

EXAMINING THE ROLE OF FOOD BANK KNOWLEDGE, HEALTHY FOOD
BEHAVIORS, AND DEPRESSION ON FAMILY FOOD INSUFFICIENCIES

by

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Abstract

The Food Sufficiency Status Model is a conceptual model that was devised to help explain why some individuals are at an increased risk of becoming food insufficient. This model proposes that there are four factors that can influence an individual's food status they are—demographics, family status/household size, food risk factors, and depression. This study uses data from the National Health and Nutrition Examination Survey (NHANES, 2007-2008)—Flexible Consumer Behavior Survey Module ($n = 3,413$), collected by the Centers for Disease Control and Prevention (CDC). The overall results generally supported the Food Sufficiency model and explained 22% ($R^2_{adj} = 0.215$) of the variance in food sufficiency in the study's population.

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Dedication

To my wife, Eva, I would never have started this journey without your support and love. I now know that the hours and days must have been longer for you than me. I will never forget coming home at odd hours in the morning, and you still waiting up just to talk to me about my day. Sometimes that was all I needed to put everything into perspective, and to ease my mind. I know the road has been long, and we have hit some bumps along the way, but through it all you have been by my side. We both know that the journey has yet to end, but through love, perseverance, and our dedication to each other will see us through. I love you.

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Chapter One

Introduction

It is estimated that between 2.6 million and 3.7 million children die worldwide each year due to hunger (Falcon & Naylor, 2005; The Food and Agriculture Organization [FAO], 2004; The Hunger Project, 2005). Unfortunately, these numbers are considered to have a large margin of error, and are believed to be an underestimation (Falcon & Naylor, 2005; The Hunger Project, 2005). This margin of error can be thought of as all the additional deaths that are related to chronic diseases (e.g., diabetes, low birth-weight, and/or cardiovascular disease) caused by malnourishment in children and adults (The Hunger Project, 2005; The State of Food Insecurity in the World, 2004). In most cases malnourishment is caused by two variables; poverty and/or food insufficiency.¹ Although both of these variables have been shown to be related, one is not dependent upon the other. Some individuals and families may have incomes above poverty levels, yet still be food insufficient due to other compounding variables (i.e., geographical location, transportation, or lack of resource management skills). In contrast, some individuals or families may be earning incomes below poverty levels, but due to social safety nets (e.g., public welfare) the individual or family may be food secure.

Unfortunately, this epidemic of hunger is not limited to third-world countries or developing nations. Instead it is an issue that has been noted in most industrialized countries around the world, and the United States is no exception (Andrews, Bickel, &

¹In this thesis I have define food sufficiency as a family or individuals ability to have unbarred access at all times to safe and nutritious foods. It is clear from the literature (Barraclough, S., & Utting, P., 1987; FAO, 1983; Kracht, U., 1981; Maxwell and Smith, 1992; Reutlinger, S., & Knapp, K., 1980; Sahn, D., 1989; Siamwalla, A., & Valdes, A., 1980; Bickel, Nord, Price, Hamilton, & Cook USDA, 2000; World Bank, 1986) that those people who are food sufficient are able to sustain a healthy lifestyle without worries about being able to maintain their health because of a lack of food.

Carlson, 1998; Bickel, Andrews, & Klein, 1996; Carlson, Andrews, & Bickel, 1999; Eisinger, 1998; Bickel, Nord, Price, Hamilton, & Cook, 2000).

This issue of food insufficiencies is not a new one in America, and can be traced back to our colonial roots where the Queen's poor law was the order of the day, and it was the duty of the family to care for those who were hungry or starving (Achenbaum, 1978; Achenbaum, 2008; Trattner, 1999). Fortunately American social programs have come a long way from our colonial past, but tragically we have not come far enough. While there are many different social safety networks in place today to assist families in meeting their food needs, many American families are still food insufficient and may be suffering from severe hunger.

According to the current United States Department of Agriculture's report regarding household food security within the United States, approximately 20.3% of respondents/households who reported children in the home suffered from food insufficiencies at some point during the last year, and 12.3% of households without children also reported food insufficiencies (Coleman-Jensen, Nord, Andrews, & Carlson, ERS, Sep. 2012). In addition, 12.7% of families with children in the home reported low food sufficiency, as compared to the 67.0% of families that reported no problems in their ability to obtain foods at all times. Unfortunately for those families that are food insufficient or have low food sufficiency, the effects can lead to problems that extend far beyond mere hunger (Coleman-Jensen et al., ERS, Sep. 2012; Radimer & Nord, 2005; Wilde & Peterman, 2006; Winicki & Jemison, 2003).

In an attempt to further understand how individuals and families make decisions about their food status; this study examines how food sufficiency status are influenced by

other compounding and mediating variables present within the Food Sufficiency Status Model. This study will begin by looking at simple demographic variables and will follow logical pathways towards more specific variables that are hypothesized to influence the risk factors that mediate this study's outcome measure.

Purpose

The purpose of this thesis is to offer a clear and empirically defined explanation of food insufficiencies and the underlying causes as they impact families and their food sufficiency status. Unfortunately, in today's continuing economic recession, more and more families are experiencing food insufficiencies, even when social networks are in place to assist in combating their food related issues. In addition, a family's ability to become food sufficient can also be impacted by their lack of knowledge about food assistance programs within their local areas. This lack of knowledge about programs within the communities can lower the family's usage of those programs and thereby causes the family's struggles with food insufficiencies to continue. Food insufficiencies among families are also based on their own perception of food sufficiency, as well as the social support programs themselves.

Some families might perceive themselves as being food sufficient, when in actuality the family maybe food insufficient but just without hunger. Children within some of these "no hunger" homes might be considered food sufficient, while at the same time adults within the household might be skipping or cutting meals in order to insure that there is enough food for the children thus making themselves food insufficient (Maxwell & Smith, 1992). The social stigmas associated with emergency food assistance programs can prevent some families from using them (Blank & Ruggles, 1996; Blaylock

& Smallwood, 1984; Daponte, Sanders, & Taylor, 1999; Moffitt, R., 1983). Whether this was from their personal stigmas about the programs or from fear of others within the community finding out that the individual was using the programs was not made clear in the research (Daponte et al., 1999; Moffitt, 1983), but one could hypothesize that both factors could influence a family's usage of such food assistance programs.

Therefore, this study seeks to contribute to the current research knowledge base by including a less utilized family-base perspective, as well as a new model (Food Sufficiency Status Model) based on the principals of social exchange (Blau, 1964; Nye, 1979), symbolic interaction (Mead, 1934), and the social ecological theories (Bronfenbrenner, 1979) in an attempt to discover how a family's knowledge and usage of food programs, in addition to their healthy food behaviors, as well as the presence of depressive symptoms and how these three factors can influence their food sufficiency status.

Rationale

The effect that food insufficiencies have on families has been examined primarily through the lenses of agriculturalists, nutritionists, and economists. Each of these approaches has yielded valuable information. However, most of these approaches have been descriptive at best and have not attempted to use a family-based lens as proposed in this thesis. In short, a significant portion of previous work has not explained the factors related to food sufficiency in any cohesive fashion, although they have highlighted the importance of the problem. Within this thesis, I have examined the variables surrounding food bank network knowledge and usage, a family's eating behaviors (e.g. healthy eating habits vs. unhealthy eating habits), in addition to indicators of depression within food

insufficient families, and the impact these factors can have upon a family's food sufficiency status.

By examining the individual descriptive and social demographic factors that influence a family's make-up, this study will assess how these variables are related to the outcome measure. It makes logical sense that an individual's sex and race influences their level of education and income, and this in turn impacts their family design. Additionally, the make-up of the family can influence how the family eats as well as the family's food status. I theorize that the mediating variables influencing a family's food sufficiency status are their knowledge and usage of food banks within their community, the mental health status of parents, in addition to their healthy eating habits. These elements can combined to impact and effect the family's food sufficiency status, not only in how they obtain the foods they eat but also in the time and frequency that they eat.

Conceptual Theoretical Orientation

Academic research around food insufficiency has been at best atheoretical. As a result, the findings have not been adequately used to explain what and how individuals cope with or adjust to their situations. What I propose to do is to incorporate many different frameworks in an effort to explain a family's food sufficiency status, and how this status is impacted by food bank knowledge and usage, mental health status, as well as healthy food behaviors. I begin with using principles from the social exchange (Blau, 1964; Nye, 1979), symbolic interaction (Mead, 1934), and the social ecological theories (Bronfenbrenner, 1979) in an effort to construct the Food Sufficiency Status Model.

Social Exchange

An important aspect of social exchange theory is that actors are motivated to make rational choices based off their perception of cost verses reward in order to minimize problems and to maximize the outcomes. This study will be able to examine how families make decisions regarding their food sufficiency status, and how that status can affect how the family eats. An example of this might be when an individual decides that the reward of being able to eat and feed their children outweighs the cost of having to ask for help. By doing this, families are minimizing their food related issues in hopes of giving their children a balanced meal that can help them maximize their potential. Often times the food that the family acquires may not be considered nutritionally dense, and may in fact be loaded with sodium and fats.

Symbolic Interaction

Symbolic interaction is predicated on the axiom that what an individual defines as real has real consequences and when viewed from a family's perspective food status perception does have real consequences. If an individual defines their family as food insufficient, then they are likely to view the consequences of being food insufficient as real (e.g., hunger, lack of food, or having to cut meals), and this may be a motivating factor for families to search out emergency food options. Again the families that do seek out help may become food sufficient, but the foods they eat may not meet their nutritional needs.

Social Ecological Theories

The social ecological perspective is well suited to the study of families. It utilizes a systemic approach that allows one to study the interaction between the systems. It is

understandable that individuals and families (micro system) are affected by the multiple systems surrounding them (meso-, exo-, macro-, and chrono-system). An example of this could be when a family is food insufficient; they may go outside of their normal systems in search of relief to their food related issues. In addition, once these families are situated within these new systems e.g., food banks or church pantries (exosystem), other larger systems e.g., welfare from state and federal programs or women, infants, and children (W.I.C.) programs (macrosystem) may open up for them and offer assistance in order to help fight the families' food insufficiencies over time (chronosystem) .

Food Sufficiency Status Model.

In order to conceptualize the process that influences food sufficiency status the Food Sufficiency Status Model was developed. This model examines how a family's risk factors lead to issues of healthy food behaviors, depression, and ultimately food sufficiency. The model is depicted in Figure 1.1.

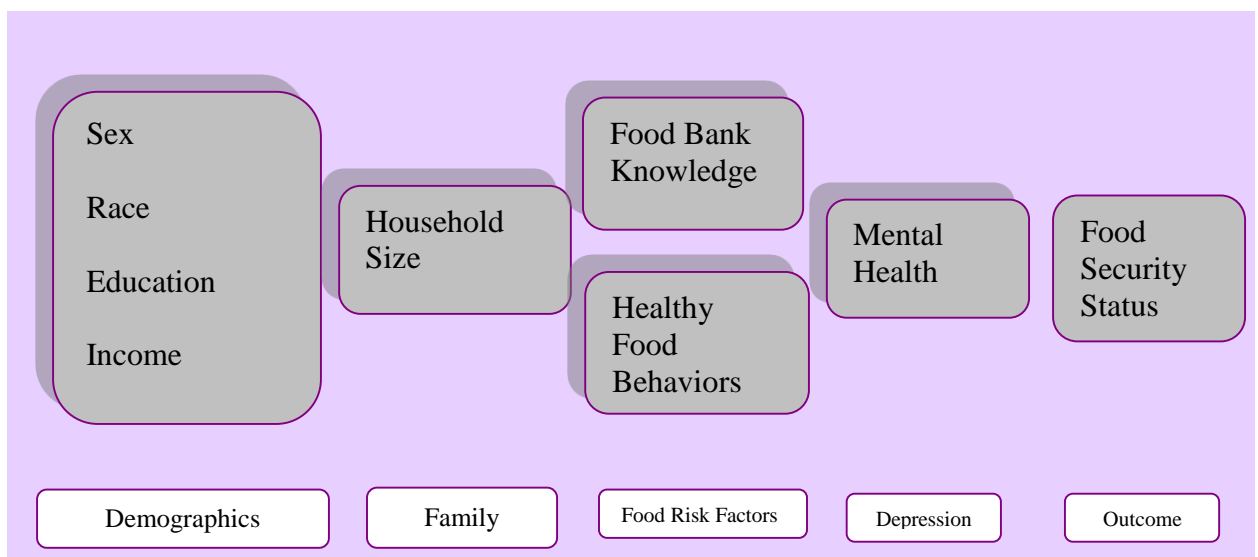


Figure 1.1
Conceptual Version of the Relationships and Risk Factors Influencing Food Sufficiency Status.

Conceptual Definition

In this section a brief description of the variables utilized within the Food Sufficiency Status Model are given. These measures helped to develop the Food Sufficiency Status Model.

Variables in the Study

I utilized multiple variables in this study in order to explore and measure the relationships between knowledge and usage of social safety networks (i.e., food banks, churches, or food pantries) within the communities, parental mental health status, a family's eating habits, and how these factors can influence a family's food sufficiency status. I categorized these variables into five different groups (four predictor groups and one outcome group). They are: demographics; family; food risk factors, depression and the outcome measure.

