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A Case Study to Assess Food Variety and Availability among Low-Income Mothers in Residential Substance Abuse Recovery

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Abstract

We assessed household food insecurity, and amount and variety of food items using a 251-item Household Food Inventory (HFI) among 11 mothers residing in a recovery from substance use facility in rural, North Carolina. Food and beverage items were coded and categorized into food groups based on the 2015 Dietary Guidelines and MyPlate. Households lacked fresh fruit, vegetables, low-fat dairy, lean meat, and whole grain and had an abundance of sweetened, pre-packaged, high-fat food items. Further research focusing on shifts in addiction and food choice would better guide nutrition interventions and understanding of the recovery process in this population.

Keywords: *Dietary Guidelines; Food Choice; Substance Abuse Recovery; Household Food Inventory*

Introduction

Obesity remains a prominent public health issue among adults and children in the US [1]. Obesity has a strong associative risk with cardiovascular disease, type 2 diabetes mellitus, renal failure, pulmonary dysfunction, and endometrial, breast, prostate, and colon cancers [2]. Women, particularly mothers, in substance abuse recovery are a demographic population of specific concern for poverty-related obesity due to specialized nutrient needs, difficulties obtaining healthy food choices, and oftentimes raising multiple young children [3]. As compared to those who do not use illicit drugs, women who use drugs are younger, less educated, have poorer health status, suffer a greater degree of emotional stress, are unmarried or divorced, unemployed, and more likely to receive public assistance [4].

The 2015 Dietary Guidelines for Americans serve as a primary food-related, disease-prevention tool, reflecting evidence-based findings in nutrition research [5]. Nutritious, balanced eating along with physical activity helps to maintain a healthy weight and reduce disease risk [5] and is critical when recovering from substance abuse or dependence [6]. The goal is to help build balanced, healthy eating patterns by highlighting fruits, vegetables, whole grains, lean meats or plant-based protein sources, low-fat/fat-free dairy products, and water while emphasizing reductions in dietary saturated fats, trans fats, sodium, and added sugars. It stresses that in order to move toward healthier, easier, and more cost-effective dietary practices, comprehensive and coordinated care in all levels of society must be obtained [5].

The Dietary Guidelines [5] are especially important for adults with children in the home, as child eating patterns tend to mimic the patterns of their parents [7,8]. However, obtaining nutritious foods can be difficult for those on fixed budgets with limited resources, particularly single mothers. In 2014, 14% of all American households were unable to obtain adequate food to meet their needs [9]. However, food insecurity was 39.5% among households with annual incomes below the federal poverty line [9]. When a household is food insecure, the viability of the household as a constructive and reproductive unit is endangered by food unavailability [10]. From reports in 2006 and 2014, food insecurity among children was about three times more prevalent in households headed by single women than those of married couples [9,11]. Food insecure children are at higher risk for poorer generalized health, more frequent hospitalization rates, behavioral and psychosocial issues, and lower math and reading scores [9].

The current study aims to assess household food insecurity, and the amount and variety of food items by utilizing a Household Food Inventory (HFI) in a residential substance abuse recovery facility for mothers. The findings of this study will provide information regarding the types of foods used by mothers and their children in a residential substance abuse recovery program, especially focusing on nutrients that are emphasized by the Dietary Guidelines [5].

Materials and Methods

Participants

Participants were a convenience sample selected from a perinatal substance abuse treatment program with an apartment-based supervised living facility for low-income, homeless mothers and their children up to 11 years of age. A full kitchen equipped with a refrigerator, freezer, stove, oven, microwave, and storage space was included in each apartment. Eligibility included mothers over the age of 18 who were at least one year postpartum, not currently pregnant, and residing in the residential substance abuse recovery program. East Carolina University's Institutional Review Board approved this study.

Thirteen women were recruited and consented to participate during a regularly scheduled meeting at the facility. One participant was excluded because she had no children, creating a sample of 12 mothers. The cross-sectional study was completed during October-November 2011. Digital cameras (Olympus Model FE-26) were distributed during the first in-home visit and served as incentive for study participation.

