

Food Purchasing Behavior: Choice, Change, Challenge

by

Diana Kinsfather

A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Approved August 2012 by the
Graduate Supervisory Committee:

Carol Johnston, Chair
Eric Hekler
Colin Tetreault

ARIZONA STATE UNIVERSITY

May 2013

ABSTRACT

This study was designed to influence consumer habits, specifically those relating to purchases of fruits, vegetables, and junk food. Previous studies have clearly shown the ineffectiveness of simply describing the health benefits of eating more fruits and vegetables (F/V). In contrast, this study aimed to change the result by changing the message: providing participants with insight into the hidden agendas of food companies and grocery stores, provide useful tips on how to include children when selecting F/V, and emphasizing the importance of parental modeling in regard to food purchases.

Participants of this study were separated into two groups, the tour group and the education group. The tour group was guided through a grocery store where they learned about sales tactics and manipulations used by grocery stores and food companies to influence purchases. Education group participants were provided with an education session focusing on USDA and FDA handouts displaying current educational suggestions for increasing F/V consumption.

Grocery store receipts were collected and analyzed to track the progress of both groups. The goal of the study was to identify a method of informing consumers that will produce a significant change in behavior. Increasing F/V consumption, even in relatively small amounts, would be an important step forward in improving the diet and overall health of Americans.

This study was the first of its kind to measure purchasing patterns objectively (through analysis of purchase receipts, rather than personal opinion/evaluation surveys) and in a wide-scope retail environment that includes all grocery store purchases by participants. Significant increases or decreases in the amount of money spent on F/V, or the amount (pounds) of F/V purchased were not seen, however a small correlation ($r = 0.133$) exists when comparing the weight of F/V purchased pre/post intervention. Data from Food Frequency Questionnaires shows participants consuming significantly higher amounts of F/V post intervention ($p=0.043$). The tour group and education group experienced an average increase of 0.7 servings per day. Future interventions might benefit by extending their scope to include cooking demonstrations, in-home interventions, and education on healthy eating outside of the home.

ACKNOWLEDGMENTS

Thank you to my committee members who have provided excellent guidance and support. Their expertise and background have been so helpful. A special thank you to my family for their unconditional love, encouragement, and wonderful proofreading skills. Without you all this would not have been possible.

TABLE OF CONTENTS

	Page
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
CHAPTER	
1 INTRODUCTION.....	1
Purpose.....	5
Hypotheses.....	5
Definition of Terms.....	6
Delimitations and Limitations.....	7
2 REVIEW OF LITERATURE.....	9
Current Intake of Fruits and Vegetables.....	9
Lack of Variety and Preparation and Consumption Issues.....	12
Association with Health Risks.....	14
Influence of Location.....	15
Previous Interventions Point-of-Purchase (POP).....	16
Education Curriculum.....	18
Technology.....	20
Economic Considerations.....	21
Behavior Change Theory.....	23
Parental Modeling.....	25

CHAPTER	Page
Grocery Store Tours	27
Manipulation	32
New Strategies	35
3 METHODS	37
Participants	37
Study Design	37
The Grocery Store Tour	39
Measures	40
Statistical Analyses	42
4 RESULTS	43
5 DISCUSSION	50
Limitations	56
6 CONCLUSION	58
REFERENCES	60
APPENDIX	
A INFORMED CONSENT	65
B HEALTH HISTORY QUESTIONNAIRE	69
C FOOD FREQUENCY QUESTIONNAIRE	72
D HOME FOOD INVENTORY	77
E USDA HANDOUTS	86

APPENDIX	Page
F EDUCATION OUTLINE	93
G TOUR OUTLINE	95
H RECIPES	98

LIST OF TABLES

Table		Page
1.	Fruit and Vegetable Purchases.....	13
2.	Subject Characteristics	45
3.	Intervention Data.....	47
4.	Subjective Measures	48
5.	Correlation between FFQ and other measures	48
6.	Correlation between weight of F/V purchases and other measures....	49

LIST OF FIGURES

Figure		Page
1.	Consort Diagram	44
2.	Fruit and Vegetable Pie Charts	49

Chapter 1

INTRODUCTION

A meager 2.2% of American men and 3.5% of American women met current USDA recommendations for daily intake of fruits and vegetables according to recent data from the National Health and Nutrition Examination Survey (NHANES) (1). Given those startling statistics and the numerous campaigns that have attempted to teach and persuade Americans to eat more fruits and vegetables (F/V) one must wonder if such changes in the average American diet are possible. A 2002 review of behavioral interventions designed to promote intake of F/V concluded that out of the twenty-two studies identified, seventeen showed a significant increase in consumption of F/V by an average of 0.6 servings per day (2). The other five studies reviewed did not show significant increases in consumption. More recent studies reported an increase ranging from 0.4-1.1 servings/day (2).

While those statistics might provide a glimmer of hope, the overall numbers continue to illustrate harsh truths surrounding the likelihood of behavior change and a resultant healthy lifestyle. Consuming the USDA-recommended five servings of F/V per day can lower risk factors associated with cardiovascular disease, type 2 diabetes and overweight/obesity (3,4); however, efforts that result in intake of only half a banana per day are unlikely to produce any meaningful improvement in overall health. Future interventions should focus on increasing

servings of F/V by the significant amounts necessary to cause material health benefits.

Research surrounding consumer food-buying trends at supermarkets dates back decades and continues to be an area of focus that attempts to alter consumer eating habits and behavior. Studies have evaluated point of purchase (POP) techniques, rating systems, and supplemental information for promoting behavior change (5,6). In these studies the outcome variables have been F/V purchases, children's willingness to try new F/V, and influences relating to socioeconomic status (SES) (7). Several teaching tools have been evaluated as a means to help inform consumers to make better choices. While the results from these studies vary, common trends have emerged: (i) increasing F/V intake among both children and adults continues to be a challenge, (ii) general labeling techniques are not effective, and (iii) multi-component teaching techniques like those described below can produce higher rates of success in increasing daily F/V intake.

Grocery store tours consist of small groups of shoppers being led through the store by a food or nutrition expert, usually a Registered Dietitian (RD). Specific tour goals may differ, but all goals aim to increase the shopper's knowledge of the nutritional content of various items. Some prior grocery store tours have focused on preventing or treating specific diseases such as diabetes and heart disease, (8,9)

primarily by identifying foods linked to the disease and assisting the consumer in finding healthy alternatives (9).

The results of grocery store tours have been based generally on participant feedback via tour evaluations; thus far such feedback has been positive (8–13). However, a weakness in previous research has been its reliance on subjective feedback and lack of objective measures that show the desired results in behavior change.

Data collected on prior grocery tours use subjective measures of effectiveness, usually gathered by self-reported questionnaires that evaluate the participant's dietary behavior. A problem with this method is that study participants may complete their questionnaires with an optimistic mindset and thus paint a picture that does not accurately reflect their actions (10). This study will attempt to measure purchasing behavior objectively by collecting grocery receipts from all participants thus providing for unbiased tracking of actual F/V purchases.

This study will follow the guidelines used in previous grocery store tours that were viewed as effective (10) and will also attempt to educate consumers regarding the strategies used by the grocery stores and large food companies to influence food purchases. The tour group will learn about sales tactics, manipulations, and other techniques used to promote high-fat and high-sugar products. These foods are generally energy dense and nutrient sparse, composed

of refined and artificial ingredients ('junk food'). Identifying these messages and training the tour group to spot them will be one of this study's primary goals. Because increases in junk food consumption have been shown to reduce F/V consumption (7), the tour group will be encouraged to reduce junk food purchases.

Research suggests that incorporating behavior theories or constructs into a study can produce a higher success rate (2). Because of the effectiveness of prior multicomponent studies, the tour outline is based on multiple components designed to change health-related behaviors; those components are modeling and autonomy. This study will emphasize the importance of parental modeling and the role parents play in determining their children's food preferences (7,14).

Autonomy refers to the ability of the individual consumer to make an informed choice. Another goal of this study is to educate the consumer and minimize the power gap between the consumer and the large food companies in making those choices.

Selecting a target population of parents and children who can benefit from detailed, personalized grocery store tours is relatively easy; virtually every parent and child can serve as a subject for measurement of healthy food choices.

Suitable locations for surveying consumer behavior are also readily available.

According to the U.S. Bureau of Labor Statistics, Americans spend more money on food eaten at home than food consumed outside the home (15). The

proportion of food eaten at home or outside the home varies with income brackets, but all families, including those in the highest income levels, spend more money on food that is consumed in the home. “Grocery stores are an important and promising venue for environmental, policy, and pricing initiatives to increase F/V intake (16).”

Purpose

The purpose of this randomized control study is to demonstrate that personalized grocery store tours will increase F/V purchases compared to the control treatment. A second goal of this study is to show decreases in purchases of high-sugar cereals, soda, and candy among the tour group. The third goal of this study is to determine if correlations exist between subjective data (such as food frequency questionnaires and home food inventories) and objective data (purchase receipts).

Hypotheses

The tour group will show an increase in F/V purchases while the education group will have little to no change in purchasing behavior. A secondary hypothesis predicts a decrease in junk food purchases among the tour group, with the education group again having little to no change in purchasing behavior. The final hypothesis predicts participant responses from food frequency questionnaires (FFQ) and home food inventories (HFI) will report higher consumption of F/V compared to grocery store receipts.

Definition of Terms

- Fruit and Vegetable (F/V)- includes all fresh, frozen, and canned fruits and vegetables that do not have added sugar
- Purchasing behavior- measured from grocery store receipts as cost and weight of F/V, or measured from HFI and FFQ as items or servings.
- High-Sugar Cereal- cereal containing more than 10g/serving sugar
- Soda-includes all sweetened versions of soda pop (regular and diet)
- Candy- confections made with sugar, syrup, dyes, or chocolate
- Point-of-purchase- information displayed as signs or tags on or near the specific food item. Messages usually include information about nutrients, calories, cholesterol, and recommendations.
- Rating System- evaluation system, usually marked by stars that correlate with the health of the specific food item rated
- Supplemental Information- printouts available from FDA and USDA websites promoting F/V consumption
- Grocery receipts- register receipts from supermarkets, grocery stores, and convenience stores where food items were purchased
- Junk food- candy, high-sugar cereal, and soda
- Health behavior- an action taken to maintain, achieve or regain good health and to prevent illness
- Modeling- repeating an action after seeing the action done by another individual
- Autonomy- the ability to make an informed choice

- Self-efficacy- the level of confidence a person has in their own ability to succeed or complete a desired task
- End caps- displays placed at the end of aisles to market promotional or seasonal items
- Stock Keeping Unit (SKU)- an identifying barcode or number given to each specific item
- Electronic Benefit Transfer (EBT) use- formally known as food stamps. Receipts recorded with this code include purchases subsidized through the government's Women, Infants, and Children, (WIC) Special Supplemental Nutrition Program.

Delimitations and limitations

- This study will recruit the primary food purchaser from families in the Phoenix metro area and therefore will only be generalized to that area.
- The primary food purchasers in this study are women who have at least one child age 2-13.
- Convenience sampling will recruit only those individuals who are motivated and interested in gaining knowledge and changing behavior. Data will be collected from this subgroup, which introduces bias.
- Small sample size will be a limitation to this study.
- Seasonal grocery pricing and availability cannot be controlled.
- This study is unable to ensure that each participant turns in 100% of her grocery store receipts.

- Interpretation/accuracy of receipt tracking and coding is a possible limitation.
- The tracking procedure will only show foods that are purchased, not actual consumption or preparation procedures.
- F/V purchased at farmers markets or co-ops do not come with a detailed receipt for tracking purposes, and families who use these outlets more than two times per month will be excluded from this study.
- Carryover of F/V already in the home or purchased during the first phase of this study might cause a decrease in purchases later in the study.

Chapter 2

REVIEW OF LITERATURE

Current Intake of Fruits and Vegetables

In 1862 the United States Department of Agriculture (USDA) was created and given the responsibility “to acquire and diffuse among the people of the United States useful information on human nutrition” (17). The USDA-recommended five servings of F/V per day has been a guideline for decades and had little variation between 1980 and 2000 (17). The F/V recommendation is designed to reduce risk of chronic disease; unfortunately, as described below the F/V consumption in the average American diet falls significantly below these recommendations (3).

Data on the exact numbers of F/V consumed are mixed. The literature from 1994 to present paints a scattered picture ranging from optimistic to bleak in terms of servings of F/V consumed among Americans. Kimmons and colleagues found only 10% Americans met the USDA recommendation, with less than 1% of adolescents, 2.2% of adult men, and 3.5% of adult meeting recommendations based on weight, height, and activity level (1). The Kimmons data were derived from NHANES 2003-2004 and analyzed two non-consecutive days of 24-hour recall data gathered from adolescents and adults.

The Continuing Survey of Food Intakes by Individuals (CSFII) 1994-1996 shows Americans consuming 5.2 servings per day of F/V (18). Those data were derived from 24-hour recall on non-consecutive days; only adults ranging in age from 25-75 years were surveyed. The U.S. Center for Disease Control (CDC) states that 75% of Americans do not meet the five servings per day recommendation. The CDC data come from its Behavioral Risk Factor Surveillance System (BRFSS), and can be segregated by state, age, BMI, gender, and physical activity level. The data show similar consumption among Americans in general and those living in Arizona (19).

The disparity among statistics on F/V consumption can be attributed to a variety of factors. A main difference among the studies revolves around how and which F/V were counted. Two of the studies specifically state that whole juice was included and that F/V subtypes were defined by the USDA food code; other studies, however fail to describe their protocol for F/V inclusion criteria (1,18). Misclassification and errors in self-reported data can come from surveys that have unclear or non-uniform criteria for defining or measuring F/V, and this is a likely explanation for the significant differences produced by studies of F/V consumption in America.

Kimmons differentiates fruits that include added sugar and vegetables consumed with excess discretionary fat: those differences in criteria could be a reason for the lower intake in F/V reported by participants (Kimmons had the lowest reported

consumption of F/V among all studies reviewed, with only 2.2% of men and 3.5% of women meeting recommendations). Another possible explanation comes from Kimmons' use of calorie-specific F/V guidelines (the MyPyramid website) to generate caloric requirements centered on an individual's age, sex, and physical activity levels. If an individual was male, highly active, and 24 years old he is advised to eat more than the standard five servings per day. No other study used the MyPyramid website for comparing F/V intake to caloric requirements based on sex, age, and activity level. This could explain why F/V intake numbers from Kimmons are extremely low.

Race, age, gender, demographics, BMI and SES can be relevant when interpreting data. Studies show generally that men consume more F/V than women, persons aged 65 or older consume more than those aged 35-44, Hispanics consume more than non-Hispanic whites, and college graduates consume more than those with lower levels of education (19). Persons earning more than \$50,000 per year consume more than someone earning less than \$50,000, and persons classified as overweight or obese consumed less F/V than those classified as normal or underweight (19). On a state-wide basis, residents of Oklahoma, Arkansas, Mississippi, Alabama, and Kentucky had the lowest F/V consumption rates compared to the rest of the United States (19).

Lack of Variety and Preparation and Consumption Issues

An important finding in the majority of the literature is the lack of variety in F/V consumed. The lack of variety is concerning because of the many health benefits provided by an adequate consumption of a wide assortment of F/V.

In every study reviewed where F/V were separated by type, potatoes dominated vegetable consumption. Of particular concern is the high-fat method in which the potatoes are usually cooked. Fried potatoes account for 1-1.5 servings of total vegetables consumed by adults and adolescents respectively (1). French fries are usually high in fat and sodium and stripped of their skin, which minimizes the health benefits associated with this vegetable.

Iceberg lettuce and tomatoes were consumed by approximately 40% of Americans during the two days surveyed (18). Unfortunately, those items were consumed in amounts less than the USDA full serving, most likely because they were consumed as condiments. Table 1 illustrates the popularity of common F/V, as well as the small percentage of purchases made for less common items like kale and figs (18).

Table 1. Fresh and processed fruits and vegetables: Quantity purchased at retail outlets. Data calculated by the authors of How Much Do Americans Pay for Fruits and Vegetables Economic Research Service/USDA. Calculated using Nielsen HomeScan Database.