Outcome Measure

Food sufficiency status is the outcome measure because it logically follows the risk factors that lead to it. The outcome measure is a result of the different relationships that take place within the Food Sufficiency Status Model. A study of whether or not a respondent reported food insufficiencies within the household during the last year was observed.

Food Sufficiency Status—a respondent reported whether they were food sufficient, food insufficient without hunger, food insufficient with moderate hunger, or food insufficient with severe hunger during the current wave of the investigation.

Predictors

These variables help to predict the outcome measure, and are mainly demographic in nature. This thesis uses these variables to assist in measuring risk factors associated with the outcome variable.

Demographics

These variables are descriptive statistics of the individuals within the study, and provide a starting point in the Food Sufficiency Status Model. By first looking at the respondents' sex and race, the model is able to show how these individual variables influence the subsequent social variables.

Sex/Gender—refers to the biological sex of the respondent.

Race/Ethnicity—the respondents self-reported racial and ethnic groups.

These variables are social in nature and can be influenced by the individual demographics within the Food Sufficiency Status Model. Because a respondent's sex and race can influence their demographics, such as their highest level of education or their income level, it makes logical sense that these variables follow the preceding individual variables.

Education—the highest level of formal schooling that the respondent completed.

Income—the amount of money available to the responded.

Family Make-Up (Household Size)

These elements can all be influenced by the previous variables in the Food Sufficiency Status Model, and can have a direct effect on the food risk factors of the family or the individual. Based on the presents of children within the household, some families might be likely to seek out information regarding food banks within their

community in order to confront their food insufficiencies, all the while not being aware of the nutritional content of the foods they receive.

Household Size—this refers to the number of persons living within the household, including adults and children.

Risk Factors

These are the mediating factors that can have the heaviest influence on a family's food sufficiency status. This thesis hypothesizes that these variables will have a direct impact on a family's food sufficiency status.

Food Risk Factors

These factors are hypothesized to influence perceptions about food insufficiencies within families. In addition, these factors can influence where an individual or family receives their food which impacts their food status as well.

Food Bank Knowledge—this variable refers to whether a respondent knows of food banks within their community and whether or not a respondent utilized those social food programs (e.g., food banks, pantries, churches, etc.) during the past twelve months.

Healthy Food Behaviors—respondents reported knowledge about recommended daily guidelines (e.g., food guide pyramid), amounts that an individual should eat from each recommended group, and the types of foods that they bought based on the nutritional label located on the food items.

Depression as a Mental Healthy Proxy

This variable is hypothesized to have direct effects upon a family's food sufficiency status. In addition, depression is believed to be influenced by the food risk factors within the Food Sufficiency Status Model. I hypothesize that individuals and

families who do not know about food banks within their local area, who are food insufficient, are more likely to show depressive symptoms.

Mental Health—respondents reported whether or not they had been bothered by feeling down, hopeless, or depressed, and how often they felt this way over the last two weeks.

Research Questions

This study seeks to examine how a family's knowledge and usage of food banks, in addition to the mental health of the parents, influences their food sufficiency status. I also seek to develop a deeper understanding of how food bank knowledge and usage, as well as parental mental health and healthy food behaviors, can influence food sufficiency status. By utilizing the Food Sufficiency Status Model, it will make it possible for this thesis to address the following questions:

1. The overarching question is what is the role of food bank usage, healthy food behaviors, and overall depression in the status of family food insufficiencies?
2. To what extent does knowledge about food banks influence the family's food sufficiency status?
3. To what extent does healthy food behaviors influence the family's food sufficiency status?
4. To what extent does depression influence the family's food sufficiency status?

Research Hypotheses

In order to address the research questions that I have proposed, I have developed four hypotheses, each with sub-hypothesis. These hypotheses were developed in order to measure household awareness and usage of social safety networks within their

community, and how that influences the family's food sufficiency status. It is also hypothesized that healthy food behaviors impacts the food sufficiency status.

Additionally it is hypothesized that overall depression and mental health status can influence the food sufficiency status.

- H₁ – The greater the awareness of food banks the more likely one is to engage in healthy food behaviors.

From this hypothesis, I developed two sub-hypotheses that have been shown to be related to an individual's awareness of food bank programs.

- H_{1a} – Women are more likely than men to be aware of food banks and are more likely to engage in healthy food behaviors.
 - H_{1b} – People who have higher incomes and better education are more aware of food banks and are more likely to engage in healthy food behaviors.
- H₂ – The smaller the household size is the more likely one is to engage in healthy food behavior.

From this hypothesis, I developed two sub-hypotheses in order to explore how respondents' individual demographics can influence their awareness of healthy food behaviors.

- H_{2a} – Women in smaller households are more likely than men to engage in healthy food behaviors.
- H_{2b} – People with higher incomes, better education, and smaller households are more likely to engage in healthy food behaviors.

- H₃ – Individuals who report mental health in the normal range are more likely to be aware of their food sufficiency status.

From this hypothesis, I developed two sub-hypotheses in order to explore how respondents' level of depression can influence their awareness of food sufficiency status.

- H_{3a} – Women are more likely than men to be aware of their level of depression and are more likely to be aware of their food sufficiency status.
 - H_{3b} - People with higher incomes and better education are more aware of their level of depression and are more likely to be aware of their food sufficiency status.
- H₄ – People who exhibit a greater awareness of food banks, have healthier food behaviors, and normal levels of mental health, are more likely to be awareness of food sufficiency status.

From this hypothesis, I developed a sub-hypotheses in order to explore how respondents' awareness of food bank programs, having healthy food behaviors and normal level of depression can influence their food sufficiency status.

- H_{4a} - People who exhibit greater awareness of food banks, have healthy food behaviors, normal levels of mental health, and better education, are more awareness of food sufficiency status.

Importance of Study

This study will make a number of important contributions to the current literature base. First, it will utilize individual demographic variables that are often overlooked

when studying a respondent's education and income. Second, it will shed further light onto how an individual's social demographics influence their family make-up. Third, this study will further explore how family demographics such as the presence of children influence the households' knowledge of food banks as well as their willingness to use them. A fourth contribution of this study will be to investigate how food risk factors impacts a families' food sufficiency status. Fifth, this study uses a nationally representative data set, and therefore makes these findings generalizable to the general public. Finally, by taking a family-based perspective this study is able to yield valuable information about healthy food behaviors and family food insufficiencies from data collected by the Center for Disease Control and Prevention, thereby transforming health and nutritional data into information that can help social scientists combat unhealthy food habits and family food insufficiencies. By themselves each of these contributions can help expand current understandings of the factors that lead to family food insufficiencies, but when taken together they can help paint a clearer picture of the demographic variables and risk factors that can contribute to a family's food insufficiencies.

Overview

In this Chapter I highlighted the purpose and rationale for why the investigation in needed. In addition, the theoretical concepts that are used in creating the Food Sufficiency Status Model were discussed as well as the conceptual definitions of the variables that reside within the model. By using the Food Sufficiency Status Model as a guide, the research questions and hypothesizes were created and discussed followed by the importance of the study. The literature review helps to add context to this thesis, as well as providing the opportunity to compare research questions and hypotheses to the

current body of research. The specific methods and tools used to explain the hypotheses are examined in Chapter Three of this document. The results and discussion sections of this thesis can be found in Chapter Four and Five.

Chapter Two

Literature Review

This chapter focuses on the literature of current and pertinent research that discusses issues related to the issues of food insufficiencies. I will then cover the types of food insufficiencies, how these can influence the lives of children and adults, as well as the structural factors that contribute to food insufficiencies. Then I will cover how a family's healthy food behaviors can influence their food sufficiency status. Lastly, the chapter will conclude with a summary discussing the relevant information found in this literature review.

Food Insufficiencies

The research of food insufficiencies has yet to develop a mutually agreed upon definition of what food security is. Most investigators base their definitions of food security off of four key concepts (FAO, 1983; Maxwell & Smith, 1992; Reutlinger & Knapp, 1980). They are: sufficiency, access, security, and time.

Sufficiency. The core concept of sufficiency deals with having adequate levels of food for individual members of the household. In addition, sufficiency also looks at the nutritional and caloric value of the foods, as this relates directly to the health of the individuals as well as their healthy food behaviors (Barraclough & Utting, 1987; Kracht, 1981; Maxwell & Smith, 1992; Sahn, 1989).

Access. This is the second concept of food security, and it builds off of the concept of sufficiency. This concept looks at the ability of the individual to acquire sufficient levels of food. The concept of access does not differentiate between how or where the individual acquires foods (e.g., grocery stores, food marts, or food banks), just

at their ability to have access to foods in sufficient levels (Barracough & Scott, 1988; Chen, 1990; Devereux, 1988; Eide, 1989; Eide, A., Oshaug, & Eide, W., 1991; Sen, 1981). This concept looks mainly at access to food and not the value of the food itself.

Security. As with the concept of access, security builds off of the first two concepts, and can be thought of as an individual having secure access to sufficient levels of food. In this concept, the term security refers to an individual's ability to secure foods with their available resources (e.g., available income, food stamps, etc.). Therefore, individuals that have limited amounts of resources at their disposal may have hard times securing access to quality nutritious foods and this can affect their eating habits (Clay, 1981; Eide, 1990; Eide et al., 1991; Sen, 1981).

Time. This last concept takes all of the other three concepts and places them within a time parameter by adding the distinction of an individual having secure access to sufficient amounts of foods at all times. When individuals or families are unable to have access at all times to food, they can become food insufficient. In addition to allowing individuals to have access to food at all time, this concept of time can also be utilized when looking at the patterns of food insufficiencies within households (Canadian International Development Agency [CIDA], 1989; Maxwell & Smith, 1992; World Bank, 1986).

This definition only looks at secure access at all times to sufficient amounts of foods, but it does not always differentiate between foods that are calorically dense versus nutritionally dense. In addition, some investigators found that even when individuals are meeting their daily calorie intake, they may be missing out on much needed protein and

micro-nutrients and this can lead to a greater risk of hunger and illness (Edie, 1990; Heald & Lipton, 1984; Maxwell & Smith, 1992; Reutlinger & Selowsky, 1976)

Working Definition of Food Sufficiency's

In addition to the four key concepts of food sufficiency's from above, the United States Department of Agriculture further defines (USDA, 2000, p.6) food security in the following way:

- Food security—*Access by all people at all times to enough food for an active, healthy life. Food security includes at a 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).*
- Food insecurity—*Limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways.*
- Hunger—*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.*

This definition is very specific in defining food security, food insecurity, and hunger, unfortunately it does not take into account the different levels of food sufficiency's (i.e., food sufficient, food insufficient without hunger, food insufficient with

moderate hunger, or food insufficient with severe hunger), but this definition does add in the concept of nutritionally adequate foods.

Types of Food Insufficiencies

There are two main types of food insufficiencies, and those are classified as either chronic or transitory (CIDA, 1989; Maxwell & Smith, 1992; World Bank 1986). Most commonly, chronic food insufficiencies are related to lower income levels, and affect households for longer periods of time. For those households that are in the chronic category and are food insufficient, some members of the family may also be dealing with moderate to severe hunger in addition to cutting or skipping meals, thereby demonstrating unhealthy food behaviors. Current research reminds us that a family's food sufficiency status is based on the household and not individual members within the home (Bickel et al., 2000; Coleman-Jensen et al., ERS, Sep. 2012; Maxwell & Smith, 1992). Because of this, it can become difficult to discern between those families with food insufficiencies without hunger and those families with food insufficiencies with hunger. Current data suggests that when one adult within the household is experiencing hunger, most if not all of the adults in the household may be facing issues related to hunger (Current Population Survey, 2010; Maxwell & Smith, 1992). In addition, the impact on children within the household may be less severe (i.e., no hunger) due to parental patterns of coping with food insufficiencies. Thus, a household with children may be classified as food insufficiency without hunger, all the while the adults within the home are suffering from moderate to severe hunger related to their food insufficiencies (Bickel et al., 2000).

In contrast, transitory insufficiencies can be further defined into two different groups, cyclical and temporary, with each having distinct differences (CIDA, 1989; Maxwell & Smith, 1992).

Cyclical

Cyclical food insufficiencies can also be thought of as seasonal insufficiencies that can be related to an individual's seasonal work status (e.g., nine month employment positions, school district employees, agricultural workers or other seasonal employment). Unfortunately these families food status can change multiple times during the year, and can range in severity. Because of this, a family's food status can moves from a food sufficient status to one of the three insufficient groups on an annual basis (CIDA, 1989; Maxwell & Smith, 1992; Quandt, Arcury, Early, Tapia, & Davis, 2004). In addition, the further a family or individual gets into their seasonal layoff (e.g., the last month before returning to work), the more severe their food insufficiencies may become and as a result the families may be buying or receiving foods that are not nutritionally adequate (CIDA, 1989; Maxwell & Smith, 1992).

