

EXPLORING FOOD INSECURITY AMONG INDIVIDUALS WITH SERIOUS
MENTAL ILLNESS: A QUALITATIVE STUDY

BY

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Abstract

Food insecurity, the limited or uncertain availability of food, affects millions of Americans each year. While Third World hunger has largely been eradicated from the United States (US), many individuals face the uncertainty of having sufficient food supplies. Previous research shows that food insecurity directly impacts individuals on a number of levels including impairing physical and mental health, negatively impacting nutritional intake, and potentially contributing to overweight and obesity.

Food insecurity within the US is assessed on a yearly basis to inform public policy efforts and programs designed to increase food security. These assessments have helped identify segments of the population that may be at greater risk (e.g. single parents, elderly, homeless individuals, etc). Given that individuals with serious mental illness (SMI) are often faced with similar circumstances, this population is also likely vulnerable. In particular, these individuals often report low socioeconomic status, restricted social networks, lack of transportation and limited nutrition knowledge. Despite this vulnerability, the prevalence and impact of food insecurity remains unexplored within this population. To provide insight into the perceptions and experiences of these individuals, the current dissertation research uses a mixed method approach to assess the prevalence and underlying factors associated with food insecurity within the SMI population.

Food security status was assessed within a convenience sample of 72 community-dwelling individuals with documented SMI. Following assessment of food security status using a 30-day modified version of the US Household Food Security Questionnaire, semi-structured interviews (n=28) and focus groups (n=4) were conducted among a sub-sample of these individuals. A stratified nested sampling frame was used to assess experiences of individuals based upon food security status (food secure vs. food insecure) and living situation (live alone vs. live with others).

Within the sample assessed, 45.8% were classified as food insecure, with 29.2% identified as experiencing the most severe level of food insecurity (e.g. very low food security). In comparison to national data, this SMI sample was nearly 8 times more likely to report food insecurity. While classic food insecurity barriers (e.g. lack of transportation, fixed income, inadequate resources, etc) were identified, these factors were further compounded by symptoms associated with mental illness. Unique challenges that surfaced included lack of drive or initiative, binge eating associated with depression, and erratic spending resulting from periods of mania. Food secure individuals tended to report more complex food security strategies including meal planning, budgeting and methods to stock up food supplies. In contrast, less food secure individuals reported more drastic measures such as purchasing mostly cheaper foods and skipping or limiting meals. For many individuals, a classic food insecurity-binge cycle was common and appeared to perpetuate food insecurity. Mental health

tended to be most impacted by food insecurity, although other health conditions and weight fluctuations were also identified.

The research conducted within this dissertation has implications for not only the food security literature, but also for healthcare providers and weight loss researchers working within the psychiatric population. Although caution is required when generalizing or transferring these findings to the overall SMI population, this convenience sample of individuals was highly vulnerable to food insecurity.

Information discovered during interviews and focus groups will enable researchers to tailor a food security intervention uniquely suited to address the challenges presented within this population. By tailoring intervention efforts for vulnerable populations, strides may be made to help alleviate this preventable public health issue.

Introduction

Inadequate food supplies are often a reality in many Third-World countries, but unfortunately even with advancements in technology, agriculture and an abundant food supply, many individuals living within the United States (US) face similar concerns. The most severe forms of hunger and deprivation have largely been eliminated, yet millions of Americans continue to face various degrees of food insecurity (ADA, 2006). Since this public health issue is potentially preventable, many feel that allowing food insecurity to persist at current levels within the US is short-sighted and cruel. Consequently, addressing insufficient resources and hunger has been a goal among US health, nutrition and social policy for many years.

The concept of food security emerged within the United States during the mid 1980's as a result of international development work (Cook, 2002). Although several nutrition-assistance programs were established to assist vulnerable or underserved populations during prior years, it was not until 1984 that the President's Task Force on Food Assistance demanded action be taken. Extensive work went into understanding household food security, food insecurity and hunger. In 1990, the Life Sciences Research Office (LSRO) of the Federation of American Societies for Experimental Biology released conceptual definitions to explain food security. According to the LSRO (Anderson, 1990), food security was defined as "access by all people at all times to enough food for an active, healthy life. Food security includes

at minimum: (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)” (p. 1560). In contrast, food insecurity was then defined as “limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (p. 1560).

Literature Review

Measuring Food Security

Before food security became an issue of public policy during the 1980s and 1990s, the prevalence of hunger and food insecurity was largely estimated using indirect methods. Although food insecurity and hunger are perceived as a direct consequence of financial constraint, merely examining alterations in poverty and income status does not provide an accurate picture of the true availability of food within the household (Frongillo, Raushenbach, Olson, Kendall, & Colmenares, 1997). Indeed, research indicates many low-income households are food secure, while some households living above the poverty line appear to have inadequate access to food. Hence, a measure that would provide independent, more specific information than can be discerned based upon income alone was warranted (Bickel, Nord, Price, Hamilton, & Cook, 2000). Likewise, utilizing traditional methods of assessing nutritional status often associated with malnutrition via anthropometric, clinical or biochemical measurements does not provide a reliable estimate of the prevalence or

severity of the condition as it does in less food secure Third-World countries. The reason these measurements do not produce accurate findings among more food-secure developed countries is that overt clinical or biochemical signs of malnutrition rarely exist; with overweight or obesity more commonly being associated with poverty, rather than wasting or stunting (Kendall, Olson & Frongillo, 1995).

To date, several assessment tools have been developed for the evaluation of food security. Three single-item indicator measures have been widely utilized among national surveys (as reviewed in Keenan, Olson, Hersey, & Parmer, 2003); however, concern over the reliability and validity of these measures has been raised. Single indicators may provide a rough estimate of the prevalence of the issue, but do not ascertain the full range of food insecurity and hunger that a household survey captures (Bickel et al., 2000). Thus, four comprehensive scales have also been developed to measure the severity of food insecurity and hunger at the individual or household level (Keenan et al., 2003). These instruments are designed to acquire information on specific conditions, experiences and behaviors that are indicators of the varying degrees of severity of the condition (Bickel et al., 2000). The four broad scales that are available include the Community Childhood Hunger Identification Project (CCHIP) hunger index (Wechler, Scott & Anderson, 1992), the Radimer/Cornell measures of hunger and food insecurity (Radimer, Olson, Greene Campbell, & Habicht, 1992; Kendall & Olson, 1995; Frongillo, 1997), the U.S. Household Food Security Core Module Scale (Bickel et al., 2000), and the 6-Item

Short Form of the U.S. Household Food Security Scale (Bickel et al. 2000; Blumberg, Bialostosky, Hamilton & Briefel, 1999).

The U.S. Food Security Questionnaire is the most comprehensive and widely used food security measure available (Bickel et al., 2000; Keenan et al., 2003). The core module-based Food Security Scale consists of 18-items assessing severity level of food insecurity and hunger experienced at the individual or household level during the previous 12 months. The greatest strength of the module is that it contains multiple indicator questions which capture and distinguish between the various levels of severity that result from an inadequate food supply. According to the *Guide for Measuring Household Food Security* (Bickel et al., 2000), “this feature is critical for accurately assessing the *prevalence* of food insecurity because the greater the severity, the less the prevalence and each separate indicator captures a *different degree* of severity. The frequency of the various indicators varies widely depending upon *exactly which* level of severity each one reflects (p. 2).” Another strength of the core module is that the findings are readily interpretable. National and state-level standard benchmark data are published annually and made available to the public by the United States Department of Agriculture (USDA) (Bickel et al., 2000). Likewise, annual data are also available for a shorter 30-day reference period. Hence, local surveys can be directly compared to this national benchmark.

Until 2006, food insecurity measures categorized households as either food secure or food insecure; with the latter category further divided into food insecure without hunger or food insecure with hunger. A change in terminology occurred in 2006 when the USDA proposed a new labeling system that refrained from identifying whether a household experienced hunger or not. Table 1 provides an overview of the original and revised food security labeling terminology. The new system classifies individuals that are food secure as having high food security or marginal food security (Economic Research Services, 2006, accessed July 15, 2007). A household exhibiting high food security is one that shows no indications of food access problems while marginal food security refers to households that may report one or two indications of limitations in accessing food. At this point, little or no change in dietary intake has occurred. The food insecure category is also divided into two categories: low food security and very low food security. It is not until a household is identified as one of the previous two categories that true alterations in dietary intake are observed. The alterations may be in the form of reduced variety or poorer quality and desirability. However, a reduction in actual food intake is typically reserved for those identified as very low food secure.

Trends in Food Security

Through the past few decades, assessment techniques have improved, yet efforts to reduce the prevalence of food insecurity have not yet made a significant impact. Additional measures must be taken in order to meet the goals set by many national

programs to help alleviate this preventable public health issue. During 2006, 10.9% of American households reported experiencing food insecurity at some point throughout the course of the year (Nord, Andrews & Carlson, 2007). Reaching the proposed Healthy People 2010 goal of increasing food security to 94% would require a 5% further reduction in food insecurity (U.S. Department of Health and Human Services, 2000). Similar reductions would also be necessary to reach goals set by the US Department of Agriculture's Community Food Security Initiative which calls for reducing the prevalence of US food insecurity by half by the year 2015 (National Center for Appropriate Technology, accessed July 15, 2007).

According to the latest report on food insecurity status among Americans (Nord et al., 2007), prevalence varies greatly among different household types. Families with more than one adult and no children were significantly below the national 10.9% average, with only 6.5% experiencing food insecurity. Similarly, only 6% of elderly households were food insecure at some point during 2006. Low or very low food insecurity occurred more frequently among households living below the poverty line, headed by a single mother or by certain racial or ethnic groups (e.g. Hispanic and African American). Within 2006, 36.3% of households with incomes less than the official poverty line experienced food insecurity. Almost as prevalent were 30.4% of households with children headed by a single female parent. Reduced food security was also reported among 21.8% and 19.5% of African American and Hispanic households, respectively.

Outcomes Associated with Food Insecurity

Previous research shows that food insecurity is directly related to numerous health outcomes such as poor health (Siefert, Hellin, Cocoran, & Williams, 2004; Stuff, Casey, Szeto, Gossett, Robbins, Simpson et al., 2004), poor nutrition (Dixon, Winkeby, & Radimer, 2001; Kempson, Keenan, Sadani, Ridlen, & Rosato, 2002; Rose & Oliveira, 1997), impaired mental health status (Heflin, Siefert, & Williams, 2005; Siefert et al., 2004), and being overweight or obese (Hanson, Sobal & Frongillo, 2007; Jeffery & French, 1996; Wilde & Peterman, 2006).

Research suggests a link between household food insecurity and physical and mental health; however, distinguishing between consequences associated with food insecurity and other common risk factors associated with poverty and low socioeconomic status is difficult. One mechanism that was suggested by Siefert, Heflin, Corcoran and Williams (2004) is that “poor physical health is a risk factor for poor mental health such that poor physical health status may mediate the relationship between food insufficiency and mental health (p. 173).”

Until recent years, little was known regarding the relationship between hunger and dietary intake. Existing research suggests a number of nutrition-related issues such as decreased energy intake, reduced consumption of nutrient-rich foods such as fruits, vegetables and dairy products as well as disordered eating patterns. As a result of reduced energy intake, decreased intake of key nutrients and antioxidants has also

been reported. Households suffering from food insufficiency often use certain coping strategies to deal with an inadequate food supply. Research conducted by Kempson, Keenan, Sadani, Ridlen and Rosato (2002) sought to identify which food management practices are most often used, and of these, which may pose food safety and nutritional risks. In general, strategies used to manage food supplies presented more food safety than nutritional risks. Participants often cited making low-cost dishes, removing slime or mold from foods, or diluting foods to make them last longer. Other strategies were suggested for rationing or conserving food supplies such as labeling food with family member names, locking up or hiding food, limiting the amount of food consumed and taking leftovers from charitable organizations. Proper food storage was lacking as refrigeration and other storage techniques were often unavailable or limited.

In addition to poor dietary intakes, an inverse association between overweight/obesity and food insecurity has also been proposed and supported by considerable research (Wilde & Peterman, 2006; Jeffery & French, 1996; Sarlio-Lahteenkorvca & Lahelma, 2001; Townsend, Peerson, Love, Achterberg, & Murphy, 2001; Hanson, Sobal, & Frongillo, 2007). The phenomenon represents a paradox since individuals with inadequate food supplies are often thought as having limited intake and consequently being underweight or malnourished. Research shows that the opposite is true, especially among women. While the mechanism associated with food insecurity and increased prevalence of obesity is not well understand, one common hypothesis is the

inconsistent availability of food among food insecure households. Lack of consistent availability is thought to result in disordered eating patterns such that under-consumption or limited consumption occurs when resources are constrained and over-consumption results when food supplies become available (Wilde & Peterman, 2006; Sarlio-Lahteenkorva & Lahelma, 2001). This cycle represents the pattern that occurs in developed countries such as the US, whereas the pattern associated with malnutrition and weight loss is observed in more underdeveloped countries.

Underrepresented Populations and Food Security

Although national surveys utilize surveying techniques to capture a representative sample, these data potentially conceal segments of the population that are at higher risk for food insecurity. One potential vulnerable population underrepresented within national surveys is individuals with serious mental illness. Strides have recently been made to integrate individuals with mental illness within the community; hence these individuals face many barriers that may limit their ability to maintain a consistent supply of nutritionally adequate food. Poverty is a common risk factor for food insecurity and, not surprisingly, individuals with mental illness often report limited income (Bruce, Takeuchi & Leaf, 1991). Other potential barriers may include limited social networks, restricted means of transportation, and lower educational status. Despite that these factors would suggest these individuals may be particularly vulnerable to food insecurity, no research examining the prevalence or underlying causes of food insecurity have been conducted within this population.

In a study examining predictors of food insecurity conducted among inner city families with preschool children living within the Vancouver area (Broughton, Janssen, Hertzman, Innis & Frankish, 2006) cooking skills and availability of appliances played a large role in food selection. Within this sample of individuals, those households exhibiting food insecurity reported having to make careful consideration for taste, nutrition, cost and convenience when selecting food choices. Although many convenience items are available which eliminate the need for cooking skills or equipment, these products often cost more and are less nutritious than other foods. Further, this research suggested that individuals having limited access to food with reasonable quality were more likely to be food insufficient. For individuals living within low-income neighborhoods of the inner city, few places are available to purchase food. Those places that are available typically include convenience stores and small markets that may have limited supplies of nutritious foods. To compound matters, transportation is often limited thus traveling to areas with better food supplies often is not possible. Similar to the population described by Broughton and colleagues, individuals with serious mental illness oftentimes live in low-income neighborhoods within the inner city. These individuals would likely face similar barriers to maintaining adequate supplies of food.

Two other potential barriers to maintaining adequate food supplies are grocery shopping skills and nutrition knowledge. Brown, Rempfer, Hamera and Bothwell

(2006) conducted a study examining knowledge of grocery shopping skills as a mediator of cognition and performance among individuals with serious mental illness. The purpose of this research was to examine how mediators account for the relationship between outcome and predictor variables. Once mediators are identified, this provides a valuable means of identifying targets for intervention. The researchers suggest that foundational cognitive abilities (such as memory, attention and problem solving) are necessary for grocery shopping. These skills are necessary in order to recognize the systematic structure or arrangement of grocery stores and/or to effectively locate less expensive or healthier products. The findings suggest that knowledge of grocery shopping skills mediates the relationship between cognition and performance of these skills and further suggests that future research should make distinctions between knowledge and performance of skills. Since many individuals with serious mental illness have difficulty with memory and concentration, this could ultimately have an impact on their shopping skills and contribute to food insecurity.

Mixed Methods Design

Although an extensive body of literature exists within the realm of food security, future research requires both quantitative and qualitative research to explore the experiences reported by more vulnerable food insecure populations. Utilizing quantitative methods alone to assess the prevalence of this public health issue is insufficient as this does not identify the underlying reasons, needs, and barriers that are associated with an inadequate supply of food. Further in-depth, semi-structured

interviews and focus groups will add rich details that might provide insight into improving existing programs or identify needs for additional intervention.

In light of the fact that no research examining food insecurity was identified within the serious mental illness literature, formative research is necessary before intervention efforts can be properly tailored for this vulnerable population. Hence, this dissertation research utilized the complementary strengths of quantitative and qualitative methodology to provide insight into the presence of food insecurity among individuals with mental illness. As with many public health issues being explored within a new population, prevalence must first be assessed. Although this information will provide insight into the number of individuals affected, it does not necessarily address the underlying issues such as barriers and strategies used to overcome food insecurity. To address these issues, qualitative methods which are uniquely suited for providing rich detail were employed.

Research Design and Methods

This dissertation examines the prevalence of food insecurity among a group of individuals with serious mental illness participating in a weight loss intervention within the Kansas City, Kansas metropolitan area. Further, the researcher sought to elicit the personal experiences and perceptions of factors associated with being unable to consistently maintain an adequate supply of food. By examining both the extent of the issue and the underlying causes and perceived impact, this will not only contribute to the current literature, but potentially help attenuate this public health issue by providing rich detail necessary to design a tailored intervention for the SMI population. A mixed method design was used to address the following four research questions:

Primary Research Questions

1. What is the prevalence rate of food insecurity among individuals with serious mental illness participating in a weight loss intervention in urban Kansas?
 - Rationale: Limited research addressing food security has been identified within the serious mental illness literature. Although a group of Occupational Therapists from Australia (Foley and Pollard, 1998) designed a program (Food Cent\$) to provide mothers with mental illness the knowledge and skills to shop smarter and eat a more balanced diet based upon the notion of value for money, the authors did not report the prevalence or severity of the issue within the population examined. Obtaining prevalence data will not only

assist in determining the extent of the issue within this vulnerable population, but provide rationale for future intervention efforts as well.

2. What do individuals with serious mental illness perceive to be barriers to maintaining an adequate food supply?
 - Rationale: Barriers to maintaining an adequate food supply have been well-evaluated among the general population. Findings obtained from this research may be compared with these recognized barriers, and consequently determine whether individuals with serious mental illness face unique barriers that may contribute to the situation. With this information, a food security intervention can be specifically tailored for this population of individuals.

Secondary Research Questions

3. What strategies are most commonly utilized by individuals with serious mental illness to overcome barriers associated with not having an adequate food supply each month?
 - Rationale: Intervention time can be maximized by understanding what strategies are already used, with greater time spent on teaching other strategies that may attenuate these identified barriers. Additionally, assessing whether common themes emerge from those individuals reporting greater success with food security, researchers can determine whether certain strategies may be more beneficial than others.

4. In what ways do individuals with serious mental illness perceive having an inadequate supply of food to impact themselves and other household members?
 - Rationale: Food security has a negative impact upon individuals at many levels. Understanding the consequences of having an inadequate supply of food may help healthcare professionals understand why many interventions and recommendations are ineffective.

Methods

Quantitative Methods

Participants

A convenience sample was obtained from a larger weight loss intervention conducted among individuals with documented serious mental illness. Baseline data from participants enrolled in Cohort 1 (n= 36) and Cohort 2 (n= 36) of the Recovering Energy through Nutrition, Exercise and Weight Loss (RENEW) program were used to assess food security status and to provide overall demographic data for the sample. To be eligible for inclusion within the larger RENEW program, individuals had to meet the following criteria:

- Diagnosis of a serious mental illness as defined by the Kansas Department of Social and Rehabilitation Services (2001). This includes a diagnosis of a

schizophrenia spectrum disorder or mood disorder and evidence of impaired function for a minimum of two years,

- Age 18 – 65,
- BMI \geq 25 kg/m²

Individuals were excluded from participation in the RENEW study if any of the following exclusion criteria were observed:

- Diagnosis of mental retardation or dementia,
- A history or current diagnosis of an eating disorder,
- Individuals who are pregnant or breast feeding,
- Uncontrolled hypertension (SBP > 160, DBP > 90),
- Severe coronary artery disease,
- Severe valvular disease,
- Uncontrolled diabetes (HbA1c > 8.5),
- Sustained arrhythmia,
- Severe physical limitations (severe joint disease, advanced neurologic disease),
- Uncontrolled lung disease

Setting

All testing procedures, interviews and focus groups were conducted at local mental health facilities. Cohort 1 was conducted at a facility (site 1) located in a lower

socioeconomic county, within close proximity to a downtown metropolitan area. In comparison, cohort 2 was conducted in a suburban, higher socioeconomic county of the same metropolitan area (site 2).

Ethical Concerns

Prior to conducting research this study was approved by the University of Kansas Medical Center Human Subjects Committee. The approved consent form is located within the appendices.

Data Collection Procedures

Demographics

The following demographic data were obtained for all participants: age, gender, race/ethnicity, education level obtained, current living situation, smoking status, and monthly income sources and amounts.

Diagnosis and Symptoms

Information was obtained regarding psychiatric diagnoses and symptoms. Diagnosis and psychiatric medications were confirmed via a chart review conducted at the mental health facility. Psychiatric symptoms were assessed using the Brief Psychiatric Rating Scale (BPRS).

Food Security Questionnaire

Food security status was assessed using the 10-item adult version of the U.S. Household Food Security Questionnaire (Bickel et al., 2000) created by the United States Department of Agriculture (USDA). The questionnaire is the most comprehensive and commonly used instrument to assess food security status. Although comprehensive in nature, the questionnaire is designed to reduce subject burden through the use of skip patterns, with many households only being asked 3-5 questions (Bickel et al., 2000; Keenan et al., 2003). In an effort to circumvent any deficits in memory or concentration levels, the questionnaire was adapted from the original version by shortening the reporting period from the prior 12 months to only the prior 30 days. The altered timeframe was selected because it had been used extensively in previous research, and national comparison data were available (Bickel et al., 2000). In addition to these 10 questions, the single-identifier food sufficiency question was also administered. This question asks the following: “Which of the following statements best describes the food eaten in your household: 1) Enough of the kinds of food we want to eat, 2) Enough but not always the kinds of food we want to eat, 3) Sometimes not enough to eat, or 4) Often not enough to eat.”

The questionnaire (see Appendix A for adapted version) was administered to all subjects in a quiet, private corner following explanation of the questionnaire. Each individual was informed that the questionnaire was specifically examining the amount of food individuals have available due to financial constraints and not other issues

such as personal choice, dieting, or other health conditions.

Qualitative Methods

Semi-structured Interviews and Focus Groups

In order to ascertain potential barriers to maintaining an adequate food supply, strategies used to avoid being food insufficient, and the impact of food insecurity on households and individuals, a series of semi-structured interviews and focus groups were conducted. These methodological strategies were selected in order to gain thoughtful reflection from individuals, but also perspectives identified from the interaction of individuals with similar circumstances. Using more than one qualitative data collection technique also enables researchers to explore in greater depth the perceptions and experiences of individuals with serious mental illness. Prior to participation, procedures and confidentiality were explained to participants and informed consent was obtained. Participants were given a \$10 and a \$15 grocery store gift card as compensation for participation following the interview and focus group, respectively.

Sampling Frame

A purposive sample of individuals from the larger RENEW study were recruited for the qualitative procedures. Efforts were made to recruit an equal proportion of individuals from each of the two mental health facilities. A stratified, nested sampling frame with divisions based upon food security status (food secure or food

insecure) and living situation (live alone or with others) was used to assess the barriers and strategies used to maintain current food supplies. Individuals identified as having either high or marginal food security were classified as food secure, while individuals classified as having low or very low food security were collectively classified as food insecure. Food insecurity prevalence rates have been shown to largely vary depending upon the makeup of the household, thus living situation (living alone or with others) also was stratified. According to findings reported by the ERS from the December 2006 Current Population Survey Food Security Supplement (Nord et al., 2007), households with more than one adult experience less food insecurity than those households with individuals living on their own. These data suggest that while only 6.5% of households with more than one adult experience food insecurity at some point during the year, 11.3% of households headed by a single female, and 11.4% of households headed by single male experience food insecurity. Additionally, these individuals may experience different barriers to maintaining an adequate food supply. Since food insecurity is highly episodic in nature, individuals that had not been administered the US Household Food Security Questionnaire within the previous 30 days were administered the questionnaire again and stratum placement was determined. Table 3 provides an overview of the proposed sampling frame.

Semi-structured Interviews

To assess factors associated with household food supplies, seven semi-structured interviews were conducted within each stratum, for a total of 28 interviews. The sample size was determined *a priori* with a larger sample not pursued due to the limited number of study participants that lived in a household with other individuals. Despite the small study sample, reaching redundancy or saturation of data was possible given the homogenous population examined within each stratum. Even if saturation was not achieved, the information-rich data gathered would provide sizeable insight into factors associated with the food supply of individuals with serious mental illness, and therefore, provide useful information for tailoring future intervention efforts.

Focus Groups

Once all semi-structured interviews were conducted within a given strata, individuals were invited to participate in a subsequent focus group session (see Figure 1). The purpose of conducting focus groups in addition to the interviews was to identify whether similar themes emerged when individuals were given the opportunity to discuss the matter privately or among a group of peers. Given the relatively homogeneous sample of individuals within each strata, it was hoped that individuals would feel comfortable sharing their experiences and perceptions with others faced with similar circumstances. A single focus group session was conducted among each of the four sampling stratum. This number was sufficient to determine whether

similar barriers and strategies were addressed and to assess whether any contradictory statements were made between the two qualitative methodologies.

Qualitative Procedures

Interviews

Semi-structured interviews lasting approximately 20-30 minutes in duration were conducted to gauge the level of the concern, evaluate the extent to which food supplies were inadequate, and to assess barriers and factors that have helped individuals overcome an inadequate food supply. Interviews were conducted in a private area at mental health facilities and were autotaped and later transcribed.

Interview questions followed a logical flow and progressed from least threatening to more complex with five main topic areas covered: 1) food supply characteristics throughout the month, 2) barriers associated with maintaining an adequate supply of food, 3) strategies used to improve food security, 4) whether individuals would seek assistance during times of need, and 5) how individuals perceived fluctuations in food supplies to impact themselves and other individuals within the household. Follow-up questions also were asked based upon the participants' responses to these main topic areas (see Appendix B for a general overview of interview questions). Although grand tour and follow-up questions were synthesized prior to the interviews as a means for keeping conversations guided towards the topic at hand, these questions were adapted based on the participants unique experiences and situations.

Focus Groups

Based upon the researchers prior work with the SMI population, limited attention spans are often common. Consequently, focus group sessions were restricted to approximately 60 minutes in duration. Similar procedures to those used during interview sessions were employed, with an assistant moderator present to help facilitate and take notes during the discussion. A semi-structured format using open-ended questions was used to facilitate the discussion. The focus group moderator's guide (see Appendix C) was developed based upon themes identified within the food security literature pertaining to barriers and strategies used to avoid food insecurity. Questions were similar in topic to those asked during the semi-structured interviews; however, more broad in nature. Because responses provided within each stratum would be compared for differences and similarities, questions presented were similar across all four strata. However, more emphasis was placed on barriers associated with an inadequate food supply for those groups that were food insecure, while strategies used to improve food supplies were focused on within the food secure stratum. Even though individuals may have been identified as food secure, these individuals may have had other experiences or circumstances during recent periods that may have resulted in more food insecure experiences.

Data Analysis

Food Security Questionnaire

Coding procedures outlined in the *Guide to Measuring Household Food Security – 2000* (Bickel et al., 2000) were used to classify food security status. Since the reference period was modified from the original 12 month period to a 30-day period, decisions were made on scoring temporal-dimension questions. Although the guide published in 2000 (Bickel et al.) designated 5 or more days as the recommended cut off, more recent research findings have recommended using 3 or more days per month to denote an affirmative response as this number more closely approximates the coding used in the original 12-month reference period (Nord M, 2002). Questions answered either “don’t know” or “refused” had a missing value imputed using the procedures described in the *Guide to Measuring Household Food Security -2000* (Bickel et al, 2000). The method imputes responses for missing items based on the nature of the answers that the same individual supplied during previous questions. This imputation procedure is methodologically conservative, thus minimizing false positives. All responses were coded as either “negative” or “affirmative” according to coding criteria (see Appendix D), with affirmative responses tallied and subsequently categorized by food security status (see Table 2 for classifications).

Questionnaire responses were analyzed using SPSS version 16. Food insecurity prevalence was ascertained by determining the frequency of the sample within each food security classification. Since the correct value for raw score = 0 is unknown, a

median value was calculated for the total sample as well as each sampling stratum. Data were then collapsed into two categories: food secure or food insecure (food secure= high food security and marginal food security; food insecure= low food security and very low food security). Data were subsequently compared to national data assessing the same 30-day time reference period.

To assess whether differences in major demographic characteristics were observed among those individuals categorized as food secure (high and marginal food security) and food insecure (low and very low food security), simple statistical analyses were conducted. Independent-samples t- tests were conducted to assess whether a relationship existed between classifications as food secure or food insecure and ordinal variables such as mean age and monthly income. Categorical demographics were examined using chi-square tests to determine whether differences existed between individuals classified as food secure and food insecure. Demographic variables assessed included mental health facility site, gender, smoking status (smoker versus non-smoker), living situation (live alone versus live with others), and psychiatric diagnosis. Follow-up tests were conducted on variables with more than two levels which resulted in statistically significant chi-square values.

Qualitative Procedures

Modified verbatim transcripts were inductively coded and a code book was developed to facilitate the coding process (see Appendix E for coding example). Text analysis

following a grounded-theory approach (Glaser and Strauss, 1967) whereby categories and concepts emerge from the text and are then linked into substantive and formal theories. Inductive analysis was selected based upon the limited food insecurity literature available within the serious mental illness population. While common barriers occurring within the general population have already been established, individuals with serious mental illness may experience different barriers and strategies for overcoming food insufficiency.

Following completion of the code book, a secondary deductive coding was performed by a second trained researcher. Coded transcripts were cross-checked by an independent individual, with approximately 10% of codes checked for inter-coder reliability. Disputes among coders were discussed and resolved prior to discussing patterns that emerged from the identified themes. To facilitate the reduction process, a coding sort based upon the main topic areas discussed was developed to help summarize information and concepts based upon the frequency with which the codes appeared within the actual data set. Through the data reduction process, central and secondary themes were derived. Themes and patterns were examined across stratum as well as between interviews and focus groups conducted within the same strata to identify any differences that emerged. Quotes selected to support patterns and themes were selected based upon the following criteria: 1) the comment was based upon the individual's own beliefs or experiences 2) subsequent statements made by the same

individual were not contradictory and 3) the individual was providing a detailed account rather than generalities (Ulin, 2005).

Results

Food Security Prevalence

The average age of the overall sample was 43.9 years with a range of 19 to 64 years of age. Sixty-one percent of the sample was female. The majority of individuals lived independently (80.6%), with over half of the sample living alone (58.3%).

Completion of high school (or G.E.D. equivalent) or higher was obtained by 88% of subjects. Exactly half (50%) of the population was identified as a current smoker.

Detailed subject demographics for the overall sample are provided within Tables 3 and 4.

A comparable proportion of subjects were classified as food secure and food insecure (54.2% vs. 45.8%, respectively). Of those food secure individuals, 53.8% reported high food security. The lowest form of food insecurity, very low food security, was reported by 63.6% of those classified as food insecure. In comparison, the 2006 Annual Food Security Survey conducted by the Economic Research Service (ERS) from the USDA (Nord et al., 2007) indicated that 30-day food insecurity prevalence rates for the general population were 5.8%, with the remaining 94.2% of households categorized as food secure. Further comparison data can be viewed in Table 5. No statistically significant differences in demographics (i.e. income, age, gender, site, living situation, and psychiatric diagnosis) were found between food insecure and food secure individuals (Refer to Table 6 and Figures 2 through 8).

Interview and Focus Group Findings

A total of 28 individuals participated in the semi-structured interviews. As a result of recruitment issues, two of the strata had a different number of subjects than proposed. One individual originally identified as food insecure, living with others (stratum 4) was found to have had a change in living situation and was now living alone. Thus, 8 individuals living alone and food insecure (stratum 1) were interviewed while only 6 individuals living with others and food insecure (stratum 2) completed the interview. Efforts were made to recruit an additional individual for stratum 4, but this was unsuccessful due to subject withdrawal and missed appointments. A high focus group attendance rate of 78.6% was achieved across the four groups. Table 7 shows actual participant size for each stratum.

A higher number of individuals from site 1 participated in the qualitative measures (57.1% versus 42.9%) (Refer to Table 8). The subsample had slightly more females (57.1%) and was primarily Caucasian (75%). For those individuals living in a household with other individuals, 38.5% lived with a spouse or live in partner, 30.8% lived with family, and the remaining 30.8% lived with other non-related individuals (see Table 4). Only four of those interviewed had children living within the household. A summary of subject characteristics for the subsample can be found in Table 8.

Individuals within the food insecure stratum were primarily classified as the most severe category, very low food security (87.5% living alone, 83.3% living with others). Within the food secure stratum, high food security was reported by 57.1% and 42.9% of individuals living alone and with other individuals, respectively (stratum 2 and 3). Thus, it is important to note that a large number of individuals within the food secure stratum were marginally food secure, and thus may have experienced anxiety regarding maintaining an adequate food supply. Details of food security status by stratum are shown in Table 10.

Food Supply across Month

Barriers and concerns to having an adequate supply of food, at least to some degree, were reported by individuals in each stratum. In contrast to the general population, the majority of individuals within this SMI population receive Supplemental Security Income (SSI) and/or Social Security Disability Insurance (SSDI) at the beginning of the each month. Consequently, food supplies tend to be distinctly different at the beginning and end of the month. “At the beginning I have plenty of food, you know, but it doesn’t last all month.” Food insecure individuals tended to report experiencing a reduction in quality and quantity of food throughout the month, with food completing running out on some occasions as suggested by the following participant’s comment, “that last week, I’m scrounging up to you know, to make a meal out of things....unfortunately the way I eat, it don’t last...it don’t last.” This depletion-repletion cycle was described by one participant in the following way: “The

beginning of the month it's like paradise. All the food that I want, everything I could dream of; by the end of the month, it's like I'm living in poverty." Another participant expressed her despair by indicating that she and her husband weren't asking for much, just a basic supply of food when she commented, "we are not asking for steak every night or nothing like that. We're just asking for basic necessities. You know just something. But my kids know that when it's the last half of the month and there is no more snacks, there's no more snacks, they've ate them."

Reductions in quantity, quality and variety appeared to occur consistently month to month for the majority of food insecure individuals. "It seems to follow each month, I struggle with it." However, several participants living in a household with others reported recent circumstantial issues which may have increased the severity of the issue (i.e. loss of food stamps, moving, and transitioning from living alone to living with a partner). In comparison, food secure individuals tended to report only a reduction in the variety of foods towards the end of the month, with some type of food always being available although perhaps "not as grand as at the beginning of the month." Frequently individuals would report running out of fresh produce and perishables prior to the end of the month. Additionally, many commented that they weren't always able to have "the type of foods we would like to have." Situations tended to vary as suggested by one individual, "sometimes we've run out and sometimes we don't, it depends on the month and you know how we do different things and stuff." In contrast, a handful of food secure individuals reported virtually

no issues with maintaining an adequate food supply, as elucidated by one participant, “We are living the good life! We might be on social security, but we’re living well!”

Income and Monthly Expenses

For the most part, all groups except those who were food insecure and living alone (stratum 1) tended to report receiving SSI/SSDI plus a secondary source of income.

Stratum 1 was more apt to receive only SSI/SSDI supplemented by a small food stamp amount. With the exception of stratum 2, food secure and living alone, most individuals received food stamps; however, the amounts received varied greatly.

Those individuals living alone, tended to receive only minimal amounts. Frequently individuals living alone received only \$10 in food stamps each month, whereas those living with others often received \$150 or more depending upon household size.

Monthly expenses appeared similar across all groups and included rent/mortgage, utilities, transportation, medications, doctor/healthcare and entertainment. For many individuals, cigarettes were also a common expense and often competed with money that might otherwise be spent on food. In the words of one participant, “It always goes cigarettes then food.” Although half of the sample population was smokers, not everyone expressed these same sentiments as suggested by the following food secure individual when presented with the choice between food and cigarettes: “I would have to take food because I can always hold back on my cigarettes, I can always do that.” Although not all smokers were queried regarding this decision, the tendencies

for those that were asked were that food insecure individuals reported preference for cigarettes while food secure individuals selected food.

A common theme expressed by those having issues maintaining an adequate food supply was that their fixed income was quickly exhausted after paying monthly bills and other competing needs. “It doesn’t look that much [expenses], but when you have GA [General Assistance] and you are managing everything, it does!” After paying monthly bills, many subjects reported having only \$100 remaining for food and personal needs. Comments such as, “I’ve got a limited budget, so I can barely make it through the month” were common, but others suggested “I get ample money if I would manage it better.” Although many individuals had a rough estimate of the amount of money that might be spent on food each month, an equal number indicated that the amount depended upon the bills and other needs that month. Remarks like the following were common: “Probably what is leftover, which is usually nothing after paying all the bills. That’s probably the main thing because I pay all the bills and then there is, you know, usually nothing left in the check. And so then I’m saying, ‘where do I get the money for the food?’”

Barriers to Food Security

Barriers to either accessing or affording food were commonly reported, regardless of strata. While the logistics of obtaining food could be perceived as a common barrier, differences emerged across the food secure and food insecure groups. Although just

as many individuals living within a multiple person household reported not owning their own form of transportation, these individuals were less apt to see this as a barrier as other arrangements had been made and appeared to be working well for these individuals. In contrast, although food insecure individuals often reported other means of transportation such as walking, using cab services, or taking advantage of the mental health or public transportation system, these individuals still viewed this as a barrier which often resulted in less frequent grocery visits, or worse, utilizing convenience stores on a regular basis. Thus, transportation, access, and prices were all reported as barriers as evidenced by the following strongly worded statement: “I got two grocery stores [near me], but again like when it’s wintertime, there is snow on the ground. It’s hard to walk a mile and a half to a fricken grocery store, so you have to go with like Quip Trip and CVS where the food is fricking expensive.”

For many food insecure individuals, lack of transportation appeared to create a vicious cycle which necessitated a greater reliance on nearby convenience stores which were more expensive, and consequently, less money was available for groceries. To compound matters, the variety and nutritional content of the items commonly available in these stores are poor. Although lack of transportation may make accessing food more difficult, food secure individuals appeared more resourceful and confident in finding means of transportation, and thus, access to stores was not as much of an issue. Even though some individuals still reported concerns with transportation and access to grocery stores, those multiple person

households appeared to be least limited by these barriers. Lack of skills or strategies such as food budgeting, meal planning, nutrition knowledge, or cooking skills was mentioned by individuals in all strata, but was most often reported by food insecure individuals.

Another topic that was overwhelmingly discussed and appeared to perpetuate the food insecurity cycle, was binge eating. “I don’t know if you all notice, but when you have more food, you eat more cause it’s like I have it and it’s all at the first of the month or whenever you get your food stamps you buy everything that you like. So it’s gonna be gone in about a week or two, I mean maybe not that long. You know, then you are back to the skimping or whatever.” Individuals reported a vicious and common cycle of food depletion due to inadequate food supplies followed by binge eating when food supplies become available (see figure 9). “When we go through that, those few days or week or whatever at the end of the month, you want to gobble up everything when you get your food stamps.” When asked when binge eating is most prevalent, a food insecure participant stated, “It’s always at the beginning of the month because at the end of the month I always run out of food and so for a whole week of really not having much food, I think about all of the foods that I want and so the beginning of the month I get my food stamps and just boom buy you know cookies and ice cream and just everything that I love, and then I eat it all within couple of days.”

The majority of individuals were aware of the impact this cycle caused. “When I go on an eating binge, I can eat for 3 to 4 days straight. You know, whatever is in the kitchen, I’m going for. And I know that it is not good because I have a tendency of running out round the last week of the month.” Despite understanding that this cycle contributes to food insecurity, individuals were lacking the motivation and self-control to stop this cycle. A common pattern among those reporting this food insecurity-binge cycle was that if this behavior did not occur, the food supply would likely last throughout the entire month. “It may not be what I want, but I can get food to take me through the month, but like I said with the binge eating, it don’t...it don’t last.”

Although binge eating was also identified within the food secure stratum, it appeared that the underlying reason was more emotional or associated with mental illness symptoms rather than the typical cycle reported by food insecure individuals. Consequently, bingeing for these reasons did not appear to negatively impact the monthly food supply. For many food secure individuals, lack of initiative or drive for shopping, cooking and or eating was often a greater contributing factor for insufficient food supplies than restricted or limited income. Many individuals reported that symptoms associated with their mental illness were often the cause for this lack of initiative.

Strategies to Improve Food Security

Regardless of stratum, most individuals participating in the interviews and focus groups were well aware of strategies and resources that were available to combat this public health issue; however, the difference occurred in whether or not these strategies were actually used and to what degree they were utilized. A common theme noted among food insecure individuals was a tendency to use more drastic measures for stretching the food supply rather than some of the skills that were reported by individuals from the food secure stratum. Food insecure individuals often reported purchasing the cheapest foods available (i.e. ramen noodles, pot pies, inexpensive frozen dinners) and skipping meals or limiting themselves to one meal per day as an effort to make food last longer. One participant remarked the following, “Usually when I go shopping, three-fourths of my groceries will be just regular groceries....milk, eggs, stuff like that. The other fourth of them will be the cheapest things I can find like ramen noodle soup and macaroni and cheese...and just cheap things so that when I do come towards the end of the month, I’ll have some things that can last me.” Another suggested “yeah, you’re buying the cheapest that there is because it stretches your dollars further.” Both groups of food insecure individuals appeared to be heavily reliant upon emergency services such as food pantries, soup kitchens, and meals served at mental health agencies as a method for obtaining free food. “Yep I rely on them every month, I mean that’s every month...I don’t miss my appointments.” When asked what would happen should these services be unavailable one individual reported, “then I’d be out...I’d be in bad trouble.” An

interesting finding was that a small handful of individuals experiencing the most severe form of food insecurity that were not utilizing emergency services expressed sentiments such as the following: “I’m kind of embarrassed to go to the food pantry because I um feel like that there are people who need it more than I do.”

