COMMUNITY FOOD SECURITY IN UNITED STATES CITIES
A Survey of the Relevant Scientific Literature
Community Food Security in United States Cities: A Survey of the Relevant Scientific Literature

Stephen A. Haering, MD, MPH
Shamsuzzoha B. Syed, MD, MPH, DPH (Cantab)
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Introduction

Hamm and Bellows define community food security as “a condition in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance, social justice, and democratic decision-making” (Hamm & Bellows, 2003).

Community food security, as defined above, is a fundamental component of assuring that appropriate conditions are in place to enable people and communities to enjoy health and well-being. Threats to community food security may be dramatic, as demonstrated internationally by the continued suffering from malnutrition by Sudanese children (Gertler, 2007) and domestically by the 56 percent of Houston Astrodome shelter residents who went without adequate food in the aftermath of Hurricane Katrina in 2005 (Brodie, Weltzien, Altman, Blendon & Benson, 2006). Thus food availability becomes a matter of immediate life and death in such circumstances, and significant national and global resources are dedicated to emergency relief efforts.

But food availability is only one aspect of food security. Lee and Greif review four core dimensions of food insecurity: consumption level pertains to the number of meals eaten per day, the amount being eaten, and the degree of regularity of meals; quality refers to both the nutritional aspects of food and personal, subjective preferences; sources indicates both the foundations from which foods are supplied and the personal and cultural acceptance of the sources; and cost dimension is central to fully considering components that compose food security / insecurity (B. A. Lee & Greif, 2008). Thus, in many communities, the threats to community food security are subtle. Members of such communities may have access to adequate, or even excessive, caloric intake, but the food environment is still insecure: The available foods are of limited to absent nutritional value; the method of food attainment may be culturally unacceptable (e.g., foods may be acquired only by means that do not support the dignity of individuals and families); healthy foods may be available but financially inaccessible; the food system may be unsustainable, hegemonic, or environmentally hazardous. These scenarios are realities among vulnerable populations in the United States and likely contribute to the growing nutritional and associated health disparities among races / ethnicities and socioeconomic groups.

Recognizing the importance of the more subtle threats to food security, the Johns Hopkins Center for a Livable Future (CLF) is collaborating with stakeholders to improve the understanding of food systems. A food system is a concept complementary to food security / insecurity and is defined as “a set of interrelated functions that includes food production, processing, and distribution; food access and utilization by individuals, communities, and populations; and food recycling, composting, and disposal” (McCullum, Desjardins, Kraak, Ladipo & Costello, 2005). The collaborations among CLF, community organizations, business owners, government agencies, and decision-makers will help to identify the gaps and strengths of the food system of vulnerable communities and enable stakeholders to improve the food security of at-risk individuals and families.

The focus of CLF efforts pertaining to food security includes:

- Collecting, analyzing, and disseminating information on the knowledge, practices, attitudes, and desires of community members and on the availability, price, and quality of healthy food choices
- Mobilizing and enhancing relationships among a wide range of stakeholders within a food system, for example, producers, stores, consumers, community members and organizations, government agencies, food security advocates, and academia
- Advancing community knowledge about the health and environmental consequences of food choices
- Interpreting and providing food security—related scientific information in a manner that strengthens the interface between available evidence and decision making at multiple levels within a food system

This literature synthesis can form the basis of action to enhance community food security. It also allows future research and activities to be informed by the global knowledge pool on the subject. The synthesis draws from peer-reviewed academic literature and other relevant sources that the authors felt would enhance this overview of food security. Much of the “gray literature” has not been included in this account and is one potential source for further development of this fund of information. The synthesis is divided into 12 themes, presented after a section on definitions.
Definitions

A common lexicon is the ideal starting point in developing an understanding of the complexities in the field of food security. Table 1 includes some of the more common phrases and definitions as presented by researchers and key organizations; words and phrases are grouped thematically while multiple definitions for a given word or phrase are listed chronologically, when possible.

Table 1. Definitions of Common Words and Phrases

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION (Source)</th>
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</table>
| Food security       | “Access by all people, at all times, to enough food for an active, healthy life and includes at a minimum: a) the ready availability of nutritionally adequate and safe foods and b) the assured ability to acquire acceptable food in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, and other coping strategies).”  
                      | *(Life Sciences Research Office, Federation of American Societies for Experimental Biology, 1990)*                                                |
|                     | “Assured access, at all times, to enough food for an active, healthy life.”  
                      | *(Andrews, Nord, Bickel & Carlson, 2000)*                                                                                                        |
|                     | “A situation in which all households have both physical and economic access to adequate food for all members and where households are not at risk of losing such access. There are three dimensions implicit in this definition: availability, stability, and access. Adequate food availability means that, on average, sufficient food supplies should be available to meet consumption needs. Stability refers to minimizing the possibility that, in difficult years or seasons, food consumption might fall below consumption requirements. Access draws attention to the fact that, even with bountiful supplies, many people still go hungry because they are too poor to produce or purchase the food they need.”  
                      | *(United Nations Food and Agriculture Organization [FAO], cited in Hamm & Bellows, 2003)*                                                          |
| Food insecurity     | “Exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable food in socially acceptable ways is limited or uncertain.”  
                      | *(Life Sciences Research Office, Federation of American Societies for Experimental Biology, 1990)*                                             |
|                     | “At some time during the previous year they were uncertain of having, or unable to acquire, adequate food sufficient to meet basic needs at all times due to inadequate household resources for food.”  
<pre><code>                  | *(Andrews et al., 2000)*                                                                                                                                 |
</code></pre>
<table>
<thead>
<tr>
<th><strong>Table 1 – continued</strong></th>
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</table>
| **Community food security** | “A condition in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance, social justice, and democratic decision-making.”
(Hamm & Bellows, 2003) |
| **Food insufficiency** | “‘Sometimes’ or ‘often’ does not get enough food to eat.”
(Alaimo, Briefel, Frongillo & Olson, 1998) |
| | “An inadequate amount of food intake due to a lack of money or resources.”
(Third National Health and Nutrition Examination Survey, cited in Alaimo, Olson & Frongillo, 2001a) |
| | “Living in a family that ‘sometimes or often did not get enough to eat.’”
(Alaimo, Olson & Frongillo, 2001b) |
| **Hunger** | “The actual physiological effects of extended nutritional deprivations” and “the inability, even occasionally, to obtain adequate food and nourishment. In this sense of the term, hunger can be said to be present even when there are no clinical symptoms of deprivation.”
| | “The uneasy or painful sensation caused by a lack of food. The recurrent and involuntary lack of access to food.”
(Life Sciences Research Office, Federation of American Societies for Experimental Biology, 1990) |
| | “The mental and physical condition that comes from not eating enough food due to insufficient economic, family or community resources.”
(Wehler, Scott & Andersen, 1992) |
| | “Resource-constrained food insufficiency.”
(Wehler et al., 2004) |
| | “The uneasy or painful sensation caused by a lack of food.”
(The Food Research and Action Center, 2007) |
| **Hungry** | “Indicates that five or more [of eight] different signs of hunger are present in the household and that at least one of these signs of hunger directly affects the children in the household.”
(Wehler et al., 1992) |
| **At risk for hunger** | “At least one sign of a food shortage problem [of eight] exists in the household.”
(Wehler et al., 1992) |
| **Household hunger** | “A deficit of food availability relative to food requirements.”
(Wehler et al., 1992) |
<table>
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<tr>
<th><strong>Table 1 – continued</strong></th>
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<tbody>
<tr>
<td><strong>Ability to use food</strong></td>
<td>“The ability to prepare, gain access to, and eat food that is available in the household.”&lt;br&gt;<em>(J. S. Lee &amp; Frongillo, 2001a)</em></td>
</tr>
<tr>
<td><strong>Food secure</strong></td>
<td>“Access at all times to enough food for an active, healthy life for all household members.”&lt;br&gt;<em>(Nord, Andrews &amp; Carlson, 2007)</em></td>
</tr>
<tr>
<td><strong>Food insecurity</strong></td>
<td>“Access to adequate food is limited by a lack of money and other resources.”&lt;br&gt;<em>(Nord et al., 2007)</em></td>
</tr>
<tr>
<td><strong>Very low food security</strong></td>
<td>“At times during the year, the food intake of household members was reduced and their normal eating patterns were disrupted because the household lacked money and other resources for food.”&lt;br&gt;<em>(Nord et al., 2007)</em></td>
</tr>
<tr>
<td><strong>Low food security</strong></td>
<td>“Multiple indications of food access problems [due to lack of money and resources], but typically…few, if any, indications of reduced food intake.”&lt;br&gt;<em>(Nord et al., 2007)</em></td>
</tr>
<tr>
<td><strong>Food desert</strong></td>
<td>“Poor communities, where residents cannot buy affordable healthy food.”&lt;br&gt;<em>(Pearson, Russell, Campbell &amp; Barker, 2005)</em></td>
</tr>
<tr>
<td><strong>Social desirability</strong></td>
<td>“The tendency to respond in a manner consistent with societal expectations.”&lt;br&gt;<em>(Hampl &amp; Hall, 2002)</em></td>
</tr>
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<td><strong>Disordered eating</strong></td>
<td>“The umbrella term for eating problems related to excessive weight management. It encompasses both cognitive and behavioral aspects of excessive weight management.”&lt;br&gt;<em>(Townsend, Peerson, Love, Achterberg &amp; Murphy, 2001)</em></td>
</tr>
<tr>
<td><strong>Gleaning</strong></td>
<td>“The collection of crops from farmers’ fields that have already been mechanically harvested or on fields where it is not economically profitable to harvest.”&lt;br&gt;<em>(Kantor, Lipton, Manchester &amp; Oliveira, 1997)</em>&lt;br&gt;“Recovery of produce left in fields for use by the poor.”&lt;br&gt;<em>(Hoisington, Butkus, Garrett &amp; Beerman, 2001)</em></td>
</tr>
<tr>
<td><strong>Food recovery</strong></td>
<td>“The collection, or recovery, of wholesome food from farmers’ fields, retail stores, or food service establishments for distribution to the poor and hungry.”&lt;br&gt;<em>(Kantor et al., 1997)</em></td>
</tr>
<tr>
<td><strong>Community garden</strong></td>
<td>“Any place where two or more people garden together.”&lt;br&gt;<em>(Kantor, 2001)</em></td>
</tr>
<tr>
<td><strong>Phyto-remediation</strong></td>
<td>“A plant-specific form of the larger classification ‘bio-remediation,’” in which plants “successfully extract lead, chromium, and other pollutants from soils and waters.”&lt;br&gt;<em>(Brown &amp; Jameton, 2000)</em></td>
</tr>
</tbody>
</table>
Food Security Frameworks