Temporary

Temporary food insufficiencies can be influenced by multiple factors, such as family members losing paid employment, or a new birth in the family, or a gap between securing suitable paid employment (CIDA, 1989; Maxwell & Smith, 1992). For these families, the sudden and abrupt change can cause the family to reexamine their food sufficiency status, and in doing so the family may find themselves facing food insufficiencies. Because these families suddenly find themselves forced into facing food insufficiencies, this may influence them to seek out and utilize emergency food services

in order to combat their food related issues (CIDA, 1989; Maxwell & Smith, 1992). For the temporary food insufficient group, if the family does not recover in a timely manner, they can fall further behind financially and slip into the chronic food insufficiency category (CIDA, 1989; Maxwell & Smith, 1992). One way these types of families try to cope with their chronic food insufficiencies is to sell or liquidate assets (e.g., stocks or bonds, 401K withdrawals, or sale of a home) in hopes of stabilizing their situation (Maxwell & Smith, 1992).

Stages of Food Insufficiencies

In addition to the different types of food insufficiencies discussed above, there are also three stages of food insufficiencies that can affect members of the household differently based upon the stage of food insufficiency (Bickel et al., 2000; Lynn, 2007). Each of these stages becomes more severe as more members of a family becomes affected by food insufficiencies.

Stage One.

The first stage of food insufficiencies occurs when a family becomes aware of their inability to obtain adequate amounts of foods because of their lack of resources (Bickel et al., 2000; Lynn, 2007). This can create a feeling of anxiety within the household, and can cause the family to make adjustments in the amount of money they spend on food as well as the types of foods they buy and consume (Beretta, Koszewski, Betts, & Benes, 2001; Holben, McClincy, Holcomb, Dean, & Walker, 2004). When resources become limited, families may forgo purchasing high quality nutritiously dense foods for more filling foods that may lack in nutritional value, thereby affecting the families eating habits (Bickel et al., 2000; Lynn, 2007).

Stage Two.

Upon entering the second stage, families become food insufficiency and are faced with making decisions in order to cope with their food insufficiencies. During this stage, adults in the household may start to adjust or cut the size of their meals (e.g., unhealthy food behaviors) in order to insure there is enough food for the children within the home (Greder & Brotherson, 2002; Nord & Prell, 2007). Hunger may be the outcome for many adults living in stage two, who cope with food insufficiencies by cutting their meals (Bickel et al., 2000; Lynn, 2007).

Stage Three.

Stage three is the most severe of the stages, and can affect all members of the household. This stage can be classified as the most severe, and usually categorizes families as food insufficient with severe hunger. During this stage, families may face severe shortages of resources and foods, and because of this all members of the family may be forced to reduce or miss meals (e.g., unhealthy food behaviors) due to the lack of food within the home (Bickel et al., 2000; Lynn, 2007). This stage can bring hunger upon the children in the household. Adults that were already facing moderate hunger may reach severe levels of hunger (Bickel et al., 2000; Lynn, 2007).

As the research suggests, individuals and families can have different types of food insufficiencies that can impact their food sufficiency status in different ways. Depending upon the type of insufficiencies the family is facing, the family may adjust their eating behaviors in different ways in order to deal with their food related issues. In addition, based on a families stage of food insufficiencies, different members of the family may suffer more severely than others at different times.

Food Insufficiency in America

Lynn (2007) suggested, income may be one of the strongest predictor of food insufficiencies, but it is in no way the sole predictor. Other variables that may influence a families food status includes extenuating household circumstances (e.g., loss of employment), the state of the economy (e.g., unemployment rate), as well as the state-level policies that are in-place to assist families in becoming food sufficient.

Who is at Risk

Research found that families with lower levels of food and financial skills, higher levels of maternal depression, not being able to afford medical care, not owning a home, and less than a high school education among non-White participants were more likely to suffer from food insufficiencies (Anderson, 1990; Campbell, 1991; Olson, Anderson, Kiss, Lawrence, & Seiling 2004; Olson, Rauschenbach, Frongillo, & Kendall, 1997).

In addition to these characteristics, additional research has shown that families living at or below poverty level with children present are almost twice (40.6% vs. 27.7%) as likely to be food insufficient when compared to others living at or below poverty level without children in the home (Lynn, 2007; Nord, Andrews, & Carlson, 2006). Likewise, the most recent USDA's report concerning household food insufficiencies indicates that 20.3% of household with children in them had food related issues and that 12.3% of single person households also reported food insufficiencies (Coleman-Jensen et al., 2012). It appears that both individuals and households with children present have been shown to be susceptible to varying degrees of food insufficiencies.

Children

Childhood is a time that is critical to human development, not only from a biological stand point but cognitively as well. Children's biological development is directly linked to food intake. When a child has no food, or not enough food their cognitive abilities (e.g., no fuel for the brain due to no breakfast), as well as their psychosocial abilities (e.g., their ability to connect with their peers) become impaired (Alaimo, Olson, & Frongillo, 2001a; Pollitt, Golub, & Gorman, 1996). Food also provides us with essential vitamins and minerals, as well as proteins, fats, and carbohydrates. All of these combine to help keep us healthy and happy. Children living in food insufficient households are often fed less nutritious (e.g., unhealthy food behaviors) foods that are higher in fats (e.g., ready to make box dinners), and because of this the likelihood of childhood obesity may increase (Casey, Szeto, Lensing, Bogle, & Weber, 2001).

Biological

There are two sides to this debate, one that says there is not a direct relationship between childhood obesity and food insufficiency, while the other side claims there is a link between the two variables. Alaimo, Olson, and Frongillo (2001b), discovered no significant relationship between food insufficiency and obesity, with two exceptions. They revealed that girls who were 2 to 7 years old who were food insufficient were 1.6 times more likely to be overweight than their food sufficient counterparts, and non-Hispanic White girls 8 to 16 years old were 3.5 times more likely to be overweight than their food sufficient counterparts (Alaimo, Olson, & Frongillo, 2001b).

In contrast, Casey, Szeto, Lensing, Bogle, and Weber (2001) indicated that there was a relationship between food insufficiencies and obesity when comparing families of lower income levels with families of higher income levels. The authors showed that 7.5% of low-income families with children present reported food insufficiencies (Casey et al., 2001). In addition, some families reported that they went up to five and a half days (e.g. extreme unhealthy food behaviors) without having enough food to eat (Casey et al., 2001). This translated into not only into an increased risk of childhood obesity among low-income families with children, but also into an increased risk of minor health issues related to poor diet such as fatigue, dizziness, and headaches among children. Additionally, this research suggests that children in food insufficient homes were more likely to score lower on the Total Health-Related Quality of Life ($p < 0.05$) physical ($p = 0.006$) and psychosocial ($p = 0.017$) tasks when compared to food sufficient children (Casey, Szeto, Robbins, Stuff, Connell, Gossett, & Simpson, 2005).

Much like the systems within the ecological theory, the three domains are interrelated and are affected by one another. This means that what happens within the biological domain effects both the cognitive and psychosocial domains as well. When a child is faced with family food insufficiencies, their biological system is shorted key ingredients that fuel the rest of their body, including the brain. Unfortunately when the brain does not have enough fuel, cognitive function can become impaired, and this can impact the child's ability to learn.

Cognitive

Tragically, when children are faced with food insufficiencies within their homes, the affects often times follow them into their other systems (e.g., school). Current

research suggests that when pre-school and elementary school aged children come from low-income food insufficient households, their physical health (e.g., colds, ear infections, and/or stomachaches) is often time reported as being significantly poorer than children from higher-income families (Alaimo, Olson, Frongillo, & Briefel, 2001). Because children from homes with lower-incomes were reported as having poorer health, it would make logical sense that these children missed more days of school due to their increased risk of illness (Alaimo et al., 2001a). This can affect these children's cognitive development by missing valuable in-class information that these students often times use to build upon in later grades.

It has also been suggested that children from food insufficient households have lower academic scores when compared to their food sufficient counterparts (Alaimo et al., 2001a; Strupp & Levitski, 1995; Gorman, 1995; Kleinman, Murphy, & Little, 1998; Kramer, Allen, & Gergen, 1995). This research used a nationally representative sample of children and teens that were divided into two age ranges, six to eleven years old, and twelve to sixteen years old. They reported that children from food insufficient homes, in both age categories scored lower on the Wechsler Intelligence Scale for Children as well as on the Wide Range Achievement Test-Revised (1.3 to 2.5 points lower, on a 20 point scale) than children from food sufficient homes (Alaimo et al., 2001a). In addition, the children from the younger food insufficient age group had lower math and reading scores than food sufficient children. Tragically the data also suggests that both children and teenagers from food insufficient households were more likely to have repeated a grade than children who are food sufficient (Alaimo et al., 2001a).

Besides having academic issues related to food insufficiencies, some children and teenagers may also suffer from psychosocial affects that can also impact their other social systems (Kleinman et al., 1998; Kramer et al., 1995). There have also been some works that showed an increased likelihood of having been in trouble at school, and having harder times getting along with other children when food insufficiency was present (Alaimo et al., 2001a; Kleinman et al., 1998; Kramer et al., 1995).

Psychosocial

For many children from food insufficient homes, the realities of daily life can sometime create feelings of shame and isolation. Not realizing that many of their fellow students may also be suffering from family food insufficiencies (of varying levels), these children go through the motions of their day without making any meaningful connections with other children, and were often times in trouble at school (Alaimo et al., 2001a; Kleinman et al., 1998; Kramer et al., 1995).

Both younger aged children (six-eleven) and teenagers (twelve to sixteen) from food insufficient households were at increased risks of having psychosocial difficulties (Alaimo et al., 2001a; Kleinman et al., 1998; Kramer et al., 1995). These difficulties included issues such as not having any friends, or having trouble getting along with others their age. Children and teens from food insufficient homes were also more likely to have been suspended from school, as well as having seen a psychiatrist. In fact, food insufficient teenagers from this study were twice as likely to have seen a psychiatrist, twice as likely to have difficulties getting along with their peers, three times as likely to have been suspended from school, and four times as likely not to have any close friends, when compared to their food sufficient peers (Alaimo et al., 2001a). Fortunately for the

younger children within the study, even though they were one and a half times more likely to have repeated a grade and almost twice as likely to have seen a psychiatrist, there were no other significant differences between their ability to get along with and make friends with other children than their food sufficient counterparts (Alaimo et al., 2001a).

Adults

Although a great deal of research centers on food insufficiencies among children and older adults there is an ever growing focus on adults. Valuable information concerning how adults are affected by food insufficiencies is being generated.

Biological

By the time most of us have become adults, we have met our developmental milestones and our growth has slowed. Many of us may even be in good health. Unfortunately for those adults that are food insufficient, the biological effects may come in the form of increased risk of chronic illness and diseases. Examples of these diseases can include diabetes, obesity, heart diseases, cancers, and strokes (Anderson & Hanna, 1999; Bazzano, He, Ogden, Loria, Vupputuri, Myers, & Whelton, 2002; Duff, 2001; Hu & Willet, 2002; Joshipura, Hu, Manson, Stampfer, Rimm, Speizer, Colditz, Ascherio, Rosner, Spiegelman, & Willet, 2001; Marlett, McBurney, & Slavin, 2002; Ness & Powles, 1997; Sadvovsky, 2002). Each of these illnesses by themselves can be considered a serious medical condition, but when two or more of these conditions are found within one individual the outcomes can be considered dire.

In an investigation of adult food insufficiency it was found that adults from food insufficient homes were more likely to have lower intakes of vitamins (e.g., A, E, & C),

fresh fruits, vegetables, and calcium (Dixon, Winkleby, & Radimer, 2001; Olson & Holben, 2002; Rose & Oliveira, 1997). As a direct result many adults were at increased risk of developing chronic illnesses and diseases, in addition to obesity. Recent research also suggests that micro-nutrients within food may biologically alter chemical levels in the brain (Fernstrom & Wurtman, 1971; Christensen, 1993).

Cognitive

There has been very little research aimed at the cognitive effects of food insufficiencies on adults but it makes logical sense that if an adult is suffering from food insufficiencies their ability to think clearly and rationally may be slowed. This can affect adults in different ways, from not being able to complete work related projects to being unproductive at work due to having limited energy (Hamelin, Habicht, & Beaudry, 1999).

Another study conducted by Christensen (1993) suggested that individuals use different types of foods to enhance or alleviate certain moods. This research pointed out how some adults used specific types of foods based upon their mood, such as consuming alcohol as a mood enhancer, or by eating simple sugars (e.g., chocolate) to relieve negative moods associated in women entering their menstrual cycle (Bancroft, Cook, & Williamson, 1988; Both-Orthman, Rubinow, Hoban, Malley, & Grover, 1988; Brzezinski, Wurtman, J., Wurtman, R., Gleason, Greenfield, & Nader, 1990; Christensen, 1993). Other investigators have found that foods may even lessen the biological and cognitive side effects (e.g., weight gain and/or irritability) associated with quitting smoking (Bowen, Spring, & Fox, 1991; Christensen, 1993; Gritz, 1980; Grunberg, 1983; Hall, McGee, Tunstall, Duffy, & Benowitz, 1989; Hughes, Gust, Skoog, Keenan, & Fenwick, 1991). Current research also suggests that foods can have major influence over

the way we operate cognitively as adults, not only in our mood but also in our cognitive processes as well (Christensen & Burrows, 1990; Christensen, Krietsch, White, & Stagner, 1985; Christensen, 1993; Fernstrom, & Wurtman, R., 1971; Fernstrom, Krowinski, & Kupfer, 1987).

