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Home Food Environment Factors Associated with the Presence of Fruit and Vegetables at Dinner: A Direct Observational Study

Amanda C. Trofholz, MPH, RD [research associate],

Division of Family Medicine and Community Health, University of Minnesota, Minneapolis.

Allan D. Tate, MPH [PhD student],

Division of Epidemiology and Community Health, University of Minnesota, Minneapolis.

Michelle L. Draxten, MPH, RD [research associate],

Division of Family Medicine and Community Health, University of Minnesota, Minneapolis.

Dianne Neumark-Sztainer, PhD, MPH, RD [professor], and

Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis.

Jerica M. Berge, PhD, MPH, LMFT, CFLE [associate professor]

Department of Family Medicine and Community Health, University of Minnesota, Minneapolis.

Abstract

Background—Little research exists about the factors influencing the foods available at family meals. This study examines the home food environment factors contributing to the presence of fruit and vegetables at family meals.

Methods—Home food inventory (HFI) and survey data were collected from low-income, minority families (n=120) with children 6-12 years old. Observations from video-recorded family dinner meals, totaling 800 videos, were used to measure the frequency at which fruit and vegetables were served. Multiple regression was used to investigate how the fruit and vegetables in the HFI and other home food environment factors were related to the number of days fruit and vegetables were served at dinner during the observation period.

Results—Availability and accessibility of fruit and vegetables in the home were each found to be significantly associated with the presence of fruits and vegetables at family dinners. Of the fruit and vegetable categories (i.e., fresh, canned, or frozen), having fresh fruit and vegetables available in the home was found to be most strongly associated with serving fruit and vegetables at dinner, respectively. Higher parent intake of vegetables was associated with the presence of vegetables at dinners, and parent meal planning was associated with the presence of fruit at dinners.

Corresponding Author: Amanda C. Trofholz, MPH, RD, Department of Family Medicine and Community Health, 717 Delaware St, SE, Minneapolis, MN 55414, 612-624-7129, trofh002@umn.edu.

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Conclusions—Increasing the availability and accessibility of fresh fruit and vegetables in the home may be an effective approach to increasing the presence of fruits and vegetables at family dinners, especially among low-income, minority households. It is also essential to understand why families are not using all fruits and vegetables (e.g., canned and frozen) available in the home for family meals. Family meals are a place to promote the increased presence of both fruit and vegetables.

Keywords

family meals; direct observation; fruit and vegetables; home food availability; foods served at meals; home food environment; foods available

Introduction

Studies on child dietary intake have consistently shown that children's fruit (Brady, Lindquist, Herd, & Goran, 2000; Currie et al., 2004; Guenther, Dodd, Reedy, & Krebs-Smith, 2006; Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010; Lorson, Melgar-Quinonez, & Taylor, 2009; Yngve et al., 2005) and vegetable consumption is below dietary recommendations (Brady et al., 2000; Currie et al., 2004; Guenther et al., 2006; Krebs-Smith et al., 2010; Lorson et al., 2009; Yngve et al., 2005). In considering strategies to raise fruit and vegetable consumption, there is some evidence that the foods present at family meals are associated with children and adolescent's overall dietary intake of those same foods (Arcan et al., 2007; Boutelle, Fulkerson, Neumark-Sztainer, Story, & French, 2007; Trofholz et al., 2015). For example, a longitudinal study found that adolescents who were served vegetables and milk at family dinners were more likely to consume those foods at a 5-year follow-up (Arcan et al., 2007). Another cross-sectional study found that serving vegetables, dairy, and empty calories (e.g., sugar-sweetened beverages) at dinner was significantly associated with 6-12 year olds' overall intake of those same foods (Trofholz et al., 2015). We are not aware of any published research examining the relationship between serving fruit at family meals and children or adolescent's intake of fruit.