Fruit	<u>Quantity Purchased</u> (Million pounds)	Vegetables	<u>Quantity Purchased</u> (Million Pounds)
Bananas	3,606	Potatoes	4,964
Oranges	2,836	Tomatoes	1,618
Apples	2,243	Onions	1,292
Grapes	1,323	Corn, sweet	1,096
Watermelon	1,166	Beans, green	997
Grapefruit	753	Carrots	997
Cantaloupes	696	Lettuce, iceberg	621
Strawberries	418	Peas, green	525
Pineapples	407	Cabbage	464
Peaches	365	Broccoli	429
Plums/prunes	346	Cucumber	368
Pears	259	Celery	350
Nectarines	209	Pepper, bell	342
Tangerines	154	Sweet potatoes	291
Honeydew	118	Mushrooms	220
Cherries	100	Spinach	172
Avocados	91	Cauliflower	156
Blueberries	86	Asparagus	127
Mangoes	65	Lettuce, romaine	109
Kiwi	55	Lettuce, red/green	82
Cranberries	50	Radishes	76
Apricots	48	Beets	43
Tangelos	21	Brussels sprouts	32
Papayas	20	Eggplant	26
Raspberries	16	Collard greens	20
Blackberries	5	Turnip greens	16
Figs	0.2	Okra	27
		Squash, summer	10
		Mustard greens	9
		Kale	5

The statistics on consumption of dark green leafy vegetables, orange vegetables and legumes are discouraging, because although these foods provide significant

health benefits, they account for only a small proportion of total ingested vegetables. Similarly, the healthful cruciferous vegetables such as broccoli, cauliflower, cabbage, and kale account for only 0.2 serving/day (18).

Association with Health Risks

The leading causes of death in the United States are cardiovascular disease (CVD) and cancer (3). High intake (five to ten serving/day) of F/V can decrease the risk of CVD, stroke, some types of cancer, and chronic disease (3,4). Consuming six servings F/V per day was associated with a 30% reduction in ischemic stroke risk (4). Additional health benefits of F/V may include a protection against cataracts, chronic obstructive pulmonary disease, diverticulosis, and hypertension (4). The many benefits of eating a diet with a high intake of F/V are well-established, but that information has not been enough to change America's food consumption patterns.

According to an analysis by Hung and colleagues, persons who consumed at least five servings of F/V per day had a risk of CVD 28% lower than that of persons who only consumed 1.5 servings per day (3). Significant decreases in overall cancer risk were not found, but a significant inverse association between consumption of green leafy vegetables and risk of chronic disease was shown (3). That analysis covered 71,910 women and 37,725 men included in the Nurses' Health Study (NHS) and the Health Professionals' Follow-up Study; participants were generally healthy before 1984. The mechanisms for lowering disease risk

are not entirely understood, but high intakes of nutrients like folic acid, potassium, and phytochemicals contained in F/V are thought to play a major role in fighting disease (3,4,18). The beneficial role of phytochemicals include acting as an antioxidant, carcinogen detoxifier, and cell regulator (18).

Influence of Location

Where and how an individual chooses to consume a meal can have an impact on F/V intake (20). Eating in the home, having dinner as a family, and positive parental eating habits have been found to increase intake of F/V (14). F/V intake in the home environment depends on availability and accessibility of F/V.

Availability refers to the fruit or vegetable being in the house, while accessibility refers to the fruit or vegetable being visible and ready to consume (21).

Befort and colleagues studied relationships between home availability, race, and restaurant type. That study sought to find a positive relationship between home availability and F/V intake, as well as to identify whether a certain type of restaurant contributed to the percentage of dietary energy attributed to fat. The Befort study included 144 non-Hispanic black adolescents and 84 non-Hispanic white adolescents, and 228 parents (85% mothers) who were included to provide home availability data. The Befort study's findings indicate home availability was significantly correlated with fruit consumption, but not vegetable consumption (21). The adolescents reported eating more vegetables at non-fast-food restaurants than in the home. The findings also suggest that buffet and other

non-fast food restaurants can increase F/V consumption among adolescents, partially due to the availability of F/V offered (21). The relationship between accessibility of F/V in the home and consumption of these item was not evaluated (21).

The setting where meals are consumed appears to have a correlation with fat and F/V ingestion. Meals consumed in fast food restaurants tend to be high in fat and low in F/V, whereas meals consumed in non-fast-food restaurants show a positive correlation with vegetable consumption in adolescents (21,22). The problem is not the location itself, but rather the large portion sizes of meals, high fat and calorie content, and inability to select healthy cooking methods while dining out (20). The environment in which food is consumed is determined by a variety of factors, particularly SES and culture. While Befort and other studies have produced some intriguing results, further research is needed to identify clearly the environmental factors that increase or decrease intake of F/V, and the methods that would promote those environmental factors.

Previous Interventions

Point-of-Purchase (POP)

POP displays are informational messages usually in the form of a tag, poster, or sign located on or near the specific item targeted. The POP display usually gives suggestions to the consumer on how to select F/V, recipes and preparation tips, or nutritional information of the product. POP displays are common for all types of

food and several studies have reviewed their effectiveness. Seymore and colleagues reviewed 38 studies that used a variety of POP and education material in a grocery store to evaluate environmental nutrition interventions. Results of Seymore's review showed varied levels of POP effectiveness; study design and lack of consistent and reliable outcome measures were noted as major limitations (23).

Programs with easy to identify rating systems appear to have a greater effect on purchases than POP displays that use descriptive and educational text (24). The Guiding Stars program was designed to give consumers in northern New England and New York a quick reference tool associated with the nutritional quality of an item. Items were given one, two, or three stars from a three-tiered point system relating to the content of trans-fat, saturated fat, cholesterol, sodium, added sugar, vitamins, fiber, and whole grains. Over a two year period, the Guiding Stars program resulted in approximately 2.9 million more starred items being purchased monthly compared to those items without the star rating (24). The study tracked the first two years of the implementation, and items with a star rating experienced a significant increase in purchases, compared to those products without stars ($p < 0.001$). The Guiding Star program credits its success to providing consumers clear, concise, and simplified nutritional information (24). Models of this system are now easy to spot in Safeway stores and on many General Mills products.

Educational Curriculum

Educational curriculum is difficult to categorize into one section, as nutritional lesson plans are extremely heterogeneous in terms of duration, presentation, training of presenter, and intentions. Teaching sessions vary in time from 30-90 minutes, promote everything from F/V preparation to cafeteria marketing, include a variety of subjects, and use multiple teaching techniques and devices. Most educational sessions include a combination of lecture, classroom activities, and tailored newsletters.

Due to the extreme differences between educational interventions, comparison is difficult. Successful studies report that a multi-component curriculum is a key factor in their success; however, having multiple components also makes measuring specific individual aspects of an effective intervention difficult (25). Successful educational interventions note that programs with well-trained staff, high parental involvement, and convenient times for the interventions showed an increase of 1.68 F/V serving/day (25).

Education-focused interventions can target the child or focus on the parent. An intervention geared toward educating parents on improving the nutritional content of sack lunches showed a daily increase of 0.24 servings of vegetables, and no increase in fruit consumption (26). Averages from studies conducted in the United Kingdom show increases of 0.3 servings F/V per day (27). These studies

focused on the children in a school setting, but were not homogeneous in study design.

Counseling and motivational interviewing sessions are often the focus of an intervention. However, they are seldom used alone and are often accompanied by education materials or classroom curriculum. The Health Centers Study provided in-person and follow-up telephone counseling to participants, along with tailored behavior prescriptions provided by a primary care provider. From baseline measurements to eight months 3% of participants from the intervention group increased their F/V intake to five servings or greater of F/V per day, while the control group experienced a decrease in intake (2). The South Dakota State University Study used motivational interviewing along with informational newsletters and emails, and found a significant difference among F/V consumption between the intervention and control groups (2). The intervention group increased F/V consumption by 0.9 servings/day in four months, while the control group remained unchanged (2).

Additional support for the effectiveness of counseling is shown in the study done by Vitolo et al. which found maternal counseling during the first year of life showed improvements in the diet quality of preschool aged children (28).

Technology

Interventions incorporating technology are increasing in number (16). E-mails, tailored web groups, and text messages are just a few examples of new applications researchers are using to interact with participants. The Five-a-day Rio Grande Way study showed a significant increase ($p=0.049$) in F/V consumption among the intervention group who received immediate access to web site-based information and e-mail delivery (2). Internet components were built into the Boy Scout Five-a-day Badge study that showed F/V increases of 0.94 servings per day (2).

The MENU study conducted a three-arm trial: group A received untailed web diet intervention, group B received a tailored web intervention, and group C received the same tailored web intervention as group B, and also completed motivational interviewing via email. The only significant difference occurred between groups A and C, with group C increasing F/V servings/day by 0.46 more than group A (2). While the MENU study showed that multi-component strategies can be effective, it was unclear whether motivational interviewing alone could have produced similar changes in behavior.

While many studies are using technology to recruit, remind, and educate participants about increasing F/V consumption, other studies are using technology to measure intake and design effective interventions. Raymond Burke and colleagues analyzed purchases from the grocery store and compared them to

purchases made in a computer-simulated environment (29). Burke collected grocery receipts in an effort to track specific items that would also be analyzed in the simulated environment. This study found strong predictors of actual purchases from participants' reaction to stimuli in the computer-simulated environment (29).

Economic Considerations

The price of an item represents the cost or sacrifice that must be incurred to purchase an item. Price can be one of the most important marketplace cues and can come with positive and negative sensations (30). Price to many consumers represents quality and this can affect purchase probabilities. Consumers differ greatly in their consideration and reaction to price and pricing strategies (30). Some shoppers associate price with value, others are strictly price sensitive, and some are more likely to only focus on cost when sales or coupons are present; some purchases are even made on the basis of social influence or prestige sensitivity (some consumers show a preference for "name brand" products, as an implied badge of status) (30).

Researchers note that promoting items with lower costs can be more effective with groups having less disposable income (27). However, price is not always an effective means of increasing F/V intake: a study conducted in eight supermarkets in Iowa used coupons for 50 cents off towards the purchase of F/V (31). POP displays, educational information and coupons were given to the intervention

group; 36% of shoppers used the coupon, but no significant increase was seen in F/V purchases between the control and intervention group (31). Future research is needed to determine the effectiveness of raising costs on unhealthy items, such as junk food, in order to increase promotion of healthier items like fresh F/V (23).

Coupons and sales are often used as measures to promote purchases and consumption of various items. Price reductions of 50% on healthy items (those lower in fat, sodium, and artificial additives) in vending machines have been shown to increase sales of these items by 93% (27). While that study showed that a price reduction could apparently cause an increase in vending machine purchases of healthier options, it did not provide any direct application to F/V and effective pricing strategies.

Because of income limitations, many shoppers base their choices almost exclusively on price. A study of 92 low-income mothers on a food stamp budget in the Twin Cities area evaluated food purchases and food preferences. The majority of women surveyed said meat was the most important product, because other meals can be cheaply made around this staple item (32). Purchasing habits of consumers will vary greatly based on their SES. Research is needed to explore the threshold between budget considerations and F/V purchases, and whether effective interventions and strategies can be designed to cause consumers to make healthier choices based on factors other than cost.

Behavior Change Theory

Incorporating behavior change theories into the design of nutrition intervention studies has become standard practice. A study that aims to change the behavior of an individual or group of individuals first needs to focus on a specific behavior, identify influences of that behavior, and then evaluate the influences on a specific population (33). To influence a behavior change a strong relationship between the behavior and the perceived health outcome should exist (33).

Baranowski emphasizes the importance of understanding the linkages between mediating and moderating variables (33). Mediating variables are those that participants are willing to change, like parental modeling practices or home availability of F/V. Moderating variables may cause the relationship between other variables to differ, and thus should be minimized. A good example of a potential moderating variable is gender: an intervention might be more effective for girls than boys. Successful programs will understand all variables and their relationships to the desired outcome of a population (33). The Food Purchasing Behavior study will focus on self-determination theory (SDT), autonomy, values, and modeling.

SDT was proposed by Deci and Ryan and has been expanded by many others and used around the world as a theory of motivation (34). SDT is based on the notion that when a person can relate a message to his/her individual values and goals, he/she will be more likely to change behavior (34).

Resnicow and colleagues conducted a study to evaluate the effectiveness of tailored theoretical approaches with the outcome measure being F/V intake. In the Resnicow study the control group was given health newsletters that incorporated constructs related to SDT. The information was tailored on age, gender, medical history, and food preferences, and resembled a traditional physician-centered style of communication. The intervention group was given similar newsletters with the addition of text and graphic information that related to autonomous motivation to eat more F/V. A focus of the intervention was whether messages incorporating autonomous motivation based on personal values, religion and spirituality could have a relationship to F/V intake.

Resnicow assessed autonomy by the participant's answer to the question "In general, when it comes to my health I would rather an expert just tell me what I should do." Strong disagreement to this statement indicated higher autonomy. High autonomy individuals in the intervention group increased F/V consumption by 1.07 servings/day, compared to the high autonomy individuals in the control group who increased consumption by 0.43 servings per day ($p=0.14$) (34). Although the increase between groups was not significant, the subgroup classified as high autonomy in both groups showed a significant increase in F/V consumption (34). This study portrays the importance of identifying an individual's autonomy, values, and other motivational constructs in order to tailor effective interventions.

Parental Modeling

Normal childhood development involves stages where food preferences are created. Multiple studies show a positive correlation between parent's F/V intake and their children's F/V consumption (7,14,35). A systematic review of 60 papers emphasizes the importance of targeting the family environment because of the positive association between parental F/V intake with children's F/V consumption. This correlation most likely is caused by mimicking parental behavior, availability and accessibility of F/V, and continued introduction of new and repeat foods (36).

Eating traits are passed down from parent to child (36). While parents may be unaware of the direct influence they have on their child's eating preferences and behaviors, mother-child similarities in food intake have been found in multiple studies (5,7,14). A study conducted by Stutherland observed 120 children age 2-6 years who selected various items from a miniature grocery store. The pretend store was stocked with 73 items, categorized as "least healthy", "somewhat healthy", and "most healthy". Children's purchases directly reflected the parents' purchasing categorization scores ($p=.02$) (5). "The data suggest that children begin to assimilate and mimic their parents' food choices at a very young age, even before they are able to fully appreciate the implications of these choices" (5). Children whose parents frequently eat a variety of F/V, limit junk food, and eat at

home regularly are more likely to learn and follow the traits of a healthy-eating home environment (7).

Parents often complain that their child is a picky eater, but should realize a neophobic response (i.e. a resistance to unique food choices, including F/V) is common, especially in children. Repeated exposure (eight to ten times) is recommended for improving acceptance (36). Busick *et al.* studied 62 preschool aged children and their parents and found that increased exposure to F/V would lead to increased preferences of the F/V. A child's willingness to taste various F/V was positively correlated with the amount of money spent on F/V purchases ($p < .05$) (7).

Negative relationships with food and promotion of overeating can have the same influence on children as healthy eating habits. Parents who fail to purchase a variety of F/V will limit their children's taste preferences (7). Children may develop negative relationships with food based on their parents eating habits and how parents practice the behaviors of restraint and disinhibition. Restraint refers to the level of effort that is put into avoiding certain foods (such as a strict vegan diet); disinhibition is seen as a lack of control (such as binge eating episodes). Mothers who place great emphasis on practicing restraint, particularly limiting overall energy intake, tend to have girls who have higher levels of disinhibition (14).

Grocery Store Tours

The first published data relating to grocery store tours dates back to 1992, when the Netherlands Heart Foundation and the Dutch Public Health Services implemented 59 grocery store tours over a four month period (37). The grocery store tours grew in popularity and became part of the Netherlands nationwide “Fat Watch” Campaign. The only data on the effectiveness of the tours were measured by participant feedback. Participants reported they were highly satisfied and learned new information, but no specifics relating to changes in purchasing patterns were recorded (37). Prior to this study there were no reported grocery store tours or tour evaluations, even though grocery stores were recognized as important settings for nutrition education (37).

The amount of published literature on grocery store tours is minimal. All documented interventions focus on a specific behavior (such as selecting low fat products), a particular disease (shopping tours for diabetics), or a specific group of people (low-income mothers). While size, focus, and format may differ all tours share a common goal: increasing consumer knowledge in an effort to improve diet quality.

Grocery store tours are valued for their hands-on approach to presenting nutritional information. The University of Arkansas School of Medical Sciences has used tours as a teaching method for the last 15 years to educate medical students on nutrition (38). The learning objectives of these tours focus on

increasing knowledge relating to nutrients, diseases associated with deficiencies, and the influence labeling and regulation have on consumption. However, no data are available from those tours that relates specifically to F/V intake or behavior change.

Similar educational based tours were conducted in the United Kingdom where grocery store tours are directly linked to meeting the National Curriculum for England and Wales. Tours focus on reading comprehension, mathematical skills, 'healthy' eating, and teaching children to be responsible for their own health (39). The tours are customized by grade and ability level. Delivering educational information in this manner demonstrates how government and private business can mutually share the role of educator; however, like the University of Arkansas tours, the literature describing the United Kingdom tours did not disclose any behavior change or outcome data.