Psychosocial

Much like the cognitive aspect above, there has been limited research aimed at the psychosocial affects that food insufficiencies can have on adults. What research does exist typically fails to ask adults about their overall general level of happiness. Because this variable has been overlooked by many studies, it makes it very hard to measure how adults are affected psychosocially (e.g. friends, co-workers, and/or society) by their lack of food.

Among the limited works done, Hamelin, Habicht, and Beaudry (1999) conducted an examination of parent child interactions within food insufficient households. This research discovered that some parents reported strained relationships with their children (e.g. irritability, anger, less availability of time due to new constraints of trying to acquire food) during times of food insufficiencies (Hamelin et al., 1999). In addition, this research pointed out that some parents reported not being able to communicate with their children due to their feelings of inadequacy by not being able to feed their children wholesome meals (Hamelin et al., 1999).

Another investigation found that both primary and non-primary wage earning adults within households were affected by depressive symptoms related to financial strain and food insufficiencies (Heflin, Siefert, & Williams, 2005; Okechukwu, El Ayadi, Tamers, Sabbath, & Berkman, 2012; Siefert, Heflin, Corcoran, & Williams, 2004;

Whitaker, Phillips, & Orzol, 2006). In addition, the study discovered that primary wage earners were more likely to sufferer from depressive symptoms from food insufficiencies then financial strain, and as I noted above this may be due to their feelings of inadequacy about not being able to provide for their family's food needs (Hamelin et al., 1999; Okechukwu et al., 2012). In contrast, non-primary wage earners were affected with depressive symptoms often times related to financial strain (Okechukwu et al., 2012).

There have been a few investigations that focused on stigma and food insufficiencies (Blank & Ruggles, 1996; Blaylock & Smallwood, 1984; Daponte et al., 1999; General Accounting Office [GAO], 1988; Moffitt, 1983). One study discovered that 6.3% of those households that were eligible for social food programs refused to participate because of social stigmas associated with receiving food assistance (Daponte et al., 1999). In addition, some studies uncovered that most food insufficient family's stigma level was associated with the degree of food insufficiency (Blank & Ruggles, 1996; Blaylock & Smallwood, 1984; Daponte et al., 1999; GAO, 1988; Moffitt, 1983). In other words, the greater the need, the less the stigma in seeking help. This relates directly to the main concepts of social exchange (Blau, 1964; Nye, 1979) that I discussed in chapter one of this thesis.

Clearly this limited amount of research on adults has affected the depth of our understanding of how they are affected by food insufficiencies both cognitively and psychosocially. While the majority of the research regarding the effects of food insufficiencies on children and adults discussed above uses family income as one of the main mediating factor associated with family food insufficiencies, it is by no means the only factor shown to influence a family's healthy food behaviors. The following section

of this study will look at other mediating variables that have been shown to influence a family's food sufficiency status.

Barriers to Food Sufficiency

When it comes to families and their ability to become food sufficient, there are many barriers that can prevent them from acquiring sufficient amounts of nutritious food. Of the many barriers transportation, food deserts, and lack of knowledge about local programs have been found to be the most prominent. These barriers can affect families in both rural and urban areas.

Transportation

Transportation is one of the many hurdles that stand before families and their ability to become food sufficient. Lack of transportation is not limited to geographical location, and families living either rural (38%) or urban (39%) were affected by a lack of affordable transportation within their community (Bitto, Morton, Oakland, & Sand, 2003; Garasky, Morton, & Greder, 2004; Morland, Wing, Rouz, & Poole, 2002). If the family does not have a vehicle, or a reliable vehicle, they are prone to having limited access to well-priced nutritious foods. For some families that may own a vehicle, funds may be limited and they may not be able to afford gas for the vehicle in order to travel long distances to secure healthy foods (Bitto et al., 2003). In addition, some families may not be able to locate a ride to food sources, and if they are able to find a ride, some of these emergency food sources (i.e., food banks, or church pantries) may have limited hours and be closed then these individuals are able to locate a ride (Morland et al., 2002; Zedlewski & Nelson, 2003).

One study found that nearly 30% of individuals living at or below poverty levels did not own a vehicle compared to only 10% of individuals with higher incomes (Wang, Kim, Gonzalez, MacLeod, & Winkleby, 2007; U.S. Census, 1990). Additional researchers found that an individual's ability to access food sources was not only influenced by their lack of transportation, but by living in what has been termed food deserts by some investigators (Apparicio, Cloutier, & Shermur, 2007; Guy & David, 2004; Larsen & Gilliland, 2008; Leete, Bania, & Sparks-Ibanga, 2012; Reisig & Hobbiss, 2000; Smoyer-Tomic, Spence, & Amrhein, 2006)

Food Deserts

Food deserts have been defined by some researchers as areas where there is extremely limited to virtually no access to food retail outlets, and those stores that do exist often times do not offer quality nutritious foods (Apparicio et al., 2007; Guy & David, 2004; Larsen & Gilliland, 2008; Leete et al., 2012; Reisig & Hobbiss, 2000; Smoyer-Tomic et al., 2006). By using this definition as a starting point further definition includes living within reasonable walking distance (i.e., less than half a mile) to food outlets for urban areas, or as having appropriate transportation to secure foods (Clarke, Eyre, & Guy, 2002; Leete et al., 2012). Food desert research uncovered that different geographical influences on the presence of food deserts (Apparicio et al., 2007; Guy & David, 2004; Larsen & Gilliland, 2008; Leete et al., 2012; Reisig & Hobbiss, 2000; Smoyer-Tomic et al., 2006).

These findings show that households residing in inner-city urban areas are classified as living in a food deserts if their access to full service specialty markets, independent grocery stores, and chain supermarkets is located over a half of a mile away

for the residents home (Apparicio et al., 2007; Clarke et al., 2002; Guy & David, 2004). Most families living in an urban food desert, have limited access to food outlets and those families must rely on convenience store, small grocery stores, corner store, or ethnic markets as a way to acquire their foods. Tragically for individuals or families living in urban deserts they must acquire foods from these limited food sources thus limiting their food safety and selection of nutritious foods (Algert, Agrawal, & Lewis, 2006; Alwitt & Donley, 1997; Ball, Timperio, & Crawford, 2009; Bolen & Hecht, 2003; Chung & Myers, 1999; Clifton, 2004; Hendrickson, Smith, & Eikenberry, 2006).

A recent investigation discovered that these types of stores often times had limited shelf space, limited or no refrigeration (Algert et al., 2006; Alwitt & Donley, 1997; Ball et al., 2009; Bolen & Hecht, 2003; Chung & Myers, 1999; Clifton, 2004; Hendrickson et al., 2006). Because of this, these stores often did not stock fresh fruits and vegetables, and those that were stocked were often times spoiled. The limited amount of space available influenced inventory, and the end result is that most of these markets often carried calorically dense foods (i.e., filling, not nutritious), a compact inventory for sale (Hendrickson et al., 2006).

As problematic as food deserts are for urban families they present difficult issues for most rural families (Kaufman, 1998). Within rural communities there are typically no grocery stores, or any stores within walking distance. Because of this, rural food deserts can be defined as an area where stores are often times located many miles away from where rural families reside, and in order to become food sufficient these families must having appropriate transportation to secure food (Bitto et al., 2003; Clifton, 2004; Morton et al., 2008). Because rural families live considerable distances from stores, they have to

plan accordingly when it comes to obtaining food. This usually consists of making plans to travel to nearby towns or cities where supermarkets are located. Unfortunately for some rural families who lack access to transportation, the mere distance they live from food sources can have detrimental effects on their abilities to be food sufficient (Apparicio et al., 2007; Clifton, 2004 ; Guy & David, 2004; Larsen & Gilliland, 2008; Leete et al., 2012; Reisig & Hobbiss, 2000; Smoyer-Tomic et al., 2006).

Lack of knowledge

A current investigation of low-income households focused on whether or not those homes used social programs, mainly food stamps, in their fight with food related issues (Blank & Ruggles, 1996; Blaylock & Smallwood, 1984; Daponte et al., 1999). Daponte, Sanders, and Taylor (1999) uncovered that of the respondents in their study who were not currently receiving food stamp assistance, 62.5% of those households were considered eligible to receive benefits. Numerous other studies have also noted that some families who are eligible may in fact not know that they are eligible (Coe, 1983; Coe, 1985; Daponte, Osborne, Lewis, Sanders, & Taylor, 1994; GAO, 1988)

An additional study by Olson, Anderson, Kiss, Lawrence, and Seiling (2004) had similar findings. Their study suggested that knowledge about community programs was a significant predictor of family food insufficiencies. The results of their study showed that almost half (49.1%) of their sample was food insufficient, even though almost all families in the study were eligible for the food stamp program, over half (51.9%) did not participate (Olson et al., 2004). This indicates that the more knowledgeable an individual or family is, the more likely they are to utilize social food programs and the less likely they are to be affected by food insufficiencies (Anderson, 1990; Bickel et al., 2000;

Campbell, 1991; McConnell & Ohls, 2002; Morris, Neuhauser, & Campbell, 1992; Nord, 2002).

Factors Contribution to Food Insufficiencies

In addition to the common barriers preventing families from becoming food sufficient, there are also demographical factors that have been shown to impact not only a family's food status but their healthy food behaviors as well.

Income

Poverty is believed to be the number one contributing factor associated with food insufficiencies (Casey et al., 2001; Chung & Myers, 1999; Lynn, 2007; Olson et al., 2004; Ridar & Hamrick, 2003). Poverty in America has become an issue that affects all arenas of individual and family life, including, where they live and how they secure foods.

Poverty guidelines for a family of four living within the continental United States (i.e., continental 48 states) is estimated to be \$23,550, and \$29,440 and \$27,090 in Alaska and Hawaii (U.S. Department of Health and Human Services Poverty Guidelines, 2013). This figure is approximately less than \$2,000 a month and when it is estimated that over half of a family's income goes towards rent it leaves very little left over for utility bills and food. Research has found that over half (57%) of families facing food insufficiencies had to make the choice between paying rent or buying food, and among those same families, well over half (63%) had to make the choice between paying utilities or buying food with funds that were left after paying rent (Cohen, Kim, & Ohls, 2006; Edin & Lein, 1997; Kirkpatrick & Tarasuk, 2003; Mammen, Bauer, & Richards 2008; Mirowsky & Ross, 1999).

While it is estimated that families living below poverty levels face food insufficiencies at a rate of three times the national average, income is not the only factor associated with increased levels of family food insufficiency (Nord, Kabbani, Tiehen, Andrews, Bickel & Carlson, 2000; Olson & Holben, 2002).

Household Type

Recent research found that single-mother households had a prevalence of food insufficiencies at three times the national rate of other types of households (Edin & Lein, 1997; Mammen et al., 2008; Morton et al., 2005; Nord et al., 2000; Olson & Holben, 2002). The presence of children within the household can have a direct impact on the family's food sufficiency status, as well as their healthy food behaviors. Additional investigators also found that households with children in them made up almost a third (31%) of food insufficient families, thereby making these families highly susceptible to food insufficiencies (Cohen et al., 2006; Edin & Lein, 1997; Kirkpatrick & Tarasuk, 2003; Mammen et al., 2008; Mirowsky & Ross, 1999).

Race

Race has been shown to have a direct impact upon a family's food status. Some links were found in recent investigations that have indicated that individuals from ethnic minority groups may be at an increased risk of food insufficiencies (Baker, Schootman, Barnidge, & Kelly, 2006; Lynn, 2007; Olson & Holben, 2002). These studies have suggested that individuals from Non-Hispanic Black (22.4%) and Hispanic (17.9%) households are almost twice as likely to suffer from food related issues when compared to Non-Hispanic White (8.2%) households (Lynn, 2007; Olson & Holben, 2002). Chavez, Telleen, and Kim (2007) found similar results in their investigation, but they also noted

that Latino families from Puerto Rican background suffered from higher levels of food insufficiencies than Latino families from Mexican background.

Education

While education is usually a direct indicator of an individual's income, it can also be used as an influencing variable in food sufficiency status. Recent research suggests that head of households with less than a high school education were at increased risks of food insufficiencies (Olson et al., 2004; Olson et al., 1997). Additional suggested that parental education about household management skills (e.g., shopping skills, food preparation skills, financial skills) can also impact a family's food status (Beretta, Koszewski, Betts, & Benes, 2001; Guthrie & Scheer, 1981; Kennedy, Ohls, Carlson, & Fleming, 1995; Martin, 1996; Morton & Guthrie, 1997; Olson et al., 2004).

Location

Geographical location has been related to a family's ability to become food sufficient. Families residing in non-metropolitan and inner-city areas were twice as likely to be food insufficient when compared to metropolitan families living outside of inner-city areas (Mammen et al., 2008; Olson & Holben, 2002). The link between geographical location and a family's ability to become food sufficient (Alaimo, Briefel, Frongillo, & Olson, 1998; Morris, Neuhauser & Campbell, 1992; Ruel, Garrett, Hawkes, & Cohen, 2010) continues to be examined.