Development of conceptual frameworks on complex issues allows researchers and stakeholders to work from similar mental maps, thereby facilitating mutual understanding of the interplay of multidimensional systems. A selection of frameworks from the food security literature is presented in this section. The application of these frameworks to the real world of food security certainly assists in understanding the complex determinants of food insecurity—more importantly, these frameworks can also guide the development of multifaceted interventions to enhance food security for individuals, households, and communities.

The Community Childhood Hunger Identification Project (CCHIP) conceptual framework of hunger is a common referent in the academic literature. Wehler and colleagues, working on the CCHIP, developed their conceptual framework by modifying a model previously developed by Cheryl Wehler as part of the 1983 Massachusetts Nutrition Survey Multivariate Analysis (Wehler et al., 1992). The CCHIP version provides a “graphic representation of the sequential nature of the determinants of hunger and some of their attendant outcomes.” The researchers note that access to food is determined by multiple factors, including food purchasing power, various community characteristics (such as type and number of stores, transportation), and government and private assistance programs. Their model includes “negative emotional, psychological, functional, and behavioral or health outcomes” that may result from hunger. Including these factors reflects part of the project's intent of advancing a model of hunger measurement in the United States, where “the subtle nature of chronic but subclinical hunger” cannot be measured by physiological methods (e.g., clinical, anthropometric, or hematologic indicators) used in less-developed countries (Wehler et al., 1992). The CCHIP food security framework model is presented in Figure 1.

Figure 1. The Community Childhood Hunger Identification Project Conceptual Model (Wehler et al., 1992)
Campbell notes that the emotional and political aspects surrounding the discussion of hunger and food had previously been incongruent with the academic debate (Campbell, 1991). She states that the differentiation of biological and socioeconomic factors in the definition of “food security” (see “Definitions” section) allowed researchers to “move beyond a focus on the nature of the relationship between hunger and undernutrition and malnutrition.” By agreeing on critical definitions, researchers, policymakers, and organizations have been able to expand their work into the social, psychological, and political aspects of the phenomenon while also allowing recognition of food insecurity as a global issue, not just one afflicting peoples in low-income countries. The constructs established with these definitions provided researchers with avenues to measure food insecurity in four essential components at the individual and household levels: quantity, quality, psychological acceptability, and social acceptability. Additionally, the constructs included the involuntary nature of restrictions of behavior and the community environment (Campbell, 1991). Campbell’s conceptualization of food insecurity and its risk factors is reproduced in Figure 2.

Figure 2. Campbell’s Conceptualization of Food Insecurity and Its Risk Factors (Campbell, 1991)
Campbell also presents an additional conceptual framework for the potential consequences of food insecurity as they related to its risk factors (Campbell, 1991). In this model she explains that “food insecurity can affect health either directly or indirectly through a physiological mechanism related to nutriture.” In her 1991 article she challenges the notion that food insecurity is simply a predictor of malnutrition or poor quality of life and suggests “that food insecurity be considered an important outcome variable,” rather than a predictor variable. She further asserts that such an approach “is at its root an ethical claim.” Her framework showing the relationships of food insecurity to risk factors is shown in Figure 3.

Figure 3. Logical Status of Nutrition and Related Indicators
(Campbell, 1991)
A more recent conceptual framework of food insecurity, its risk factors, and consequences has been proposed by Broughton and colleagues (Broughton, Janssen, Hertzman, Innis & Frankish, 2006). Their model builds on Campbell’s previous frameworks and subsumes previous categories under broader groupings. It is reproduced in Figure 4.

**Figure 4. Broughton’s Food Security Conceptual Framework**  
(Broughton et al., 2006)

In an editorial Glanz and colleagues present an ecologically based conceptual model they used to develop survey instruments for their Nutrition Environment Measurements Study (NEMS) (Glanz, Sallis, Saelens & Frank, 2005). See Figure 5 below. They prioritized the “community nutrition environment” and the “consumer nutrition environment” because of the paucity of identified research studies in these topic areas and because of their potential extensive impacts on individual eating patterns (Glanz et al., 2005).
Cheadle and colleagues provide evidence that an ecologic approach to individual eating patterns is valid (Cheadle et al., 1991). They evaluated the relative availability of healthful food items (using a community-level food store environment measure) and of individual dietary practices in 12 communities. They found a positive correlation between the percentage of stores’ shelf space devoted to healthful foods and the healthfulness of self-reported diets. The researchers note that this correlation suggests a method to track community dietary changes by evaluating the grocery store environments (Cheadle et al., 1991).
A Brief History of Policy of Food Security in the United States

Policy on food security has been a consistently controversial issue in the United States. A brief history of policy development in this area is described in this section. The food security policy arena today—particularly the hotly debated topics of measurement of food insecurity, the effectiveness of government food programs, or the existence of food deserts—can be better understood when considered in the context of food security policy development over time. Advocating for interventions to enhance food security in the present requires cognizance of this gradual development. Certain points are particularly striking: the power of the media in shifting public opinion on food policy; the power of advocacy in achieving changes in food policy; the crucial role of evidence in achieving policy changes; the marked effects of international issues on US domestic food policy, for example war; and the significant interdependence of economic policy and food security policy.

Knowledge and evidence are impotent unless translated into action. Through understanding the world of food security policy, the interface between evidence and policy-making can potentially be strengthened, thus leading to enhanced community food security in the United States.

The importance of hunger and food security as a 20th-century national policy issue can be traced back to the Great Depression when the Food Stamp Program (FSP)—known since October 1, 2008, as the Supplemental Nutrition Assistance Program, or SNAP—was developed to assist farmers and to feed the impoverished (Biggerstaff, Morris & Nichols-Casebolt, 2002). The program ended in 1943 in an effort to divert excess commodities to soldiers fighting in World War II (Biggerstaff et al., 2002). However, given that 40 percent of would-be draftees were rejected because of physical disabilities, which were found to be primarily a result of undernutrition, Congress passed the National School Lunch Act in 1946 to enhance the health of children and thus national security (Parker, 2002). In the 1950s President Dwight D. Eisenhower initiated a surplus commodity program. Hunger as a policy issue gained considerable national priority under the presidency of John F. Kennedy: After assuming office, he doubled Eisenhower’s surplus commodity program and restored the Food Stamp Program (Biggerstaff et al., 2002). The program retained its anachronistic name for years, even after recipients started receiving benefits through electronic benefit transfer cards, which are ATM-like debit cards used at authorized food stores (Trenkamp & Wiseman, 2007). SNAP continues to serve as a significant component of the nation’s social assistance program.