A grocery store tour can enable participants to learn about healthful dietary messages with real food examples (10). The tour series conducted by Baic and Thompson found 98% of participants thought the tour was interesting, 75% felt they had learned new information, and 80% considered a healthy diet easier to follow after the tour (10).

A major limitation of previous grocery store interventions is the subjective, self-reported measurements used to gather data. FFQ, HFI surveys, or evaluation forms are commonly used methods of determining the tour's results and success.

The only known study that incorporated an objective measure for tracking purchases in a grocery store tour is the Healthy Heart Store Tours conducted in 2000 (8). That study evaluated purchases by use of store loyalty cards, tracking specific items in an attempt to objectively measure purchasing data. F/V purchases and cholesterol-lowering fat spreads were tracked seven weeks prior to the tour and seven weeks after the tour. The study was sponsored by Flora pro.activ®, a cholesterol-lowering spread. Post-tour results showed that while F/V purchases decreased by 12%, the variety of F/V purchases increased (8). The study notes that price and seasonal effects could account for the drop in F/V purchases. 'Healthier' spreads experienced a significant increase compared to 'buttery-taste' spreads (8). This increase could be attributed to the promotional activities and sampling of products sponsored by Flora pro.active®. Another limitation to the Healthy Heart Store Tour study is the inability to record purchases from other grocery stores.

In contrast to the Healthy Heart Store Tours, the Smart Shoppers Tours (1995-1996) focused on low-income mothers in the Dallas area. 128 women completed at least one tour where the emphasis was on budget sensitive items, including increasing the consumer's perception of generic items, and identifying healthy

foods available on a limited budget (11). Participants were recruited from local WIC clinics and great emphasis was placed on self-efficacy and the goal of improving the participant's views of her ability to perform the above-mentioned actions. Attitudes related to taste, cost, knowledge, self-efficacy, and food inventory were all shown to have significant increases from pre-testing to post-testing (34). A HFI showed significant increases in availability from pre/post measurements of fruits ($p=0.05$) and vegetables ($p=0.024$) (11).

Smaller scale grocery tours have also been implemented for a variety of subgroups. Shopping tours for cardiac patients was a pilot study initiated in 1998 to test the effectiveness of a grocery store tour in patients participating in cardiac rehabilitation (9). Participant evaluations ($n=21$) were the only measurement taken; 81% found the tour to be helpful, 95% said the tour helped in making food choices, and 86% would return for another tour (9). The shopping tour has become a permanent excursion for patients of the cardiac rehabilitation center at St. Vincent's University Hospital in Dublin, Ireland. Effective nutrition intervention was credited to the cooperation between health care services, consumers, and the grocery stores (9).

Hunting for Whole Grains is another example of a small-scale grocery store intervention. That tour focused on 27 students (4th and 5th graders) and their parents, with the goal of increasing the ability to identify whole-grain products and their locations in the grocery store. The tour was administered as a field trip

and students were able to taste whole grain products and then complete a treasure map of the supermarket. Supermarket Safari [™] was launched as a pilot program in Ontario in 1989. The goal was to increase healthy purchases and preparation practices. Surveys collected after the tour stated that participants had greater intentions to purchase more low-fat dairy items and whole grain foods after the tour (35).

While limitations of previous grocery store tours are evident, the benefits and positive feedback from participants must be acknowledged and could be used to develop future studies. Baic and Thompson published their “lessons learned” from previous grocery store interventions (8,10–12,37) and emphasized the need for clear learning objectives, well-planned tour design, effective recruitment strategies, and rigorous evaluation. Baic and Thompson recommend the tour should focus on area of the store where the learning can be observed: for example, dairy, fats, and oils were the main focus of cardiac shopping tours (10).

Recommended tour length should be 45-60 minutes and include eight to ten participants (10). Successful facilitation of the grocery store tour is imperative and should include asking open-ended questions, group discussions, active listening, and respectful corrections of misinformation (10).

Although practitioners have not collected any fees from clients for previous grocery store tours, the tour can be a cost-effective way of utilizing the practitioner’s time and resources (10). Practitioners might see one to four clients

per hour in an office setting, compared to reaching eight to ten clients in the grocery store's hands-on environment. Previous interventions have been sponsored by food companies, health care providers, or grants from governmental agencies, and the free service they provided could be a factor in their popularity among consumers (8,34). However, interested consumers who are willing to invest money in nutrition/health education might someday reduce or eliminate the need for sponsorship by government or business.

Manipulation

While the grocery store offers researchers an ideal environment for an intervention, it is also a setting ripe for food producers and retailers (including the store itself) to promote high profit items and last minute "impulse" shopping decisions. Marketing research surrounding food packaging, advertising, and branding has been conducted for decades; the parameters and results of that research is beyond the scope or purpose of this study. However, certain tactics used by grocery stores and large food producers to persuade the consumer to spend more time and money in the store will be reviewed.

Shoppers may be able to identify promotional displays, POP signage, and end caps placed throughout a grocery store, but are they aware that the store's lighting, music, and flooring have also been carefully selected? Music, color, scent, temperature, layout, and lighting can influence customer mood and purchasing behavior (36). Slow, quiet, and unfamiliar music lead to more time

spent shopping, and warm colors like yellow ranked most popular among consumer feedback (36,37). A well-lit room can be more arousing to customers, and displays that are illuminated may entice shoppers to slow down and make an additional purchase (37). Consumers actually pick up and handle more items under “bright” light conditions (38).

In comparing stores, shoppers value cleanliness and a layout that makes shopping easy (37). Minimizing steps and avoiding unnecessary movement are important factors in determining the store layout most preferred by customers (41). While customers want an easy, efficient layout, grocery store owners want a layout that maximizes profits. Having consumers walk through the majority of the store to gather their selected items will benefit store owners, since “unplanned selections” are a major component of shopping carts (9). Planned items are usually staple foods are quickly selected by the consumer, while “impulse purchases” or unplanned items like snacks and desserts are influenced by in-store promotional efforts (39).

A November 2011 issue of Time Magazine included an article by the best-selling author Martin Lindstrom discussing the depths to which consumer behavior is studied and manipulated throughout the grocery store. Lindstrom describes a warehouse that was designated as the laboratory for one of the world’s largest consumer-goods manufacturers. Inside the warehouse were hundreds of people

viewing computer images of real life shopping trips; consumers were unaware they were the subjects of great interest.

Consumer behavior was evaluated as they entered intervention areas or “zones of seduction” that were being tested. On one particular day the “zone of seduction” was an aisle that had upscale floor tiles. The click-clack noise of the cart going over floor tiles caused the shoppers to slow down. Another “zone of seduction” studied the dollar sign symbol and a POP display for canned soup that read “Maximum 3 cans per customer.” Consumers purchased more products when the dollar sign was eliminated from the price tag, and an “impulse to hoard” caused a sevenfold increase in cans of soup purchased (40).

Shelf space and location also influence purchasing behavior. Customers are less interested in an excessive number of stock-keeping units (sku) available, but are influenced by the space given to the category as a whole (41). Market research has shown that products placed at eye level tend to be selected more than items above or below eye level (37). Even the placement of nutritional information has been studied, and results showed the nutritional label is viewed more often if placed at the top and in the center of the package compared to the bottom or side (42).

Marketing companies are sponsoring research to collect data using grocery store receipts in an effort to detect purchasing and consumption patterns (29). A study

conducted in the United Kingdom looked at receipts from 223 households over a period of 28 days (46). Researchers were interested in seeing if actual fat and energy intake could be predicted from evaluating supermarket receipts.

Participants provided researchers with a four-day food diary that was used to help determine actual intake. Results showed an association between energy and fat purchased at the supermarket and actual energy and fat consumed ($r=0.77$) (46). Researchers hope to use this information to find trends in fat consumption to aid in tailoring intervention programs. How marketing firms will use this information is unknown.

New Strategies

Increasing consumer awareness, knowledge, and self-efficacy seem to be at the top of all behavior change interventions geared at increasing healthy eating. Past and current intervention techniques include: counseling, motivational interviewing, teaching, and distribution of written materials. Using technology to assist in the intervention process is relatively new and results are varied (2). Email, text messages, and interactive websites have all been used in behavior change interventions. The majority of studies use multiple channels to teach, remind, and retain information regarding behavior change (2). This multicomponent structure has been attributed to many successful interventions; however, a problem consistently affecting these studies is the difficulty of identifying and assessing the specific intervention which provided the desired effect (2)(22).

Studies using technology as their primary intervention place great emphases on the ability to tailor the intervention. One benefit of technology is the capability to quickly change and modify an intervention to appeal to a specific person or group. This concept, called “mass customization” or “relational marketing”, is a growing field, and future research is sure to focus on the notion that the better a person can relate to the information given, the more likely he or she will implement the desired behavior change (43). Regardless of the intervention, one thing is for certain: increasing F/V purchases and consumption among U.S. adults and children will be a challenge. Creating awareness of marketing and manipulation strategies used by large food companies and retailers is a design element yet to be incorporated into a grocery store tour. The knowledge that consumers make more than half their purchasing decisions while they shop affords an opportunity to guide them toward the proven benefits of spending more time in the produce section and less time in the junk food aisles.

Chapter 3

METHODS

Participants

Participants (women with at least one child age 13 or younger) were recruited through flyers posted at daycare centers in Mesa, Tempe, Chandler, and Gilbert, as well as through email notices sent to addresses maintained by Arizona State University. Flyers were also distributed through fire stations in Mesa and by word of mouth. Women were recruited in recognition of their role as the family's primary food purchaser. This study aimed to recruit a total of 40 participants living or working in the Phoenix Metropolitan Area. Interested mothers were asked to complete a short questionnaire on Survey Monkey, a web-based data gathering service. Participants who qualified for this study and signed the informed consent were stratified by age and number of children; a random number generator was used to categorize participants into the tour group or education group. Participants met with investigators on three separate occasions during the nine-week duration of the study, which was approved by the Arizona State University Institutional Review Board approved the study.

Study Design

The study was a randomized, controlled trial; randomization into the tour group or education group occurred after the first meeting. Participants were told which group they were in prior to the second meeting, since meeting locations varied between the two groups. At the first visit, all participants read and signed the

informed consent (Appendix A). Once the consent was signed, the subjects completed a health history questionnaire (HHQ) and food frequency questionnaire (FFQ) (Appendix B and C). Participants were given a validated home food inventory (HFI) to complete at home (Appendix D) (48). The HFI was returned to the researcher via an addressed, postage pre-paid envelope provided by the researcher. Participants were given instructions to save all grocery store receipts, which were submitted to the researcher after study weeks five and ten. Original receipts or photocopies of the receipts could be submitted. The researcher was available to answer any questions about the study during the meetings and at other times by phone and email.

The second meeting took place approximately 30 days after the initial meeting, and took place at libraries, bakeries, or coffee shops. The education group met with the researcher in groups of one or two participants, who were given information in the form of USDA handouts (Appendix E). The education material was reviewed and discussed for approximately 45 minutes. The handouts include information on smart shopping for F/V, ways to incorporate F/V in meals, and advice on being a healthy role model (see appendix F).

The tour group met with the researcher at a Fry's grocery store approximately 30 days following the initial meeting. The grocery store tours were conducted in small groups of one or two participants and lasted approximately 45 min. Participants were guided through the store by the researcher. The grocery store

tour followed the design and recommendations based on Baic and Thompson's work, but with a focus on increasing F/V consumption as opposed to reducing CVD (see appendix G for a tour outline). Participants of both groups submitted their first month's receipts at the second meeting, and were instructed to continue receipt collection for an additional four weeks.

The third (final) meeting took place approximately 30 days after the second meeting. Participants met with the researcher, completed a second FFQ, submitted receipts, and were given a second HFI to complete and return in an addressed, postage pre-paid envelope. Participants were emailed on weekly basis to remind them of receipt collection and upcoming meeting times and days. Participants were reimbursed for their time with a \$15 Target gift card given at the second meeting, and another Target gift card of \$20 given at completion of the study.

The Grocery Store Tour

The form of education provided is the manipulated variable that this study hypothesizes will increase F/V intake among the tour group. The tour group's intervention took place in a real-world hands-on setting, compared to the education group that received their intervention in a more standard classroom format. The tour group was given the grocery store tour with additional information on tactics that the grocery store and large food companies use to influence shoppers to spend more time in the store and subsequently spend more

money during their shopping trip. The tour group was made aware of the atmospheric effects of lighting, music, flooring, and store layout. POP, end cap displays, and pricing tactics used by the store were identified and discussed. Approximately 15 minutes was spent in the produce department where descriptions and benefits of F/V were given. Recipes (Appendix H), preparation instructions, and tips on selection and storage were also given to participants of both groups.

Measures

The primary measure for this study is F/V purchases, measured objectively by tracking receipts collected from both groups. Receipts were collected and analyzed for F/V including fresh, dried, canned, and frozen. When a F/V was identified on the receipt the item was highlighted and the name, weight, and cost were recorded.

If weight was unavailable the unit or batch number was recorded. Units/batches were computed into weight by use of the standardized serving sizes provided by the USDA. For example bananas are commonly listed on receipts as a total count. According to the USDA the average serving size of one small banana is 0.22 lbs. Weight of the item was then multiplied by the count and weight in pounds was recorded. When larger items like melons, pineapples, and cauliflower were listed as a count, they were assigned the standardized serving size of weight and then multiplied by four. For example, one serving size of pineapple is 125 g or 0.28

pounds, multiplied by four equals a total recorded weight of 1.1 pounds. These weight equivalents were only used when weight was not listed on receipts.

The weights of canned, dried, and frozen F/V were often not listed on receipts. If weight was not listed on the receipt, the researcher would use the following equivalents for each category of F/V; cans equaled a weight of 0.94 pounds (15 ounces), frozen vegetables were one pound (16 ounces), and dried fruit was counted as 8 ounces or 0.5 pounds. Purchases from Costco were evaluated separately, as neither weight nor count was listed on their receipts. The researcher identified the F/V purchased by participants, and went to Costco to record weight or count of these items.

Herbs and small peppers (such as jalapenos) were excluded from the analysis. Pickles, olives, applesauce, beans, and tomato sauce were also excluded. Deli salads like broccoli salad were not counted, but vegetable trays and fruit salads were counted. If weight was unavailable a default weight of one pound was assigned. French fries and potatoes were counted, but divided into their own categories. Prepared mashed potatoes were not included in the analysis because conversions to actual potato count or weight were not available.

A secondary measure of intake and availability was assessed by a FFQ and HFI. The FFQ measured the participant's average weekly servings, and the HFI

counted items available in the house. The sums of F/V gathered from these items were used in analysis.

Statistical Analyses

Statistical tests were calculated using Social Sciences (SPSS) version 19 software package. Servings of F/V were measured by weight. Throughout this study the level of a significant p-value was set at 0.05 or lower. Pearson correlation coefficient is given a medium strength at 0.30-0.49, and a large strength at 0.50 or above (49). All data are listed as the mean \pm the standard error, unless otherwise noted. Descriptive characteristics were calculated using independent t-tests. Percentages were calculated using Chi-square outcomes for p-values. Pre and post-tour questionnaires and receipts were compared using one-way ANOVA repeated measures. Cook's distance measure and three standard deviations away from the mean were used to assess outliers. No outliers were found to be influential throughout the analyses.

Chapter 4

RESULTS

The following Consort diagram gives the flow of participants through each stage of this study (Figure 1). A total of 64 subjects responded and completed the initial questionnaire through Survey Monkey. The study started with 22 participants, stratified by age and number of children and randomly assigned to either the tour group or the education group. Initially, eleven participants were in each group, and the study ended with ten per group: two persons were unable to complete participation for personal reasons unrelated to this study.