Although individuals in the food secure strata also reported purchasing at least some cheaper foods, very few reported drastic measures such as skipping meals as a strategy for extending food supplies. While all individuals were knowledgeable regarding strategies that might be helpful, food secure individuals were more likely to pursue and engage in these strategies. Food secure individuals more commonly reported employing strategies or skills to improve the food supply such as meal planning, food budgeting and capitalizing on opportunities to stock up food supplies when possible (see Figure 10 for strategy comparison). Other common strategies reported including food portioning and use of leftovers and/or cooking inexpensive meals that would provide several servings and then freezing remaining portions for later meals. These individuals appeared to be less reliant, if any, upon emergency services providing free food or meals. “If I didn’t have it it would be a little tighter, I could get through it though.” In many cases these individuals had utilized services before or continue to do so on occasion, but these individuals did not appear as dependent on these services.

Willingness to Seek Help

Although many individuals were willing to seek assistance during times of need, many others indicated that a limited or depleted food supply was a personal issue that was not shared with others. “If I got down to absolutely nothing, I don’t know that I’d say anything.” Another individual reported, “I don’t tell nobody when I’m out, I just bare it.” Individuals often expressed embarrassment regarding the situation and commonly reported “I just wouldn’t really burden anyone with it.” Of all topic areas discussed, willingness to seek help was the only issue where conflicting statements were made by the same individuals between interview and focus group sessions. Stratum one, those individuals living alone and food insecure, expressed more of a willingness to ask others for help during interviews, but then clearly indicated during the focus group that they would be unwilling to seek help, especially from family or case managers. During interviews, although one individual expressed unwillingness to seek help and another did not directly answer the question, participants were more likely to indicate, “I would tell a case manager or something like that.”

Examining patterns across focus groups, it appeared that those individuals reporting the most severe problems were less likely to seek help while those with little or only slight concern were more likely to ask for assistance. For example, one food secure individual asserted “I wouldn’t be tripping about it because sometimes you need help.” Several reasons were presented for not seeking help, but common themes were embarrassment, guilt, and anxiety which were expressed in the following ways:

“There is a difference between being frustrated with something or liking to have something, and being in a situation that is more embarrassing.” Guilt was often expressed as in the following commentary, “You feel guilty when they do happen to offer um to take you to the store. You know it’s like you should be able to do that yourself, and you can’t...you know, there’s a lot of guilt.”

For those willing to seek help, the most commonly cited sources were family members or staff at mental health facilities. Many individuals, especially those households with other individuals, reported commonly borrowing money or food from family members. However, another segment of those interviewed expressed anxiety, embarrassment, and guilt; and consequently, were hesitant to tell family as shown by these remarks: “I’m not real critical of myself, but I’m certainly afraid of discussing these things with my family.” For some individuals, family members were likely not even aware of the situation. “I don’t think that my family is aware that I go without eating or that I go without meals.” Embarrassment was the most commonly cited reason for shying away from help as with the following statement, “I’d be too embarrassed to tell my family...I’d be thinking I was guilt tripping them or something.”

Case managers were a common source of assistance as they are often able to help gain access to food pantries and other emergency services and may be able to find additional sources of assistance during emergency situations. However, many

individuals, particularly those in the food insecure, live alone (stratum 1) focus group indicated an unwillingness to seek help from case managers. Many voiced fearing that they would be unsympathetic or unable to help. One participant recounted a recent conversation with her case manager, “You need to get it together and start learning to budget your money right because we aren’t going to be around here forever and you have to learn to be independent and go on your own someday.” For others, fear of not being helped was a concern. “That’s why I don’t discuss it with them....because I don’t want to hear what you can’t do, you know, that hurts more than, more than anything else.” As a result of these concerns, many participants reporting telling case managers or attendant care staff that they were doing fine. Many participants agreed with the following during a focus group, “My case manager will say, ‘how are you doing on your groceries and your meal planning and everything?’ and I’ll say, ‘I’m doing okay, but I’m not.’”

Impact of Food Insecurity

Most everyone reporting concerns with food insufficiency perceived that this had an impact on their mental and/or health status. The situation, however, clearly affected food insecure individuals to a greater degree than did those individuals who were more food secure. An inadequate supply of food caused added stress, depression, and altered mood. Some individuals reported becoming so depressed regarding an inadequate food supply, that they would be unable or unwilling to leave the house. For those households with children, poor self-esteem often resulted from feeling that

they were unable to provide basic needs for their children. While many individuals were embarrassed, one participant expressed more anger over the situation. “It makes me really depressed; I get kind of like pissed off at mankind. You know, I figure this is the United States and there shouldn’t be people going hungry in the United States, you know?”

Binge eating not only depleted food supplies, but also caused drastic fluctuations in body weight throughout the month such that weight increases when food becomes available at the beginning of the month and decreases when food depletes towards the middle to end of the month. “My weight fluctuates like crazy. I mean, beginning of the month I gain weight so quickly, I put on 10 pounds in a week. At the end of the month, I’ll lose 10 pounds in a week.” The cycle was consistently described by those having food insecurity-binge cycles, but was not reported by those individuals binging for other reasons.

Although impaired mental health was the most common theme that surfaced, other health effects were also reported such as poor dietary intake and potentially contributing to or perpetuating general health conditions such as high cholesterol or blood pressure, diabetes, or obesity. Several individuals mentioned simply not doing well when food is unavailable, and thus, becoming sick or experiencing pain.

A unique issue that emerged within this psychiatric population was that food insufficiency often led to stomach ulcers, dizziness, and queasiness due to the large number of medications taken on a daily basis. These medications should be taken with food, yet many individuals report having to take them on an empty stomach when food is unavailable. “I have no choice but to take my medications because when I’m not on them there is a serious difference, so I have to take them and I just don’t eat no food.” When asked how this impacts individuals, responses such as “I get dizzy spells, really bad,” “yeah I feel sick,” “weak, very weak” were given. By contrast, other individuals reported that the symptoms occurring when these medications are taken without food are so great that they simply elect not to take these medications when food is not available. Thus, not only are these individuals faced with the stress of not having enough to eat, but many have further impaired mental status due to the lack of medication.

Site Differences

Few clear distinctions were made when examining data provided by participants at the two mental health facilities. Although this research was studying the people and not the actual mental health site, some insight may be gathered by looking at differences in barriers and strategies across mental health sites. Contrary to original assumptions, the site in a lower socioeconomic county near downtown appeared to be slightly less impacted by transportation and access to stores. People at this site also appeared to use discount or thrift stores more frequently as well as to stock up on

foods when possible. By contrast, the more suburban site (site 2) reported a greater frequency of meal planning. Although both sites relied on emergency food services, one clear distinction existed: site one was heavily reliant on services obtained from food pantries while site two had a greater tendency of consuming meals at the mental health facility. This facility offers a nutritious breakfast and lunch five days a week. Breakfast is free and lunch is only one dollar or individuals can work at the agency to earn credit for a free meal. In contrast, the other mental health facility only offers food during celebrations or at a consumer run facility where not everyone attends.

Gender Differences

Although barriers and strategies used were not drastically different between genders, female participants tended to report the following: shopping at discount/thrift stores, purchasing cheaper foods, shopping sales, utilizing food pantries and/or mental health agency meal services, and skipping meals. While not every person was queried regarding tendency to binge eat, the female participants were more apt to report binge eating, and in particular, the food insecurity-binge cycle described earlier within this manuscript. Both genders appeared to be equally likely to put forethought into shopping by utilizing a grocery list or meal planning. Barriers to transportation and access to stores did not appear drastically different between genders.

Living Alone versus With Others

Based upon national data, individuals living in households with others tend to report greater food security (Nord et al., 2007). Themes emerging from this study population varied greatly depending upon whether the living situation was supportive or one in which other individuals were taking advantage and not contributing equally. For many of the individuals in the food insecure group, loss of control over the food situation or finances was another factor reported commonly. This loss of control resulted from other household members either consuming a greater share of the food or simply not contributing and essentially “free loading” off of other individuals living within the household. Those food secure individuals having others in their household described a more supportive, equitable relationship that fostered a greater understanding and respect for the food supply. Admittedly, these individuals also noted occasionally being upset or emotional regarding the amount of food that others consumed, but the extra support either through increased income, resources, or assistance in shopping and cooking appeared to more than make up for this extra food consumption.

When asked if maintaining an adequate supply of food would be easier or harder if living with others, remarkably those individuals currently living alone indicated that their food supply would be improved. These individuals commonly cited added income, greater likelihood of personal transportation, and being able to prepare larger,

more inexpensive recipes as reasons. No one within this group considered that others might contribute unequally or consume large amounts of food.

Discussion

Prevalence of Food Insecurity

Individuals within this psychiatric population were nearly 8 times more likely than the general population to report concerns with maintaining an adequate food supply. Not only were more individuals affected by this public health issue, it also appears that the severity of the situation was also more critical for them. Of those individuals classified as food insecure, 63.6% were identified as experiencing the most severe form of food insecurity, in which both quality and quantity of foods are negatively affected. In comparison to the national sample (Nord et al., 2007) these individuals were 13 times more likely to report very low food security (29.2% versus 2.4%). Although prevalence rates may be artificially high due to depressive symptoms associated with mental illness, these rates are much higher than those found within the general population. Hence, this convenience sample of individuals with SMI is particularly vulnerable towards food insecurity.

Food security status within this population was assessed only upon the previous 30-day period and thus prevalence data for the previous year are unknown. National data indicate that prevalence rates are higher when using a time reference of one year as opposed to only the previous 30-days. This difference occurs due to the episodic nature of food insecurity. When individuals within the national sample were questioned regarding the frequency of occurrence (Nord et al., 2007), one-third of those households identified with very low food security reported experiencing the

phenomenon only rarely, in one or two months of the year. The remaining two-thirds reported more frequent issues, with food insecurity occurring in three or more months of the year. For a smaller proportion of individuals (20% low food security, 30% very low food security), the occurrence was more chronic with food security occurring on average during 6 months during the previous year. Very low food secure households were more likely to be food insecure during 7 months out of the year, with 1 to 7 days of food insecurity being reported within each of those months. Given these trends from the general population, the prevalence rate within this SMI population may be greater if assessing over a longer one-year period. However, based upon responses provided during interview and focus group sessions, it is not likely that these prevalence rates would be substantially greater. In general, individuals with high food security tended to report little to no issues with food insecurity and those identified with low and very low food security reported a consistent trend that occurred each and every month. Likely the greatest variation would come from those individuals with marginal food security.

The responses obtained from the single-identifier food sufficiency question provide validity to the data obtained from the US Household Food Security Questionnaire. Over slightly half of the sample population were classified as having high or marginal food security. Based upon responses from the single-identifier question, 44.4% of individuals reported having enough of the kinds of foods desired. Another 34.7% of participants indicated “enough but not always the kinds of food we want.” Since those

who are high or marginally food secure typically do not exhibit signs of decreased quality or quantity of food, this provides a check that these individuals were consistent with their responses. Additionally, when examining questions presented within the US Household Food Security Questionnaire in order of severity, the frequency of affirmative responses appears to decrease as severity increases, with a few minor exceptions. Taken together, more confidence can be given to whether respondents understood the questions being asked of them.

Differences between Quantitative and Qualitative Findings

Whereas the food security questionnaire inquired about the severity of the issue, it did not allow room for explanation of those responses. The interview and focus groups gave participants a greater freedom to structure their answers in whatever way was most appropriate for them. Using both closed and open ended questions for similar issues provided a set of checks on data reliability and validity. For the most part, the US Household Food Security Questionnaire (Bickel et al., 2000) appeared to correctly categorize the individuals according to food security status. Given that individuals may misunderstand or interpret questions differently, the instrument is not perfect. Consequently, in a few instances individuals were categorized as food secure when in actuality their responses provided during the in-depth interviews would have suggested food insecurity. In particular, two individuals within the food secure, living alone group (stratum #2) reported responses approximating those of individuals in stratum #1 (live alone, food insecure). Similarly, it was believed that one individual in

the food secure, live with others group (stratum #3) should also have been classified as food insecure.

Rapport

In qualitative research a standing question is often which is better: anonymity or an established relationship with participants? In cases with anonymity, individuals may feel less reluctant to share their true experiences. With the current research, the investigator had worked extensively with the majority of individuals, and thus, a rapport had been established. Participants appeared overwhelmingly willing to share circumstances and beliefs with the researcher. It is questionable, however, whether participants in some cases reported strategies to combat food security because that was a favorable answer and potentially not what was actually occurring. It is unclear whether similar responses would have been reported with a different investigator or if participants just wanted to provide what they considered to be “correct” answers.

Differences between Interviews and Focus Groups

Although richer detail was likely obtained during focus group sessions, by and large the experiences and perceptions were similar to those presented during individual interview sessions. Individuals appeared to relate to one another during the focus groups and appeared reassured by the fact that they were not alone in this situation. For the most part, reluctance to speak within a group setting was not evident. One exception, however, were those individuals likely misclassified by the food security

questionnaire. These individuals reported many of the same barriers and strategies as indicated during the interview, but largely seemed hesitant to share their experiences among a group of individuals not reporting similar concerns. These individuals voiced far less concern and stress from food insecurity during the focus group than the interview session. Contrary to my original expectation, conducting focus groups with individuals from two separate mental health facilities did not appear to hinder discussion. For those individuals experiencing food insecurity, interaction and agreement regarding similarities in situations was particularly evident.

Division between Food Secure and Food Insecure

During the initial design of the nested sampling frame, different divisions for classifying food secure and food insecure were proposed. Only high food secure individuals were classified as food secure. Individuals with marginal food security often express concern and fear over an inadequate food supply, and thus, these individuals were consequently categorized as food insecure. Although these divisions seemed feasible, several concerns were expressed. First, only 29.2% of the convenience sample was identified as high food secure. Achieving a sufficient sampling frame within the food secure strata would likely have been a problem given the limited number of individuals living in a multiple person household. Secondly, divisions for food security within national data include both high and marginally food secure households. Consequently, the food security divisions were altered to conform

to national data and to increase the likelihood of achieving the desired sampling frame.

After completing the interview and focus group sessions it is apparent that utilizing the originally proposed food security divisions may have aided in a cleaner analysis and subsequently stronger conclusions. Achieving saturation within the food secure strata was difficult because an almost equal division occurred between high and marginally food secure individuals. Thus, half of the individuals reported no concern regarding their food supply while the remaining half expressed anxiety and were often faced with at least some barriers to maintaining an adequate food supply. Combining high and marginally food secure individuals did not appear to impact the information obtained during interviews, but did cause some difficulties sorting out themes and patterns during the analysis. The greatest impact was apparent during focus groups sessions because the group was not as homogenous as originally intended. Marginally food insecure individuals tended to report fewer concerns during focus groups than during the individual interview sessions. Consequently, better responses and participation within the focus group would have occurred if marginally food secure individuals would have been grouped with other food insecure individuals.

Barriers to Food Security

A wide range of barriers to maintaining a nutritious and adequate food supply were identified within the psychiatric population, with most individuals describing a multifactorial situation. The vast majority of individuals referenced limited income and other competing needs as primary reasons for food insufficiency. For many individuals, especially those receiving SSI/SSDI as their sole source of income, bills including rent, utilities, transportation, healthcare and medications largely account for the funds available each month. This leaves many individuals seeking assistance and/or utilizing strategies they have learned help “stretch” food supplies.

Within the SMI population, simply suggesting additional means of income is not always plausible. Many food insecure individuals living alone mentioned the situation being slightly attenuated or even largely resolved given additional income. Several individuals with similar living situations but more food secure noted that one of the best strategies those individuals having more of an issue with an inadequate food supply could do was obtain a secondary source of income such as a job. While this seems intuitively obvious for increasing food security, many barriers including potential disincentives for employment exist for person with disabling mental illness.

Statistics denote employment rates among this SSI/SSDI population are far less than those for individuals without mental illness (As reviewed in Cook, 2006). For example, data obtained from four nationally representative surveys conducted

between 1989 and 1998 indicate that while employment rates for individuals without mental illness are relatively high (76 to 87%), rates are much lower (32 to 61%) especially among those with high levels of disability such as schizophrenia (22 to 40%). Individuals with mental illness are also more likely to be out of the labor force or underemployed. Likewise, many are only earning minimum wage. Although many individuals with SMI express a need and willingness to work, barriers such as low educational attainment, lower productivity, and labor force discrimination persist (Cook, 2006). To compound matters, the benefits programs by the Social Security Administration (SSA) are criticized as discouraging many individuals capable of returning to the work force from doing so for fear of lost or reduced benefits. Upon reentry into the workforce, disability status is reviewed. Following gainful employment, benefits often are decreased or even terminated. Those individuals receiving SSI particularly are vulnerable to reduced benefits because after monthly income exceeds \$65 per month, benefit payments decrease by \$1 for every \$2 earned. Hence, these persons essentially are taxed at 50%; a much higher tax bracket imposed then even on the wealthiest of individuals. Furthermore, not only are cash payments affected but should beneficiary status be lost, additional benefits such as housing subsidies and utility supplements, food stamps, health insurance, and transportation stipends may also be terminated. Taken together, individuals with disabling mental illness may lose more than they gain when deciding to enter the workforce.

Consequently, individuals with mental illness are affected by many of the barriers commonly cited among the food insecurity literature (such as unstable employment, lack of transportation, and limited social networks). In addition to these barriers, this population also presents unique challenges stemming from their mental illness. Individuals with serious mental illness are challenged more by lack of initiative or drive than by limited income. This is particularly true for those classified with marginal or low food security. During interview and focus groups, these individuals suggested that food was often unavailable simply because they didn't have the initiative to go to the store and purchase foods. Similarly, lack of drive was responsible for failing to find or use other strategies for increasing food supplies and/or not preparing meals even when food was available. Also reported, although less frequently, was that extra food consumed during times of depression tended to deplete supplies that would have otherwise been available.

Although varying degrees and types of barriers were reported during the qualitative measures, definite patterns emerged with few new barriers mentioned during subsequent interviews and focus groups. Consequently, saturation of data regarding barriers within this group of individuals likely occurred. The statements made by the majority of these individuals provide excellent support and rationale for the elevated prevalence of food insecurity found among this population. Importantly, no demographic differences were observed between food secure and insecure individuals, thus supporting the idea that differences lie in the strategies employed. It

is remarkable that food secure households even exist within this population given the number of barriers that are often faced. Consequently, studying those individuals capable of rising above these challenges and barriers is especially important for understanding how to best address this concern among those requiring a little extra assistance.

Strategies for Increasing Food Security

Information obtained during the interview and focus group sessions suggest arrays of strategies are used to avoid having a reduced food supply. Examining these strategies across four distinct groups of individuals provides insight that food secure and food insecure individuals use differing strategies. Given the extremely multi-faceted nature of food insecurity, it is impossible to conclude that these individuals are more food secure simply because they are using more effective strategies for stretching their food supplies. We can presume, however, that individuals with SMI are capable of effectively using more complex food security strategies such as meal planning, budgeting, and tactics for stocking up during opportunistic times to help preserve food supplies. Perhaps if individuals who tend to be less food secure would receive the skills necessary to utilize these approaches rather than resorting to more drastic measures such as cutting or skipping meals, individuals may not be impacted as severely by food insecurity.

Except in a few circumstances, individuals overwhelmingly indicated that obtaining the knowledge and skills to utilize these more complex and potentially effective strategies would positively impact food supplies. One exception was individuals living in households where chaos regarding the food supply arose due to the number of individuals living within the household, with many members contributing unequally. In these cases, participants indicated that until these situations were resolved, no amount of effort for utilizing these strategies would be effective. Outside of this situation, either developing or further refining these skills was desired by the majority of individuals.

Impact of Food Insecurity

The impact that food insecurity has on individuals was much less clear than simply determining the common barriers and strategies associated with food insecurity. Clearly, this phenomenon has a tremendous impact on the mental health status of individuals as it causes extra stress, anxiety and depression. For many individuals embarrassed to admit having difficulties with food insufficiency, these matters were further complicated by the unwillingness to leave home for fear others would learn of their situation. While impact on mental health status was apparent, what impact this phenomenon has on physical health was less consistent.

Given the large number of co-morbidities many individuals with SMI have, it's difficult to piece out whether an inadequate food supply could be a contributing

factor. It appeared that responses provided were more in reference to health being affected by poor dietary intake rather than lack of food in general. For many individuals, obtaining the cheapest sources of foods which are often high in calories and fat, were the only option for extending food supplies such that they last during the entirety of the month. The necessity to purchase lower quality food items paired with the tendency to binge after times of inadequacy provides strong rationale for why many individuals report weight gain and drastic fluctuations in weight throughout the month (see Figure 9). As with the general population, further research needs to be conducted to explore what impact food insecurity has on these issues and to determine the severity level at which these conditions occur.

Limitations

Although the current research presents valuable data that provide insight into a population not previously examined, these findings must be interpreted with some caution. First, this mental illness sample was a purposeful sample obtained from a larger weight loss study. Thus, differences also may be observed in individuals of normal weight. Caution should be used when transferring to the larger SMI population or other settings. Additionally, the findings reported do not necessarily represent the voice of all individuals with serious mental illness. Given that no other data are currently available this study does provide a glimpse into the issues this vulnerable population face.

The prevalence data could have been affected as some individuals may have misunderstood or interpreted questions differently within the food security questionnaire. Despite this, the prevalence of food insecurity presented within this SMI population is likely accurate, if not underestimated. As mentioned, a small handful of individuals reporting food security, were probably food insecure based upon circumstances later described. This misclassification could have also impacted the stratum assignment, thus making it less straightforward to decipher distinctions between groups. Further, although the sample size was small within this relatively homogeneous sample, results were consistent across methodology, thus increasing our confidence in the findings.

Finally, a learning curve occurred as the researcher developed a greater familiarity with the interview process. As more individuals were questioned regarding their experiences, new questions developed and were asked of subsequent individuals. While this often occurs with qualitative research based upon grounded theory, it made comparing themes and patterns across interview stratum more problematic as not all of the same questions were posed to all participants. Further, during times of silence or latency response, the interviewer was at times quick to offer options rather than waiting a longer period of time for the interviewee to respond. Consequently, this could have ultimately affected the data as individuals may have responded in a manner based upon what was felt to be a desirable response rather than what actually occurred.

Implications and Future Studies

Based upon the findings that this convenience sample of individuals with SMI was nearly 8 times more likely to be food insecure than the general population combined with the extensive testimonies made during the interviews and focus groups, intervention efforts to increase food security among SMI populations are warranted. It is important to note that although poverty and food insecurity are related, this does not preclude individuals from obtaining the skills and strategies to at minimum slightly increase stability of food supplies. Participants suggested that food supplies might be improved should they be given the knowledge and skills to assist with food budgeting, meal planning, thrifty shopping skills, and basic cooking skills. Having a group where individuals are free to share their experiences and bounce ideas off one another was also appealing as suggested by the following comment made during a focus group: “this group is nice because it makes you think about why you aren’t making it. It’s not so problematic I don’t think to find a solution. It’s just that alone, we’re not finding the solutions.”

Another important finding that was revealed was the impact of food insecurity on compliance with psychiatric medications. Clinicians could benefit from this finding and thus potentially express more empathy and provide suggestions for how food might be obtained to ensure medication is taken as directed. Finally, future weight loss interventions targeting this vulnerable population could profit from the insight into the food insecurity-binge cycle that was uncovered during this research. Until

self-control and binge eating are addressed, many individuals may be unlikely to make sustainable changes to their eating habits. Researchers need to be aware that many individuals with SMI may be faced with uncertainties regarding their food supply, and thus may not be as easily able to obtain the types of foods that are often recommended. As a result, attention to healthy foods obtained on a limited budget should be addressed within intervention efforts.

Conclusion

The mixed method design utilized within this dissertation provides evidence that individuals with serious mental illness appear to be at increased risk for being unable to consistently maintain an adequate supply of nutritious and safe foods. In addition to barriers commonly cited among food insecure individuals, this population presented unique concerns stemming from symptoms associated with their mental illness. The rich detail achieved by the current research not only provides preliminary data for assessing this public health issue within a vulnerable population, but also provides insight for researchers and clinicians attempting to make recommendations and changes in eating or other related behaviors within the SMI population. The experiences and attitudes expressed by individuals within this research helped achieve the ultimate purpose of this research which was to better understand the barriers, strategies, and impact food insecurity has within this vulnerable population.

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Table 1
 USDA Revised Food Security Labeling Chart

General Category	Old Label	New Label
Food Security	Food Security	High Food Security
		Marginal Food Security
Food Insecurity	Food Insecurity, without Hunger	Low Food Security
	Food Insecurity, with Hunger	Very Low Food Security

Table adapted from USDA website:
<http://www.ers.usda.gov/Briefing/FoodSecurity/labels.htm>

Table 2
Food Security Status Categorization

Raw Score*	Food Security Category
0	High Food Security
1-2	Marginal Food Security
3-5	Low Food Security
6-10	Very Low Food Security

*Scoring for 10-Item Adult version

Nord, M. (personal communication, October 16, 2007).

Table 3
Subject Demographics for Total Sample

	Mean \pm SD	Frequency (N=72)	Percent
Age	43.9 \pm 10.6 (Range: 19-64)		
Gender			
Male		28	38.9%
Female		44	61.1%
Race			
African American		20	27.8%
Caucasian		50	69.4%
Other		2	2.8%
Monthly Income	\$877.9 \pm 767.0 (Range: 35- 6,560.00)		
Smoking Status			
Never smoked		27	37.5%
Non-smoker, quit \geq 1 year		9	12.5 %
Smoker, trying to quit		9	12.5%
Current Smoker		27	37.5%

Table 3 Continued
Subject Demographics for Total Sample

	Mean \pm SD	Frequency	Percent
Education Level			
Special Education		1	1.4
Some High School		7	9.7
High School Graduate/GED		27	37.5
Post High School, Not College		2	2.8
Some College		25	34.7
Bachelor's Degree		7	9.7
Beyond Bachelor's Degree		3	4.2
Psychiatric Diagnosis			
Schizophrenia		19	27.1
Schizoaffective Disorder		20	28.6
Bipolar Disorder		12	17.1
Major Mood Disorder		18	25.7
Other		1	1.4

Table 4
Living Situation for Total and Sub-Sample

Living Situation	All (N=72)	Sub-Sample (n=28)	Stratum*			
			1	2	3	4
Living Situation						
Relatives, Heavily Dependent Care	1	0	0	0	0	0
Relatives, Largely Independent care	8	3	0	0	1	2
Supervised Care/ Live In Staff	4	1	0	1	0	0
Independent Living	58	23	7	6	6	4
Other	1	1	1	0	0	0
Who Living With						
Other Non- Related Persons	8	4	0	0	2	0
Spouse/Partner	8	5	0	0	3	4
Parents/Guardians	5	1	0	0	0	1
Other Family Members	9	3	0	0	2	1
Live Alone	42	15	8	7	0	0

* Stratum 1 = Food Insecure, Live Alone; Stratum 2 = Food Insecure, Live Alone;
Stratum 3 = Food Secure, Live with Others; Stratum 4 = Food Insecure, Live with
Others

Table 5
 Food Security Classification for Total Sample compared to National Sample for 30-day Period

	N	Percent	N (1,000)	Percent
	(Psychiatric Sample)		(National Sample)*	
High Food Security	21	29.2%	108,926**	94.2%**
Marginal Food Security	18	25.0%		
Low Food Security	12	16.7%	3,900	3.4%
Very Low Food Security	21	29.2%	2,779	2.4%

*2006 Prevalence data Calculated by Economic Research Service (USDA) using data from the December 2006 Current Population Survey Food Security Supplement.

**High and marginal food security were combined and reported as food secure.

Table 6
Results from Test of Homogeneity for Demographic Variables and Food Security Status ^a

Ordinal Data					
Variables	df	t	p value (significance)	95% Confidence Interval	
Age	59.8	1.427	.159	-1.46 - 8.73	
Income	66	1.415	.162	-108.1 - 634.4	
Categorical Data					
Response Variables	N	df	Pearson Chi-square	p value (Alpha)	Cramer's V
Site	72	1	0.56	.813	.028
Gender	72	1	1.63	.686	.048
Living Situation ^b	72	1	.705	.401	.099
Smoking Status ^c	72	1	.503	.478	.478
Diagnosis ^d	69	4	5.91	.206	.293

^a Food Security Status = Food Secure versus Food Insecure

^b Living Situation = Live Alone versus Live with Others

^c Smoking Status = Smoker versus Non-Smoker

^d Diagnosis = Schizophrenia, Schizoaffective Disorder, Bipolar Disorder, Major Mood Disorder, Other

Table 7
Actual Sample Size for Interviews and Focus Groups

	# Interviews	# Focus Group Participants
Food Insecure, Live Alone	8	6
Food Secure, Live Alone	7	6
Food Secure, Live with Others	7	6
Food Insecure, Live with Others	6	4

Table 8
Number of Participants from each Site

	Interviews		Focus Group	
	Site 1	Site 2	Site 1	Site 2
Food Insecure, Live Alone	4	4	4	2
Food Secure, Live Alone	4	3	4	2
Food Secure, Live with Others	4	3	4	2
Food Insecure, Live with Others	4	2	2	2
Total	16	12	14	8

Table 9
Subsample Demographic Information

	Sub-Sample (n=28)	Stratum*			
		1 (n=8)	2 (n=7)	3 (n=7)	4 (n=6)
Age (Mean \pm SD)	42.5 \pm 11.25				
Gender					
Male: Female Ratio	12:16	3:5	5:2	3:4	1:5
Race/Ethnicity					
Caucasian	21 (75.0%)	4	6	6	5
African American	7 (25.0%)	4	1	1	1
Income (Monthly) (Mean \pm SD)	728.2 \pm 265.5				
Smoking Status					
Smoker	13 (46.4%)	4	3	5	1
Non-Smoker	15 (53.6%)	4	4	2	5
Diagnosis					
Schizophrenia	8 (28.6%)	1	4	3	0
Schizoaffective Disorder	3 (10.7%)	3	0	0	0
Bipolar Disorder	9 (32.1%)	2	1	4	2
Major Depression	7 (25.0%)	1	2	0	4
Other	1 (3.6%)	1	0	0	0

* Stratum 1 = Food Insecure, Live Alone; Stratum 2 = Food Insecure, Live Alone;
Stratum 3 = Food Secure, Live with Others; Stratum 4 = Food Insecure, Live with
Others

Table 10
Food Security Status by Stratum

Food Security Classification	Stratum*			
	1	2	3	4
High Food Security	0 (0%)	4 (57.1%)	3 (42.9%)	0 (0%)
Marginal Food Security	0 (0%)	3 (42.9%)	4 (57.2%)	0 (0%)
Low Food Security	1 (12.5%)	0 (0%)	0 (0%)	1 (16.7%)
Very Low Food Security	7 (87.5%)	0 (0%)	0 (0%)	5 (83.3%)

(%) = Percentage of food security classification within each stratum

* Stratum 1 = Food Insecure, Live Alone; Stratum 2 = Food Insecure, Live Alone;
Stratum 3 = Food Secure, Live with Others; Stratum 4 = Food Insecure, Live with Others

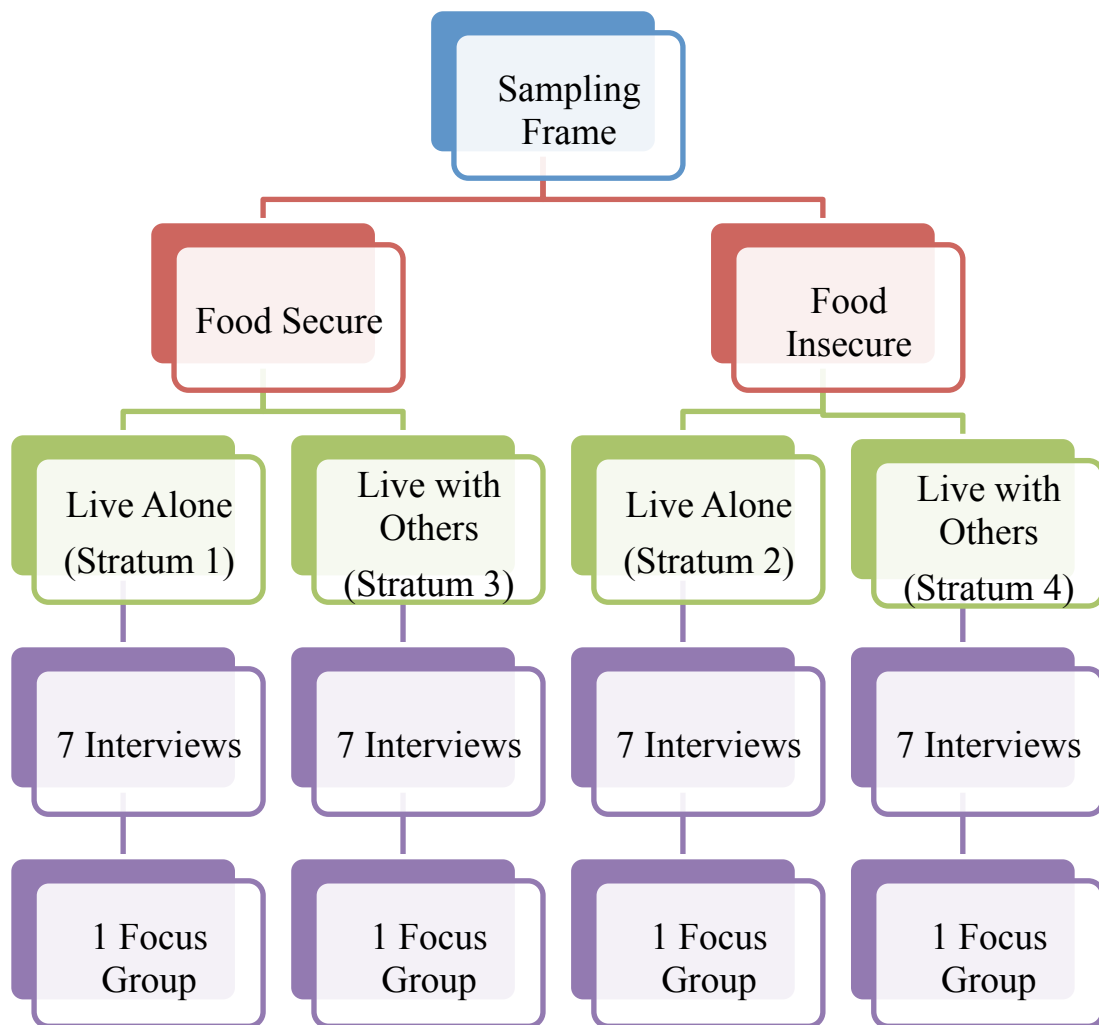


Figure 1. Proposed Sampling Frame for Semi-structured Interviews and Focus Groups