Baseline Questionnaire

During recruitment, a survey including a sociodemographic questionnaire and household food insecurity assessment was read aloud to participants by the researcher and was completed by participants. Sociodemographic characteristics included participant's age, residence, number of adults and children residing in the household, self-reported weight and height, marital status, race, education level, employment status, annual household income, self-assessment of current health status, and participation in nutrition federal assistance programs (e.g., Supplemental Nutrition Assistance Program [SNAP], Special Supplemental Nutrition Program for Women, Infants, and Children [WIC], Supplemental Security Income [SSI], and Social Security Disability Insurance [SSDI]). Household food insecurity at the adult and child levels was measured using the US Household Food Security Survey Module: Three-Stage Design, With Screeners [12]. Food security is nominally categorized as high, marginal, low, and very low. Households with low or very low scores are considered food insecure [12].

Household Food Inventory (HFI)

There are a number of methods available to assess household food supply, including grocery store receipts [13] and household food inventories [14,15]. Inventories of household food supplies (HFI) enumerate a large variety of food items in the home and may be a suitable and accurate method for assessing the home food environment [16]. Household foods were inventoried in each participant's home by two trained researchers during two separate visits with 12 - 16 day intervals. The visits were scheduled two weeks apart to account for intra-household variability of grocery purchases throughout the month. The HFI instrument included 251 food items to measure food presence [15]. Total amounts of food counted by number of items as well as the packaged weight were recorded. Prepared foods from fast food restaurants and leftover boxed food items were excluded.

During each visit, participants were asked to specify any areas in the residence where food or beverage items were stored. A comprehensive inventory of household food supplies was conducted from refrigerators, freezers, cabinets, storage areas/pantries and countertops. The researchers utilized a "call out" method in which one member of the research team located and stated the type and amount (by weight or number) of each food item while the other researcher recorded the information. The first HFI required an average of 40 minutes and the second, approximately 25 minutes to record.

Data Analysis

Descriptive statistics were calculated for mean and frequency of sample demographic characteristics and food insecurity using SPSS. HFI data were coded and categorized into individual food groups based on the 2015 Dietary Guidelines for Americans [5] and MyPlate food groups [17]. Fruits and vegetables were categorized as fresh, canned, or frozen. Results were then further detail-coded by separating whole grain from refined products, distinguishing 100% juice from fruit drinks or concentrate, and distinguishing fat and sugar content (i.e. reduced, low, free as per product food labels).

Results

Eleven of 12 participants completed two household food insecurity inventories. One participant did not maintain her second appointment and thus her data were excluded from analysis.

Characteristics of Participants

Demographic characteristics of the participants are displayed in Table 1. Ages ranged from 24 to 40 years (mean age = 32 years). The majority of participants were Caucasian, African American, or mixed race. All had at least one child under 18 years of age in the household; all reported challenges with grocery shopping, cooking, and preparing foods; all participated in at least two federal food assistance programs with seven participating in at least three federal assistance programs (data not shown); nine had household annual incomes of less than $10,000 and had obtained at least a high school diploma; ten were unemployed, with four reporting that they were unable to work.

Participant Characteristics (n = 11)	
Children	**Number**
Care for Children Without Help of Husband or Partner	10
1 Child Under 18 in Household	8
2 Children Under 18 in Household	2
3 Children Under 18 in Household	1
Participation in Nutrition Federal Assistance Programs	
Women, Infants, and Children (WIC)	7
Supplemental Nutrition Assistance Program (SNAP)	11
Medicaid	10
Medicare	1
Race/Ethnicity	
White	3
Black or African American	4
American Indian, Alaska Native	1
Mixed Race	3
Annual Income	
$0-10,000	9
$10,001-20,000	1
Don't Know/Refused	1
Health Status[1]	
Very Good	2
Good	4
Fair	5
BMI[2]	
Normal	3
Overweight	3
Obese	5

Table 1: *Participant Characteristics (n = 11).*

[1]Self-reported as poor, fair, good, or very good

[2]Calculated from self-reported height and weight

Four of the households were considered to be food secure, and seven were food insecure (n = 3 with low food security; n = 4 with very low food security). Over half (n = 6) of the adult participants were considered food secure (n = 2 with low food security, n = 3 with very low food security), however eight of the households reported to be food secure at the child level.