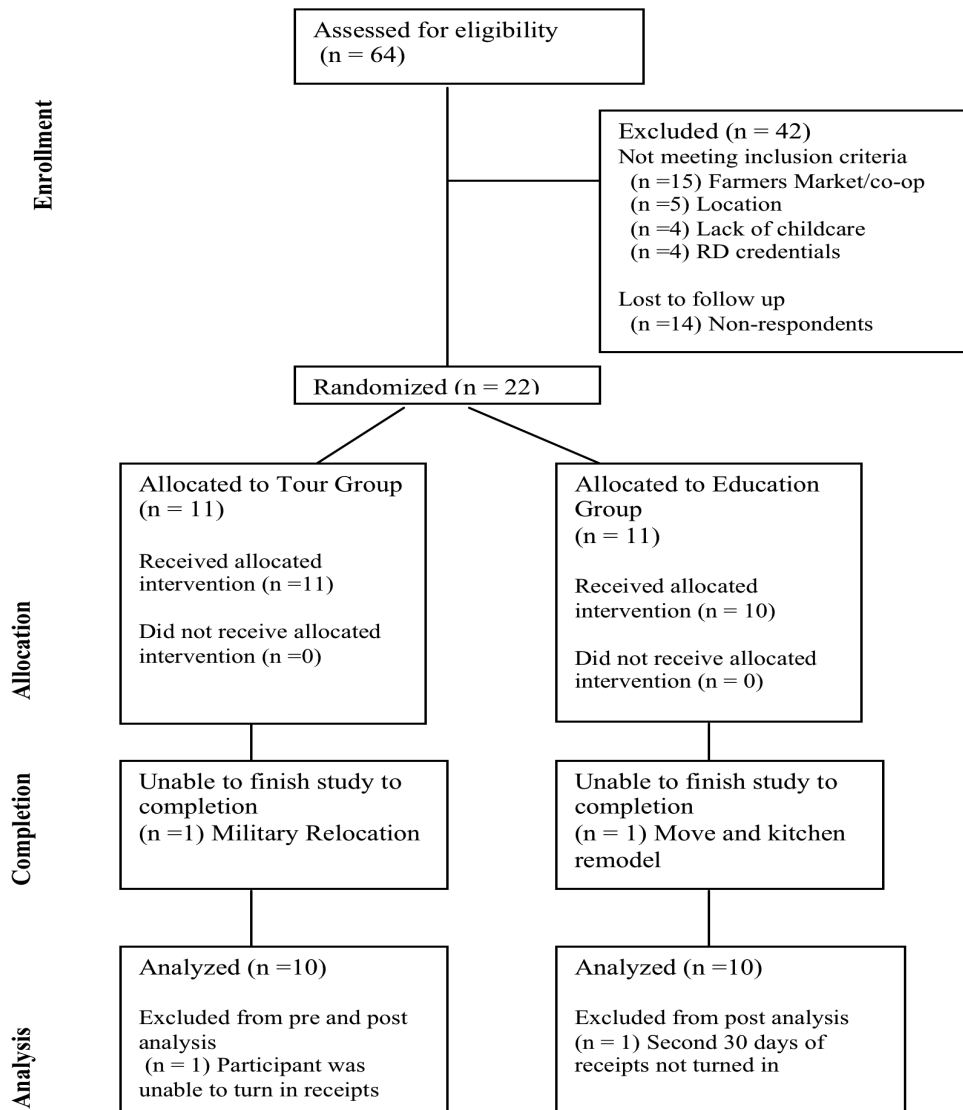


Figure 1. Consort Diagram describing flow of recruitment and total number of participants.

Table 2 is a description of the 22 women who started the study. All information was gathered from the Health History Questionnaire (HHQ), with the exception of (i) whether the participant was a single mother and (ii) EBT use. The single mother category was obtained through participant and researcher conversation, and EBT use was collected from receipts. The descriptive characteristics of the

participants shows that the majority are Caucasian, well educated, middle class, not overweight, and active. All the women were nonsmokers.

Table 2. Subject Characteristics were calculated using independent t-test and chi square calculations used for percentages.

Characteristics	Tour ^a	Education ^a	P value
n	11	11	-
Age (y)	36.1 ± 1.8	37.7 ± 2.1	0.566
Height (in)	64.4 ± .65	64.6 ± .75	0.857
Body Weight (lbs)	142.8 ± 7.7	139.55 ± 11.4	0.815
BMI	24.4 ± 1.6	23.4 ± 1.6	0.654
Number in Household	3.7 ± .20	3.9 ± .21	0.534
Number of Children < 7 yr	1.2 ± .26	1.0 ± .36	0.687
Physical Activity (METS/wk)	40.6 ± 7.7	47.3 ± 7.5	0.543
Mother F/V Intake (ser/day)	4.0 ± .74	3.0 ± .41	0.276
Child F/V Intake (ser/day)	3.1 ± .36	3.2 ± .41	0.870
Income ^{b,c,d} (% w/ income of \$40,000+)	73	91	0.269
Income ^{b,c,d} (% w/ income of \$60,000+)	55	90	0.056
EBT Participants ^e (% who used EBT)	30	1	0.223
EBT Use ^e (% of receipts paid for w/ EBT)	22	1.1	0.343
Single Mothers (%) ^b	27	9	0.269
Education (% w/ ≥ 4 yr college) ^b	82	73	0.274
Ethnicity (% Caucasian) ^b	73	82	0.409
Lifestyle (% Active/very active) ^b	64	64	0.767

^a Listed as mean +/- standard error unless otherwise noted.

^b Listed as percentage.

^c Reported as range

^d n=11 for tour and n= 10 for Education

^e n=10 for tour and n= 11 for Education

Table 3 represents data gathered from participant receipts. Receipts were counted 30 days prior to the intervention and 30 days following the intervention. All participants were included in this analysis, as there were no outliers that were calculated as influential. The total number of receipts were counted (Total

Receipts Pre/Post) and then separated into those that included F/V purchases (FV Receipts Pre/Post). All F/V listed on the receipts were entered into a spreadsheet and counted. All similar types/varieties were combined: for example Fuji, Granny Smith, Red Delicious were all counted as “apples”.

F/V cost was calculated from the receipts and was then divided by the number of adults and children in the household to get F/V cost per household. Weight was calculated from the receipts and then also divided by number per household. A detailed description of weight calculations is set out above under “*Measures*”.

While no significant p values were seen between groups or within either group for any of the categories pre or post intervention, it is important to note the small correlation of effect size time in all weight categories. Due to the small sample size of this study, the absence of a significant p value is not surprising, but effect size time (r-value) for weight and weight per number in household (0.133 and 0.111) both show small correlations between weight of F/V purchases pre and post intervention. This correlation is useful when interpreting data as it provides support for the amount of variance that is explained or accounted for by this study. None of the descriptive characteristics including income, single mothers, or BMI were influential or related to the variables.

Table 3. Intervention Data represent counts from receipts that were collected 30 days prior to intervention and 30 days after the intervention.

Data	Tour ^a	Education ^a	P time	P interaction	Effect size time	Effect size interaction
Total Receipts Pre	14.7 ± 1.7	18.5 ± 2.5				
Total Receipts Post	14.5 ± 1.5	17.6 ± 1.7	0.642	0.767	0.012	0.005
FV Receipts Pre	9.0 ± 1.3	11.3 ± 1.4				
FV Receipts Post	8.9 ± 1.3	9.7 ± 1.3	0.317	0.376	0.056	0.044
Number of F/V Pre ^b	18.3 ± 2.8	19.1 ± 2.1				
Number of F/V Post ^b	18.2 ± 2.1	19.1 ± 2.3	0.964	0.964	0.000	0.000
F/V Cost Pre	85.5 ± 21.6	91.4 ± 11.4				
F/V Cost Post	81.5 ± 12.2	101.3 ± 16.4	0.733	0.416	0.007	0.037
F/V Cost per number in Household Pre	22.7 ± 5.3	23.6 ± 2.4				
F/V Cost per number in Household Post	21.6 ± 2.8	25.6 ± 3.3	0.825	0.492	0.003	0.027
F/V Weight Pre	48.3 ± 10.9	60.5 ± 7.5				
F/V Weight Post	55.4 ± 9.8	70.4 ± 11.4	0.114	0.790	0.133	0.004
F/V Weight per number in Household Pre	13.0 ± 2.7	15.6 ± 1.8				
F/V Weight per number in Household Post	14.9 ± 2.6	17.7 ± 2.4	0.151	0.930	0.111	0.000

^a Listed as mean +/- standard error

^b Total number of F/V recorded from receipts

While Table 3 provides figures that were objectively measured through receipts, Table 4 sets out the subjective measures provided by participant responses on HFI and FFQ. Table 4 measures the increase in intake from the FFQ, and home availability was measured from the HFI. A significant increase in intake is shown from the FFQ pre and post intervention ($p=0.043$.) This increase was due to a time effect, not an interaction effect. The data from the FFQ shows participants increased their average weekly servings of F/V by 26%. This accounts for an average increase of 0.7 servings/day. The number of people per household did not affect this increase. No significance was seen when evaluating the HFI pre and post.

Table 4. Subjective measures reported from participants. Home Food Inventory (HFI) is a count of total items in house, and the Food Frequency Questionnaire (FFQ) is a measure of the mother's average weekly servings.

Subjective Measure Totals	Tour ^a	Education ^a	P time	P interaction	Effect size time	Effect size interaction
FFQ Pre	17.7 ± 4.2	20.2 ± 3.1	0.043 *	0.872	0.208	0.001
FFQ Post	23.0 ± 4.2	24.8 ± 3.7				
HFI Pre	22.7 ± 1.3	19.3 ± 2.2	0.347	0.547	0.049	0.021
HFI Post	23.1 ± 1.8	21.1 ± 2.4				

^a Listed as mean +/- standard error

* Statistically significant

Table 5 shows the correlations between the FFQ and other measures. No significant correlations between the FFQ and other measures were found. Table 6 shows the correlations between F/V weight and other measures. Weight does not correlate with the HFI or FFQ, but strongly correlates with all the other measures. Weight of the F/V are highly correlated and have significant p-values when compared with number of receipts, number of F/V items, F/V cost, F/V cost per household, and F/V weight per household.

Table 5. Correlations between FFQ and other measures.

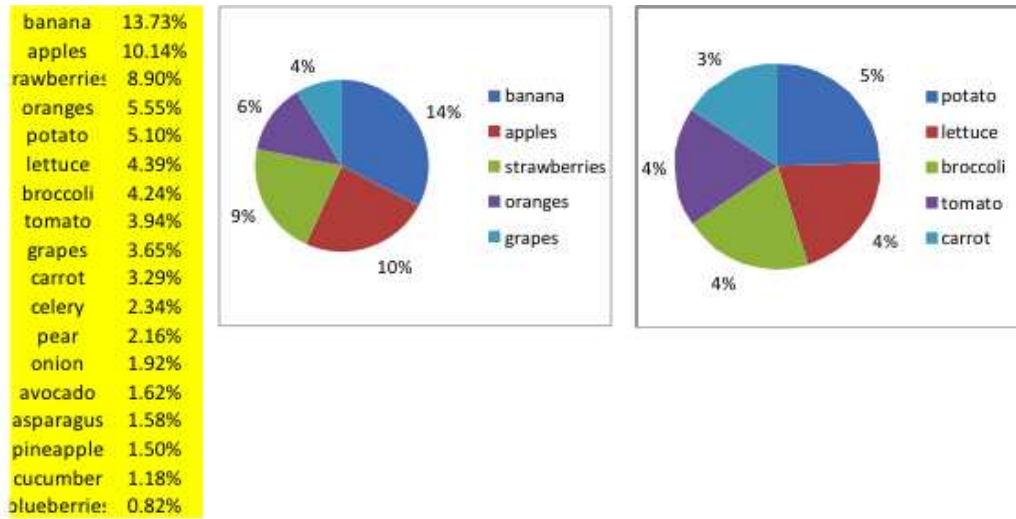
Food Frequency Questionnaire	Pearson Correlation Pre	P-Value Pre	Pearson Correlation Post	P-Value Post
Home Food Inventory	0.071	0.766	0.139	0.581
F/V Receipts	0.127	0.594	-0.199	0.399
# of F/V Itmes ^a	0.298	0.201	0.224	0.342
F/V Cost	-0.075	0.752	0.020	0.932
F/V Weight	0.207	0.382	0.254	0.280
F/V Cost per Household	0.000	0.999	0.018	0.939
F/V Weight per Household	0.291	0.213	0.274	0.243

^a Separated by variety

Table 6. Correlations between weight of F/V purchased in comparison to other measures.

Weight of F/V Purchases	Pearson Correlation Pre	P-Value Pre	Pearson Correlation Post	P-Value Post
Food Frequency Questionnaire	0.207	0.382	0.254	0.28
Home Food Inventory	-0.209	0.376	-0.063	0.804
F/V Receipts	0.637	0.003	0.500	0.025
# of F/V Items ^a	0.655	0.002	0.583	0.007
F/V Cost	0.867	0.000	0.874	0.000
F/V Cost per Household	0.841	0.000	0.846	0.000
F/V Weight per Household	0.944	0.000	0.932	0.000

^a Separated by variety



*Potatoes include sweet/yams

Figure 2. Represents the top F/V purchases measured by weight. 18 foods represented 76% of weight of F/V purchases: five fruit and five vegetables represented the top ten F/V purchases.

Chapter 5

DISCUSSION

This study was the first of its kind to measure purchasing patterns objectively and in a wide-scope retail environment that includes all grocery store purchases by participants. The task of collecting, sorting, coding, and identifying F/V on store receipts was time consuming and challenging. Previous studies have used receipts as a measure, but because they used a retailer's database, those studies were limited to the receipts from that particular retailer. Although a single-store database might provide detailed information of items, prices, and purchasing trends, it does not allow for a complete analysis of shopping patterns because families shop at a variety of stores. Every participant of this study submitted receipts from at least three different retail chains over a 30-day period, with the average participant shopping at four stores, and one participant visiting eight different stores in one month.

The Healthy Heart Store Tours provided participants with a grocery store tour and analyzed purchases from loyalty cards. The goals of that study were based around heart health, with a focus on functional foods, specifically cholesterol-lowering spreads. Results from that study showed a 12 % decrease in F/V purchases, but a 25% increase in cholesterol-lowering spreads (8). The inability of that study to track purchases from other stores was a major limitation; its authors also

suggested seasonal pricing and factors other than the store tour contributed to the decrease in F/V purchases.

This study aimed to influence purchases of F/V, but was unable to show significant increases in purchases of those items. The tour group was expected to increase purchases of F/V compared to the education group. This hypothesis was rejected, as neither group showed significant increases or decreases in the amount of money spent on F/V, or the amount (pounds) of F/V purchased. However, a small correlation ($r=0.133$) was seen in the weight of F/V purchased pre/post intervention.

The effectiveness of grocery store tours is commonly measured by evaluating participant feedback via post-survey questionnaires. Studies have shown the large majority of participants are overall very satisfied with the grocery store tour (8–11,37). This study also reported high participant satisfaction, with 72% of tour participants and 75% of the education group stating they were “extremely satisfied” with their experience. However, the objective measures of this study shows participant satisfaction does not equate to changes in food shopping behaviors.

The participants of this study were recruited by convenience samplings. This process of recruitment yields a group of individuals who are motivated and interested in gaining knowledge and possibly changing behavior. The

demographics of the participants, specifically their income brackets and high levels of education, place them in a position where behavior change was possible. Yet the question remains: what methods can effectively influence purchases of F/V? Future interventions might need to extend the scope of the intervention to include cooking demonstrations, in-home interventions, and education on healthy eating outside of the home.

An important finding of this study is that education sessions and grocery store tours appeared to have similar impacts on participants. Meeting with participants outside of the grocery store to discuss strategies of increasing F/V consumption may be easier, more focused, and equally effective as a grocery store tour.

Although every effort was made to meet participants at the grocery store during slower, low-traffic times, this was not always possible. When the store was busy, the flow of the tour was compromised by other shoppers and detours in navigation. Participants of the education group did not have to contend with any of these distractions during their meeting with the researcher.

This study followed the suggested guidelines that Baic and Thompson recommended for successful tours. The tour length was kept between 45-60 minutes, included asking open ended questions, active listening, and respectful corrections of misinformation (10). Due to a small sample size and scheduling conflicts this study was unable to have the recommended group size of eight to ten participants, and instead had groups of one to two participants.

Findings indicate that although participant satisfaction was high, a walking grocery store tour may not be the most effective intervention to increase F/V purchases. However, the grocery store should not be ruled out as a setting for interventions. A study published in June 2012 in *The Journal of the Academy of Nutrition and Dietetics* suggests the grocery store is still an ideal setting for nutrition interventions. That study used a POP display geared towards children and highlighting fruits, vegetables, and healthy snacks. The display was placed in the produce section and purchases of featured items were tracked via the store's database. Significant increases were seen in 23% of the featured items ($p < 0.05$) and the vegetable group experienced the largest increase in purchases (50). That study encourages further use of nutrition-themed displays and sampling of healthful foods. Using proven strategies (such as color, lighting, and sampling) employed for years by marketing companies and grocery stores, the study transformed a POP display into a learning center that encouraged and increased F/V purchases.