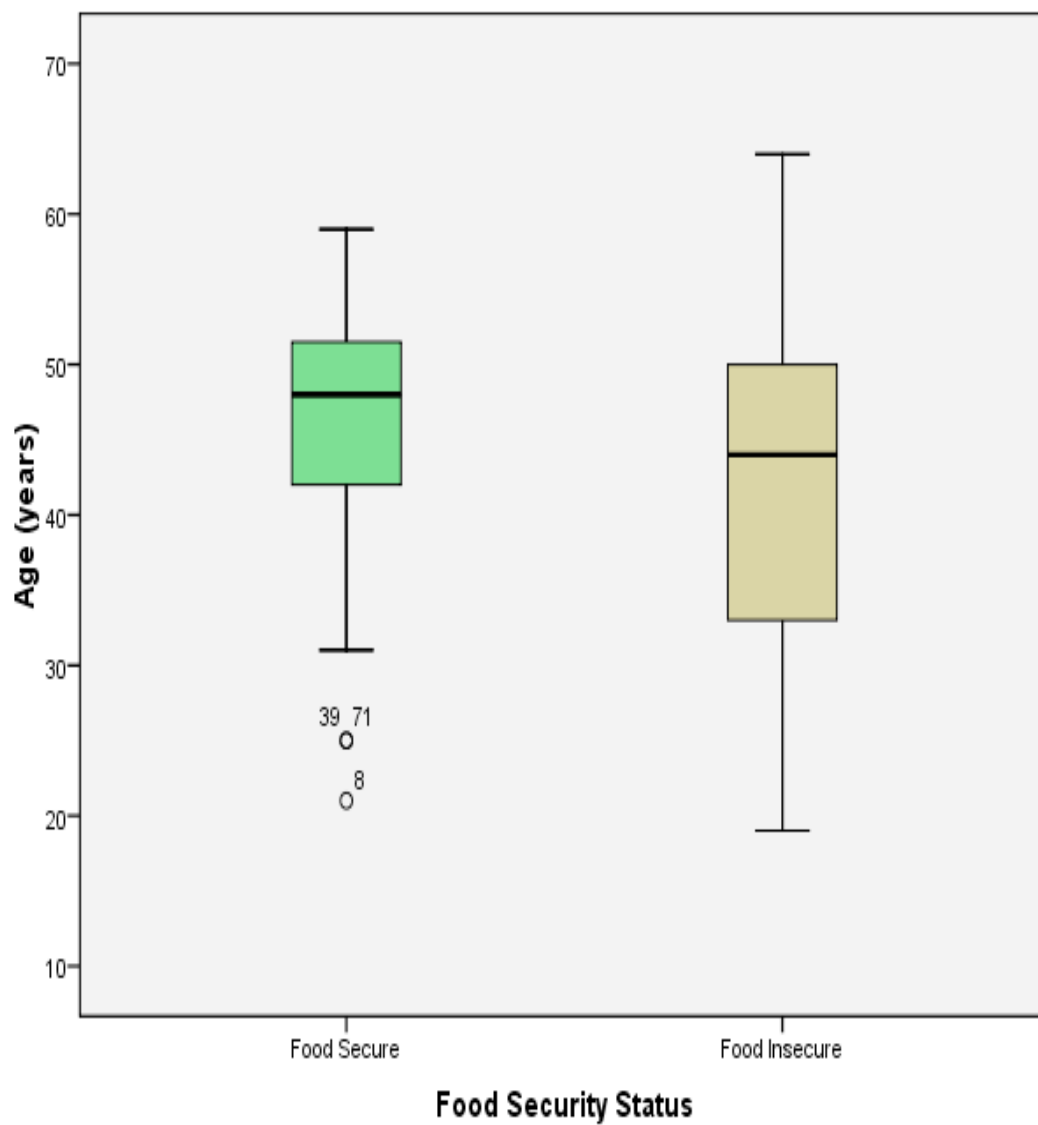


Figure 2. Mean Age by Food Security Status

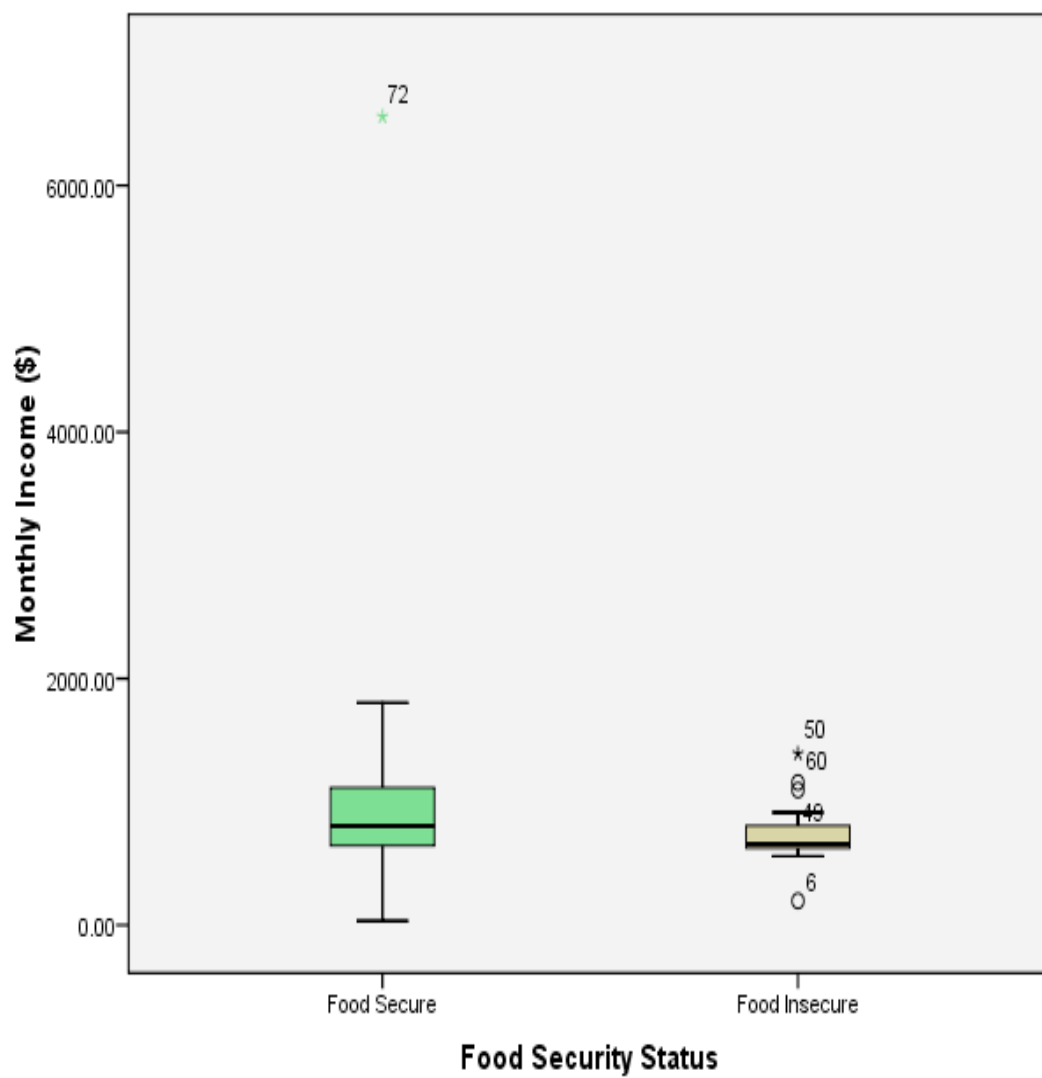


Figure 3. Mean Monthly Income by Food Security Status

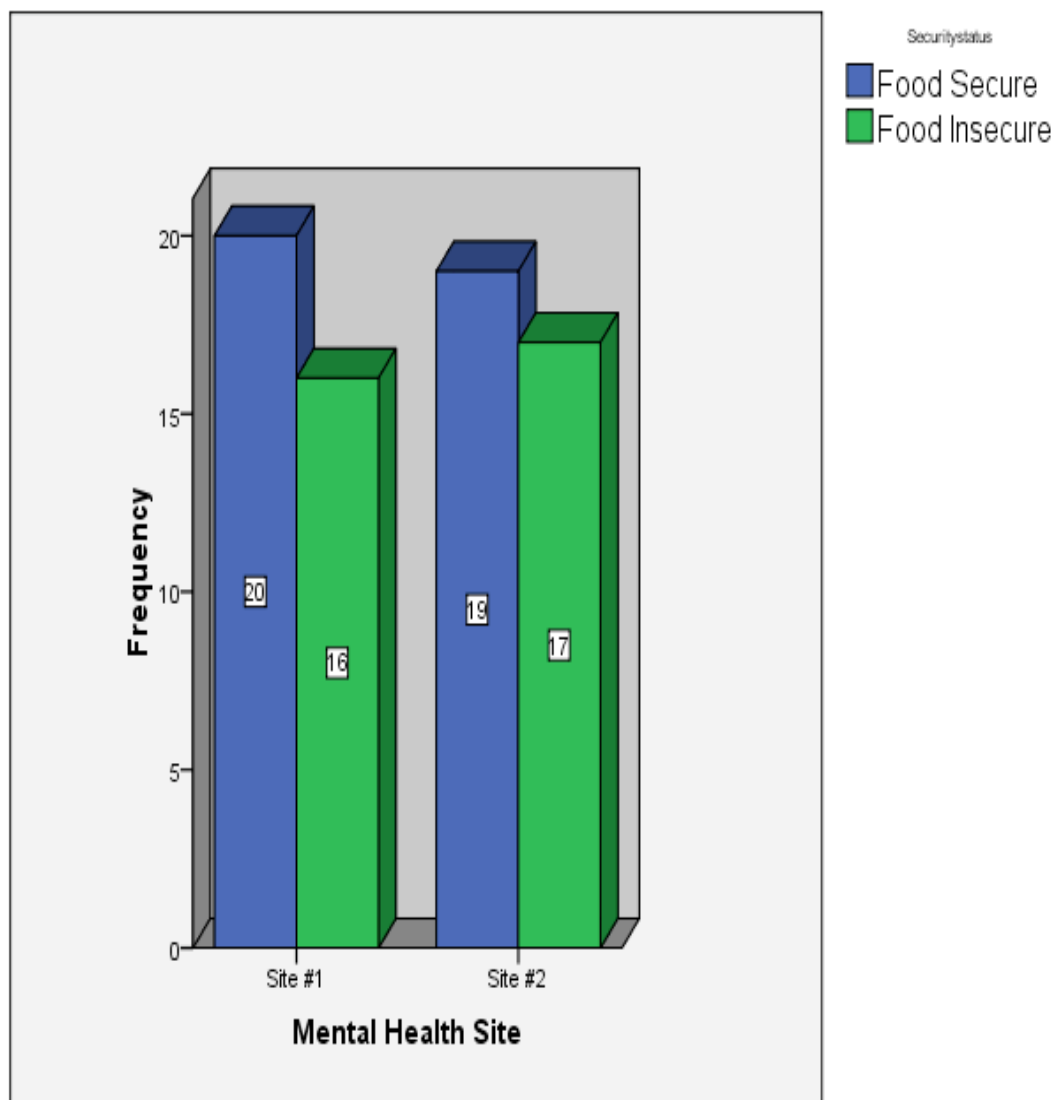


Figure 4. Frequency of Mental Health Site Participants by Food Security Status

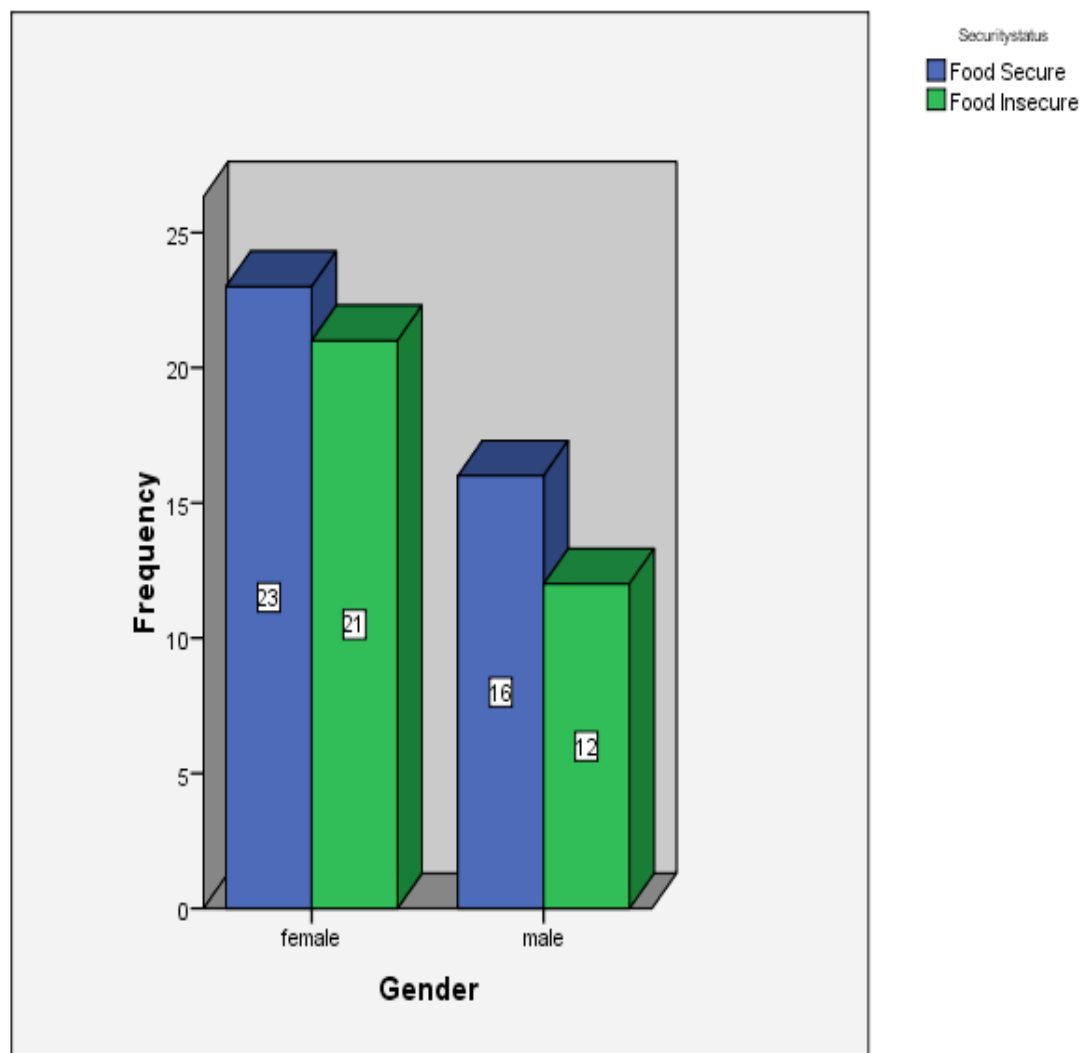


Figure 5. Frequency of Males and Females by Food Security Status

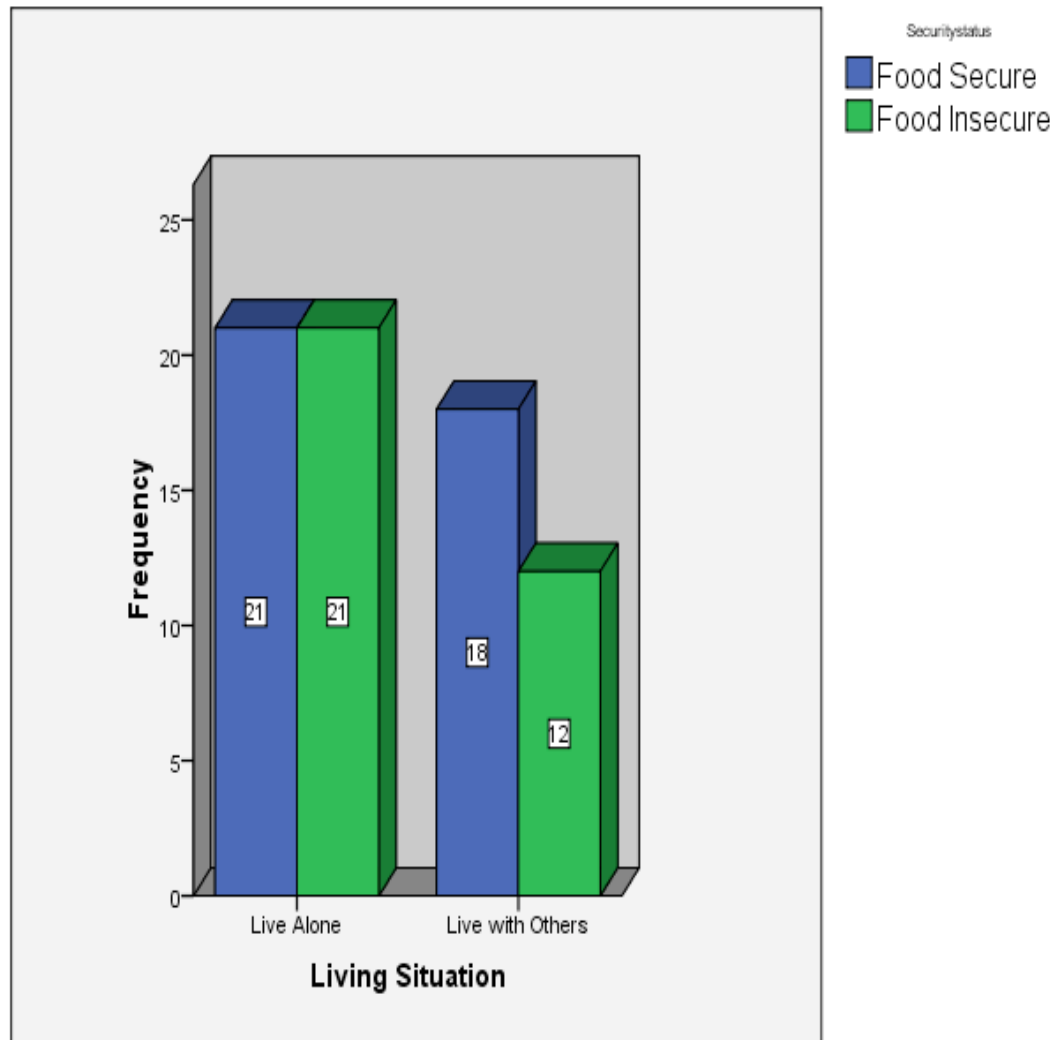


Figure 6. Frequency of Living Situation by Food Security Status

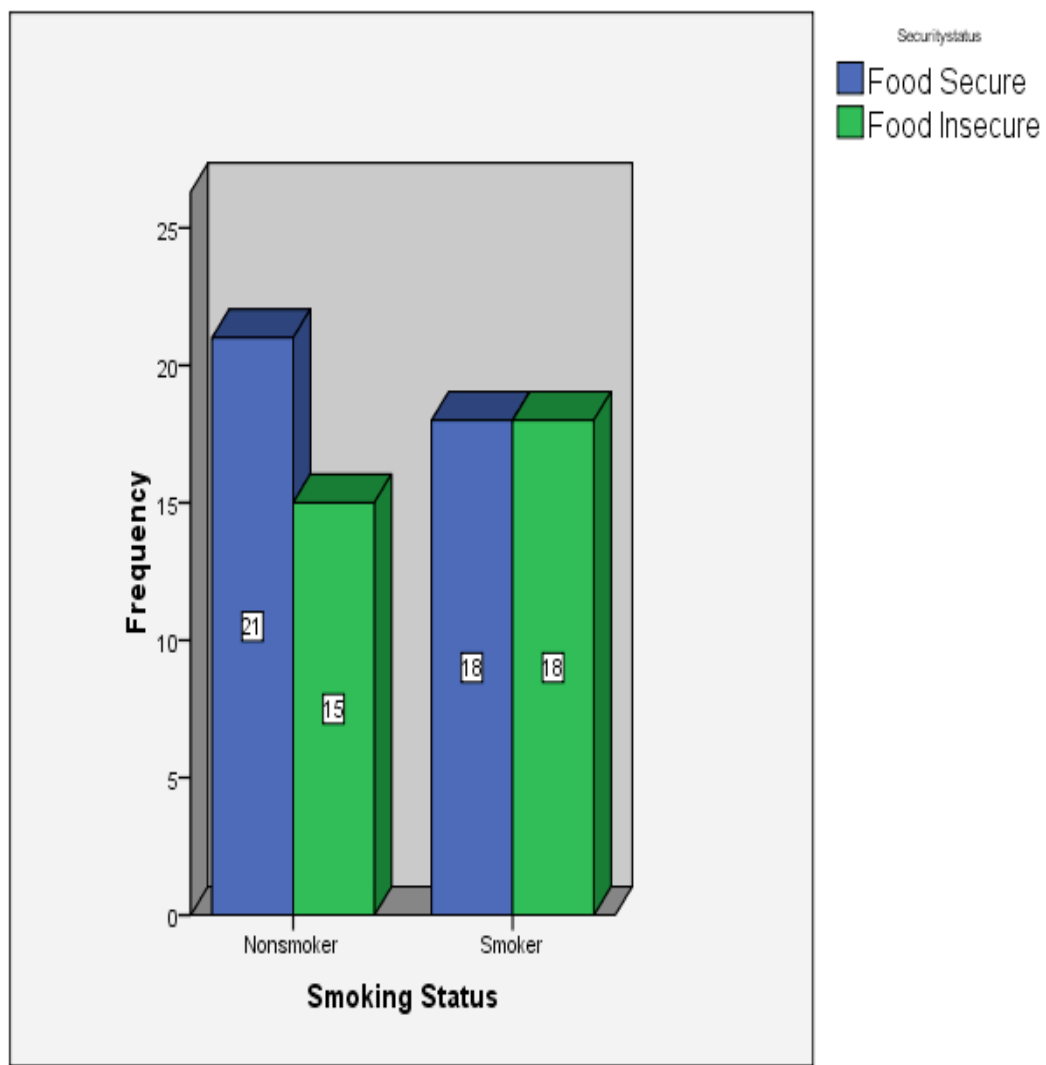


Figure 7. Frequency of Smokers and Non-Smokers by Food Security Status

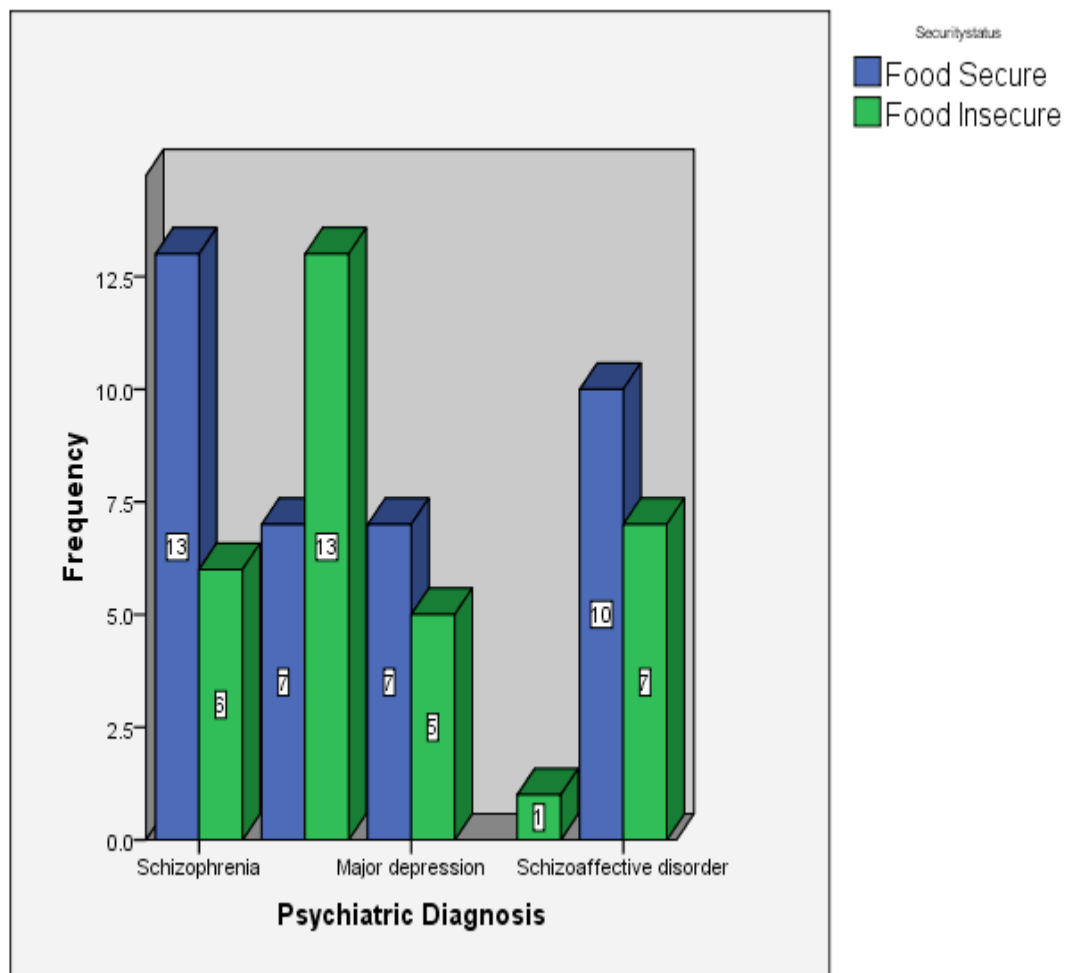


Figure 8. Frequency of Psychiatric Diagnosis by Food Security Status

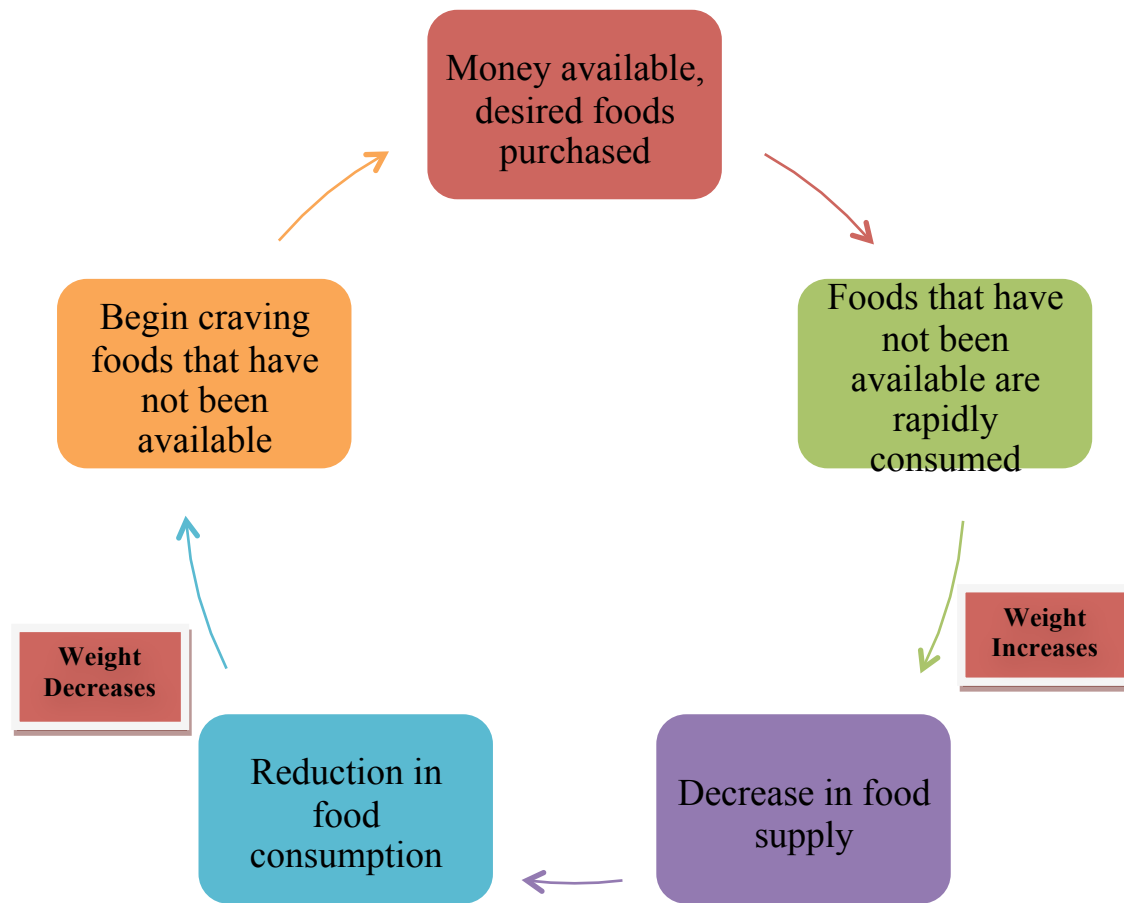


Figure 9. Relationship between Food Availability, Binge Eating and Weight Fluctuations

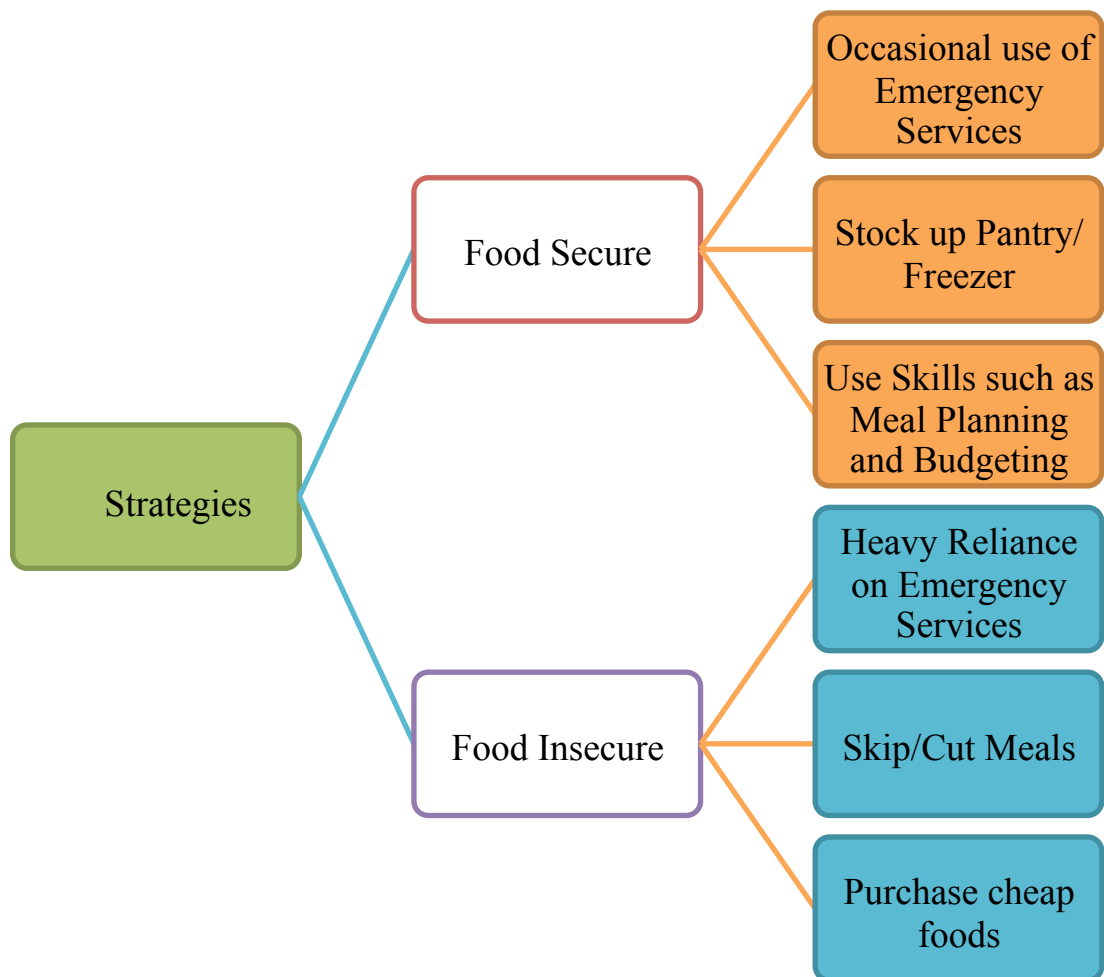


Figure 10. Common Strategies reported for Increasing Food Security

Appendix A: U.S. Household Security Questionnaire – Adapted

**U.S. HOUSEHOLD FOOD SECURITY SURVEY MODULE:
Economic Research Service, USDA
Revised 2006, Adapted for Grant by Jeannine Goetz**

Transition into Module (administered to all households):

These next questions are about the food eaten in your household in the last 30 days and whether you were able to afford the food you need.

How many individuals live in your household?

adults _____ # children _____

HH1. [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHETICALS, OTHERWISE, USE "WE."]

Which of these statements best describes the food eaten in your household in the last 30 days: —enough of the kinds of food (I/we) want to eat; —enough, but not always the kinds of food (I/we) want; —sometimes not enough to eat; or, —often not enough to eat?

- [1] Enough of the kinds of food we want to eat
- [2] Enough but not always the kinds of food we want
- [3] Sometimes not enough to eat
- [4] Often not enough to eat
- [] DK or Refused

Household Stage 1: Questions HH2-HH4 (asked of all households; begin scale items).

[IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND "YOU" IN PARENTHETICALS; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD."]

HH2. Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 30 days.

The first statement is "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that often true, sometimes true, or never true for (you/your household) in the last 30 days?

- Often true
- Sometimes true
- Never true
- DK or Refused

HH3. “The food that (I/we) bought just didn’t last, and (I/we) didn’t have money to get more.” Was that often, sometimes, or never true for (you/your household) in the last 30 days?

- Often true
- Sometimes true
- Never true
- DK or Refused

HH4. “(I/we) couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for (you/your household) in the last 30 days?

- Often true
- Sometimes true
- Never true
- DK or Refused

Screener for Stage 2 Adult-Referenced Questions: If affirmative response (i.e., "often true" or "sometimes true") to one or more of Questions HH2-HH4, OR, response [3] or [4] to question HH1 (if administered), then continue to *Adult Stage 2*; otherwise, if children under age 18 are present in the household, skip to *Child Stage 1*, otherwise skip to *End of Food Security Module*.

Adult Stage 2: Questions AD1-AD4 (asked of households passing the screener for Stage 2 adult-referenced questions).

AD1. In the last 30 days, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes
- No (Skip AD1a)
- DK (Skip AD1a)

AD1a. [IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?

_____ days

DK

AD2. In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money to buy food?

Yes

No

DK

AD3. In the last 30 days, were you ever hungry but didn't eat because there wasn't enough money for food?

Yes

No

DK

AD4. In the last 30 days, did you lose weight because there wasn't enough money for food?

Yes

No

DK

Screener for Stage 3 Adult-Referenced Questions: If affirmative response to one or more of questions AD1 through AD4, then continue to *Adult Stage 3*; otherwise, if children under age 18 are present in the household, skip to *Child Stage 1*, otherwise skip to *End of Food Security Module*.

Adult Stage 3: Questions AD5-AD5a (asked of households passing screener for Stage 3 adult-referenced questions).

AD5. In the last 30 days, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

Yes

No (Skip 12a)

DK (Skip 12a)

AD5a. [IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?

_____ days

DK

END OF FOOD SECURITY MODULE
Appendix B: Guide for Semi-Structured Interviews

Topics	Main Question	Follow-up Questions
Experience/ Awareness	Tell me about your ability to have enough food in your home throughout the entire month.	How often do you feel that you are not able to do this? Are there certain times of the month or year where this is more difficult?
Application	If you had \$20 to spend this weekend, how would you spend that money?	Would your answer be any different at the beginning of the month as opposed to the end of the month?
Barriers	List all of the barriers that you can think of that might cause you to not be able to have enough food available each month.	Do you seem to encounter the same barriers during times of food insecurity or do they vary?
Experience	Tell me about what you do differently during the months when you do not have as much difficulty maintaining an adequate supply of food.	Why do you suppose these months are different?
Experience/ Psychological	Tell me about strategies that you use to avoid not having enough food each month.	Why do you use them sometimes and not other times? Are there other strategies that you think would be helpful but have not yet used?
Opinion	If you knew that you would not have enough money for food this month, would you seek help from someone? If so, who?	Are there any programs or services you use? Tell me about your social network.
Psychology	How does food insecurity personally affect you and other family members in your household?	Does everyone within your household experience the same affects? Does it affect your health or mental status?

Appendix C: Moderator's Guide for Focus Groups

Opening Remarks:

Thank you for agreeing to be part of a focus group on household food security. For those of you who have never participated in a focus group, I just want to tell you that it is a research technique commonly used to gather data from informed sources. Your answers to our questions should not be considered “right” or “wrong.” Rather, they are information that you can supply based on your experiences, observations, or feelings.

We are collecting information about households and their food usage—whether people have enough, why they may or may not, and what they do about it. I am trying to better understand your experiences so that I may be able to design an intervention to help improve your ability to have food available all month.

Please be assured that all your responses are confidential and will be used for statistical purposes only. Our summary report will make no references to names. The purpose of this discussion is to help us understand how serious food insecurity and hunger may be in our community. Food insecurity refers to not having access to adequate amounts of affordable foods through normal means, such as buying food at supermarkets or farmers' markets or even gardening.

I want to start by saying how difficult it can be to discuss these issues publicly. But almost everyone, if not everyone, in this group is familiar with these problems. They are nothing to be embarrassed about. Your candid responses and discussion will be most helpful to us as we try to develop a community-based action plan.

Before we begin, let's go around the room and introduce ourselves. But instead of telling us just your name, why not tell everyone your name and your favorite food during the holidays?

Household Food Security

Let's start by thinking back to this past year. Give some thought to the times when you either didn't have enough food for everyone in your home or worried about whether you would have enough food.

1. How many people would say that they either ran out or worried about running out of food during the past year?
2. I'm wondering about the frequency of these things happening. How many people would say that they either ran out or worried about running out of food every month? Did these things happen at specific times of the month or year?
3. Do these events (running out of food or worrying about it) follow any pattern? That is, does something else happen regularly that causes you to run out of food or to worry about it? (*Probe for: medical emergencies, large bills, helping family members with their needs, changes in job status*)
4. Are there other reasons that you think might be responsible for not being able to make your food stretch the entire month?
5. Tell me about the locations where you live – is food accessible and affordable?
 - a. Is public or personal transportation available?
 - How often are you able to go grocery shopping?
 - b. Are other factors such as the following ever a problem
 1. Lack of transportation
 2. Not enough stores available near you
 2. Insufficient food offered (low quality, selection)
 4. Unreasonable prices
6. I'm wondering about what you do if there isn't enough food. Let's start by discussing the things you might do to make the food you have last longer. What are some of these things?

(*Probe for: cut amounts of food, cut size of meals, skip meals, water down ingredients, eat cheaper foods like potatoes or pasta, serve less expensive foods, serve less nutritious foods because they are cheaper, serve children nutritious foods but eat less or less nutritious foods yourself*)
7. People sometimes go to different places to get enough food to go around when they are running short of money. What types of places have you gone to for food and how often? (*Probe for: food assistance programs, food pantry, soup kitchen, other "free" food resources*). Which of these places works the best for you? Why? Do they each have a different role—do you go to them at different times or use them differently?

Has anyone used emergency food providers in the community like Food pantries or soup kitchens? Why or why not? (*Probe for didn't need it, not comfortable getting free food, transportation, food quality, program environment, safety, hours of operation*).

8. How much do you rely on emergency food providers for food assistance?

9. You also may have a less formal “help” network, that is, people you know who will lend you money, give you food, feed you, or let you buy on credit. Can you describe some of these networks?

10. What would you say is most important in helping you cope with times when food or food concerns are a major problem?

11. In what ways does not having enough food impact you (and other members of your household)? Do you notice changes in your physical health, mental status, weight or other health conditions?

Potential Probes:

- “One thing I have heard several individuals mention is _____. I wonder what the rest of you have to say about that.”
- “If the group runs out of things to say, just remember that what we’re interested in is what barriers you encounter or how you are able to avoid barriers to having a sufficient supply of food each month. Remember, we want to hear as many different things about this as possible.”
- “One thing I’m surprised no one has mentioned is _____. Is this a strategy that you have previously used or have thought about using?”
- “If your experience is different from what others are saying, then that is exactly what we want to hear.”
- “I would like to hear as many stories as possible. Even if you think your experiences are the same as others, I would like to hear your story because there is always something unique in each person’s own experiences.”
- “We need to hear as many different things from as many of you as time allows. There isn’t any right or wrong answers. If there were, we’d go to the experts and they’d tell us the answers. Instead, we’re here to learn from your experiences.”

Appendix D: Coding Procedures for US Household Food Security Questionnaire

Question Number	Question	Negative Responses (Code=0)	Affirmative Responses (Code=1)	Missing Data (Code= .)
1 (HH2)	Worried food would run out	Never true (or screened out)	Often true; Sometimes True	Refused; Don't Know
2 (HH3)	Food bought just didn't last	Never true (or screened out)	Often true; Sometimes True	Refused; Don't Know
3 (HH4)	Couldn't afford to eat balanced meals	Never true (or screened out)	Often true; Sometimes True	Refused; Don't Know
4 (AD1)	Adult(s) cut or skipped meals	No (or screened out)	Yes	Refused; Don't Know
5 (AD1a)	Adults cut or skipped meals, 3+ days	No on #4, 1 or 2 days (or screened out)	3+ days	Refused; Don't Know
6 (AD2)	You ate less than felt you should	No (or screened out)	Yes	Refused; Don't Know
7 (AD3)	You were hungry but didn't eat	No (or screened out)	Yes	Refused; Don't Know
8 (AD4)	You lost weight because not enough food	No (or screened out)	Yes	Refused; Don't Know
9 (AD5)	Adult(s) not eat for whole day	No (or screened out)	Yes	Refused; Don't Know
10 (AD5a)	Adult(s) not eat for whole day, 3+ days	No on #9, 1 or 2 days (or screened out)	Yes	Refused; Don't Know

Adapted from Bickel et al., 2000.

Appendix E: Illustration of Coding Topics

Primary	Secondary	Tertiary
General Information		
	Income	SSI or SSDI Food Stamps Child Support Other income sources
	Grocery Shopping Frequency	Once or fewer per month Twice per month Three or more per month
	Food Insecurity Frequency	Never or hardly Only occasionally Consistently More severe recently
	Food Insecurity Harder Times	Never or hardly Holidays Tax time/large bills due
	Food Supply Across the Month	Same at beginning/end Abundant supply Different beginning/end Runs out Not types of foods want
Monthly Expenses		
	Bills	Rent/mortgage/taxes Utilities Transportation (public) Car expenses Cable/internet Credit cards Insurance Medications Healthcare/doctor

Primary	Secondary	Tertiary
Monthly expenses (continued)		
	Food	
	Junk Food	
	Eating Out	
	Entertainment	
	Personal Items	Clothes Care needs Beauty supplies Hobbies Others
	Cigarettes	
	Alcohol	
How Spend Extra Money		
	Food Staples	
	Save/hoard money	
	Pay off something	
	Use for something needed	
	Junk food	
	Eating out	
	Cigarettes	
	On self (beauty products, etc)	
	Clothes	
	Gifts	
	Entertainment	
	On Children	

Primary	Secondary	Tertiary
Barriers to Food Security		
	Fixed Income	
	Loss of Food Stamps	
	Appliances inadequate/not working	
	Lack of initiative/drive	
	Access Issues	Transportation Limited stores Perishable foods Motivation Limited variety/quality Reasonable prices Limited storage space
	Eating Behaviors	Night eating/insomnia Binge/emotional eating Diet (special foods) Vegetarian Lack of self control Growing children Increased appetite-meds
	Competing Needs	Other bills Overspending Feeding others Drugs/illegal High priced psych meds
	Mental Illness Symptoms	
	Lack of Strategies	Meal planning Food budgeting Nutrition knowledge Cooking skills Lack cooking appliances

Primary	Secondary	Tertiary
	Cost (rising cost of food)	
	Limited Social Network/ Unwilling to Help	
	Unable to Control Others	
	Illiterate	
	No Barriers	
Strategies to increase food security		
	Shopping Strategies	Cheaper stores/outlets Farmers' markets Cheap foods/low quality Generic Foods Coupons Store ads/sales Competitor ads Grocery list Less tempting foods Avoid high cost foods Avoid shopping hungry Stock up pantry/freezer Staples Meal Plan Stretch Dollar Limit unnecessary items Limit perishable items
	Transportation	Public Transportation Mental health agency Taxi program Walk Use cart/stroller

Primary	Secondary	Tertiary
Emergency/Community Services		
		Food pantry Angel Food Ministries Christmas Bureau Commodities Senior center Mental health agency Food/soup kitchen Free bread store Apartment free room School lunch/breakfast Church Friends/family
	Budgeting	Payee Monthly food amount Calculator/round numbers Prioritize purchases Other strategies
	Meal Regimen	Skip meals Limit to one meal/day Limit portion size Reduce variety of foods Eat at work Not binge/night eat Leave home Snack rather than meals
	Cooking Strategies	Inexpensive recipes Trade food with others Convenience foods Leftovers Eating healthy/cooking Portion food at purchase Backup food supply Freeze unused items Limit Waste

Primary	Secondary	Tertiary
Strategies (continued)		
Adequate Income		
Where Seek Help?		
	Places/Person	Family member Friend Case manager/other staff Church/minister Food pantry Catholic Charities Soup kitchen SRS No one (seek no help)
	Communication	Comfortable sharing Wouldn't share
	Reasons no communication	Embarrassed Feel like guilt tripping People unsympathetic
How Affects You		
	Mental Status	Impairs mental status Stress/anxiety Depressed Mood Stay home Less energy/tired Impairs sleep Limits cooking meals Suicidal thoughts Self-esteem Concentration No affect

Primary	Secondary	Tertiary
	Health	Poor nutritional intake High cholesterol High blood pressure Diabetes Sick Ache/hurt Ulcers Take med empty stomach
	Weight Fluctuations	
	Hungry	
	Affects Income	
	Not much/no impact	
Intervention Skills		
	Skills	Food budgeting Meal planning Basic cooking skills Thrifty shopping tips Food safety tips Tips for health conditions Improved self confidence
	Strategies	Group grocery shopping Resources Group discussions Support system Support Phone line Opportunities
	Format	Keep Simple

Appendix F: Summary of Responses to Single-Identifier Food Sufficiency Question

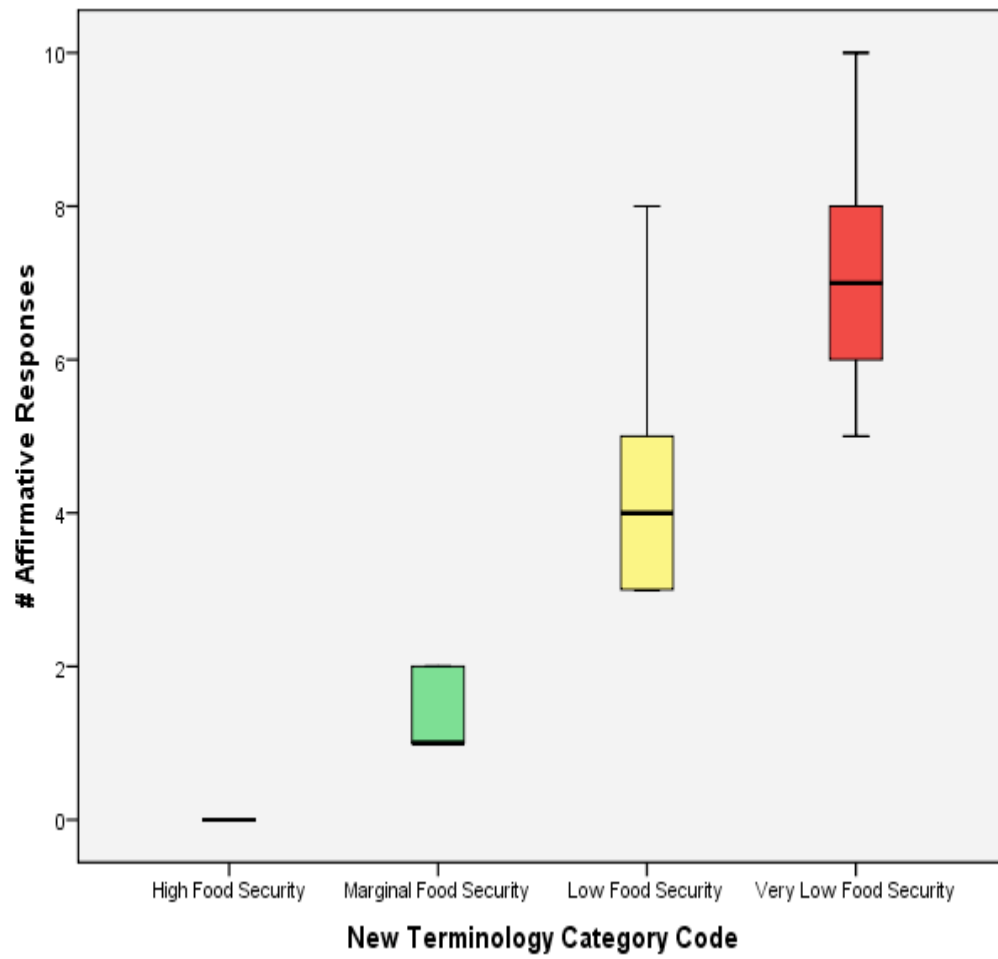
	N	Percent
Enough of the kinds of food we want	32	44.4
Enough but not always the kinds of food we want	25	34.7
Sometimes not enough to eat	10	13.9
Often not enough to eat	5	6.9
Don't know or refused	0	0

Appendix G: Affirmative Response Rates on US Household
Food Security Questionnaire

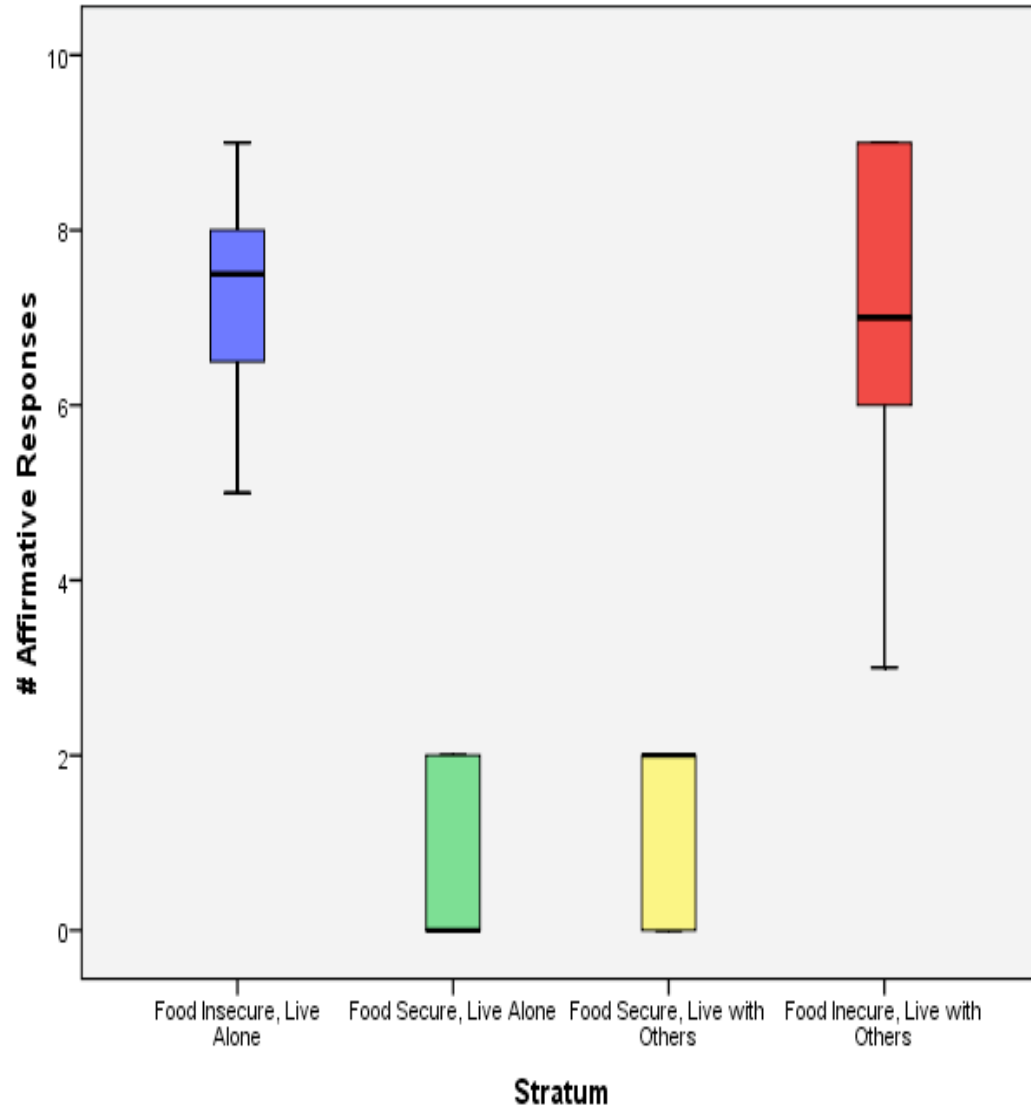
	N	Median	Minimum	Maximum
Total Sample	72	2	0	10
Food Insecure, Live Alone	8	7.50	5	9
Food Secure, Live Alone	7	0	0	2
Food Secure, Live with Others	7	2	0	2
Food Insecure, Live with Others	6	7	3	9

Appendix H: Frequency of Affirmative Responses to US Household Food Security
Questionnaire Items for Total Sample

Question	Frequency	Percent
(N=72)		
HH2- Worried food run out	41	56.9
HH3- Food just didn't last	32	44.4
HH4- Could afford balanced meals	38	52.8
AD1- Cut or skip meals	26	36.1
AD1a- Cut or skip meals on ≥ 3 days	20	27.8
AD2- Felt ate less than should	29	40.3
AD3- Hungry but didn't eat	25	34.7
AD4- Lose weight because not enough food	13	18.1
AD5- Not eat for entire day	10	13.9
AD5a- ≥ 3 days not eating for the entire day	4	5.6



Appendix I: Box Plot of Affirmative Responses by Food Security Classification



Appendix J: Box Plot of Affirmative Responses by Stratum

Appendix K: Informed Consent for Subsample

INFORMED CONSENT
University of Kansas Medical Center
Interviews and Focus Groups to Assess Barriers to
Food Security among Individuals with Severe Mental Illness
Principal Investigator: Edna Hamera RN, PhD, CS

INTRODUCTION

As an individual with severe mental illness enrolled in the RENEW weight loss program from the University of Kansas Medical Center, you are being invited to participate in additional research to examine barriers you experience or have experienced related to maintaining a sufficient supply of food in your home each month. This research study will be conducted through the University of Kansas Medical Center by Jeannine Goetz MS, RD, LD.