Limited data exist regarding the frequency at which fruits and vegetables are being served at family meals. The data that do exist have mostly been gathered through self-reported measures rather than observational methods, and most research does not specifically target low-income or minority populations. The data examining fruit and vegetable frequency at family meals shows that vegetables are sometimes to usually available at family meals (Berge, Jin, Hannan, & Neumark-Sztainer, 2013; Hanson, Neumark-Sztainer, Eisenberg, Story, & Wall, 2007; MacFarlane, Crawford, Ball, Savage, & Worsley, 2007; Neumark-Sztainer et al., 2014; Trofholz et al., 2015; Vejrup, Lien, Klepp, & Bere, 2008), while fruit is infrequently available (Berge et al., 2013; Neumark-Sztainer et al., 2014; Trofholz et al., 2015). These studies suggest that family meals are a place where more fruits and vegetables can be offered, which may then increase the consumption of fruits and vegetables in children and adolescent's overall diets.

While there is some research focusing on why families have family meals (Fulkerson, Story, Neumark-Sztainer, & Rydell, 2008; Fulkerson et al., 2011; Fulkerson, Neumark-Sztainer, &

Story, 2006), research on why particular foods are served at family meals is minimal. One population-based study found that certain socio-demographic (e.g., parental education attainment) and psychosocial (e.g., work-life stress) characteristics were significantly associated with serving healthy food options (e.g., green salad, fruit, or vegetables). The same study found that meal-specific variables (i.e., importance of family meals, food purchasing barriers, enjoyment of cooking, meal planning, and hours in food preparation) were also significantly associated with serving healthy food options (Neumark-Sztainer et al., 2014). A second study found meal preparation self-efficacy of mothers of school-aged children to be a significant predictor to a healthier evening meal. (Beshara, Hutchinson, & Wilson, 2010)

Through the use of direct observational methods, the current study seeks to expand previous literature by exploring the following research question: What home food environment characteristics (i.e., home fruit and vegetable availability and accessibility, fast food for family meals, parent intake of fruits and vegetables, and meal-specific variables) are associated with the presence of fruit and vegetables at family dinners? Factors hypothesized to be associated with serving any fruits and vegetables at dinner include higher levels of home fruit and vegetable availability and accessibility (Arcan et al., 2007; Blanchette & Brug, 2005; Cullen et al., 2003; Rasmussen et al., 2006; van der Horst et al., 2007; Wyse, Campbell, Nathan, & Wolfenden, 2011); lower report of serving fast food at meals (Boutelle et al., 2007); higher report of parental intake of fruits and vegetables (Blanchette & Brug, 2005; Lucan, Barg, & Long, 2010; Nicklas et al., 2013; Rasmussen et al., 2006; Williams, Ball, & Crawford, 2010); higher levels of family meal importance, cooking enjoyment, meal planning, and time spent in food preparation (Neumark-Sztainer et al., 2014); and lower report of food purchasing barriers (Neumark-Sztainer et al., 2014). Results from this study will help to inform interventions that aim to increase the presence of fruits and vegetables included in family meals, and thereby potentially increase child dietary intake of fruits and vegetables via family meals.

Methods

Study Design and Sample

The Family Meals LIVE! study (Berge et al., 2014) is a cross-sectional study designed to examine the home environment factors that may influence the risk of childhood obesity. Children ages 6-12 years old and their families were recruited from primary care clinics in Minneapolis/Saint Paul between 2012-2013. Recruitment was stratified such that half of the sample (n=60) were normal weight (>5th and < 85th BMI percentile) and half (n=60) were overweight (≥ 85th percentile). Data was collected by trained researchers during two home visits with an eight-day observation period between home visits. Data collected during home visits included anthropometric measurements, parent and child surveys, parent interviews, a home food inventory, and child 24-hour dietary recalls. During the observation period, families video-recorded eight family meals using an iPad provided by the study. Eligibility criteria included being able to speak and read English and having a minimum of three family dinner meals per week. All study procedures were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee.

