

USING A HOUSEHOLD FOOD INVENTORY TO ASSESS FOOD VARIETY AND
AVAILABILITY AMONG MOTHERS IN RESIDENTIAL SUBSTANCE ABUSE
RECOVERY PROGRAMS

by

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August, 2013

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Obesity and substance abuse are two major public health issues in the United States, especially among low-income individuals. The United States Department of Health and Human Services has set forth the *Dietary Guidelines*, which encourage a diet rich in fresh fruits, vegetables, whole grains, legumes, lean meat, and low-fat dairy to help Americans obtain a healthy body weight. Substance abusers in recovery are at increased risk of weight gain, as their previous addiction may continue with the substance shifting from drugs or alcohol to sugary or high fat food. Nutrition interventions have been beneficial in recovery by improving outcomes and preventing relapse, however, possible barriers to obtaining fresh, healthy food items have been noted. There is limited research investigating females, especially mothers, in recovery and their access to healthy food items. The current study utilized a demographic survey and multiple Household Food Inventories (HFI) to assess the amount and variety of food items of mothers and their children in a residential substance abuse recovery facility. A sample of 11 mothers in rural, eastern North Carolina completed the survey and two separate HFI, two weeks apart to account for intra-monthly variability. Demographic information was entered into Statistical Package for the Social Sciences [SPSS] while HFI data were coded and categorized in Microsoft Excel. Results included all 11 mothers participated in at least

two different federal food assistance programs, stated they face challenges grocery shopping, and seven households were food insecure. Fresh vegetables were slightly more common in households than fresh fruits, and canned, frozen, and packaged fruits (especially fruit juice), vegetables, and legumes, were more prevalent than fresh forms. Cheese was the most popular form of dairy, and most was full fat. The majority of protein was red meat or breakfast meat including bacon and sausage. Whole grain was less common than white, refined grain products. There was an abundance of pre-packaged, convenience food including chips, ice cream, cookies, and cakes. The results indicated that the HFI on two separate occasions was beneficial to explain variability among types and amounts of food items from one assessment to the next, especially among fresh fruits, fresh vegetables, and chicken. The lack of fresh fruits, vegetables, low-fat dairy options, lean meats, and whole grains in combination with copious sweetened, pre-packaged, high-fat food items form a diet associated with obesity and contradictive of the *Dietary Guidelines*. Possible barriers to obtaining healthier food options may include low or fluctuating income and federal assistance benefits, limited transportation, decreased storage space, infrequent grocery trips, or a lack of nutritional knowledge. Mothers and children in recovery could benefit from nutrition education and improved access to healthier food items. Future research should further investigate the barriers to obtaining fresh, healthy food items, as well as shifts in addiction from substance to food, food choice, disordered eating patterns, and subsequent weight and health issues to guide nutrition interventions for mothers and children in substance abuse recovery facilities.

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RECOVERY PROGRAMS

A Thesis

Presented To the Faculty of the Department of Nutrition Science

East Carolina University

In Partial Fulfillment of the Requirements for the Degree

Master of Science in Nutrition

by

Kylie Gearhart

August, 2013

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ACKNOWLEDGEMENTS

I would like to thank my supportive parents for providing me with the opportunity to gain this tremendous education and the necessary tools to succeed in life. I would also like to thank my director of thesis and thesis committee for their time, instruction, and tremendous effort in helping with the construction of this thesis.

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CHAPTER 1: REVIEW OF THE LITERATURE

Obesity remains a prominent public health issue among adults and children in the US (Ogden, Carroll, Kit, & Flegal, 2012). More than 35% of adults and 17% of children in the US are obese (Ogden et al., 2012). Obesity has a strong associative risk with cardiovascular disease, type 2 diabetes mellitus, renal failure, pulmonary dysfunction, and endometrial, breast, prostate, and colon cancers (National Institutes of Health [NIH], 1998). Nutritious, balanced eating along with physical activity helps to maintain a healthy weight and reduce disease risk (United States Department of Agriculture [USDA] & Department of Health and Human Services [DHHS], 2010).

The *2010 Dietary Guidelines for Americans* serve as a primary food-related, disease-prevention tool, reflecting evidence-based findings in nutrition research (USDA & DHHS, 2010). Its goal is to help build balanced, healthy eating patterns by highlighting the need for fruits, vegetables, whole grains, lean meats or plant-based protein sources, and low-fat/fat-free dairy products, 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 including individuals, families, workplaces, schools, governments, industries, and health care must be obtained (USDA & DHHS, 2010).

Adequate intake of fruits and vegetables is preventative against obesity and comorbidities, hence the heavy emphasis on mostly plant-based foods by the *Dietary Guidelines* (USDA & DHHS, 2010). Fruits and vegetables in the freshest form provide higher nutritional value than canned or frozen (Prochaska, Nguyen, Donat, & Piekutowski, 2000). Increasing fruits,

100% juice, and vegetable (FJV) consumption provides fiber, nutrients, vitamins, minerals, and antioxidants needed for a healthy, disease-free life (Potter, 1997).

The *Dietary Guidelines* (USDA & DHHS, 2010) are especially important for adults with children in the home, as child eating patterns tend to mimic the patterns of their parents (Tucker, van Zandvoort, Burke, & Irwin, 2011; Yu, 2011). Over 70% of the food eaten by Americans is consumed in the home, and there is a strong correlation between this consumption and energy intake (Sisk, Sharkey, McIntosh, & Anding, 2010). Further, children consume more FJV when these items are readily available in the homes (Hanson, Neumark-Sztainer, Eisenberg, Story, & Wall, 2005; Jago, T. Baranowski, J. C. Baranowski, Cullen, & Thompson, 2007).

However, obtaining fresh fruits and vegetables can be difficult for those on fixed budgets, particularly single mothers. In 2010, 15% of American households were unable to obtain adequate food to meet their needs due to financial hardships (Coleman-Jensen, Nord, Andrews, & Carlson, 2011). This concept of lack of adequate food is referred to as “food insecurity” (Adedeji, 1989). When a household is food insecure, the viability of the household as a constructive and reproductive unit is endangered by food unavailability (Frankenberger & Goldstein, 1991). In 2006-2007, food insecurity among children was about three times more prevalent in households headed by single women than those of married couples and about twice as prevalent in those headed by single men (Nord, 2009). Food insecurity among children was present in about a quarter of households with annual incomes below the federal poverty line (Nord, 2009). Food insecurity puts children at higher risk for health problems including poorer generalized health, more stomach aches and colds, more frequent hospitalization rates, behavioral issues, higher rates of psychosocial issues, and lower math and reading scores (Nord, 2009).

There is a strong correlation between income and obesity, and some of the most poverty-stricken states exhibit the highest rates of obesity (Aspen Publishers, Inc., 2009; Ogden, Lamb, Carroll, & Flegal, 2010). Low-income women are particularly at risk for obesity as 42% of those living below the poverty level are obese while only 29% above the poverty level are obese. Obesity rates are also significantly higher in rural areas of the US due to contributors, such as lack of local public health capacities, changing lifestyles, dependence on Medicare, lack of knowledge or information, lack of synchronization of local providers, socio-economic drawback, geographic isolation, provider shortages and lack of transportation (National Advisory Committee on Rural Health and Human Services, 2005).

Gaps in Literature

The majority of studies that have investigated nutrition-related health aspects of recovering individuals are focused on males. There is limited information of the nutritional concerns of women in recovery, especially among postpartum women. Further, there is a gap in the literature with regard to the interchanges between alcohol, drug, food, and behavioral addictions (Shaffer et al., 2004). Assessing the characteristics of substance abusers, specific stages of change in substance abuse recovery, the transitioning process between substances and behavioral addictions, eating patterns, and subsequent weight changes will help to determine the nutrition related issues faced by those in recovery.