You do not have to participate in this research study. It is important that you read the rest of this form and discuss this with your family and friends before you decide to participate. You should ask as many questions as needed to understand what will happen to you if you participate in this study.

PURPOSE

The goal of this research is to gather your views on barriers associated with maintaining an adequate food supply throughout the course of the month in order to help better develop assistance and educational programs to address food insecurity among individuals with mental illness.

PROCEDURES

If you are eligible and decide to participate in this portion of the research study, you will be asked to take part in the following:

- Complete the US Household Food Security Questionnaire so that we may assess your current food security status. This questionnaire takes approximately 3-4 minutes to complete and is the same one that has been administered to you during previous testing sessions for the RENEW weight loss project.
- Following this questionnaire, you will then be asked to meet with Jeannine Goetz to complete a 20 to 30 minute individual interview. During this interview we will assess what barriers, if any, you may encounter to having a consistent supply of food available to you each month. Additionally, researchers will ask about any strategies that you may use to help avoid such situations.

- Lastly, you will be asked to participate in a “focus group” session lasting approximately 60 to 90 minutes with up to four other individuals. During the focus group, we will have an informal group discussion on the same topic. All focus group participants will have a severe and persistent mental illness diagnosis and will be a consumer from either Johnson County Mental Health Community Support Services or Wyandot Behavioral Care Center.
- We will use the information you provided in your demographic survey during the baseline testing of the RENEW program to obtain background information, including financial status and sources.

Interviews and focus group discussions will be led by Jeannine Goetz. At the focus groups, at least one additional researcher will be present to take notes and assist with the group. During both interviews and focus groups, we will use first names only. The sessions will be audio-taped. After the session, the discussion will be typed into a computer. Any names used during the interview or focus group will not be typed into the computer. Instead, we will use a series of “X’s” wherever a person’s name should be. Tapes will be kept for five years after the study ends, as required by federal law. The information will be used to help better develop assistance and educational programs to address food insecurity among individuals with mental illness. Any time we present information from these interviews and focus groups, we will not use any information that will identify you. If you agree to participate and sign this form, it will be kept in a locked cabinet in Ms. Goetz’s office for 15 years, as required by federal law.

RISKS

If you agree to participate in this interview, you will be asked about whether or not you have enough food available to you each month and what barriers you may or may not encounter. If you agree to participate in the focus group, you and as many as four other individuals will meet with investigators to further discuss your views on barriers to having sufficient amounts of food, or if you do not have such problems, what you do to overcome such barriers. Because we will be discussing food availability as related to financial constraints, it is possible that during our discussion, you could be asked questions that make you uncomfortable or that you do not want to answer in front of other people. Should this occur, you may either refuse to answer the question or withdraw your permission to participate in the study, with no penalty.

We will be audio-taping the interviews and focus groups. Though we will use only your first name on the tapes, it is possible that someone could inadvertently use identifying information during the discussion. We will not put any identifying information, even if it is on the tape, in the transcripts of the interviews and focus groups. The tapes will be kept in a locked cabinet at the University of Kansas Medical Center for 5 years (as required by law) and will then be destroyed.

Intake forms and consent forms will have identifying information about you on them. All intake forms will be destroyed immediately following your participation in an interview or focus group. Prior to participation, they will be kept in a locked cabinet at the University of Kansas Medical Center. All consent forms will be kept in a locked cabinet at the University of Kansas Medical Center for 15 years (as required by law) and will then be destroyed.

BENEFITS

It is hoped that additional information gained by this research may be useful in helping individuals with severe mental illness identify strategies that might be useful for overcoming barriers that might cause an insufficient amount of food to be available each month due to limited financial resources. In addition, if you participate in the focus group, you will have the opportunity to talk to others about their experiences with this public health issue.

COSTS

There are no costs to you for participating in this research study.

PAYMENT TO PARTICIPANTS

In return for your time and travel costs, you will receive a \$10.00 gift card following completion of the interview and an additional \$15 after completion of the focus group session. Additionally, a snack will be provided during the focus group session. Your name and other identifying information, as well as the title of this study, will be used by offices at KUMC that process payments to research subjects.

INSTITUTIONAL DISCLAIMER STATEMENT

Although the University of Kansas Medical Center does not provide free medical treatment or other forms of compensation to persons injured as a result of participating in research, such compensation may be provided under the terms of the Kansas Tort Claims Act. If you believe you have been injured as a result of participating in research, you should contact the Office of Legal Counsel, Mail Stop #2013, University of Kansas Medical Center, 3901 Rainbow Blvd., Kansas City, KS 66160.

CONFIDENTIALITY AND PRIVACY AUTHORIZATION

Study records that identify you will be kept confidential as required by law. Researchers cannot guarantee absolute confidentiality. Efforts will be made to keep your personal information confidential. If the results of this study are published or presented in public, information that identifies you will be removed.

No personal identifiers will be placed on any data collection sheets or audio-tapes. The only study records that will have identifiers will be the initial intake forms, a master study log, and the consent forms. Original intake forms, which will be kept in

a locked cabinet in the study coordinator's office (Jeannine Goetz), will be shredded after an individual either participates in a focus group or decides not to participate. A master study log will document participants by name, corresponding to an alpha-numeric code. Once an individual is put into the master study log and assigned a code, the code will become the only means of identification. Only the PI and the study coordinator will have access to the master log and key to alpha-numeric coding. The master log will be kept electronically in a password-protected file on the research coordinator's computer, backed-up by a password-protected file on the shared drive of the KUMC computer system, which is firewall-blocked and has extensive patient security systems on it. Consent forms will be kept for 15 years, as required by law, in a locked cabinet in Ms. Goetz's office.

The privacy of your health information is protected by a federal law known as the Health Insurance Portability and Accountability Act (HIPAA). By signing this consent form, you are giving permission ("authorization") for KUMC to use and share your health information for purposes of this research study. If you decide not to sign the form, you cannot be in the study.

To do this research, the research team needs to collect health information that identifies you. They will collect information from study activities described in the Procedures section of this form. Your health information will be used at KUMC by Dr. Hamera, members of the research team, the KUMC Research Institute and officials at KUMC who oversee research, including members of the KUMC Human Subjects Committee and other committees and offices that review and monitor research studies.

By signing this form, you are giving Dr. Hamera and the research team permission to share information about you with persons or groups outside KUMC. Your information may be shared with representatives of the National Institute of Mental Health (the sponsor of the study), other business partners of the sponsor who help with the study and U.S. agencies that oversee human research (if a study audit is performed). The purpose for using and sharing your information is to make sure the study is done properly. All study information that is sent outside KU Medical Center will have your name and other identifying characteristics removed, so that your identity will not be known. Because identifiers will be removed, your health information will not be re-disclosed by outside persons or groups and will not lose its federal privacy protection. Your permission to use and share your health information will not expire unless you cancel it.

PARTICIPANT RIGHTS AND WITHDRAWAL FROM THE STUDY

You understand that your participation in this study is voluntary. You can choose not to participate, to quit at any time, or refuse to answer any study questions without any penalty or loss. You understand that not participating or quitting will have no effect upon the medical care or treatment you receive now or in the future. This study may

be discontinued for any reason without your consent by the investigator conducting the study. If you choose not to sign this form, you will not be able to participate in the study.

You have the right to change your mind about allowing the research team to have access to your health information. To cancel your permission you must send a written request to the principal investigator of the study, Dr. Hamera, at the University of Kansas Medical Center, School of Nursing, MS 4043, 3901 Rainbow Boulevard, Kansas City, KS 66160.

If you cancel your permission to use your health information, you will be withdrawn from the study. The research team may continue to use and share information that was gathered before your cancellation. They will stop collecting any additional information about you.

QUESTIONS

You have read the information in this form. The investigators have answered your questions to your satisfaction. You know if you have any more questions after signing this form, you may contact Jeannine Goetz at 913-588-1449. If you have any questions about your rights as a research subject or other concerns, you may call (913) 588-1240 or write the Human Subjects Committee, Mail Stop #1032, University of Kansas Medical Center, 3901 Rainbow Blvd., Kansas City, KS 66160.

CONSENT

The investigators have given you information about what you will have to do in this research study and how long it will take. They told you about any inconvenience, discomfort or risks you may experience due to this research.

You freely and voluntarily consent to participate in this research study. You have read and understand the information in this form and have had an opportunity to ask questions and have them answered. **You will be given a signed copy of the consent form to keep for your records.**

 Type/Print Participant's Name

 Date

 Participant's Signature

WITNESS (to participant's signature of document)

 Type/Print Witness' Name

 Date

 Witness' Signature

RESPONSIBLE INVESTIGATOR

 Date

 Responsible Investigator's Signature

Appendix L: Comprehensive Literature Review (I)

**Obesity Prevalence and Correlates among Individuals with
Severe and Persistent Mental Illness**
Comprehensive Literature Review (I)

Jeannine Goetz

Obesity Prevalence and Correlates among Individuals with Severe and Persistent Mental Illness

Severe and persistent mental illness (SPMI) is a condition that affects the lives of many Americans. The mortality and comorbidity of individuals with mental illness has been documented as more than double that of the general population (Dembling, Chen, & Vachon, 1999). Individuals with SPMI die primarily as a result of natural causes, with many obesity-related illnesses being cited as the cause (e.g., cardiovascular, respiratory, gastrointestinal, and genitourinary disorders) (Dixon, Postrado, Delahanty, Fischer, & Lehman, 1999). Obesity is a documented threat to maintaining good health and a known risk factor for developing several other medical conditions including dyslipidemia, heart disease, hypertension, type 2 diabetes mellitus, osteoarthritis and certain cancers (Allison & Pi-Sunyer, 1995; Aronne, 2001). While the United States (US) population is becoming increasingly more overweight, several risk factors contribute to a greater vulnerability towards becoming overweight for individuals with SPMI. Underlying factors that may contribute to this phenomenon include limited access to healthcare (Crews, Batal, Elasy, Casper, & Mehler, 1998; MacHaffie, 2002), poor nutrition (Brown, Birtwistle, Roe, & Thompson, 1999; McCreadie et al., 1998), sedentary lifestyles (Daumit et al., 2005; McDevitt, Snyder, Miller, & Wilbur, 2006), addictive behaviors (John, Meyer, Rumpf, & Hapke, 2005) and the affects of antipsychotic medications (Allison, Mentore et al., 1999; Blin & Micallef, 2001; McIntyre, Mancini, & Basile, 2001). Although weight management is a common issue for many dietetic and other health

professionals, the psychiatric population is often overlooked. Before actions can be taken to combat this growing issue, it is important to first examine the extent of the problem, and secondly, to determine correlates of obesity within individuals with SPMI.

Methodology

Literature Search

This literature review was guided by the following questions: 1) What is the prevalence of overweight and obesity among individuals with SPMI? 2) What are the perceptions of individuals with SPMI towards their current weight status? and 3) Why are individuals with SPMI at increased risk for developing obesity? To answer these questions, a literature search for articles published from 1985 to 2006 was conducted using the following databases: MEDLINE, CINAHL, PsycINFO, PubMed, and the Cochrane Central Register of Controlled Trials. The terms *Severe and Persistent Mental Illness (SPMI)*, *Severe Mental Illness (SMI)* and *schizophrenia* were searched individually and in combination with the terms *obesity*, *body mass index (BMI)*, *healthcare*, *dietary intake*, *physical activity*, *health behavior*, *prevalence*, and *comorbidities*. References from these identified articles were also reviewed to determine if additional literature was available.

Inclusion and Exclusion Criteria

To be included within this review, articles had to either identify the prevalence of obesity, examine the potential causes contributing to increased risk of being overweight or obese, and/or to address how individuals with SPMI perceive their current body weight. Studies were not limited to one specific diagnosis, but rather to those that utilized acceptable diagnosis criterion for selecting individuals with SPMI.

Studies including individuals with mental illness due primarily to physical illness or injury were excluded. To be eligible for this review, studies had to include human subjects and have a sample size larger than one participant. Only English language articles were considered. Additionally, studies included in this review were not required to be conducted within the United States. When reviewing studies conducted to examine the effect of anti-psychotics on weight gain, studies utilizing anti-psychotics to treat illnesses outside of mental illness were excluded. Due to the extensive nature of the anti-psychotic weight gain literature, a comprehensive review was not conducted as it was felt that this was beyond the scope of this particular review. Rather, the data supporting the link between anti-psychotic use and weight gain is primarily taken from the comprehensive research synthesis conducted by Allison and colleagues (1999) as well as a few supporting manuscripts. Finally, studies that provided an intervention in the form of diet, exercise or adjunct drug therapy were excluded from this review as they will be included within a future review.

Severe and Persistent Mental Illness and Obesity

Although some individuals with SPMI are within a healthy body weight range, overweight to obese seems to more accurately capture the body weight tendencies of this population. In fact, not only have many researchers reported an increased prevalence of obesity within these individuals, but also that these individuals are more obese than the general population as evidenced by the high number of individuals classified as obese category III (BMI \geq 40) (Dickerson et al., 2006). Based on several sets of data including the National Health Interview Survey (NHIS), Allison, Fontaine, Heo, Mentore, Cappelleri and Chandler (1999) reported that, as a whole, the schizophrenic population was as obese as or more obese than those individuals without schizophrenia. Men with schizophrenia exhibited a body mass index (BMI) similar to men without schizophrenia (26.14 vs. 25.63, respectively); however, women displayed a significantly higher BMI than those women without the illness (27.36 vs. 24.50, respectively; $p < 0.001$). Regardless, the BMI distributions of both genders were similar to that of most developed societies which indicates that a large proportion of the schizophrenic population appears to be obese.

In a study by Dickerson, Brown, Kreyenbuhl, Fang, Goldberg, and Wohlheiter (2006), the BMI of individuals aged 18-65 who were randomly selected from an outpatient psychiatric treatment group were compared to a matched sample of individuals from a national health survey that were not diagnosed with mental illness. The chronic mental illnesses represented in this study included 100 subjects with

schizophrenia (half exhibiting schizophrenia excluding schizoaffective disorder and the other half with schizoaffective disorder) and another 100 subjects with major mood disorder (equally divided between major depression and bipolar disorder). A comparison group (n=2404) from the National Health and Nutrition Examination Survey (NHANES) was matched to those subjects with SPMI who were included in the final analysis (n=169). Researchers conducted in-person interviews using questions from US national surveys and obtained information including self-reported height and weight, weight loss attempts in past year, desired body weight, smoking status, co-occurring medical illnesses and health-related quality of life. This study reported that both genders of individuals with SPMI exhibited significantly greater BMI than the matched comparison group. Females with SPMI had a mean BMI of 31.1 ± 8.0 while the female comparison group was 27.1 ± 6.2 ($p=0.0001$). Similarly, the mean BMI of the male SPMI group was 28.7 ± 6.0 while the male comparison group was 26.8 ± 4.8 ($p=0.007$). When BMI categories were examined (from underweight to obese III category), 50% of females and 41% of males with SPMI were considered obese while only 27% of females and 20% of males from the NHANES group were identified as obese. Further, there were a greater number of females with SPMI in all obese classes, particularly obese III. Dickerson and colleagues did not report any significant differences between individuals within the two categories of mental illness (schizophrenia versus major mood disorder). For further analysis of weight status, researchers included both males and females with SPMI and collapsed the BMI distributions into four classes: healthy (<24.9),

overweight (≥ 25.0 - 29.9), obese I (≥ 30.0 - 34.9), and obese II/III (≥ 35.0). Of the 169 subjects included in this secondary analysis, 28% had a BMI in the healthy range while 27% fell into the overweight range, 24% in the obese I range, and 22% in the obese II/III range. It is noteworthy that these findings may be limited by a number of factors. First, height and weight were both self-reported, and hence may introduce some degree of bias. However, this limitation is reduced since height and weight within both populations utilized the same self-report methodology. Further, these findings are only cross-sectional and do not enable researchers to examine the direction of the effect between obesity and other variables. Despite these factors, these findings add to the body of literature that underlines the extent of the obesity problem within individuals with serious mental illness.

Prevalence rates were even higher in another study examining the prevalence of obesity among adults with chronic schizophrenia receiving depot neuroleptic medication as compared to the general population (based upon Greater London Office of Population Censuses and Surveys or OPCS), with obesity occurrence being four times greater among individuals with mental illness ($n=226$) than those without mental illness (Silverstone, Smith, & Goodall, 1988). While 62% of males and 68% of females within the London population were categorized as a healthy body weight ($BMI < 25$), only 30% of males and 42% of females from the group with mental illness fell into the same category. Within the group of males with schizophrenia, 39% were identified as overweight ($BMI 25$ - 29.9) and 31% as obese ($BMI > 30$). The

comparison group for these individuals reported 33% of individuals as overweight and only 6% as obese. Likewise, 21% of females with mental illness were classified as overweight and another 37% as obese while only 23% of the general population was overweight and 9% were obese. Similar to the findings reported by Allison et al. (1999), no significant difference in obesity prevalence was found between males and females. The researchers noted that BMI increased with age, and thus, the results might possibly be explained by the skewed age distribution of the mental illness population (mean age: males 41.7 years, females 43.5 years). However, obesity prevalence was notably increased from the 25-29 year age group onward as compared to the comparison population, and hence, is likely not a major factor. Finally, Silverstone and colleagues indicate that caution should be used when extrapolating these findings as the number of subjects within this research was small in relationship to the general population comparison sample.

In order to determine whether the obesity crisis has been escalating over time within the psychiatric population, Homel, Casey and Allison (2002) evaluated whether changes in BMI and weight status occurred across the decade from 1987 to 1996 within individuals with schizophrenia versus non-schizophrenic individuals obtained from nationally representative samples of the US population. The sample was obtained from the Personal Characteristics and Health Condition files of the NHIS which is conducted by the National Center for Health Statistics. The annual survey measures self-reported height and weight as well as acute and chronic health

conditions. The NHIS uses diagnostic codes to identify respondents as either normal or schizophrenic. Overall, results from the analysis reveal that individuals within the schizophrenic group had a greater mean BMI than the normal group. While an apparent steady increase in BMI occurred across the decade within the normal group, the trend for the schizophrenic group remained steady. For males within the schizophrenic group, BMI was generally higher than the mean BMI of the normal group; however, no appreciable change occurred over time while the BMI of the male non-schizophrenic group consistently increased. Interestingly, the mean BMI of the normal male group increased such that by 1995, the mean BMI was virtually the same as the BMI of the schizophrenic male group. Similarly, the female group without schizophrenia demonstrated a consistent increase in BMI across the decade while the females with schizophrenia had no apparent trend in BMI fluctuation. One exception to these findings is the trend that occurred within the younger females with schizophrenia (ages 18-30). For these women, mean BMI was initially similar to females without schizophrenia; however, within a few years, the mean BMI sharply and steadily increased. The authors concluded that overweight and obesity appears to be at least as great of an issue for individuals with schizophrenia as the general population. Further, it appears that among young women with schizophrenia, excess weight gain appears to be a particular concern.

Finally, while fewer studies have been conducted in adolescents and young adults with SPMI, roughly 0.23% of this population is affected by chronic mental illnesses,

and thus, is also reviewed within this section. A study among German inpatient adolescents and young adults (aged 15-26 years) was conducted (Theisen et al., 2001) to assess whether similar weight distributions were observed in adolescent and adult populations with SPMI. In contrast to the adult studies previously reported within this review, the BMI's of the young adult population were transformed to age- and gender-specific percentiles and plotted onto BMI percentile curves representative for the German population. Thus, using these growth charts, subjects demonstrating a BMI percentile greater than the 90th percentile were defined as obese. Among study participants (n=151), 58.5% of females and 44.9% of males were categorized as obese. These rates are reportedly 5.1 and 6.4 times greater than that found within the German reference population. When type of mental illness was taken into consideration, obesity was more prevalent among individuals with a diagnosis of schizophrenia. Although the generalizability of these research findings may be limited by the sample characteristics as well as the definition utilized for categorizing obesity, the results are consistent with other reports within the adult mental illness population and further support that potential gender and diagnosis differences may occur.

Perceptions of Current Weight Status and Quality of Life

The previously reported findings suggest that individuals with SPMI may have a greater prevalence of overweight and obesity than the general population. While controversial, some evidence has suggested that individuals with SPMI may have a

misperception of their body size, and thus, may fail to recognize a need for weight loss efforts. The next section of the literature review examines the relationship between body size perceptions and weight loss attempts and quality of life within this population of individuals.

To assess this theory, a study was conducted to evaluate the body weight perception and dieting practices of outpatient and partial hospital patients diagnosed with schizophrenia, schizoaffective disorder and/or psychotic disorder NOS (Strassnig, Brar, & Ganguli, 2005). Trained researchers conducted structured interviews to determine the following questions of interest: 1) “Do you consider yourself now being underweight, about acceptable weight, slightly overweight, very overweight or extremely overweight?”; 2) “Would you like to weigh more, weigh less, or stay about the same?” and 3) “Have you been trying to lose weight in the past month?” If participants reported weight loss attempts, researchers also asked a series of questions to determine actual measures that were employed to assist with weight loss such as type of diet (including caloric restriction amount), physical activity, and other practices including skipping meals, fasting, weight control medications or diet pill usage, and vomiting. Upon analysis of weight status, researchers reported that 17.5% were a healthy weight (BMI 18.5-24.9 kg/m²) while 22.4% were overweight (BMI 25-29.9 kg/m²) and 60.1% were obese (BMI ≥ 30 kg/m²). Additionally, self perception of being overweight was significantly correlated to body weight ($r=0.49$, $p\leq 0.001$). In regard to the question addressing perception of weight status, 71.3% of

participants reported feeling overweight. Of the participants exhibiting a normal weight, 16% reported feeling overweight, while 50% of overweight and 95.3% of obese participants reported their weight perception as overweight. Similar to the general population, males were significantly more apt to report a misclassification of their weight status than females ($p \leq 0.001$). Thus, males were less likely to identify themselves as overweight or obese or to recognize the need for intervention when in fact they were actually overweight or obese.

Further analysis of the above findings from Strassnig and colleagues (2005) revealed that a significant correlation was found between body mass index and desire to lose weight ($r=0.63$, $p \leq 0.001$). Of the total study population, only 13.3% of subjects desired to weigh more while 15.4% desired to maintain current weight status and the remaining 70.6% desired to lose weight. A significant inverse correlation existed between body weight perception and reported weight loss attempts ($r=-0.79$, $p \leq 0.001$). Results indicate that 81 of the 143 total subjects (56.7%) were currently participating in various weight loss measures. Caloric restriction was the most common method reported (82.7%), with physical activity (48.1%) and other practices (29.6%) less often employed. Obese subjects were significantly more likely to engage in weight loss practices than overweight or healthy weight subjects ($r=-0.39$, $p \leq 0.01$). Additionally, of the subjects classified as either overweight or obese ($n=118$), 64.4% were currently making efforts to reduce their weight, with significantly more females than males making weight loss attempts ($p \leq 0.005$). These findings suggest that

individuals with schizophrenia do understand that they weigh too much and that something must be done to control their weight. The exception to this finding was only the group of overweight males (BMI category 25-29.9 kg/m²) who reported not believing they were overweight.

Similarly, a survey (Wallace & Tennant, 1998) investigating nutrition and obesity within individuals living in Sydney mental health residential services addressed the following question: “how do you feel about your weight?” Of the 58 survey respondents, 45% felt they currently needed to lose weight. Overall, the majority of respondents were overweight or obese (71%), with a mean BMI of 28 kg/m².

Individuals reporting a desire for weight loss were slightly more obese with an average BMI of 31 kg/m² (SD=2). Of the remaining respondents who reported feeling good about their current weight status (42%; mean BMI = 26 kg/m²), roughly half of these individuals fell within a healthy weight range (BMI 18.5 to 24.9 kg/m²). Hence, nearly half of this population of individuals with mental illness was aware that excess body weight was an issue; many of which expressed a desire for assistance.

In yet another study, a secondary analysis was conducted to ascertain whether an association existed between BMI and desire to lose weight and/or attempt to lose weight (Dickerson et al., 2006). Participants were asked whether they desired to weight less, the same, or more as well as whether they had attempted to lose weight within the previous year. Of the 169 SPMI respondents, 62% expressed a desire to

lose weight. Further, 56% of the same respondents had attempted weight loss during the previous year. Researchers reported that as BMI increased, the relative odds of both desire to lose weight and weight loss attempts increased monotonically. Quality of life was also assessed by researchers, with those individuals exhibiting a BMI in the obese II/III category reporting a significantly worse rating of physical functioning than those in the healthy BMI category ($p=0.02$). While this study does not specifically indicate the types of weight loss attempts that respondents have taken, it does confirm that individuals with SPMI do have concerns with their weight status and that they have a desire to take action.

Potential Causes of Obesity within Individuals with SPMI

Research supports that individuals with SPMI are at greater risk for obesity and other nutritional problems due the following issues: poverty and restricted ability to maintain employment; limited access to healthcare (Crews et al., 1998; MacHaffie, 2002); poor health behaviors such as a nutritionally inadequate diet (Brown et al., 1999; McCreadie et al., 1998) and sedentary lifestyle (Brown et al., 1999; Daumit et al., 2005; McDevitt et al., 2006); addictive behaviors and the affects of antipsychotic medications (Allison & Casey, 2001; Allison, Fontaine et al., 1999). Each of these potential contributors to weight gain will be examined in greater detail in the following section.

Access to Healthcare. Healthcare providers are often involved in providing services to support healthy lifestyle practices among the general population. Unfortunately, provision of similar services for people with serious mental illness is less common, although the need for this population is greater and far more complex. Obesity is more prevalent among lower socioeconomic individuals, and not surprisingly, individuals with mental illness often live in poverty. Limited income or lack of health insurance is often a barrier to accessing healthcare services (Druss & Rosenheck, 1998). Since people with schizophrenia and other mental illnesses typically have limited access to healthcare, many individuals turn to their psychiatrist for general medical concerns (Crews et al., 1998). Other individuals wait to receive healthcare until times when psychiatric hospitalization is necessary (Farmer, 1987). Thus, health promotion services are rarely received (Carney, Yates, Goerdt, & Doebbeling, 1998) and day-to-day issues concerning their health are rarely reported (Dixon et al., 1999).

Recently, McHaffie (2002) sought to determine from what sources do persons with SPMI obtain health promotion information, and secondly, how do these individuals perceive the reliability of services from these sources. A 19-item questionnaire and brief structured interview were conducted with participants. Similar to studies conducted among the general population, individuals within the study viewed health professionals as providing the most reliable health promotion information. Results indicate that participants reported the following order of sources as providing the

greatest amount of health promotion information: non-psychiatrist physicians, psychiatrists, nurses, and pharmacists. The findings also suggested that health books, health organizations and educational television were more regarded for their credibility and reliability than for the amount of information supplied. In contrast, family, and in particular friends, ranked higher for quantity of information provided rather than for reliability of information provided. However, family ranked higher than other sources such as health books, newspapers, television news, magazines, and telephone medical/health advice in terms of reliability. Individuals reported information obtained from the Internet near the bottom of the ranking list for both quantity of information provided and reliability. This finding is of importance as an Internet connected computer was available and accessible near each location where data were collected. Hence, subjects had access to this source of information; thus, indicating that perhaps lack of interest in or knowledge of how to access health information via computer was more a factor than actual access to a computer with Internet availability. The author concluded that these findings suggest the importance of health professionals as a source for providing health promotion information in a timely and individualized manner. Further, the author conclude that since authoritative sources such as health books and health organizations were ranked lower for quantity of information supplied, possibly information delivered via reading materials (i.e. pamphlets and handouts) may not be as efficacious in reaching individuals with SPMI. Hence, focusing upon increasing interpersonal interactions may be the best avenue for providing health information to these individuals. Also

noteworthy, despite the fact that people with schizophrenia receive limited healthcare, many individuals have the desire for seeking a better quality of life. MacHaffie conveyed that many subjects involved in his research expressed a clear interest in improving their physical well-being and had considered being more physically active, losing weight, and quitting smoking.

In another study (Muir-Cochrane, 2006) assessing barriers to care for people with schizophrenia, researchers report a number of barriers including some of the following: a focus on mental health issues while ignoring other health-related complaints, reluctance by general practitioners and non-psychiatrists to take a comprehensive approach, lack of continuity of care and follow-up due to itinerancy of patients, infrequent screening for physical problems, physical symptoms assessed incorrectly or dismissed as psychosomatic, time and resources for general health check-ups unavailable within the mental health setting, and finally, difficulties for the consumer in negotiating the health care system. The last concern elaborated on a number of barriers such as inability to describe medical issues, lack of contact with general practitioners, lack of access to care as well as a fragmentation of the health care system in general, cognitive and psychosocial deficits contributing to inaccurate self-assessment of symptoms, and lack of cooperation by consumers.

Nutritional Aspects Due to poor eating habits and food beliefs, many individuals with SPMI may exhibit multiple nutritional concerns. The dietary intake

of this population is often inadequate, as these individuals frequently consume diets high in fat and inadequate in fruits, vegetables and fiber (Brown et al., 1999; McCreadie et al., 1998). Data indicate that their diets are inadequate in several nutrients including calcium, zinc, iron, thiamin, vitamin A, and vitamin E (Brown et al., 1999; McCreadie et al., 1998; Springer, 1987). In a study (Knutsen & DuRand, 1991) looking at the prevalence of undiagnosed health issues among psychiatric patients, nutritional deficiency was cited as the second largest exacerbating factor. For example, Brown, Birtwistle, Roe, and Thompson (1999) conducted semi-structured interviews with community-dwelling middle-aged adults with schizophrenia and reported that dietary intake was higher in dietary fat and lower in fiber than the general reference population. Additionally, subjects failed to meet the general recommendation of five servings of fruits and vegetables each day.

Similar dietary deficiencies were reported by a survey conducted in mental health residential houses in the Northern Sydney area (Wallace & Tennant, 1998). A 24-hour dietary recall was conducted and revealed that all subjects reported consuming less than the recommendations made by the Sydney 12345+ Nutrition Plan. Of the food groups, the meat group was the food group that was most commonly met, with 88% of respondents consuming the recommended amount. 65% of respondents also reported consuming the recommended number of dairy servings. Consistent with other research (Brown et al., 1999; McCreadie et al., 1998), subjects were most likely to report not meeting the recommended number of servings for fruits and vegetables;

only 5% of respondents meeting these recommendations. Additionally, fruits and vegetables were the most frequent food group to be totally excluded during the previous day's reported intake. During the study, the authors also conducted a 10-question nutrition quiz to assess common nutrition knowledge; however, results were not provided as respondents had difficulty distinguishing between nutrition knowledge and their personal behaviors.

In a study previously reported in this review, Stassnig, Brar and Ganguli (2003) examined differences in nutritional composition of the diet of outpatient individuals with schizophrenia compared to the general population. Researchers conducted 24-hour dietary recalls with 146 patients with schizophrenia and compared findings with data collected from the Third National Health and Nutrition Examination Survey (NHANES III). Overall, it appeared that while the relative percentage of calories derived from fat, protein and carbohydrate were similar to that of the general population; individuals with schizophrenia appeared to consume more food in general. These findings suggest that possibly individuals with SPMI may not make poorer food choices, but do consume more calories than those individuals without SPMI.

In contrast to the above study by Strassnig et al (2003), Henderson and colleagues (2006) reported that obesity in individuals with schizophrenia may not be related to increased food consumption. The researchers conducted four-day food records to

evaluate the dietary intake of patients with schizophrenia and schizoaffective disorder who were currently taking atypical antipsychotic agents. Data were then compared to the general population using the 1999-2000 NHANES survey. Similar to other findings, the schizophrenic population exhibited a significantly greater BMI than the reference population (Mean BMI 31.3 ± 12.67 versus 28.3 ± 6.62 , respectively). Results indicate that the schizophrenic group reported consuming fewer calories, carbohydrate, protein, total fat, fiber, folate, sodium and alcohol than the general population. Hence, the authors suggest that other avenues may be responsible for excess weight gain within this population of individuals. Suggestions for contributing factors included medication side-effects and limited physical activity.

Many symptoms of SPMI often contribute to this nutritional inadequacy. Delusions often cause individuals with schizophrenia and other mental illnesses to display bizarre food beliefs, which for example, may cause the individual to believe that certain foods may be poisoned or even possess “magical powers.” While these delusions often subside with drug treatment, dietary intake may be poor during these episodes (Gray & Gray, 1989). In cases where an individual is not receiving treatment for SPMI, prolonged fasting or peculiar eating habits may cause significant nutrient deficiencies and possibly severe weight loss. In other cases, individuals may consume inconceivable amounts of food, and thus, cause significant weight gain. These cravings are often triggered by medications which may cause increased appetite and food cravings (Gray & Gray, 1989).

Sedentary Lifestyle Like many Americans, individuals with SPMI often lead sedentary lifestyles (Brown et al., 1999; Daumit et al., 2005; Murphy, Gass-Sternas, & Knight, 1995). According to the U.S. Department of Health and Human Services (HHS), approximately 60% of Americans fail to meet the recommended amount of physical activity, and 25% do not engage in physical activity at all. Adequate physical activity has been well-documented as a method to help control weight, reduce body fat mass, and develop lean muscle. Further, an active lifestyle may also help to alleviate or prevent many of the co-morbidities associated with obesity. Hence, the US Surgeon General recommends individuals should participate in 30 minutes of moderate intensity physical activity on most, if not all, days of the week.

A study from England by Brown et al. (1999) reported that subjects with schizophrenia engaged in less leisure time activity than the general population. Within the previous week, only 19% of male study participants reported at least one period of moderate activity, 45% reported only light exercise, and 36% reported not engaging in any physical activity. Similar results were presented by the female participants with 15% engaging in moderate exercise, 57% light exercise, and 32% reporting no exercise during the previous week. Thus, an overwhelming number of individuals within this study did not meet the recommendations established by the Surgeon General.

In another effort to examine physical activity patterns in adults with severe mental illness (SMI) as compared to the general population, Dummit and colleagues (2005) conducted a cross-sectional study in which self-reported physical activity was obtained from a group of adult outpatients with SMI and was compared to data obtained from NHANES III. Researchers recruited 200 subjects total; 100 individuals with schizophrenia (half with schizophrenia and half with schizoaffective disorder) and 100 individuals with affective disorder (half with major depression, half with bipolar disorder). Standard NHANES questions were administered to subjects to assess reported types of leisure time physical activity performed in the previous month as well as the number of times these activities were performed. Responses were then classified into one of three categories: none (inactive); one to 19 times/month (less than Surgeon General's recommendations); and at least 20 times/month (recommended activity level). Consistent with other findings, study subjects exhibited a significantly greater prevalence of obesity than the general population (46% vs. 26%; $p < 0.001$). However, roughly the same percentage of individuals within each population reported that their health status restricted their ability to engage in physical activity (49% SMI versus 51% general population). When activity levels were compared to the general population, individuals with SMI were more likely to report being less physically active (49% vs. 22%; $p < 0.001$). In particular, 35% of females with SMI reported inactivity during the previous month as compared to 22% of females in the NHANES sample ($p < 0.02$). Further, men with

SMI had substantially lower odds of reporting physical inactivity than females with SMI.

Within the above study by Daumit and colleagues (2005), the most frequent type of activity reported by both populations was walking. However, while only 10% of NHANES participants reported walking as their sole form of physical activity, 29% of SMI participants reported no other activities than walking ($p < 0.001$). Researchers suggest that increased use of public transportation for daily activities may be responsible for increased walking within the SMI population. While the NHANES physical activity questions specifically specify activities performed for leisure time activity, the investigators speculate that walking for other purposes than leisure may have been captured in this study. Other types of activities (i.e. running/jogging, biking, dancing, gardening/yard work, and competitive sports) were less frequently reported by individuals with SMI than the NHANES sample. Researchers utilized a multivariate logistic regression model to determine factors related to recommended physical activity levels among individuals with SMI. Findings suggest that education was positively associated with recommended physical activity levels, with an adjusted relative odds of meeting recommended physical activity for individuals with at least a high school education of 3.31 (95% CI, 1.24-8.83) compared with those who had not graduated from high school. Additionally, the strongest association with physical activity was whether or not subjects had social contact during the past month, with those without contact having an adjusted relative odds of physical

inactivity 3 times higher than those with social contact (OR, 3.22; 95% CI, 1.24-8.39). In conclusion, the authors were particularly concerned with the magnitude of the gender difference that existed in reported physical activity levels. This concern stems from the fact that females were less likely to report meeting physical activity recommendations while this group already possesses an especially high prevalence of obesity. Additionally, the authors suggest that social support may be an important accessory target for increasing physical activity levels as well as focusing on strategies to increase walking among this population.

In order to determine perceptions to barriers and benefits of physical activity among outpatients in psychiatric rehabilitation, McDevitt, Snyder, Miller, and Wilbur (2006) conducted four focus group sessions among 34 participants. One of the common themes provided by participants was difficulties and dilemmas of living with mental illness which provided a number of barriers for engaging in physical activity. Respondents indicated that the effect of the mental illness itself, including profound avolition and lack of initiative, were contributing factors. One respondent asserted this concern with the following statement, “once you experience some trauma, you’ve been depressed, you feel like you’re carrying the weight of the world on your shoulders. You can’t even find yourself getting up out of bed, let alone going to exercise.” Another cited barrier to physical activity was being medicated. Respondents reported that treatment involves determining the correct medication and dosage which can often take long periods of time before it is properly adjusted.