Participants in The Food Purchasing Behavior study show purchasing patterns that are representative of USDA data in terms of the most popular F/V purchased. The top five purchased F/V of the participants closely resemble the top F/V purchased by Americans (51). Bananas, apples, and oranges are at the top of the fruit list and potatoes and tomatoes dominate the vegetable category. Although tomatoes are a fruit, participants commonly misplace them in the vegetable

category when recalling intake, and therefore are listed in the vegetable category for Table 1 and Figure 2.

The Food Purchasing Behavior study may not have found significant increases in purchases of F/V, but participant feedback showed that the mothers in the study learned new information, became more aware of tactics the retailer uses to influence purchases, and recognized the importance of being a role model for healthy eating. The participants received nutritional information first hand, and were then left with the task of using that information while shopping and also sharing it with their families. Focusing only on mothers might have limited the effectiveness of the study: a future intervention that includes spouses and children might not only provide valuable data on F/V intake, but also help illustrate the role those individuals play in the family's food purchases and overall dietary choices. This notion of targeting the family for effective interventions is supported in a systematic review that emphasizes the association between parental and children F/V intake (35).

The study's second hypothesis stated the tour group would show a decrease in high-sugar cereal and junk food purchases. However, cereal purchases could not be measured due to a lack of consistency on receipts. Some stores did not specify the name of the cereal on the receipt (i.e. all General Mills ® cereal was listed as GM cereal) and therefore the study was unable to conduct analysis on the purchasing patterns of cereals. This hypothesis also stated that junk food

purchases would decrease among the tour group. Junk food items were also difficult to identify on receipts and were therefore omitted from any analyses. Future interventions targeting cereal and junk food should use a HFI that specifically focuses on these items. Compared to tracking receipts, a HFI geared specifically to these items could give better estimates of availability and purchases and would also minimize moderating variables such as sales and holidays.

The third hypothesis in the study compared subjective and objective measures. The study hypothesized the subjective measures from the HFI and FFQ would report higher levels of F/V consumption compared to grocery store receipts. The FFQ shows participants consuming significantly higher amounts of F/V post intervention ($p=0.043$). An average increase of 0.7 servings per day was experienced in the tour group and education group. Significance is only shown when both groups are combined. No correlations or significance was seen when the HFI was analyzed.

Intake values from the FFQ correlated to F/V intake reported on the HHQ, demonstrating construct validity. These two separate measures show significant correlations of F/V intake ($p=.022$ and Pearson Correlation coefficient $r=0.509$.) The HHQ was completed at the start of the study, so this correlation only relates to pre intervention data. A 24-hour dietary recall measure used in addition to the FFQ could have increased the strength of the study's subjective measures. Both

tools are valid measures but research suggest using a combination of the two provides a more detailed assessment of intake (52).

The average increase of 0.7 servings per day of F/V experienced by both groups (as reported by FFQ) is consistent with previous increases of 0.6 servings F/V per day reported in a systematic review of interventions for increasing F/V intake (2). This slight increase in F/V consumption is not enough to cause most Americans to reach the USDA-recommended five servings per day, but it is a step in the right direction.

Limitations

The small sample size of 20 participants is a limitation. The study participants were mostly Caucasian, active, well-educated, not overweight, and with a household income of \$60,000 or greater. Findings from this study cannot be generalized to a large population because of the small sample number and atypical participant demographics.

Seasonal factors that influence pricing and availability of F/V is another limitation of the study. The sale price is listed on all receipts, so the analyses were run on sale pricing, however no significance was seen in cost per item, pre or post intervention.

Tracking purchases from receipts allowed for unbiased review of food purchasing trends, but this study was unable to account for the food once it arrived in the participant's house: waste and preparation methods were not measured. Foods consumed outside of the home or eaten in the home from outside restaurants were also not included.

Chapter 6

CONCLUSION

Previously reviewed research illustrates the challenges of incorporating effective interventions that improve F/V intake; this study was no exception. Educational material, counseling, motivational interviewing, technology, and theories of behavior change have all been incorporated into efforts that aim to change behavior and promote increases in F/V consumption. The grocery store is commonly thought of as an ideal setting for interacting with consumers, as it provides hands-on and real life experiences to teach and influence consumer behavior.

This study was not the first to use a grocery store tour in hopes of influencing purchases, but it was the first to measure purchasing patterns objectively and in a wide-scope retail environment that includes all grocery store purchases by participants. This study showed that while the tour group was “extremely satisfied” with the tour, their results were not any different when compared to the results of the education group. Based on the objective measures neither group showed a significant change in purchases of F/V, however both groups showed a small correlation ($r=0.133$) between weight of F/V purchased pre/post intervention. Subjective measures of a FFQ showed the mothers of the study had significant increases ($p=0.043$) in consumption of F/V by 0.7 servings per day.

Future research should focus on interventions that increase F/V consumption to levels that equal or exceed the USDA recommendations of five servings per day. The challenges of accomplishing this will be many, but the benefits will exceed the obstacles. Children and families who continually strive to follow a healthy diet that incorporates a variety of F/V into their daily lives will experience the advantages associated with lower risk of CVD, cancer, obesity, and other related diseases (4).

REFERENCES

1. Kimmons J, Gillespie C, Seymour J, Serdula M, Blanck HM. Fruit and vegetable intake among adolescents and adults in the United States: percentage meeting individualized recommendations. *Medscape journal of medicine*. 2009;11:26.
2. Thomson CA, Ravia J. A systematic review of behavioral interventions to promote intake of fruit and vegetables. *Journal of the American Dietetic Association*. 2011;111:1523-1535.
3. Hung H-C, Joshipura KJ, Jiang R, Hu FB, Hunter D, Smith-Warner SA, Colditz GA, Rosner B, Spiegelman D, Willett WC. Fruit and vegetable intake and risk of major chronic disease. *Journal of the National Cancer Institute*. 2004;96:1577-1584.
4. Van Duyn MA, Pivonka E. Overview of the health benefits of fruit and vegetable consumption for the dietetics professional: selected literature. *Journal of the American Dietetic Association*. 2000;100:1511-1521.
5. Sutherland LA, Beavers DP, Kupper LL, Bernhardt AM, Heatherton T, Dalton MA. Like parent, like child: child food and beverage choices during role playing. *Archives of pediatrics & adolescent medicine*. 2008;162:1063-1069.
6. Ernst ND, Wu M, Frommer P, Katz E, Matthews O, Moskowitz J, Pinsky JL, Pohl S, Schreiber GB, Sondik E, et al. Nutrition education at the point of purchase: the foods for health project evaluated. *Preventive medicine*. 1986;15:60-73.
7. Busick DB, Brooks J, Pernecky S, Dawson R, Petzoldt J. Parent food purchases as a measure of exposure and preschool-aged children's willingness to identify and taste fruit and vegetables. *Appetite*. 2008;51:468-473.
8. Sadler MJ, Fine G, Richards S, Read L. Healthy Heart Store Tours - a useful communication tool? *British Nutrition Foundation Nutrition Bulletin*. 2003;28:179-186.
9. Reid V, Molamphyt F, Sullivan NO. Shopping tours for cardiac patients. *Coronary Health Care*. 1999;3:189-191.

10. Baic S, Sc M, Nutr R, Thompson JL, Ph D. Prevent It□: Using Grocery Store Tours as an Educational Tool to Promote Heart Health. *American College of Sports Medicine Health & Fitness Journal*. 2007;11:15-20.
11. Carson JA, Hedl J. Smart Shoppers Tours: Outcome Evaluation. *Journal of nutrition education*. 1998;30:323-331.
12. Silzer J. An evaluation of Supermarket Safari nutrition education tours. *Canadian journal of dietetic practice and research*. 1994;55:179-183.
13. Lafferty A, Marquart L, Reicks M. Hunting for whole grains: a supermarket tour. *Journal of nutrition education and behavior*. 2006;38:197-8.
14. Kral TVE, Rauh EM. Eating behaviors of children in the context of their family environment. *Physiology & behavior*. 2010;100:567-573.
15. Anon. Food for Thought. *U.S. Bureau of Labor Statistics*. 2009. Available at: www.bis.gov/spotlight/2010/food/home.htm.
16. Glanz K, Yaroch AL. Strategies for increasing fruit and vegetable intake in grocery stores and communities: policy, pricing, and environmental change. *Preventive medicine*. 2004;39:S75-80.
17. K.Dun G. Dietary fats, eating guides, and public policy: history, critique, and recommendations. *The American Journal of Medicine*. 2002;113:89-106.
18. Johnston CS, Taylor CA, Hampl JS. More Americans are eating “5 a day” but intakes of dark green and cruciferous vegetables remain low. *The Journal of nutrition*. 2000;130:3063-3067.
19. CDC. Fruit and Vegetabel Surveillance. *Fruit and Vegetable Consumption Data and Statistics: Data and Statistics Compare*. 2011. Available at: <http://apps.nccd.cdc.gov/5ADaySurveillance/compareV.asp>.
20. Kruger J, Blanck HM, Gillespie C. Dietary practices, dining out behavior, and physical activity correlates of weight loss maintenance. *Preventing chronic disease*. 2008;5:A11.
21. Befort C, Kaur H, Nollen N, Sullivan DK, Nazir N, Choi WS, Hornberger L, Ahluwalia JS. Fruit, vegetable, and fat intake among non-Hispanic black and non-Hispanic white adolescents: associations with home availability and food consumption settings. *Journal of the American Dietetic Association*. 2006;106:367-373.

22. Ziegler P, Briefel R, Ponza M, Novak T, Hendricks K. Nutrient intakes and food patterns of toddlers' lunches and snacks: influence of location. *Journal of the American Dietetic Association*. 2006;106:S124-34.
23. Seymour JD, Yaroch AL, Serdula M, Blanck HM, Khan LK. Impact of nutrition environmental interventions on point-of-purchase behavior in adults: a review. *Preventive medicine*. 2004;39:S108-36.
24. Sutherland LA, Kaley LA, Fischer L. Guiding stars: the effect of a nutrition navigation program on consumer purchases at the supermarket. *The American journal of clinical nutrition*. 2010;91:1090S-1094S.
25. Blanchette L, Brug J. Determinants of fruit and vegetable consumption among 6-12-year-old children and effective interventions to increase consumption. *Journal of human nutrition and dietetics* □: *the official journal of the British Dietetic Association*. 2005;18:431-443.
26. Sweitzer SJ, Briley ME, Roberts-Gray C, Hoelscher DM, Harrist RB, Staskel DM, Almansour FD. Lunch Is In The Bag: Increasing Fruits, Vegetables, and Whole Grains in Sack Lunches of Preschool-Aged Children. *Journal of the American Dietetic Association*. 2010;110:1058-1064.
27. Buttriss J, Stanner S, McKeivith B, Nugent AP, Kelly C, Phillips F, Theobald HE. Successful ways to modify food choice: lessons from the literature. *Nutrition Bulletin*. 2004;29:333-343.
28. Vitolo MR, Rauber F, Campagnolo PDB, Feldens CA, Hoffman DJ. Maternal dietary counseling in the first year of life is associated with a higher healthy eating index in childhood. *The Journal of nutrition*. 2010;140:2002-2007.
29. Burke RR, Harlam BA, Kahn BE, Lodish LM. Comparing Dynamic Consumer Choice in Real and Computer-Simulated Environments. *Journal of Consumer Research*. 1992;19:71-82.
30. Lichtenstein DR, Ridgway NM, Netemeyer RG. Price Perceptions and Consumer Shopping Behavior: A Field Study. *Journal of Marketing Research*. 1993;30:234-245.
31. Kristal AR, Goldenhar L, Muldoon J, Morton RF. Evaluation of a supermarket intervention to increase consumption of fruits and vegetables. *American journal of health promotion* □: *AJHP*. 1997;11:422-425.

32. Wiig K, Smith C. The art of grocery shopping on a food stamp budget: factors influencing the food choices of low-income women as they try to make ends meet. *Public health nutrition*. 2009;12:1726-1734.
33. Baranowski T. Understanding the behavioral linkages needed for designing effective interventions to increase fruit and vegetable intake in diverse populations. *Journal of the American Dietetic Association*. 2011;111:1472-1475.
34. Resnicow K, Davis RE, Zhang G, Konkell J, Strecher VJ, Shaikh AR, Tolsma D, Calvi J, Alexander G, Anderson JP, Wiese C. Tailoring a fruit and vegetable intervention on novel motivational constructs: results of a randomized study. *Annals of behavioral medicine* □: a publication of the Society of Behavioral Medicine. 2008;35:159-169.
35. Pearson N, Biddle SJH, Gorely T. Family correlates of fruit and vegetable consumption in children and adolescents: a systematic review. *Public health nutrition*. 2009;12:267-283.
36. Brown J. *Nutrition Through the Life Cycle*. Fourth Edi. Belmont: Wadsworth; 2011:272-280.
37. Assema PV, Brug J, Glanz K, Dolders M. Nationwide implementation of guided supermarket tours in the Netherlands □: a dissemination study. *Health Education Research*. 1998;13:557-566.
38. Kahn RF, O'Sullivan P, Vannatta PM. Supermarket tour: the effect of presentation mode on nutrition knowledge and attitudes. *Family medicine*. 2003;35:721-725.
39. Colls R, Evans B. Embodying responsibility: children's health and supermarket initiatives. *Environment and Planning A*. 2008;40:615-631.
40. Yalch RF, Spangenberg ER. The Effects of Music in a Retail Setting on Real and Perceived Shopping Times. *Journal of Business Research*. 2000;49:139-147.
41. Gajanayake R. The Impact of Selected Visual Merchandising Techniques on Patronage Intentions in Supermarkets. In: *2nd International Conference on Business and Economic Research*. Sri Lanka; 2011:1130-1153.
42. Summers TA, Hebert PR. Shedding some light on store atmospherics: influence of illumination on consumer behavior. *Journal of Business Research*. 2001;54:145-150.
43. Glanz K, Hewitt A, Rudd J. Consumer behavior and nutrition education: an

- integrative review. *Journal of nutrition education*. 1992;24:267-270.
44. Lindstrom M. Zones of Seduction. How Supermarkets turn shoppers into hoarders. *Time*. 2011:58.
45. Broniarczyk SM, Hoyer WD, McAlister L. Consumers' Perceptions of the Assortment Offered in a Grocery Category: The Impact of Item Reduction. *Journal of Marketing Research*. 1998;35:166-176.
46. Ransley JK, Donnelly JK, Khara TN, Botham H, Arnot H, Greenwood DC, Cade JE. The use of supermarket till receipts to determine the fat and energy intake in a UK population. *Public Health Nutrition*. 2001;4:1279-1286.
47. Graham D, Jeffery R. Location, Location, Location: Eye-Tracking Evidence that Consumers Preferentially View Prominently Positioned Nutrition Information. *Journal of the American Dietetic Association*. 2011;111:1704-1705.
48. Fulkerson J, Nelson M, Lytle L, Moe S, Heitzler C, Pasch K. The validation of a home food inventory. *International Journal of Behavioral Nutrition and Physical Activity*. 2008;5:55.
49. Graziano A, Raulin M. *Research Methods A Process of Inquiry*. 6th ed. Pearson; 2007:110-111.
50. Holmes AS, Estabrooks PA, Davis GC, Serrano EL. Effect of a Grocery Store Intervention on sales of nutritious foods to youth and their families. *Journal of the Academy of Nutrition and Dietetics*. 2012;112(6):897-901.
51. Reed J, Frazao E, Itskowitz R, Service. USD of AER. How much do Americans pay for fruits and vegetables? 2004.
<http://www.ers.usda.gov/publications/aib790/aib790.pdf>.
52. Thomson CA, Giuliano A, Rock CL, Ritenbaugh CK, Flatt SW, Faerber S, Newman V, Caan B, Graver E, Hartz V, Whitacre R, Parker F, Pierce JP, Marshall JR. Measuring Dietary Change in a Diet Intervention Trial: Comparing food frequency questionnaire and dietary recalls. *American Journal of Epidemiology*. 2003; 157:754-762.

APPENDIX A
INFORMED CONCENT

INTRODUCTION

The purposes of this form are to provide you (as a prospective research study participant) information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in the study.

RESEARCHERS

Dr. Carol Johnston, Associate Director of the Nutrition Program at Arizona State University, and Nutrition graduate student, Diana Kinsfather, have invited your participation in a research study.

STUDY PURPOSE

The purpose of the research is to examine ways to promote fruit and vegetable consumption and to reduce intakes of high sugar foods by families.