Methods of Literature Review

In order to address the gap in the food availability and nutritional concerns of women recovering from substance abuse, a systematic review of the literature was conducted to identify specific issues that women face during the stages of recovery. Studies in this review were collected via a comprehensive literature review using the following East Carolina University

Electronic Database: One Search, Academic Search Complete, LexisNexis Academic, MEDLINE, PubMed, and CINAHL. The search was conducted in 2012 and 2013 using combinations of the following search keywords: nutrition, food choice, eating behavior, weight change, health, substance abuse, addiction, dependence, treatment, stage of recovery, cognitive-behavioral, postpartum women, females, obesity, dietary guidelines, income, food insecurity and symptom substitution. A total of 61 articles were identified and summarized in this literature review.

Substance Abuse

Substance abuse and dependence are some of the most pressing and detrimental health and social issues in the United States today. They yield serious, life threatening physical and mental health problems, destroy familial ties, friendships, and other social relationships, and compromise economic status and financial well-being. An estimated 22.1 million people in the United States suffer from substance dependence or abuse with 15 million of those abusing solely alcohol (DHHS, 2010). Close to 95% of Americans with substance use issues meet the diagnostic criteria for treatment (DHHS, 2010). Substance use conditions often co-occur with mental health illnesses (DHHS, 2009). Over 8.9 million people have both a mental and substance use disorder, however only about 7% receive treatment for both conditions (DHHS, 2009). Extraordinary efforts have been made to understand the disorders and identify appropriate treatment strategies. Numerous hospitals now have treatment units for alcoholism and drug addiction, and treatment/rehabilitation centers, residential substance abuse services, and various other treatment programs may be found in diverse locales across the United States. Unfortunately, with recovery comes new challenges and dependencies, specifically with regard to relapse, dual addictions, and food choices that may adversely affect health (Hatcher, 1989).

Understanding food selections and health status of recovering substance abusers at various stages of recovery may help define optimal treatment.

An addiction is characterized as an intense, overriding motivational force or compulsion to get a hold of and consume a substance, along with a reduced ability to control this craving despite damaging consequences (Blüml et al., 2011; Coombs, 2004). The repeated exposure to the drug of abuse leads to sensitization, which is an increase in the rewarding properties and locomotor activating effects of a substance that accompany repeated exposure (Grigson, 2002). Other characteristics of addiction include tolerance, which is observed when users require greater amounts and doses to reach the desired level of intoxication, and withdrawal when the user becomes ill after stopping use for a prolonged amount of time and must dose again (Shaffer et al., 2004). Shaffer et al. (2004) describes an “addiction syndrome,” suggesting that an addiction be categorized by the origin, nature, and processes underlying the addiction rather than the substance of choice. In this model, the addictive disorders may not be independent, and there is evidence of many biopsychosocial precursors, manifestations, and consequents surrounding excessive substance use and behavior which may indicate a root addiction syndrome (Shaffer et al., 2004). A trademark of addiction is the desire to find an external reason and cure for problems, or something to blame for one’s actions or choices (Hatcher, 1989). Whether the substance of choice is alcohol, marijuana, nicotine, cocaine, prescription medicine, a combination of drugs, or even chocolate, recovery from any substance addiction requires a behavior-change process stemming from a cognitive-behavioral framework which is widely used in recovery programs (Cowan & Devine, 2007).

According to the cognitive-behavior theory, substance dependence is a learned behavior resulting from repeated experience with achieved desired outcomes, such as stress relief or

euphoria. From this viewpoint, the most pertinent aims of recovery are to distinguish the needs that the substance is being used to meet and to acquire skills which provide alternate, healthier ways of meeting needs while achieving abstinence from the substance (Kadden, 2002). As the addicted person progressively acquires new skills that support recovery, they discontinue old habits and thinking patterns that promote recovery, although relapse is a possibility (Cowan & Devine, 2007). Cognitive-behavioral interventions, along with a client-centered approach, have demonstrated to be the most successful treatment methods for abusers attempting to achieve initial abstinence (Coombs, 2004).

Within the small percentage of Americans who recognize their substance dependence problem, 273,000 have made an unsuccessful effort to obtain treatment (DHHS, 2006). For those who obtain treatment, 80% to 90% will relapse within the first year (Marlatt & Gordon, 1985). According to the “syndrome model,” the reason for such high relapse may lie in the common treatment method of focused object-specific treatment despite the current research suggestion that addiction arises from more dominant foundations rather than just the objects of addiction themselves (Shaffer et al., 2004). Symptom substitution likely occurs when the therapist treats the symptoms of the addiction, but fails to treat underlying psychological issues (Conner, Stein, Longshore, & Stacy, 1999).

Healthy People 2020 (DHHS, 2013) recognizes substance abuse as one of the most complex public health issues due to social attitudes and political and legal responses to the use of alcohol and illicit drugs. The Healthy People 2020 goal in this regard is to reduce substance abuse to protect the health, safety, and quality of life (DHHS, 2013). Specific objectives for screening and treatment include increasing the proportion of people who receive alcohol and/or illicit drug treatment, specialty treatment for abuse or dependence, and emergency medical and

follow-up care (DHHS, 2013). Healthy People 2020 also aims to promote health and reduce chronic disease risk through the intake of nutritious diets and maintenance of healthy body weights. Objectives related to healthier food access include increasing state-level policies that persuade food retail outlets to supply foods that are recommended by the Dietary Guidelines and the proportion of Americans who have access to these locations. Other objectives in the health care and worksite settings include increasing the proportion of physician office visits and worksite counseling for nutritious, balanced eating and healthy weight management (DHHS, 2013). Combining the individual objectives by increasing access to substance abuse treatment, healthier food outlets, and balanced eating and weight management counseling, the substance abuse population in America may experience expedited, more successful and sustainable healthier recoveries.

Characteristics of Substance Abusers

There are a number of demographic factors that are associated with substance abuse risk as demonstrated in Figure 1 (DHHS, 2010). Substance abuse may be equally as common among males and females (Substance Abuse and Mental Health Services Administration [SAMHSA], 2010). Notably, of those 18 years of age and older with drug or alcohol dependence, 20% of males and 17% of females receive treatment (DHHS, 2010). According to DHHS, in 2010, the rate of alcohol and substance abuse was highest among adults aged 18 to 25 years, and among American Indians and Alaska Natives (16%), followed by those of mixed race or Hispanic nationality (10% for each, respectively).

Highest rates of substance abuse in the US occur in the Western region of the US (10%), and more commonly in metropolitan rather than rural setting (DHHS, 2010). In 2010, DHHS reported those who graduate with a baccalaureate degree have low rates of substance abuse or

dependence, and unemployed have higher prevalence (16%) as compared to adults with part-time (11%) or full-time employment (9%). However, about half of substance abusers aged 18 or older were employed full-time in 2010 (DHHS). DHHS (2010) reported those with a criminal record who had been released from jail or on parole had higher rates of drug and alcohol dependence (38%), than those who were not recently in jail or on parole (8%). Those who had been on probation also had a significantly higher rate of substance abuse (37%), than those who were not on probation (8%) (DHHS, 2010).

Keyes and Hasin (2008) have reported alcohol dependence is higher among those experiencing socioeconomic disadvantage. Of those with family income levels less than \$20,000, the substance use problem is 12.5%, while families earning \$50,000 and higher have an 8.4% substance use problem (Han, Clinton-Sherrod, Gfroerer, Pemberton, & Calvin, 2011). Cigarette smoking, cannabis and polysubstance use are also more common among those from low socioeconomic status (Redonnet, Chollet, Fombonne, Bowes, & Melchior, 2012). It is important to recognize that although substance dependence and abuse is more prevalent in certain populations, addictions can be found commonly throughout the US (DHHS, 2010).

