
Household size ^c (M)	1.6	2.0	2.6	2.2	< 0.001
Households with <i>n</i> children ≤ 18					
<i>n</i> =0	86.3	74.9	62.3	71.5	< 0.001
<i>n</i> =1	4.7	13.5	15.2	12.7	
<i>n</i> ≥ 2	9.0	11.7	22.6	15.7	
Four-year degree	49.5	54.8	56.6	54.7	0.229
Employed or self-employed	68.4	67.1	53.2	61.6	< 0.001
Household income > 50,000/year	46.7	58.3	57.1	56.0	0.005
Never smoker	55.2	53.4	52.1	53.1	0.744
High priority on convenience ^d	43.1	26.3	20.2	26.5	< 0.001

Note: Boldface indicates statistical significance ($p < 0.05$).

^ap-value from ANOVA for age and household size and from Pearson χ^2 test for other all other variables.

^bSample for marital status $n=1,317$.

^cHousehold size, number of adults and children in the household.

^dThose who *strongly agreed* with the statement “It is important to me that the foods I usually eat take little time to purchase, cook and clean up.” Sample for Convenience question $n=1,314$.

more compared to just over 30% of those who spent ≥ 2 hours/day. On multivariable analysis, those who spent < 1 hour/day on meal-related activities were about 1.8 times more likely to visit quick-service restaurants once per week or more compared to those who spent the most time on food preparation. Analysis for use of full-service restaurants showed no differences across groups.

Discussion

The results indicate that healthier food consumption patterns may have an associated time cost. In this study, healthier food consumption patterns, characterized by more frequent consumption of fruits and vegetables, less money spent on food away from home, and fewer visits to fast food restaurants, were all significantly associated with more time spent preparing, cooking, and cleaning up from meals. One interpretation of these findings is that time spent cooking at home is a prerequisite to achieving healthier food consumption patterns. Even the USDA's Thrifty Food Plan (characterized by a healthy diet plan at

the lowest cost) heavily relies on cooking at home, implying that home cooking is important for achieving higher diet quality at lower costs.²⁰

However, a number of individual-level factors may prevent individuals from cooking at home, including limited time availability⁵ and lack of cooking skills.²¹ In the present study, respondents who spent the least amount of time cooking were more likely to be employed or self-employed adults who prioritized convenience over home-cooked meals. These individuals spent substantially more money on food away from home and patronized fast food restaurants more frequently compared to the other groups, confirming that time savings and convenience does come at a price.^{22,23} These results are consistent with analyses of U.S. consumer expenditure data, which found that spending at quick-service outlets was strongly and positively associated with hours spent in paid employment.²⁴

The present findings were also largely in line with patterns of time use observed in the general U.S. population. Analyses^{4,25} based on the American Time

Table 2. Adjusted^a estimates of food consumption and food spending for three food-related time-use groups, M (SE)

	Hours per day spent preparing, cooking, and cleaning up from meals			<i>p</i> -value ^b
	< 1 hour	1–2 hours	> 2 hours	
Food consumption (frequency of consumption per week)				
Fruit (not including juice)	6.1 (0.7)	7.1 (0.6)	8.4 (0.6)	< 0.001
Green salad, lettuce	2.8 (0.3)	3.2 (0.2)	3.6 (0.2)	< 0.001
Vegetables other than green salad or potatoes	10.6 (0.9)	12.1 (0.8)	13.6 (0.8)	< 0.001
Fruit juice	4.2 (0.5)	4.8 (0.4)	5.0 (0.4)	0.038
Sugar-sweetened beverages ^c	3.3 (0.5)	3.4 (0.4)	3.7 (0.4)	0.369
Sweet snacks ^d	2.9 (0.4)	2.6 (0.3)	2.7 (0.3)	0.309
Food spending (\$ per person per week)				
Eating out	22.8 (2.7)	16.4 (2.3)	15.1 (2.3)	< 0.001
Food at home	43.8 (4.3)	44.6 (3.7)	46.5 (3.6)	0.406

Note: Boldface indicates statistical significance ($p < 0.05$).

^aMeans adjusted in general linear models containing respondent's age, gender, race, employment status, educational attainment, and income as covariates.

^b*p*-value indicated for difference between lowest and highest time-use groups.

^cIncluding soft drinks, cola, and sweetened fruit drinks.

^dIncluding cakes, cookies, and other sweetened baked goods.

Use Survey (ATUS) found that the responsibility for food preparation was held primarily by women, whereas adults who were married or not in paid employment spent more time on food preparation. The ATUS also indicates that time spent on food preparation increases with greater numbers of children in the household, which aligns with the present finding that participants in the highest time-use group were most likely to have one or more child resident in their households.