Significantly, all of these programs, with the exception of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), were entitlement programs; if the need of a state or locality increased, funding would increase to meet the need (Parker, 2002).

A 1960s television documentary titled “Hunger in America” vividly presented to the American nation the problem of domestic hunger; a report was written on the subject by a Citizens’ Board of Inquiry titled “Hunger USA” (Radimer, 2002). The effects of this documentary were notable: “Government leaders were incredulous that hunger could exist in a country with such a plentiful food supply as the United States” (Kennedy, 2002). In the next decade President Richard M. Nixon called a White House Conference on Food, Nutrition and Health to tackle “hunger in America,” which had by then become a priority area for national policy-makers; federal food programs were established and extended (Radimer, 2002).

In 1967 a group of physicians, after traveling throughout the United States, reported to Congress of “children in significant numbers who were hungry and sick,” and they presented “stunning” evidence to lawmakers (Parker, 2002). Congress responded vigorously with the expansion of the Food Stamp Program; the implementation of the School Breakfast Pro-
on Food Assistance to investigate the state of affairs; they concluded that there was no evidence of widespread undernutrition as a health problem, and that, although hunger existed, there was no indicator to estimate the degree of hunger or temporal trends. Thus, the issue of accurate measurement became a policy priority (Radimer, 2002). The report of the task force emphasized the necessity of distinguishing medical definitions of hunger from poverty-driven hunger, leading to empirically grounded measurement scales for food security (Kennedy, 2002).

In the early 1990s lobbying efforts to incorporate community food security funding within the 1995 US Farm Bill provided an opportunity for a diverse group of activists, organizations, academics, and practitioners to work together (Hamm & Bellows, 2003). This culminated in the formation of the Community Food Security Coalition, which has since organized annual meetings that have contributed significantly to the US food security policy arena. Other umbrella organizations with large impacts at the interface between community food security and policy-making include the Food Research and Action Center and the National Family Farm Coalition (Hamm & Bellows, 2003).

Kennedy reports on two further developments in the 1990s that were critical in developing the field of work in food security and hunger (Kennedy, 2002). First, in 1990 Congress passed the National Nutrition Monitoring and Related Research Act, which required the US Department of Agriculture (USDA) and the US Department of Health and Human Services (HHS) to recommend an instrument and method to obtain prevalence data on food insecurity. Second, the American Institute of Nutrition issued a report that elucidated from the scientific literature the meaning of hunger and explored linkages between hunger and food insecurity (Kennedy, 2002). Food security data was first collected systematically by the federal government in 1995; subsequently, the status of food security and hunger has been the focus of the annual Food Security Supplements to the Current Population Survey (Andrews et al., 2000).

The Bill Emerson Good Samaritan Food Donation Act entered into law in 1996. By limiting the liability of food donors to gross negligence and deliberate misconduct, this act promoted food recovery efforts (Kantor et al., 1997). The act also created nationwide uniform definitions regarding the donation and distribution of foods, ensuring that quality and labeling criteria of federal, state, and local laws and regulations are met (Kantor et al., 1997).

Objective number 19-18 of Healthy People 2010 articulates a target of increasing food security among US households in order to reduce the burden of hunger. The specific target is to increase the percentage of food secure US households to 94 percent in 2010 from a baseline of 88 percent of all US households in 1995 (US Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2006). The two data sources to be utilized are the Food Security Supplement to the Current US Population Survey (Department of Commerce, Bureau of the Census) and, beginning in 2001, the National Food and Nutrition Survey (USDA and HHS). Healthy People 2010 also provides data on the marked inequalities in food security within US subpopulations (specifically, race and ethnicity, income level, and household composition). The document further states the commitment of the US government to increasing food security by working with local leaders as outlined in the US Action Plan on Food Security, through USDA’s Community Food Security Initiative, and the Maternal and Child Health Bureau’s Healthy Start (US Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2006).

Carlson and colleagues present a history (to 1999) of the development of national measurement and prevalence estimates conducted by the US government (Carlson, Andrews & Bickel, 1999), which first undertook broad national measures of food insecurity and hunger within the United States in the 1990s. Prior work by the Community Childhood Hunger Identification Project (CCHIP) and by the Cornell University Division of Nutritional Sciences was instrumental in both the underlying conceptual framework and the development of measurement instruments. The Conference on Food Security Measurement and Research was convened in 1994 to bring together leading experts in the field to provide advice and assistance to the US Department of Agriculture Food and Nutrition Service and the National Center for Health Statistics. Eighteen questions were identified, and it was determined that they could be utilized in a scale to measure the severity of food deprivation. Further testing revealed the validity and reliability among the range of households sampled in the United States. Thus, households were to be placed in one of four categories according to their responses (see further discussion of methodology in the “Food Security Measurement Tools” section). The survey is conducted by
the US Bureau of the Census through its Current Population Survey (CPS) annually, alternating between the April and September CPS (Carlson et al., 1999).

Before 1996 the US government classified households in one of four groups: food secure; food insecure without hunger; food insecure with hunger, moderate; and food insecure with hunger, severe (see the “Food Security Measurement Tools” section for details of the methodology used). In November 2006, at the recommendation of the National Academy of Sciences, the USDA abandoned these groupings for a classification scheme that has three groups: food secure, low food security, and very low food security. The purpose of the elimination of the word hunger from the classification schemes was to reflect both the evolution of the understanding of hunger as a phenomenon distinct from, though closely related to, food insecurity as well as to recognize the limitations of extant measurement instruments for accurately gauging hunger (Panel to Review the US Department of Agriculture’s Measurement of Food Insecurity and Hunger, 2006). The National Academy of Sciences panel stated that “the highest research priority is to develop a clear conceptual definition of hunger and to determine how best to implement the new definition” and specifically called on the USDA to “undertake a program to measure hunger, which is an important potential consequence of food insecurity” (Panel to Review the US Department of Agriculture’s Measurement of Food Insecurity and Hunger, 2006). Table 2, from the USDA website, shows the changes in the USDA nomenclature (US Department of Agriculture, 2008).

Table 2. Changes in the United States Department of Agriculture Food Security Language (US Department of Agriculture, 2008)

<table>
<thead>
<tr>
<th>General Category</th>
<th>Old Label</th>
<th>New Label</th>
<th>Description of Conditions in the Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Security</td>
<td>Food Security</td>
<td>High Food Security</td>
<td>No reported indications of food-access problems or limitations</td>
</tr>
<tr>
<td></td>
<td>Marginal Food Security</td>
<td>Low Food Security</td>
<td>One or two reported indications, typically of anxiety over food insufficiency or shortage of food in the house. Little or no indications of changes in diets or food intake.</td>
</tr>
<tr>
<td>Food Insecurity</td>
<td>Food Insecurity without Hunger</td>
<td>Low Food Security</td>
<td>Reports of reduced quality, variety or desirability of diet. Little or no indication of reduced food intake.</td>
</tr>
<tr>
<td></td>
<td>Food Insecurity without Hunger</td>
<td>Very Low Food Security</td>
<td>Reports of multiple indications of Security disrupted eating patterns and reduced food intake.</td>
</tr>
</tbody>
</table>

The National Nutrition Safety Net (NNSN) has been established by the USDA to combat hunger in the United States (Oberholser & Tuttle, 2004). The NNSN is composed of economic and food assistance programs that are designed to promote and assist with food security for low-income households.

The Supplemental Nutrition Assistance Program (SNAP) is operated by the Food and Nutrition Service of the US Department of Agriculture. As “the cornerstone of the Federal food assistance programs” (Food and Nutrition Service, 2007), the SNAP is a significant source of benefits to the nation’s impoverished, whether considering this group numerically or by severity; only the Medicaid program serves more people than the SNAP, and only 10 percent of households receiving food stamps are above the Federal Poverty Level (Biggerstaff et al., 2002).
federal government funds the entire cost of SNAP benefits, and the administrative costs are evenly split between the federal and state governments. The largest number of people to participate in the SNAP, 28 million, did so in 1994. Since that time, there has been a steady decrease in the number of participants (Biggerstaff et al., 2002). In fiscal year 2000, USDA spent approximately $32.5 billion (representing more than half of its annual budget) on food assistance programs (Kantor, 2001). In 2004 the national expenditure on SNAP benefits was $24.6 billion (Trenkamp & Wiseman, 2007).