DESCRIPTION OF RESEARCH STUDY

Mothers with two or more children at home (≤ 13 y of age) who are the primary food shoppers for the family are eligible to participate. If you decide to be a research participant, you will join a study to evaluate ways to promote fruit and vegetable consumption by families and to reduce intakes of high sugar foods by families. Participants will live in the East Valley of the Phoenix Metropolitan area and agree to meet with investigators on three (3) occasions for ≤ 60 minutes. Locations will be in public places (libraries or grocery stores) in the East Valley. About 40 women will participate in this study. Participants will be divided into two comparison groups: educational lecture and discussion or educational grocery store tour.

At visit 1, participants will complete health and food consumption questionnaires. Participants will be given a questionnaire to complete at home regarding foods in the home. Participants will be instructed to collect all food receipts for the next 9 weeks. At visit 2, participants will receive either an educational lecture or grocery tour. Food receipts for the initial 4-5 weeks of the study will be turned in to investigators. Participants will be given a second questionnaire to complete at home regarding foods in the home. At visit 3, food receipts for the final 4-5 weeks of the study will be turned in, and participants will complete a food consumption questionnaire.

RISKS

There are no risks for participating in this study. Participants may be inconvenienced by having to collect all food receipts for 9 weeks.

BENEFITS

You will receive useful information to promote healthy dietary choices including consuming more fruits and vegetables and less high sugar foods.

NEW INFORMATION

If the researchers find new information during the study that would reasonably change your decision about participating, then they will provide this information to you.

CONFIDENTIALITY

All information obtained in this study is strictly confidential unless disclosure is required by law. The results of this research study may be used in reports, presentations, and

publications, but the researchers will not identify you. Your name will not be associated

with any data related to the study. In order to maintain confidentiality of your records, you will be assigned to a subject number, which will be used throughout the course of the study to identify you. Only the investigators will have access to subject names and their corresponding codes.

WITHDRAWAL PRIVILEGE

It is ok for you to say no. Even if you say yes now, you are free to say no later, and withdraw from the study at any time. Your decision will not affect your relationship with Arizona State University or otherwise cause a loss of benefits to which you might otherwise be entitled.

COSTS AND PAYMENTS

The researchers want your decision about participating in the study to be absolutely voluntary, yet they recognize that your participation may pose some costs such as inconvenience and a small time commitment. In order to help defray your costs, you will receive a \$15 Target gift card at study visit 2 and a \$20 Target gift card at study visit 3 for a total of \$35.

COMPENSATION FOR ILLNESS AND INJURY

If you agree to participate in the study, then your consent does not waive any of your legal rights. However, no funds have been set aside to compensate you in the event of injury.

VOLUNTARY CONSENT

Any questions you have concerning the research study or your participation in the study, before or after your consent, will be answered by Dr. Carol Johnston, Principal Investigator and Professor of Nutrition at ASU (602-827-2265) or Diana Kinsfather, Graduate Student (480-612-4144).

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk; you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480-965 6788.

This form explains the nature, demands, benefits and any risk of the project. By signing this form you agree knowingly to assume any risks involved. Remember, your participation is voluntary. You may choose not to participate or to withdraw your consent and discontinue participation at any time without penalty or loss of benefit. In signing this consent form, you are not waiving any legal claims, rights, or remedies. A copy of this consent form will be given (offered) to you.

Your signature below indicates that you consent to participate in the above study.

Subject's Signature

Printed Name

Date

Preferred contact: phone and/or email:

INVESTIGATOR'S STATEMENT

"I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature. These elements of Informed Consent conform to the Assurance given by Arizona State University to the Office for Human Research Protections to protect the rights of human subjects. I have provided (offered) the subject/participant a copy of this signed consent document."

Signature of Investigator _____

Date _____

APPENDIX B
HEALTH HISTORY QUESTIONNAIRE

HEALTH QUESTIONNAIRE

ID# _____

1. Height _____ Weight _____ Age _____ Gender _____

2. Number of children: _____ children's ages: _____ children's genders: _____

3. Education (please circle one): High school Years college: 1 2 3 4 5+

4. Ethnicity: (please circle) Native American African-American Caucasian Hispanic Asian Other

5. Do you smoke? No _____ Yes _____ # Cigarettes per day = _____

6. Do you or your child have any unresolved medical conditions? Yes No
If yes, please list:

	<u>Condition</u>
__Mother	_____
_____	_____
__Children	_____
_____	_____

7. Do you or your children take any medications regularly? Yes No
If yes, please list type and frequency:

	<u>Medication</u>	<u>Dosage</u>	<u>Frequency</u>
__Mother	_____	_____	_____
_____	_____	_____	_____
__Children	_____	_____	_____
_____	_____	_____	_____

8. Do you or your children currently take supplements (vitamins, minerals, herbs, etc.)? Yes No
If yes, please list type and frequency:

	<u>Supplement</u>	<u>Dosage</u>	<u>Frequency</u>
__Mother	_____	_____	_____
_____	_____	_____	_____
__Children	_____	_____	_____
_____	_____	_____	_____

9. How would you rate your lifestyle?
Not active _____ Active _____
Somewhat active _____ Very Active _____

OVER →

10. Please circle the total time you spend in each category for an average **week**.

Light activities such as:

Slow walking, golf, slow cycling, doubles tennis, easy swimming, gardening

Hours per week: 0 1 2 3 4 5 6 7 8 9 10+

Moderate activities such as:

Mod. Walking, mod. cycling, singles tennis, mod. swimming, moderate weight lifting

Hours per week: 0 1 2 3 4 5 6 7 8 9 10+

Vigorous activities such as:

Fast walking/jogging, fast cycling, court sports, fast swimming, heavy weight lifting

Hours per week: 0 1 2 3 4 5 6 7 8 9 10+

11. Do you or any of your children have any food allergies? Yes No

If yes, please explain:

Allergy

__Mother_____

__Children_____

15. Do you or your children follow a special diet? (weight gain/loss, vegetarian, low-fat, etc.) Yes No

If yes, please explain:

Condition

__Mother_____

__Children_____

16. How many servings of fruits and vegetables do you eat daily? _____

How many servings of fruits and vegetables do each of your children eat daily? _____

17. How many servings of fruits and vegetables do you WANT to eat daily? _____

18. How many servings of sweets do you eat daily? _____

How many servings of sweets do each of your children eat daily? _____

19. How many servings of sweets do you WANT to eat daily? _____

APPENDIX C
FOOD FREQUENCY QUESTIONNAIRE

Date Due _____

Name _____ Today's Date _____

Food Frequency Questionnaire #1 2 3 4

This questionnaire will give us information about your eating habits. There are no “right” or “wrong” answers. Accurate and thoughtful responses will allow us to pinpoint your good habits as well as the habits that you should consider changing.

- Use the **past month** as your standard for how you eat.
- Recall the times during the day when you ate, and what you had.
- Include snacks and “nibbles” as well as meals and beverages.
- If you ate out regularly or traveled, remember to include those foods too.
- Be sure to answer every item on this form. If you did not eat a food listed below — or ate it less than once a week — write a “0” in the space provided. Please do not leave blanks.

Part I. We want to know how often you ate certain foods. For each of the foods listed, please indicate how many servings per week you **usually** ate in the past month. (If you ate a food less than once a week, write a “0” in the space provided.) Where indicated, check whether your servings are large, small, or about average in size.

Food Item	Average Weekly Servings	Serving size:			Size of average serving	
		Lg.	Av.	Sm.		
Red meat (beef, pork and ham, veal, lamb)	_____	_____	_____	_____	4 ounces*	(1)
Meat dishes (casseroles, tacos, pizza, meat sauce)	_____	_____	_____	_____	1 cup casserole, 1 taco or pizza slice	(2)
Chicken or turkey	_____	_____	_____	_____	1 lg or 2 sm pieces	(3)
Fish or shellfish, including fish canned in water	_____	_____	_____	_____	4 ounces*, 1/2 can	(4)
Bacon, sausage	_____	_____	_____	_____	2 pieces	(5)
Luncheon meats (salami, bologna, hot dogs, etc. including turkey and chicken varieties)	_____	_____	_____	_____	1 piece	(6)
Low fat luncheon meats (at least 95% fat free)	_____	_____	_____	_____	1 piece	(7)
How many of the above servings are from fast food outlets (McDonald’s, Taco Bell, etc.)?					_____	(8)

* 4 ounces of meat or fish is roughly the size of a deck of cards.

(OVER)



Food Item	Average Weekly Servings	Size of average serving	
Whole eggs or egg yolks	_____	1 egg or yolk	(9)
Milk, yogurt or cottage cheese	_____	1 cup (8 ounces)	(10)
Cheese or cream cheese	_____	1 ounce/slice	(11)
Ice cream	_____	1/2 cup (1 scoop)	(12)
Fruits, fresh or dried	_____	1 whole piece or 1 cup cut-up fruit	(13)
Fruit juice	_____	1/2 cup (4 ounces)	(14)
Vegetable salads or raw vegetables	_____	1 cup	(15)
Cooked vegetables (fresh, frozen, or canned)	_____	1/2 cup	(16)
Spaghetti, noodles or other pastas	_____	1 cup	(17)
Dried beans, split peas or lentils	_____	3/4 cup (cooked)	(18)
Potatoes, rice or bulgur	_____	3/4 cup or 1 potato	(19)
Bread, bagels, rolls, tortillas, English muffins, homemade low fat muffins	_____	1 piece	(20)
Biscuits, bakery muffins, croissants, flaky rolls	_____	1 piece or slice	(21)
Cold or hot breakfast cereals	_____	1 med. bowl	(22)
Salad dressing	_____	2 Tbsp.	(23)
Mayonnaise	_____	1 Tbsp.	(24)
Nuts, nut butters (like peanut butter)	_____	2 Tbsp.	(25)
Chips or French fries	_____	1 cup	(26)
Baked desserts and pastries (cake, cookies, etc.)	_____	1 slice or 2 cookies	(27)
Donuts or sweet rolls	_____	1 piece	(28)
Chocolate or candy bars	_____	1 candy bar	(29)
Alcoholic drinks	_____	1 drink, 1 can beer 1 glass wine	(30)
Sweetened beverages, not including diet drinks (soft drinks, fruit drinks, etc.)	_____	1 large glass, 1 can	(31)

©1994 The Board of Trustees of Leland Stanford Junior University. All rights reserved.
Reprinted with permission.



Food Frequency Questionnaire - page 2

Part II. For each of the following items, check the **one** answer that best describes you. Use your eating habits of the past month as your standard.

Between butter and margarine, (32)

- 1 I almost always use butter.
- 2 I almost always use margarine.
- 3 I use both.
- 4 I don't use butter or margarine.

The person who cooks my food, (33)

- 1 almost always uses butter, shortening or lard for cooking and baking.
- 2 almost always uses vegetable oil or margarine for cooking and baking.
- 3 does both.
- 4 doesn't use any fat at all for cooking and baking.

When I use milk, (34)

- 1 I almost always use whole milk.
- 2 I use both whole and lowfat (2%) milk.
- 3 I almost always use lowfat (2%) milk.
- 4 I use both lowfat (2%) and nonfat (skim) milk, or 1% milk.
- 5 I almost always use nonfat (skim) milk.
- 6 I don't use milk.

When I eat chicken or turkey, (35)

- 1 I almost always eat the skin.
- 2 I almost never eat the skin.
- 3 I do both.
- 4 I don't eat chicken or turkey.

When I eat meat, fish or poultry, (36)

- 1 I almost always have it fried or cooked with oil or another fat, or with gravy.
- 2 I almost always have it broiled, baked, or stewed, and without any gravy or fat.
- 3 I do both.
- 4 I don't eat meat, fish or poultry.

When I eat cheese, (37)

- 1 I almost always have a "regular-fat" cheese (like Cheddar, Jack, Swiss, or cream cheese).
- 2 I almost always have a part-skim cheese (Mozzarella, Ricotta, Neufchatel, or Farmers).
- 3 I do both.
- 4 I don't eat cheese.

When I eat cooked vegetables, (38)

- 1 I almost always have them with butter, margarine or sauce; or cooked with butter, margarine, oil, or another fat.
- 2 I almost always have them without any of the fats listed above.
- 3 I do both.
- 4 I don't eat cooked vegetables.

When I eat potatoes, rice or bulgur, (39)

- 1 I almost always have them with butter, margarine, sour cream, gravy or sauce; or fried.
- 2 I almost always have them without any of the fats listed above.
- 3 I do both.
- 4 I don't eat potatoes, rice or bulgur.

When I eat pasta, (40)

- 1 I almost always have it with butter, margarine, cream or white sauce.
- 2 I almost always have it plain or with tomato sauce.
- 3 I do both.
- 4 I don't eat pasta.

When I eat bread, rolls or muffins, (41)

- 1 I almost always have them with butter, margarine or mayonnaise.
- 2 I almost always have them without butter, margarine or mayonnaise.
- 3 I do both.
- 4 I don't eat bread, rolls or muffins.

When I use salad dressing, (42)

- 1 I usually use a creamy or bleu cheese dressing.
- 2 I usually use an oil-based dressing.
- 3 I use both creamy and oil-based dressings.
- 4 I usually use low calorie or fat-free salad dressing.
- 5 I don't use salad dressing.

How many times did you eat out (restaurant, deli, fast food) in the last 7 days? _____ (43)

Please look over this form to be sure you answered every question. Do not leave any items blank.

Thank you!

APPENDIX D
HOME FOOD INVENTORY

Home Food Inventory

Date: ____/____/____

Look in areas in your home where your household stores food, including the refrigerator, freezer, pantries, cupboards, and other storage areas (list follows in that order). Please check “yes” or “no” to each of the food product/item/category below. Check “yes” to a food product/item/category if it is present anywhere in your home (opened or unopened) as you are completing this form. Check “no” to a food product/item/category if it is not present anywhere in your home as you are completing this form.

Lower fat products will be labeled as “reduced-fat,” “low-fat,” “light,” “nonfat,” or “skim” on product and can be interchangeable.

1. Cheese

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Shredded or block regular cheese (example: American, cheddar)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Sliced regular cheese (example: American, cheddar)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Shredded or block of reduced-fat cheese (example: low fat cheddar)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Sliced reduced-fat cheese (example: low fat cheddar, low fat swiss)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. String cheese
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. Mozzarella cheese
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Regular ricotta or cottage cheese (minimum of 4% fat)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	h. Reduced-fat ricotta or cottage cheese (2% or low fat on label)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	i. Regular cream cheese
1 <input type="checkbox"/>	0 <input type="checkbox"/>	j. Reduced-fat cream cheese or neufchatel
1 <input type="checkbox"/>	0 <input type="checkbox"/>	k. Cheez Whiz, Velveeta, canned cheese or other similar cheese

Go to next page.

2. Milk/Dairy (see the “other beverage” section for non-dairy beverages)

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | a. Skim milk |
| <input type="checkbox"/> | <input type="checkbox"/> | b. 1% or 2% low fat milk |
| <input type="checkbox"/> | <input type="checkbox"/> | c. Whole milk |
| <input type="checkbox"/> | <input type="checkbox"/> | d. Half and half, whipping cream or heavy cream |
| <input type="checkbox"/> | <input type="checkbox"/> | e. Sour cream or sour cream/cheese dips |
| <input type="checkbox"/> | <input type="checkbox"/> | f. Reduced-fat sour cream or low fat sour cream/cheese dips |
| <input type="checkbox"/> | <input type="checkbox"/> | g. Chocolate or flavored milk |
| <input type="checkbox"/> | <input type="checkbox"/> | h. Reduced-fat yogurt (with or without fruit) |
| <input type="checkbox"/> | <input type="checkbox"/> | i. Regular yogurt (made from whole milk, with or without fruit) |
| <input type="checkbox"/> | <input type="checkbox"/> | j. Reduced-fat yogurt drinks |

3. Butter, Margarine and Oils

- | Yes | No | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | a. Regular butter |
| <input type="checkbox"/> | <input type="checkbox"/> | b. Light butter |
| <input type="checkbox"/> | <input type="checkbox"/> | c. Regular margarine or butter substitute |
| <input type="checkbox"/> | <input type="checkbox"/> | d. Light margarine or butter substitute |
| <input type="checkbox"/> | <input type="checkbox"/> | e. Olive oil |
| <input type="checkbox"/> | <input type="checkbox"/> | f. Vegetable oil (example: canola oil, corn oil) |
| <input type="checkbox"/> | <input type="checkbox"/> | g. Seed oil (example: sunflower oil, sesame oil) |
| <input type="checkbox"/> | <input type="checkbox"/> | h. Lard or shortening |

4. Salad Dressing

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | a. Regular dressing (example: blue cheese dressing, Caesar, ranch) |
| <input type="checkbox"/> | <input type="checkbox"/> | b. Light/reduced fat dressing (example: light blue cheese, light Italian) |

5. Condiments

- | Yes | No | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | a. Regular mayonnaise |
| <input type="checkbox"/> | <input type="checkbox"/> | b. Light/reduced fat mayonnaise |
| <input type="checkbox"/> | <input type="checkbox"/> | c. Miracle Whip or other sandwich spread |
| <input type="checkbox"/> | <input type="checkbox"/> | d. Mustard or ketchup |

6. How many other types of condiments (e.g., BBQ sauce, horseradish sauce, tartar sauce, steak sauce) do you estimate you have in your home? (Mark only one response)

- None
- 1-5
- 6-10
- More than 10

Fulkerson JA, Nelson MC, Lytle LA, Moe S, Heitzler C, Pasch KE. The validation of a home food inventory. International Journal of Behavioral Nutrition and Physical Activity, 2008, 5;55.