Table 1
Substance Dependence or Abuse in the Past Year among Persons Aged 18 or Older,
by Demographic Characteristics (n=67,804)

Demographic Characteristic	Illicit Drugs (% of total population)	Alcohol (% of total population)	Illicit Drugs or Alcohol (% of total population)
Total	3	7	9
Gender			
Male	4	10	12
Received Treatment	1	2	2
Female	2	5	6
Received Treatment	1	1	1

Race			
Caucasian	2	8	9
African American	4	6	9
American Indian or Alaska Native	6	15	17
Native Hawaiian or Other Pacific Islander	0	5	5
Hispanic or Latino	3	8	10
Two or More Races	3	8	10
Asian	1	3	4
Education			
Less than High School	4	7	10
High School Graduate	3	7	8
Some College	3	9	11
College Graduate	1	7	7
Current Employment			
Full-time	2	8	9
Part-time	4	9	11
Unemployed	6	12	16
Other	2	5	6
Geographic Division			
Northeast Region	3	8	9
Midwest Region	3	8	9
Southern Region	2	7	8
Western Region	3	9	10
County Type			
Large Metropolitan	3	8	9
Small Metropolitan	3	8	9
Non-metropolitan	2	7	8

Source: DHHS, 2010

Unique Needs of Women in Substance Abuse Recovery

While most substance abuse recovery research is based on males, it is important to consider that women who abuse substances have unique recovery needs (Brady & Ashley, 2005; Grella, 1999). Females in substance abuse treatment programs are often younger, have lower incomes and more children in the home, belong to more diverse minority racial/ethnic groups (Table 2), and are less likely than males to be employed than males (Brady & Ashley, 2005).

Low-income women seeking substance abuse and mental health treatment often lack sufficient financial resources, and there is concern that they are not obtaining as much treatment as other income levels (Rosen, Tolman, & Warner, 2004).

Table 2
Percentages of Women Aged 18 to 49 Who Needed Treatment in the Past Year, by Race/Ethnicity: 2004-2006 (n=6.3 million)

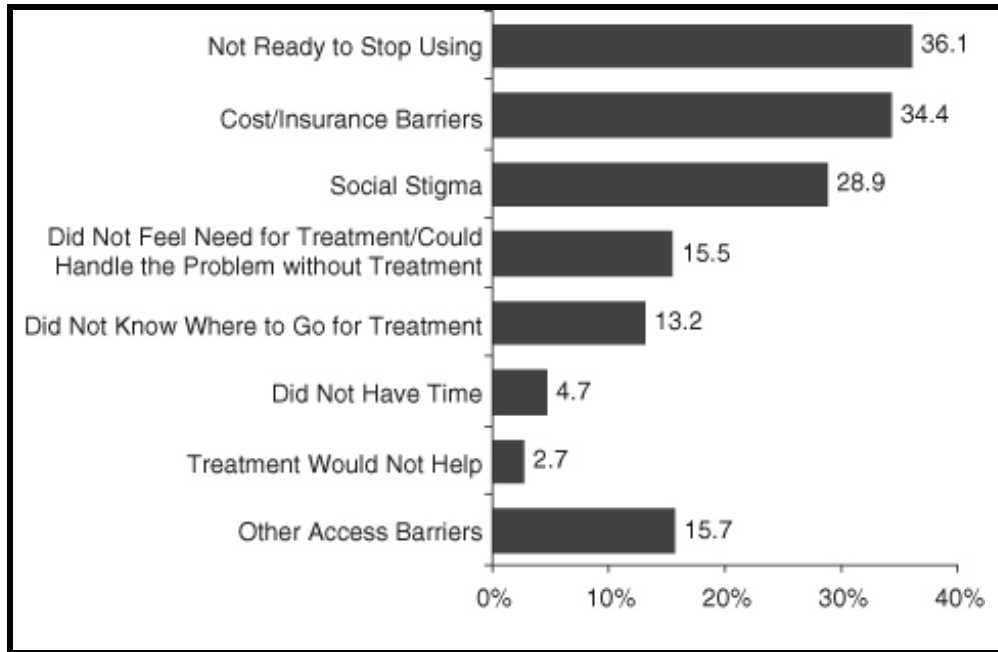
Race/Ethnicity	Percent
Caucasian	11%
African American	8%
American Indian or Alaska Native	22%
Native Hawaiian or Other Pacific Islander	10%
Hispanic or Latino	6%
Two or More Races	17%
Asian	4%

Source: DHHS, 2012

Social stigma, labeling, and guilt are all substantial obstacles to receiving treatment for recovering females. Females are more susceptible and vulnerable than males to the psychosocial effects of substance abuse, and their addictions more commonly coincide with psychosocial problems and traumatic life events (Brady & Ashley, 2005). Although recovery time is extended, Grella (1999) found that females recover from addictions more effectively in women-only programs. Collectively, these findings suggest that women in substance abuse recovery programs have greater psychological stress of social stigmatism, have more children, are at a younger age, and have lower income. As shown in Figure 1, Brady & Ashley (2005) found that the main reason women with substance abuse or dependence do not receive treatment is because they are not ready to quit using (36%), experience cost and insurance barriers to enter treatment programs (34%) and report social stigma (29%).

Figure 1

Percentages of Women Aged 18 to 49 Who Needed Substance Use Treatment in the Past Year But Did Not Receive Treatment and Their Reasons For Not Receiving Treatment: 2004-2006 (n=345,000)



Source: Brady & Ashley, 2005 & DHHS, 2010

Unique Needs of Mothers in Substance Abuse Recovery

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 are oftentimes raising multiple young children (Brady & Ashley, 2005). Further, these women may face legal consequences, fear loss of child custody and endure economic hardship from substance abuse treatment. 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 receive public assistance than mothers that do not use illicit drugs (Simmons, Havens, Whiting, Holz, & Bada, 2009).

Stevens and Patton (1998) found that mothers in recovery from an alcohol or drug addiction exhibited better post-discharge outcomes if they live with their children during treatment. Those residing with their children were more likely to refrain from using alcohol and drugs, have employment, maintain child custody, avoid legal trouble, and are involved in continuum of care support groups after treatment (Stevens & Patton, 1998).

Stages of Recovery

The Transtheoretical Model (TTM), commonly referred to as the stages-of-change model, is used as a guide for clinical interventions for a variety of health problems. TTM has been used to define stages of change in substance use disorders based on readiness to change behavior (Migneault, Adams, & Read, 2005). TTM describes purposeful change as a process rather than a specific moment, and is sensitive to the dynamic changes one endures over time in terms of motivational stage. The five major stages include *Precontemplation*, *Contemplation*, *Preparation*, *Action*, and *Maintenance* and are each defined as follows:

Precontemplation is described as no intention to change the behavior within the upcoming six months, and the person may not believe that they have a problem. The most suitable intervention technique at this stage is psychoeducation (De Biaze Vilela et al., 2009).

Contemplation is the stage when the individual is considering change with ambivalence and no further commitment to action. Interventions should focus on educating the individual on benefits of change, with intent to motivate the individual to act on their decision to change (De Biaze Vilela et al., 2009).

Preparation is represented by commitment to action. The intervention should focus on strengthening the sense of commitment to change and to assist the individual to create a personalized action plan (De Biaze Vilela et al., 2009).

Action is the first stride toward modification of earlier habits. The individual becomes engaged and develops an improved attitude. This stage typically lasts three to six months. Interventions include intermittent reviews of the plan and reaffirmation of the commitment to change (De Biaze Vilela et al., 2009).

Maintenance is a dynamic stage and continuous process of sustaining and integrating new habits that lasts at least six months. The new behavior can be considered established and secure when it becomes more natural and the individual no longer has to apply conscious effort or energy to maintain it. The focus of treatment is to prevent relapses and solidify positive gains made in the action stage (De Biaze Vilela et al., 2009).