During initiation of a new medication, individuals noted that side effects caused lethargy, and thus, significantly affected activity levels. Another barrier voiced by all participants was weight gain associated with medications. One individual indicated that, "I'm not trying to sound judgmental, but you look around and all of us have gained...I used to be overweight, but a lot of us have gained weight because of our medication that we're on. It makes you want to eat. It's hard to exercise when you're really overweight." Finally, living in urban neighborhoods was reported as a barrier to engaging in exercise. Respondents reported feeling vulnerable and unsafe when out in public, not only due to living in low-income neighborhoods, but also the fear of being identified as a person with a mental illness. Participants were aware of other consumers being physically attacked and were fearful that they themselves may be attacked.

Despite the above barriers (McDevitt et al., 2006), many focus group respondents did engage in physical activity and all participants had some idea about the benefits of physical activity in general. Overall, exercise was viewed both as positive and desirable, with benefits being cited for both physical and mental health. However, mental health benefits seemed to prevail with many participants reporting feeling more energetic, less stressed, and sleeping better. Exercise was also identified as providing a much needed distraction by keeping individuals busy and making them feel better. Additionally, being physically active was viewed both as being involved in life and as a key to recovery from mental illness. For example, one respondent

indicated the following, “you have to really get involved in something in order not to give in to depression. And I don’t want to and then I will maybe slide deeper in laziness. I start doing more, and I then become more involved in my life.” Finally, when asked how to overcome some of the previous barriers, respondents indicated that the right type of motivational leadership was key. Leaders must believe in the consumers and provide persuasion while avoiding coercion. Respondents also indicated that providing relevant information to client concerns was important, particularly in relationship to weight gain. Such information was reported to potentially “give you the drive to do things.” Additional suggestions included providing gender specific exercise opportunities and offering choice and variety in the types of activities that are provided. These findings suggest that barriers to engaging in physical activity may differ from those barriers asserted by the general population. For example, the authors propose that the common barriers cited by the general population, lack of time and competing responsibilities, were not cited by respondents with SPMI. These findings are important to reframing the types of programming that are available to individuals with mental illness.

Addictive Behaviors Another potential pathway that has been suggested for contributing to overweight status within individuals with SPMI is the common dependence on nicotine and alcohol by individuals within this population. John, Meyer, Rumpf and Hapke (2005) suggest that a potential mechanism is the withdrawal symptoms that may occur with nicotine and alcohol such as restlessness,

irritability and nervousness. The authors suggest that nicotine, alcohol and food consumption might be similar behaviors in dealing with stress, with all three producing positive feelings. Interestingly, while consumption of alcohol may lead to excess weight gain due to high energy intake, both alcohol intake and nicotine consumption may also decrease appetite or contribute to reduced dietary intake. Based upon these potential pathways to overweight status among individuals with SPMI, John and colleagues (2005) conducted a study with 18-64 year old individuals (n=4075) living in Northern Germany to assess the relationship between nicotine, alcohol and weight status. Of the respondents with psychiatric disorders, overweight and obesity was greater in those individuals who were former nicotine-dependent than among current (unadjusted OR, 1.5; CI, 1.1 to 1.9) and never nicotine-dependent (unadjusted OR, 1.6; CI, 1.3 to 2.0). Similarly, those individuals who reported a previous alcohol use disorder exhibited a higher rate of overweight or obesity than did those individuals with a current alcohol use disorder (OR, 1.7; CI, 1.1 to 2.8) and individuals never reporting the disorder (unadjusted OR, 1.5; CI, 1.1 to 1.9). Interestingly, a main sex effect occurred, with results for nicotine and alcohol status in conjunction with weight status being valid only for men. These findings suggest that healthcare providers should be prepared to offer information for preventing weight gain when counseling nicotine-dependent tobacco consumers on cessation, especially when dealing with male patients. Additionally, the findings from the alcohol use disorders do not support that increased energy intake from alcohol

contribute to overweight status. The researchers suggest that diseases of the gastrointestinal tract may lead to decreased energy intake.

Effects of Antipsychotic Medications Before the widespread use of atypical antipsychotic drugs, obesity was a common health issue for individuals with mental illness (Dixon et al., 1999). However, even greater concerns exist today with the increasing evidence that atypical antipsychotics increase the risk for weight gain in an already vulnerable population. While these second-generation drugs are generally more favorable and have alleviated many of the extrapyramidal side effects associated with the conventional antipsychotics, these newer drugs have been responsible for producing significant weight gain, poor glycemic control and dyslipidemia (Allison, Mentore et al., 1999). Although extensive research has been conducted in this area, only a basic overview of the general consensus is presented within this section as it is beyond the scope of this paper.

It appears that although nearly every antipsychotic drug on the market produces some weight gain, the magnitude of this side effect varies between classes of drugs and also between different individuals taking the same medication (Ganguli, 1999). Allison, Mentore, Heo, Chandler, Cappelleri, Infante, and Weiden (1999) conducted a comprehensive literature search to compare the effects of antipsychotics on body weight. Included within the study were both conventional and newer antipsychotic drugs. There were two primary findings: 1) Many antipsychotic drugs do produce

clinically significant weight gain, and 2) Weight gain is often reported in an “incomplete, idiosyncratic, and poorly defined manner.” Due to heterogeneity among studies (varying durations and dosages) researchers utilized a random effects estimate. By doing so, the researchers determined that those individuals receiving a placebo experienced an average weight loss of 0.74 kg. Weight loss was also produced in individuals consuming the conventional drugs molindone and pimozide. While molindone produced an overall mean weight loss of 1.06 kg, the weight loss was not significant at 10-weeks (-0.39 kg). Similarly, weight loss from pimozide was not found to be significant (-2.69 kg). Among newer antipsychotic agents, clozapine and olanzapine (+4.45 and 4.15 kg, respectively) were associated with the greatest weight gains, risperidone (+2.10 kg) and sertindole (+2.92 kg) produced mild weight gain, and ziprasidone was typically associated with the least amount of weight gain (+0.04 kg).

Multiple medication and dosage switches are often common standard of care when treating individuals with SPMI. As mentioned, the weight gain liability varies greatly among the various antipsychotic drugs that are available. Thus, Ried, Renner, Bengtson, Wilcox and Acholonu (2003) conducted a study to examine weight change following an atypical antipsychotic switch from either risperidone to olanzapine or vice versa. To be eligible for the study, participants had to have received ≥ 2 prescriptions for risperidone or olanzapine for ≥ 60 days, and then switched to the other antipsychotic drug for a period of at least 60 days. Anthropometric

measurements including height and body weight were taken as close to the index date (i.e. date of medication switch) and then a minimum of 60 days post-medication change. At the time of the medication switch, approximately 77% of participants were classified as overweight (≥ 25 BMI), with 49.5% classified as obese (≥ 30 BMI). The mean weight change that occurred following the switch from risperidone to olanzapine was +2.3 kg (range: -15 to +15.5), which represented an average percent body weight increase of 2.8% from baseline weight. In contrast, the average weight change following the switch from olanzapine to risperidone was a decrease of 0.45 kg, representing a 0.4% reduction in percent weight change. While the weight gain following a drug switch is not as severe as following initiation of atypical antipsychotics in general, the authors found the weight gain to be statistically, if not clinically significant. Hence, Ried and colleagues suggest that practitioners should consider utilizing these findings when prescribing antipsychotic changes to patients.

Recent data suggest that clinically significant weight gain occurs in nearly 60% of individuals prescribed antipsychotic medications (Allison & Casey, 2001; Blin & Micallef, 2001; Kurzthaler & Fleischhacker, 2001; Sussman, 2001). This creates a substantial nutritional issue as many individuals must remain on drug treatment for years or even decades. Weight gain is a distressing issue for most anyone who experiences it, and therefore, may cause deterioration in quality of life. Consequently, many individuals may become noncompliant with treatment and psychotic symptoms

may return. Antipsychotic-induced weight gain adds further risk for obesity-related mortality in an already vulnerable population of people.

Discussion

What is the prevalence of overweight and obesity among individuals with SPMI?

Based upon the findings presented within this review of literature, there is strong evidence that individuals with severe mental illness are at least as overweight, if not more so, than the general population. These findings, which are summarized in Table 1, are surprisingly consistent even over the course of the past three decades (data are presented from research articles from 1988 to present). While three research teams reported gender differences and two did not, there appears to be a particularly notable concern with regards to females with severe mental illness. In all cases, females were reported to exhibit a BMI greater than that of women of similar ages within the general population. Additionally, while the BMI trend for individuals with mental illness has remained fairly stable over the previous decade; young females with SPMI displayed a sharp increase in BMI trend over this same time period. Thus, this subgroup of individuals with severe mental illness may require additional efforts by healthcare professionals.

Overall, it appears that the general tendency for individuals with SPMI is to exhibit a weight status that exceeds recommendations. These findings have been consistent both within the adult population as well as for young adults and adolescents with mental illness. It is also notable that in addition to the majority of individuals being classified as overweight, a significant number of individuals are extremely obese (class II and III obese). Although the mechanisms that underlie this trend towards

overweight/obese status remain unclear, it is clear that these individuals would benefit from the assistance of dietitians and other healthcare professionals. On the positive side, BMI trends within this population have been reported to remain steady in recent years, and thus, if investigators and healthcare workers can determine the mechanisms for excessive weight gain, perhaps successful interventions and treatment programs can be targeted towards these individuals.

What are the perceptions of individuals with SPMI towards their current weight status? Whereas some researchers have suggested that individuals with severe mental illness do not recognize that they would benefit from weight loss attempts, the research reported in this review suggests otherwise. Based upon the above findings regarding perceptions of weight status by individuals with SPMI, we can surmise that many individuals with mental illness are in fact distressed about their current weight status and are motivated to make weight loss attempts. Additionally, this population of individuals is fairly accurate at assessing whether they are a healthy weight or not, especially females. Similar to the general population, females appeared to express a greater concern regarding their body weight and were more apt to engage in dieting behaviors. Whereas a variety of weight loss behaviors were reported by individuals with mental illness, a low percentage of individuals engaged in effective long-term weight management strategies including a combination of caloric restriction and physical activity. These findings paired with the consistent reports of overweight and

obesity within this population suggest that weight loss programs targeted towards individuals with SPMI are warranted.

Why are individuals with SPMI at increased risk for developing obesity?

A number of contributing factors have been suggested within this review as reasons for why individuals with severe mental illness might be more vulnerable towards weight gain; however, no conclusive evidence has been found to pinpoint one factor over another. Many researchers and healthcare professionals have been quick to blame antipsychotic medications, but the other factors presented in this review such as poverty, limited access to healthcare, and poor health behaviors cannot be easily dismissed. Thus, it is likely that all of these factors work in a synergistic manner and contribute to excessive weight gain.

Clinicians should be aware of the potential for drug induced weight gain and should be prepared to discuss such consequences with their patients. By doing so, healthcare professionals may potentially reduce or limit the possibility of such side effects from occurring. Likewise, healthcare professionals should have a basic understanding of the weight gain typically associated with each drug, and should take this into consideration especially when dealing with an obesity-prone individual. Once these factors are taken into consideration, the healthcare professionals should remember

that the best approach to weight control is a combination of a healthy diet, regular bouts of physical activity and behavioral modification of eating habits.

Limitations and Future Research

While the research almost conclusively agrees that individuals with SPMI are more likely to exhibit excessive body weight due to a number of contributing factors, several limitations should be noted. According to a review of literature by Kurzthaler and Fleischhacker (2001), in no single case did a researcher conduct a study that was sufficiently large, nationally representative, exactly diagnosed and inclusive of accurately obtained height and weight data. Another limitation from the literature supporting the prevalence of overweight and obesity within this population is that BMI was in all but one case assessed at only one time point. Further longitudinal studies would add considerably to this relatively small body of literature. Limitations also exist when comparing data from adult and young adult/adolescent populations. Not only did sample characteristics differ, the definition of obesity is not synonymous between the two groups of individuals. Regardless, it is apparent that the weight status of many individuals suffering from SPMI is too high, and thus, represents an important potential public health concern.

Although the body of literature examining the prevalence of weight status and its causes within the psychiatric population has grown considerably in recent years, additional research is warranted within this highly vulnerable population. Prevalence

data obtained longitudinally from a large, nationally representative population with accurate height and weight measurements would be beneficial. Additionally, little research assessing the dietary habits of individuals with SPMI has been obtained. Researcher should consider conducting quality dietary assessments using multiple intake days, trained interviewers and numerous methods for documenting accurate portion sizes. Interviewers conducting the dietary recalls should be trained in using neutral probing questions, especially while working within the SPMI population. Focus group sessions assessing the nutrition knowledge, habits and concerns of this population may also assist healthcare professionals.

In conclusion, the findings of this literature review can be summarized by the following points: 1) Individuals with SPMI are at least as overweight, if not more so, than the general population. 2) Females with SPMI are particularly likely to exhibit higher BMI status. 3) During the previous decade, the BMI of individuals with SPMI has remained largely stable, while the BMI of individuals within the general population has been consistently increasing. 4) Young women with SPMI appear to be particularly at risk for excessive weight gain. 5) Individuals with mental illness are fairly accurate at assessing current weight status and many express a desire for weight loss assistance. 6) These individuals appear to be more vulnerable than the general population towards excessive weight gain due to poverty, limited access to healthcare, poor nutritional and physical activity behaviors, as well as the side effects of antipsychotic medications.

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Table 1. Obesity Prevalence among Individuals with Severe and Persistent Mental Illness

Citation	Data Source	SPMI Sample (N=)	Comparison Sample (N=)	Obesity Prevalence BMI > 30	Results	Gender Differences
Allison, Foutaine, Moonseong et al. (1999)	1) 1989 NHIS (mental health supplement) 2) Ziprasidone trial 3) Phase III data from NHANES III	NHIS: N= 150; Ziprasidone: N= 420	NHIS: N= 80,130; NHANES III: N= 17,689	Actual percentage not reported	Females: Significantly higher BMI than individuals without SPMI (27.3 vs. 24.5, p <0.001) Men: No significant difference in BMI between groups (26.1 vs. 25.6, NS) Other weight related findings not reported	YES; Women higher BMI; particularly Obese Class III.
Daumit, Goldberg, Anthony et al (2005)	1) Outpatients from 2 psychiatric centers 2) NHANES III	185	2705	46% overall		Significance not reported
Dickerson, Brown, Kreyenbuhl et al. (2006)	1) Outpatient community-based psychiatric care 2) NHANES III	169	2404 (matched)	50% females 42% males (45.6% overall)	Females: Significantly higher BMI than comparison group (31.1±8 vs. 27.1 ±6.2, <0.0001) Males: Significantly greater BMI than comparison group (28.7±6.0 vs. 26.8±4.8, p=0.0007)	YES; Women higher BMI.
Hamel, Casey, and Allison (2002)	Personal Characteristics and Health Condition files of the NHIS (National Center for Health Statistics)	877	427,760	Greater than reference population, especially females; actual % not reported.	-Individuals without SPMI had a consistent increase in BMI across the 10-year period; SPMI trend remained relatively flat -Rate of BMI increase was particularly increased for young women with schizophrenia	YES; women higher BMI, particularly young females

Table 1 (cont'd) Obesity Prevalence among Individuals with Severe and Persistent Mental Illness

Citation	Data Source	SPMI Sample (N=)	Comparison Sample (N=)	Obesity Prevalence BMI > 30	Results	Gender Differences
Silverston, Smith and Goodall (1988)	1) Depot neuroleptic clinics 2) Greater London Office of Population Censuses & Surveys (OPCS)	226	Greater London General Population	70% females 54.8% males (62.8% overall)	- Four times more likely to be obese than the general population.	YES; women higher BMI
Strassnig, Brar, Ganguli (2004)	Outpatient clinic and partial hospital at the Comprehensive Care Services Clinic	143	None	60.1% overall	Females: mean BMI of 35.1±8 Males: mean BMI of 30.8±7.3	Significance not reported
Theisen, Linden, Geller (2001)	German psychiatric rehabilitation center for adolescents and young adults	109	42	59% females 45% males (56% overall)	Mean BMI = 25.6 ± 4.4 vs. 22.8 ±4.2 in comparison group Females more likely than males to be overweight (64% vs. 51%)	YES; Girls higher; Significance not reported
Wallace & Tennant (2001)	1) Residential mental health patients from Northern Sydney 2) National Heart Foundation Risk Factor Prevalence Study	58	Not Reported	50% females 32% males (37% overall)	Significantly higher BMI than comparison group; males: p=.0007 and females: p<0.0001	Significance not reported

Appendix M: Comprehensive Literature Review (II)

**Identifying Effective Behavioral Strategies to Control Weight Gain
Among Individuals with Severe and Persistent Mental Illness: A Systematic
Review**

Comprehensive Literature Review (II)

Jeannine Goetz

Identifying Effective Behavioral Strategies to Control Weight Gain

Among Individuals with Severe and Persistent Mental Illness:

A Systematic Review

As the prevalence rate of individuals who are either overweight or obese continues to escalate, this tremendous public health issue has become regarded as an epidemic within the American culture. According to the 2003-2004 National Health and Nutrition Examination Survey (NHANES) (Ogden et al., 2006), a nationally representative population sample, an estimated 34.1% of Americans are overweight and another 32.2% are currently obese. Data from the 2003-2004 periods indicate that while the prevalence of obesity is remaining steady among females, rates are increasing among males, children and adolescents.

While strategies to induce weight loss and weight management have been thoroughly researched and evaluated within the general population, many special populations are often excluded from these efforts. One such group of individuals is those with severe and persistent mental illness (SPMI). Persons with mental illness have been shown to have higher mortality and comorbidity rates than the general population (Dembling, Chen, & Vachon, 1999) with obesity-related illnesses being commonly cited (Dixon, Postrado, Delahanty, Fischer, & Lehman, 1999). Additionally, individuals with SPMI have been shown to have a greater vulnerability or susceptibility to becoming overweight or obese. Common underlying traits potentially contributing to this phenomenon include the following: low socioeconomic status, limited access to

healthcare (Crews, Batal, Elasy, Casper, & Mehler, 1998; MacHaffie, 2002), poor dietary habits (S. Brown, Birtwistle, Roe, & Thompson, 1999; McCreadie et al., 1998), sedentary lifestyles (Daumit et al., 2005; McDevitt, Snyder, Miller, & Wilbur, 2006) as well as the affects of antipsychotic medications (Allison et al., 1999).

Since individuals with SPMI are prone to excess weight gain and would clearly benefit from some type of weight loss efforts, the purpose of this paper is to provide a systematic review of the literature that has sought to determine the most effective behavioral weight loss strategies for those individuals with severe mental illness. This paper differs from the existing review article by Faluner, Soundy and Loyd (2003) as it is limited to behavioral interventions, and thus, does not cover the effectiveness of various pharmacological weight loss interventions.

Methodology

Literature Search

A comprehensive literature review was conducted to identify effective, non-pharmacological interventions or strategies for controlling weight gain associated with antipsychotic medications and other causes within individuals with SPMI. To answer this question, a literature search for articles published from 1990 to March 2007 was conducted using the following databases: CINAHL, PsycINFO, PubMed, and the Cochrane Central Register of Controlled Trials. The terms *Severe and Persistent Mental Illness (SPMI)*, *severe mental illness* and *schizophrenia* were

searched individually and in combination with the terms *intervention, obesity, weight, weight loss, weight change, weight gain, body mass index (BMI), behavioral therapy, cognitive therapy, diet, and exercise*. References from these identified articles were also reviewed to determine if additional literature was available.

Inclusion and Exclusion Criteria

Studies were not limited to one specific diagnosis, but rather to those that utilized acceptable diagnosis criterion for selecting individuals with SPMI. Studies including individuals with mental illness due primarily to physical illness or injury were excluded. To be eligible for this review, studies had to include human subjects, have a sample size larger than one participant, and not be a review article. Only English language articles were considered. Additionally, weight loss was required to be cited as an outcome goal. Studies included in this review were not required to be conducted within the United States. Finally, interventions utilizing pharmacological strategies to achieve weight reduction were not included within the scope of this review.

Results

After conducting the initial literature search, 23 articles met the inclusion criteria and comprised 982 participants (691 intervention, 291 control). The articles that were reviewed included the following: one retrospective chart review, nine pre-post design, five case-control studies, and eight randomized control trials (RCT). Three programs were conducted within in-patient or residential living facilities, two interventions

targeted a mixture of in-patient and out-patient individuals, eleven programs targeted community-dwelling or out-patient individuals and the remaining seven populations were not specifically identified although were most likely individuals from out-patient settings. Interventions were categorized as diet only (n=2), exercise only (n=3), a combination of diet and exercise (n=3), or a multi-modal (diet, exercise, and behavioral changes) strategy (n=14). Although fourteen manuscripts were identified as using a multi-modal strategy, only twelve will be reported. After reviewing the articles published by Menza et al. (2004) and Vreeland et al. (2003), it was determined that the manuscripts were reporting on the same interventions. Likewise, the search yielded two manuscripts by Pendlebury and colleagues (Pendlebury, Bushe, Wildgust, & Holt, 2007; 2005) with the latter (2007) reporting follow-up data from the main intervention. In both instances, data from the latest follow-up will be reported (Menza et al., 2004; Pendlebury et al., 2007)

The review will begin with an overview of the various strategies that have been deemed successful within the general population. Following this brief overview, intervention strategies specifically employed within individuals with SPMI will be reviewed and evaluated.

Intervention Strategies for Weight Control in the SPMI Population

Weight loss Recommendations within the General Population

Due to the enormity of the public health issue dealing with the rapid increase in the prevalence of overweight and obesity, the National Heart, Lung, and Blood Institute's (NHLBI) Obesity Education Initiative along with the National Institutes of Diabetes and Digestive and Kidney Diseases (NIDDK) identified a panel of leading health professionals and investigators to form an expert panel on the identification, evaluation and treatment of overweight and obesity in adults (NIH, 1998). Based upon a systematic review of available scientific literature, the Expert Panel compiled and published a set of evidence-based guidelines to establish the most appropriate prevention and treatment strategies available. The following section is based upon the guidelines that have been reported by the panel.

When possible, efforts should be made to prevent individuals from becoming overweight or obese. However, since the purpose of this literature review deals specifically with the treatment and management of excess body weight, evidence-based guidelines for the best treatment strategies within the general population will be discussed within this section. Clinical guidelines have been established to define overweight and obesity. Body mass index or BMI is a measure used to assess total body fat and is defined as weight in kilograms divided by height in meters squared

(BMI = weight (kg) / height squared (m^2)). Overweight is classified as a BMI between 25.0 and 29.9 kg/m^2 and obesity as a BMI greater than or equal to 30 kg/m^2 .

According to the panel, general goals for weight loss and weight management include a reduction in body weight, to maintain a lower body weight over the long-term, or at the very least, to prevent further weight gain from occurring. Research has shown that even moderate weight loss (i.e. 10 percent of initial body weight) can greatly reduce the risk for obesity-associated risk factors. Using a structured weight loss plan, an initial goal of a 10 percent reduction in body weight can be achieved within a six month period. This may be achieved by adhering to a caloric reduction of 500 to 1,000 calories per day, which will result in a weight loss of 1 to 2 pounds per week. Following the initial six month weight loss goal, weight loss strategies should either be reassessed or a weight maintenance program should be initiated.

Based upon the systematic review of weight loss strategies that was conducted by the Expert Panel, dietary therapy is required by most individuals attempting weight loss. Dietary therapy is the technique of assisting individuals to make alterations to their diet such that a caloric deficit is achieved. Suggestions for caloric restrictions have been identified as 1,000 to 1,200 calories for women and 1,200 to 1,500 calories for men. A key component to this technique is to teach individuals to achieve a slow but gradual weight loss with educational strategies often consisting of establishing the energy value and composition (fat, carbohydrates and protein) of various foods,

understanding healthy eating habits, reading nutrition facts labels, limiting portion sizes, and identifying techniques for low calorie food preparation.

Physical activity has been identified as another integral component of any healthy weight loss plan as it helps to increase energy expenditure. Additionally, being physically active also imparts other health benefits such as an overall reduction in cardiovascular risk factors, improved mood and self-esteem and increased cardiorespiratory fitness. Evidence from the Expert Panel guidelines suggests that physical activity both alone and in conjunction with dietary therapy produces weight loss. However, weight loss generated by increased physical activity alone generally only produces a weight loss on average of two to three percent of initial body weight, compared to a reduction of eight to 10 percent when a combination of diet and exercise are employed. Physical activity has also been recognized for its role in assisting individuals to maintain body weight once weight loss has been achieved.

In addition to diet and exercise, behavior therapy has been cited as a key component, especially for long-term weight maintenance. It has been acknowledged that unless individuals learn new eating and physical activity habits or behaviors, it is likely that weight loss efforts will not be sustained over the long-term. Indeed, research has shown that most individuals regain 30% of weight loss within one year and nearly all within the first five years (NIH, 1998). Since eating and activity behaviors are learned, behavior therapy attempts to provide methods for overcoming various

barriers to compliance with dietary and physical activity recommendations. Examples of behavioral therapy might include self monitoring of dietary intake and/or physical activity, stress management, problem solving, stimulus control (i.e. keeping high calorie foods out of sight or limiting times when eating can occur), cognitive restructuring and social support. According to the review of evidence, no one behavioral strategy or combination of strategies was shown to be more effective than another.

Utilizing a combined therapy strategy including diet, physical activity and behavior therapy have been suggested to produce the greatest weight loss success, especially the potential for long-term weight control. Prior to considering more drastic forms of weight loss strategies such as pharmacotherapy or weight loss surgery, combined therapy should be employed for a minimum of six months.

While not the scope of the current review, it should be acknowledged that other weight loss strategies are also available. The Expert Panel suggests that in conjunction with diet and activity, use of appropriate weight loss drugs can help to achieve a healthier body weight. In particular, since weight loss is often not sustained by most individuals, the use of long-term pharmacotherapy may assist individuals in achieving long-term weight maintenance. In general, guidelines suggest that when other weight loss methods have not produced desirable effects, the addition of weight loss drugs approved by the Federal Drug Administration (FDA) may be added to

existing weight loss programs for those individuals with a BMI greater than 30 kg/m² or for those individuals with a BMI greater than or equal to 27 kg/m² that also have concomitant obesity-related risk factors or diseases. Finally, when substantial effort has been made and all of the above mentioned weight loss strategies have proven unsuccessful, gastrointestinal surgery (gastric restriction or bypass) may be considered. The Expert Panel recommends such procedures be limited to only those individuals who are well-informed, highly motivated and who have either a BMI greater than 40 kg/m² or greater than or equal to 35 kg/m² when co-morbid conditions are present.

Review of Weight Loss Interventions for Individuals with SPMI

The Expert Panel on the identification, evaluation and treatment of overweight and obesity suggest that weight loss programs should be tailored specifically to the needs and desires of the specific population group being addressed (NIH, 1998).

Importantly, the panel addresses specific populations that should potentially be excluded from weight loss therapy, and included within this group are individuals with serious psychiatric illness although no specific reasons for exclusion are provided. Until recently, limited research had been conducted on weight loss interventions within individuals with severe mental illness. While not all weight loss strategies may be appropriate for this population, it is important to note that these individuals are highly susceptible to excess weight gain and co-morbid conditions; and thus, may actually benefit from carefully tailored weight reduction programs. For the purpose of this review, a comprehensive search of the literature was conducted in order to determine the most effective behavioral strategies for inducing weight loss in individuals with SPMI. A summary of the identified non-pharmaceutical weight loss interventions within this population from 1990 to 2007 is provided in Table 1 and is arranged according to treatment strategy. Within this table, data are available for number of subjects, duration of study, whether a control group or randomization procedures were employed, a brief description of the intervention components, average weight change for the group, and finally retention and attendance rates. The following section of this review will provide findings from research targeting diet, exercise or a combination of weight loss strategies.

Interventions Targeting Diet Only

Research among the general population has shown that when only one weight loss strategy is targeted, diet alone has produced more favorable results than exercise alone (NIH, 1998). Although weight loss research back in the 1960's to 1980's initially targeted mainly dietary alterations within individuals with SPMI (Bernard, 1968; Knox, 1980; Sletten, Cazenave, & Gershon, 1967), little research since then has focused solely on diet. For the purposes of this review, interventions conducted only between 1990 and 2007 will be included.

A "Healthy Eating Habits" intervention conducted by Aquila and Emanuel (2000) found non-significant reductions in body weight following a 16-week intervention aimed at offering nutrition education by explaining healthy eating habits and consequences of nutrition habits on physical health. Subjects were individuals with SPMI, whom were formerly homeless and now living within a residential care center for adults. Researchers reported a mean weight loss of 1.3 pounds at one year and a weight gain of 0.9 pounds at one and a half years following the start of the intervention. While significant reductions were not observed within the "Healthy Eating Habits" intervention, it is notable that this population of individuals was originally homeless and likely stabilized their weight due to obtaining a consistent meal pattern. Based upon their research, the authors suggest that a patient's diet may actually be a better predictor of weight gain than the selection of a particular antipsychotic medication.

In contrast to the inpatient “Healthy Eating Habits” intervention, a brief nutrition education program was conducted by Nguyen, Yu, and Maguire (2003) among individuals starting olanzapine treatment. During a five minute session, education was provided such that individuals understood the following concepts: 1) weight gain is associated with increased appetite; 2) the more food that is consumed, the more weight is potentially gained; 3) to reduce hunger, eating snacks such as fruits, vegetables, and low-fat crackers are better options than high-calorie “junk food;” and 4) choosing water or diet soda instead of soft drinks is a good option for weight control. Investigators then provided two minute refresher sessions at each follow-up appointment during which time they inquired whether appetite had in fact increased. Following 7 months of brief intervention, the mean weight gain from olanzapine treatment was 5.27 pounds; 40-60% less than reported in other studies. While this simple intervention did not prevent weight gain from occurring, it did effectively minimize the extent of the potential weight gain.

Although retention rates were not reported within the outpatient nutrition education study (Nguyen et al., 2003), rates for the inpatient program (Aquila & Emanuel, 2000) were relatively high with 96.9% and 87.5% attending the 12-month and 18-month follow-up sessions, respectively. Little information was provided by Aquila and Emanuel about the actual duration of the intervention or the frequency and intensity of the nutrition education sessions. It is noteworthy that this intervention

was conducted within a residential care center, and thus, the researchers were able to have almost complete control over the foods and beverages that were provided to program participants. In contrast, little control was likely achieved during the minimal outpatient education sessions by Nguyen and colleagues.

Interventions Targeting Exercise Only

Of the interventions considered for this review, only three interventions focused primarily on increasing exercise or physical activity levels (Archie, Wilson, Osborne, Hobbs, & McNiven, 2003; Skrinar, Huxley, Hutchinson, Menninger, & Glew, 2005; Voruganti et al., 2006). As mentioned previously in the general strategies for achieving weight loss, physical activity is an important component of any weight loss or maintenance program as it evokes increased energy expenditure and may help individuals reduce food intake (NIH, 1998).

In contrast to the studies targeting diet alone, weight reduction was achieved to some degree within each of the programs targeting increased physical activity. A novel intervention was conducted (Voruganti et al., 2006) to examine the feasibility of providing an adventure and recreation-based group intervention for individuals with schizophrenia. Participants engaged in the intervention for an 8-month period that was designed to address the physical, psychological and social limitations of people with schizophrenia and other severe mental illnesses. The program, Going Beyond, consisted of a summer and winter module providing 8 weekly sessions that involved

brainstorming, planning, preparation and then actual participation in a recreational activity. Examples of summer activities include camping, canoeing, kayaking, and rock climbing while examples of winter activities include skating, snow shoeing, skiing, snowboarding, and bowling. Participants could attend both the summer and winter modules and were encouraged to maintain weekly contacts with the research team. Twenty-three individuals attended the Going Beyond intervention while 31 individuals served as the control group. Control subjects received standard of care as well as recreational activities such as movie nights or dances. Individuals participating in the Going Beyond program on average lost approximately 12 pounds during the intervention while the comparison group gained an average of 9 pounds. Additionally, compliance and enthusiasm by participants in the intervention was high. Hence, recreational-based activities may serve to improve motivation and self-esteem while reducing unhealthy lifestyle activities, by promoting reduced physical inactivity.

Similar to the more recreational approach used in the previous intervention, Archie, Wilson, Osborne, Hobbs, and McNiven (2003) conducted a pilot intervention to assess whether individuals with severe mental illness would utilize the Young Men's Christian Association (YMCA) fitness facilities if given free access. Since many health professionals suggest obtaining a membership to a health club as a means for achieving a healthy lifestyle, the researchers wanted to see if individuals with SPMI would take advantage of such opportunities, and if so, to what extent would they

adhere to an exercise program. Participants were randomly assigned to either receive the free 6-month membership (N= 10) or to serve as a control participant (N=10). The YMCA membership provided access to a pool, aerobics courses, a weight room, treadmills, and a track as well as to facilities for racquetball, tennis, and basketball. To address barriers to participation, bus passes and parking vouchers were offered. Attendance for the program was judged as a 30 minute session, with the goal being 3 sessions per week or 12 sessions per month. Dropout rates for the study were largely disappointing with attrition rates of 40% at 4 months, 70% at 5 months and 90% at 6 months. Further, two of the ten participants never attended a single workout session. Reasons for poor attendance and attrition were attributed to moving, hospitalization, relapse of illness, lack of someone to go to sessions with, and most overwhelming, a lack of motivation and low comfort level. Although weight loss data was collected, the investigators only reported a 15 kg loss for the individual that completed the program. Thus, this intervention shows that considerable barriers do exist to getting individuals with SPMI to regularly attend a health club, with lack of motivation cited as the primary factor. However, the positive finding for the individual who adhered to the program shows that if motivated, such a strategy may be effective for helping to promote weight loss.

While the above interventions by Voruganti and colleagues (2006) and Archie and colleagues (2003) emphasized a recreational exercise approach, the intervention conducted by Skinar, Hutchinson, Menninger and Glew (2005) provided a more

structured lifestyle exercise program. The 12-week intervention program involved four exercise opportunities each week along with a 30-40 minute weekly health seminar. Participants were either randomly assigned to the healthy living (HL) group (N=9) or to a wait-list control group (N=11). The intervention exercise regime included a mix of warm-up, cardiovascular training and cool-down, with strength training being conducted twice each week. Subjects were encouraged to exercise at 70-85% of predicted maximum heart rate, with a goal of 30-45 minutes per session. Information provided during the health seminars included topics such as healthy eating, weight management, exercise recommendations, stress relief, and spirituality and wellness. The investigators reported an average attendance rate of 63% (average of 31 out of 48 possible sessions). Thus, participants on average engaged in 2.6 sessions each week. While intervention subjects did lose weight and control subjects gained a small amount of weight, no significant findings were reported for any weight-related measures. Conversely, individuals engaging in the exercise group did report improved subjective ratings of general health ($p < .05$) and empowerment ($p < .01$).

Across the two interventions that reported changes in body weight (Skrinar et al., 2005; Voruganti et al., 2006), both interventions reported trends for weight loss within the experimental group and weight gain among control subjects. Greater weight loss was achieved within the recreational program as compared to the intervention targeting a formal exercise strategy. Additionally, program adherence

and retention was extremely high within the recreational-based program (Voruganti et al., 2006) with no attrition and a 97% attendance rate reported. While attendance was moderately high considering the physically demanding routine of 4 exercise sessions per week in the Skrinar et al. intervention (2005), attendance was poor in the Archie et al. (2003) intervention targeting use of YMCA facilities. Hence, average retention rates across all three of the studies were moderately high at 80% while attendance rates were slightly lower at 56.7%. While the target population in the interventions by Voruganti et al. (2006) and Archie et al. (2003) were outpatient, recruitment in the Skrinar et al. (2005) intervention targeted individuals from either inpatient, partial hospitalization, or outpatient unit in a community treatment center. Study duration for interventions targeting exercise alone were lower than reported for diet alone; 22.6 weeks or roughly 5 months.

Interventions Targeting a Combination of Diet and Exercise

According to the findings presented in the general weight loss strategies above (NIH, 1998), interventions targeting a combination of both diet and exercise are more successful at facilitating weight loss and maintenance than using only one of the two methods. From the comprehensive literature search, three studies (Ball, Coons, & Buchanan, 2001; Centorrino et al., 2006; Merriman, Riddell, & Thrush, 1995) were identified as utilizing a combined therapy approach.

Of these studies, only the intervention conducted by Centorrino and colleagues (2006) reported significant weight loss among both genders. The 24-week program, called TRIAD™, emphasized both diet and exercise as well as counseling and included a second 24-week less intensive phase for those participants who were still interested. Subjects participating in this study had a diagnosis of either schizophrenia or schizoaffective disorder, experienced weight gain following antipsychotic treatment (≥ 4.5 kg and $\geq 5\%$ increase in BMI) and were currently taking antipsychotic medications. For the intensive phase of the intervention, 90-minute group sessions were held biweekly, with the first half of the session focused on problem solving and nutrition counseling and the second half devoted to an exercise session. TRIAD™ was adapted and tailored for the targeted population such that additional, detailed dietary counseling was provided. The dietary plan encouraged a low-fat, low-calorie intake, with a 1600 and 2000 calorie diet prescribed for women and men, respectively. In addition to the two weekly group exercise sessions, subjects received a home exercise regime consisting of three, 30-minute workouts each week. During the less intensive phase of the intervention, participants were encouraged to attend weekly group sessions, with a minimum commitment of one session each month. During the initial intensive phase of the intervention, 17 community-dwelling individuals participated. Of these participants, twelve opted to remain in the study for the less intensive phase. Findings from the intervention suggest that the greatest weight loss was achieved during the first 12 weeks of the program (66%), with an average body weight reduction of 6.0 ± 5.9 kg after the initial 24-week intervention.

Researchers reported that between the end of the intensive phase and the end of the program (weeks 24 to 48), participants largely maintained the weight loss, with a negligible increase in body weight of 0.43 kg reported. Additionally, those individuals who consistently attended the group sessions during the less intensive phase continued to lose weight, while those that only attended intermittently gained a small amount of weight. Given that participants reported poor compliance to the home exercise regimen, the authors suggest that perhaps the strongest strategy for weight loss in the SPMI population may be emphasizing nutrition education and caloric restriction.

While the previously mentioned research produced favorable outcomes for both genders, weight loss was only achieved in males during an intervention conducted by Ball, Coons and Buchanan (2001). Participants of this study were individuals with SPMI that had been taking olanzapine and had experienced at least a 7% increase in body weight since initiation of the drug. The 10-week intervention consisted of the Weight Watcher 1-2-3 Program that utilized a point system to help participants evaluate food choices in conjunction with monitored exercise sessions three times per week. A reinforcement system of tokens was used to encourage compliance with attendance and adherence to the diet and exercise portion of the program. Although 21 individuals originally agreed to participate in the program, only 11 participants completed the study with eight of these individuals participating in the supervised exercise portion of the intervention. No significant differences in body weight or BMI

were reported; however, individuals participating in the Weight Watchers program did experience a greater amount of weight loss than the comparison group. It is notable, however, that a significant sex by group and time interaction did occur, with a mean weight loss of 7.31 ± 5.87 pound ($p=0.05$) occurring in males. While two of the three female participants actually gained weight, all seven male subjects lost weight (range 1 to 18 pounds). In contrast to the other diet and exercise intervention by Centorrino (2006), no modifications were made to the program to compensate for deficits typically demonstrated by individuals with severe mental illness. Despite this fact, the researchers did report a slightly better compliance to the exercise regimen of the program, although the maximum duration reported of 25 minutes three times per week was still less than current recommendations.

In contrast to the above two combined strategy interventions, Merriman, Riddell and Thrush (1995) conducted a 12-week intervention among an inpatient population with severe mental illness in which a combination of diet, exercise and self-assertiveness training was conducted. The multidisciplinary team conducted the program among 6 individuals and presented the findings as a single subject combined design in which each individual served as his or her own control. When data from the 5 subjects completing the program were combined, an average weight loss of 0.44 pounds occurred. Follow-up testing conducted four weeks after completion of the program revealed that slight weight gain occurred following the conclusion of the intervention.

Hence, the investigators suggested that the changes that were made during the short 12-week program were not “sufficiently entrenched to prevent relapse.”

Although varying degrees of weight loss were achieved among those interventions employing a combined approach consisting of diet and exercise, each of these interventions produced at least some degree of weight loss during the initial phase of the intervention (range -0.44 to 6 pounds). The longer intervention of 24-weeks conducted by Centorrino and colleagues (2006) produced almost 2.5 times more weight loss than the shorter 10-week trial by Ball, Coons and Buchanan (2001) and 30 times more than the 12-week findings produced by Merriman and colleagues (1995). Retention rates were considerably lower among the combined strategy as compared to both the nutrition or exercise only programs with an average completion rate of only 71.6% (range 55.3-83.3%). Although the population was not completely described by Centorrino et al. (2006), it is assumed that the population was indeed outpatient, similar to those individuals within the Ball et al. (2001) intervention while the intervention by Merriman et al. (1995) was conducted within an in-patient facility. Thus, with the greater number of out-patient studies, the lower retention rate is not surprising. Attendance rates were not reported within any of the interventions.

Multi-modal Therapy (Diet, Exercise and Behavioral Changes)

While targeting diet and exercise has been shown to produce favorable weight loss outcomes, intensive multi-modal programs incorporating a combination of diet,

exercise and behavioral changes have been suggested to produce even greater weight loss effects (NIH, 1998). The majority of literature that was located during the literature search utilized a combination of diet, exercise and behavioral strategies for promoting weight loss within individuals with SPMI (Brar et al., 2005; C. Brown, Goetz, Van Sciver, Sullivan, & Hamera, 2006; Kalarchian et al., 2005; Kwon et al., 2006; Littrell, Hilligoss, Kirshner, Petty, & Johnson, 2003; McKibbin et al., 2006; Menza et al., 2004; Pendlebury et al., 2007; Richardson, Avripas, Neal, & Marcus, 2005; Vreeland et al., 2003). All total, 614 individuals participated within these twelve interventions; 405 individuals serving as intervention participants and 209 as controls.