Of the 120 participants, 53% were boys and 47% were girls with a mean age of 8.9. The racial backgrounds of the participants were as follows: 74% African American, 18% white, 9% Native American, 6% Asian, and 3% mixed/other. Nearly all primary caregivers of the target child were female (92%) with a mean age of 34.8. Over half of the primary caregivers were either unemployed or stay at home caregivers (51%), while nearly a third worked full time (31%). Nearly three quarters of the households had income less than \$35,000 (73%). Regarding the number of people living in the household, 13% had only the primary caregiver and target child, 36% had 3-4 people, 40% had 5-6 people, and 11% of the homes had 7 or more people (Berge et al., 2014).

Procedures

The amount of fruits and vegetables available and accessible in the home was assessed with a validated Home Food Inventory (HFI) (Fulkerson, Nelson, et al., 2008), which was completed by a member of the research team during a home visit to the participant's home. HFI items are listed in a checklist format with yes/no options. Research members were instructed to look at all foods located in the participant's house (e.g., in the refrigerator/freezer, pantry, cupboards) and select “yes” to the foods that were present in the home. Additional information for whether fruits and vegetables were canned, fresh or frozen was collected. At this same home visit, the primary guardian completed an electronic survey, and heights and weights were taken on all available family members.

Foods served at family meals were assessed by direct observations of eight video-recorded family dinner meals. At the beginning of each meal, family members said what was served for dinner on the video-recording. After completing the meal, families completed a meal screener, which served as a written report of what was served at the meal. To obtain an authentic representation of each meal, families were told to “eat as they normally do” and there was “no right or wrong way to have a family meal” (e.g., what food was served, where the meal was served). Family meals did not have to be home-prepared; meals prepared away from the home (e.g., fast food) that were eaten at home also counted as a family meal. Additionally, to allow participants time to acclimate to being recorded, the first day of video-recorded meals was not used (Gardner, 2000; Haidet, Tate, Divirgilio-Thomas, Kolanowski, & Happ, 2009). Comprehensive study procedures have been previously documented (Berge et al., 2014).

Measures

Input Variables—Descriptions of input variables, including how variables were assessed, are presented in a separate measures table (Table 1).

Output Variables—Three research members (including two registered dietitians (RD)) were trained by an RD supervisor on how to code the video-recorded meals via the HOM index (Trofholz et al., 2015). Researchers coded for the presence of fruit and/or vegetables at the family dinner meal using the self-reported meal screener data in combination with the video-recorded meals. Family meals received a “1” if any fruit was present at the meal, and a “1” if any vegetables (not including French fries) were present at the meal. Meals were scored solely on the presence of fruit and/or vegetables; coders were not able to quantify the

amount of the fruit or vegetable served or if the fruit or vegetable was eaten from the video-recordings. Meals were coded until research members reached 95% reliability (100% inter-rater reliability after consensus). To ensure consistency, 30% of family meals were double-coded, and the coders for each meal met to reach 100% consensus. The majority of the 120 families completed all eight days of video-recorded meals, providing 800 coded meals. A comprehensive description of the coding process has been previously documented (Trofholz et al., 2015).

Covariates—Anthropometric measurements were obtained on the primary caregiver by research members using standardized procedures. Height was assessed to the nearest 0.1 cm using a stadiometer and weight to the nearest 0.1 kg using a calibrated scale; parent body mass index (BMI) was calculated using the standard formula. The number of people living in each family's home was based on parent report.

Statistical Analysis

Multiple linear regression was performed to examine how home food environment characteristics were related to serving fruits and vegetables at dinner. Fruit and vegetable availability and accessibility were each evaluated as continuous independent predictors. Serving fast food for family meals, parent fruit and vegetable intake, and meal-specific barriers were also evaluated as continuous independent predictors. The frequency of days that any vegetables were served at dinner and the frequency of days that any fruit was served at family dinner were each evaluated as continuous dependent variables. Crude and adjusted analyses for number of people living in the household and parent BMI were performed. Weights were applied in all analyses to account for the sampling design (Berge et al., 2014). All analyses were performed in Stata 13.1/SE (College Station, TX).