Relapse is the final component of the TTM, and defined as an expected regression in the stages of behavior transformation. Relapse is an expected part of the process, and represents the cycling through stages until the individual can adequately consolidate the transformation in behavior. Interventions should focus on returning to the plan, strengthening self-efficacy, and renewing self-confidence (De Biaze Vilela et al., 2009). Recognizing an individual's stage of change can help guide clinical interventions and possibly be a tool for implementing appropriate nutrition interventions (Greene et al., 1999).

The Syndrome Model

Once a substance abuser is in recovery, other addictive behaviors are ordinarily adopted to continue patterns of compulsive behavior and alter body sensations (Hatcher, 1989). It is common for recovering substance abusers to acquire another addiction before completely recovering from their original ones (Shaffer et al., 2004). The “hopping” between objects of addiction, as suggested in the “syndrome model” has been noted for illicit drugs and nicotine, alcohol abuse and bulimia, and for substance abuse and gambling (Conner et al., 1999; Shaffer et

al., 2004). Common substances used to replace the drug or alcohol include caffeine, sugar, chocolate, nutritional supplements and medicinal herbs (Hatcher, 1989). The common link that ties obsessive food behaviors and new addictions is the addictive behavior remains intact, however the substance has changed to a more socially acceptable alternative (Hatcher, 1989).

Substance Abuse and Nutrition

Disordered Eating in Recovery

In addition to use of new substances and development of food addictions during the recovery process, substance abusers may experience disordered eating and weight change (Hatcher, 1989). Isralowitz and colleagues reported that females who used drugs did not understand the importance of proper eating patterns on their health, and were inclined to skip meals or use cigarettes as a weight control strategy (Isralowitz, 1996). Weight gain during recovery tends to panic women, resulting in disordered eating (Hatcher, 1989). Women in recovery may starve themselves to lose touch with reality, create a crisis, and preserve low self-esteem by negating one's need for nourishment, or binge eat to lose sense of time or reality (Hatcher, 1989). These rewards are similar to those of substance abuse (Hatcher, 1989).

Ifland et al. (2009) reported that processed foods with high amounts of sugar, fat, salt, and caffeine act as replacement addictive substances and that the associated behaviors imitated the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision [DSM-IV-TR] (American Psychiatric Association [APA], 2000) criteria for substance use disorders. Because foods with certain qualities (sugary, starchy, fatty, salty) may be consumed in excess in a manner which conforms to DSM-IV-TR criteria, over-eating may be classified as an addiction stemming from a mental disorder (Gearhardt, Corbin, & Brownell, 2009). Sugar is often consumed in excess by recovering alcoholics since alcohol causes blood sugar spikes (Hatcher,

1989). Once one achieves abstinence from alcohol, the blood sugar flux intensifies, causing mood swings, depression, poor concentration, and sugar cravings from hypoglycemia (Hatcher, 1989). Caffeine is typically increased during early recovery to relieve alcohol withdrawal symptoms by central nervous system stimulation (Hatcher, 1989). Chocolate is thought to be a sensual and socially acceptable way to alter mood during recovery (Hatcher, 1989).

Weight Changes in Recovery

Avena et al. (2011) reported that the cessation of drug use is associated with hyperphagia, and most substance abusers gain about 15 pounds over a 28-day treatment program period (Hatcher, 1989). Lindsay, Warren, Velasquez, and Lu (2012) reported that the typical diet of a drug user is high in sugar and fat (including sources such as soda, candy, potato chips), and over 70% of women recruited from substance abuse treatment facilities expressed weight-related concerns while in treatment. Returning to regular daily eating patterns after long episodes of fasting coupled with sedentary lifestyle may result in rapid weight gain during recovery.

Cowan and Devine (2007) categorized eating patterns and weight issues among males during recovery. Those in middle (7-13 months) and late (14-36 months) recovery expressed dissatisfaction with excess weight gain in recovery and their frustration with efforts to lose weight (Cowan & Devine, 2007). Most participants stated that during their addiction they rarely ate, sometimes only twice per week, and experienced an extreme weight loss (Cowan & Devine, 2007). Reasons for decreased food intake include: anorexic drug side effect; less time spent on food preparation and more time spent seeking, using, and recovering from drugs or alcohol; to stay high; and fewer relationships with family who may have previously supplied food (Glovsky, Christensen, Amaro, & Nieves, 2007).

During recovery, most participants had body mass index (BMI) greater than recommended and stated that they had reached the highest weight of their lives (Cowan & Devine, 2007). This could be attributed to medications causing weight gain, physiological factors, a decrease in smoking cigarettes, increased food intake, and decreased physical activity due to meetings and treatment activities (Glovsky et al., 2007). Another factor to consider regarding weight gain during recovery is high treatment cost or debt from buying drugs and alcohol, substance abusers may resort to calorie-dense inexpensive food items (Dammann & Smith, 2009).

Nutritional Supplementation in Recovery

Nutritional supplements, such as multivitamins, glutamine, and niacin are commonly used by those in recovery to relieve withdrawal symptoms, provide satisfaction toward improving health, or attempt to reconcile poor dietary practices (Hatcher, 1989). Taking supplements can be detrimental to the recovering abuser as ingesting nutritional supplements mirrors previous addiction patterns by altering state of mind or physical health while removing the obligation to eat nutritiously (Hatcher, 1989). For example, glutamine and niacin decrease alcohol cravings and relieve hangover symptoms (Hatcher, 1989). Glutamine has been reported to cause delusions and insomnia. Excess intake of nicotinic acid causes a burning sensation or “high” that the user might crave (Hatcher, 1989). Nicotinic acid is hepatotoxic (Winter & Boyer, 1973). Herbs, which one might believe is “safe” to use because it is “natural” are not Food and Drug Administration regulated (Elsberry, 2001) and can have harmful side effects (Bent, 2008). For example, valerian has been used to tame the withdrawal symptom known as “dry drunk syndrome” (Hatcher, 1989). Multivitamins and herbs are considered relatively harmless when

taken in doses within recommended limits, but may be ingested in excess by those recovering from substance abuse (Hatcher, 1989).

Nicotine in Recovery

Cigarette smoking increases during recovery, because nicotine eases feelings of withdrawal accompanying alcohol or drug cessation (Hatcher, 1989). Like other drugs, nicotine stimulates the dopamine reward system that individuals in recovery lack (Conner et al., 1999). Likewise, smoking cigarettes provides 15 to 60 minutes of appetite suppression, mimicking the pattern of skipping meals that normally accompanies a drug or alcohol addiction (Hatcher, 1989). Nicotine is an unhealthy substitute to illicit drug and alcohol use and should be discouraged in rehabilitation facilities, especially since smoking cessation is associated with greater abstinence from drug use after treatment (Lemon, Friedmann, & Stein, 2003). However, smoking cessation is associated with hyperphagia, thus weight gain is a common side effect of quitting (Avena, Wang, & Gold, 2011).

Neuro-Science of Addictions

A probable reason for replacement of drugs and alcohol with food during recovery deals with the areas of the brain that control addictions. Blüml et al. (2011) found that both food and drug intake are regulated by the same neurobiological pathways, and compete for the same target brain reward sites. These reward sites include the mesolimbic and mesocortical dopaminergic reward-motivation circuits, and deficits in these neural reward responses are thought to be typical mechanisms for obesity and drug addiction (Blüml et al., 2011). A dopamine D2 receptor deficit has been identified in obese and drug-addicted adults (Blüml et al., 2011). Dopamine D2 receptor antagonists have been shown to enhance meal size and duration of feeding by decreasing sensitivity to reward stimuli, therefore making the individual feel the need to eat more

to compensate for the deficit. Low dopamine D2 receptor sites have also been linked to increasing the pleasant effects of stimulant drugs, possibly showing an increase for drug abuse susceptibility (Wang, Volkow, & Thanos, 2004). These may be reasons why overweight and obese adults were significantly less likely to consume illicit drugs, as essentially, their brain reward sites were already occupied by neural substrates following food intake. If substances no longer occupy these brain reward sites, as occurs during the recovery process, then recovering addicts might compensate by using food to satisfy deficits in neural reward responses (Blüml et al., 2011). Simply put, “the brain mechanisms underlying the drive to procure and consume food are the same as those that are ‘hijacked’ when one becomes dependent on a drug” (Avena et al., 2011, p. 478).