Healthy Food Behaviors

It does families little good to be food sufficient if the foods they are eating are considered filling (e.g., calorically dense foods) but that they lack in basic nutritional elements (e.g., protein, vitamins, minerals, micro-nutrients) that the body requires in

order to function properly (Heald & Lipton, 1984; Maxwell & Smith, 1992; Pacey & Payne, 1985; Reutlinger & Selowsky, 1976). Additionally, some adults and children have an increased likelihood of obesity due to unhealthy food behaviors, as well as hunger and other illnesses and diseases (Alaimo et al., 2001; Alaimo et al., 2001b; Campbell, 1991; Duncan, 1997; Dutton, 1985; Montgomery, Kiely, & Pappas, 1996; Newacheck, Jameson, & Halfon, 1994; Rank & Hirshl, 1999; Rose & Bodor, 2005; Starfield, 1982). Beyond the short-term health risks facing children, there may also be future risks in adulthood.

Research has suggested that healthy food behaviors is an individual's knowledge about recommended daily nutritional values (e.g., USDA food pyramid). One investigation looked at primary care givers and their nutritional knowledge and how that related to the diets of the individuals within the household (Beretta et al., 2001). What many investigators have discovered was that when adults had higher levels of nutritional knowledge (e.g., nutritional values, food item nutritional labels, and food groups), the children within these homes often had well-balanced diets, yet the primary care givers diet was still measured as less than adequate, and this may be due to the parents cutting or skipping meals (Beretta et al., 2001; Guthrie & Scheer, 1981; Kennedy et al., 1995; Martin, 1996; Morton & Guthrie, 1997).

The second concept of healthy food behaviors looks at an individual's knowledge of recommended daily serving of the different food groups. This is an important aspect because how can we expect individuals and families to eat properly when they are struggling with food insufficiencies, and the limited foods they do have are lacking in needed nutrients (Beretta et al., 2001; Kennedy et al., 1995; National Research Council,

1998). In addition, if adults do not know what the recommended daily needs are, they may fail to purchase fill-in items (these can be thought of the small food items and fresh vegetables that families may not receive from food banks) to supplement missing needs of their diet (Beretta, Koszewski, Betts, & Benes, 2001; Guthrie & Scheer, 1981; Kennedy, Ohls, Carlson, & Fleming, 1995; Martin, 1996; Morton & Guthrie, 1997; Olson et al., 2004). Overall a lack of knowledge about daily recommended servings of the different food groups can lead both adults and children to suffer from malnourishment (e.g., lack of vitamins, calcium, iron, protein, zinc, and other micro-nutrients) (Beretta et al., 2001; Kennedy et al., 1995; National Research Council, 1998). Many researchers have shown a link between poor diets (e.g., a diet lacking nourishment) and chronic health issues (Beretta et al., 2001; Casey et al., 2001; Dixon et al., 2001; Olson & Holben, 2002; Rose & Oliveira, 1997; USDA, 1989; USDA, 1990). Because this concept is so critically important, many social programs (e.g., head start, WIC, or food stamps) aimed at helping lower income families now incorporate some type of nutritional education component for program participants (Beretta et al., 2001; Lopes, 1994; Martin, 1996; Shield & Mullen, 1992).

The last concept of healthy food behaviors looks at how and where individuals and families acquire foods, and if these locations offer healthy food options. Hendrickson, Smith, and Eikenberry's (2006) focused on low-income families and their inability to acquire fresh fruits and vegetables. They discovered that many low-income families were limited in their ability to purchase these items, either because shops located within the communities did not have shelf space for these items or because some families could not afford to purchase these items. Many other investigators have explored how

individuals whose diets lacked in fiber from fresh vegetables and fruits were at an increased risk of heart disease and cancer (Anderson & Hanna, 1999; Bazzano et al., 2002; Duff, 2001; Hu & Willet, 2002; Joshipura et al., 2001; Marlett et al., 2002; Ness & Powles, 1997; Sadovsky, 2002).

Summary

This brief literature review has help by offering a definition of food insufficiencies. In addition, the literature review has also revealed not only who can be affected by food insufficiencies, but how families were affected was also examined. Thirdly, this review offered insight into some common barriers that can prevent families from becoming food sufficient, as well as some of the factors associated with food insufficiencies. Finally, this literature review explored some of the variables that are associated with healthy food behaviors and how families can be impacted by these behaviors. It should be noted that this literature review is in no way exhaustive, and yet it helps to offer insight and direction to guild this study.

Chapter Three

Methodology

This chapter will focus on applying the appropriated methodological procedures to the data in order to help answer this thesis's research questions and hypotheses. This chapter starts with outlining the research questions that drive this study in addition to the hypothesis. Next the chapter will operationalize the outcome and predictor variables as well as discussing how each variable will be measures. An overview of the data source will also be a topic within this chapter, and lastly the chapter will close with a description of the plan of analysis.

Research Questions

This study seeks to examine how family's knowledge and usage of food banks, in addition to the mental health of the parents, influences their food sufficiency status. I also seek to develop a deeper understanding of how food bank knowledge and usage as well as parental mental health, and healthy food behaviors can influences food sufficiency status. By utilizing the Food Sufficiency Status Model, it will make it possible for this thesis to address the following questions:

1. The overarching question is what is the role of food bank usage, healthy food behaviors, and overall depression in the status of family food insufficiencies?
2. To what extent does knowledge about food banks influence the family's food sufficiency status?
3. To what extent does healthy food behaviors influence the family's food sufficiency status?
4. To what extent does depression influence the family's food sufficiency status?

Research Hypotheses

In order to address the research questions that I have proposed, I have developed four hypotheses, each with sub-hypothesis. These hypotheses were developed in order to measure household awareness and usage of social safety networks within their community, and how that influences the family's food sufficiency status. It is also hypothesized that healthy food behaviors impacts the food sufficiency status. Additionally it is hypothesized that overall depression and mental health status can influence the food sufficiency status.

- H₁ – The greater the awareness of food banks the more likely one is to engage in healthy food behaviors.

From this hypothesis, I developed two sub-hypotheses that have been shown to be related to an individual's awareness of food bank programs.

- H_{1a} – Women are more likely than men to be aware of food banks and are more likely to engage in healthy food behaviors.
 - H_{1b} – People who have higher incomes and better education are more aware of food banks and are more likely to engage in healthy food behaviors.
- H₂ – The smaller the household size is the more likely one is to engage in healthy food behavior.

From this hypothesis, I developed two sub-hypotheses in order to explore how respondents' individual demographics can influence their awareness of healthy food behaviors.

- H_{2a} – Women in smaller households are more likely than men to engage in healthy food behaviors.
- H_{2b} – People with higher incomes, better education, and smaller households are more likely to engage in healthy food behaviors.
- H₃ – Individuals who report mental health in the normal range are more likely to be aware of their food sufficiency status.

From this hypothesis, I developed two sub-hypotheses in order to explore how respondents' level of depression can influence their awareness of food sufficiency status.

- H_{3a} – Women are more likely than men to be aware of their level of depression and are more likely to be aware of their food sufficiency status.
- H_{3b} - People with higher incomes and better education are more aware of their level of depression and are more likely to be aware of their food sufficiency status.
- H₄ – People who exhibit a greater awareness of food banks, have healthier food behaviors, and normal levels of mental health, are more likely to be awareness of food sufficiency status.

From this hypothesis, I developed a sub-hypotheses in order to explore how respondents' awareness of food bank programs, have healthy food behaviors and normal level of depression can influence their food sufficiency status.

- H_{4a} - People who exhibit greater awareness of food banks, have healthy food behaviors, normal levels of mental health, and better education, are more awareness of food sufficiency status.

Operationalization of Research Variables

In order to gain a better understanding of how the Food Sufficiency Status Model operates, it is essential that the variables within the model can be measured. In order to do this, the elements must be placed into an operational form so that each one can be statistically tested as outlined in this thesis. The following section offers a brief description of how the variables are measured in this study.

Operational Outcome Measure

The Food Sufficiency Status Model has one outcome measure, the families' food sufficiency status.

Food Sufficiency Status—respondents we asked a series of questions regarding their food status over the last twelve months, and an answer of yes or sometimes or often times was recorded as an affirmative answer. Based on the number of affirmative answers given, the individuals' food status was measures from food sufficient all year to food insufficient with severe hunger.

Operational Predictor Variables

While most of these variables are demographically descriptive in nature, once there are operationalized into a measurable form, they can yield a vast wealth of information about those individuals that are at risk to suffer from food insufficiencies and unhealthy eating habits. In addition, once these variables are entered into the Food Sufficiency Status Model they help demonstrate the relationships present within the

model, as well as showing the influence that the food risk factors have with the outcome measure.

Demographics

These variables are individual in nature and when analyzed can offer data that is relevant about the individual. These variables can also influence and impact the second predictor group. This is evident in the fact that an individual's education level is directly influenced by their sex and race.

Sex/Gender—this is a dichotomous measure; Male (1), Female (2).

Race/Ethnicity—this variable was self-reported by the respondent, and contained five values; Non-Hispanic White (1), Non-Hispanic Black (2), Mexican American (3), Other Hispanic (4), and Other Race – including Multi-Racial (5).

These variables are important to measure because they can directly impact an individual's family make-up, in addition to their level of knowledge about social programs within their area.

Education—this is measured in years of formal school completed, and the values range from less than 9th grade though college graduate and beyond.

Income— this was measured from a combination of income (e.g. money from jobs, net income from business, farm or rent income, pensions, bank dividends or interest, social security payments) from all family member (i.e., 15 years of age or old) during the last twelve months based in the actual dollar amounts.

Family Make-Up (Household Size)

These variables can be influenced by both the individual and social variables, and can have a direct impact upon the food risk factors. Given the fact that an individual's

education level and occupation can affect their family factors, it is important to measure the extent that these factors influence family make-up. In addition, family variables are important to measure because they can influence a family's food risks as well as their perceptions about their food sufficiency status.

Household Size—this refers to the number of persons living within the household, including adults and children.

Risk Factors

These mediating variables have direct impact upon an individual's outcome of food sufficiency status, and are therefore extremely important to this study. Because it is hypothesized that food bank knowledge and usage, families healthy food behaviors, and parental depression, and that all of these risk factors impact a family's food sufficiency status, it is key to operationalize these variables so that they can be accurately measured.

Food Risk Factors

These factors are believed to be influenced by the demographic measures, and are the mediating pathways to a family's food sufficiency status.

Food Bank Knowledge—this measure asked respondents if they had knowledge about church's, food pantries, food banks, or other emergency food sources within their community, and if they received food from any emergency food source in the last twelve months.

Healthy Food Behaviors—this is a scaled variable created that utilizes the respondent's answers to a series of questions regarding their knowledge about the correct amounts of food to be consumed across a variety of measures extracted from the USDA Food My Pyramid. Scores ranged from Correct (1), Near Correct (2), or Wrong (3). The

final measure is a summary variable across the six measures deemed as important knowledge by the USDA.

Mental Health Depression

This variable is believed to be influenced by all of the preceding variables, in addition to directly impacting food sufficiency status.

Mental Health—respondents were asked if they had been feeling down, hopeless, or depressed at any time during the past two weeks. The depression measure corresponds to the Major Depressive Disorders Inventory and utilizes the same cutoff measure for establishing mental health; Normal (1), Mild (2), Moderate (3), and Severe (4). An answer of 2, 3, or 4 was measured as having depression.

Data Source

Data for this study was collected from The National Health and Nutrition Examination Survey (NHANES, 2007-2008). The NHANES is designed to assess the health and nutritional status of adults and children in the United States. The survey is unique in that it combines interviews and physical examinations. NHANES is a major program of the National Center for Health Statistics (NCHS). NCHS is part of the Centers for Disease Control and Prevention (CDC) and has the responsibility for producing vital and health statistics for the Nation. The NHANES interview includes demographic, socioeconomic, dietary, and health-related questions (Center of Disease Control and Prevention, 2013 <http://www.cdc.gov/nchs/nhanes.htm>).

The current study contains responses from a national sample of individuals over 18 years of age who head households. Data was collected by using both in person interviews as well as telephone interviews. Due to the extremely large and diverse

sample, the data can be used to make references towards the general public and thereby adding relevance to this study.

Analysis Plan

The analysis process will begin by taking a general look at the sample population and then proceeding forward along the Food Sufficiency Status Model towards more specific variables that are present within the model. For this reason, this study will begin with simple descriptive statistical analysis, and when necessary more specific statistical analysis will be used.

Univariate Analysis

In order to get a basic understanding of the sample, simple descriptive analysis for the sample were run. These test included frequency distributions as well as simple t-tests when necessary. When this study needed to make comparisons beyond the univariate level, bivariate and multivariate analyses were utilized.

Bivariate Analysis

Due to the nature of the current study, it was necessary to examine the mean differences between groups in order to understand how groups differ from one another. In addition, multivariate analyses were conducted on dichotomous measure in order to examine the differences associated with the outcome measure between groups. In the case of race, ANOVA will be utilized in order to fully explain mean differences between groups.

Multivariate Analysis

In order to test the Food Sufficiency Status Model as well as the research questions and hypothesis, this study will look at the linkages between measures by using forms of regression analysis.