Food Availability and Variety

The amount and variety of foods available in households is expressed in Table 2.

Food availability and variety: Number of Participants (n = 11) with Foods Present During Two Household Food Inventories			
Fresh Fruits	**Two Inventories**	**One Inventory**	**No Inventory**
Apples	3	6	2
Bananas	1	3	7
Grapes	0	2	9
Lemons	1	1	9
Oranges	2	4	5
Peaches	0	1	10
Pears	0	0	11
Plums	0	1	10
Strawberries	0	1	10
Watermelon	0	1	10
Variety of Fresh Fruits			
0	1	3	7
1-2	6	2	3
≥3	1	2	8
Fresh Vegetables			
Avocado	1	0	10
Broccoli	0	1	10
Carrots	2	1	8
Celery	2	4	5
Corn	0	2	9
Cucumbers	1	2	8
Greens	1	1	9
Lettuce	4	5	2
Mushrooms	1	1	9
Onions	4	4	3
Peppers, Bell	2	4	5
Potatoes	6	4	1
Radishes	0	1	10
Squash	0	0	11
Tomatoes	0	4	7
Variety of Fresh Vegetables			
0	2	0	9
1 - 2	0	3	8
≥ 3	6	3	2
Canned Fruits and Vegetables			
Applesauce	4	2	5
Cranberry Sauce	1	0	10
Mixed Fruit	2	1	8
Peaches	2	2	7
Pears	2	0	9
Pineapple	2	0	9
Banana Peppers	2	1	8
Beets	1	1	9
Carrots	2	1	8
Corn	9	1	1
Greens	3	3	5
Green Beans	9	1	1
Green Peas	6	1	4
Pickles	5	5	1
Salsa	3	1	7
Tomatoes	7	2	2
Yams	1	1	9
Frozen Vegetables			
Asparagus	1	0	10
Broccoli	3	2	6
Brussels Sprouts	1	1	9
Cauliflower	0	1	10
Corn	4	0	7
Green Beans	1	0	10
Mixed	1	2	9
Okra	1	1	9
FF Potatoes	4	3	4
Legumes			
Canned Beans	5	2	4
Beans (Dry)	2	2	7
Beans (Sauce, Chili)	1	1	9
Pork and Beans	1	2	8
Refried/Baked Beans	8	1	2
Dairy - Milk			
Whole	2	0	9
Reduced Fat (2%)	5	2	4
Low Fat (1%)	0	1	10
Skim (Fat Free)	1	0	10
Soy	1	1	9
Dairy - Yogurt			
Regular	1	3	7
Low Fat	2	3	6
Greek	1	1	9
Dairy - Cheese			
Cheese spread	4	3	4
Regular	10	1	0
Low Fat	0	1	10

Table 2: *Food availability and variety: Number of Participants (n=11) with Foods Present During Two Household Food Inventories.*

Fresh Vegetables

Fresh vegetables were more commonly available in the homes than fresh fruits. Only two households had none during either HFI collection period. The most common were nutrient-poor vegetables, such as potatoes, lettuce (typically Iceberg) and yellow onions.

Canned and Frozen Fruits and Vegetables

Applesauce was the most prevalent canned fruit available in six households on at least one HFI collection period. Almost all of the canned fruits, however, were packed in their own juice or 100% juice with the exception of one household which were canned in heavy syrup (data not shown). Canned corn, green beans, tomatoes, and green peas were the most common canned vegetables, and one household had as much as eight pounds at one time (data not shown). Nine households had corn and green beans on both inventories. French fried (FF) frozen potatoes were also a common frozen vegetable; four households had FF at both HFI collection periods and three households had FF at one HFI collection period.