Results

Description of Home Food Variables

Families had more types of vegetables available in the home (mean 6.8) than types of fruit (mean 4.0), although fruit was slightly more accessible than vegetables (Table 1). On average, parents did not feel that there were barriers to serving fruit and vegetables at dinner or barriers to purchasing fruit and vegetables. Mean results show parents report of meal planning and enjoyment of cooking to be between “Sometimes” (43.3% meal planning/ 52.5% cooking enjoyment) and “Most of the time” (40.8%/20.0%). On average, parents reported having dinner meals 5.3 days/week and serving fast food for a family meal the past week between “Never” and “1-2 times”.

Associations between Home Food Environment Variables and Serving Fruit at Dinner

Adjusted analyses for parent BMI and number of people living in the home indicated that availability of fruit (any form) ($p=0.03$), availability of fresh fruit ($p=0.03$), meal planning (i.e., planning in the morning what will be eaten for dinner that night) ($p=0.02$), and having fruit accessible in the home ($p=0.01$) were positively associated with the presence of any fruit at dinner meals (Table 2). For example, in the adjusted model, having fruit accessible in the home was associated with 0.79 more days of fruit being served at dinner over a seven-

day period. Non-significant results include: availability of canned or frozen fruit or quick cook foods, serving fast food for family meals, parent fruit intake, fruit/vegetable meal barriers (e.g., My family wastes too much food when I serve fruit and vegetables.), enjoyment of cooking, food purchasing barriers (e.g., I don't buy many fruits because they cost too much.), hours spent in food preparation, and frequency of family meals.

Associations between Home Food Environment Variables and Serving Vegetables at Dinner

Adjusted analyses for parent BMI and number of people living in the home indicated that availability of vegetables (any form) ($p=0.004$), availability of fresh vegetables ($p=0.001$), and parent vegetable intake ($p=0.01$) were positively associated with the presence of any vegetables at dinner meals. Results also indicate that vegetable accessibility in the home was positively associated ($p=0.04$) with the presence of any vegetables at dinners (Table 3). For example, in the adjusted model, a one-unit change in the number of fresh vegetables available in the home (e.g., moving from 4 fresh vegetables in the home to 5 fresh vegetables in the home) was associated with 0.31 more days of vegetables being served at dinner over a seven-day period. Non-significant results include the availability of canned or frozen vegetables or quick cook foods, serving fast food for family meals, fruit/vegetable meal barriers, meal planning, enjoyment of cooking, food purchasing barriers, hours spent in food preparation, and frequency of family meals.

Discussion

The presence of any fruit and/or vegetables for dinner was most consistently related to availability of any (i.e., fresh, canned, or frozen) fruits/vegetables, availability of fresh fruits/vegetables, and accessibility of fruits/vegetables. These results complement previous findings showing home availability and accessibility of fruit and vegetables as being predictive of fruit and vegetable intake in children and adolescents (Blanchette & Brug, 2005; Cullen et al., 2003; Nicklas et al., 2013; Rasmussen et al., 2006; van der Horst et al., 2007; Wyse et al., 2011). An association between home availability of fruit and/or vegetables and the presence of fruit/vegetables at dinner makes logical sense, in that it would be difficult for families/parents to serve fruit and vegetables at dinner if they are not present in the home. Thus, having fruits and/or vegetables accessible in the home may encourage parents to make them available for dinner. Additionally, while there were significant associations between having fresh fruits and/or vegetables in the home and the presence of fruits and/or vegetables at dinner, similar associations did not exist for canned or frozen fruits or vegetables. The shorter shelf life of fresh fruit and vegetables may be driving this finding in that participants who have fresh fruits and vegetables in their homes may be more likely to eat them before they go bad. Families might also be unsure of how to cook with canned and frozen fruits and vegetables and, therefore, refrain from serving them at family dinners. More research is needed to determine why families are not preparing all fruits and vegetables available in the home for dinner. This result regarding fresh food availability can inform future interventions focusing on increasing fruit and vegetable consumption in children and families. Making fresh fruits and vegetable available and accessible in the home, and particularly at family dinners, may increase child and family

consumption of fruits and vegetables. As this study focuses on a low-income population, future interventions may wish to consider food assistance programs such as food banks, as places to offer more fresh fruits and vegetables. Also, since low-income families are much less likely to own their homes (“US Census Bureau: Housing Vacancies and Homeownership,” 2014) and report low levels of gardening (Hendrickson, Smith, & Eikenberry, 2006), increasing efforts to expose low-income participants to community gardens may also be considered.