Nutrition Interventions in Recovery

A healthy, balanced diet is critical when recovering from substance abuse or dependence (Ryan, 2006). Recovery affects important bodily processes including metabolism, organ function, and mental well-being (Ryan, 2006). Having a nutrient-dense 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 (Ryan, 2006). It is important for those in recovery 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 (Ryan, 2006). Balanced nutrition may prevent relapse by improving overall mood and health (Ryan, 2006).

Certain substances of abuse require individualized nutrition assessment and intervention. During withdrawal, opiate users experience gastrointestinal distress including diarrhea, nausea, and vomiting, which can cause electrolyte imbalances (Ryan, 2006). Alcohol abuse damages the

pancreas and liver, causing fluid, protein-energy malnutrition and electrolyte imbalances (Ryan, 2006). It further causes nutrient deficiencies of pyridoxine, thiamin, and folic acid (Ryan, 2006). Nutrient deficiencies can result in anemia, neurologic problems, and Wernicke-Korsakoff syndrome (Ryan, 2006). Stimulant abusers tend to lose weight and have low calorie intake while using whereas marijuana abusers may be overweight or obese from hyperphagia (Ryan, 2006).

Nutrition education may improve health throughout all stages of recovery (Grant, Haughton, & Sachan, 2004; Hodgkins, Cahill, Seraphine, Frost-Pineda, & Gold, 2004; Lindsay et al., 2012). Since most substance abusers exhibit nutrient deficits, improved nutrition status throughout recovery can enhance treatment outcomes (Grant et al., 2004). Most treatment programs do not include nutritional counseling (Hodgkins et al., 2004). Grant et al. (2004) reported that nutrition education during substance abuse treatment increases the possibility of addiction recovery, especially in a group setting. Women in recovery showed improvement in Addiction Severity Index (ASI) scores (predictive of treatment outcomes) in the Psychiatric, Medical, and Family/Social domains after nutrition education services (Grant et al., 2004). Hodgkins, Frost-Pineda, and Gold (2007) found that adolescents who received nutrition education and aerobic exercise interventions throughout an 8-week substance abuse recovery program gained an average of three pounds less than a control group. There is an opportunity for healthcare providers to promote healthy eating among residential and outpatient programs in private, public, and governmental health care settings for those in recovery for alcohol and substance abuse.

In summary, food addiction and obesity are interrelated issues for those in recovery. Assessment of changes in weight status, eating patterns, and other health related issues throughout recovery provides guidance to direct nutrition interventions (Cowan & Devine,

2007). Researching the association between addictive substance abuse, disordered eating, and obesity and determining whether these disorders have comparable underlying psychosocial elements is important to identify changeable risk components and implement interdisciplinary treatment methods (Denoth, Siciliano, Iozzo, Fortunato, & Molinaro, 2011).

Suggestions for Future Research

Research is warranted among young adult females in substance abuse recovery programs to better understand the stage-specific weight changes, eating behaviors, and nutritional concerns among childbearing women. To date, no validated survey instrument that assesses nutritional concerns among this population exists and a screening instrument for women with disordered eating and a history of substance abuse is needed (Piran & Gadalla, 2007). Research testing the effectiveness of different nutrition interventions and education techniques would also be beneficial to determine the most successful interventions for weight maintenance and relapse prevention in recovery. In addition, research assessing women in recovery's access to healthy food choices including fresh fruits and vegetables, lean meats, whole grains, and low-fat dairy would be beneficial in determining appropriate and realistic nutrition interventions for this population.

CHAPTER 2: MATERIALS AND METHODS

There are a number of methods available to assess household food supply, including grocery store receipts (Ransley et al., 2003) and household food inventories (Beto, Sheth, & Rewers, 1997; Sisk et al., 2010). The current study aims to assess 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* (USDA & DHHS, 2010). HFIs evaluate a large variety of food items in the home and may be a suitable and accurate method for assessing the home food environment (Crockett, Potter, Wright, & Bacheller, 1992). Most research that has assessed home food availability offers a single point of data collection (Byrd-Bredbenner, Abbot, & Cussler, 2009; Cullen et al., 2007; French, Shimotsu, Wall, & Gerlach, 2008; Satia & Galanko, 2007), however single inventories may overlook intra-monthly turnover caused by influences, such as income cycles, purchasing behavior, storage limitation, holidays and events (Sisk et al., 2010).

Participants

Participants were a convenience sample selected from a rural setting in the South with the following demographic characteristics: 67% overweight or obese, nearly 33% of children overweight or obese, and 83% of adults consuming fewer than five fruit and vegetable servings daily (State Center for Health Statistics, 2009). The residential facility was a peri-natal program with an apartment-based supervised living facility for low-income, homeless mothers with children up to 11 years of age. The facility provides Substance Abuse Comprehensive Outpatient Treatment and Substance Abuse Intensive Outpatient, along with 12-Step support groups, social

services assistance, transportation to/from school and job, infant/child care, access to medical care facilities, and case management/linkage services to other community resources. Women residing in this facility are provided with a full kitchen equipped with a refrigerator, freezer, stove, oven, microwave, and storage space. Those eligible for the study were mothers over the age of 18 years who were at least one year postpartum, not currently pregnant, and residing in the residential substance abuse recovery program in Pitt County, NC. East Carolina University's Institutional Review Board approved this study.

Thirteen women were recruited to participate during a regularly scheduled meeting at the facility. One participant was excluded because she had no children, leaving a sample of 12 participants. The study was completed during October-November 2011. Digital cameras 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 it was completed by participants. Sociodemographic characteristics included participant age, 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], Women, Infants, and Children Nutrition Program [WIC], Supplemental Security Income [SSI], and Social Security Disability Insurance [SSDI]). Household food insecurity was measured using the US Household Food Security Survey Module: Three-Stage Design, With Screeners (USDA, 2008). The module assesses adult and child household food insecurity. Food insecurity is nominally categorized as high (raw score 0),

marginal (score 1-2), low (3-7), and very low (8-18). Households with low or very low scores are considered food insecure (USDA, 2008).

Household Food Inventory (HFI)

Household foods were inventoried in each participant's home in the rehabilitation facility by two trained researchers during two separate visits with 12-16 day intervals. The visits were scheduled two weeks apart to account for intra-variability of household grocery purchases throughout the month. The HFI instrument included 251 food items to measure food availability (Sisk et al., 2010). 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 foods 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 recorded the information onto the HFI. The first household food inventory 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 food groups based on the *2010 Dietary Guidelines for Americans* (USDA & DHHS, 2010) and *MyPlate* food groups (USDA, 2013). 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).

CHAPTER 3: RESULTS

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

Characteristics of Participants

Demographic characteristics of the participants are displayed in Table 3. Ages ranged from 24 to 40 years (mean age was 32 years). The majority were Caucasian, African American, or mixed race. All had one child under 18 years of age in the household while three had two or more children under the age of 18; all faced challenges grocery shopping, cooking, and preparing foods; all participated in at least two federal food assistance programs with seven participating in at least three (data not shown); nine had household annual income 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.

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.

Table 3
Participant Characteristics (n=11)

Demographic	Number
Number Who Care for Children Without Help of Husband or Partner	10
Children Under 18 in Household	
1	8
2	2
3	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 Status¹	
Very Good	2
Good	4
Fair	5
BMI²	
Normal	3
Overweight	3
Obese	5

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

² Calculated from self-reported height and weight

Food Inventories

Fresh Fruits

The amount and variety of fresh fruits in the household are reported in Table 4. Only one had three or more varieties at both HFI collection periods, and only two had three or more varieties during one collection period. Inconsistency in types of fruits in the home was common; many types were found at only one collection period and seldom at both collection periods.