The dietary component included within most of the multi-modal interventions was described only briefly and appeared to mainly consist of nutrition education on a broad range of topics in conjunction with an array of behavioral changes targeting improvements in dietary behaviors (Brar et al., 2005; Kwon et al., 2006; Littrell et al., 2003; McKibbin et al., 2006; Menza et al., 2004; Richardson et al., 2005). The only intervention specifically targeting a caloric deficit was a weight loss program incorporating psychiatric rehabilitation and evidence-based weight loss principles by Brown, Goetz, Van Sciver, Sullivan and Hamera (2006). Using strategies from the Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults (NIH, 1998), the researchers used an individually planned diet designed to create a 500-1000 calorie energy deficit per day. Dietary plans with

individualized energy requirements were given to each participant at the first session along with the corresponding number of servings of each food group needed to attain that recommended calorie level. Another strategy used by researchers within this intervention to induce weight loss was the use of meal replacements. Two meal replacements were provided each day during the first eight weeks of the program, with participants being encouraged to consume a regular low-calorie breakfast and at least five servings of fruits and vegetables each day. Meal replacements were utilized to assist participants with adhering to a low-calorie diet as well as to model the correct portion size and to minimize the burden of menu planning and cooking. During the final four weeks of the program, participants received one meal replacement per day and received instructions for preparing meals similar in caloric and nutrient content. In comparison to the dietary restriction and meal replacements used in psychiatric rehabilitation study (C. Brown et al., 2006), an eating plan based upon the Stoplight diet was utilized in the 6-month intervention conducted by Kalarchian and colleagues (2005). This eating plan classified various foods according to colors found in the stoplight. For example, those foods coded green were “Go” foods and could be eaten in unlimited quantities while yellow foods were “Caution! Eat in limited quantities” and red foods were “Stop! Think before you eat foods.” Based upon this dietary plan, participants were encouraged to increase their consumption of fruits and vegetables (green and yellow foods) while decreasing the amount of foods that were high in fat and sugar. Finally, Pendlebury, Bushe, Wildgust and Holt (2007) targeted one specific dietary change at a time in their long-

term behavioral treatment program conducted in the United Kingdom. The researchers had participants keep records of foods and beverages consumed each day and then used this information to individually negotiate a single change within the individual's diet. Examples of changes included switching to non-sugary soft drinks, eating more fruits and vegetables, choosing lower-fat milk products, replacing sugar in beverages with artificial sweeteners, using lower-fat spreads instead of butter, or limiting alcoholic beverage intake.

Similar to the nutrition component of the multi-modal interventions, the exercise component in most instances (Brar et al., 2005; Kalarchian et al., 2005; Kwon et al., 2006; Littrell et al., 2003; McKibbin et al., 2006; Pendlebury et al., 2007) consisted only of a variety of educational topics such as methods for decreasing sedentary behaviors, benefits of exercise, education on various types of exercise, exercise logs, and suggestions for low to no cost exercise opportunities. Devices such as pedometers were provided within a few programs to encourage increased physical activity (C. Brown et al., 2006; Kalarchian et al., 2005; Richardson et al., 2005). Actual opportunities for engagement in physical activity within group sessions was noted within three intervention (C. Brown et al., 2006; Menza et al., 2004; Richardson et al., 2005) with two extra weekly opportunities for group exercise provided within two of these programs (C. Brown et al., 2006; Menza et al., 2004).

Many of the behavioral strategies utilized within these interventions are common strategies that have been shown to be effective within the general population. Some common strategies used across many interventions included short- and long-term goal setting (C. Brown et al., 2006; Richardson et al., 2005; Weber & Wyne, 2006) discussions on overcoming barriers to diet and physical activity changes (C. Brown et al., 2006; Pendlebury et al., 2007; Richardson et al., 2005; Weber & Wyne, 2006), self-monitoring (Brar et al., 2005; C. Brown et al., 2006; Kalarchian et al., 2005; Kwon et al., 2006; McKibbin et al., 2006; Menza et al., 2004; Pendlebury et al., 2007; Richardson et al., 2005; Weber & Wyne, 2006), stimulus control techniques to minimize cues for eating and to increase cues for activity (Brar et al., 2005; Kalarchian et al., 2005; Menza et al., 2004), providing regular feedback (C. Brown et al., 2006; Kalarchian et al., 2005), strategies for reducing sedentary behaviors (Kalarchian et al., 2005; McKibbin et al., 2006), stress management (Menza et al., 2004), social support (C. Brown et al., 2006; Menza et al., 2004) and relapse prevention to encourage long-term retention of behavioral changes (Kalarchian et al., 2005).

In addition to these strategies, specific adaptations were made by many investigators in an effort to tailor the weight loss program specifically for individuals with SPMI. In a 3-month weight reduction program targeting 35 overweight individuals with schizophrenia or other related psychoses, Kalarchian and colleagues (2005) included modifications to the program consisting of streamlined self-monitoring forms as well

as a points system to help reinforce changes in eating, physical activity and body weight. Additionally, as lifestyle modifications were discussed within the group, issues of particular relevance to the target population were included such as transportation, budget, and housing situations. Similar modifications were also reported in a lifestyle intervention for middle-aged and older individuals with schizophrenia and type-2 diabetes mellitus (McKibbin et al., 2006). The Diabetes Awareness and Rehabilitation Training (DART) program adapted educational materials for older adults with mental illness by introducing only one or two topics at a time, providing overviews and summaries of material, implementing a teach-and-query training method, using mnemonic aids, and including large font and limited text on printed materials. Likewise, similar tailoring strategies were implemented within the intervention by Brown and colleagues (2006) in their weight loss program that incorporated psychiatric rehabilitation and evidence-based weight loss strategies. The researchers customized the program for the targeted population by individualizing the goal setting process and by providing regular, understandable feedback regarding goal attainment. Further, the program provided instrumental supports of basic materials that may assist in the weight loss process as it was acknowledged that many individuals likely would not have access to such items. Yet another study employing a tailored approach was Menza and colleagues (2004) in which special consideration was taken for cognitive deficits by use of repetition, homework, and the use of visual materials. In contrast, another six-month psychoeducation class (Littrell et al., 2003) utilized “Solutions to Wellness,” a program specifically designed for use in people

with schizophrenia. The program consists of two written components: 1) “Nutrition, Wellness, and Living a Healthy Lifestyle” and 2) “Fitness and Exercise.” While the researchers mentioned that the “Solutions to Wellness” program was written at a fifth grade reading level and contained multiple presentation formats, no other specific tailoring for the target population was mentioned.

Three studies included within this section of the review indicated that a cognitive behavior therapy intervention approach was utilized (Khazaal et al., 2007; Umricht, Flury, & Bridler, 2001; Weber & Wyne, 2006). Although it was stated that a cognitive behavior approach was implemented within the letter to the editor by Umricht and colleagues (2001), no details of specific strategies used were provided. Weber and colleagues (2006) used cognitive and behavioral strategies within their 16, one-hour group sessions in order to promote risk reduction. The researchers included a variety of topics and used strategies such as role plays, goal setting, motivational scaling, problem solving, risk versus benefits comparisons and discussions on barriers to change. In contrast, during the 12-week intervention examining the difference between providing a cognitive and behavioral treatment program (CBT) versus brief nutrition education (BET) (Khazaal et al., 2007), the researchers provided extensive details on the rationale and use of such strategies. Khazaal and colleagues suggest that binge eating disorder (BED), a type of eating disorder characterized by patterns of recurrent episodes of binge eating with a lack of self-control over eating, is common among individuals receiving antipsychotic medications. Fear of weight gain

potentially causes a number of attitudes and behaviors, and thus, is targeted within the program. This intervention sought to assess the effect of the intervention handbook on cognitive distortions related to eating behavior and weight, binge eating, and weight loss in individuals experiencing weight gain from antipsychotic medications.

Out of the multi-modal interventions, all but one program (Weber & Wyne, 2006) reported significant reductions in body weight or BMI. Across these studies, weight loss to a certain degree (range -0.06 to -13.64 pounds mean group weight loss), was achieved within all intervention groups. The greatest weight loss from a multi-modal intervention strategy was reported in the four-year follow-up findings from a long-term treatment program from the United Kingdom (Pendlebury et al., 2007). It is also noteworthy that in many of the interventions including a comparison group, many of the individuals serving as controls experienced an increase in body weight (C. Brown et al., 2006; Littrell et al., 2003; McKibbin et al., 2006; Menza et al., 2004). When taking into consideration that many of the intervention participants may have continued to gain weight if they had not participated within the weight loss program, the clinical significance is even greater.

Although more long-term interventions are being reported, most weight loss interventions targeting individuals with psychiatric illnesses have been short in duration with the average length across all multi-modal interventions being approximately 34 weeks. This number, however, is greatly influenced by the two

long-term studies (Menza et al., 2004; Pendlebury et al., 2007) that have been conducted. When the 4-year intervention conducted by Pendlebury and colleagues (2007) is not included, the average duration is reduced to only 18 weeks. Overall, most interventions spanned between 12 and 24 weeks, with many reporting follow-up data after the intervention was completed. Further, the intensity of the intervention was similar across interventions, with group sessions most frequently occurring for an hour once each week. In a few cases, programs were either conducted bi-weekly or for a longer 90 minute (McKibbin et al., 2006) or 2-hour weekly duration (C. Brown et al., 2006; Kalarchian et al., 2005). Multiple phases with varying intensities were utilized in three of the interventions (Brar et al., 2005; Menza et al., 2004; Richardson et al., 2005). In each case, an intensive phase was followed by a less intensive or maintenance period.

Across those multi-modal studies that reported subject retention rates (N=10), 77.3% of participants on average either completed the entire study or the intensive phase when more than one phase was available (range 56.4 – 100%). These rates decreased slightly to 71.3% when retention rates from the final intervention phases were considered (Kalarchian et al., 2005; Khazaal et al., 2007; Menza et al., 2004; Richardson et al., 2005). In a few instances (Brar et al., 2005; Richardson et al., 2005) researchers reported enrolling a subject into the program; however, the individual never took part within the intervention. When these individuals were removed from consideration, retention rates increased slightly to 79.1%. While retention rates

within the multi-modal interventions was moderately high, attendance rates for group and individual sessions was greatly variable with low rates reported in many instances. Across the four studies (C. Brown et al., 2006; McKibbin et al., 2006; Menza et al., 2004; Pendlebury et al., 2007) reporting attendance rates, an average rate of 58.1% (range 20% - 75.8%) was observed.

Retrospective Reviews

Finally, a retrospective chart review (O'Keefe, Noordsy, Liss, & Weiss, 2003) was conducted in individuals who had successfully reversed weight gain associated with antipsychotic medications in order to determine which strategies were effective at inducing weight loss within individuals with mental illness. Case managers were asked to identify individuals who had gained at least 20 pounds during the previous 5 years of treatment, but who had subsequently lost at least 10 pounds. Through these referrals as well as a chart review, the researchers identified 35 individuals that had on average experienced a weight gain of 64.6 pounds. While these individuals gained approximately one-third of their original body weight, they successfully lost roughly two-thirds of this weight gain and sustained a loss of one-half of the original gain over the 5 year period. Of the 33 individuals that had data available, the mean number of interventions utilized for weight loss was 1.77 with 46% of individuals reporting one intervention, 27% two forms of intervention, 21% three interventions and 6% four types of weight loss intervention. Researchers reported that those persons using three intervention techniques lost significantly more weight than those only using two

forms of intervention (81.69 pounds versus 27.61 pounds; $p=0.043$). Interestingly, 82% of individuals followed some type of dietary restriction while only 18% employed some form of exercise regimen. Additionally, 18% of individuals attempted only non-behavioral strategies such as surgery, illness, or medications to achieve weight reduction. The most common strategy employed was consulting with a dietitian which included strategies such as self-monitoring and small behavioral changes such as elimination of one to two high calorie foods. Findings from this study suggest that dietary alterations, multiple behavioral strategies and time may all assist individuals with mental illness in successful weight loss.

Other Outcome Measures

Although weight-related outcome measures were the primary purpose of this review, it is important to note that other positive outcomes may occur as a bi-product of the health promotion components of these weight loss interventions. The following section will provide a brief overview of some additional outcome measures that were reported.

General Health, Psychiatric Symptoms & Quality of Life

One common finding across studies was a general report of improved overall health and/or improved psychiatric symptoms. For example, the healthy lifestyle intervention by Skrinar and colleagues (2005), suggested that although the 12-week fitness program did not produce significant differences in weight-related outcome measures, subjective ratings of general health were significantly improved compared

to that reported by control subjects ($p < .05$). Additionally, subjects appeared to report trends towards improved depression ($p < .09$) and OCD ($p < .09$) as well as well-being and quality of life scores on the MOS 36-Item Short-Form Health Survey (SF-36).

The researchers suggest that although participants did not engage in physical activity to the intensity or duration originally intended, these positive outcomes in well-being may have occurred simply because these individuals believed that they were doing something to combat their growing weight concerns.

Likewise, psychiatric symptoms were clearly improved during the multi-modal intervention conducted by Richardson and colleagues (2005). This feasibility study largely sought to determine participation and satisfaction derived from the program. Both symptoms of depression and mood were reported to improve, with 58% of individuals reporting improvements in depression at the conclusion of the intervention.

Self-Esteem & Empowerment

Not surprisingly, one of the most commonly reported outcomes was an improvement in self-esteem or empowerment following the intervention sessions. The *Going Beyond* intervention conducted by Voruganti and colleagues (2006) was one of the more notable interventions suggesting that positive outcomes occurred outside of weight loss. While numerous surveys and rating scales were administered to track self-esteem, cognitive function, and health-related psychosocial adjustment,

researchers reported positive experiences that were not captured by such measurement scales. Among the benefits reported, the researchers indicated that subjects reported satisfaction derived from group participation, feelings of accomplishment, development of trusting relationships with peers and therapists, and a changed perspective on life that led to pursuing studies and employment.

Dietary Intake

Even though alterations in dietary intake and habits were common among intervention components, few researchers reported results for changes in dietary patterns following the intervention. Within the psychiatric rehabilitation intervention by Brown and colleagues (2006), a significant reduction in total energy or caloric intake was reported ($p=.045$) as well as a trend towards a reduction in dietary fat intake ($p=.09$). Similar dietary intake findings were reported by McKibbin et al. (2006), which reported that number of fat servings consumed was significantly reduced within the DART group as compared to the usual care plus information control group ($p < .01$).

Analysis of eating behavior questionnaires conducted within the behavioral treatment program by Kalarchian and colleagues (2005) suggested positive improvements within 5 of the 26 eating behaviors represented within the questionnaire. Those behaviors that were most strongly changed included self-monitoring of intake ($p < 0.0001$), keeping a weight graph ($p < 0.0001$), consuming foods believed to aid in

weight loss ($p=0.036$), keeping one to two raw vegetable for snacks ($p=0.02$), and storing food in closed containers or out of sight ($p=0.05$). While general changes in eating behaviors were reported by Kalarchian et al., specific alterations in dietary intake were not reported.

Blood Chemistry

Although blood chemistry was not commonly assessed among intervention outcome variables, in the few instances where findings were reported, statistically significant improvements were not found (Centorrino et al., 2006; Kwon et al., 2006; McKibbin et al., 2006; Menza et al., 2004; Skrinar et al., 2005). Small decreases were noted by researchers in the 24-week program providing a combination of diet and exercise principles (Centorrino et al., 2006). Subjects on average were found to have a 4% and 15% reduction in total cholesterol and triglycerides, respectively. One significant improvement in blood chemistry was reported in the lifestyle intervention for middle-age and older adults with schizophrenia and type-2 diabetes mellitus. As reported earlier within this review, McKibbin et al (2006) conducted a randomized pre-test, post-test control group design with a Diabetes Awareness and Rehabilitation Training (DART) group and a Usual Care plus Information (UCI) group. Although no significant changes were reported for HgA1c, total cholesterol, HDL or LDL values, significant reductions in plasma triglyceride levels were achieved within the DART group compared to the UCI group ($p < .01$).

Other Anthropometric Measurements

Although outcome measures presented within this review were mostly limited to changes in body weight or BMI, changes in waist circumference (Brar et al., 2005; C. Brown et al., 2006; McKibbin et al., 2006; Menza et al., 2004; Vreeland et al., 2003), waist-to-hip ratio (Brar et al., 2005; Menza et al., 2004; Weber & Wyne, 2006), or percent body fat (Skrinar et al., 2005) were also reported by some researchers. Of those researchers reporting differences in waist circumference or waist-to-hip ratio, three out of the five interventions reported significant reductions (C. Brown et al., 2006; McKibbin et al., 2006; Menza et al., 2004). In contrast, Skrinar and colleagues (2005) were the only researchers to report changes in percent body fat following their exercise intervention. Body fat was assessed using skin calipers; however, methods used to obtain percent body fat were not provided within the manuscript. Similar to changes in body weight and BMI, percent body fat was decreased among participants in the Healthy Lifestyle group while percent body fat increased among control participants (intervention -0.9%, control +1.0%). While this suggests a trend in the correct direction; findings were not statistically significant.

In addition to common anthropometric measurements associated with measuring alterations in body weight, a few researchers also provided data on variables such as resting heart rate (Brar et al., 2005; Centorrino et al., 2006; Kwon et al., 2006; Menza et al., 2004; Skrinar et al., 2005; Vreeland et al., 2003), blood pressure (Brar et al., 2005; C. Brown et al., 2006; Centorrino et al., 2006; Kwon et al., 2006; McKibbin et

al., 2006; Menza et al., 2004; Richardson et al., 2005; Skrinar et al., 2005; Vreeland et al., 2003), and exercise heart rate and blood pressure (Skrinar et al., 2005). Although most researchers did not report statistically significant reductions for blood pressure (C. Brown et al., 2006; Kwon et al., 2006; McKibbin et al., 2006; Richardson et al., 2005; Skrinar et al., 2005; Vreeland et al., 2003), a few studies did report favorable outcomes (Brar et al., 2005; Centorrino et al., 2006; Menza et al., 2004). Participants within the Brar et al. study (2005) demonstrated a reduction in mean sitting systolic blood pressure from baseline to 14-weeks (122.7 ± 14.58 mm Hg to 117.8 ± 12.25 mm Hg; $p = .019$). Similar reductions were also reported for mean standing systolic blood pressure (124.0 ± 15.35 mm Hg to 117.8 ± 11.73 mm Hg; $p=0.06$); although, statistically significant changes were not reported for the other cardiovascular-related outcome measures of diastolic blood pressure, heart rate or vital signs. Centorrino et al. (2006) reported significant reductions in both systolic and diastolic blood pressure ($p=0.001$) among intervention participants within their intensive multi-modal intervention. Likewise, significant reductions in systolic blood pressure ($p < 0.05$) and diastolic blood pressure ($p=0.001$) were reported within the 12-month data presented by Menza and colleagues (2004).

Discussion

General Weight Loss Results

Of the 21 articles included within this review, with the exception of the diet only intervention by Nyugen and colleagues (2003), all interventions either prevented further weight gain or achieved weight loss; 13 of which produced statistically significant results. Further, those interventions employing a comparison group (Archie et al., 2003; Ball et al., 2001; Brar et al., 2005; C. Brown et al., 2006; Kalarchian et al., 2005; Khazaal et al., 2007; Kwon et al., 2006; Littrell et al., 2003; McKibbin et al., 2006; Menza et al., 2004; Skrinar et al., 2005; Voruganti et al., 2006; Weber & Wyne, 2006) typically reported weight gain among those individuals not attending the weight loss program. Thus, it could theoretically be presented that the interventions produced an even larger effect when considering that further weight gain was avoided. Those studies including follow-up or extension phases (Aquila & Emanuel, 2000; Centorrino et al., 2006; Kalarchian et al., 2005) reported either continued weight loss or only minor weight regain (range -3.07 lb to +0.95 lb). When considering all intervention strategies, those researchers employing a multi-modal strategy or a combination of diet, exercise and behavioral changes consistently produced a reduction in body weight. However, across all intervention strategies, investigators commented on the importance of dietary alterations and often concluded that such changes may be largely responsible for producing desirable outcomes. Also noteworthy, although a multi-modal strategy may have produced slightly more

desirable changes in weight status, dietary alterations were more easily achieved within this population than other forms of behavioral change. In particular, across almost all studies incorporating an exercise component, researchers reported difficulties in getting individuals with mental illness to become motivated and engaged in the desired intensity and duration of exercise. Thus, if time and resource constraints exist when starting a weight loss intervention within the SPMI population, dietary changes might be a place to start.

On average, weight losses reported were only approximately 2 to 3 percent of initial body weight. In the initial component of this review, the Expert Panel suggested that a 10 percent reduction in body weight could greatly reduce health risks (NIH, 1998). Assuming that if individuals would not have taken part within the weight loss program and that further weight gain would likely have occurred, the findings produced by the various interventions suggest a clinically significant outcome despite not reaching the recommended 10 percent reduction. Although not known for sure, individuals within the control group could have potentially consciously or unconsciously watched their weight as a result of simply being apart of a research project; and thus, with no intervention in place, a larger magnitude of weight gain could ultimately have occurred. Regardless, further research addressing effective strategies for achieving weight loss within the mentally ill is warranted in order to identify interventions and/or innovations that could potentially lessen the gap between

the weight loss that is currently being achieved and that of the general recommendations for improving health and well-being.

The positive findings from these studies are also helpful for adding to the body of literature that weight reduction programs can and have been successfully employed within individuals with severe mental illness. Specifically, this evidence is in contrary to the disclaimer provided within the recommendations made by the Expert Panel that individuals with severe psychiatric illnesses should potentially be excluded from such efforts (NIH, 1998). It is notable, however, that weight loss programs can be enhanced within this population by making small adjustments to compensate for cognitive deficits, lack of motivation, and other barriers that may be greater than within the general population. Strategies that were successfully employed across all types of weight loss programs included simplification and repetition of material or education, introduction of only one or two key concepts at a time, identification and targeting of specific barriers to the targeted population (i.e. transportation, monetary resources, living situations and medication side effects), and increased social support.

While pharmaceutical weight loss interventions were not included within the scope of this review, it is important to note that this is another potential avenue for achieving weight reduction within individuals with SPMI. For a comprehensive overview of interventions that have utilized various weight loss strategies in conjunction with weight loss medications, a systematic review is available by Faulkner, Soundy and

Lloyd (2003). Conclusions from this review suggest that inconsistent results have been reported among pharmacological interventions; hence, widespread use of these agents among the mentally ill cannot be recommended at this time. Further, the researchers suggest that research has yet to determine whether the use of anti-obesity drugs may or may not exacerbate psychotic symptoms. Given these findings, Faulkner and colleagues suggest that pharmacotherapy should be considered only as a last resort.

Study Duration

Although investigators appear to be increasing the duration of interventions targeting weight reduction both within the general population as well as specifically within individuals with SPMI, longer durations may still be warranted. Among all studies reviewed within this paper, an average duration of 30.4 weeks occurred. However, as mentioned within the results from the multi-modal strategies, this estimate is largely inflated by the four-year findings from the study by Pendlebury et al (2007). When this long-term program is excluded, the average program duration is reduced to approximately 21 weeks or roughly 5 months. This estimate is slightly less than the recommendations provided by the Expert Panel that state that a reasonable time frame to achieve the desired 10 percent weight reduction is 6 months (NIH, 1998). Perhaps these findings suggest that although weight reduction can be achieved within individuals with mental illness, a longer time period is required to produce reductions similar to what can be achieved within the general population.

Study Retention and Attrition

One important finding from this review of the literature is that while desirable outcomes can be achieved, keeping individuals engaged and participating continuously within the program may be difficult. Both retention rates and attendance among group and individual sessions were only moderate across the various intervention strategies. An average of 77.5% of individuals completed the weight loss programs. In a few instances (Aquila & Emanuel, 2000; Voruganti et al., 2006; Weber & Wyne, 2006) excellent retention rates were reported. It would be interesting to determine whether these high rates were achieved due to specific intervention strategies employed or whether those researchers were more engaged with the participants, and thus, utilized a greater number of techniques such as reminder phone calls and the like to get participants to continue attending the program. It is likely that the high retention reported by Aquila and Emanuel (2000), however, could be attributed to the fact that the intervention was conducted with individuals attending a residential home facility; hence greater control may have been able to be achieved. Overall, retention rates were similar across intervention strategies, with the exception of the nutrition only interventions; likely due to only one study reporting retention rates (average retention rates across intervention strategies: 77.3% multimodal, 71.6% nutrition/exercise combined, 80% exercise only, and 96.1% nutrition only). When designing future intervention efforts, strategies to promote subject retention and engagement should be carefully considered.

Limitations of Current Literature

Previous systematic reviews of the literature pertaining to weight loss interventions targeting individuals with mental illness have consistently noted the poor methodological designs and limitations of the available literature. Although recent trials demonstrating improved research design have added considerably to the available body of literature, further improvements are still necessary. Until 2003, no randomized controlled trials (RCT) had been conducted. Since then, the available evidence has been greatly strengthened as seven additional RCT trials have been reported; however, even these findings are limited due to small sample size.

As previously cited within this paper, attrition rates were considerable among the interventions reported. This factor plays a large role in the strength of the literature. In most cases, an intent to treat strategy was not utilized; and thus, data were only reported by those individuals completing the intervention program. It can be surmised that for many individuals not fully engaging in the program, less than desirable results may have been achieved. Should the end results from these individuals have been included within the analysis, findings may have been less favorable than reported.

It is notable that the literature within the psychiatric arena has been greatly enhanced over recent decades as research has been conducted among many different populations of individuals with psychiatric illness; thus strengthening the

generalizability of the evidence available. During the 1960's to 1980's most interventions were conducted within in-patient populations only. Investigators conducting interventions within hospitalized patients may achieve more favorable results as they have the ability to obtain a greater amount of control over attendance and adherence. With the movement to have individuals with severe mental illness functioning within society, findings from these interventions were not necessarily transferable to such community-dwelling individuals. During the timeframe that this review of literature was conducted, 1990 to 2007, the majority of literature available is now among outpatient populations.

Future Research

In a recent systematic review by Loh, Meyer, and Leckband (2006), the authors note that a long-term study investigating the effects of behavioral therapy for weight gain in individuals with schizophrenia has recently been funded by the National Institute of Mental Health (NIMH). Such research may help to identify the type of behavioral intervention and patient characteristics which ultimately lead to successful long-term weight control.

Based upon the findings presented within this review, many areas for potential future research can be identified. Clearly, interventions employing a greater duration with longer follow-up periods are necessary to ascertain what intervention duration is optimal for producing the greatest weight loss effects. While data are available from

the four year intervention conducted by Pendlebury and colleagues (2007), this intervention utilized only minimal intervention strategies. It would be interesting to determine if more intensive strategies were employed, if this would further strengthen the findings. It was noted within the discussion that perhaps a longer intensive duration may be necessary to achieve desired outcomes. Perhaps examining whether individuals would be compliant with a longer intensive intervention would provide insight into this hypothesis. Interventions designed to address the limitation of subject retention are also warranted. Possibly researchers could recruit several different intervention groups and examine the effectiveness of various methods used to enhance retention and attendance to the weight loss program. Some suggestions for enhancing subject retention might be to provide instrumental support such as providing items that would encourage participants to implement behavioral changes, other reward systems such as prizes or points for attendance and achieving goals, stronger support systems including closer contact with intervention staff, or possibly a buddy system to keep individuals motivated towards the program. Eliminating transportation constraints and assuring that session times are convenient for not only the intervention staff, but for the participants as well are also important considerations for increasing attendance.

Similarly, this review highlights the tremendous difficulties in getting individuals to not only attend exercise sessions, but even to engage in any form of physical activity outside of the program. Potential suggestions for enhancing compliance with the

exercise component include discussing barriers and false assumptions at the beginning of the program, listening to participants regarding the types of activities they enjoy doing as well as what they are able to do outside of the group sessions and offering less structured exercise sessions by moving towards an emphasis of engaging in physical activities as opposed to primarily traditional forms of exercise.

Finally, as evidenced by the lack of findings available in the section of this review detailing outcomes other than weight-related measures, there is a strong need for researchers to report additional study findings. For example, dietary intake and physical activity are common weight loss intervention components, yet few researchers report data on measures associated with these components. Conducting measures to assess alterations in dietary intake or intensity and frequency of physical activity both before and after the intervention would be insightful. Including such measures would obviously increase costs associated with the project; however, data would be invaluable as it would add to the body of literature that is currently available. Additionally, such information would add to the fidelity of the intervention as it would verify whether behavioral changes were actually implemented as intended. Without such measures, we are currently unable to establish exactly which component of an intervention is responsible for the improvements in body weight and composition. As this information becomes available, this can greatly aid researchers in deciphering the key components to include in future research, while weeding out strategies that may be less effective. Other measures that researchers should consider

reporting might include improvements in health and psychiatric symptoms, motivation for change, alterations in body composition (i.e. changes in % body fat or waist circumference), change in knowledge (i.e. nutrition or exercise knowledge), and alterations in blood chemistry.

Conclusions

While there are still obvious limitations to the weight loss literature that is available within the severe mental illness population, it is still possible to make some broad conclusions that are likely generalizable to other individuals with SPMI. First, despite some literature that may suggest that weight loss efforts should not be employed within the psychiatric population, these findings suggest otherwise and clearly show that individuals with SPMI are able to adhere to similar strategies used within the general population when minor modifications are made. Literature available suggests that small reductions in body weight can be achieved and are clinically significant as further weight gain is likely averted. Ideally, weight gain should be avoided when possible by prescribing antipsychotic medications known to have lower weight gain side effects; however, when weight loss is necessary, a combined strategy employing diet, exercise and behavioral alterations may be beneficial for controlling weight. Lastly, greater attention to keeping individuals with mental illness engaged and attending programs may be required than within the general population.

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Table 1. Summary of Non-Pharmaceutical Weight Loss Interventions for Individuals with SPMI

Study	Treatment Category	N	Duration	Control Group	Randomized	Intervention Specifications	Weight Change *	Retention/Attendance Rate
Aquila & Emanuel (2000)	Diet	31	12 m; 18 m follow-up	No	No	Switch to a patient-optimal atypical drug; low-calorie, monitored diet with nutrition education and supportive care.	Mean loss of 1.3 lb at 12 months; 0.9 lb gain at 18 months.	-96.9% - 12 months -87.5% - 18 months No attendance rates reported
Nguyen, Yu, Maguire (2003)	Diet	22	7 mo	No	No	5 minute nutrition and physical activity education session on outpatient visit; 2 minute reminder on follow-up visits	Mean gain of 5.27 lb	Not reported No attendance rates reported
Archie, Wilson, Osborn et al. (2003)	Exercise	20 (10 I, 10 C)	6 m	Yes	Yes	Pilot to assess adherence to an exercise plan when given a 6-month membership to YMCA. Attendance defined as 3 – 30 minute sessions/wk	Weight change not reported but for 1 subject attending entire intervention; 33 lb.	-80% Attendance at 6 months was 10%
Skrinar, Huxley, Hutchinson et al. (2005)	Exercise	30 (15 I, 15 C)	12 wks	Yes (Wait list)	Yes	Healthy lifestyle exercise group including 4 exercise opportunities/per week plus a 30-45 minute weekly health seminar.	Mean loss of 4.84 lb in intervention and a gain of 2.64 lb in wait list controls (p=NS)	60% intervention 73.3% control 63%- average attendance
Voruganti, Whatham, Bard, et al. (2006)	Exercise	54 (23 I, 31 C)	8 m; 12 m f/u	Yes	No	Adventure and recreation-based group intervention targeting activities to promote well-being and weight loss	Mean loss of 12.0 lbs in intervention; mean gain of 9 lbs in control	100%; no dropouts Attendance 97% intervention, 72% controls
Ball, Coons, & Buchanan (2001)	Diet & Exercise	32 (21 I, 11 C)	10 wks	Yes	No	Weight Watchers 1-2-3 Program with monitored exercise 3 times/week	Mean loss of 5.1 lb, significant only for males (p=0.05)	-52.3% from intervention No attendance rates reported
Centorrino, Wurtman, Duca, et al. (2006)	Diet & Exercise	22	24 wks intensive, 24 wks extension phase	No	No	TRIAD: dietary counseling, exercise and low-fat, low-calorie diet plan; met twice weekly during intensive phase & once weekly during extension phase	Mean loss of 13.2 lb in 1 st 24-wks; 0.95 lb gain during 2 nd 24-wks	-77.3%– 24 weeks -54.5% -less intense phase No attendance rates reported
Merriman, Kiddell, Thrush (1995)	Diet & Exercise	6	12 wk; 4 wk f/u	No	No	Wonderful Me! Multi-disciplinary program using a group-based setting to teach diet, exercise, and self-assertiveness training	Mean loss of 0.44 lb	83.3% No attendance rates reported

Table 1. (cont'd) Summary of Non-Pharmaceutical Weight Loss Interventions for Individuals with SPMI

Study	Treatment Category	N	Duration	Control Group	Randomized	Intervention Specifications	Weight Change **	Retention/Attendance Rates
Brar, Ganguli, Pandina et al. (2005)	Multi-modal	71 (34 I, 37 C)	14 wks	Yes	Yes	Manualized group-based behavioral intervention with 2 sessions/wk for 6 wks and 1 session/wk for 8 wks (20 total)	Mean loss of 7.04 lb in intervention and 3.08 lb for control (for completers)	-76.9% No attendance rates reported
Brown, Goetz, Van Sciver, Sullivan & Hamera (2006)	Multi-modal	59 (28 I, 31 C)	12 wks	Yes	No	Weekly manualized intervention using evidence-based weight loss and psychiatric rehabilitation techniques	Mean loss of 5.94 lb in intervention; 1.1 lb gain in control (p=.009)	-75% for intervention -48.4% for control 75.8%- average attendance
Kalarehian, Marcus, Levine, et al. (2005)	Multi-modal	35	3 mo; 6 mo f/u	No	No	Diet based on Stoplight diet, decreased sedentary activity, and psycho-education on nutrition and PA; 16 one-hour group sessions.	Mean loss of 5.04 lb (p=0.001) at 3 m; 7.14 lb (p=0.003) at 6 m	-82.9% -77.1% completed 3-month post exam
Khazaal, Fresard, Rabia et al. (2007)	Multi-modal (CB)	61 (31 I, 30 C)	12 wks	Yes (BNE)	Yes	Cognitive and behavioral program with 2 hour weekly sessions. Control group received 2 hr group healthy eating session (Brief Nutrition Education or BNE)	Mean loss of 7.7 lb at 12 wks; mean gain of 3.74 lb in control	No attendance rates reported -CBT 80.6% at week 12; 74.2% at week 24 -BNE 76.7% at week 12; 76.7% at week 24
Kwon, Choi, Bahk, et al. (2006)	Multi-modal	48 (33 I, 15 C)	12 wks	Yes	Yes	Individualized dietary and exercise management with sessions occurring weekly for 4 weeks and biweekly for remaining 8 week	Mean loss of 8.7 lb in intervention and 3.3 lb in control (p=0.28)	Attendance rate not reported -66.7% intervention -93.3% control
Litrell, Hilligoss, Kirchner et al. (2003)	Multi-modal	70 (35 I, 35 C)	6 mo	Yes	Yes	Solutions for Wellness targeting diet and exercise. 16 weekly, 1 hour sessions	Mean loss of 0.06 lb in intervention; mean gain of 9.57 lb in control (p=0.005)	Attendance rate not reported -Not reported
McKibbin, Patterson, Norman, et al. (2006)	Multi-modal	64 (32 I, 32 C)	24 wks	Yes	Yes	Diabetes Awareness and Rehabilitation Training (DART) including 90 minutes weekly diabetes education, nutrition and lifestyle exercise sessions	Mean loss of 5 lb for intervention; 6 lb gain for control group	Attendance rate not reported -87.5% DART intervention -90.6% control
Menza, Vreeland, Minsky, et al. (2004)	Multi-modal	51 (31 I, 20 C)	52 wks (3 phases); f/u to Vreeland et al. report	Yes	No	"Healthy Living" Program: 4 stage intervention including nutrition counseling, exercise, and behavioral interventions; motivational interviewing & both individual and group sessions included	Mean loss of 6.6 lbs for intervention; mean gain of 7.0 lb in control group (p=0.01)	-12 weeks – 87% -12-months – 65% 69%-Average attendance

Table 1. (cont'd) Summary of Non-Pharmaceutical Weight Loss Interventions for Individuals with SPMI

Study	Treatment Category	N	Duration	Control Group	Randomized	Intervention Specifications	Weight Change *	Retention/Attendance Rates
Pendlebury, Handdad & Dursun (2005)	Multi-modal	70	3 yrs	No	No	1 hour weekly group sessions including weighing, discussion and topics such as healthy eating, exercise and motivation	Mean weight loss of 10.9 pounds	-Not reported 21.8%-average attendance (Range 2-128 - 156 total)
Pendlebury, Bushe, Wildgust et al. (2007)	Multi-modal (f/u from 2005 report)	93	4 yrs	No	No	1 hour weekly group sessions including weighing, discussion and topics such as healthy eating, exercise and motivation	Mean weight loss of 13.64 pounds	Not reported 20.0% average attendance (Range 2 to 202 - 208 total)
Richardson, Avripas, Neal & Marcus (2005)	Multi-modal	39	18 wks	No	No	Education provided on nutrition and exercise; goal setting and overcoming barriers. Included 9, one-hour group sessions (1 st 6 occurred weekly; last 3 monthly)	Mean loss of 5 pounds	56.4% - 6 wks 30.8% - 18 wk assessment
Umbrecht, Flury, Bridler (2001)	Multi-modal (CB)	6	10 wks	No	No	Group and individual format targeting low-calorie nutrition, exercise and cognitive behavior strategies	Mean reduction in BMI of 4.5 kg/m ² (p<0.02); weight loss range 0-46.2 lb; no mean provided)	No attendance rates reported 60%
Vreeland, Minsky, Menza, et al. (2003)	Multi-modal	46 (31 I, 15 C)	12 wks; (9 mo f/u reported by Menza et al.)	Yes	No	Healthy lifestyle intervention focusing on diet, exercise and behavioral changes; 2 group sessions and 1 individual session per week	Mean loss of 5.94 lb in intervention; 6.38 lb gain in control group	Attendance rate not reported 87.1% intervention 77% - average group attendance; 82% average individual attendance
Weber & Wýne (2006)	Multi-modal (CB)	17 (8 I, 9 C)	16 wks	Yes	Yes	Diabetes Prevention Project (DPP): 1 hour weekly group sessions providing cognitive/behavioral strategies to promote risk reduction	Mean loss of 5.4 lbs in intervention and 1.35 lb in control (NS)	100% - intervention 77.8% control Attendance rate not reported
O'Keefe, Noordsy, Liss, & Weiss (2003)	Retrospective chart review	35	5 year chart review	No	No	Retrospective chart review of dietitian visit, self-directed diet	Patients using interventions stopped weight gain or lost weight	-Not reported; chart review Attendance not reported

Key to Chart:

Abbreviations: I=Intervention and C= Control; NS= not significant; CB= Cognitive Behavioral Program

*All reported weight changes were converted to pounds (lb) for the purpose of this comparison chart.

Appendix N: Comprehensive Literature Review (III)

Food Insecurity, Obesity and Dietary Intake: Is there a Relationship?

Comprehensive Literature Review (III)

Jeannine Goetz

Abstract

With the advancements in technology, agriculture and an abundant food supply, many individuals believe that having limited access to an adequate food supply is a thing of the past and an issue that is specifically limited to Third-World countries.

Unfortunately, food insecurity is a reality for millions of Americans (ADA, 2006). By definition, food insecurity occurs “whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain” (Anderson, 1990, p. 1560). Although it is true that the most severe forms of food insecurity and hunger have been largely eliminated from the United States; insufficient resources and hunger have been a concern among US health, nutrition and social policy for many years. Furthermore, many feel that allowing food insecurity to persist at current levels within the United States is cruel, short-sighted and avoidable. Food insecurity not only causes psychological suffering and disturbances among family life, but also may cause physical impairments and chronic disease (Holben & Myles, 2004).

This review seeks to provide an overview of the history of food insecurity as well strategies that have been developed to measure its prevalence within the United States. Consequences associated with lower food security are also explored, with particular attention given to its relationship with overweight or obese status as well as nutritional quality and dietary intake. Finally, the role of nutrition education as a

potential means for alleviating food insecurity and its consequences is explored briefly within the scope of this review paper.

Food Insecurity, Obesity and Dietary Intake: Is there a Relationship?

Methodology

Literature Search

The purpose of this paper is to provide a review of the literature on the history, measurement, prevalence and associated outcomes of food insecurity among Americans. To address these issues, a search of the literature was conducted to identify articles published from 1980 to present, July 2007. Studies were identified by searching PubMed, OVID and the world-wide web using combinations of key words relating to food security and insecurity (food insecurity, food security, food insufficiency, hunger, validity, measurement, diet, intake, availability, severe and persistent mental illness, nutrition education and obesity) and by searching references cited among identified manuscripts.

Inclusion and Exclusion Criteria

During the literature search, search fields were limited to those articles written in English with human subjects and published since 1980. Since this review is specifically examining food insecurity among Americans, only research conducted within the United States was included. Research examining hunger due to reasons other than financial constraints were not included within the review. Due to the extent of the literature available on food insecurity, this literature review had to be limited in some respects. First, this review of literature focuses upon food insecurity at the

individual or household level rather than at the community level. Additionally, while a great deal of literature is available concerning the effects of food insecurity on children and adolescents, this paper will primarily focus on the adult population.

History of Food Insecurity

The concept of food security emerged within the United States during the mid 1980's as the result of international development work (Cook, 2002). Although several nutrition-assistance programs had been established to assist vulnerable or underserved populations during prior years, it was not until the issues were identified in the President's Task Force on Food Assistance in 1984 that public policy demanded action be taken. The Task Force boldly commented that "it has long been an article of faith among the American people that no one in a land so blessed with plenty should go hungry. ...Hunger is simply not acceptable in our society (Bickel, Nord, Price, Hamilton, & Cook, 2000, p. 1)." At that time, the President's Task Force sought to differentiate between "hunger as medically defined" and "hunger as commonly defined". This panel suggested that the latter social concept was more inline with the contemporary experiences of the United States (US) culture than that of severe, prolonged food deprivation. Hence, the panel stated (Report of the President's Task Force on Food Assistance, 1984):

"In this sense of the term, hunger can be said to be present even when there are no clinical symptoms of deprivation, a situation in which someone cannot obtain an adequate amount of food, even if the shortage is not prolonged enough to cause health problems, the experience of being unsatisfied, of not getting enough to eat. It is easy to think of examples of this kind of hunger: children who sometimes are sent to bed hungry because their parents find it

impossible to provide for them; parents, especially mothers, who sometimes forego food so that their families may eat; the homeless who must depend on the largess of charity or who are forced to scavenge for food or beg; and people who do not eat properly in order that they save money to pay rent, utilities and other bills.”