The concept of how utilization of the phrase food desert may have inappropriate impact on policy is discussed by Cummins and Macintyre (Cummins & Macintyre, 2002). The authors do not categorically dispute the existence of food deserts. They report on several research studies and policy reports that cite research revealing the presence of food deserts but point out that the research studies cited were either inconclusive or misinterpreted. The authors believe that, because the issue of food insecurity and hunger is less contentious than other socio-medical problems, research about food deserts is underscrutinized. They caution that the ease of lumping the complex issue of food insecurity and hunger in the phrase food deserts oversimplifies the problems and may provide unwarranted evidence in the development of policy (Cummins & Macintyre, 2002).

Not all policy has been directed toward alleviating food insecurity and hunger but, instead, has been derived from it. The US Federal Poverty Level (FPL) was created in 1963 on the basis of the cost to feed a family (Cook, 2002). This has been adjusted annually for inflation but has not been adjusted for the change in the percentage of the average household’s budget for food expenditures. The current method uses the USDA’s Thrifty Food Plan for different size families—a differential based on family size is applied to the costs of minimally adequate diets—to determine the yearly Federal Poverty Level (Cook, 2002).

Thus, the concept of food security, as it relates to poverty, predated the actual use of the phrase and influenced standards by which many entitlement programs determine eligibility for benefits. Cook points out that keeping the FPL tied to dietary requirements minimizes the number of people classified as impoverished. In 1963 approximately one-third of the average household budget was used for food, whereas four decades later the average annual percentage of household expenditures spent on food is about 11 percent, while expenditures on other basic needs have risen dramatically. Using the logic that established the FPL in 1963 would require that the federal government multiply the cost of minimum food needs by a factor of 9 instead of 3, drastically raising the threshold under which people are classified as impoverished as well as the number of people eligible for entitlement programs (Cook, 2002).

Position papers from the American Dietetic Association (ADA) on food insecurity and hunger in the United States have promulgated progressive concepts in their policy-focused publications (Holben & American Dietetic Association [ADA], 2006; Kendall & Kennedy, 1998; C. M. Olson & Holben, 2002; Stang & Bayerl, 2003). The ADA 2006 position paper articulates the need for systematic and sustained action on the issue of food security. Emphasizing the economic dimension to food insecurity, it calls for adequate funding for and increased utilization of food and nutrition assistance programs, the inclusion of food and nutrition education in all programs providing food and nutrition assistance, and innovative programs to promote and support the economic self-sufficiency of individuals and families, to end food insecurity and hunger in the United States (Holben & American Dietetic Association [ADA], 2006).

American Dietetic Association position papers on child and adolescent food and nutrition programs are also constructive, policy-focused publications (Stang & Bayerl, 2003; Stang, Taft Bayerl, Flatt & Association Positions Committee Workgroup, 2006). The 2006 position paper asserts all children and adolescents, regardless of age, sex, socioeconomic status, racial diversity, ethnic diversity, linguistic diversity, or health status, should have access to food and nutrition programs that ensure the availability of a safe and adequate food supply that promotes optimal physical, cognitive, social, and emotional growth and development. (Stang et al., 2006)

The position statement continues by calling for food and nutrition programs to include “food assistance and meal programs, nutrition education initiatives, and nutrition screening and assessment followed by appropriate nutrition intervention and anticipatory guidance to promote optimal nutrition status.” The ADA insists on continued
funding for such programs and highlights the consistent positive impact on child and adolescent health and well-being. The role of such programs as a “vehicle for nutrition education and promotion of physical activity designed to prevent or reduce overweight and prevent chronic disease” is highlighted in addition to the impact on reducing food insecurity (Stang et al., 2006).

The “Dietary Guidelines for Americans” is the foundation of federal nutrition policy and nutrition education projects and is “oriented toward policymakers, nutrition educators, nutritionists, and healthcare providers” (US Department of Health and Human Services and US Department of Agriculture, 2005). It was first published in 1980 and has been updated every five years by a committee appointed by the secretaries of the Department of Agriculture and the Department of Health and Human Services. The 2005 guidelines include the recommendation that adults consume two cups of fruit and two and a half cups of vegetables, and they call for consumption of a variety of healthful foods (e.g., selections from five vegetable subgroups). The 2005 guidelines also address issues of safety (US Department of Health and Human Services and US Department of Agriculture, 2005), but they do not mention other vital components of food security such as availability, affordability, cultural acceptability, social justice, or democratic decision making.

Schoonover and Muller calculate that the real cost of fresh fruit and vegetables has increased by 40 percent from 1985 to 2000, while the costs of fats and oils and of soft drinks have decreased by more than 10 percent and 20 percent, respectively; they contend that US farm policy has created this gap by directing food industry investment into cheap food additives for processed foods (Schoonover & Muller, 2006).
Magnitude and Predictors of Food Insecurity

The US Department of Agriculture has conducted annual evaluations of the magnitude of food insecurity in the United States since 1995. Its findings consistently indicate that more than one in 10 households in the nation is food insecure at one or more times during the year, and that the severity of food insecurity is higher in households with certain characteristics. Further, wide variations from state to state and from locality to locality have been demonstrated. Findings on the magnitude of food insecurity are summarized in this section.

There is a broad body of knowledge on the characteristics of individuals, households, communities, and society in general that predict food insecurity. The literature on these predictors is summarized in this section. Many of these characteristics can be considered both predictors and consequences of food insecurity, and the complexities of potential causal pathways in food insecurity should be emphasized (as highlighted in the “Food Security Frameworks” section). Poverty can and should be considered at the core of food insecurity issues. But recognizing food insecurity and hunger as a poverty-based problem oversimplifies the issue, as there are many impoverished families and individuals who maintain food security. Despite these caveats, knowledge on such predictors can inform the targeting of food security interventions to achieve optimal effectiveness.

According to the US Department of Agriculture (USDA), 11.1 percent of United States households and 12.2 percent of all individuals, representing more than 36.2 million people, were food insecure at one or more times in 2007 (the latest period of time for which national data were available for this monograph) (Nord, Andrews & Carlson, 2008). While the prevalence rates for household and individuals categorized as “low food security” and “very low food security” remained approximately the same from 2005 to 2007, the actual number of households suffering this degradation increased by 425,000 (to more than 13 million households), and the number of individuals suffering increased by more than 1.1 million over this period of time. The 2005–2007 increase between the two food insecure categories for individuals was not congruent; in 2007, there were actually 62,000 fewer individuals categorized as “low food security,” but there were nearly 1.2 million more individuals in the worse “very low food security” group compared to 2005. Unfortunately, for children in food insecure households, the numbers worsened for both categories of food insecurity. Compared to 2005, 32,000 more children were in households in the “low food security” group in 2007; even worse, the number of children living in households in the “very low food security” group increased by 85,000 from 2005 to a total of 691,000 children living in “very low food security” households in 2007 (Nord et al., 2008).

Prevalence rates of food insecurity varied by household type (Nord et al., 2008). Households with children were more likely to be food insecure (15.8 percent) compared to households without children (8.7 percent); 30.2 percent of households with children headed by single women were found to be food insecure, compared to 18.0 percent of households with children headed by single men. In African American and Hispanic households, 22.2 percent and 20.1 percent, respectively, were discovered to be suffering from some form of food insecurity. The predictor with the highest percentage was poverty: 37.7 percent of households with incomes below the Federal Poverty Level (FPL) were food insecure (Nord et al., 2008).

One of the best-known attempts to identify the prevalence of hunger in the lower socioeconomic strata of the United States was undertaken by Wehler and researchers under the auspices of the Community Childhood Hunger Identification Project (CCHIP) (Wehler et al., 1992). The CCHIP demonstration project conducted in Seattle in 1987–88 revealed “many of the antecedents and consequents of hunger”—lower monthly income, higher poverty level, unemployment, greater number of reliance strategies, greater number of child health problems, and greater number of child school absences (Wehler et al., 1992).

The prevalence of concern about enough food has been examined at the state level and confirms substantial variation by state (Evenson, Laraia, Welch & Perry, 2002). Data from nine states from the Social Context Module of the Behavioral Risk Factor Surveillance System Survey from 1996 to 1999 were utilized to ascertain statewide prevalence of concern about enough food and were found to range from 3.1 percent to 11.8 percent. The study also looked at the association of such concern with sociodemographic and health characteristics at the state level; consistencies across states were demonstrated. The authors point out the importance of state-based data in addition
to national data, as many efforts to tackle food insecurity are organized at the state level (Evenson et al., 2002).