Chapter Four

Analysis and Results

This chapter is centered on explaining the current investigation's findings related to the outcome and predictor variables as they relate to each other and an individual's *food sufficiency status*. This chapter is divided into three sections that are focused on the main theme of this thesis that an individual's *gender, food bank knowledge, healthy food behaviors, income levels, education levels* and *mental health* and their relationship to *food sufficiency status*. The first section of this chapter discusses in detail the demographics of the sample population. The second section of this chapter focuses on utilizing simple bivariate measures including t-tests, zero-order correlation and Analysis Of Variance (ANOVA) are used in order to test the investigations hypotheses. The final section of this chapter discusses the statistical findings as they relate to the outcome and predictor variables and they are examined with multiple regression because of the outcome measure, *food sufficiency status*.

Sample Demographics

The original data set provided by the Centers for Disease Control and Prevention for The National Health and Nutrition Examination Survey (NHANES, 2007-2008) consisted of $n = 10,149$ respondents. In this investigation, I used the Flexible Consumer Behavior Survey Module (FCBS)—a supplemental instrument—that involved a sub-sample of respondents. The FCBS was selected because it contained specific information on food attitudes, the USDA Food Pyramid, and specific food knowledge that was essential for the creation of the healthy food behaviors factor that was needed to test the hypotheses of this investigation. After matching the files with the general NHANES

2007-2008 survey modules on demographics, mental health, food attitudes, and food security measures a subpopulation of $n = 3,413$ respondents emerged. Subsequent analyses and descriptions are based on the subpopulation described above. Within the current sample, females accounted for 58.3% and males 41.7% of respondents. In terms of race/ethnicity, the majority of the sample was White (51.3%). Blacks accounted for the second largest group (20.9%), followed by Mexican Americans (15.1%), with the remaining 10.0% consisting of both Other Hispanics (9.9%) and Other Races (2.8%). Education levels varied within the sample with one-fifth (20.3%) of the sample having less than a high school diploma. The modal category for this group was found among those who had some college or an Associate's degree (30.4%). Additionally, 25.2% had obtained a baccalaureate degree or higher (see Table 4.1).

Table 4.1
Selective Sample Demographic Data (n = 3,413)

Variable	Coding Scheme	<i>n</i>	<i>f</i>
Gender	Female	1991	58.3%
	Male	1422	41.7%
Race	White	1750	51.3%
	Black	714	20.9%
	Mexican American	517	15.1%
	Other Hispanic	337	9.9%
	Other Race – Including Multi-Race	95	2.8%
Education	Less Than 9 th Grade	166	5.5%
	9 th - 12 th Grade No Diploma	444	14.7%
	High School Graduate or GED	729	24.2%
	Some College or AA Degree	914	30.4%
	College Graduate or Above	758	25.2%

The mean *age* of the sample was $M_{age} = 44.26$ years (SD = 18.72, range 18-89 years). The mean *household income* was \$50,831 (SD = \$31,241), with a median income

of \$40,000. The mean *family income* was \$49,069 (SD = \$31,585), with a median income of \$40,000. In addition, the average *household size* consisted of 3.23 (SD = 1.63) people.

See Table 4.2 for further description.

Table 4.2
Frequency Analysis of Sample (n = 3,413)

Variable	Mean	SD	Mdn
Age	44.26	18.72	43.00
Household Size	3.23	1.63	3.00
Household Income	\$50,831.00	\$31,241.00	\$40,000.00
Family Income	\$49,069.00	\$31,585.00	\$40,000.00

As for households that received *emergency food assistance*, 6.9% of the sample reported having received emergency food assistance within the last year, while the remaining 93.1% reported not having had received emergency food assistance from a food bank. An examination of *healthy food behaviors*, which is based on a summative score across a series of questions that asked respondents about which foods and how much of each group should they consume on a daily basis from each of the food groups. The scores were then placed into three groups: correct—where the sum of all answers given were in the cumulative range of 1.00 to 1.49; near correct—where the respondent had cumulative range of 1.50 to 2.49; and incorrect— where the sum of all answers given were in the cumulative range of 2.50 to 3.00. The final scores revealed that about one-third (33.6%) were aware of the correct amounts of foods to consume by food groups represented within the food guide pyramid. In contrast, well over one-half (58.8%) had near correct answers while less than ten percent (7.6%) answered every response in the scale incorrectly.

The measure for *household food sufficiency* revealed that 75.5%, more than three-quarters of the sample, had high food sufficiency, while the remaining one-quarter had

marginal to very low food sufficiency. Another variable used in this investigation was the overall *depression score* based on the composite international diagnostic interview (CIDI) designed to assess major depressive disorders. Overall, 80.4% scored in the normal range while the remaining 19.6% revealed symptoms of depression which is consistent with the general findings for depression symptoms in the U.S. population (see Table 4.3).

Table 4.3
Sample Health Measures (n = 3,413)

Variable	Coding Scheme	<i>n</i>	<i>f</i>
Received Emergency Food	Yes	234	6.9%
	No	3161	93.1%
Food Sufficiency Status	High Food Security	2563	75.5%
	Marginal Food Security	288	8.5%
	Low Food Security	358	10.5%
	Very Low Food Security	186	5.5%
Healthy Food Behaviors	Correct	1148	33.6%
	Near Correct	2006	58.8%
	Wrong	259	7.6%
Depression Score	Normal Range	2445	80.4%
	Mild Range	502	16.5%
	Moderate Range	68	2.2%
	Sever Range	27	0.9%

Results

The predictor variables selected were *gender, food bank awareness, healthy food behaviors, household income, adult education levels, and depression scores*. The outcome measure selected was an individual's *food sufficiency status*. SPSS (Version 21) was used to analyze and describe the data.

Research Hypothesis H₁

The current hypothesis argues that *food bank awareness* has a direct effect on *healthy food behaviors*. In order to test this hypothesis and the two sub-hypotheses, correlation, t-test, and ANOVA statistics were used. The analysis findings are discussed as they relate to each of the hypothesis.

H₁: *The greater the awareness of food banks the more likely one is to engage in healthy food behaviors.* In order to examine and test this hypothesis, I conducted a simple correlation analysis in an attempt to discover if there was a relationship between *food bank awareness* and *healthy food behaviors*. As hypothesized, it was believed that the more aware an individual was of emergency food banks located within their area, the more likely it was that they would have healthier eating habits. The results indicated that there was an extremely small and non-significant relationship ($r = -0.010, p < 0.564$). With these findings, I was unable to support the null hypothesis and must therefore accept the alternative. See Table 4.4 below for full description of the correlation.

H_{1a}: *Women are more likely than men to be aware of food banks and are more likely to engage in healthy food behaviors.* In order to test this sub-hypothesis, I conducted independent sample t-tests to discover if there were differences between women and men and their *knowledge of food banks* and *healthy food behaviors*. In essence, the analysis showed that there was no significant difference between women and men in terms of their *knowledge of food banks* ($t = 0.760, df = 3393, p < 0.128$) and their propensity to engage in *healthy food behaviors* ($t = 0.497, df = 3411, p < 0.563$). Since these findings were non-significant, I was unable to support the null hypothesis and must

therefore accept the alternative. See Table 4.5 below for a more complete description of the results.

H_{1b}: *People who have higher incomes and better education are more aware of food banks and are more likely to engage in healthy food behaviors.* A factorial ANOVA was conducted to test this sub-hypothesis that individuals with *higher incomes* and *better education* had more *awareness of food banks* and therefore were more likely to engage in *healthy food behaviors*. Results of the ANOVA demonstrated that *adult education* was a significant factor ($F_{(4, 2792)} = 9.505, p < 0.000, \eta^2 = .014$) in an individual's *healthy food behaviors*. Although the overall *F* score for the *household income* variable was not significant, its *F* score suggested that there might be some important issues that might be uncovered in some *post-hoc* testing. I used the LSD *post-hoc* procedure to examine the relationship between the variables. All of the *post-hoc* test results for *adult education* were significant. In other words, each level of education differed from each other and all contributed the overall *F* score. The findings for *household income* indicated that individuals who had the *lowest income levels* and those with the *highest income levels* did not differ in terms of their *healthy food behaviors* ($M_{diff} = -0.138, p < 0.141$), but all others whose *incomes* ranged from \$12,500 to \$70,000 differed significantly from those individuals in the *lowest* and *highest income* levels in their *healthy food behaviors*. There were no meaningful differences reported for any other variable and *food bank awareness*. The inconclusive nature of the findings, with only one of my measures being significant, has made me cautious and as a result I am rejecting the null hypothesis and accepting the alternative. See Table 4.6 below for full description.

Research Hypothesis H2

The current hypothesis argues that *food sufficiency status* has a direct effect on *healthy food behaviors*. In order to test this hypothesis and the two sub-hypotheses, correlation, t-test, and ANOVA statistics were used. The analysis findings are discussed as they relate to each of the hypothesis.

H₂: *The smaller the household size is the more likely one is to engage in healthy food behavior.* In order to examine and test this hypothesis, I conducted a simple correlation analysis in an attempt to discover if there was a relationship between *household size* and *healthy food behaviors*. As hypothesized, it was believed that the *smaller the family*, the more likely it was that they would have *healthier eating habits*. The results indicated that there was a very small and non-significant relationship ($r = 0.022, p < 0.202$). With these findings, I was not able to support the null hypothesis that *household size* would influence *healthy food behaviors*.

H_{2a}: *Women in smaller households are more likely than men to engage in healthy food behaviors.* In order to test this sub-hypothesis, I conducted independent sample t-tests to discover if there were differences between women and men and their *household size* and *healthy food behaviors*. In essence, the analysis showed that there was no significant difference between women and men in terms of their *household size* ($t = -0.106, df = 3411, p < 0.900$) and their propensity to engage in *healthy food behaviors* ($t = 0.497, df = 3411, p < 0.563$). Since these findings were non-significant, I must reject the null hypothesis and must therefore accept the alternative. See Table 4.5 below for a more complete description of the results.

H_{2b}: *People with higher incomes, better education, and smaller households are more likely to engage in healthy food behaviors.* A factorial ANOVA was conducted to test this sub-hypothesis that individuals with *higher incomes* and *better education* had *smaller households* and therefore were more likely to engage in *healthy food behaviors*. Results of the ANOVA revealed that *adult education* was a significant ($F_{(4, 2792)} = 9.010$, $p < 0.000$, $\eta^2 = .013$) factor in an individual's *healthy food behavior*. Although the overall F score for the *household income* variable was not significant, there was a suggestion in the overall ANOVA results that led me to believe that there might be some important issues that might be uncovered in further *post-hoc* testing. I used the LSD post-hoc procedure to examine the relationship between the variables. All of the post-hoc test results were significant for *adult education* as expected. The findings indicated that individuals who had the *lowest income levels* and those with the *highest income levels* did not differ in terms of their *healthy food behaviors* ($M_{diff} = -0.138$, $p < 0.141$), but all others whose *incomes* ranged from \$12,500 to \$70,000 differed significantly from those individuals in the *lowest* and *highest income* levels in their *healthy food behaviors*. In addition, although the overall F score for the *household size* variable was not significant, post-hoc testing for the measure showed that those households that consisted of two to four members were significantly different from those with a single household member and those with larger households of five or greater in terms of their *healthy food behaviors*. With only one of my measures being significant and the others clearly suggesting uncertainty I am rejecting the null hypothesis and accepting the alternative that there were some measures that simply did not support my hypothesis as constructed. See Table 4.6 below for full description.

Research Hypothesis H3

The current hypothesis argues that *mental health status* has a direct effect on *awareness of food sufficiency status*. In order to test this hypothesis and the two sub-hypotheses, correlation, t-test, and ANOVA statistics were used. The analysis findings are discussed as they relate to each of the hypothesis.

H₃: *Individuals who report mental health in the normal range are more likely to be aware of their food sufficiency status.* In order to examine and test this hypothesis, I conducted a simple correlation analysis in an attempt to discover if there was a relationship between *mental health status* and *food sufficiency status*. As hypothesized, it was believed that individuals who reported *normal ranges of mental health* were more likely to be aware of their *food sufficiency status*. The results indicated that there was a significant relationship ($r = 0.220, p < 0.001$). With these findings, I was able to support the null hypothesis that *mental health* was strongly related to *food sufficiency status*. See Table 4.4 below for full description of the correlation.

H_{3a}: *Women are more likely than men to be aware of their level of depression and are more likely to be aware of their food sufficiency status.* In order to test this sub-hypothesis, I conducted independent sample t-tests to discover if there were differences between women and men and their *level of depression* and *food sufficiency status*. On the one hand the analysis showed that there was a significant difference between women and men in terms of their *levels of depression* ($t = -5.478, df = 3040, p < 0.001$). On the other hand analysis showed was no significant difference between women and men in terms of their *awareness of food sufficiency status* ($t = -1.020, df = 3393, p < 0.130$). Since these

findings were inconsistent, I was unable to support the null hypothesis and must therefore accept the alternative. See Table 4.5 below for a more complete description of the results.