Many concerns were raised regarding the availability of an adequate food supply for all Americans, and hence, a great deal of research and public policy efforts evolved. At this time, extensive work went into understanding household food security, food insecurity and hunger. Before researchers could begin tracking the extent of the problem and identifying strategies to alleviate this public health issue, clear definitions were required in order to standardize efforts. The Life Sciences Research Office (LSRO) of the Federation of American Societies for Experimental Biology released conceptual definitions to explain this phenomenon in 1990. According to the LSRO (Anderson, 1990), food security was defined as “access by all people at all times to enough food for an active, healthy life. Food security includes at minimum: (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)” (p. 1560). In contrast, food insecurity was then defined as “limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (p. 1560).

While hunger is not necessarily an absolute outcome associated with food insecurity, in the most extreme forms, hunger does in fact exist. Within the context of hunger and food insecurity, hunger is strictly related to a financial resource constraint rather than dieting or leading a busy lifestyle. Hence, the LSRO (Anderson, 1990) defined hunger as “the uneasy or painful sensation caused by a lack of food. The recurrent and involuntary lack of access to food. Hunger may produce malnutrition over time... Hunger ... is a potential, although not necessary, consequence of food insecurity” (p. 1560).

Before food security became an issue of public policy in the 1980's and 1990's, prevalence of hunger and food insecurity was largely estimated using indirect methods. Although food insecurity and hunger are perceived as a direct consequence of financial constraint, simply examining alterations in poverty and income status does not provide an accurate picture of the true availability of food within the household (Frongillo, Raushenbach, Olson, Kendall, & Colmenares, 1997). Research has shown that many low-income households are indeed food secure, while some households living above the poverty line appear to have inadequate access to food. Hence, a measure that would provide independent, more specific information than can be discerned based upon income alone was warranted (Bickel et al., 2000). Likewise, utilizing traditional methods of assessing nutritional status often associated with malnutrition via anthropometric, clinical or biochemical measurements does not

provide a reliable estimate of the prevalence or severity of the condition as it does in less food secure Third-World countries. The reason these measurements do not produce accurate findings among more food-secure countries is that overt clinical or biochemical signs of malnutrition rarely exist; with overweight or obesity more commonly being associated with poverty, rather than wasting or stunting (Kendall, Olson & Frongillo, 1995).

Following the original report by the President's Task Force, researchers began developing and refining assessment methods. The call for action was heightened in 1990 when Congress enacted the National Nutrition Monitoring and Related Research Act (NNMRRP) and further mandated the need for better monitoring and assessment of the nutritional status within the United States. As long-term goals were projected, one essential element specified was that the data obtained from food security measures should be standard, consistent and applicable at the national, state and local levels (Bickel et al., 2000).

While deciphering key elements for the measurement of food insecurity, researchers and policy makers learned that two other groups were concurrently making strides to create a national measure for food insecurity and hunger: 1) the research program at Cornell University Division of Nutritional Sciences and 2) the Community Childhood Hunger Identification Project (CCHIP) sponsored by the Food Research and Action Center (FRAC) (Carlson, Andrews & Bickel, 1999). The Cornell research group

produced several measurement surveys to assess household and individual level food insecurity. These surveys were developed based upon a grounded-research approach (Carlson, Andrews, & Bickel, 1999) in which food insecurity is a managed process with a general sequence as the problem worsens. Thus, this sequence evolves as household food insecurity is first experienced, yet signs of compromised food intake are not readily observed. This sequence progresses through more severe stages of food insecurity as compromises in quality and quantity of foods consumed by adults occurs, and lastly, hunger experienced by children is observed. The latter is evidence of the most severe problems associated with food insecurity (Kendall et al., 1995).

Given that great strides had been made in refining how food insecurity was to be measured, the government sought to build upon the available research and select the best comprehensive indicator variables for all levels and severity of food insecurity. Hence, leading researchers and experts from the field convened at the Conference on Food Security Measurement and Research assembled by the Food and Nutrition Service (FNS) of the United States Department of Agriculture (USDA) and the National Center for Health Statistics (NCHS) (Carlson et al., 1999; Kendall et al., 1995). Using key indicator items from both the CCHIP and Radimer/Cornell questionnaires as well as previous USDA and NCHS surveys, the experts developed a draft questionnaire that assessed both the prevalence and severity of food insecurity during the previous 12-month reference period (Bickel et al., 2000; Carlson et al., 1999) and continued providing insight and revisions throughout the remainder of the

year. Designing an instrument that would accurately capture not only the prevalence of food security and insecurity, but also the severity of the condition was difficult. As aptly explained by the Food and Nutrition Service (FNS) *Guide to Measuring Household Food Security* (Bickel et al., 2000), “food insecurity is a complex, multidimensional phenomenon which varies through a continuum of successive stages as the condition becomes more severe. Each stage consists of characteristic conditions and experiences of food insufficiency to fully meet the basic needs of household members, and of the behavioral responses of household members to these conditions” (p. 2). The survey that was ultimately devised contained both a numerical food security scale and a related categorical food-security-status measure.

The following year, the core module that was developed under the direction of this expert panel and in conjunction with the USDA, NCHS, and the Bureau of the Census was implemented in the April 1995 Current Population Survey (CPS) (Bickel et al., 2000; Frongillo et al., 1997). Since developed, this food security measure has been validated and used to present both national and state-level statistics on food insecurity on a yearly basis. These data are immensely important as they serve to document the changing needs for assistance as well as to demonstrate the effectiveness of current nutrition assistance programs (Bickel et al., 2000). A more detailed overview of the actual core module will be provided within the section of this paper detailing the available individual or household level food security measures.

Change in Food Security Terminology

Until 2006, food insecurity measures categorized households as either food secure or food insecure, with the latter category being further divided into food insecure without hunger or food insecure with hunger. As mentioned previously within this review, the USDA has sought to monitor the prevalence of food insecurity among Americans for several decades. Working in conjunction with the Committee on National Statistics of the National Academies (CNSTAT), the USDA desired to determine whether the measurement techniques and language used to describe such conditions were conceptually sound; and hence, whether it could provide useful information for both policy officials and the general public (Economic Research Services, 2006b). The expert panel that was convened specifically examined whether the current concept and definition of hunger and the relationship between hunger and food insecurity were appropriate for the context in which food security statistics are currently used.

Upon review, the panel determined that the USDA should continue monitoring food insecurity and that current assessment techniques are adequate, but suggestions for refining some of the methodology and terminology were provided. One of the primary suggestions was that the USDA should make a clear and distinct differentiation between food insecurity and hunger. While food insecurity is a household-level economic or social condition involving having limited or uncertain

access to an adequate food supply; hunger is an individual-level physiological condition that potentially could result from being food insecure. Specifically, the panel suggests within its report that hunger “should refer to a potential consequence of food insecurity that, because of prolonged, involuntary lack of food, results in discomfort, illness, weakness or pain that goes beyond the usual uneasy sensation” (Economic Research Services, 2006b, ¶ 4). In addition to simply making a distinction between these two terms, the panel suggested that additional assessment measures were necessary in order to accurately assess whether hunger is present. These procedures would need to assess physiological experiences at the individual household level. Hence, new data collection tools are required and an effort to conduct a national assessment of hunger is warranted at the individual level as opposed to the household level currently assessed in surveys.

These modifications elicited a change in terminology or labeling (Economic Research Services, 2006b). Thus, in 2006 the USDA proposed a new labeling system that refrained from identifying whether a household experienced hunger or not. This new system classifies individuals that are food secure as having high food security or marginal food security. A family exhibiting high food security is one that does not have any indications of food access problems, while marginal food security refers to households that may report one or two indications of limitations in accessing food. At this point, there is little or no change in dietary intake. The food insecure category is also divided into two categories: low food security and very low food security. It is

not until a household is identified as one of the previous two categories that true alterations in dietary intake are observed. The alterations may be in the form of reduced variety or poorer quality and desirability. However, a reduction in actual food intake is typically reserved for the very low food security group.

Despite changes in terminology, no alterations were made to the basic food security assessment; hence, data obtained in the future can still be compared with data obtained in previous years (Economic Research Services, 2006b). The USDA provides an excellent table comparing the old and revised labeling system and an adapted version is provided within Table 1.

Current and Previous Food Insecurity Trends

As a result of these concerns, numerous approaches and goals have been established to help alleviate this preventable threat. One example is the *Healthy People 2010* objective to increase food security within America to 94% (Healthy People 2010). Similar objectives have been established by the US Department of Agriculture's Community Food Security Initiative, which calls for reducing the prevalence of US food insecurity by half by the year 2015 (National Center for Appropriate Technology).

Although prevalence rates are on a downward trend, the current status of households falling short of being food secure is far from the previously stated goals. The

following data were obtained from data collected in the Current Population Survey (CPS) food security surveys from 2005 (Nord, Andrews, & Carlson, 2005). These data indicate that 89.0% of U.S. households were food secure throughout the entire year of 2005. Slight improvements were made from the 2004 data, which indicated that only 88.1% of households were food secure throughout the course of the year. Hence, 11.0% of households were categorized as experiencing some form of food insecurity throughout the year during 2005. Of these 11.0%, 7.1% experienced low food security. This translates into 8.2 million households were able to avoid significantly disrupting their eating patterns through a number of coping strategies. The remaining 3.9% of households were identified as having very low food security, with one or more family members experiencing disrupted food intake during the previous year. All total, 35 million people, including 12.4 million children, lived in households that experienced limited food security at some point during 2005.

As might be imagined, the prevalence of food insecurity varies greatly among different types of households (Nord et al., 2005). Families with more than one adult and no children were significantly below the national 11% average, with only 6.7% experiencing food insecurity. Likewise, only 6% of elderly households were food insecure at some point during 2005. Slightly higher rates were observed among those individuals living on their own. In comparison to the 6.7% of households with more than one adult experiencing food insecurity, 11.0% of households with women living alone and 11.5% of households with men living alone experienced food insecurity.

Low or very low food insecurity occurred more frequently among households living below the poverty line, particularly those headed by a single mother or by certain racial or ethnic groups. Within 2005, 36% of households with incomes less than the official poverty line experienced food insecurity. Almost as prevalent were 30.8% of households with children headed by a single female parent. Likewise, reduced food security was observed among 22.4% and 17.9% of African American and Hispanic households, respectively. Thus, these findings suggest that food insecurity is most prevalent among households living under the poverty line, headed by a single parent, in households with only one individual and certain ethnic groups.

Other trends occurring during 2005 (Nord et al., 2005) included a higher rate of low food security among families living within principle cities of metropolitan areas (13.5%) and non-metropolitan areas (12.0%) as compared to households living in suburb areas or other metropolitan areas not within a principle city (8.7%).

Prevalence rates also varied regionally, with higher than national rates being observed in the South (12%), rates comparable to the national average occurring within the Midwest (11.1%) and West (10.8%) and rates below the national average reported in the Northeast (9.1%).

Food security trends from CPS surveys conducted annually from 1995-2005 are available and indicate that while prevalence rates declined during 2005, rates were on a slight upward trend prior to this time period. Data from 1995-2000 indicate a

downward trend with substantial two year cycles that are thought to have resulted from seasonal variations in data collection. CPS surveys were conducted in April during odd-numbered years and August or September during even-numbered years. Surveys conducted during August and September identified a larger percentage of households as having lower food security than data collected in April. Hence, the organization suggests a seasonal-response effect. Since 2001, annual surveys have been consistently conducted in December to avoid seasonality effects in interpreting annual data.

Frequency of Occurrence

Although data obtained for the U.S. Household Food Security Survey identifies households that are food insecure, the measure does not distinguish how frequently this condition occurs. Rather, it simply indicates that at least once during the previous 12 months, households have experienced at least one condition related to food insecurity. Thus, the measure is designed to register even occasional or episodic occurrences of food insecurity (Economic Research Services, 2006a).

A clearer picture of the severity of the issue is produced when responses to questions obtained from the food security survey regarding frequency of food-insecure conditions were examined by the ERS (2006a). Findings indicate that very low food security occurred only rarely or occasionally in one-third of the 3.9% of households identified as very low food secure in 2005. Hence, these families only experienced

disrupted food intake in one or two months out of the year. The remaining two-thirds of the 3.9% of households experiencing very low food security experienced the condition in three or more months out of the year. Unfortunately, these data suggest that for one-fifth of all food insecure households and nearly 30% of those households identified as very low food secure, the condition is frequent or chronic. On average, these households experienced food insecurity during half of the months in the year. These findings were even more severe among the very low food secure, with households experiencing a disruption in food intake during seven of the 12 months. Additionally, eating disruptions occurred between one and seven days out of those months.

Finally, when prevalence rates were examined during only the 30 days prior to the survey administration, the rate was considerably lower than those reported during the 12 month reference period (Economic Research Services, 2006a). Rates were even less when only the single day prior to the survey was examined, with only 0.5 to 0.7% of households reporting very low food security on that particular day. Thus, these findings support the fact that food insecurity likely does not affect households on a day to day basis, but rather on a more episodic basis.

Measuring Food Insecurity

Since the initial call for action, numerous food security/insecurity instruments have been developed. Measures have been established for assessment at both the household

or individual level as well as at the community level. Currently, three single indicator and four scales are available for measurement of individual or household level food security. Assessing changes in food security status among the community is of great importance when considering and adapting social programs to alleviate the public health issue. Unfortunately, this area of research has not received as much attention as assessment at the individual or household level. Currently, the most basic estimate is obtained simply through a prevalence study about household and household members living within a specified community (Keenan, Olson, Hersey, & Parmer, 2003). Thus, community level food security tools will not be discussed within the context of this review. This section will provide a brief overview of the characteristics, validity, strengths and weaknesses of each individual or household measurement. A summary providing the number of questions, method of administration, and reliability/validation of the measures are located in Table 2.

Individual or Household Level Food Security/Insecurity Measures

Single Indicators. Thus far, three single-item indicators of food security and insecurity have been developed. While these measures have been widely used among national surveys, some cause for concern regarding the reliability and validity of the measures have been raised (As reviewed in Keenan et al., 2003). Single indicators may provide a rough estimate of the prevalence of the issue; however, they do not ascertain the full range of food insecurity and hunger that a household survey would capture (Bickel et al., 2000).

Despite the fact that food insecurity was not well-addressed as a public health issue until the late 1980's, the USDA has actually attended to this issue on every USDA food survey conducted since 1977. The "USDA food sufficiency question" has been included both within the Nationwide Food Consumption Survey (NFCS) and the Continuing Survey of Food Intakes by Individuals (CSFII). The single-identifier food sufficiency question is as follows: "Which of the following statements best describes the food eaten in your household: 1) Enough of the kinds of food we want to eat, 2) Enough but not always the kinds of food we want to eat, 3) Sometimes not enough to eat, or 4) Often not enough to eat." Two versions of this question have been previously used among national surveys; one providing all four responses and an abbreviated version that omits option number two. Research has shown that the two different responses produce significantly different results, as the number of responses for "Sometimes not enough to eat" nearly doubles when the second option concerning variety of foods is eliminated (Keenan et al., 2003).

Another single-indicator food sufficiency question that has been used is the Expanded Food and Nutrition Education Program (EFNEP) Evaluating/Reporting System question (Keenan et al., 2001). This question was developed based upon focus group research and asks the following: "How often do you run out of food before the end of the month? 1) Do not run out of food, 2) Seldom, 3) Sometimes, 4) Most of the time, or 5) Almost always." Unlike the USDA food sufficiency question, the EFNEP

question has not been studied for reliability or validity and concerns have been addressed about the questions ability to detect changes in true food security status. The cause for concern was raised because oftentimes individuals are unwilling to honestly answer personal questions, such as the one presented, when first entering a program. Yet, when trust is established with educators, individuals are more willing to accurately report their current status at post-test. Thus, this assessment technique may underestimate improvements in food security status.

The final single-indicator question utilizes a slightly different questioning technique by inquiring about concern regarding food security (As reviewed in Keenan et al., 2003). The indicator simply asks for a “yes” or “no” response to the following statement: “In the past 30 days, have you been concerned about having enough food for you or your family?” Similar to the EFNEP question, this single-indicator question has also not been assessed for validity or reliability.

Broad Scales. In addition to the above single indicators, four more comprehensive scales have also been developed to measure the severity of food insecurity and hunger at the individual or household level (Keenan et al., 2003). These instruments are designed to acquire information on specific conditions, experiences and behaviors that are indicators of the varying degrees of severity of the condition (Bickel et al., 2000).

Community Childhood Hunger Identification Project (CCHIP) hunger index.

As stated previously within this review, the CCHIP hunger index was one of the first scales developed to assess food security (as reviewed in Keenan et al., 2003). The scale specifically measures hunger in families with at least one child under the age of twelve (See Appendix A). Two versions of the index exist: a complete version containing four questions with skip patterns to facilitate ease of administration, and a short form containing eight simple “yes” or “no” questions. The complete version provides a more comprehensive measure that addresses the frequency and duration of each experience. This version requires a longer administration time; however, the measure has been routinely used across the country with little to no complaint of subject burden.

Analysis of the complete version is more complex than its simpler counterpart; however, the measure provides information not only about whether households are affected by food insufficiency due to financial constraint, but also information pertaining to the frequency and episodes of food insufficiency and hunger (Keenan et al., 2003). The shorter version can be quickly administered and only provides an indication of whether individuals or households are affected by food insufficiency. “Yes” and “no” responses are tallied and compared to a set of guidelines, with a score of one to four affirmative responses indicating that a family may be at risk for food insufficiency, and a score of greater than five affirmative responses serving as an

indicator that the entire family, including children, are affected by an inadequate food supply.

The CCHIP Hunger Index has been shown to have excellent reliability (As reviewed in Keenan et al., 2003; Wehler et al, 1992). During initial development of the questionnaire, focus group sessions, extensive pre-testing, and consultation and assessment by experts in the field of food security were sought. The measure has been tested in several different states with reliability coefficients (Cronbach's alpha) ranging from .80 to .89. Additionally, the index has been shown to be strongly associated with economic and socio-demographic variables, health problems in children and use of coping strategies.

Radimer/Cornell measures of hunger and food insecurity.

Like the CCHIP hunger index measure, the Radimer/Cornell measure was one of the first measures developed to assess food security within the United States. The framework associated with the Radimer measure is sequential. Household food insecurity is experienced, followed by reductions in quality and quantity of food consumed by adults, and finally decreases in the quantity of food eaten by children represents the most severe stage (Kendall et al., 1995). During early stages of development, Radimer and colleagues conducted interviews among women and children living within rural and urban areas of Central New York. Through this process, the researchers developed definitions, conceptual frameworks and began

refining measures to assess food insecurity among households with children (Keenan et al., 2003). Through these in-depth interviews, two conceptual frameworks emerged. The narrower concept of the two referred to an inadequate food intake as well as going without food; thus, including the physical sensations of hunger. The broader concept encompassed a number of conditions associated with food insufficiency and included problems with household food supply, quality of diets, feelings regarding the situation, and what attempts had been made to maintain adequate food supplies (Kendall et al., 1995). Out of the original 30 questions on the Radimer/Cornell measure, 18 were eliminated, leaving 12 questions which were then structured into three subscales. These four-question subscales included household food insecurity, women's food insecurity and hunger, and child hunger. These subscales loosely correlate to a single overall scale for severity of food insecurity and hunger within the household. A final question was also added to the measure to assess the quality of food available (Keenan et al., 2003). The Radimer Hunger scale can be found in its entirety in Appendix B.

Similar to that of the Community Childhood Hunger Identification Project Hunger Index, the Radimer/Cornell measure is easily administered, with little complaint of subject burden. While the questionnaire has primarily been utilized within face-to-face situations, the measure can easily be adapted for data collection via telephone or self-administered among literate populations (Keenan et al., 2003). Another strength of the measure is the simplistic scoring which simply entails counting up the number

of items reported as “often” or “sometimes true” and comparing this number with cutoffs outlined in the guidebook, *Food Security in the United States* (Leidenfrost & Wilkins, 1994; Keenan et al., 2003).

Researchers developing the Radimer/Cornell measure consider the measure to have face validity as each of the questions was obtained directly from the words of the original women interviewed (Kendall, Olson & Frongillo, 1995). In order to determine the validity of the measure, a sample of women (n=193) from a rural county in New York State were surveyed during two separate interviews. During interviews, demographic characteristics, risk factors for food insecurity, and the Radimer/Cornell hunger and food insecurity items were administered. Frequency of fruit and vegetable consumption, as obtained during the Behavioral Risk Factor Surveillance Survey, was also obtained. Additionally, a 51 food-item inventory of household food supplies was obtained using standardized approaches at each interview session. During this validity test, the Radimer/Cornell measure was assessed for construct validity, internal consistency of the items included in each measure, and criterion-related validity by comparing demographic and dietary characteristics which might be expected to vary by food insecurity status (Kendall et al., 1995). Findings suggest good internal reliability coefficients for each subscale: household insecure measure (.84), individual insecure measure (.86), and children’s hunger (.85). Additionally, total household food inventory and fruit and vegetable consumption progressively declined as severity of food insufficiency increased. Food

insecurity status was also strongly associated with demographic characteristics such that food insecurity occurred more frequently among households with lower income, lower education, greater rates of unemployment, and higher participation in food assistance programs.

U.S. Household Food Security Scale.

The core module-based Food Security Scale is the most comprehensive food security measure available and was developed by the Food Security Measurement Project based upon data obtained from the 1995 CPS survey (Bickel et al., 2000). The U.S. Household Food Security Scale is the most widely used scale for measuring food insecurity and hunger and consists of an 18-item scale assessing level of severity of food insecurity and hunger experienced at the individual or household level during the previous 12 months (Keenan et al., 2003). The greatest strength of the module is that it contains multiple indicator questions which are able to capture and distinguish between the various levels of severity that result from an inadequate food supply.

According to the *Guide for Measuring Household Food Security* (Bickel et al., 2000), “this feature is critical for accurately assessing the *prevalence* of food insecurity because the greater the severity, the less the prevalence and each separate indicator captures a *different degree* of severity. The frequency of the various indicators varies widely depending upon *exactly which* level of severity each one reflects (Emphasis expressed by author, p. 2).” The full version of the core module is located within Appendix C.

Research conducted since the President's Task Force call for action has determined that food insecurity is characterized by a set of conditions, experiences and behavior patterns (Bickel et al., 2000). The core module of the U.S. Household Food Security questionnaire inquires about these particular patterns through examining the following:

“1) Anxiety that the household food budget or food supply may be insufficient to meet basic needs; 2) The experience of running out of food, without money to obtain more; 3) Perceptions by the respondent that the food eaten by household members was inadequate in quality or quantity; 4) Adjustments to normal food use, substituting fewer and cheaper foods than usual; 5) Instances of reduced food intake by adults in the household, or consequences of reduced intake such as the physical sensation of hunger or loss of weight; and 6) Instances of reduced food intake, or consequences of reduced intake, for children in the household” (page 8).

In order to assure that responses to these types of situations and experiences are due strictly to financial constraint, each question within the module includes phrases such as “because we couldn't afford that” or “because there wasn't enough money for food” (Bickel et al., 2000). Appendix A contains a complete copy of the questions presented within the U.S. Household Food Security survey. Administration time for the core module typically takes only two minutes on average, as the module provides skip patterns for those households that are clearly food secure or who do not have

children under the age of 18 living within the home (Bickel et al., 2000). Should all questions within the module be administered, as is often the case in population groups that are more food-insecure than average, the screening procedure is slightly longer at approximately four minutes.

The scale provides a continuous measure of food insecurity levels and is particularly useful for assessing subtle effects obtained during pre- and post-testing, as it detects relatively slight movements along the scale (Keenan et al., 2003). Responses from the core module are tallied and a single numerical number is produced. Although simply a matter of convention, the full continuum of food security and insecurity is expressed by numerical values ranging from 0 or not having experienced any conditions of food insecurity, to 10 or having experienced all of the conditions associated with being food insecure. Based upon the original terminology, scores obtained from the scale can then be used to classify households into one of four food security status categories: 1) Food secure – households with no or minimal evidence of a problem, 2) Food insecure without hunger – households with concerns and adjustments to food management (e.g. reduced dietary quality) but little or no reported reduction in the quantity of food intake by household members, 3) Food insecure with hunger – households in which adults have reduced food intake to the extent that they have experienced hunger, and 4) Food insecure with severe hunger – households in which children have reduced food intake and adults report going whole days with no food owing to a lack of resources (Bickel et al., 2000). Terminology for the complete

module has now been adapted to meet the recommendations set by the Committee on National Statistics of the National Academies (CNSTAT) and consists of the terminology changes reported in Table 1 (Economic Research Services, 2006b).

Although the standard core module addresses a reference time period of the previous 12 months, this time period may be modified to capture shorter periods of time if necessary (Bickel et al., 2000). One common modification is to assess the previous 30 day period. If this modification is made to the survey, simple changes to the wording of temporal-dimension questions are required. Additionally, researchers would need to establish the number days of occurrence that would indicate an affirmative response. For example, on the question asking, “How often did this happen – almost every month, some months but not every month, or in only 1 or 2 months,” the question might be changed to “In the last 30 days, how many days did this happen?” Previous surveys using a 30-day reference period have used 5 days or more within the past 30 days to indicate an affirmative response. However, more recent research (Nord, 2002) suggests that using 3 plus days as a cutoff for determining an affirmative response more closely approximates the severity level of the cutoff used within the original 12 month reference period. Using the adapted 30-day reference period has been shown to be only slightly less reliable than the 12 month reference period and specifically only affects those households with children. According to Nord (2002), the 30-day food security scale shows greatest promise within the

research field where temporal specificity can help improve any complications associated with the 12 month scale.

An additional strength of the 18-item core module is that the findings are readily interpretable. National and state-level standard benchmark data are published annually and made available to the public by the USDA (Bickel et al., 2000). Likewise, annual data is also available for a shorter 30-day reference period. Hence, local surveys can be directly compared to this national benchmark. This benchmark data set may be obtained from the U.S. Census Bureau, by CD-ROM or from the Census Bureau website (www.census.gov or <http://ferret.bls.census.gov>).

Similar to CCHIP and Radimer/Cornell questionnaires, the 18-item core module of the U.S. Household Food Security questionnaire has demonstrated good reliability, with an average reliability coefficient of .81 for households with children and .74 for all households combined (as reviewed in Keenan et al., 2003; Hamilton et al., 1997). Additionally, the scale scores were significantly related in the anticipated direction for a number of factors including the following: 1) poverty-income ratio, 2) weekly food expenditures, and 3) the USDA food sufficiency question. Presently, no available research was identified indicating the level of sensitivity and specificity for the core module questionnaire.

Although the U.S. Household Food Security Scale is the most comprehensive and widely used instrument for identifying food insecurity and hunger, it does have a few limitations (Bickel et al. 2000). First, while the scale is able to ascertain whether a household has an inadequate food supply, it does not distinguish who within the family is actually affected. Rather, it denotes that the household members as a group have experienced the condition. Thus, if there is more than one adult or more than one child under the age of 18, the scale does identify which of the adults or children have experienced the condition. However, it is generally believed that when food insecurity is present, it affects the entire household, although not necessarily always in the same manner. In contrast, hunger is not necessarily felt by everyone within a household. Hence, those households categorized as food insecure with hunger simply indicates that at least one family member experienced hunger within the previous 12 month period. Additionally, the survey covers key dimensions associated with food insecurity; however, it does not cover all aspects of the phenomenon. The definition of food security mandates that all individuals should have access at all times to an adequate amount of food in order to live an active, healthy life. Furthermore, the minimum requirement of this definition states that food insecurity includes at minimum “1) the ready availability of nutritionally adequate and safe foods, and 2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing or other coping strategies” (Anderson, 1990, p. 1560). Thus, the U.S. Household Food Security scale measures whether enough food is available, but fails to capture the other requirements stated

within the definition: food safety, nutritional quality, and acquisition of food through socially acceptable manners.

Should individuals desiring to assess the level of food insecurity among a particular population have a limited amount of time for administration, it is recommended that the validated 6-Item Short Form be used rather than using only select questions from the full core module. The questions among the full module work systematically together, and thus, simplistic interpretations made from a select question or questions should not be made. Documentation from the 1995 CPS Food Security Supplement emphasized this concern with the following statement (Bickel et al., 2000):

“Responses to individual items in this supplement are not, taken alone or in themselves, meaningful measures of food insufficiency, food insecurity, or hunger, and should not be used in such a manner” (p. 10).

6-Item Short Form (U.S. Household Food Security Scale)

Should researchers require a more abbreviated version of the original 18-item core module, a 6-item subset of the core-module has been developed. This shorter form reliably captures the first two thresholds in the full food security continuum scale and categorizes households into one of three groups: food secure, food insecure without hunger or food insecure with hunger (Bickel et al., 2000). A subset of questions (see Appendix B) were selected from the core module through the following selection process: questions were required to work well for households both with and without

children (questions 4, 6, 9, 12, 14, and 16-18 eliminated), questions targeting the most severe form of food insecurity were eliminated as sample sizes from groups using an abbreviated survey are typically not large enough to make precise population estimates for the most severe level of food insecurity (questions 13 and 15 excluded), and the least severe item (question 1) was excluded due to limited discriminability. Since it was felt that a subset of 6 questions (3 conditions x 2 categories) was ideal, research was conducted to determine which final question was to be removed from the seven remaining questions. The subset from the U.S. Household Food Security Scale that provided the smallest average bias and strongest accordance was selected for the 6-item short form (items 2, 3, 5, 7, 8 and 10 from core module) (Blumberg, Bialostosky, Hamilton, & Briefel, 1999). The full version of the abbreviated questionnaire can be found within Appendix D.

Researchers can feel confident using the abbreviated version without greatly compromising sensitivity or specificity. The main limitation of this version of the U.S. Household Food Security scale is simply that it does not capture the most severe range of food insecurity (Bickel et al., 2000). Research conducted on the reliability of the measure indicates that the abbreviated version correctly identified the food security status of 97.7% of households. Reliability was slightly better among families without children, with 99.0% correctly identified as compared to 95.6% of households with children. Thus, should investigators have limited time or resources

and not find it necessary to distinguish between those households with moderate and severe food insecurity, the short form is a good option (Blumberg et al., 1999).

In 1999, Blumberg and colleagues conducted research to determine the effectiveness of the 6-item short form. Although the researchers provided positive findings regarding the reliability, sensitivity and specificity of the measure, the research team cited several important limitations that should be considered prior to use. First, since financial constraint is focused upon within the survey, other reasons food intake may be limited are not captured. For example, physical inabilities to access food such as limited transportation, limitations in food intake due to religious beliefs, and communitywide unavailability of sufficient quantities of food are not captured by the abbreviated form. Additionally, the researchers indicate that the measures of bias associated with the abbreviated survey are likely sample dependent. Thus, while the measure is relatively unbiased within the general population, the accuracy and bias may be different when used within special populations.

Health Outcomes Associated with Food Insecurity

Previous research suggests that food insecurity is directly related to numerous health outcomes (Siefert, Hellin, Cocoran, & Williams, 2004; Stuff, Casey, Szeto, Gossett, Robbins, Simpson et al., 2004). At the individual level, it has been suggested that food insufficiency is associated with not only poor health outcomes, but also poor nutrition (Dixon, Winkeby, & Radimer, 2001; Kempson, Keenan, Sadani, Ridlen, &

Rosato, 2002; Rose & Oliveira, 1997) and mental health status as well (Heflin, Siefert, & Williams, 2005; Siefert, Heflin, Corcoran, & Williams, 2004). Similarly, the presence of this phenomenon at the household level suggests vulnerability to a large range of consequences including poor health status. Thus, the following section will provide a more comprehensive overview of the consequences of food insecurity on physical and mental well-being, weight status and dietary intake.

Physical and Mental Well-being

Research has suggested a link between household food insecurity and physical and mental health; however, distinguishing between consequences associated with food insecurity and other common risk factors associated with poverty and low socioeconomic status is difficult. One mechanism that was suggested by Siefert, Heflin, Corcoran and Williams (2004) is that “poor physical health is a risk factor for poor mental health such that poor physical health status may mediate the relationship between food insufficiency and mental health” (p 173).

In a study conducted by Stuff and colleagues (2004), researchers examined the association between food insecurity and adult health status among adults living in the Lower Mississippi Delta region. This region, which includes Arkansas, Louisiana, and Mississippi, has been documented as having a higher prevalence of lower socioeconomic and educational status than most regions within the United States. In fact, another study (The Lower Mississippi Delta Nutrition Intervention Research

Consortium, 2004) conducted within the same region suggests that food insecurity rates are twice that of the national US average. Hence, Stuff and colleagues (2004) used a representative sample of adults living within the Lower Mississippi Delta (LMD) region to assess associations between household food insecurity measured by the U.S. Food Security Survey Module and self-reported physical and mental health measured by the Short Form 12-item Health Survey (SF-12). Data were obtained from the FOODS 2000 cross-sectional telephone survey which was conducted among 36 counties within the region.

All total, 1488 participants completed both surveys necessary to compute food security and health status scores (Stuff et al., 2004). The demographic characteristics of the population included 46% male, 55.1% black and 44.9% white. Results of the surveys indicated that over one-fifth of households surveyed were food insecure (20.3%), with 27.9% of the sample population reporting an annual income of less than \$14,999. Of those participants surveyed, 20.2% reported poor health status. A much greater proportion of individuals living within food insecure households reported a fair to poor health status than food secure households ($p < 0.0001$). Similarly, lower SF-12 scores for both physical and mental scales were observed within those households documented as food insecure ($p < 0.0001$). Regression models were used to control for income, gender and ethnicity when determining factors associated with poor/fair health status. Results indicated an interaction between food insecurity status and race. In general, food secure households reported

better general health status than food insecure families, regardless of race. However, among those identified as food insecure, physical health status was higher among blacks than whites. The researchers suggested several possible explanations for this gender difference including that minority individuals may view chronic illness as a condition to be accepted rather than amenable to intervention and that there may have been differences in the way questionnaires and scales were answered by individuals of varying race/ethnicity. Finally, those households identified as food secure reported better scores than food insecure households on all outcome measures. Hence, these researchers suggest that households with inadequate food supplies are associated with poorer health status, and thus, these findings warrant continued efforts to improve health status and efforts to adequately feed individuals both within the LMD region and the nation.

This association was further studied among food insufficient African American and white female welfare recipients through preliminary research conducted by Siefert, Heflin, Corcoran, and Williams (2001). Investigators reported that while controlling for factors often associated with low socioeconomic status, household food insufficiency was a significant predictor of self-reported poor or fair physical health, limitations in physical functioning, and meeting the criteria for diagnosis of major depression. This 2001 cross-sectional research by Siefert and colleagues was further expanded when the investigators conducted a longitudinal study based upon the same data set (Siefert et al., 2004). This study greatly improves upon the original research

as it allows for analysis of persistent or recurrent food insufficiency and adds a measure of psychological functioning known as mastery, or the degree to which individuals feel they are in control of their own lives. Additionally since two waves of the same data set are analyzed, investigators can look at the effect of food insecurity on health status at wave 2, while controlling for baseline health status and common risk factors associated with poor health or mental status. In contrast to the national average for food insecurity (11.0%), over 30% of respondents within this welfare population were categorized as food insufficient at either both or one of the two testing periods (11.8% food insufficient at both waves, 12.7% at wave 1 only and 10.2% at wave 2 only). Risk factors commonly associated with poor health and mental status were prevalent among the population studied and included factors such as being identified as poor during the month prior to the survey, being currently unemployed, and/or experiencing numerous stressful life experiences or abuse during the prior year. Like the preliminary study, results indicated that food insufficiency was significantly associated with a self-report of fair to poor health status. Further, persistent or recurrent food insufficiency was a significant and independent predictor of health status. The researchers suggest that their findings also indicate that individuals do not have to be suffering from severe forms of food deprivation in order to feel the negative effects on physical and mental health. On a positive note, however, if food insufficiency occurs only on a short-term basis, effects on health may not persist long-term.

Food Insecurity and Obesity

An inverse association between overweight/obesity and food insecurity has been proposed and supported by considerable research (Wilde & Peterman, 2006; Jeffery & French, 1996; Sarlio-Lahteenkorva & Lahelma, 2001; Townsend, Peerson, Love, Achterberg, & Murphy, 2001; Hanson, Sobal, & Frongillo, 2007). This phenomenon represents a paradox; however, as individuals with inadequate food supplies are often thought as having limited intake, and thus, experiencing weight loss and malnutrition. Yet research has shown that the opposite is true, especially among women. While the mechanism associated with food insecurity and increased prevalence of obesity is not well understood, one common hypothesis is the inconsistent availability of food among food insecure households. Lack of consistent availability is thought to result in disordered eating patterns, such that under-consumption or limited consumption occurs when resources are constrained and over-consumption results when food supplies become available (Wilde & Peterman, 2006; Sarlio-Lahteenkorva & Lahelma, 2001).

Other hypotheses have been proposed for this phenomenon and include discrimination, restricted environmental opportunity, and culture (Jeffery and French, 2006). Research has consistently shown that an increased prevalence of obesity is directly related to women, but not men who are living within households with food constraints. Thus, each of the hypotheses explored here are specifically related to women living in food insecure households. Discrimination, as proposed by Jeffery

and French (1996), suggests that lower socioeconomic status experienced by obese women results from social forces that block socioeconomic advancements as a function of obesity. Other research supporting this hypothesis included data suggesting that obese women were less likely than non-obese women to marry, and that obesity impacts both educational and employment opportunities. These researchers suggest that limited access may partially explain the differences in obesity rates, as low socioeconomic status imposes an economic liability on women that bears negative behavioral consequences. Meaning, that the reduced educational opportunities afforded to women of low socioeconomic status results in a lower knowledge and skills level of behaviors associated with weight loss. These restraints also prohibit accessibility to many behavioral practices positively associated with weight control such as access to healthy foods and locations conducive to a safe exercise environment. Finally, Jeffery and French suggest that culture may have an impact on weight status, as many women living within poverty place less value upon weight control. Individuals with lower economic status are often faced with stressful life situations that leave these individuals with less time, effort and resources to devote to weight control behaviors. Additionally, standards in physical attractiveness may be lower among these individuals than those with higher economical status.

Based upon these hypotheses, Jeffery and French (1996) examined differences in weight concerns and behaviors among women from a diverse range of socioeconomic status. Key outcomes explored included how health behaviors related to energy

balance, whether concern about weight and weight control practices differed among economic status, and how psychosocial characteristics might influence body weight by socioeconomic category. Data from 988 women were obtained from baseline surveys conducted during the Pound of Prevention study; an intervention which sought to evaluate the effectiveness of low-cost interventions on reducing weight gain as women age. Findings suggest that current BMI, BMI at 18 years of age, maximum BMI, and rate of weight gain with age were inversely related to income. In all cases, BMI status decreased incrementally as income group increased ($p=0.0001$). Interestingly, women in the lowest income category ($< \$10,000$ annual income) were four times more likely than women in the highest income group ($> \$40,000$ annual income) to experience an unintentional weight gain greater than 20 pounds (9 kg). To support these data, researchers reported that women among the lowest income categories reported consuming a greater number of calories and a greater percentage of calories from dietary fat than their higher socioeconomic counterparts. While differences in type of physical activity were detected, no differences in the amount of activity were reported among differing income levels. Women of higher economic status reported more recreation-based activities, while women of lower socioeconomic status engaged in a greater number of work-related and/or home maintenance-related forms of physical activity. Multivariate analyses revealed that income category alone explained 4% of the variance in body mass index ($R^2=.039$). Other demographic covariates accounting for variance in BMI included diet (7%) and

exercise behaviors (8.5%), weight concerns (11%), social support (4%) and weight loss practices (20%).

Jeffery and French (1996) suggest that these cross-sectional data provide only limited support to their proposed hypotheses. First, the researchers propose that steep gradients at the lowest end of the income distribution in body mass index as well as healthy and unhealthy dietary practices suggest the role of economic resources in determining weight control activities, and hence, this area warrants further study. Secondly, the hypothesis that women with low socioeconomic status care less about body weight was not supported by the researchers' finding, as neither perceived importance of weight or desired body weight differed among income levels. Data did support the premise of discrimination, as fewer lower income women were married and/or employed.

Energy density and energy costs are yet another hypothesis that has been proposed by researchers (Drewnowski & Specter, 2004). This potential mechanism suggests an inverse relationship exists between energy density (MJ/kg) and energy cost (\$/MJ). Energy density of foods has been said to be a key influence on daily caloric intake. Based upon this concept, energy density of foods is determined based upon their water content, such that foods heavily hydrated are energy-dilute while more energy-dense foods are often composed of refried grains, added sugars or fat. Ironically, more calorically or energy-dense foods are often the most economical to purchase

(Drewnowski, 1998). Analysis of food prices suggests a hierarchy with dry, shelf-stable products generally costing less than those perishable products containing a higher water-content such as meat or fresh produce. For example, while the energy cost of chips or cookies is approximately 20 cents/MJ (1200 kcal/dollar), fresh carrots are much more costly at 95cents/MJ (250 calories/dollar). An even greater hierarchy is observed among beverage options, with the energy cost of soft drinks being only 30 cents/ MJ (875 kcal/dollar) as opposed to orange juice from concentrate costing 143 cents/MJ (170 kcal/dollar). Hence, Drewnowski and Specter (2004) speculate that this inverse relation between energy density and energy cost suggests that “obesity-promoting” foods are those foods that offer the most dietary energy at the lowest price. Hence, the researchers suggest that the association between obesity and poverty may be mediated, at least in part, by the low cost of energy-dense foods and further reinforced by the high palatability of sugar and fat contained within such foods.