Apples, oranges, and bananas were the most commonly available fresh fruit. Most households had one to five whole fruits during any one collection period.

Table 4
Number of Participants with Fresh Fruits Present During Two Household Food Inventories (n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
Fresh Fruits	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			
	0	1	3	7
	1-2	6	2	3
	≥3	1	2	8

Fresh Vegetables

Fresh vegetables were more commonly available in the homes than fresh fruits, as reported in Table 5. Only two households had none during either HFI collection period. Six households had three or more varieties during both collection periods, and three households had three or more varieties on at least one HFI collection period. The most common were nutrient-poor vegetables, such as potatoes, lettuce (typically Iceberg) and yellow onions.

Table 5
Number of Participants with Fresh Vegetables Present During Two Household Food Inventories (n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
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			
	0	2	0	9
1-2	0	3	8	
≥3	6	3	2	

Canned and Frozen Fruits and Vegetables

The HFI inventory results for canned fruits and vegetables and frozen vegetables are reported in Table 6. 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 had theirs 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.

Table 6
Number of Participants with Canned Fruit and Vegetables, and Frozen Vegetables Present During Two Household Food Inventories (n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
Canned Fruit 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

Household availability of legumes is reported in Table 7. 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 during either collection period, while eight households had baked beans for both collection periods.

Table 7
Number of Participants with Legumes Present During Two Household Food Inventories (n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
Legumes	Can 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

Household availability of dairy products is reported in Table 8. 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; the amount ranged between 0.5 and 3.5 gallons (data not shown). Yogurt was the least available: Low-fat was the most common, found in five households; Greek was the least popular, found in two households.

Table 8
Number of Participants With Dairy Present During Two Household Food Inventories
(n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
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
	Yogurt			
	Regular	1	3	7
	Low Fat	2	3	6
	Greek	1	1	9
	Cheese			
	Cheese spread	4	3	4
	Regular	10	1	0
	Low Fat	0	1	10

Meat, Poultry, Seafood, and Other Protein

Household availability of meat, poultry, seafood, eggs and peanut butter is reported in Table 9. Beef was more prevalent than any other type of meat, poultry, or seafood. Pork was most commonly found in the form of bacon. Un-breaded 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.

Table 9
Number of Participants with Meat/Poultry/Seafood and Other Protein Present During
Two Household Food Inventories (n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
Meat, Poultry, Seafood, and Other Protein	Beef	10	1	0
	Pork			
	Regular	4	3	4
	Sausage	1	3	7
	Bacon	4	4	3
	Vienna Sausage	2	1	8
	Hot Dogs			
	Beef/Pork	2	2	7
	Turkey/Chicken	4	1	6
	Lunch Meat			
	Chicken/Turkey	0	4	7
	Ham/Bologna	4	3	4
	Chicken			
	Breast	3	4	4
	Whole/Pieces	3	6	2
	Breaded	4	2	5
	Canned	1	0	10
	Turkey	1	2	8
	Fish			
	Not Breaded	3	1	7
	Breaded	1	4	6
	Canned	5	4	2
	Eggs	8	3	0
Peanut Butter	8	2	1	

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

Cereals, breads, crackers, prepared desserts, noodles, and rice available in households is reported in Table 10. 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 Rice-a-Roni 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, however donuts were found in just one household on one occasion.

Table 10
Number of Participants with Cereals, Breads, Crackers, Prepared Desserts, Noodles,
and Rice Present During Two Household Food Inventories (n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
Cereals, Breads, Crackers, Prepared Desserts, Noodles, Rice	Cereal			
	Unsweetened	1	5	5
	Sweetened	6	2	3
	Oatmeal	7	1	3
	Grits	5	3	3
	Bread			
	White	10	1	0
	Whole Wheat	0	5	6
	Tortillas			
	Corn	0	1	10
	Flour	1	4	5
	Whole Grain	1	0	10
	Biscuits	3	2	6
	Crackers			
	Regular	8	1	2
	Filled	4	3	4
	Whole Grain	0	1	10
	Prepared Desserts			
	Donuts	0	1	10
	Cookies	3	2	6
	Cake	2	4	5
	Noodles			
	White Pasta	8	2	1
	Whole Grain Pasta	3	0	8
	Ramen	9	2	0
	Box Macaroni and Cheese	6	3	2
	Hamburger Helper	3	2	6
	Rice			
	White	3	5	3
	Brown	0	3	8
Rice-A-Roni	3	4	4	

Chips, Snacks, and Frozen Desserts

Household availability of snack foods, such as chips, pretzels, popcorn, candy, ice cream, and popsicles is reported in Table 11. 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.

Table 11
Number of Participants with Chips, Snacks, and Frozen Desserts Present During Two Household Food Inventories (n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
Chips, Snacks, Frozen Desserts	Dry Chips			
	Regular	5	5	1
	Baked	4	2	5
	Pretzels	2	1	8
	Pop Corn			
	Unpopped	5	0	6
	Pre-Popped	1	2	8
	Nuts	1	1	9
	Candy	4	6	1
	Granola Bars	0	2	9
	Pop Tarts	3	4	4
	Ice Cream			
	Regular	4	3	4
	Low Fat	0	1	10
	Popsicles	2	3	6

Beverages

The availability of beverages in households is expressed in Table 12. 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.

Table 12
Number of Participants with Beverages Present During Two Household Food Inventories (n=11)

		Number of Household Inventories in Which Foods Were Present		
		2	1	0
Beverages	Sugar-Sweetened Tea	0	4	7
	Soda			
	Regular (Sugar)	2	6	3
	Low Sugar (Diet)	0	4	7
	100% Fruit Juice	8	3	0
	Fruit Drinks	4	4	3
	Drink Concentrate			
	Regular Sugar	0	4	7
	Low Sugar	1	1	9
	Sports Drinks	0	0	11

CHAPTER 4: DISCUSSION AND CONCLUSION

Food availability in the home has a large impact on daily food choices of individuals, and subsequently, overall health. Many factors influence food availability, especially among females in substance abuse residential recovery facilities. For instance, residents may be prohibited to drive to the grocery store, limited in the timing of food purchases or storage space, income may be lower, and supplemental nutritional services may be inadequate to provide enough food (United Nations Office on Drugs and Crime [UNODC], 2004). Since there has been little research on the household presence of types and amounts of food among mothers in substance abuse recovery, the primary objective of this study was to assess household food and beverage availability among households with children in a rural, Eastern NC residential substance abuse facility on two separate occasions.

This study used direct observation and two separate HFI collection periods because researchers have recognized the importance of documenting availability of food items in the home through direct observation HFI (Cullen et al., 2007) and multiple in-home HFI (Sisk et al., 2010). Many of the types and amounts of food items varied from one assessment to the next, and fresh fruits, fresh vegetables, and chicken were especially variable among the households. Of the 11 participants, all qualified and participated in more than one federal food assistance program. Further, nine had annual incomes less than \$10,000 which may account for lack of food variability. Lack of variability may also relate to increasing fluctuations in household income over periods of time, with low-income households experiencing the most month-to-month income variation, sometimes causing ineligibility in federal assistance programs (Joliffe & Ziliak, 2008). For example, a household that is income-eligible one month may later have a monthly income that exceeds the limit because of income instability. Reasons for these intra-

monthly fluctuations in income are work-related changes, including hours worked, number of adults in the household working, and changes in jobs and wages (Joliffe & Ziliak, 2008).

Mothers entering residential substance abuse recovery facilities may need to re-locate, transfer jobs, work different hours, and therefore face income fluctuations possibly affecting eligibility in federal assistance programs which results in food item variability.