Results regarding parent eating behaviors build on the research base that suggests that taste preference for vegetables (and fruit) is a main promoter of vegetable (and fruit) consumption (Blanchette & Brug, 2005; Lucan et al., 2010; Nicklas et al., 2013; Rasmussen et al., 2006; Williams et al., 2010). Parents’ intake of vegetables was associated with the presence of vegetables at dinners. However, the same association was not found for parents’ intake of fruit. This may be that although parents report liking both fruit and vegetables, it does not occur to them to serve fruit for dinners, or fruit is thought more of a breakfast, lunch, or snack food. Another recent study showed parents reporting most frequently serving fruit at breakfast and vegetables at dinner (Smith et al., 2015).

The significant association found between meal planning and the presence of fruit at family dinners corroborates findings from a previous study that found the same association for both fruit and vegetables (Neumark-Sztainer et al., 2014). When participants take the time to plan dinner meals, it may be more likely that they consider all foods available in the home as options, and therefore, be more likely to serve fruit at the dinner meal. Thus, encouraging parents to meal plan and consume more fruit at the dinner meal could increase exposure and consumption of fruit in children.

Surprisingly, purchasing barriers (i.e., the cost, quality and variety of fruit and vegetables available at participant's grocery store) were not found to be statistically related with the presence of any fruit and/or vegetables at dinner meals (Cassady, Jetter, & Culp, 2007; Hendrickson et al., 2006; Neumark-Sztainer et al., 2014; Webber, Sobal, & Dollahite, 2010). This finding may be due to the fact that the study population is very homogenous and experience similar barriers or that they have similar fruit and vegetable preferences. Or, as one study suggests, it may be that the participants are able to manage the purchase of their habitual amount of fruit and vegetables and only see the cost of buying *more* fruits and vegetables as being prohibitive (Dibsdall, Lambert, Bobbin, & Frewer, 2003).

This study has several strengths, namely through the use of non-intrusive direct observational data. Home food availability was determined through the use of the HFI, a measure completed in the participant's home by trained researchers. Staff dietitians used an objective measurement tool to determine the fruit and vegetables served in the video-recorded family meals (Trofholz et al., 2015). Analysis also benefited from the evaluation of 800 family meals, which were video-recorded in the homes of a low-income, minority population.

The study also has limitations that need to be considered when interpreting findings. Some of the variables were assessed via self-report survey items; social desirability may have led

participants to over-report on questions such as those related to fruit and vegetable intake and under-report on other questions such as the amount of times fast food is served at meals. Additionally, as the family meal did not have to be home prepared (e.g., fast food eaten at home counted as a family meal), there would not necessarily be a relationship between foods found at home and foods served at family meals for all observed meals. Finally, it may be that there are differences among the families who tend to both have fruit and vegetables available in the home and serve fruit and vegetables at family meals versus those who neither have nor serve fruit and vegetables which are unable to be captured by this current study.

Study results provide direction for registered dietitians and practitioners working with families; families should strive to have fruit and vegetables, particularly fresh, available and accessible in the home. Additionally, family meals should be promoted as a place where both fruit and vegetables are consistently served. Special attention should also be paid to ensure that the addition of fruit to family meals does not replace vegetables. However, discussion regarding availability cannot be had without also discussing the barriers to having fruit and vegetables present in the home. Research suggests factors such as convenience of fast foods/snack foods, not liking the taste of fruit and vegetables, and prohibitive cost to be barriers to children and adults' consumption of fruit and vegetables (Blanchette & Brug, 2005; Cassady et al., 2007; Lucan et al., 2010; Nicklas et al., 2013; Rasmussen et al., 2006); it is likely these are also barriers to having fruit and vegetables present in the home. It is important for individual practitioners and community nutrition interventionists to consider these factors when encouraging home food availability of fruit and vegetables.