Note, please mark whether each vegetable present is fresh, canned or frozen (mark all that apply). For example, if you have both fresh and canned asparagus in your home, you would check “yes” to asparagus and check in both the fresh and canned columns.

7. Vegetables

			<u>Fresh</u>	<u>Can/Jar</u>	<u>Frozen</u>
Yes	No		(Mark all that apply)		
<input type="checkbox"/>	<input type="checkbox"/>	a. Asparagus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	b. Beets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	c. Bell peppers (example: green, red)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	d. Broccoli	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	e. Cabbage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	f. Cauliflower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	g. Carrots	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	h. Celery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	i. Corn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	j. Cucumbers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	k. Green beans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	l. Lettuce (example: romaine, endive)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	m. Mushrooms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	n. Peas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	o. Potatoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	p. Spinach/other greens (collard)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	q. Squash (example: butternut, zucchini)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	r. Sweet potatoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	s. Tomatoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	t. Mixed vegetables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Go to next page.

Note, please check whether each fruit present is fresh, canned, frozen, or dried (mark all that apply). For example, if you have both fresh and frozen blueberries in your home, you would check “yes” to blueberries and check in both the fresh and frozen columns.

8. Fruit

		Fresh	Can/Jar	Frozen	Dried
Yes	No	<i>(Mark all that apply)</i>			
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Apples	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Apple sauce	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Apricots	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Avocado	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Bananas	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. Blueberries	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Cranberries	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	h. Dates	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	i. Grapes (red or green)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	j. Grapefruit	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	k. Kiwi	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	l. Lemons or limes	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	m. Mango	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	n. Melons (example: watermelon)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	o. Mixed fruit/fruit cocktail	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	p. Nectarines	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	q. Oranges	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	r. Pears	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	s. Peaches	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	t. Pineapple	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	u. Plums	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	v. Prunes	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	w. Raisins	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	x. Raspberries	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	y. Strawberries	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	z. Tangerines/Clementines	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>

Go to next page.

9. Deli, Luncheon, Sandwich Meat and Sausage

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Sliced turkey or chicken deli meat
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Sliced ham, roast beef
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Bologna
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Salami, summer sausage, pepperoni
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Bacon, breakfast sausage
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. Hot dogs, bratwurst, polish sausage

10. Meats and Other Protein (Fresh, frozen, canned or jar)

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Chicken/turkey (example: burgers, breasts, whole)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Beef, pork, lamb (example: burgers, steaks, roasts, chops)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Tofu, seitan, tempeh, textured vegetable protein (TVP)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Veggie burgers
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Fish (example: canned, packet, fresh or frozen tuna, salmon, cod)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. Shellfish (example: shrimp, scallops, crab)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Lentils
1 <input type="checkbox"/>	0 <input type="checkbox"/>	h. Beans (example: black beans, pinto beans, kidney beans)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	i. Peanut butter or other nut butter
1 <input type="checkbox"/>	0 <input type="checkbox"/>	j. Eggs

11. Frozen Desserts (Ice cream/yogurt type only)

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Regular ice cream (any flavor)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Reduced-fat ice cream (any flavor)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Frozen yogurt (any flavor)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Frozen treats made with ice cream or pudding
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Frozen treats made with ice milk, frozen yogurt, sherbet, sorbet
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. Frozen fruit juice bars
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Frozen soy or rice desserts

12. Microwavable or Quick-Cook Frozen Foods

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Pizza (any variety)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Hot Pockets (any flavor)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Pizza rolls or bagel snacks (any flavor)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Burritos or other Mexican snacks
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Chicken nuggets
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. French fries or tater tots
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Egg rolls
1 <input type="checkbox"/>	0 <input type="checkbox"/>	h. Ramen noodles

Fulkerson JA, Nelson MC, Lytle LA, Moe S, Heitzler C, Pasch KE. The validation of a home food inventory. International Journal of Behavioral Nutrition and Physical Activity, 2008, 5;55.

Note, please check whether each bread present is fresh or frozen (mark all that apply). For example, if you have both fresh and frozen whole wheat rolls in your home, you would check “yes” to whole wheat bread or rolls and check in both the fresh and frozen columns.

13. Bread

			<u>Fresh</u>	<u>Frozen</u>
Yes	No		(Mark all that apply)	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. <u>Wheat</u> bread or rolls	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. White bread/rolls (example: baguette)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. English muffins (wheat)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. English muffins (white)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Bagels (wheat)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. Bagels (white, any flavor)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Tortillas (wheat, sprout)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	h. Tortillas (flour, any flavors)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	i. Tortillas (corn)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	j. Pita bread (wheat, sprout)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	k. Pita bread (white, any flavor)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	l. Croissants	1 <input type="checkbox"/>	1 <input type="checkbox"/>

Note, please check whether each prepared dessert type present is homemade or store-bought (mark all that apply). For example, if you have both homemade and store-bought chocolate chip cookies in your home, you would check “yes” to regular cookies and check in both the store bought and homemade columns.

14. Prepared Desserts (do not count boxed mixes that are not prepared)

			<u>Store-bought</u>	<u>Homemade</u>
Yes	No		(Mark all that apply)	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Regular cookies (any flavor/variety)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Reduced-fat cookies (any flavor/variety)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Regular cake/cupcakes (any flavor)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Reduced-fat cake/cupcakes (any flavor)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Regular muffins (any flavor/variety)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. Brownies/bars (any variety)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Other snack cakes (any variety)	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>	h. Pastry, sweet rolls, donuts	1 <input type="checkbox"/>	1 <input type="checkbox"/>

15. Chips, Crackers and Other Snack Foods

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | a. Whole grain snack crackers (labeled “whole grain” or “whole wheat”, example: Triscuit) |
| <input type="checkbox"/> | <input type="checkbox"/> | b. Regular snack crackers (example: Saltines, Wheat Thins) |
| <input type="checkbox"/> | <input type="checkbox"/> | c. Reduced-fat snack crackers (example: Reduced-fat Wheat Thins) |
| <input type="checkbox"/> | <input type="checkbox"/> | d. Regular potato chips |
| <input type="checkbox"/> | <input type="checkbox"/> | e. Reduced-fat potato chips (example: Baked Lays) |
| <input type="checkbox"/> | <input type="checkbox"/> | f. Corn chips (example: Fritos) |
| <input type="checkbox"/> | <input type="checkbox"/> | g. Tortilla chips |
| <input type="checkbox"/> | <input type="checkbox"/> | h. Reduced-fat tortilla chips (example: baked tortilla chips) |
| <input type="checkbox"/> | <input type="checkbox"/> | i. Cheese curls or puffs |
| <input type="checkbox"/> | <input type="checkbox"/> | j. Reduced fat cheese curls or puffs (example: baked Cheetos) |
| <input type="checkbox"/> | <input type="checkbox"/> | k. Regular bagel chips |
| <input type="checkbox"/> | <input type="checkbox"/> | l. Reduced-fat bagel chips |
| <input type="checkbox"/> | <input type="checkbox"/> | m. Graham crackers |
| <input type="checkbox"/> | <input type="checkbox"/> | n. Pretzels, any shape |
| <input type="checkbox"/> | <input type="checkbox"/> | o. Popcorn (microwave bags or bags of prepared popcorn) |
| <input type="checkbox"/> | <input type="checkbox"/> | p. Peanuts, cashews or other nuts |
| <input type="checkbox"/> | <input type="checkbox"/> | q. Regular granola bars, sports bars |
| <input type="checkbox"/> | <input type="checkbox"/> | r. Reduced-fat granola bars, sports bars |

16. Are any of the chips, crackers or other snacks checked above in prepackaged snack size or single size portions (do not count granola, sports bars, meal supplement bars)?

- Yes
 No

Dry Breakfast Cereal

17. How many ready-to-eat cereals do you have that are labeled “whole grain,” “whole wheat” or have at least 3 grams of fiber per serving? (Check one response)

- None
 One
 Two or three
 Four or more

18. How many ready-to-eat cereals indicate on the nutrition label that they have less than 6 grams of sugar per serving? (Check one response)

- None
 One
 Two or three
 Four or more

Fulkerson JA, Nelson MC, Lytle LA, Moe S, Heitzler C, Pasch KE. The validation of a home food inventory. International Journal of Behavioral Nutrition and Physical Activity, 2008, 5;55.

Page 7

19. How many ready-to-eat cereals indicate on the nutrition label that they have 6 or more grams of sugar per serving ? (Check one response)

- 0 None
- 1 One
- 2 Two or three
- 3 Four or more

20. Beverages (do not include alcoholic beverages)

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Regular soda pop (any variety, flavor)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Diet soda pop (any variety, flavor)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Prepared iced teas or lemonade (example: Snapple)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Prepared light iced teas or lemonade (example: diet Snapple)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Sports drinks (example: Gatorade)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. 100% fruit juice (labeled as 100% juice)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Fruit drinks (example: <100% juice, Capri Sun)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	h. Bottled water (unsweetened, any variety, flavor)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	i. Soy milk, rice milk (any variety, flavor)

21. Candy

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Chocolate candy (any variety, except chocolate exclusively for baking)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Hard candy
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Gummies
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Fruit rollups, fruit snacks or other fruit based candy
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Chewy candy (example: Skittles, caramel)

22. Now please look around your kitchen (countertop, top of refrigerator, table) and indicate which of the following items are visible and readily accessible.

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Canned or dried fruit
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Fresh vegetables
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Regular snack crackers, pretzels, chips, popcorn
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Reduced-fat snack crackers, pretzels, chips, popcorn
1 <input type="checkbox"/>	0 <input type="checkbox"/>	f. Dry cereal
1 <input type="checkbox"/>	0 <input type="checkbox"/>	g. Bread or rolls
1 <input type="checkbox"/>	0 <input type="checkbox"/>	h. Regular soda pop
1 <input type="checkbox"/>	0 <input type="checkbox"/>	i. Diet soda pop
1 <input type="checkbox"/>	0 <input type="checkbox"/>	j. Candy
1 <input type="checkbox"/>	0 <input type="checkbox"/>	k. Regular cookies, cake, cupcakes, muffins
1 <input type="checkbox"/>	0 <input type="checkbox"/>	l. Reduced-fat cookies, cake, cupcakes, muffins

Fulkerson JA, Nelson MC, Lytle LA, Moe S, Heitzler C, Pasch KE. The validation of a home food inventory. International Journal of Behavioral Nutrition and Physical Activity, 2008, 5;55.

APPENDIX E
USDA HANDOUTS

smart shopping for veggies and fruits



10 tips for affordable vegetables and fruits

It is possible to fit vegetables and fruits into any budget. Making nutritious choices does not have to hurt your wallet. Getting enough of these foods promotes health and can reduce your risk of certain diseases. There are many low-cost ways to meet your fruit and vegetable needs.

1 celebrate the season

Use fresh vegetables and fruits that are in season. They are easy to get, have more flavor, and are usually less expensive. Your local farmer's market is a great source of seasonal produce.



2 why pay full price?

Check the local newspaper, online, and at the store for sales, coupons, and specials that will cut food costs. Often, you can get more for less by visiting larger grocery stores (discount grocers if available).

3 stick to your list

Plan out your meals ahead of time and make a grocery list. You will save money by buying only what you need. Don't shop when you're hungry. Shopping after eating will make it easier to pass on the tempting snack foods. You'll have more of your food budget for vegetables and fruits.

4 try canned or frozen

Compare the price and the number of servings from fresh, canned, and frozen forms of the same veggie or fruit. Canned and frozen items may be less expensive than fresh. For canned items, choose fruit canned in 100% fruit juice and vegetables with "low sodium" or "no salt added" on the label.



5 buy small amounts frequently

Some fresh vegetables and fruits don't last long. Buy small amounts more often to ensure you can eat the foods without throwing any away.

6 buy in bulk when items are on sale

For fresh vegetables or fruits you use often, a large size bag is the better buy. Canned or frozen fruits or vegetables can be bought in large quantities when they are on sale, since they last much longer.

7 store brands = savings

Opt for store brands when possible. You will get the same or similar product for a cheaper price. If your grocery store has a membership card, sign up for even more savings.

8 keep it simple

Buy vegetables and fruits in their simplest form. Pre-cut, pre-washed, ready-to-eat, and processed foods are convenient, but often cost much more than when purchased in their basic forms.



9 plant your own

Start a garden—in the yard or a pot on the deck—for fresh, inexpensive, flavorful additions to meals. Herbs, cucumbers, peppers, or tomatoes are good options for beginners. Browse through a local library or online for more information on starting a garden.



10 plan and cook smart

Prepare and freeze vegetable soups, stews, or other dishes in advance. This saves time and money. Add leftover vegetables to casseroles or blend them to make soup. Overripe fruit is great for smoothies or baking.

10 tips

Nutrition Education Series

choose MyPlate

10 tips to a great plate



Making food choices for a healthy lifestyle can be as simple as using these 10 Tips.

Use the ideas in this list to *balance your calories*, to choose foods to *eat more often*, and to cut back on foods to *eat less often*.

1 balance calories

Find out how many calories YOU need for a day as a first step in managing your weight. Go to www.ChooseMyPlate.gov to find your calorie level. Being physically active also helps you balance calories.

2 enjoy your food, but eat less

Take the time to fully enjoy your food as you eat it. Eating too fast or when your attention is elsewhere may lead to eating too many calories. Pay attention to hunger and fullness cues before, during, and after meals. Use them to recognize when to eat and when you've had enough.



3 avoid oversized portions

Use a smaller plate, bowl, and glass. Portion out foods before you eat. When eating out, choose a smaller size option, share a dish, or take home part of your meal.

4 foods to eat more often

Eat more vegetables, fruits, whole grains, and fat-free or 1% milk and dairy products. These foods have the nutrients you need for health—including potassium, calcium, vitamin D, and fiber. Make them the basis for meals and snacks.



5 make half your plate fruits and vegetables

Choose red, orange, and dark-green vegetables like tomatoes, sweet potatoes, and broccoli, along with other vegetables for your meals. Add fruit to meals as part of main or side dishes or as dessert.

6 switch to fat-free or low-fat (1%) milk

They have the same amount of calcium and other essential nutrients as whole milk, but fewer calories and less saturated fat.



7 make half your grains whole grains

To eat more whole grains, substitute a whole-grain product for a refined product—such as eating whole-wheat bread instead of white bread or brown rice instead of white rice.

8 foods to eat less often

Cut back on foods high in solid fats, added sugars, and salt. They include cakes, cookies, ice cream, candies, sweetened drinks, pizza, and fatty meats like ribs, sausages, bacon, and hot dogs. Use these foods as occasional treats, not everyday foods.

9 compare sodium in foods

Use the Nutrition Facts label to choose lower sodium versions of foods like soup, bread, and frozen meals. Select canned foods labeled "low sodium," "reduced sodium," or "no salt added."



10 drink water instead of sugary drinks

Cut calories by drinking water or unsweetened beverages. Soda, energy drinks, and sports drinks are a major source of added sugar, and calories, in American diets.

USDA United States Department of Agriculture Center for Nutrition Policy and Promotion

Go to www.ChooseMyPlate.gov for more information.

DG TipSheet No. 1
June 2011
USDA is an equal opportunity provider and employer.

10 tips
Nutrition
Education Series

be a healthy role model for children



10 tips for setting good examples

You are the most important influence on your child. You can do many things to help your children develop healthy eating habits for life. Offering a variety of foods helps children get the nutrients they need from every food group. They will also be more likely to try new foods and to like more foods. When children develop a taste for many types of foods, it's easier to plan family meals. Cook together, eat together, talk together, and make mealtime a family time!

1 show by example

Eat vegetables, fruits, and whole grains with meals or as snacks. Let your child see that you like to munch on raw vegetables.

2 go food shopping together



Grocery shopping can teach your child about food and nutrition. Discuss where vegetables, fruits, grains, dairy, and protein foods come from. Let your children make healthy choices.