Although analyses of the ATUS have found that respondents with lower income tended to spend slightly

more time on food preparation,²⁵ the present results indicated that more time spent on food preparation was associated with higher income. This contrast may be related to the nature of the current study sample, which had higher incomes and educational attainment than the general U.S. population.

Limitations

Features of this study are worth addressing because they may have implications for the results presented here. First, the cross-sectional nature of the study limits the

Table 3. Full- and quick-service restaurant use by three food-related time-use groups

	Hours per day spent preparing, cooking, and cleaning up from meals			
Restaurant type	< 1 hour	1–2 hours	> 2 hours	<i>p</i> -value ^a
Crude percentage of each time-use group with ≥ 1 restaurant visit per week (%)				
Full-service	37.7	41.0	38.8	
Fast food/quick-service ^b	42.9	38.9	30.7	
Covariate-adjusted ORs ^c (95% CIs) for ≥ 1 restaurant visit per week				
Full-service	1.09 (0.77, 1.54)	1.13 (0.88, 1.45)	ref	0.581
Fast food/quick-service ^b	1.79 (1.27, 2.53)	1.44 (1.11, 1.86)	ref	0.001

Note: Boldface indicates statistical significance ($p < 0.05$).

^a*p*-value indicated for difference between lowest and highest time-use groups.

^bFast food/quick-service defined as food outlets where payment is made prior to receiving food.

^cORs from logistic regression models adjusting for respondent's age, gender, race, employment status, educational attainment, and income as covariates.

ability to draw conclusions regarding causality. Whether more time spent on preparing food enables healthier eating habits or whether individuals who consume healthier diets also tend to enjoy spending more time cooking could not be determined. Second, the independent variable (time use) and the three main outcomes (food consumption, food spending, and restaurant use) were all self-reported, which subjects them to both error and bias.^{26,27} Third, dietary intake of only a few food groups was assessed and only frequency but not quantity of intake. As a result, a more detailed and nuanced picture of diet quality in this sample could not be obtained.

Finally, the present analyses could not identify whether these food behaviors lead to better health outcomes, which would ideally be explored in longitudinal study designs. These limitations are balanced by a number of strengths, including a relatively large, population-based sample of adults involved in food shopping and preparation and what the authors believe is a novel linkage of food intake, food spending, restaurant use, and time spent on food preparation, which is a neglected domain in understanding dietary behavior.

Conclusions

The findings reported here indicate that spending time on food preparation at home might be essential to healthier dietary habits among adults. More research is needed to identify barriers that limit cooking at home and the lifestyles of those who prioritize convenience in food choice. Meanwhile, dietary advice and food producers and retailers should encourage foods and meals that are nutritious and yet quick and convenient for the consumer. Moreover, government efforts toward identifying lowest-cost yet healthy food patterns²⁰ need to explicitly account for the associated time costs of producing healthier meals. Doing so would make the true costs of healthier diets more realistic^{9,10} and, importantly, inform improvements to the Supplemental Nutrition Assistance Program to better support healthy eating in low-income populations.

This work was supported by a grant from the National Institute of Diabetes and Digestive and Kidney Diseases (grant No. R01 DK076608). Pablo Monsivais also received support from the Centre for Diet and Activity Research, a United Kingdom Clinical Research Collaboration Public Health Research Centre of Excellence funded by the British Heart Foundation, Economic and Social Research Council, Medical Research Council, the National Institute for Health Research, and the Wellcome Trust. The study sponsors had no role in the study design, analysis, or publication.

No financial disclosures were reported by the authors of this paper.