Using data from the Third National Health and Nutrition Examination Survey (NHANES III), Alaimo and colleagues estimated the prevalence of food insufficiency and examined the sociodemographic characteristics of those suffering from food insufficiency (Alaimo et al., 1998). NHANES III was a cross-sectional representative sample of US civilian population living in households conducted in two phases between 1988 and 1994. From that data, the researchers found that 4.1 percent of examinees experienced food insufficiency (which meant that the respondent answered that the family “sometimes” or “often” did not get enough food to eat). Food insufficiency was chiefly associated with poverty. The researchers note that the odds of a family at the poverty level being food insufficient were 2.4 times greater than those of a family whose income placed them at two times above the poverty level. When controlling for poverty and other sociodemographic factors, the researchers found that Mexican-American families were twice as likely as non-Hispanic white families to be food insufficient; and for families designated as low-middle-income (131–185 percent of the FPL), those with households with children headed by single females were 5.5 times more likely to be food insufficient compared to other family types. The researchers note that these prevalence data do not reflect other surveys for several reasons: NHANES III measured the quantity component of family-level food insecurity and not the quality, uncertainty, or psychological components; and there were differences in survey design, administration, and question construction (Alaimo et al., 1998).

Explicating the root causes of food insecurity and hunger has led to suggestions of wide social causes, including unemployment, low-paid jobs, high housing costs, lack of income, medical or health costs, substance abuse, high utility costs, mental health problems, homelessness, high child-care costs, and reduced public benefits (Holben & American Dietetic Association [ADA], 2006). Further, tipping points into food insecurity, such as loss of employment, loss of assistance, or gaining a household member have been suggested. Immigrants and their children are known to be particularly vulnerable to food insecurity, especially due to recent welfare reforms that have decreased food assistance to these groups (Holben & American Dietetic Association [ADA], 2006).

Harrison and Sidebottom, using their Prenatal Risk Overview (a systematic assessment and quantification of psychosocial risks associated with poor birth outcomes), evaluated 1,386 prenatal patients in four St. Paul, Minnesota, federally qualified health centers in 2005–2007 (P. A. Harrison & Sidebottom, 2008). Using four of the six questions in the Six-Item Short Form of the Household Food Security Scale they assigned participants to low, moderate, or high risk of food insecurity; they found that 32 percent of the expectant mothers were in the moderate or high risk categories. The researchers also found correlations of food insecurity with limited telephone access as well as with limited transportation access (P. A. Harrison & Sidebottom, 2008).

A cross-sectional study assessing predictors of household food insecurity among inner-city families with preschool children conducted in Vancouver found that, after controlling for household income, three factors increased the odds of experiencing household food insecurity: less access to food of reasonable quality, fewer kitchen appliances, and low parental cooking skills (Broughton et al., 2006).

The association of social capital with the risk of hunger was examined in 330 low-income households in Connecticut by Martin and colleagues (Martin, Rogers, Cook & Joseph, 2004). The authors defined social capital at the household level as “the households’ perceived sense of social trust and community reciprocity” and then aggregated these measures to the neighborhood level. Social capital was measured using a 7-item Likert scale, and the US Household Food Security Survey Measure was used to measure household food security and hunger. Logistic regression techniques were utilized to explore the relationship between social capital and hunger, while controlling for other potential confounding variables. The study clearly indicated that superior social capital is significantly associated with decreased odds of hunger after controlling for household socioeconomic status (adjusted odds ratio = 0.47 [95% CI 0.28-0.81]); the authors expressed caution, however, in inferring causality from this cross-sectional study (Martin et al., 2004).

Wellman and colleagues emphasize that the elderly are among those at greatest risk for hunger and malnutrition (Wellman, Weddle, Kranz & Brain, 1997). The reasons are multifaceted and include high poverty rates, stigma associated with accepting government assistance and pride of independence, chronic diseases (including cognitive impair-
wallace and colleagues, evaluating the 2003 california health interview survey, report a high prevalence of food insecurity in elderly californians who have chronic, food-related diseases (wallace, molina & jhawar, 2007). from that survey, 24.2 percent of elders with diabetes, 20.3 percent who have had a stroke, and 19.3 percent with heart disease also suffer from food insecurity. the authors also report that 28.6 percent of elders living below the federal poverty level (fpl) were food insecure, while 15.4 percent of those living at 100–199 percent of the fpl were food insecure (wallace et al., 2007).

the continuing survey of food intakes by individuals, 1994–96, was evaluated by guthrie and lin, along with data from the 1999 food security supplement to the current population survey (guthrie & lin, 2002). while households with an elderly member had less prevalence of food insecurity than households without an elderly member, some sort of food insecurity was present in more than 6 percent of households with an elderly member. comparing low-income elderly to high-income elderly revealed that the former were significantly more likely to consume fewer 1) calories; 2) servings of whole grains, vegetables, fruit, milk, and meat; and 3) micro- and macronutrients. the researchers reported on others’ work regarding barriers to the elderly receiving assistance, including lack of information, perceiving the gain is not worth the effort, and the belief that they were not in need of assistance (guthrie & lin, 2002).

in a consecutive sample of ambulatory pediatric patients under age 5 in an inner-city teaching hospital, cutts and colleagues determined a number of characteristics of children classified as “hungry” according to the community childhood hunger identification project’s hunger scale (cutts, pheley & geppert, 1998). in their sample population, a history of homelessness in the previous year was the strongest predictor of hunger. other family characteristics associated with childhood hunger included family unemployment, maternal education less than some postsecondary schooling, parental marital status (single or divorced), belonging to a nonwhite race, and increasing age of the child. the researchers also found that family participation in aid to families with dependent children, food stamps, and food shelves was associated with childhood hunger. family participation in special supplemental nutrition program for women, infants, and children (wic), however, was not associated with hunger. the authors suggest that instead of wic being a protective factor against hunger, various barriers to participation in wic inhibit families with hungry children from obtaining wic assistance. the researchers also note that hungry children in their sample consumed larger quantities of noncarbonated beverages (e.g., kool-aid) than other children (cutts et al., 1998).

lee and greif evaluated information from the client portion of the national survey of homeless assistance providers and clients collected in 1996 involving a multistage probability sample of 2,898 respondents aged 18 or older who lacked a permanent and adequate nighttime residence of their own (b. a. lee & greif, 2008). the researchers used five questions to determine respondents’ experiences with various aspects of food insecurity. notably, they found that 61 percent suffered from an inadequate quantity of food; 40 percent had gone a full day without eating in the past month, and 40 percent were unable to afford food in the prior month; and 12 percent had engaged in subsistence eating within the last week (e.g., handouts, scavenging trash cans) (b. a. lee & greif, 2008).

evaluating data from the current population study (cps), the third national health and nutrition examination survey, and the 1989–91 continuing survey of food intake by individuals, rose labels income as “one of the most important determinants of food insecurity and hunger” as people with incomes below the poverty level were found to have >3.5 times the likelihood of being food insufficient as those with incomes above the poverty level after controlling for variables of ethnicity, education, region of the country, and household composition (rose, 1999). still, a one-to-one relationship between poverty and likelihood of food insufficiency does not exist: while 1995 cps data show that roughly 13 percent of those in poverty are affected by hunger, 50 percent of households afflicted by hunger are above the poverty level. rose and colleagues report that other factors that cause a household to tip into food insecurity include loss of a job, loss of food stamps, and the gain of a household member. evaluating the negative change in the economic status of the household, rose found an inverse relationship between food insufficiency and number of food stamps: he calculates that a decrease in 1 percent of food stamp benefits results in an increase of food insufficiency in 4,000–13,000 households. failure to complete high school, belonging to a hispanic household, larger households, and households with a single adult with children are each more likely to be food insufficient. con-
Contrary to other studies, Rose reports that age >60 is protective against food insufficiency (and he postulates that this is because the elderly might have savings not reflected in income levels, and those who are homeowners might not have a mortgage payment) (Rose, 1999).

K. Nelson and colleagues performed a cross-sectional survey of adult patients admitted to the hospital or receiving insulin from the hospital pharmacy in Minneapolis to determine the prevalence of food insecurity and hunger (K. Nelson, Brown & Lurie, 1998). They report that annual income <$10,000 and a decrease in food stamp benefits were independent predictors of hunger. Annual income <$10,000, illicit drug use, and a decrease in food stamp benefits were each independent predictors of food insecurity (K. Nelson et al., 1998).

M. Nelson reports on data from Britain that revealed that households with “lone parents” on low income had lower consumption of vegetables and fruit compared to higher-income lone parents (M. Nelson, 2000). Additionally, low-income lone parents were found to have lower consumption of fruit and vegetables compared to other low-income families with two adults and one or more children (M. Nelson, 2000).