3 get creative in the kitchen

Cut food into fun and easy shapes with cookie cutters. Name a food your child helps make. Serve "Janie's Salad" or "Jackie's Sweet Potatoes" for dinner. Encourage your child to invent new snacks. Make your own trail mixes from dry whole-grain, low-sugar cereal and dried fruit.

4 offer the same foods for everyone

Stop being a "short-order cook" by making different dishes to please children. It's easier to plan family meals when everyone eats the same foods.



5 reward with attention, not food

Show your love with hugs and kisses. Comfort with hugs and talks. Choose not to offer sweets as rewards. It lets your child think sweets or dessert foods are better than other foods. When meals are not eaten, kids do not need "extras"—such as candy or cookies—as replacement foods.

6 focus on each other at the table

Talk about fun and happy things at mealtime. Turn off the television. Take phone calls later. Try to make eating meals a stress-free time.



7 listen to your child

If your child says he or she is hungry, offer a small, healthy snack—even if it is not a scheduled time to eat. Offer choices. Ask "Which would you like for dinner: broccoli or cauliflower?" instead of "Do you want broccoli for dinner?"

8 limit screen time

Allow no more than 2 hours a day of screen time like TV and computer games. Get up and move during commercials to get some physical activity.

9 encourage physical activity

Make physical activity fun for the whole family. Involve your children in the planning. Walk, run, and play with your child—instead of sitting on the sidelines. Set an example by being physically active and using safety gear, like bike helmets.



10 be a good food role model

Try new foods yourself. Describe its taste, texture, and smell. Offer one new food at a time. Serve something your child likes along with the new food. Offer new foods at the beginning of a meal, when your child is very hungry. Avoid lecturing or forcing your child to eat.

liven up your meals with vegetables and fruits



10 tips to improve your meals with vegetables and fruits

Discover the many benefits of adding vegetables and fruits to your meals. They are low in fat and calories, while providing fiber and other key nutrients. Most Americans should eat more than 3 cups—and for some, up to 6 cups—of vegetables and fruits each day. Vegetables and fruits don't just add nutrition to meals. They can also add color, flavor, and texture. Explore these creative ways to bring healthy foods to your table.

1 fire up the grill
Use the grill to cook vegetables and fruits. Try grilling mushrooms, carrots, peppers, or potatoes on a kabob skewer. Brush with oil to keep them from drying out. Grilled fruits like peaches, pineapple, or mangos add great flavor to a cookout.

2 expand the flavor of your casseroles
Mix vegetables such as sauteed onions, peas, pinto beans, or tomatoes into your favorite dish for that extra flavor.



3 planning something Italian?
Add extra vegetables to your pasta dish. Slip some peppers, spinach, red beans, onions, or cherry tomatoes into your traditional tomato sauce. Vegetables provide texture and low-calorie bulk that satisfies.

4 get creative with your salad
Toss in shredded carrots, strawberries, spinach, watercress, orange segments, or sweet peas for a flavorful, fun salad.

5 salad bars aren't just for salads
Try eating sliced fruit from the salad bar as your dessert when dining out. This will help you avoid any baked desserts that are high in calories.

6 get in on the stir-frying fun
Try something new! Stir-fry your veggies—like broccoli, carrots, sugar snap peas, mushrooms, or green beans—for a quick-and-easy addition to any meal.

7 add them to your sandwiches
Whether it is a sandwich or wrap, vegetables make great additions to both. Try sliced tomatoes, romaine lettuce, or avocado on your everyday sandwich or wrap for extra flavor.



8 be creative with your baked goods
Add apples, bananas, blueberries, or pears to your favorite muffin recipe for a treat.

9 make a tasty fruit smoothie
For dessert, blend strawberries, blueberries, or raspberries with frozen bananas and 100% fruit juice for a delicious frozen fruit smoothie.



10 liven up an omelet
Boost the color and flavor of your morning omelet with vegetables. Simply chop, saute, and add them to the egg as it cooks. Try combining different vegetables, such as mushrooms, spinach, onions, or bell peppers.

Fruits

Nutrition Facts



Raw, edible weight portion.
Percent Daily Values (%DV) are
based on a 2,000 calorie diet.

Fruits Serving Size (gram weight/ounce weight)	Calories	Calories from Fat		Total Fat		Sodium		Potassium		Total Carbohydrate		Dietary Fiber	Sugars	Protein	Vitamin A	Vitamin C	Calcium	Iron
		g	%DV	mg	%DV	mg	%DV	g	%DV	g	%DV							
Apple 1 large (242 g/8.6 oz)	130	0	0	0	0	260	34	5	20	25g	1g	2%	8%	2%	2%			
Avocado (California, 1/5 medium (38 g/1.1 oz)	50	35	4.5	7	0	140	3	1	4	0g	1g	0%	4%	0%	2%			
Banana 1 medium (126 g/4.5 oz)	110	0	0	0	0	450	30	3	12	19g	1g	2%	15%	0%	2%			
Cantaloupe 1/4 medium (134 g/4.8 oz)	50	0	0	20	1	240	7	4	4	11g	1g	120%	80%	2%	2%			
Grapefruit 1/2 medium (154 g/5.5 oz)	60	0	0	0	0	160	5	2	8	11g	1g	35%	100%	4%	0%			
Grapes 3/4 cup (126 g/4.5 oz)	90	0	0	15	1	240	7	8	4	20g	0g	0%	2%	2%	0%			
Honeydew Melon 3/10 medium melon (114 g/4.8 oz)	50	0	0	30	1	210	6	4	4	11g	1g	2%	45%	2%	2%			
Kiwifruit 2 medium (148 g/5.1 oz)	90	10	1	2	0	450	13	7	16	13g	1g	2%	240%	4%	2%			
Lemon 1 medium (58 g/2.1 oz)	15	0	0	0	0	75	2	2	8	2g	0g	0%	40%	2%	0%			
Lime 1 medium (67 g/2.4 oz)	20	0	0	0	0	75	2	2	8	0g	0g	0%	35%	0%	0%			
Nectarine 1 medium (148 g/5.8 oz)	60	5	0.5	1	0	250	7	5	8	11g	1g	8%	15%	0%	2%			
Orange 1 medium (154 g/5.5 oz)	80	0	0	0	0	250	7	6	12	14g	1g	2%	130%	6%	0%			
Peach 1 medium (147 g/5.1 oz)	60	0	0.5	1	0	230	7	5	8	13g	1g	6%	15%	0%	2%			
Pear 1 medium (166 g/5.9 oz)	100	0	0	0	0	190	5	9	24	16g	1g	0%	10%	2%	0%			
Pineapple 2 slices, 3" diameter, 3/4" thick (112 g/4 oz)	50	0	0	10	0	120	3	4	4	10g	1g	2%	50%	2%	2%			
Plums 2 medium (151 g/5.4 oz)	70	0	0	0	0	230	7	6	8	16g	1g	8%	10%	0%	2%			
Strawberries 8 medium (147 g/5.3 oz)	50	0	0	0	0	170	5	4	8	8g	1g	0%	160%	2%	2%			
Sweet Cherries 21 cherries, 1 cup (148 g/5.8 oz)	100	0	0	0	0	350	10	9	4	16g	1g	2%	15%	2%	2%			
Tangerine 1 medium (103 g/3.9 oz)	50	0	0	0	0	160	5	4	8	9g	1g	6%	45%	4%	0%			
Watermelon 1/10 medium melon; 2 cups diced pieces (280 g/10.0 oz)	80	0	0	0	0	270	8	21	7	20g	1g	30%	25%	2%	4%			

Most fruits provide negligible amounts of saturated fat, *trans* fat, and cholesterol; avocados provide 0.5 g of saturated fat per ounce.

U.S. Food and Drug Administration

(January 1, 2008)

Vegetables

Nutrition Facts



Raw, edible weight portion.
Percent Daily Values (%DV) are
based on a 2,000 calorie diet.

Vegetables Serving Size (gram weight/ounce weight)	Calories		Calories from Fat		Total Fat		Sodium		Potassium		Total Carbohydrate		Dietary Fiber		Sugars		Protein		Vitamin A		Vitamin C		Calcium		Iron		
			g	%DV	mg	%DV	mg	%DV	g	%DV	g	%DV	g	%DV	g	%DV	g	%DV	%DV	%DV	%DV	%DV	%DV	%DV	%DV	%DV	
Asparagus 3 spears (93 g/3.3 oz)	20	0	0	0	0	0	230	4	1	2	8	2g	2g	10%	15%	2%	2%										
Bell Pepper 1 medium (148 g/5.3 oz)	25	0	0	0	40	220	6	2	6	2	8	4g	1g	4%	190%	2%	4%										
Broccoli 1 medium stalk (148 g/5.3 oz)	45	0	0.5	1	80	460	3	13	8	3	12	2g	4g	6%	220%	6%	6%										
Carrot 1 carrot, 2" long, 1 1/4" diameter (78 g/2.8 oz)	30	0	0	0	60	250	3	7	7	2	8	5g	1g	110%	10%	2%	2%										
Cauliflower 1/8 medium head (99 g/3.5 oz)	25	0	0	0	30	270	1	8	5	2	8	2g	2g	0%	100%	2%	2%										
Celery 2 medium stalks (110 g/3.9 oz)	15	0	0	0	115	260	5	7	4	1	2	2g	0g	10%	15%	4%	2%										
Cucumber 1/3 medium (99 g/3.5 oz)	10	0	0	0	0	140	0	4	2	1	4	1g	1g	4%	10%	2%	2%										
Green (Snap) Beans 1/4 cup cut (83 g/3.0 oz)	20	0	0	0	0	200	0	6	5	2	12	2g	1g	4%	10%	4%	2%										
Green Cabbage 1/12 medium head (84 g/3.0 oz)	25	0	0	0	20	190	1	5	5	2	8	3g	1g	0%	70%	4%	2%										
Green Onion 1/4 cup chopped (25 g/0.9 oz)	10	0	0	0	10	70	0	2	2	1	4	1g	0g	2%	8%	2%	2%										
Iceberg Lettuce 1/8 medium head (89 g/3.2 oz)	10	0	0	0	10	125	0	4	2	1	4	2g	1g	6%	6%	2%	2%										
Leaf Lettuce 1 1/2 cups shredded (185 g/6.6 oz)	15	0	0	0	35	170	1	5	2	1	4	1g	1g	130%	6%	2%	4%										
Mushrooms 5 medium (84 g/3.0 oz)	20	0	0	0	15	300	0	9	3	1	4	0g	3g	0%	2%	0%	2%										
Onion 1 medium (148 g/5.3 oz)	45	0	0	0	5	190	0	5	11	3	12	9g	1g	0%	20%	4%	4%										
Potato 1 medium (148 g/5.3 oz)	110	0	0	0	0	620	0	18	26	9	8	1g	3g	0%	45%	2%	6%										
Radishes 2 radishes (85 g/3.0 oz)	10	0	0	0	55	190	2	5	3	1	4	2g	0g	0%	30%	2%	2%										
Summer Squash 1/2 medium (98 g/3.5 oz)	20	0	0	0	0	260	0	7	4	1	2	2g	1g	6%	30%	2%	2%										
Sweet Corn kernels from 1 medium ear (90 g/3.2 oz)	90	20	2.5	4	0	250	0	7	18	6	8	5g	4g	2%	10%	0%	2%										
Sweet Potato 1 medium, 5" long, 2" diameter (138 g/4.9 oz)	100	0	0	0	70	440	0	3	23	8	16	7g	2g	120%	30%	4%	4%										
Tomato 1 medium (148 g/5.3 oz)	25	0	0	0	20	340	0	10	5	2	4	3g	1g	20%	40%	2%	4%										

Most vegetables provide negligible amounts of saturated fat, *trans* fat, and cholesterol.

U.S. Food and Drug Administration
(January 1, 2008)

APPENDIX F
EDUCATION OUTLINE

- I. Introduction
 - A. Learning objectives
 - B. Receipt collection

- II. USDA Handouts
 - A. Liven up meals with fruits and vegetables (F/V)
 - 1. stir-fry suggestions
 - 2. breakfast additions- omelet, smoothie, yogurt parfait
 - 3. casseroles and salads
 - B. Shopping for F/V
 - 1. canned or frozen- benefits and cautions
 - 2. pre-cut ready to eat advantages/disadvantages
 - C. MyPlate
 - 1. appearance of plate- ½ F/V
 - 2. whole grains, low-fat milk
 - 3. portions-examples

- III. F/V Nutrition Facts Page
 - A. Fruits
 - 1. highlight powerful fruits
 - 2. encourage variety
 - B. Vegetables
 - 1. highlight disease fighting vegetables
 - 2. fiber benefits
 - C. Role Model
 - 1. lead by example
 - 2. incorporate children into cooking and shopping duties

- IV. Question/Answer

APPENDIX G
TOUR OUTLINE

I. Introduction

- C. Tour objectives and timeline
- D. Receipt collection
- E. Learning objectives

III. Produce

B. Fruit

- 4. selection of variety, trying something new, involving children
- 5. selections suggestions- price, season, selection
- 6. frozen, canned, fresh, pre-cut

B. Vegetables

- 1. usual players vs disease fighters
- 2. selection, preparation, and storage ideas
- 3. emphasize trying something new, focus on color

C. Layout

- 1. non F/V items placed in or near produce section
- 2. lighting, signage, flooring
- 3. ask for help

III. Deli/Bakery

B. Whole grains

- 1. reading ingredient and nutrition labels
- 2. focus on fiber

B. Meat/Cheese

- 1. proportional to F/V
- 2. low-fat options

C. Pre-made meals

- 1. eat this- not that- rotisserie vs fried, mayonnaise vs yogurt
- 2. focus on flow, POPs, what does the store want you to select

IV. Junk Food

A. Cereal

- 1. whole grain vs sugar
- 2. product placement- colors, eye level, characters

B. Beverages

- 1. soda- limit as much as possible, displaces calories
- 2. sports drinks- beware of dyes and sugar
- 3. juices- look for 100%

C. Tips to decrease time spent in junk food isles

- 1. leave shopping cart on end of isle
- 2. stick to the list

3. who are you buying the product for, and why are you buying the product

- V. Dairy
 - A. Note location- back of the store
 - B. Beware of your surroundings

- VI. Summary
 - A. Role models
 - B. Habit formation
 - C. Q&A

APPENDIX H
RECIPES

📄



Recipe for: Captain's Pasta Salad



Preparation time: 20 minutes

Ingredients:

- 1 cup of grapes sliced in half
- 1 cup of strawberries sliced in quarters
- 1/2 cup of green onion sliced
- 1 small mandarin orange - drained
- 1 cup of cooked chicken sliced
- 1 lb of penne or bowtie pasta
- 1/4 cup of poppy seed dressing

Instructions:

1. Boil pasta according to package directions
2. Drain pasta and toss with all ingredients except mandarin oranges
3. Add mandarin oranges and salt/pepper to taste
4. Serve and enjoy

📄

📄

📄

Recipe for: Watermelon & Heirloom Tomato Salad

From: True Foods Kitchen

Preparation time: 20 minutes

Ingredients:

- 1 watermelon peeled & cut into chunks
- 4 heirloom tomatoes - cut into chunks
- 12 mint or basil leaves - chopped
- 1 lb of sliced onion - paper thin
- 2 tsp extra virgin olive oil
- 1 tsp white balsamic vinegar
- Sprinkle of feta cheese (optional)
- Coarse sea salt and pepper to taste

Instructions:

1. Arrange watermelon and tomato in serving platter
2. Sprinkle with mint or basil leaves and onion
3. Drizzle with olive oil and vinegar
4. Finish with salt and pepper

📄

📄

📄

📄



TUSCAN KALE SALAD

True Food
kitchen

4-6 cups Kale, loosely packed, sliced
leaves of Italian black (Lacinato,
"dinosaur," cavolo nero) midribs removed

Juice of 1 Lemon

3-4 T Extra-Virgin Olive Oil

2 cloves Garlic, mashed

Salt & Pepper, to taste

Hot Red Pepper Flakes, to taste

2/3 cup grated Pecorino Toscano cheese
(Rosselino variety if you can find it) or
other flavorful grating cheese such as
Asiago or Parmesan

1/2 cup freshly made Bread Crumbs from
lightly toasted bread

DIRECTIONS:

Whisk together lemon juice, olive oil, garlic, salt, and pepper, and a generous pinch (or more to taste) of hot red pepper flakes. Pour over kale in serving bowl and toss well. Add 2/3 of the cheese and toss again. Let kale sit for at least 5 minutes. Add bread crumbs, toss again, and top with remaining cheese.

© 2009 Fox Restaurant Concepts