H_{3b}: *People with higher incomes and better education are more aware of their level of depression and are more likely to be aware of their food sufficiency status.* A factorial ANOVA was conducted to test this sub-hypothesis that individuals with *higher incomes and better education* had more *awareness of their depression levels* and therefore were more likely to be aware of their *food sufficiency status*. Results of the ANOVA discovered that *household income* were significant factor ($F_{(11, 2670)} = 24.722, p < 0.000, \eta^2 = .093$) in an individual's *awareness of their food sufficiency status*. Additionally, the results also showed that *adult education* was also a significant factor ($F_{(4, 2670)} = 16.054, p < 0.000, \eta^2 = .024$) in an individual's *awareness of their food sufficiency status*. In addition, the ANOVA results also concluded that *depression level* was a significant ($F_{(3, 2670)} = 23.018, p < 0.000, \eta^2 = .025$) in an individual's *awareness of their food sufficiency status*. The conclusive nature of the findings, with all of my measures being significant, lends credence to the original hypothesis. See Table 4.6 below for full description.

Research Hypothesis H4

The current hypothesis argues that *food bank awareness, healthy food behaviors, and mental health status* has a direct effect on *food sufficiency status*. In order to test this hypothesis and the sub-hypotheses, hierarchical regression analysis was used. This procedure allowed me to enter data in blocks and to build a clear picture of how the variables come together to explain the outcome measure. The analysis findings are discussed as they relate to each of the hypothesis.

Table 4.4
Pearson Correlation Coefficients from the Healthy Food Behaviors Model.

Variable and Hypothesis	Food Bank Awareness	Healthy Food Behaviors
H ₁		
Food Bank Awareness	-----	
Healthy Food Behaviors	-0.010	-----
H ₂		
Household Size	-----	Healthy Food Behaviors
Healthy Food Behaviors	0.022	-----
H ₃		
Depression	-----	Food Sufficiency
Food Sufficiency	0.220***	-----

*p<0.01 **p<0.05 ***p<0.001

Table 4.5
Independent Sample t-test for Selected Model Factors by Gender (n = 3,413).

Variable	Gender	n	M	SD	t	η ²
Food Bank Awareness	H _{1a} Female	1980	1.93	0.25	0.760	0.013
	Male	1415	1.93	0.24		
Healthy Food Behaviors	H _{1a} Female	1991	1.74	0.59	0.497	0.008
	Male	1422	1.75	0.59		
Household Size	H _{2a} Female	1991	3.23	1.641	-0.106	0.002
	Male	1422	3.23	1.615		
Healthy Food Behaviors	H _{2a} Female	1991	1.74	0.59	0.497	0.008
	Male	1422	1.75	0.59		
Depression	H _{3a} Female	1776	1.28	0.57	-5.478***	0.098
	Male	1266	1.17	0.45		
Food Sufficiency	H _{3a} Female	1980	1.47	0.89	-1.020	0.018
	Male	1415	1.44	0.88		

*p < 0.05 **p < 0.01 *** p < 0.001.

H4: *People who exhibit a greater awareness of food banks, have healthier food behaviors, and normal levels of mental health, are more likely to be awareness of food sufficiency status.* In order to examine and test this hypothesis, I conducted a hierarchical

Table 4.6
Factorial ANOVA Results for Healthy Food Behaviors by Household Income, Adult Education Levels, and Food Bank Awareness (n = 3,413).

Tests of Between-Subject Effects

Dependent Variable: H_{1b} *Healthy Food Behaviors*

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η^2
Corrected Model	26.529 ^a	16	1.658	4.891***	0.027
Intercept	1877.663	1	1877.663	5539.212***	0.666
Income	6.035	11	0.549	1.618	0.006
Education	12.888	4	3.222	9.505***	0.014
Food Bank	0.021	1	0.021	0.062	0.000
Error	940.999	2776	0.339		
Total	9334.000	2793			
Corrected Total	967.528	2792			

Dependent Variable: H_{2b} *Healthy Food Behaviors*

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η^2
Corrected Model	28.421 ^a	21	1.353	3.993***	0.029
Intercept	3762.825	1	3762.825	11102.878***	0.800
Income	4.960	11	0.451	1.330	0.005
Education	12.214	4	3.053	9.010***	0.013
Household Size	1.914	6	0.319	0.941	0.002
Error	939.107	2771	0.339		
Total	9334.000	2793			
Corrected Total	967.528	2792			

Dependent Variable: H_{3b} *Food Sufficiency Status*

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η^2
Corrected Model	378.128 ^a	18	21.007	35.344***	0.193
Intercept	918.418	1	918.418	1545.195***	0.368
Income	161.634	11	14.694	24.722***	0.093
Education	38.169	4	9.542	16.054***	0.024
Depression	41.043	3	13.681	23.018***	0.025
Error	1576.269	2652	0.594		
Total	7372.000	2671			
Corrected Total	1954.398	2670			

* p < 0.01 ** p < 0.05 *** p < 0.001

regression in an attempt to discover if *food bank awareness*, *healthy food behaviors*, and *depression levels* could significantly predict an individual's *food sufficiency status*. As hypothesized, it was believed that individuals who had a greater *awareness of food banks*, *healthier eating habits*, and had *normal levels of mental health*, would be more aware of *their food sufficiency status*. The first block (A) revealed that approximately 15% of the variance in food sufficiency status could be explained by the first factor *food bank awareness* ($R^2_{adj} = 0.155$, $F_{(1, 3027)} = 554.818$, $p < 0.001$). When the healthy food behaviors block (B) was added to the equation along with food bank awareness (A + B) the amount of variance explained ($R^2_{adj} = 0.157$, $F_{(2, 3026)} = 282.520$, $p < 0.001$) increased to 16% revealing a small but significant ΔR^2 change ($\Delta R^2 = 0.002$, $p < 0.003$) in the overall regression score.

In the final block the variable, mental health (C) was added to the model. It enhanced the overall amount of variance explained. A notable change in the R^2 change ($\Delta R^2 = 0.027$, $p < 0.003$) was accompanied by the reported variance of 18% ($R^2 = 0.183$, $F_{(3, 3025)} = 227.331$, $p < 0.001$) up from the 16% reported previously. These results supported the research hypothesis. It is clear that on some level *food sufficiency status* can be predicted by knowing how much *food bank awareness* a person has, what their *healthy food behaviors* are, and their current level of *mental health*.

In essence, the overall amount of variance explained in this model was 18.3%, or almost a one-fifth of what is understood as food sufficiency status using the measures as developed here. Table 4.7 provides a summary of change by blocks in the current Food Sufficiency Status Model.

Table 4.7

Hierarchical Regression Analyses of Food Bank Awareness (A) (Block1), Food Bank Awareness (A) with Healthy Food Behaviors (B) (Block 2), Food Bank Awareness (A) Healthy Food Behaviors (B) with Mental Health (C) (Block 3).

Model	<i>B</i>	<i>SE</i>	β	R^2_{adj}	ΔR^2
<i>Block1</i>					
Food Bank Awareness	-1.357	0.058	-0.394***	0.155	0.155***
<i>Block2</i>					
Food Bank Awareness	-1.354	0.058	-0.343***	0.157	0.002**
Healthy Food Behaviors	0.073	0.025	0.049**		
<i>Block3</i>					
Food Bank Awareness	-1.272	0.057	-0.369***	0.183	0.027***
Healthy Food Behaviors	0.068	0.024	0.046**		
Mental Health	0.272	0.027	0.165***		

* $p < 0.01$ ** $p < 0.05$ *** $p < 0.001$

a. Dependent Variable: Food Sufficiency Status.

H_{4a}: *People who exhibit greater awareness of food banks, have healthy food behaviors, normal levels of mental health, and better education, are more awareness of food sufficiency status.* In order to examine and test this sub-hypothesis, I conducted a hierarchical regression in an attempt to discover if an individual's *food bank awareness, healthy food behaviors, depression levels, and education* could significantly predict their *food sufficiency status*. As hypothesized, it was believed that individuals with a greater *awareness of food banks, healthier eating habits, who had normal levels of mental health, and better education* would be more aware of their *food sufficiency status*. The first block

(A + B + C) revealed that approximately 18% of the variance in food sufficiency status could be explained by the first three factor ($R^2_{adj} = 0.179$, $F_{(3, 2857)} = 208.662$, $p < 0.001$).

In the final block education (D) was added to the model. It enhanced the overall amount of variance explained. A notable change in the R^2 change ($\Delta R^2 = 0.036$, $p < 0.001$) was accompanied by the reported variance of 22% ($R^2_{adj} = 0.215$, $F_{(4, 2856)} = 113.218$, $p < 0.001$) up from the 18% reported previously.

In essence, the overall amount of variance explained in this model was 22%, or about slightly more than one-fifth of what is understood as *food sufficiency status* using the measures as developed here. The overall model was acceptable. However when *education* was introduced the effect of *healthy food behaviors* were suppressed and that as *education* levels ($\beta = -0.196$) levels declined the person is less likely to be *food sufficiency*. Table 4.8 provides a summary of change by blocks in the current Food Sufficiency Status Model.

Table 4.8

Hierarchical Regression Analyses of Food Bank Awareness (A) Healthy Food Behaviors (B) with Mental Health (C) (Block 1), Food Bank Awareness (A) Healthy Food Behaviors (B) Mental Health (C), with Education (D) (Block 2).

Model	<i>B</i>	<i>SE</i>	β	R^2_{adj}	ΔR^2
<i>Block1</i>					
Food Bank Awareness	-1.238	0.059	-0.360***	0.179	0.180***
Healthy Food Behaviors	0.056	0.027	0.039**		
Mental Health	0.276	0.027	0.172***		
<i>Block2</i>					
Food Bank Awareness	-1.164	0.058	-0.339***	0.215	0.036***
Healthy Food Behaviors	0.017	0.024	0.012		
Mental Health	0.232	0.027	0.145***		
Education	-0.143	0.012	-0.196***		

* $p < 0.01$ ** $p < 0.05$ *** $p < 0.001$

a. Dependent Variable: Food Sufficiency Status.

Chapter Five

Discussion

With an estimated 20.3 % of households with children in America reporting food insufficiencies during the last year it is essential that steps be taken to uncover what are some of the social factors besides lack of funding that contributes to food insufficiency in the United States (Coleman-Jensen, Nord, Andrews, & Carlson, ERS, Sep. 2012). This investigation sought to offer some insight into this issue. The basic research question asks, what is the overall effect of healthy food behavior, awareness of food banks, and mental health, on food sufficiency? The issue generated by this question led to the development of four hypotheses that addressed each of these aspects while in some cases controlling for gender differences. The results of these findings and their meaning are discussed in the paragraphs below.

The first hypothesis looks at the relationship between food bank awareness and healthy food behaviors. After testing the hypothesis and its sub-hypothesis there were no meaningful connections found for most of the results; however there was an important link to the overall education level of the respondent. It was also apparent from these findings that individuals and households that are facing food insufficiencies may not have healthy eating habits, and these unhealthy eating habits can affect their mental health in a negative way. In addition, if household members are not eating the right kinds of foods, their biological well-being could also be affected due to a lack of nutrition within their diet.

The second hypothesis articulated the relationship between healthy food behaviors and household size. While it may be logical to assume that people who have

larger families are likely to have more food security issues, the data did not necessarily support this conclusion. In fact, the data show that there are thresholds—places where families with smaller numbers and those who would be considered large families seem to have better food knowledge and are more food secure than those who have average to moderately larger families. This finding came as a surprise and is certainly one that has been absent in the food sufficiency literature. Household size was also showed no difference in terms its relationship between gender and the healthy food behavior. In other words, in some households having a female head of household made no difference, generally speaking men and women simply do not differ on their food knowledge. The most important difference came in terms of education. Healthy food behaviors were directly influenced by education. The data consistently revealed that people who are better educated seem to be better educated over a variety of measures, including what makes for proper eating habits. It also did not seem to matter what level of income or size of household was involved, as long as the person appeared to be well educated then there was a plausible explanation for healthy food behaviors.

The third hypothesis examined the relationship of mental health to practices of food sufficiency. It was argued that those people who displayed poor mental health were also more likely to display a lack of concern for their health and that in turn would reveal itself in their food sufficiency scores. In this investigation individuals who reported moderate to severe levels of depression were more likely to be faced with food insufficiencies. Unfortunately for those individuals residing within these ranges, their likelihood of having healthy eating habits were also diminished. With current research suggesting that foods can have major influence over the way we operate cognitively,

unhealthy eating habits can further complicate mental health by altering brain chemistry and thereby increasing an individual's level of depression and quite possible further complicating their food insufficiencies (Christensen & Burrows, 1990; Christensen, Krietsch, White, & Stagner, 1985; Christensen, 1993; Fernstrom, & Wurtman, R., 1971; Fernstrom, Krowinski, & Kupfer, 1987).