Legumes

A variety of canned beans, such as refried and baked was much more prevalent in households than dry beans. Seven households did not have any dry beans on either collection period, while eight households had baked beans present at both collection periods.

Dairy

Cheese was the most popular during the HFI collection periods: Ten households had some type on both occasions; regular fat was the most available; low-fat was available in one household. Ten of 11 households had no low-fat or fat-free milk, while 7 had reduced-fat or whole milk. Yogurt was the least available dairy: Low-fat was the most common, found in five households; Greek was the least popular, found in two households.

Meat, Poultry, Seafood, and Other Protein

Beef was more prevalent than any other type of meat, poultry, or seafood. Pork was most commonly found in the form of bacon. Unbreaded chicken breast was available in seven households, while breaded chicken was available in six. Eggs were available in each household on at least one occasion. Peanut butter was a popular protein source, with eight households having peanut butter on both occasions.

Cereals, Breads, Crackers, Prepared Desserts, Noodles, and Rice

The majority of cereal was sweetened, available in six households on both HFI occasions, compared to unsweetened cereal, available in one household on both occasions. Most often, refined grain versions were purchased over whole grain products (breads, crackers, tortillas, pasta). Most bread was white refined grain (available in 10 households on both occasions), as opposed to whole grain (unavailable on both occasions for six households). Both white rice and pre-packaged, processed rice were available in seven households, however brown rice was available in three. The majority of participants possessed Ramen noodles (n = 11), refined pasta (n = 10), and boxed macaroni and cheese (n = 9), while very few households had whole grain pasta available (n = 3). Cookies and cake were present in about half of the households.

Chips, Snacks, and Frozen Desserts

Regular fried potato chips were the most popular snack food, available on more occasions than baked chips. Pretzels (available in three households), nuts and granola bars (two households) were less common snack food items. Regular ice cream was present in seven households on at least one occasion, but low-fat ice cream was present in one household on one occasion.

Beverages

The most common was 100% fruit juice, available in all households during at least one HFI collection period, while artificial fruit drinks were present in eight. Regular soda was available in eight households on at least one HFI collection period; diet soda was available in four households at one HFI collection period.

Discussion

Overall, the households lacked fresh fruits and vegetables, whole grains, lean meat, and low-fat dairy. The most commonly available fresh vegetables were onions and iceberg lettuce, which have high water content and less nutritional value than darker leaves or colorful vegetables recommended by the Dietary Guidelines [5]. The Dietary Guidelines recommend 2 - 2 ½ cup-equivalents each of fruits and vegetables per day for the average adult 2,000 calorie diet [5]. Mothers in recovery are consuming significantly less fruits and vegetables, which contribute to lower fiber, vitamin, and nutrient intake than the recommended daily value. Further, falling short of fruit and vegetable intake recommendations places children at risk for chronic disease [2] as well as growth and development issues [18]. The data supports current findings that lower income households may not have the resources to make frequent grocery store trips, which leads to limited access to fresher and healthier food items [19]. The lower price and higher shelf life of packaged food versus fresher versions may explain the higher availability of packaged fruits and vegetables, such as canned green beans, corn, and packaged fruit juice in the households.

For women in recovery, weight gain is a common issue [20]. Despite women in recovery having increased need for complex carbohydrates, nutrients, and fiber from whole grain sources to promote weight maintenance [6], most households had an abundance of white, refined grains available during both collection periods. Adults who eat more whole grains tend to maintain a healthy body weight [5]. Thus, an increased intake of whole grains would be beneficial to women in recovery.