While the link between food insecurity and obesity has been studied for a little over the past decade, the body of literature available was greatly expanded based upon the work by Wilde and Peterman (2006). Until this research, no other nationally representative, longitudinal research had been conducted regarding this phenomenon. Using data obtained from the National Health and Nutrition Examination Study (NHANES) during 1999-2000 and 2001-2002, the researchers sought to determine whether an association existed between food security status and change in weight

across time. NHANES provided data regarding household food security status during the previous 12 month reference period as well as current weight and weight 12 months prior to the survey. As opposed to other research that has assessed food security status based upon the single USDA food sufficiency question, the 18-item US Food Security Module was used to assess food security status within the NHANES data collection. Using simple bivariate comparisons, women living within fully food-secure households exhibited the lowest prevalence rate for overweight or obesity, while women categorized within the remaining three food security categories exhibited significantly higher BMI status. Obesity ($BMI \geq 30 \text{ kg/m}^2$) was lowest among fully food-secure women (30.9%), but only significantly higher among women in the intermediate categories of marginally food secure and food insecure without hunger (43.1% and 46.3%, respectively). Further, women living in fully food secure households were least likely to report a weight gain of five pounds or greater during the previous year. Similar to other findings, the researchers reported that those women in households with intermediate levels of food insecurity were significantly more likely to report weight gain. For example, the prevalence of a 10 pound (4.54 kg) weight gain was lowest among those women who were fully food secure (20.7%) compared to marginally food secure (34.6%), food insecure without hunger (32.9%) and food insecure with hunger (30.6%). Hence, the prevalence of weight gain detected across the previous one-year period traced an “inverted U shape” pattern, with the highest level of weight gain experienced among women from households with intermediate food insecurity levels.

In contrast, similar analyses conducted among men indicated that mean BMI and prevalence of overweight or obesity were actually moderately lower among men living within households that were food insecure without hunger as compared to fully secure households. Prevalence rates of 5- and 10-pound weight gain among men were lowest among fully food secure and slightly higher among marginally food secure men. The researchers conclude that this longitudinal research confirms that the greatest amount of weight gain and highest prevalence rates for overweight and obesity are experienced by women living within households of intermediate levels of food insecurity. While a causal relationship cannot be established based upon these findings, the results do strengthen the available evidence. The authors suggest the reason that the most severe category of food insecurity did not have the highest prevalence of BMI or weight gain is because these individuals experience energy deficits more frequently than those in less severe categories.

While research has consistently shown that food insecurity is positively associated with increased body weight among women, but not men, Hanson, Sobal and Frongillo (2007) conducted research to decipher characteristics and roles of individuals who are likely to be both food insecure and overweight or obese. Cross-sectional data obtained from NHANES 1999-2002 were analyzed, with 4338 men and 4172 women included within the analysis. Demographic trends associated with lower food security

status included those individuals that were never married, cohabiting, and separated or divorced men or women. Of those surveyed, separated and divorced men and women were most likely to report very low food security. Overall, separated women had the lowest reported income (172% federal poverty level) as well as the lowest level of food security (66%) and highest level of overweight status (76%). Also among the least educated and poorest were widowed men and women, yet food security levels were relatively high (90% men and 88% women).

In contrast to other findings, Hanson and colleagues (2007) found that marginally food secure men exhibited higher BMI than fully food secure men (+1.2 kg/m², P <0.05). Additionally, men that reported marginal food security were also more apt to be overweight or obese than their fully food secure counterparts. However, men experiencing low food security exhibited lower BMI as well as lower prevalence of overweight or obesity as compared to those men who were fully food secure (-0.9 kg/m², p <0.05). For women, similar trends were true with marginally food secure women reporting a higher BMI (+0.8 kg/m², p=0.10) and tendencies toward overweight or obesity. Further, women experiencing low food security were significantly more likely to be obese than their fully food secure counterparts. No significant interactions between marital status and food insecurity in relationship to body weight status were found among men, although variations were found among women. Compared with fully food secure, never-married women, food insecure

women living with partners and food insecure widows were more likely to be obese. Thus, Hanson and colleagues concluded that marital status was associated with food insecurity among men, but not women. The researchers suggested that women are the primary source of social networks within a marriage, and when wives are no longer present, a lack of social supports is available to mediate periods of economic distress. Hence, one potential population for food assistance is divorced men. Consistent with other researchers, Hanson and colleagues found that marginally food secure women were more likely to be overweight, while women with low food security were more apt to be obese. Interestingly, the researchers propose that body weight may influence reported food insecurity, as overweight or obese women may report food insecurity due to their eating habits and importance of food within their lives. These findings suggest that gender differences do in fact exist. As food security becomes compromised, men tend to exhibit lower body weight while women have a tendency for higher body weight. The authors suggest that more research is warranted to better assess the temporal order and processes involved with associations between gender, marital and non-marital partnerships, food insecurity, and body weight. Once these associations are better understood, interventions to address obesity and food insecurity can be better developed.

Nutritional Status

Until recent years, little data had been conducted to examine the relationship between hunger and nutrient intake. Research that has been conducted has suggested a

number of nutrition-related issues such as decreased caloric intake, reduced consumption of nutrient-rich foods such as fruits, vegetables and dairy products as well as disordered eating patterns. As a result of reduced caloric intake, decreased intake of key nutrients and antioxidants has also been reported.

Households suffering from food insufficiency often use certain coping strategies to deal with an inadequate food supply. Research conducted by Kempson, Keenan, Sadani, Ridlen and Rosato (2002) sought to identify which food management practices are most often used, and of these, which may pose food safety and nutritional risks. Semi-structured interviews were conducted with Rutgers Cooperative Extension EFNEP (New Jersey Expanded Food and Nutrition Education Program) and FSNEP (New Jersey Food Stamp Nutrition Education Program) educators to inquire about stories their participants may have shared regarding the practices they have been forced to use to ensure food sufficiency. Responses from 51 nutrition educators were compiled and constant comparative methods were used for analysis. Results indicated that two separate trends emerged: 1) manage food supply, and 2) regulate eating patterns. In general, strategies used to manage food supplies presented more food safety than nutrition risks. Participants often cited making low-cost dishes, removing slime or mold from foods, or diluting foods to make them last longer. Other strategies were suggested for rationing or conserving food supplies such as labeling food with family member names, locking up or hiding food, limiting the amount of food consumed and taking leftovers from charitable organizations. Proper

food storage was lacking as refrigeration and other storage techniques were often unavailable or limited. One educator recalled the following story: “They only had this little refrigerator. So people would begin to take their mayonnaise and butter and they would put it on the windowsill...to try to keep it cold. I had seen them keep the butter until it got rancid, and they would still be using that” (p. 1797). More nutritional risks were identified among the strategies used to regulate eating patterns. Techniques that were used included restricting food intake for the sake of others, overeating when food became available, consuming expired or non-food items, seeking free food samples or finding road kill, and eating low-cost foods. Additionally, cyclic food patterns were reported, with many households consuming fresh food at the beginning of the month, followed by only canned or packaged food remaining at the end of the month. Many families had very little resources remaining at the end of the month; hence, variety was often limited and many households had to resort to using emergency food supplies. This research is important, especially for nutrition educators, as it reveals the broad spectrum of risky food management practices that food insufficient households often practice. The researchers conclude the manuscript with numerous suggestions for educators regarding ways that they may be able to work with participants with resource constraints to ensure that they are consuming both a safe and nutritious food intake.

One of the first studies conducted to examine food sufficiency and nutritional status was a national study conducted by Cristofar and Basiotis (1992) using data obtained

from the 1985-1986 Continuing Survey of Food Intake by Individuals. Although the researchers did not account for other underlying social or demographic characteristics, results suggested that 19- to 50-year old women from food insecure households had lower nutrient intakes than women living in food secure households. Rose and Oliveira (1997) conducted a similar study using data from the 1989-1991 Continuing Survey of Food Intake by Individuals and sought to quantify the relationship between food insecurity and nutrient intake while controlling for other factors that might have an independent effect on diet. Three populations were targeted: preschool children (ages 1 to 5 years), adult women (19-50 years) and the elderly (males and females 65 years and older). Dietary intake data were obtained by a single 24-hour dietary recall conducted by trained interviewers. Accuracy of portion size and preparation techniques was increased by conducting interviews within the home. Data were entered into a nutrient database designed by the USDA and energy plus 14 additional nutrients were examined. Nutrient intakes for each person were divided by the Recommended Daily Allowance (RDA) for that individual and then expressed as a percentage. Nutrients were flagged as “low intake” when an individual’s consumption was less than 50% of the RDA. Food sufficiency was determined using the one-item US food sufficiency question which asked “Which of the following statements describes the food consumption within your household: 1) Enough of the kinds of food we want to eat; 2) Enough, but not always what we want to eat; 3) Sometimes not enough to eat; 4) Often not enough to eat.” Respondents selecting statement one or two were categorized as food secure while statements three

and four were identified as food insecure. Other confounding factors that were considered within the analysis were race and ethnicity, household composition, educational level, socioeconomic status and participation within USDA food assistance programs (Food Stamp Program, National School Lunch Program or the Special Supplemental Nutrition Program for Women, Infants and Children). Regional food habits and time of consumption were controlled for by examining region, urbanization, season, year and whether dietary intake was examined during a weekday or weekend. Finally, the following individual-specific variables were also controlled for within the analysis: age, smoking status, pregnancy or lactation, and gender.

Within the findings reported by Rose and Oliveira (1997), dietary intakes for preschoolers were overall adequate, with the exception of Vitamin E and zinc among those children living within food insecure families (71% and 63% of RDA, respectively). Less favorable dietary intakes were reported by both women and the elderly. Food insecure adult women were found to have inadequate intakes (less than two-thirds the RDA) for six nutrients: energy, calcium, iron, vitamin E, magnesium and zinc. Similar findings were reported among food insufficient elderly, with a major finding that the mean energy intake was only 58% of the recommended daily allowance. Additionally, these elderly adults reported intakes less than two-thirds the RDA for calcium, vitamin E, vitamin B₆, magnesium and zinc. Regardless of age group, the mean nutrient intake of selected nutrients was consistently lower among

those households categorized as food insecure compared to those as food secure. The researchers suggest that the strongest evidence for impact of food insecurity on nutritional status occurred among the elderly population studied. Interestingly, unlike the elderly and women population, food insufficiency among preschool children was not associated with a low intake of any of the nutrients studied. The researchers suggest that women were likely giving up food to ensure adequate consumption for children. Additionally, children may also be receiving breakfast and lunch during school. Findings from this research are important when considering future efforts to improve food assistance and nutrition education targeted towards individuals living within food insufficient households.

These previous studies provide a wealth of information pertaining to food insufficiency and nutrition; however, the knowledge available was greatly expanded by the work of Dixon, Winkleby, and Radimer (2001) when they included serum concentrations of nutrients, which reflect longer-term nutritional status than that simply captured during 24-hour dietary recalls. Cross-sectional data from the National Health and Nutrition Examination Survey (NHANES III) were used to establish whether dietary intakes and serum nutrients differed between adults living in food sufficient and insufficient households. Food sufficiency status was determined by asking the following single statement question, “Which one of the following statements best describes the food eaten by you/your family? 1) Do you have enough food to eat, 2) sometimes not enough to eat, or 3) often not enough to eat.” Based

upon these responses, individuals answering statements two or three were categorized as food insecure while those that answered response one were identified as food secure. Dietary intake was assessed by both a single 24-hour dietary recall and a one-month food frequency questionnaire (FFQ) containing 60-items. Fasting blood draws were completed on subjects with concentrations of serum lipids, serum albumin, serum carotenoids, serum vitamins A, C, E. serum and red blood cell folate, serum vitamin B₁₂, and serum ferritin analyzed within the context of this study.

Results indicated that among younger adults (age 20-59 years) calcium intake was lower among food insufficient families than food sufficient families. Young adults from food insufficient households were also more likely to have calcium and Vitamin E levels less than 50% of the recommended amounts. The one-month FFQ revealed that younger adults living within food insufficient households were less likely to consume milk/milk products, fruits/fruit juices, or vegetables. Among older food insufficient adults, energy intake was often lower as were intakes of vitamin B₆, magnesium, iron and zinc. While these findings are similar to those presented by other researchers, mean serum concentration levels were within normal ranges for all age ranges in both food sufficient and insufficient households. However, younger adults from food insufficient households demonstrated lower serum concentration of total cholesterol, vitamin A and three carotenoids, while older adults presented with lower concentrations of HDL cholesterol, albumin, Vitamin A, and Vitamin E. Correlation analyses indicated that although adults from food insufficient families

typically had lower intakes and lower serum concentrations of many nutrients, dietary intakes were weakly correlated with the serum nutrients. The authors suggest that the research may have actually understated the poor nutritional status as only one individual per household was surveyed, while the food sufficiency question inquired about the status of the entire family. Hence, since food insecurity is a complex phenomenon, different persons within a family may experience food insufficiency at different times. Additionally, the food sufficiency question did not provide a time range, and hence, dietary intake methods may not have captured a time when food insufficiency actually occurred. Regardless, the findings are similar to those presented by Rose and Oliveira (1997), and suggest a need for improving nutritional status by ensuring that all Americans have an ample supply of food available.

A brief overview of this concern was addressed within a 2004 editorial (Holben & Myles, 2004), with specific recommendations being made for considerations that should be taken into account when physicians work with patients that may have inadequate food supplies. Holben and Myles suggest that physicians should consider whether food insecurity may be a concern when obtaining patient history information. While many physicians may be pressed for time and feel that the issue is not pressing for current treatment, the authors suggest that compliance to prescribed treatment regimens may hinge upon whether this important issue is taken into consideration or not. Sadly, many individuals living within food insecure households have difficult decisions to make regarding what they can and cannot afford. America's Second

Harvest (Kim, Ohls, & Cohen, 2001) reported that 30% of emergency food clients had to choose between purchasing food, medicine or medical care. An even greater percentage of these households (45%) were forced to choose between food and utilities such as heat. Thirty-six percent of families even had to select between basic needs such as food and rent or mortgage. Hence, when physicians learn that limited resources may be available and food insecurity is likely, they should further inquire about any weight loss or dietary habits that may result from a lack of an adequate food supply. The editorial includes a detailed set of tables that provide referral information as well as Food Assistance Programs that are available within the United States.

Nutrition Education as a Means to Combat Food Insecurity

Although overt forms of malnutrition rarely occur within the United States as compared to that observed among many Third-World countries, this review of literature has established that limited availability to adequate and safe food supplies is a major concern for many individuals living within the United States. To combat this growing concern, interventions and federal nutrition assistance safety nets are warranted. Although numerous food assistance programs and interventions are currently available, due to the brevity of this review, this paper will simply address the role nutrition education may play in the alleviation of this phenomenon.

Food Insecurity and Nutrition Education

Nutrition education as a means for decreasing the prevalence of food insecurity is a concept that has only briefly been explored. Keenan and colleagues (2003) indicate within their extensive review that educators working with vulnerable populations often recount stories that support improvements in food security status through increased nutrition education. While personal accounts and success stories have been told, empirical research has yet to be conducted. Although this type of intervention may hold promise for future interventions, others are skeptical. During manuscript preparation, Keenan and colleagues obtained personal communication from Dr. Chris Hamilton of Abt Associates, who commented “food insecurity is presumed to arise principally from economic constraints, which are beyond the reach of nutrition education. Nutrition education may teach people how to maximize the nutritional value they obtain with the resources they have available, but one would expect this effect to be small relative to the effect of what they have available” (S51).

In contrast to this skeptical viewpoint, Keenan and colleagues (2003) propose that nutrition education may arm families of lower economical status with the knowledge necessary to make good decisions about food consumption and management; hence, potentially increasing food security. These researchers suggest that should nutrition education be utilized as a potential intervention for improving food security status, additional indicators of food security changes that occur as a result of nutrition education may be warranted. Thus meaning, nutrition education may reveal other

indicators of food security, such as unsafe food preparation and acquisition practices, which should then be considered for inclusion within other food security measures.

Discussion

As shown by the research presented within this review, even within a country as affluent as America, millions of individuals are forced to make difficult decisions which often result in having a limited or restricted food supply. While the extent of the issue is not as great as other less developed countries that must deal with statements such as this one made by the Food and Agriculture Organization of the United Nations (FAO): "In moral terms, just stating the fact that one child dies every five seconds as a result of hunger and malnutrition should be enough to prove that we cannot afford to allow the scourge of hunger to continue -- case closed;" this is still a growing concern that is largely preventable within the United States (FAO, accessed July 15, 2007, ¶ 2).

Through the past few decades, assessment techniques have improved and are able to better identify those in need, yet efforts made to reduce the prevalence of food insecurity have not yet made a significant impact. Trends are improving, but additional measures must be taken in order to meet the goals that have been set by many National programs to help alleviate this preventable threat. Currently, 89% of Americans are food secure throughout the course of the year. This would require a 5% further reduction in food insecurity in order to meet the Healthy People 2010 objective of increasing food security within America to 94% (Healthy People 2010). Similar reductions would also be necessary to reach those goals set by the US Department of Agriculture's Community Food Security Initiative, which calls for

reducing the prevalence of US food insecurity by half by the year 2015 (National Center for Appropriate Technology, accessed July 15, 2007).

Potential Vulnerable Groups

As with any health disparity or public health issue, there are always those individuals who are more vulnerable or susceptible to an issue than other individuals. In this case, which individuals may be more vulnerable towards not having a consistent supply of food available each month? The previously stated findings reported from the *Household Food Security in the United States, 2005* report (Nord et al.) provide some insight into these vulnerable populations by identifying those groups of individuals reporting higher prevalence rates of food insecurity. It appears that food insecurity may be more or less prevalent among different genders, age groups, marital status, living arrangements, socioeconomic status and/or regions of the country. The most obvious vulnerable population might be those individuals with lower socioeconomic status. This factor is inherently implied within food insecurity questionnaires, as is evident in the U.S. Household Food Security Questionnaire, which includes statements such as “because there wasn’t enough money for food” or “because we couldn’t afford it.” Yet many middle income households, and even some higher income households, report experiencing food insecurity at some point during the course of the year. For example, middle-and higher income families accounted for 20% of all food insecure households in the nation during 1995-1997 as reported by

the Current Population Survey Food Security Supplement (Nord & Brent, 2002).

Nord and Brent suggest that a portion of these individuals may actually be food sufficient, but that some individuals with middle and higher incomes may answer the food security questionnaire erratically or not understand the questions being asked. Responses appear to be less consistent among higher income than lower income households; yet these inconsistencies likely only account for a small portion of those middle to high income households categorized as food insecure. Other reasons have been suggested for this apparent anomaly: incomes may be uneven throughout the course of the year; multiple families may live within the same location yet not equally share resources; and/or household compositions may have changed during the course of the previous year.

Although national surveys utilize surveying techniques to capture a representative sample, these data potentially conceal segments of the population that are at higher risk for food insecurity. These populations have smaller numbers or are hidden from national surveys (Quandt, Shoaf, Tapia, Hernandez-Pelletier, Clark & Arcuy, 2006). For example, geographically defined pockets of low-income populations, as is the case in Appalachia, the lower Mississippi delta, and Los Angeles County, California, have much higher rates than the national US average. Additionally, the very groups that are most vulnerable may not be well-represented within these statistics as these individuals may be harder to reach. Individuals living in poverty may not have access to a telephone or may live within more rural areas where sampling is limited.

Immigrants, who have been shown by researchers (Quandt et al., 2006) to be highly food insecure, may be difficult to identify and receive information because they fear deportation. This population of individuals is rapidly growing within the United States and faces immense barriers to maintaining a food supply as they often lack valid immigration documents and hence are unable or unwilling to seek assistance. Other vulnerable populations that might not be accurately captured within national surveys are those individuals that have severe mental illness or mental retardation. Strides have recently been made to integrate individuals with mental illness within the community; and hence, these individuals face many barriers that may limit their ability to maintain a consistent supply of nutritionally adequate food. Poverty is a common risk factor for food insecurity, and not surprisingly, individuals with mental illness often report limited income. Other potential barriers may include limited social networks, restricted means of transportation, and lower educational status. While this group of individuals appears to be particularly vulnerable, no research examining the prevalence or underlying causes of food insecurity have been conducted within this population.

Importantly, the reasons that some individuals may be more prone to having an inadequate supply of food may differ among various groups or populations of individuals. While financial constraints are one obvious reason for having a limited food supply, limitations in transportation, limited cooking skills, inadequate

knowledge pertaining to nutrition or food budgeting, limited social networks and functional impairments are other potential reasons that shortages may exist.

Limitations of Current Assessment Tools and Research

The assessment tools that have been developed and refined over the course of the past few decades offer valuable insight into this tremendous public health issue; yet many of these tools are limited in the findings they may produce. As mentioned previously during this review, the broad scale questionnaires used to assess food security status are more reliable and have superior sensitivity and specificity than the other single-indicator questionnaires, yet in many studies that are completed, time is a limiting factor. Consequently, many researchers choose to base their classifications of food security solely upon these single-indicator questions.

One limitation of the questionnaires validated and used to assess food insecurity is that these questionnaires address only part of the issue of food security. By definition, food security occurs “whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain” (Anderson, 1990, p. 1560). While the assessment tools detect with reasonable accuracy whether or not financial constraints preclude households from maintaining a consistent supply of food each month as well as partially addresses the issue of nutritionally adequate food supplies, it fails to address the remaining factors provided within its very definition. In no case does the measure identify strategies

that are used in order to avoid having such problems. Strategies that have been reported often include methods that would not be considered to be safe food nor obtained in socially acceptable manners. Further, how are these factors defined? If this definition is going to include the specification that the food is safe for eating, foods that are not safe need to be well- defined and need to be somehow included within the food security assessment. Likewise, obtaining food in socially acceptable manners may be a matter of opinion based upon the culture of the population being questioned. The definition further indicates “without resorting to emergency food supplies, scavenging, stealing or other coping strategies” (Anderson, 1990, p. 1560). In many communities using emergency food supplies such as that obtained through charity organizations, food pantries and soup kitchens is common for many community members. Although others may view this as an undesirable method, these individuals are utilizing the precise services that have been created to assist with the food security crisis, and by doing so, are often able to avoid having a food insufficient household. Again, these distinctions are not made, and thus, it is unclear whether individuals utilizing emergency food services consider themselves as not having enough food available or whether they consider themselves to be food secure because these services enable them to not have to restrict their intake or go without food.

Although nutritional adequacy is to some extent addressed within the assessment of food security status, the question used to assess this issue is one that is vague and not well-defined. Within the U.S. Household Food Security Questionnaire (Bickel et al.,

2000), availability of a nutritionally adequate food supply is assessed using the following question; “In the last 12 months, we couldn’t afford to eat balanced meals” (was that often true, sometimes true, or never true). The response to this question depends largely on what that individual considers to be a “balanced meal.” This question assesses whether the quality of the foods and beverages consumed is affected by financial constraints, and thus, is used as a threshold indicator of food insecurity. According to the federal government, those respondents who reply affirmatively to this question (often true or sometimes true) have clearly crossed the line from being food secure to food insecure (Hamilton, Cook, Thompson, 1992). During scale validity assessment, this vague “balanced meal” question had a high level of variability compared with the other 17 questions. Why might this be? For starters, what “balanced meal” means for one person may be completely different than for another individual. This would be particularly true among different regions and ethnic groups.

Derrickson, Sakai and Anderson (2001) conducted focus groups among low-income gatekeepers (those who purchased and/or prepared food) in Hawaii to clarify interpretations of the term “balanced meals.” Many respondents indicated that this term was confusing and some individuals responded “don’t know” on the questionnaire because the meaning of the term was not understood. Based upon these focus group findings, gatekeepers in Hawaii largely considered a balanced meal to be one that was composed of a starch, meat and vegetable. Responses were variable;

however, 53% of the respondents indicated that “balanced” meant at least three or more food groups. Interestingly, which three food groups these foods should come from varied greatly among respondents. Other typical responses included: all food groups, basic food groups, enough to eat, following the Dietary Guidelines, enough variety of foods or enough different foods, and no idea. According to Derrickson and colleagues, “It would be logical to expect that, in addition to diverse interpretations, this uncertainty about the meaning of this question will likely affect the validity and stability of this critical food insecurity threshold question” (756). Further, these authors suggest that misinterpretation of this important question may affect classification of household food security status that is based on the total number of affirmative responses. The second question within the U.S. Household Food Security Questionnaire (Bickel et al., 2000) that examines nutritional adequacy is one that is limited to those households with children. The question, “We relied on only a few kinds of low-cost food to feed the children because we were running out of money to buy food,” accurately captures one common coping strategy used to avoid food insecurity, but yet is only asked of children and not other individuals within the household.

Finally, the assessment by the National Research Council on the USDA’s food security measurement and monitoring methods revealed that since hunger is a separate concept from food insecurity, the USDA should develop a program to derive a separate measure to assess hunger (Panel to Review USDA’s Measurement of Food

Insecurity and Hunger, 2006). The expert panel suggested that to measure hunger, which is an individual and not household construct, modified or new data gathering mechanisms are necessary. Prior to the development of any new assessment tools, an operationally feasible concept and definition of hunger is imperative. Although the questions within the assessment tool have not changed and the new terminology associated with the measure are comparable to previous terminology, the ability to assess hunger as a potential consequence of food insecurity is currently limited.

Future Research

Future research should be directed at conducting both quantitative and qualitative methods within those populations that have been identified as being more vulnerable towards food insufficiency. Simply utilizing quantitative methods to assess the prevalence of this public health issue among various populations is insufficient as this does not identify the underlying reasons, needs, and barriers that are associated with an inadequate supply of food. Further in-depth, semi-structured interviews and/or focus groups will add rich details that might provide insight into improving existing programs or identify needs for additional programs.

Better assessment tools are necessary to capture the full definition of food insecurity. Questions within these assessment tools should be reassessed with terms better defined to allow for consistency among researchers. Items to capture nutritional adequacy, using safe food and socially acceptable methods should some how be

incorporated within these measures. Better methods should be used to ensure a representative sampling of the nation in which more vulnerable, harder to reach populations are included. Further, researchers should begin to develop separate measurement tools to capture the prevalence of hunger within the United States.

Should lack of knowledge pertaining to nutrition, meal planning and food budgeting be identified as an underlying cause for food insufficiency, this would be a potentially valuable avenue for researchers to consider. Designing carefully tailored interventions aimed at providing the knowledge and skills necessary to plan and budget meals using low-cost, nutritious foods may provide these individuals the means to more effectively budget their money and food supplies throughout the entire course of the month. Demonstrations could be made to show households how to utilize leftovers and how to balance less healthy foods with those foods that may be low-cost but more nutritious. Individualized grocery shopping tours with individuals trained in the nutrition field could provide households with hands on experience with using store advertisements, coupons, unit pricing and other budgeting techniques. Depending on the population being targeted, different ethnic or regional foods, meals requiring minimal cooking skills, or other issues could also be taken into consideration. Researchers should consider adding assessment tools to determine if knowledge and skills level actually increase as a result of these interventions. Similarly, follow-up assessments could be conducted in the long-term to determine if

these real world skills were permanently implemented and if these changes have led to households being more consistently food secure.

Conclusions

Recent research indicating that food insecure households may be more prone to experiencing health conditions such as obesity, poorer mental and physical health and inadequate dietary intakes suggest that the consequences of food insecurity are substantial and potentially long-term. Improvements in measurement techniques and additional qualitative research to determine underlying causes and barriers to food security are essential to revising and improving food safety net mechanisms within the United States.

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Appendix A

Community Childhood Hunger Identification Project (CCHIP)

Community Childhood Hunger Identification Project (CCHIP)

Questions:

1. Does your household ever run out of money to buy food to make a meal?
2. Do you or members of your household ever eat less than you feel you should because there is not enough money for food?
3. Do you or members of your household ever cut the size of meals or skip meals because there is not enough money for food?
4. Do your children ever eat less than you feel they should because there is not enough money for food?
5. Do you ever cut the size of your children's meals or do they ever skip meals because there is not enough money for food?
6. Do your children ever say they are hungry because there is not enough food in the house?
7. Do you ever rely on a limited number of foods to feed your children because you are running out of money to buy food for a meal?
8. Do any of your children ever go to bed hungry because there is not enough money to buy food?

Scoring:

Hunger Criterion: 5 positive responses or more out of 8.

Appendix B

Radimer/Cornell Hunger Scale

Radimer's Hunger Scales

Household Hunger

1. Do you worry whether your food will run out before you get money to buy more?
2. The food that I bought just didn't last and I didn't have money to get more.
3. I ran out of the foods that I needed to put together a meal and I didn't have money to get more food.
4. I worry about where the next day's food is going to come from.

Women's Hunger

5. I can't afford to eat the way I should.
6. Can you afford to eat properly?
7. How often are you hungry, but you don't eat because you can't afford enough food?
8. Do you eat less than you think you should because you don't have enough money for food?

Children's Hunger

9. I cannot give my child(ren) a balanced meal because I can't afford that.
10. I cannot afford to feed my child(ren) the way I think I should.
11. My child(ren) is/are not eating enough because I just can't afford enough food.
12. I know my child(ren) is/are hungry sometimes, but I just can't afford more food.

Response categories:

Hunger questions: never, sometimes, often.

Hunger statements: not true, sometimes, true, often true

Hunger Criterion: Any response other than "never" or "not true"

Appendix C**U.S. HOUSEHOLD FOOD SECURITY SURVEY MODULE:
THREE-STAGE DESIGN, WITH SCREENERS**

**U.S. HOUSEHOLD FOOD SECURITY SURVEY MODULE:
THREE-STAGE DESIGN, WITH SCREENERS
Economic Research Service, USDA
Revised 2006**

Revision Notes: The food security questions are essentially unchanged from those in the original module first implemented in 1995. The following changes were made in 2006:

- Minor changes were introduced to standardize wording of the resource constraint in most questions to read, "...because there wasn't enough money for food."
- Question order was changed to group the child-referenced questions following the household- and adult-referenced questions. The Committee on National Statistics panel that reviewed the food security measurement methods in 2004-06 recommended this change to reduce cognitive burden on respondents. Conforming changes in screening specifications were also made. NOTE: Question numbers were revised to reflect the new question order.
- Follow up questions to the food sufficiency question (HH1) that were included in earlier versions of the module have been omitted.
- User notes following the questionnaire have been revised to be consistent with current practice and with new labels for ranges of food security and food insecurity introduced by USDA in 2006.

Transition into Module (administered to all households):

These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year and whether you were able to afford the food you need.

Optional USDA Food Sufficiency Question/Screeners: Question HH1 (This question is optional. It is not used to calculate any of the food security scales. It may be used in conjunction with income as a preliminary screener to reduce respondent burden for high income households).

HH1. [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHESES, OTHERWISE, USE "WE."]

Which of these statements best describes the food eaten in your household in the last 12 months: —enough of the kinds of food (I/we) want to eat; —enough, but not always the kinds of food (I/we) want; —sometimes not enough to eat; or, —often not enough to eat?

- [1] Enough of the kinds of food we want to eat
- [2] Enough but not always the kinds of food we want
- [3] Sometimes not enough to eat
- [4] Often not enough to eat
- [] DK or Refused

Household Stage 1: Questions HH2-HH4 (asked of all households; begin scale items).

[IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND "YOU" IN PARENTHETICALS; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD."]

HH2. Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months—that is, since last (name of current month).

The first statement is "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

HH3. "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

HH4. "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

Screener for Stage 2 Adult-Referenced Questions: If affirmative response (i.e., "often true" or "sometimes true") to one or more of Questions HH2-HH4, OR, response [3] or [4] to question HH1 (if administered), then continue to ***Adult Stage 2***; otherwise, if children under age 18 are present in the household, skip to ***Child Stage 1***, otherwise skip to ***End of Food Security Module***.

NOTE: In a sample similar to that of the general U.S. population, about 20 percent of households (45 percent of households with incomes less than 185 percent of poverty line) will pass this screen and continue to Adult Stage 2.

Adult Stage 2: Questions AD1-AD4 (asked of households passing the screener for Stage 2 adult-referenced questions).

AD1. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes
- No (Skip AD1a)
- DK (Skip AD1a)

AD1a. [IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- DK

AD2. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

- Yes
- No
- DK

AD3. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

- Yes
- No
- DK

AD4. In the last 12 months, did you lose weight because there wasn't enough money for food?

- Yes
- No
- DK

Screener for Stage 3 Adult-Referenced Questions: If affirmative response to one or more of questions AD1 through AD4, then continue to *Adult Stage 3*; otherwise, if children under age 18 are present in the household, skip to *Child Stage 1*, otherwise skip to *End of Food Security Module*.

NOTE: In a sample similar to that of the general U.S. population, about 8 percent of households (20 percent of households with incomes less than 185 percent of poverty line) will pass this screen and continue to Adult Stage 3.

Adult Stage 3: Questions AD5-AD5a (asked of households passing screener for Stage 3 adult-referenced questions).

AD5. In the last 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

- Yes
- No (Skip 12a)
- DK (Skip 12a)

AD5a. [IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- DK

Child Stage 1: Questions CH1-CH3 (Transitions and questions CH1 and CH2 are administered to all households with children under age 18) Households with no child under age 18, skip to *End of Food Security Module*.

SELECT APPROPRIATE FILLS DEPENDING ON NUMBER OF ADULTS AND NUMBER OF CHILDREN IN THE HOUSEHOLD.

Transition into Child-Referenced Questions:

Now I'm going to read you several statements that people have made about the food situation of their children. For these statements, please tell me whether the statement was OFTEN true, SOMETIMES true, or NEVER true in the last 12 months for (your child/children living in the household who are under 18 years old).

CH1. “(I/we) relied on only a few kinds of low-cost food to feed (my/our) child/the children) because (I was/we were) running out of money to buy food.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

CH2. "(I/We) couldn't feed (my/our) child/the children) a balanced meal, because (I/we) couldn't afford that." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

CH3. "(My/Our child was/The children were) not eating enough because (I/we) just couldn't afford enough food." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

Screener for Stage 2 Child Referenced Questions: If affirmative response (i.e., "often true" or "sometimes true") to one or more of questions CH1-CH3, then continue to *Child Stage 2*; otherwise skip to *End of Food Security Module*.

NOTE: In a sample similar to that of the general U.S. population, about 16 percent of households with children (35 percent of households with children with incomes less than 185 percent of poverty line) will pass this screen and continue to Child Stage 2.

Child Stage 2: Questions CH4-CH7 (asked of households passing the screener for stage 2 child-referenced questions).

NOTE: In Current Population Survey Food Security Supplements, question CH6 precedes question CH5.

CH4. In the last 12 months, since (current month) of last year, did you ever cut the size of (your child's/any of the children's) meals because there wasn't enough money for food?

- Yes
- No
- DK

CH5. In the last 12 months, did (CHILD'S NAME/any of the children) ever skip meals because there wasn't enough money for food?

- Yes
- No (Skip CH5a)
- DK (Skip CH5a)

CH5a. [IF YES ABOVE ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- DK

CH6. In the last 12 months, (was your child/were the children) ever hungry but you just couldn't afford more food?

- Yes
- No
- DK

CH7. In the last 12 months, did (your child/any of the children) ever not eat for a whole day because there wasn't enough money for food?

- Yes
- No
- DK

END OF FOOD SECURITY MODULE

Appendix D

U.S. Household Food Security Survey Module: Six-Item Short Form

U.S. Household Food Security Survey Module: Six-Item Short Form
Revised September 2006

Revision Notes: The food security questions in the six-item module are essentially unchanged from those in the original module first implemented in 1995 and described previously in this document. The following changes were made in 2006:

- Minor changes were introduced to standardize wording of the resource constraint in most questions to read, "...because there wasn't enough money for food."
- Question numbers were changed to be consistent with those in the revised U.S. Household Food Security Survey Module.
- User notes following the questionnaire have been revised to be consistent with current practice and with new labels for ranges of food security and food insecurity introduced by USDA in 2006.

Background: The six-item short form of the survey module and the associated Six-Item Food Security Scale were developed by researchers at the National Center for Health Statistics in collaboration with Abt Associates Inc. and documented in "The effectiveness of a short form of the household food security scale," by S.J. Blumberg, K. Bialostosky, W.L. Hamilton, and R.R. Briefel (published by the *American Journal of Public Health*, vol. 89, pp. 1231-34, 1999). ERS conducted additional assessment of classification sensitivity, specificity, and bias relative to the 18-item scale.

If respondent burden permits, use of the 18-item U.S. Household Food Security Survey Module or the 10-item U.S. Adult Food Security Survey Module is recommended. However, in surveys that cannot implement one of those measures, the six-item module may provide an acceptable substitute. It has been shown to identify food-insecure households and households with very low food security with reasonably high specificity and sensitivity and minimal bias compared with the 18-item measure. It does not, however, directly ask about children's food security, and does not measure the most severe range of adult food insecurity, in which children's food intake is likely to be reduced.

[Begin Six-Item Food Security Module]

Transition into Module :

These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year and whether you were able to afford the food you need.

NOTE: If the placement of these items in the survey makes the transition/introductory sentence unnecessary, add the word “Now” to the beginning of question HH3: “Now I’m going to read you....”

FILL INSTRUCTIONS: Select the appropriate fill from parenthetical choices depending on the number of persons and number of adults in the household.

HH3. I’m going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months—that is, since last (name of current month).

The first statement is, “The food that (I/we) bought just didn’t last, and (I/we) didn’t have money to get more.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

HH4. “(I/we) couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

AD1. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn’t enough money for food?

- Yes
- No (Skip AD1a)
- DK (Skip AD1a)

AD1a. [IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- DK

AD2. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

- Yes
- No
- DK

AD3. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

- Yes
- No
- DK

[End of Six-Item Food Security Module]

User Notes

(1) Coding Responses and Assessing Households' Food Security Status:

Responses of “often” or “sometimes” on questions HH3 and HH4, “yes” on AD1, AD2, and AD3, and “almost every month” on AD1a are coded as affirmative (yes). The sum of affirmative responses to the six questions in the module is the household’s raw score on the scale.

Food security status is assigned as follows:

- Raw score 0-1—High or marginal food security (raw score 1 may be considered marginal food security, but a large proportion of households that would be measured as having marginal food security using the household or adult scale will have raw score zero on the six-item scale)
- Raw score 2-4—Low food security
- Raw score 5-6—Very low food security

For some reporting purposes, the food security status of households with raw score 0-1 is described as food secure and the two categories “low food security” and “very low food security” in combination are referred to as food insecure.

For statistical procedures that require an interval-level measure, the following scale scores, based on the Rasch measurement model may be used:

Number of affirmatives	Scale score
0	NA
1	2.86
2	4.19
3	5.27
4	6.30
5	7.54
6 (evaluated at 5.5)	8.48

However, no interval-level score is defined for households that affirm no items. (They are food secure, but the extent to which their food security differs from households that affirm one item is not known.)

(2) Response Options: For interviewer-administered surveys, DK (“don’t know”) and “Refused” are blind responses—that is, they are not presented as response options but marked if volunteered. For self-administered surveys, “don’t know” is presented as a response option.

(3) Screening: If it is important to minimize respondent burden, respondents may be screened after question AD1. Households that have responded “never” to HH3 and HH4 and “no” to AD1 may skip over the remaining questions and be assigned raw score zero. In pilot surveys intended to validate the module in a new cultural, linguistic, or survey context, however, screening should be avoided if possible and all questions should be administered to all respondents.

(4) 30-Day Reference Period: The questionnaire items may be modified to a 30-day reference period by changing the “last 12-month” references to “last 30 days.” In this case, items AD1a and AD5a must be changed to read as follows:

AD1a/AD5a. [IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?

_____ days

[] DK

(5) Self Administration: The six-item module has been used successfully in mail-out, take-home, and on-site self-administered surveys. For self-administration, question AD1a may be presented in one of two ways:

- Indent AD1a below AD1 and direct the respondent to AD1a with an arrow from the “Yes” response box of AD1. In a parenthetical following the “No” response box of AD1, instruct the respondent to skip question AD1 and go to question AD2.
- Present the following response options to question AD1 and omit question AD1a:
 - Yes, almost every month
 - Yes, some months but not every month
 - Yes, only 1 or 2 months
 - No

In this case, either of the first two responses is scored as two affirmative responses, while “Yes, only 1 or 2 months” is scored as a single affirmative response.

The two approaches have been found to yield nearly equal results. The latter may be preferred because it usually reduces the proportion of respondents with missing information on how often this behavior occurred.

Table 1
 USDA Revised Food Security Labeling

General Category (same for both old and new labeling)	Old Label	New Label
Food Security	Food Security	High Food Security
		Marginal Food Security
Food Insecurity	Food Insecurity, without hunger	Low Food Security
	Food Insecurity, with hunger	Very Low Food Security

Table adapted from USDA website:

<http://www.ers.usda.gov/Briefing/FoodSecurity/labels.htm>

Table 2
Overview of Food Security/Insecurity Measures

Food Security Measure	Method of Data Collection	# of Questions	Reliability (Cronbach's alpha; Test-Retest)	Validated	Sensitivity and Specificity
Single-item Indicators for Food Security/Insecurity at the Individual or Household Level					
CSFII and NHANES III food Sufficiency Question	In person, telephone, group	1 item	NA	YES	Sensitivity: 32% Specificity: 90%
EFNEP Reporting System- Behavior Checklist	In person, telephone, group	1 item	NA	NO	NA
Concern about Food Security Question	Telephone	1 item	NA	NO	NA
Broad Scales for Measuring Food Security at Individual or Household Level					
CCHIP	In person	8 items	YES $\alpha=.80-.89$	YES	NA
Radimer/Cornell Questionnaire	In person, telephone, group	13 items Subscales: Household (5) Women (4) Children (4)	YES $\alpha=.84-.86$	YES	Sensitivity: 89% Specificity: 63%
U.S. Household Food Security Scale	In person, telephone, group, self-administered	18 questions	YES $\alpha=.74-.93$	YES	NA
6-item Short form (US Household Food Security Scale)	In person, telephone, group	6 questions	Correctly classifies	NA	NA

Table adapted from Keenan et al., 2003.

Note: CSFII= Continuing Survey of Food Intakes by Individuals; NHANES III= Third National Health and Nutrition Examination Survey; EFNEP= Expanded Food and Nutrition Education Program; CCHIP= Community Childhood Hunger Identification Project