Walker and associates report on the results of a cross-sectional, self-administered mailed survey in Athens County, Ohio, to which 235 women responded in 2005 (Walker, Holben, Kropf, Holcomb & Anderson, 2007). Of the respondents, 170 were WIC participants and 65 were WIC / Farmers’ Market Nutrition Program participants; other than higher education in the latter group, there were no statistically significant differences between the two. On the whole, household food insecurity, measured by the HFSSM (see Table 4, page 50), was inversely associated with perceived health status, measured by the 36-item short-form health survey; food insecurity was also inversely associated with perceived social capital, measured by a 7-item tool that assesses factors such as neighborhood security and interactions and trust among neighbors. Walker et al. also report that high social capital was greater in the WIC participants compared to the WIC / Farmers’ Market Nutrition Program group. They propose that several organizational requirements may decrease social capital in those utilizing the Farmers’ program, including the possible perception of “begging” for vouchers at the farmers’ market booth and the atmosphere or culture of the market where coupons must be redeemed (Walker et al., 2007).

Cook states that food insecurity, like poverty, is correlated with the state of the economy (Cook, 2002). When the economy is expanding and unemployment is low, the amount of food insecurity declines; when the economy is contracting and unemployment is rising, food insecurity increases. He presents data that suggests that the US economy will probably never have an unemployment rate of less than 4 percent, and therefore poverty and food insecurity may never disappear even with economic booms (Cook, 2002).

Using 2000–2004 data from the Pregnancy, Infection, and Nutrition Study (a prospective cohort study), Laraia and colleagues evaluated prevalence of food insecurity and associated factors in 606 pregnant women with incomes ≤ 400% of FPL (Laraia, Siega-Riz, Gundersen & Dole, 2006). They used the HFSSM to determine food security status. They found that pregnant women who were marginally food secure or food insecure had less income and less education, and were older than pregnant women who were fully food secure. The researchers, after adjusting for income, race, education, marital status, age, and number of children, found a number of psychosocial factors that were more likely to be associated with pregnant women who were food insecure compared to their food secure counterparts: perceived stress (2.2 times more likely), trait anxiety (2 times), depression (1.9 times), chance locus of control (1.7 times), and powerful locus of control (1.5 times). All of these factors were also found to be statistically significantly higher for marginal food insecure pregnant women compared to their food secure counterparts (Laraia et al., 2006).

Braveman and associates analyzed postpartum survey data from California’s Maternal and Infant Health Assessment, 2002–2006, involving 18,332 women to determine associations of income with various hardships (Braveman et al., 2008). The survey used the Six-Item Short Form of the Household Food Security Scale (see Table 9, page 55 for identification of women who were food insecure. The researchers report that 35 percent of pregnant women with family income 0–100 percent of the Federal Poverty Level (FPL) suffered food insecurity; 20 percent of those with income 101–200 percent of FPL were food insecure; and 4 percent and 0.6 percent of pregnant women with incomes 301–400 percent and >400 percent of FPL, respectively, experienced food insecurity (Braveman et al., 2008).

But data measuring food insecurity can conflict with data on economic conditions. Analyzing the California Health
Limited US food production is certainly not a cause of food insecurity experienced by so many people. Kantor and researchers estimate that, in 1994, the US food production would have provided an estimated 3,800 calories per person per day (more than 1.5 times the average daily caloric needs) (Kantor et al., 1997).

An indirect magnitude of the problem of hunger can be how stakeholders view its import. Olson and colleagues report that 58 percent of responding clergy in Chicago ranked hunger as a “top priority” (L. M. Olson, Reis, Murphy & Gehm, 1988). Hunger as a community problem ranked fourth among listed concerns, behind unemployment, teenage pregnancy, gang crime, and school dropout (L. M. Olson et al., 1988).

Lee and Frongillo evaluated data from the Third National Health and Nutrition Examination Survey (1988–94) (NHANES III) and from the 1994 Nutrition Survey of the Elderly in New York State (NSENY) to look at functional impairments, sociodemographic factors, and economic status in the elderly and their associations with food insecurity (J. S. Lee & Frongillo, 2001a). They report that the presence of functional impairments as measured by Activities of Daily Living were 1.9 times more likely (NHANES) to 2.8 times more likely (NSENY) in food insecure elders than in their food secure counterparts. Both the NHANES and the NSENY data revealed that elderly Hispanics were more likely to be food insecure than elderly non-Hispanics; additionally, the NHANES data showed that elderly persons in any of three categories of a Poverty Index Ratio of 130 percent or less resulted in a 2.8- to 3.8-fold likelihood of being food insecure (J. S. Lee & Frongillo, 2001a).

Moore and Diez Roux compared food establishment types located in census tracts categorized according to racial/ethnic composition (predominantly black, predominantly Hispanic, racially mixed, predominantly white) in North Carolina, Maryland, and New York (Moore & Diez Roux, 2006). They found that, while predominantly minority and racially mixed tracts had more than twice as many grocery stores than predominantly white tracts, they had only half as many supermarkets. Low-income tracts (median income <$25,000) were found to have 4 times the number of grocery stores but half the number of supermarkets compared to the highest income tracts ($45,000–$175,000). The researchers also note statistically significant differences in the likelihood of the presence of convenience stores (2.4 times more likely) and natural food stores (0.3 times as likely) of the low-income tracts versus highest-income tracts. The researchers state that “dietary consequences of neighborhood differences in food stores depend on many factors including the types of foods available at the stores and the extent to which residents rely on local stores for shopping” and that residents in an area may be “nutritionally disadvantaged” if local, non-supermarket stores do not offer healthful foods (Moore & Diez Roux, 2006).

In a review article, Cummins and Macintyre report that neighborhood differences in price and availability of healthful food and of accessibility to supermarkets have been documented in numerous studies in the United States (Cummins & Macintyre, 2006). They report that the “picture outside North America is different” and that recent studies in the United Kingdom have found no association between neighborhood food availability and diet; no differences in prices between poor and prosperous areas; and a reasonable availability of foods across economically different areas. Cummins and Macintyre also contend that studies in Northern Ireland, Australia, and Scotland reveal little differences in the food environments between impoverished and affluent areas (Cummins & Macintyre, 2006).

Horowitz and colleagues compared the availability and cost of five “diabetes-healthy foods” in 173 stores in a poor, racial/ethnic minority area in East Harlem, New York City, to 152 stores in an adjacent, affluent, mostly white neighborhood on the Upper East Side (Horowitz, Colson, Hebert & Lancaster, 2004). While only 18 percent of the East Harlem stores carried all five desirable foods, 58 percent of stores on the Upper East Side carried the items. The researchers report that 50 percent of residents in East Harlem were likely to have stores on their block that did not sell the diabetes-healthy foods, while only 24 percent of residents in the affluent neighborhood were likely to encounter this problem. The authors also
noted other research revealing the disparity of diabetes in Latinos and blacks compared to whites, and that there were 16 diabetes-related amputations in adults ≥ 65 per 10,000 population in the East Harlem neighborhood, while there was only 1 per 10,000 on the Upper East Side (Horowitz et al., 2004).

Chávez, Telleen, and Kim evaluated the differential impact of the food insufficiency parameters among Latino ethnicities; they performed a cross-sectional, face-to-face survey of 320 women in three low-income immigrant Chicago communities in 2000 (Chavez, Telleen & Kim, 2007). Of their survey population, 90 percent participated in food assistance and child nutrition programs. The researchers note that 90 percent of all the Latinos who were classified as food insufficient (by responses to NHANES III relevant questions) had anxiety about whether the food they could afford would be enough for their family. They also report that Puerto Rican Latinos, compared to Mexican Latinos, were more likely to have anxiety about whether they would run out of food before they had money to buy more (95 percent versus 81 percent) and that Puerto Rican Latinos were more likely to indicate that they ate less than they should because they did not have enough money for food (62 percent compared to 44 percent for Mexican Latinos and 34 percent for the entire food insufficient population in their study) (Chavez et al., 2007).

Weigel and colleagues, from a site-based, convenience-sampling, cross-sectional survey conducted in 2003 on 100 migrant and seasonal farmworkers living on the US-Mexico border, found that 82 percent experienced some degree of food insecurity, with 49 percent suffering from hunger (Weigel, Armijos, Hall, Ramirez & Orozco, 2007). The researchers found statistically significant association between household food insecurity (measured by the HFSSM, see Table 4, page 50) and the presence of minor children in the household, as well as low maternal education, both independently and after controlling for household size, birthplace, and time in the US (Weigel et al., 2007).