Study analyses did not show the same significant findings for home food environment variables (e.g., time spent in food preparation, cooking enjoyment, food purchasing barriers) as found in a previous study evaluating the variables associated with serving fruit and vegetables (among other foods) at family dinners (Neumark-Sztainer et al., 2014). This may be due to differing study measures and techniques. Thus, more research is needed to determine which home food environment factors most contribute to serving fruit and vegetables at family dinners. It would also be beneficial to assess the relationship between home food environment factors and serving fruit and vegetables at family dinners in populations of different race/ethnicities and income status. Additionally, community nutrition interventionists may also consider targeting the serving of fruit at family dinners in an effort to increase its presence at dinners and, hence, increase children and adolescent's intake of fruit (Trofholz et al., 2015).

Conclusions

Findings from the current study suggest that family meals may be a plausible intervention point to increase fruit and vegetables served to children, and possibly, to increase children's overall fruit and vegetable intake. Having available and accessible fruit and vegetables in the home may be an effective approach to increasing the presence of fruit and vegetables at family dinners. Understanding the barriers to home fruit and vegetable availability and promoting the dinner meal as a place to serve fruit and vegetables may be successful

approaches to improving the dinner meal as well as children's overall fruit and vegetable intake.

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Highlights

- *800 video-recordings of family meals were evaluated to determine fruit and vegetables served at family meals
- *Home food availability of fresh fruit and fresh vegetables significantly associated with serving fruit and vegetables at family dinners
- *Home fruit and vegetable accessibility significantly associated with serving fruit and vegetables at family dinners
- *Parent meal planning significantly associated with serving fruit at family meals; parent vegetable intake significantly associated with serving vegetable at family meals
- *Parents did not perceive there to be barriers to serving fruit and vegetables at dinner or to purchasing fruit and vegetables

Table 1

Description of Home Food Environment Measures

Variable	Response Options	Variable Creation	Mean (SD)	Actual Range	Possible Range
Availability of Food in Home¹	Yes/No	Summed foods present under each food category (i.e. Fruit, Vegetable, or Quick-Cook Foods)			
<i>Fruit Availability</i>			4.0 (3.1)	0-14	0-26
<i>Vegetable Availability</i>			6.8 (3.0)	1-15	0-20
<i>Quick-Cook Foods (e.g. pizza, chicken nuggets, ramen) Availability</i>			2.9 (2.2)	0-9	0-9
Accessibility of Food in Home¹					
<i>Fruit Accessibility</i>	Yes/No	A yes to any question would indicate fruit being accessible in the home	0.5 (0.5)	0-1	0-1
<i>Is fresh fruit visible and readily accessible around kitchen?</i>					
<i>Is canned or dried fruit visible and readily accessible around kitchen?</i>					
<i>Is fresh, ready-to-eat fruit readily accessible in the refrigerator?</i>					
<i>Vegetable Accessibility</i>	Yes/No	A yes to any question would indicate vegetables being accessible in the home	0.4 (0.5)	0-1	0-1
<i>Are fresh vegetables visible and readily accessible around the kitchen?</i>					
<i>Are fresh, ready-to-eat vegetables readily accessible in the refrigerator?</i>					
Serving Fast Food for Family Meals	Never; 1-2 times; 3-4 times; 4-5 times; 5-6 times; 7 times	Assessed continuously	1.7 (0.7)	1-4	1-6
<i>In the past week, how many times was a family meal purchased from a fast food restaurant, eaten either at the restaurant or at home?</i>					
Parent Intake of Fruit	1 servings; 2 servings; 3 servings; 4 servings; 5+ servings	Assessed continuously	2.3 (1.3)	1-5	1-5
<i>Thinking back over the past week, how many servings of fruit did you usually eat on a typical day?</i>					
Parent Intake of Vegetables	1 servings; 2 servings; 3 servings; 4 servings; 5+ servings	Assessed continuously	2.7 (1.4)	1-5	1-5
<i>Thinking back over the past week, how many servings of vegetables did you usually eat on a typical day?</i>					