The final hypothesis examined the overall question by including in those measures that helped to underscore the Food Sufficiency Status Model (see Figure 1.1 in Chapter 1). The results highlighted an important discovery, that is—families who are at an increased risk of suffering from food insufficiencies were those who did not have knowledge of emergency food banks within their area, those who had less than a high school diploma, those with at least three other people present in the home, those who earning an income at or below poverty levels, and who were moderately to severely depressed were at the highest risk of suffering not only food insufficiencies but food insufficiencies at the moderate to severe hunger levels, thereby making those households the most vulnerable. In addition, the children within the home can also be affected by family food insufficiencies as well, but for some children the saving grace may come in the form of free school breakfast and lunch programs in addition to adults in the homes reducing or cutting their meals so that there is enough food for the children. While it may be considered admirable for the adults to reduce their food intake in order to provide for their children, the truth is that many of these adults may be exposing themselves to the other issues related to food insufficiencies, most notably increased levels of depression.

Limitations

Several limitations were present in this study. A major limitation to this study was that an essential measure, *food bank* awareness, was measured as a dichotomy. The lack of variation within this variable made it almost impossible to distinguish any real differences. When this measure was tested using alternative statistical techniques, in this case logistic regression, the small size of people who had used versus those who had not used food banks produced no meaningful odds. Another limitation of this study which is not uncommon to secondary analysis was the inability to formulate some of the essential variables to my liking—in short, I was unable to ask questions in the way that I would have wanted to and had to deal with both the answers and answer categories that were provided. The problem was exacerbated on the healthy food behaviors measure. The variable was constructed from a series of elements that asked about which foods were consumed and what would be the correct amounts to consume for these foods. Although they measures were good, the awkward way in which the questions were phrased, the use of terms that most people may not be familiar with, and the lack of any measures on the so called “fast food” as a means of health were not included. While this was not a severe limitation, I believe that some clearer mention of fast food and other types of foods consumed by most Americans would have been a very useful indicator in determining a better picture of healthy food behavior. A final limitation to this investigation was the way in which the family variable was constructed. Instead of a family measure that showed exactly how families were constructed, e.g., single parent family there was no direct measure so one is left to infer that if there is a child in the household and one adult then that must mean there is a single parent family. While this could be the most likely

situation, it is only one explanation. There are other plausible findings but none are described within the data set itself.

Despite these limitations the overall quality of the sampling techniques, the nature of the data set itself—data were cleaned and verified before being released to the public—and the clear explanations on how and why things were done provided by the codebooks makes the NHANES an invaluable tool in addressing some of the many health issues that exist in the US today.

Recommendations

Coping Strategies Utilized by Food Insufficient Families

Unfortunately once families are faced with food insufficiencies, they must develop coping strategies in order to feed the family members. Based on where the family resides (e.g. urban or rural), different coping strategies may be utilized based on community and cultural norms, as well as services and support offered within the area. Both rural and urban areas have coping strategies that are in some ways similar and yet vastly different in other ways.

Rural Strategies

Mammen et al., (2008) found the five coping strategies most commonly used by rural low-income families. These strategies include, but are not limited to, shopping techniques (i.e. use of coupons, bulk-buying, and buying off brands), community support (i.e. food banks, food pantries, and church or non-profit organizations), consumption reduction behaviors (i.e. dieting, curbing appetite, and deciding which family members eat first), money techniques (i.e. use of credit cards, juggling bills, and writing bad checks), and use of governmental programs (i.e. WIC or food stamp program).

In addition to these five coping strategies, Mammen et al., (2008) also found that some rural families could add human capital (i.e. gardening, canning and/or freezing goods) as an additional technique to cope with food insufficiencies. Most notably was their ability to garden, and trade what they grow for what they need. This reciprocal non-market food trade system was noted for some rural families (Lois Wright Morton, Bitto, Oakland, & Sand, 2008). In addition, some rural families had the ability to hunt and fish in order to offset food insufficiencies.

Urban Strategies

Similar research was conducted by Greder & Brotherson (2002), and they too found that both urban and rural residents had coping strategies that were very similar. Their research fell in line with Mammen et al., (2008), and found five primary strategies utilized by both rural and urban families in order to meet their family's food and nutritional needs; relying on others, adjusting resources, reducing food consumption, making trade-offs, and acquiring nutrition and shopping knowledge and skills. When compared to Mammen et al., (2008) five coping strategies, Greder & Brotherson (2002) had two main differences; making trade-offs, and acquiring food and shopping skills.

When it came to demands (e.g. time and lack of energy) placed upon the parent, the decision to make quick and easy meals for the family was the trade-off between time consuming nutritiously balanced meals. Additionally, one respondent commented that even though she was trying to cut down on the amount of red meat served within the household to help her husband with his high cholesterol, her husband demanded to be served meat. For her the trade-off was between less family conflict and better health.

Additionally, some families used food and financial management skills in order to help make their home food sufficient. In fact, recent research suggests that when individuals, namely mother, attend food and nutrition education programs, their ability to manage their household increased, and this in turn decreased their risk of food insufficiencies (Greder & Brotherson, 2002). In addition, mothers who participated in the programs reported an increased ability to plan menus, utilizing shopping lists to only buy the food items needed, as well as to comparative shopping (e.g. store brand vs. name brand), and to stock-up of sale items. All of these learned skills help to combat food insufficiencies, and to become a food sufficient household. Additionally, the testimonials cited from respondents within Greder & Brotherson's (2002) study indicated an increased self-confidence as well as feeling like they created healthier meals for their families.

Programs for Food Insufficiencies

Fortunately for many families facing food insufficiencies, there are many programs in place to assist them in becoming food sufficient. The programs discussed in this study range from educational programs, social programs, and community programs that have been shown to influence a families food status, in addition to strengthen family bonds and increasing a parents confidence in their abilities to manage their households.

Family Resource Education

When it came to acquiring nutritional and shopping knowledge, all of the participants in Greder & Brotherson's (2002) study from above had attended either the Expanded Food and Nutrition Education Program or the Family Nutrition Program. In addition to educating the participants about the nutritional needs of their children,

participants also developed skills related to planning menus (e.g. use what you have, and only buy what you need), utilizing shopping lists (i.e. only buying what's on the list), comparing prices between name-brand and off-brands, reading nutritional labels, and stocking up on sale items (e.g. buy now at reduced prices, for future use). This study also suggests that some of the benefits of nutritional education programs is teaching families to be self-sufficient and thereby becoming food sufficient, in addition to increasing self-confidence among participants. Unfortunately for families that are food insufficient, nutritional educational programs may not be offered in their area, and lack of transportation may prevent them from attending these helpful programs.

Emergency Food Programs

In addition to educating individuals and families, emergency food programs may offer some relief to many families suffering from food insufficiencies. The following is a list of some of the better known programs that are federally or state funded (De Marco, Thorburn, & Kue, 2009; Olson & Holben, 2002). One of the biggest social programs in place to aid families is the food stamp program (FSP), followed closely by the special supplemental nutritional program for women, infants, and children (WIC). As mentioned earlier in the study (i.e. effects on children section), national school free breakfast and lunch programs are in place to help children from households at or below poverty levels, by making sure they have a nutritious breakfast and lunch. Those children who participate in this program, have been shown to benefit throughout the school day by consuming a nutritionally adequate breakfast and lunch (Beretta, Koszewski, Betts, & Benes, 2001).

Community Gardens

In addition to the many federal, state, and local programs in place to help families fight food insufficiencies, some researchers are looking for new ways to aid families. Recent research by Carney et al., evaluated community gardening projects and how these programs not only strengthened family bonds, but help to reduce food insufficiencies (Carney, Hamada, Rdesinsji, Sprager, Nichols, Liu, Pelayo, Sanchez, & Shannon, 2011). The researchers discovered that in addition to offering a variety of low-cost fruits and vegetables for families to consume, most families also commented on the increased physical activity that gardening offered, as well as increased amounts of quality time the family spent together gardening. This research suggests that local communities should support community gardening projects not only by offering land to garden on, but by offering resources, such as seeds, equipment, or monetary donations as well. If local communities support gardening projects, they are ultimately supporting family food sufficiency, in addition to stronger family ties.

Conclusion

Family food insufficiencies are arguably become more and more prevalent in the United States. The continuing effects of the economic recession of 2006-2009, had a great impact on individuals from virtually all walks of life, specifically those with limited education, lower incomes, and larger households, these people were more susceptible to becoming food insufficient. Even if families can be made aware of food banks within their local area, it is not always clear that they will use them even though they are the first step in helping to reduce food insufficiencies.

Another factor that was important to note was that if individuals can be helped to complete at least their high school education, there would be greater reduction in the likelihood of increasing their household income and thereby reducing their risk food becoming food insufficient. In addition, if individuals who are suffering from depression can find local low-cost counseling to help them combat their illness, their chances of becoming or staying food insufficient are greatly reduced.

Greater efforts must be made to collect more data regarding household food insufficiencies and its antecedents. Greater attempts must be made to show how food bank awareness, income, education, healthy food behaviors, and mental health, in conjunction with other elements might serve as more direct causal links to food insufficiency. It is my hope that the Food Sufficiency Status Model be further developed and refined as a tool to help individuals and families fighting food insufficiencies. As it exists currently, the Food Sufficiency Status Model does hold some hope for individuals currently suffering from food insufficiencies in their daily life. Only after further data can be collected can the value of the model be fully realized.

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Appendix A

The measure healthy food behavior consisted of a constructed variable based on respondent's answers to a series of questions regarding their knowledge about correct amounts of food to be consumed across a variety of measures extracted from the USDA My Pyramid/Food Guide Pyramid (2007 versions) for The National Health and Nutrition Examination Survey (NHANES, 2007-2008) study. Respondents were asked seven questions about what they thought were the proper amounts of food to be consumed daily. Although respondents' answers varied greatly, I theorized that answers would be correct, near-correct, or just wrong. The specific aspect of how each answer fit into one of these three groups is discussed below each question. The final answers were summed and the mean value was used to ultimately assign a respondents views to one of three characteristics of healthy food behaviors. The structure of the question was:

“Let us talk about the amounts from different food groups that a person should eat each day”.

1. How many **cups** of **milk** would you say a {man/woman} of your age and physical activity should drink each day for good health?

Respondent's answers ranged from zero cups to 16 cups per day. The USDA's daily

recommendation is 3 cups. I categorized the amounts in the following ranges: zero to 1.5

cups per day were recoded as wrong (3), 2 to 2.5 cups per day were recoded as near

correct (2), and 3 cups per day and above were recoded as correct (1).

2. How many **cups** of **fruit** would you say a {man/woman} of your age and physical activity should eat each day for good health?

Respondent's answers ranged from zero cups to 12 cups per day, with the USDA's daily

recommendation being 2 cups. I categorized the amounts in the following ranges: zero to

0.75 cups per day were recoded as wrong (3), 1 to 1.5 cups per day were recoded as near correct (2), and 2 cups per day or greater were recoded as correct (1).

3. How many **cups of vegetables**, including dark green, orange, starchy, and other vegetables, would you say a {man/woman} of your age and physical activity should eat each day for good health?

Respondent's answers ranged from zero cups to 15 cups per day, with the USDA's daily recommendation being 2.5 cups. The following ranges were used to set the recorded values: zero to 1 cup per day was recoded as wrong (3), 1.5 to 2 cups per day were recoded as near correct (2), and 2.5 cups per day and above were considered as correct (1).

4. How many **ounces of meats and bean** would you say a {man/woman} of your age and physical activity should eat each day for good health?

Respondent's answers ranged from zero ounces to 65 ounces per day, with the USDA's daily recommendation being 5.5 ounces. I used the following breakdown to construct the categories for the measure: zero to 4 ounces per day in addition to any answer about 9 ounces (due to health related issues with over consumption of meat) were recoded as wrong (3), 4.5 to 5 ounces per day were recoded as near correct (2), and 5.5 to 8 ounces per day were recoded as correct (1).

5. How many **ounces of grains** would you say a {man/woman} of your age and physical activity should eat each day for good health?

Respondent's answers ranged from zero ounces to 90 ounces per day, with the USDA's daily recommendation being 6 ounces. The large variation in answers on this measure made the recoding scheme less problematic: zero to 3 ounces per day as wrong (3), 4 to 5 ounces per day were recoded as near correct (2), and 6 ounces per day and above were recoded as correct (1).

6. How many **ounces of whole grains** would you say a {man/woman} of your age and physical activity should eat each day for good health?

Respondent's answers ranged from zero ounces to 65 ounces per day, with the USDA's daily recommendation being 3 ounces. Zero to 1.5 ounces per day were recoded as wrong (3), 2 to 2.5 ounces per day were recoded as near correct (2), and 3 ounces per day and above were recoded as correct (1).

7. About how many **calories** do you think a {man/woman} of your age and physical activity needs to consume a day to maintain your current weight?

Respondent's answers ranged from less than 500 calories to more than 3,000 calories per day, with the USDA's daily recommendation being 2,000 calories per day. The following ranges were used: less than 500 to 1,000 and more than 3,000 calories per day were recoded as wrong (3), 1,001 to 1,500 and 2,501 to 3,000 calories per day were recoded as near correct (2), and 1,501 to 2,500 calories per day were recoded as correct (1).

For those question regarding milk, fruit, vegetables, grains, and whole grains that respondents answers ranged over the daily amounts were not recoded as wrong due to the fact that over consumption of these food groups are not considered unhealthy. For the question regarding meat and beans, those respondents that answered above 9 ounces were recoded as wrong due to the healthy related issue of cholesterol related to over consumption of meats.