Armour and associates performed a retrospective study on 2,099 families interviewed in 2001 for the Panel Study of Income Dynamics to determine associations between food insecurity and cigarette and alcohol use (Armour, Pitts & Lee, 2008). They classified food security / insecurity of these families using the 18-item US Household Food Security Scale. They report that low-income food insecure families, after adjusting for socioeconomic and demographic characteristics, were statistically significantly more likely to have a head of household or spouse who smoked cigarettes than low-income food secure families (44 percent vs. 32 percent). The researchers found no statistical association, on the other hand, between food insecurity and alcohol use (Armour et al., 2008).

Noting that access to quality, “well-priced” food is a component of community food security, Block and Kouba set out in 2003 to compare the availability and affordability of the USDA’s standard market basket in a lower-income-class African American community bordering on an upper-middle-income-class racially mixed suburb in Chicago (Block & Kouba, 2006). They found that the lower-income community had fewer supermarkets, considerably more independent groceries, as well as liquor stores selling food compared to the middle-income area. The researchers report that food availability, price, and quality varied among store types, but they did not present data that showed the effective differences in the regions of interest. They did present cartographic information that revealed there was a much greater percentage of households having no car in areas more than 1/4 mile from a supermarket in the lower-income community than the upper-middle-income region (Block & Kouba, 2006).

Kasper and associates performed cross-sectional survey on a convenience sample of Latino and Asian legal immigrants attending primary care clinics and community multiservice centers, or living in immigrant communities in California, Texas, and Illinois in 1998 (Kasper, Gupta, Tran, Cook & Meyers, 2000). Using the HFSSM, the researchers found that of the 630 respondents, 40 percent were in households that were food insecure without hunger and 41 percent were in households that were food insecure with hunger. The following were each found to be independent predictors of hunger (with increased odds of being food insecure): income level below FPL (2.7 times as likely), household receipt of food stamps (2.5 times), Latino ethnicity (2.4 times), and poor English skills (1.8 times as likely) (Kasper et al., 2000).

Hadley and fellow researchers performed a cross-sectional survey of 431 undocumented Mexican migrants in New York City in 2004 to evaluate the association between hunger and three health indicators (Hadley et al., 2008). Twenty-eight percent of participants reported hunger (measured by a single item: whether they had experienced periods in the last six months when they were hungry because they could not afford enough food); those who
worked as a day laborer, had sent money home to family or friends in Mexico, or had not received money via public assistance were more likely to have been hungry than their counterparts. The authors also report statistical significance for longer duration in the US being associated with more days of reported poor physical and mental health compared to more recent immigrants (Hadley et al., 2008).

Noting that the US accepts approximately 70,000 refugees annually, with an increasing number from Africa, Hadley, Zodhiates and Sellen conducted structured interviews on a nonprobability sample of 101 Liberian caregivers to determine characteristics associated with food insecurity in these refugees (Hadley, Zodhiates & Sellen, 2007). The researchers determined food security / insecurity with a modified HFSSM (“to ensure that the instrument was culturally appropriate”). Food insecure participants were noted to have statistically significant more likelihood to have language difficulties, to be unemployed, to lack a high school education, to have been in the US for less than a year, to earn less than $1,000 per month, and to have lower dietary acculturation than their corresponding expatriates (Hadley et al., 2007).

Kaiser and colleagues evaluated data from the 2004 California Women’s Health Survey (L. Kaiser, Baumrind & Dumbauld, 2007). Participants were obtained by random digit dialing; they report a prevalence of food insecurity of 25.7 percent in this study population of 4,037 women age 18 and older. The researchers determined food security / insecurity with the Six-Item Short Form of the Household Food Security Scale (see Table 9, page 55). They provide the following variables that were independently associated, and statistically significant, with food insecurity: African American race, Latino ethnicity, education less than 12 years, under age 55, Spanish speaking, less than half their life spent in the US, and several health-related conditions (reported in the “Health Care and Food Security” section) (L. Kaiser et al., 2007).

Coley and fellow researchers evaluated data from the Three City Study, a longitudinal, multi-method study of the well-being of families and children for the three- to five-year period after passage of federal welfare reform (the Personal Responsibility and Work Opportunity Reconciliation Act, 1996) (Coley, Lohman, Votruba-Drzal, Pittman & Chase-Lansdale, 2007). The authors note that data indicate declines in food insecurity (and in financial strain) with movements into employment. The authors cite studies that contradict their findings, however, and they suggest that their study does not prove directionality and causality. The authors further note that their study was conducted over a period of positive economic and social conditions (Coley et al., 2007).

The Children’s Sentinel Nutrition Assessment Program (C-SNAP) is a research and public policy center focused on the health and nutrition of children aged 0–3 (C-SNAP, 2008). Since 1998, the C-SNAP center has sponsored ongoing, cross-sectional, convenience surveys in multiple central city medical centers; three of these are acute care and primary care centers (Baltimore, Minneapolis, and Washington, DC), and three are hospital emergency departments (Boston, Little Rock, and Philadelphia). The surveys utilize the Household Food Security Survey Measure and various other instruments to assess predictors and / or outcome variables relative to food insecurity. Some of the scientific literature reporting predictors of food insecurity (Black et al., 2004; P. Casey et al., 2004; Cook et al., 2002; Cook et al., 2008; Frank et al., 2006) is presented in the subsequent paragraphs of this section; some that reports the consequences of food insecurity is discussed in the next section “Consequences of Food Insecurity.”

Contracting economic conditions most certainly impact household decisions about whether to pay rent and energy bills, or purchase food. Cook and researchers evaluated C-SNAP data collected from caregivers of 9,271 children from 2001 to 2006 in Baltimore, Boston, Little Rock, Minneapolis, and Philadelphia to evaluate the association of household energy insecurity with household food insecurity (Cook et al., 2008). They utilized the 18-item HFSSM instrument (see Table 4, page 50) to determine household food insecurity and the eight child-related items from that instrument to define child food insecurity. They report that households with moderate energy insecurity were 2.4 times more likely to suffer household food insecurity; households enduring severe energy insecurity were more than 3 times as likely to have household food insecurity and nearly 3.5 times more likely to have child food insecurity. The researchers note that they are not aware of an officially sanctioned definition of household energy security; they provide a construct of household energy security that is conceptually based on food security parameters (Cook et al., 2008).

Cook, along with other researchers, examined the associations of reductions or loss in welfare with food security
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using C-SNAP data from all six sites from 1998 to 2000 (Cook et al., 2002). The researchers describe two types of reductions in welfare benefits from the 1996 Personal Responsibility and Work Opportunity Reconciliation Act: those who were “sanctioned” had benefits reduced or terminated secondary to failure to comply with behavioral requirements while those who were “decreased” had benefits administratively reduced because of changes in income or expenses. The researchers report that children in families whose benefits were terminated or reduced because they were “sanctioned,” as well as those who were “decreased” for administrative reasons, were 1.5 times more likely to be food insecure compared to those without declines in benefits. They found that receipt of food stamps did not mitigate the impact of the loss or reduction of benefits on household food security (Cook et al., 2002).

C-SNAP data from Baltimore, Boston, Little Rock, Minneapolis, and Washington, DC, from 1998 to 2004, were evaluated by Frank and colleagues (Frank et al., 2006). They report that, among families participating in the Low Income Home Energy Assistance Program, there was a statistically significant difference in the percentage of those that were food insecure (24 percent) versus those that were food secure (20 percent). The authors suggest that this is evidence that the heating assistance program is reaching families at higher social risk (Frank et al., 2006).

Black and researchers evaluated C-SNAP data on 5,923 WIC-eligible caregivers of infants ≤ 12 months of age at all six central-city medical centers in the C-SNAP project from 1998 to 2001 (Black et al., 2004). They examined characteristics among three groups: WIC participants, nonparticipants secondary to access problems, and nonparticipants secondary to lack of perceived need. They found that nonparticipants secondary to access problems had higher rates of food insecurity (28 percent) compared to WIC participants (23 percent). After adjusting for study site, infant characteristics (race / ethnicity, birth weight, and months breastfed), household characteristics (caregiver’s employment status, education, receipt of public insurance, receipt of housing subsidy, Temporary Assistance for Needy Families benefits, and food stamps), however, they found that there was no statistical difference for likelihood of being food insecure between the WIC participants and those not participating in WIC secondary to access problems. After these adjustments, the researchers did find that nonparticipants secondary to lack of perceived need, on the other hand, were only 40 percent as likely to be food insecure compared to WIC participants. The researchers suggest that other economic and personal resources were protective for those not perceiving a need for WIC services (Black et al., 2004).