Variable	Response Options	Variable Creation	Mean (SD)	Actual Range	Possible Range
Fruit and Vegetable Meal Barriers (Cronbach's $\alpha=0.68$)² <i>My family wastes too much food when I serve fruit and vegetables.</i> <i>Nothing I do seems to get my kids to eat more vegetables.</i> <i>Nothing I do seems to get my kids to eat more fruit.</i> <i>I don't have time to fix vegetable dishes.</i> <i>If I were to serve fruit for dessert, no one in my family would eat it.</i>	Disagree a lot; Disagree a little; Neutral; Agree; Agree a lot	Response options were summed and then divided by the number of component items to create score	1.7 (0.8)	1-4.6	1-5
Meal Planning <i>How often do you know or plan in the morning what you will eat for dinner that night?</i>	Never/rarely; Sometimes; Most of the time; Always	Assessed continuously	2.5 (0.7)	1-4	1-4
Enjoyment of Cooking <i>How often do you like trying new recipes and cooking new things?</i>	Never/rarely; Sometimes; Most of the time; Always	Assessed continuously	2.3 (0.8)	1-4	1-4
Food Purchasing Barriers (Cronbach's $\alpha=0.84$) <i>I don't buy many fruits because they cost too much.</i> <i>I don't buy many vegetables because they cost too much.</i> <i>At the store where I buy my groceries, the variety of fresh fruits and vegetables is limited.</i> <i>At the shop where I buy my groceries, the condition of fresh fruits and vegetables is poor.</i>	Strongly agree; Agree; Neutral; Disagree; Strongly Disagree	Response options were summed and then divided by the number of component items to create score	4.0 (0.9)	1-4	1-5
Hours of Food Preparation <i>On a typical day, how many hours do you spend preparing food for your family?</i> <i>On a typical day, how many hours does your partner spend preparing food for your family?</i>	0 hrs; <1/2 hr; 1/2-2 hrs; 2.5-4 hrs; 4.5-6 hrs; 6+ hrs	The midpoint of each response options was used, and the two response options were summed	1.8 (1.1) hours	0-6.5 hours	0-12 hours
Frequency of Family Meals <i>During the past week, how many times did all, or most of your family living in your house eat dinner or supper together?</i>	0 days; 1-2 days; 3-4 days; 5-6 days; 7 days	The midpoint of each response option was used	5.3 (1.7) days	1.5-7 days	0-7 days

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Foods and food accessibility present in home assessed by Home Food Inventory (HFI); all other measures assessed by parent survey
2
Fruit and Vegetable Meal Barriers is reverse coded. A higher number indicates more barriers to purchasing fruit and vegetables.

Table 2

Mean Response of Food Category, Accessibility, Fast Food, Parent Fruit Intake, and Meal Specific Barriers on Fruit Served at Dinner

Independent Variable	CRUDE MODEL			ADJUSTED MODEL		
	Mean Response	95% Confidence Interval	p-value	Mean Response	95% Confidence Interval	p-value
<i>Food Category Availability</i>						
All Fruit Categories	0.13	(0.01, 0.27)	0.04	0.15	(0.02, 0.27)	0.03
Fresh Fruit	0.23	(0.02, 0.45)	0.04	0.24	(0.02, 0.45)	0.03
Canned Fruit	-0.03	(-0.23, 0.18)	0.81	0.02	(-0.18, 0.22)	0.83
Frozen Fruit	0.22	(-0.30, 0.74)	0.40	0.24	(-0.21, 0.69)	0.29
Quick Cook Foods	-0.08	(-0.21, 0.05)	0.24	-0.07	(-0.19, 0.05)	0.25
<i>Fruit Accessibility</i>	0.84	(0.19, 1.50)	0.01	0.79	(0.17, 1.40)	0.01
<i>Serving Fast Food for Meals</i>	-0.44	(-0.88, -0.01)	0.04	-0.39	(-0.79, 0.01)	0.06
<i>Parent Fruit Intake</i>	0.13	(-0.12, 0.38)	0.31	0.20	(-0.04, 0.44)	0.10
<i>Meal Specific Barriers</i>						
Fruit/Vegetable Meal Barriers	-0.11	(-0.22, -0.01)	0.04	-0.10	(-0.21, 0.02)	0.11
Meal Planning	0.42	(0.03, 0.81)	0.04	0.46	(0.07, 0.86)	0.02
Enjoyment of Cooking	0.20	(-0.30, 0.70)	0.42	0.31	(-0.15, 0.77)	0.19
Food Purchasing Barriers	0.03	(-0.51, 0.57)	0.91	0.06	(-0.47, 0.60)	0.81
Hours of Food Preparation	-0.11	(-0.39, 0.16)	0.40	-0.11	(-0.40, 0.17)	0.44
Frequency of Family Meals	0.08	(-0.06, 0.22)	0.27	0.09	(-0.04, 0.22)	0.18