A secondary objective of this study was to investigate the availability of food items in the home related to the *Dietary Guidelines* (USDA & DHHS, 2010). Overall, the households lacked fresh fruits, fresh vegetables, whole grains, lean meat, and low-fat dairy. The *Dietary Guidelines* recommends four to five servings each of fruits and vegetables per day for the average adult 2,000 calorie diet, and two to three cups for children (USDA & DHHS, 2010). There is an emphasis on whole fruits and dark green, red, and orange vegetables to provide vitamins and minerals necessary for adequate growth and development (USDA & DHHS, 2010). Mothers in recovery are consuming significantly less fruits and vegetables, which contribute to lower fiber, vitamin, and nutrient intake than the recommended daily value, especially for those in recovery programs. 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* (USDA & DHHS, 2010). Further, children residing with mothers in substance abuse recovery may also fall short of fruit and vegetable intake recommendations, putting them at risk for chronic disease (NIH, 1998) as well as growth and development issues (Neumark-Sztainer, Wall, Perry, & Story, 2003).

Packaged fruits and vegetables, including canned and frozen, and fruit juice were more available in households than fresher versions, possibly because packaged fruits/vegetables tend to be less expensive and have increased shelf life. Since all participants faced financial

limitations, purchasing fresh fruits and vegetables may have been a challenge, resulting in an abundance of canned green beans, corn and packaged fruit juice. The data support 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 (Robinson, 2008). Unfortunately, processed fruits and vegetables tend to be less healthy than their fresh versions, as packaging typically adds extra sugar and sodium (Prochaska et al., 2000; USDA & DHHS, 2010). Although 100% fruit juice was commonly available in households of mothers in recovery, it is recommended to limit consumption as it lacks dietary fiber and can contribute extra calories compared to fresh, whole fruits and vegetables (USDA & DHHS, 2010).

The *Dietary Guidelines* recommend consuming at least half of an individual's daily grain intake from whole grain sources (USDA & DHHS, 2010). Despite women in recovery having increased need for complex carbohydrates, nutrients, and fiber from whole grain sources to promote weight maintenance (Ryan, 2006), most households had an abundance of white, refined grains available during both collection periods. Whole grain bread was found in five households during only one collection period. Since weight gain is a common issue in recovery, increased intake of whole grains would be beneficial since adults who eat more whole grains tend to maintain a healthy body weight (USDA & DHHS, 2010).

The *Dietary Guidelines* encourage intake of a variety of protein sources from seafood, meat and poultry, eggs, beans, peas, soy products, and unsalted nuts and seeds for building and preserving body muscle and tissue (USDA & DHHS, 2010). Mothers in recovery need protein to repair muscle loss and body tissue damaged by the abused substance (Lindsay, Warren, Velasquez, & Lu, 2012). Protein also provides tryptophan, the amino acid used in creating serotonin which when depleted causes depression, fatigue, cravings, and triggers relapse (Cleare,

1998; Sun et al., 2012). Lean meats, such as chicken, turkey, and fish are encouraged in the *Dietary Guidelines* as better choices to support recommended intakes of protein, however beef was the most common meat source in households in this study. High cholesterol, fat, and sodium breakfast protein including eggs, bacon, and sausage were commonly available in households. Soy protein and seeds were not available on any HFI assessments, salted nuts were available in two households, but peanut butter was available in 10 of 11 households, illustrating that processed nuts were a common form of protein. Mothers in recovery would benefit from higher intake of lean meat, soy protein, unsalted nuts and seeds to maintain healthy body weight, adequate serotonin levels, and lower risk of cardiovascular disease (USDA & DHHS, 2010).

Low-fat dairy is encouraged in the *Dietary Guidelines* (USDA & DHHS, 2010), however 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. This aligns with existing data that overall dairy and calcium intake is inadequate in most of the American population, and households with children consume most of their dairy from high-fat sources (Kranz, Lin, & Wagstaff, 2007). Children with inadequate low-fat dairy and protein intake are at increased risk for unfavorable overall performance in school as well as poor physical health and emotional well-being (Fu, Cheng, Tu, & Pan, 2007; Kalkwarf, Khoury, & Lanphear, 2003).

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) as compared to fresh ingredients for home-cooked meals recommended by the *Dietary Guidelines* (USDA & DHHS, 2010). Pre-packaged and ready-to-eat foods tend to be less nutritious, although they may be easier to prepare for those with limited knowledge of food preparation techniques or healthy food options (Capps, Tedford, & Havlicek, 1985). Women in recovery score poorly on health

and nutrition knowledge assessments, and therefore may choose convenience foods over fresh, healthful foods (Lindsay et al., 2012). Additionally, mothers in recovery may choose foods which are easier and more time efficient to prepare since they have less energy and eat less frequently due to highly scheduled days (USDA & NIH, 2012). Foods eaten in households with one or two children during recovery are usually single-item meals, such as chips or yogurt, to promote time efficiency (USDA & NIH, 2012). In the current study, 10 participants had only one or two children in their homes, which may be a reason for the abundance of ready-to-eat packaged food items. Another reason may be that all participants were federally-assisted, and stores that accept SNAP benefits carry larger proportions of packaged foods and little to no fresh fruits, vegetables, and meat products (USDA, 2009). However, federal assistance programs are working to support more nutritious food selections which should lead to better access and availability among this population (Food Research and Action Center, 2011).

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). As Shaffer et al. (2004) describe in the “syndrome model,” individuals in substance abuse recovery acquire new addictions to continue their compulsive behaviors and often rely on foods high in sugar, fat, and caffeine (Hatcher, 1989). Mothers in recovery who become addicted to food may consume more ready-to-eat sweetened foods and beverages to satisfy quick onset and sharp cravings (Hatcher, 1989). Especially among recovering alcohol abusers, sugar is consumed in excess to help balance low blood glucose levels, mood swings, depression, and poor concentration (Hatcher,

1989). Caffeinated beverages are also increased during early stages of recovery to boost the central nervous system and raise blood glucose temporarily to relieve withdrawal symptoms (Hatcher, 1989). With new addictions to sweetened, high calorie food and beverages, individuals in recovery tend to gain weight rapidly, especially in the earlier stages when still experiencing withdrawal (Cowan & Devine, 2008). The combination of increased appetite, poor food choice and significant gains in body weight pose risks for diseases, such as dyslipidemia, type 2 diabetes mellitus, and hypertension (USDA & DHHS, 2010) for mothers in substance abuse recovery.

Limitations

There were several limitations of the current study. The study did not depict overall dietary intake of mothers in all substance abuse rehabilitation facilities because it did not account for food purchased and consumed outside of the home in places, such as work or school. However, participants in this study stated they experience the majority of daily food consumption inside the residential setting. Future research should include an assessment of the frequency and types of food consumed outside the home.

Another limitation of this study is that the HFI was conducted on only two separate collection periods, and the study would have benefited from more frequent inventories to obtain more data on the effects of intra- and inter-monthly food availability. The study period included the Halloween holiday, which may have presented a confounding variable of atypical foods, such as excessive amounts of candy in the homes. Future research should assess household availability using more frequent HFIs (e.g. immediately preceding a grocery store visit, directly after, and between visits) to establish actual dietary intake in the residential recovery facilities. Frequent HFIs would be beneficial to investigate the effects of income volatility or federal

assistance program disbursements on the timing and frequency of food shopping, the relationship between what is purchased with what is actually consumed, and usual food intake.

Limitations of the HFI instrument were that it did not address food availability for infants or young children; categories for formula or baby food were considered but not added. Furthermore, the HFI did not take into account baking products, such as flour, sugar, butter, or oil, which may have been utilized in food preparation. Future research should use a modified HFI form to include categories, such as baby food, formula, and baking products.