References

1. Larson NI, Perry CL, Story M, Neumark-Sztainer D. Food preparation by young adults is associated with better diet quality. *J Am Diet Assoc* 2006;106(12):2001–7.
2. Winkler E, Turrell G. Confidence to cook vegetables and the buying habits of Australian households. *J Am Diet Assoc* 2010;110(5S):S52–S61.
3. Crawford D, Ball K, Mishra G, Salmon J, Timperio A. Which food-related behaviours are associated with healthier intakes of fruits and vegetables among women? *Public Health Nutr* 2007;10(3):256–65.
4. Hamrick KS, Andrews M, Guthrie J, Hopkins D, McClelland K. How much time do Americans spend on food? US Department of Agriculture, Economic Research Service. 2011. www.ers.usda.gov/publications/eib-economic-information-bulletin/eib86.aspx#.U4-AYPm-1cY.
5. Jabs J, Devine CM, Bisogni CA, Farrell TJ, Jastran M, Wethington E. Trying to find the quickest way: employed mothers' constructions of time for food. *J Nutr Educ Behav* 2007;39(1):18–25.
6. Devine CM, Jastran M, Jabs J, Wethington E, Farrell TJ, Bisogni CA. "A lot of sacrifices": work-family spillover and the food choice coping strategies of low-wage employed parents. *Soc Sci Med* 2006;63(10):2591–603.
7. Devine CM, Farrell TJ, Blake CE, Jastran M, Wethington E, Bisogni CA. Work conditions and the food choice coping strategies of employed parents. *J Nutr Educ Behav* 2009;41(5):365–70.
8. Lappalainen R, Saba A, Holm L, Mykkanen H, Gibney MJ, Moles A. Difficulties in trying to eat healthier: descriptive analysis of perceived barriers for healthy eating. *Eur J Clin Nutr* 1997;51(S2):S36–S40.
9. Rose D. Food Stamps, the Thrifty Food Plan, and meal preparation: the importance of the time dimension for US nutrition policy. *J Nutr Educ Behav* 2007;39(4):226–32.
10. Davis GC, You W. The Thrifty Food Plan is not thrifty when labor cost is considered. *J Nutr* 2010;140(4):854–7.
11. Davis GC, You W. Not enough money or not enough time to satisfy the Thrifty Food Plan? A cost difference approach for estimating a money–time threshold. *Food Policy* 2011;36(2):101–7.
12. Monsivais P, Aggarwal A, Drewnowski A. Are socio-economic disparities in diet quality explained by diet cost? *J Epidemiol Community Health* 2012;66(6):530–5.
13. Moudon AV, Cook AJ, Ulmer J, Hurvitz PM, Drewnowski A. A neighborhood wealth metric for use in health studies. *Am J Prev Med* 2011;41(1):88–97.
14. Behavioral Risk Factor Surveillance System. CDC. 2014. www.cdc.gov/brfss/.
15. Behavioral Risk Factor Surveillance System (BRFSS). Washington State Department of Health. www.doh.wa.gov/DataandStatisticalReports/HealthBehaviors/BehavioralRiskFactorSurveillanceSystemBRFSS.aspx.
16. Family Questionnaire CONSUMER BEHAVIOR – CBQ. National Health and Nutrition Examination Survey. Atlanta GA: CDC, 2009.
17. Behavioral Risk Factor Surveillance System Questionnaire, 2007. Atlanta GA: CDC, 2006. www.cdc.gov/brfss/annual_data/pdf-ques/2007BRFSS.pdf.
18. Behavioral Risk Factor Questionnaire, 1994. Atlanta GA: CDC, 1993:40. www.cdc.gov/brfss/annual_data/pdf-ques/94brfss.pdf.
19. Risica PM, Kerr S, Lawson E, Belhumeur R, Ankoma A. Self-report of sugar-sweetened beverage and fast food consumption by annual household income. *Med Health R I* 2009;92(2):63–4.
20. Carlson A, Lino M, Juan W-Y, Hanson K, Basiotis PP. Thrifty Food Plan, Report No.: CNPP-19. Center for Nutrition Policy and Promotion, U.S. Department of Agriculture, 2007. www.cnpp.usda.gov/publications/foodplans/miscpubs/ftp2006report.pdf.
21. Wrieden WL, Anderson AS, Longbottom PJ, et al. The impact of a community-based food skills intervention on cooking confidence, food preparation methods and dietary choices—an exploratory trial. *Public Health Nutr* 2007;10(2):203–11.

22. Stewart H, Blisard N, Jolliffe D. Let's eat out: Americans weigh taste, convenience and nutrition. United States Department of Agriculture, Economic Research Service . 2006. <http://www.ers.usda.gov/media/860870/eib19.pdf>.
23. Davis GC, You W. Preparing food at home: what is the labor cost? American Agricultural Economics Association, 2006.
24. Stewart H, Blisard N, Jolliffe D, Bhuyan S. The demand for food away from home: do other preferences compete with our desire to eat healthfully? *J Agric Resource Econ* 2005;30(3):520–36.
25. Mancino L, Newman C. Who has time to cook? How family resources influence food preparation. U.S. Department of Agriculture, Economic Research Service. 2007. www.ers.usda.gov/publications/err-economic-research-report/err40.aspx#.U4-AB_m-1cY.
26. White E, Armstrong BK, Saracci R. Principles of measurement in exposure epidemiology: collecting, evaluating, and improving measures of disease risk factors. 2nd ed. Oxford: Oxford University Press, 2008.
27. Willett W. Nutritional epidemiology. 3rd ed. New York: Oxford University Press, 2013.