* Adjusted Model Covariates: Number of People Living in the Household and Parent BMI

Interpretation Example: In the crude model, a one unit change in the number of fruit categories available in the home was associated with 0.13 more days of fruit being served at dinner over a seven day period (p=0.04). In the adjusted model, a one unit change in the number of fruit categories in the home was associated with 0.15 more days of fruits being served at dinner over a seven day period (p=0.03).

Table 3

Mean Response of Food Category, Accessibility, Fast Food, Parent Vegetable Intake, and Meal Specific Barriers on Vegetables Served at Dinner

Independent Variable	CRUDE MODEL			ADJUSTED MODEL		
	Mean Response	95% Confidence Interval	p-value	Mean Response	95% Confidence Interval	p-value
<i>Food Category Availability</i>						
All Vegetable Categories	0.13	(0.04, 0.22)	0.01	0.15	(0.05, 0.25)	0.004
Fresh Vegetables	0.29	(0.13, 0.46)	0.001	0.31	(0.15, 0.46)	0.001
Canned Vegetables	-0.18	(-0.44, 0.08)	0.16	-0.18	(-0.45, 0.09)	0.19
Frozen Vegetables	0.08	(-0.13, 0.29)	0.43	0.08	(-0.16, 0.32)	0.52
Quick Cook Foods	-0.07	(-0.23, 0.09)	0.41	-0.07	(-0.22, 0.08)	0.36
<i>Vegetable Accessibility</i>	0.83	(-0.03, 1.69)	0.06	0.87	(0.02, 1.71)	0.04
<i>Serving Fast Food for Meals</i>	-0.02	(-0.77, 0.73)	0.96	-0.04	(-0.71, 0.64)	0.92
<i>Parent Vegetable Intake</i>	0.40	(0.08, 0.73)	0.02	0.42	(0.09, 0.74)	0.01
<i>Meal Specific Barriers</i>						
Fruit/Vegetable Meal Barriers	-0.05	(-0.17, 0.07)	0.43	-0.05	(-0.17, 0.07)	0.42
Meal Planning	0.30	(0.32, 0.92)	0.34	0.30	(-0.31, 0.90)	0.33
Enjoyment of Cooking	0.32	(-0.10, 0.74)	0.13	0.35	(-0.08, 0.77)	0.11
Food Purchasing Barriers	0.23	(-0.33, 0.79)	0.42	0.25	(-0.31, 0.80)	0.38
Hours of Food Preparation	0.04	(-0.27, 0.35)	0.80	0.05	(-0.27, 0.37)	0.76
Frequency of Family Meals	0.11	(-0.19, 0.41)	0.46	0.11	(-0.19, 0.40)	0.47

* Adjusted Model Covariates: Number of People Living in the Household and Parent BMI

Interpretation Example: In the crude model, a one unit change in the number of vegetable categories available in the home was associated with 0.13 more days of vegetables being served at dinner over a seven day period ($p=0.01$). In the adjusted model, a one unit change in the number of vegetable categories in the home was associated with 0.15 more days of vegetables being served at dinner over a seven day period ($p=0.004$).