In summary, obesity is a life threatening and growing issue in the United States, especially among low-income individuals (Ogden et al., 2012). This population is more likely to be food insecure and resort to cheap, processed, less healthy grocery options (Ogden et al., 2012). Mothers in substance abuse recovery rehabilitation facilities are a population with limited research and especially at risk for food insecurity and lack of healthful foods—whether the issue is monetary, lack of transportation, decreased access to adequate healthy options, limited storage space, limited knowledge, or personal choice. 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. The lack of fresh fruits, vegetables, low-fat dairy options, lean meats, and whole grains in conjunction with an abundance of sweetened, pre-packaged, high-fat food items form a diet contradictive of the *Dietary Guidelines for Americans*. Mothers in recovery are a population of special concern due to their possible shift from substance to food addictions, which can contribute to increased risk of obesity and consequential obesity-related diseases. Since children tend to mimic their parents' eating patterns (Tucker, van Zandvoort, Burke, & Irwin, 2011; Yu, 2011), the children residing in the recovery facility would also benefit from a healthier at-home

food selection. This population could benefit from nutrition education and improved access to healthier foods, especially fresh fruits and vegetables.

Suggestions for Future Research

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. Chemical and psychological changes of mothers during substance abuse recovery and the correlation of food choices should be included in future investigations. A suggestion for future research is to implement a photovoice, in which mothers in recovery can utilize a digital camera to document their experiences with food along with a qualitative portion to discuss typical eating patterns. Furthermore, research focusing on shifts in addiction from substance to food, food choice, disordered eating patterns, and subsequent weight and health issues would be beneficial to guide nutrition interventions for mothers and children in substance abuse recovery facilities.

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APPENDIX: IRB APPROVAL



EAST CAROLINA UNIVERSITY

University & Medical Center Institutional Review Board Office
1L-09 Brody Medical Sciences Building • 600 Moye Boulevard • Greenville, NC 27834
Office 252-744-2914 • Fax 252-744-2284 • www.ecu.edu/irb

TO: Elizabeth Wall-Bassett, PhD, College of Human Ecology, ECU—Mailstop: 505

FROM: UMCIRB *kw*

DATE: June 17, 2011

RE: Expedited Category Research Study

TITLE: “Single prenatal and postpartum mothers' food use and perceptions”

UMCIRB #11-0379

This research study has undergone review and approval using expedited review on 6.16.11. This research study is eligible for review under an expedited category number 6 & 7 which include collection of data from voice, video, digital, or image recordings made for research purposes and research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b)(3). This listing refers only to research that is not exempt.)

The Chairperson (or designee) deemed this **RGS-Engaged Outreach Scholars Academy** sponsored study **no more than minimal risk** requiring a continuing review in **12 months**. Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The investigator must adhere to all reporting requirements for this study.

The above referenced research study has been given approval for the period of **6.16.11 to 6.15.12**. The approval includes the following items:

- Internal Processing Form (dated 6.6.11)
- Research Plan
- Informed Consent (version date 6.8.11)
- Grant Application
- Household Food Inventory

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

The UMCIRB applies 45 CFR 46, Subparts A-D, to all research reviewed by the UMCIRB regardless of the funding source. 21 CFR 50 and 21 CFR 56 are applied to all research studies under the Food and Drug Administration regulation. The UMCIRB follows applicable International Conference on Harmonisation Good Clinical Practice guidelines.



East Carolina University



Informed Consent to Participate in Research
Information to consider before taking part in research that has no more than minimal risk.

Title of Research Study: Single prenatal and postpartum mothers' food use and perceptions

Principal Investigator: Elizabeth Wall-Bassett
Institution/Department or Division: East Carolina University, Department of Nutrition Science
Address: Mailstop 505, Greenville, NC 27858
Telephone #: 252-737-2413

Researchers at East Carolina University (ECU) study problems in society, health problems, environmental problems, behavior problems and the human condition. Our goal is to try to find ways to improve the lives of you and others. To do this, we need the help of volunteers who are willing to take part in research.

Why is this research being done?

The purpose of this research is to enhance and improve healthy food environments, good food-purchasing and food-preparation skills. The decision to take part in this research is yours to make. By doing this research, we hope to learn: (1) What are the perceived barriers for obtaining healthy foods?, (2) What tools are needed to help with produce preparation?, (3) What supportive changes are needed to promote and produce fruits and vegetables for you?.

Why am I being invited to take part in this research?

You are being invited to take part in this research because you are a single mother in Pitt County. If you volunteer to take part in this research, you will be one of about 20 people to do so.

Are there reasons I should not take part in this research?

You may choose not to take part in this study if you do not feel comfortable working with a researcher in your home at scheduled visits, or if you do not speak English fluently.

What other choices do I have if I do not take part in this research?

You can choose not to participate.

Where is the research going to take place and how long will it last?

The research procedures will be conducted at The Village in Greenville, NC. Researchers will need to come to your residence 2 times over the course of the study for approximately 1 hour each time. Researchers will schedule a convenient time for these visits with you.

What will I be asked to do?

You are being asked to do the following: take photos with a camera provided to reflect your experience with access to healthy food, allow researchers to use a checklist to document the food in your home pantry; answer questions on a written survey about barriers to obtaining food; discuss with researchers your perceptions of the food environment and

UMCIRB Number: 11-0379

Consent Version # or Date: 6.8.11
UMCIRB Version 2010.05.01

UMCIRB
APPROVED
FROM 6.16.11
TO 6.15.12

Participant's Initials

Title of Study:

make suggestions on how to improve it. Discussions will be audio taped and photographs will be copied for the researchers. You are welcome to opt out of the study at any time without penalty.

What possible harms or discomforts might I experience if I take part in the research?

It has been determined that the risks associated with this research are no more than what you would experience in everyday life.

What are the possible benefits I may experience from taking part in this research?

We do not know if you will get any benefits by taking part in this study. This research might help us learn more about healthy food environments and how to improve them in Pitt County. There may be no personal benefit from your participation but the information gained by doing this research may help others in the future.

Will I be paid for taking part in this research?

We will not pay you for the time you volunteer while being in this study, however you will be compensated with a free digital camera that you can keep at the conclusion of the study.

What will it cost me to take part in this research?

It will not cost you any money to be part of the research. The sponsor of this research will pay the costs of the digital camera for you.

Who will know that I took part in this research and learn personal information about me?

To do this research, ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- The sponsors of this study.
- Any agency of the federal, state, or local government that regulates human research. This includes the Department of Health and Human Services (DHHS), the North Carolina Department of Health, and the Office for Human Research Protections.
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff, who have responsibility for overseeing your welfare during this research, and other ECU staff who oversee this research.

How will you keep the information you collect about me secure? How long will you keep it?

The data will be kept in a locked file at ECU for two years. Only approved persons may have access to this data. Audio recordings will be transcribed verbatim and will not include any identifiers (such as your name). Data will only be used for the purposes of this research.

What if I decide I do not want to continue in this research?

If you decide you no longer want to be in this research after it has already started, you may stop at any time. You will not be penalized or criticized for stopping. You will not lose any benefits that you should normally receive.

Who should I contact if I have questions?

The people conducting this study will be available to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at 252-737-2413 Monday-Friday between 11am-2pm.

If you have questions about your rights as someone taking part in research, you may call the Office for Human Research Integrity (OHRI) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of the OHRI, at 252-744-1971.

Is there anything else I should know?

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You will be asked to take photos during this study. Participants may appear in these photographs. If you do not wish to have your image used for this purpose, you must notify Elizabeth Wall-Bassett at any time.

I have decided I want to take part in this research. What should I do now?

The person obtaining informed consent will ask you to read the following and if you agree, you should sign this form:

- I have read (or had read to me) all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that I can stop taking part in this study at any time.
- By signing this informed consent form, I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

Participant's Name (PRINT)	Signature	Date
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Person Obtaining Informed Consent: I have conducted the initial informed consent process. I have orally reviewed the contents of the consent document with the person who has signed above, and answered all of the person's questions about the research.

Person Obtaining Consent (PRINT)	Signature	Date
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UMCIRB Number: 11-6379

Consent Version # or Date: 6-8-11
UMCIRB Version 2010.05.01

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TO 6-15-12

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