The Dietary Guidelines also encourage intake of a variety of protein sources including seafood, meat and poultry, eggs, beans, peas, soy products, and unsalted nuts and seeds [5]. Mothers are especially encouraged to increase intake of proteins to help rebuild muscle and persevere body tissue damaged by substance abuse [21]. Protein also provides tryptophan, the amino acid used in creating serotonin which can curb depression, fatigue, cravings, and triggering relapse [22]. While lean meats such as chicken, turkey, and fish are recommended, beef and high cholesterol, fat, and sodium breakfast protein including eggs, bacon, and sausage were predominantly available in the households. Another common source of protein included processed nuts. Peanut butter was available in 10 of 11 households yet soy protein and seeds were not available on any HFI assessments. Only two households had salted nuts available. In contrast to the predominant protein sources available in the households, mothers in recovery would benefit from higher consumption of lean meat, soy protein, unsalted nuts and seeds to maintain healthy body weight, adequate serotonin levels, and lower risk of cardiovascular disease [5].

In this study, low-fat cheese was found in only one household during one HFI collection period; low-fat or skim milk in two households; and low-fat yogurt in five households. These findings align with existing data that in most American households, especially those with children, have inadequate or high in fat overall dairy and calcium intake [25]. This poses increased risk for unfavorable overall performance in school as well as poor physical health and emotional well-being among children [23,24].

The majority of foods inventoried in this study were pre-packaged and ready-to-eat convenience foods (i.e. chips, crackers, boxed noodles, frozen entrees, ice cream). Poor health and nutrition knowledge, along with highly scheduled days, may contribute to the less healthy, more convenient food choices [21,26]. In the current study, all participants had at least one child in their homes which may be a reason for the abundance of time efficient, ready-to-eat packaged food items [26].

The food choices evaluated in the home inventories were highly-sweetened and representative of foods and beverages that contribute to weight gain, posing a risk for chronic health conditions. Though discouraged in the Dietary Guidelines, most households had large amounts of candy (n = 10) and sweetened snacks including ice cream (n = 8), cookies (n = 5), cakes (n = 6), sweetened cereals (n = 8), non-diet soft drinks (n = 8), and juices (n = 11). In Shaffer., *et al*. (2004) "syndrome model," recovering individuals acquire new addictions to continue their compulsive behaviors and often rely on foods high in sugar, fat, and caffeine [27]. Ready-to-eat sweetened foods and beverages are preferred to satisfy quick onset and sharp cravings [27]. Sugar is often consumed in excess to help balance low blood glucose levels, mood swings, depression, and poor concentration [27]. Caffeinated beverage intake is also increased during early stages

of recovery to boost the central nervous system and raise blood glucose temporarily to relieve withdrawal symptoms [27]. Rapid weight gain tends to occur with individuals in recovery, especially during the early stages when experiencing withdrawal and when using sweetened, high calorie food and beverages to cope [28]. The combination of increased appetite, poor food choices, and significant gains in body weight, pose risks for diseases, such as dyslipidemia, type 2 diabetes mellitus, and hypertension [5].

Limitations of the current study include not accounting for food purchased and consumed outside of the home (i.e. at work or school) and HFI collection during two separate periods. Future research should assess household availability using more frequent HFIs (including immediately preceding, after, and between grocery store visits), considering using other methods to establish actual and overall dietary intake, and include the effects of income volatility.

Conclusion

Mothers in recovery lacking healthful foods recommended by the Dietary Guidelines for Americans [5] suggests that they are a population of special concern especially at risk for food insecurity and with limited research. The HFI on two separate occasions in one month has proved to be helpful in assessing the types and amounts of foods in households of mothers in recovery. Children of mothers in recovery would also benefit from healthier at-home food selection, as children tend to mimic their parents' eating patterns [7]. Future research within this population should further investigate the barriers to obtaining fresh fruits, vegetables, low-fat dairy, lean meats, whole grains, and whole foods and the intake or acceptance of these healthier options among mothers and children.

Recovery affects important bodily processes including metabolism, organ function, and mental well-being [6]. Having a nutrient-dense, low-fat diet, is important during the early stages of recovery, as there are many key nutrients that are necessary to provide energy, build and maintain healthy organs, and prevent infection [6]. For those in recovery, it is important to follow a consistent eating pattern with regular mealtimes, consume a low-fat diet with adequate protein, complex carbohydrates and fiber, and take a daily multivitamin [6]. Balanced nutrition may prevent relapse by improving overall mood and health [6].

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