Casey and colleagues evaluated C-SNAP data from all six sites collected in 2000–2001 on 5,306 mothers (P. Casey et al., 2004). They found that, after adjusting for study site, race, insurance type, education, and low birth weight, mothers who were found to be suffering from maternal depression were 2.7 times more likely to report food insecurity than mothers who were not suffering from maternal depression (P. Casey et al., 2004).
Consequences of Food Insecurity

There is a substantial literature focused on the outcomes of food insecurity and hunger in children. The consequences of food insecurity in childhood have been described in terms of social, psychological, and physical outcomes in a wide array of settings. Further, the consequences of food insecurity on these multiple dimensions of child health have been measured in terms of a combined child health–related quality of life index. The literature consistently indicates significant negative consequences of food insecurity in childhood.

The consequences of food insecurity in adulthood have been studied in terms of social, psychological, physical, and behavioral outcomes, as well as attempts to combine these dimensions into a single measure of well-being. As it did for children, the literature consistently indicates significant negative consequences of food insecurity for adults, particularly for mothers and the elderly.

Most of the scientific literature on the effects of food insecurity focuses either on children or on adults and misses the dynamics that food insecurity exacts on family and community well-being.

Murphy and colleagues examined the relationship between food insufficiency and psychosocial functioning in school-aged children from low-income families (Murphy et al., 1998). Children in four inner-city public schools were evaluated by parent, teacher, and clinician measures for both food insufficiency (“hunger” and “at-risk for hunger”) and psychosocial functioning. Food insufficiency was assessed by the Community Childhood Hunger Identification Project (CCHIP) survey instrument and psychosocial functioning was evaluated by several commonly used measurement tools: the Pediatric Symptom Checklist, the Child Behavior Checklist, the Conners Teacher Rating Scale–39, the Children's Global Assessment Scale, and school records (for attendance and tardiness). For children classified as hungry, impairments were revealed in all measurement areas of psychosocial functioning. The researchers found that childhood hunger was significantly associated with psychosocial dysfunction, and they assert that their findings “provide clear evidence of the association between parental report of food insufficiency due to constrained resources and children's behavioral and academic functioning” (Murphy et al., 1998).

Alaimo and associates demonstrated an association between a questionnaire-based evaluation of family food insufficiency and negative outcomes in cognitive and psychosocial development in a US national sample of school-aged children (Alaimo, Olson & Frongillo, 2001a). They found children aged 6–11 from food insufficient families were significantly more likely to have scored lower in testing of arithmetic skills, they were more likely to have been suspended by a psychologist, and they were more likely to have repeated a grade than children from food sufficient families. Food insufficient teenagers were more likely to have seen a psychologist, to have been suspended from school, and to have difficulty getting along with others. For both groups, these findings were valid after adjusting for a multitude of possible confounders (including poverty status, family crowding and moves, family head education, employment, marital status, health status, lead exposure, health insurance and regular source of health care, gender, age, and metropolitan region). The researchers acknowledge developmental problems have multiple causes, and they caution not to use their study as an indication that provision of food to children with academic or psychosocial problems will be a panacea. But for children and families with fewer other risk factors, the provision of food may improve developmental outcomes (Alaimo, Olson & Frongillo, 2001a).

Weinreb and colleagues conducted a study in Worcester, Massachusetts, to examine the independent contribution of child hunger on children's physical and mental health and academic functioning, when controlling for a range of environmental, maternal, and child factors that have also been associated with poor outcomes among children (Weinreb et al., 2002). Their study went beyond previous research and highlighted the independent relationship between severe child hunger and adverse physical and mental health outcomes among low-income children (Weinreb et al., 2002).

Alaimo and colleagues investigated associations between family income, food insufficiency, and health among US preschool and school-aged children using data from the Third National Health and Nutrition Examination Survey (Alaimo, Olson, Frongillo & Briefel, 2001). Regression analyses were conducted with health measures as the outcome variables. After controlling for confounding factors, including poverty status, the researchers found that
food insufficient children were significantly more likely to have poorer health status and to experience more frequent stomachaches and headaches than food sufficient children; preschool food insufficient children had more frequent colds (Alaimo, Olson, Frongillo & Briefel, 2001).

Cook and colleagues used the US Household Food Security Scale to examine associations between food insecurity and health outcomes in young children (Cook et al., 2004). The authors conducted a multisite retrospective cohort study with cross-sectional surveys at urban medical centers in five states and Washington, DC. In a logistic regression, after adjusting for confounders, food insecure children had nearly double the odds of “fair or poor” health compared to children who were food secure; their odds of being hospitalized since birth were almost a third larger than those of food secure children. A dose-response relation appeared between fair / poor health status and severity of food insecurity. Effect modification occurred between food stamps and food insecurity: food stamps attenuated (but did not eliminate) associations between food insecurity and fair / poor health (Cook et al., 2004).

Broughton and colleagues recently demonstrated that household food insecurity in Vancouver was associated with indicators of suboptimal health status in preschoolers (Broughton et al., 2006).

The relationship between adolescent mental health and food insecurity has been explored using data from the Third National Health and Nutrition Examination Survey (Alaimo, Olson & Frongillo, 2002). Food insufficient adolescents were significantly more likely to have had dysthymia, thoughts of death, a desire to die, and an attempted suicide (Alaimo et al., 2002). Therefore there appears to be a strong association between food insufficiency and depressive disorder and suicidal symptoms in US adolescents.

Wehler and researchers found, in their Community Childhood Hunger Identification Project (CCHIP) demonstration project conducted in Seattle in 1987–88, that “at risk for hunger” and “hunger” scores were associated with a greater number of child health problems and a greater number of child school absences (Wehler et al., 1992).

In a CCHIP study of 328 families with at least one child between the ages of 6 and 12, conducted in Pittsburgh and surrounding Allegheny County, Pennsylvania, Kleinman and researchers compared children’s classification of “hungry,” “at-risk for hunger,” or “not hungry” against psychosocial dysfunction on the Pediatric Symptom Checklist (PSC) (Kleinman et al., 1998). They found that 31 of the 35 individual PSC items had statistically significant correlation with the status of hunger; they noted that five of six of the symptoms with the highest correlation were symptoms of conduct disorder. The researchers report that children in families experiencing hunger were 7 times more likely to be involved in fights and 12 times more likely to steal compared to children in families not experiencing hunger (Kleinman et al., 1998).

In a longitudinal study (from 1998 to 2002) of more than 21,000 children, Jyoti and colleagues found that those children in households that went from food secure to food insecure showed a significantly smaller improvement in reading scores and mathematics scores from kindergarten to third grade compared to children in families that remained food secure (Jyoti, Frongillo & Jones, 2005). The researchers discuss several theories for these findings, including reduced dietary quality or quantity, consumption of less expensive, calorie-dense foods, and the effects of the psychological stress of experiencing food insecurity by the children and parents (Jyoti et al., 2005).

A cross-sectional study conducted in the Delta region of Arkansas, Louisiana, and Mississippi examined the association of household food insecurity with overall child health–related quality of life (CHRQOL) (P. H. Casey et al., 2005). CHRQOL is an increasingly used multidimensional measure of physical, emotional, social, and school functioning in children. The study was the first to use this well-validated measure, as well as the US Household Food Security Scale, to explore the relationship between household food insecurity and child health–related quality of life. Household food insecurity status was found to be significantly associated with total CHRQOL after adjusting for gender, ethnicity, age, and household income. The difference found between food secure and insecure households approximated the difference between healthy children and acutely and chronically ill children. Food insecurity in children aged 3–8 years predominantly affected physical function; in children aged 12–17 years psychosocial functions were more affected. Although these findings have profound implications for measuring the impact of food insecurity, the authors highlight the need for caution, first in generalizing the results to other US settings and second in attributing causality from a cross-sectional study design (P. H. Casey et al., 2005).
Another cross-sectional study in 36 rural counties in the Lower Mississippi Delta region was performed by Champagne and colleagues in 2000 on 1,751 adults; the researchers set out to compare the quality of diet in food secure and food insecure adults (Champagne et al., 2007). They used the US Department of Agriculture's Healthy Eating Index (or HEI, a tool to assess whether diets comply with Dietary Guidelines and the Food Pyramid). After adjusting for age groups, household income, race, sex, education, and household size, food secure adults scored statistically significantly higher on vegetable intake compared to food insecure adults, but there was not a statistically significant difference on overall HEI score nor on 10 of the HEI variables reported (e.g., intakes of dairy, fruits, grains, saturated fat, etc.). The researchers also found that, after adjusting for previously mentioned parameters, food insecure adults were statistically significantly less likely to receive the Estimated Average Requirement of vitamin A and of selenium (with no significant differences among other nutrients, including other vitamins and minerals, protein, carbohydrates, and fiber). They also report no difference in dietary energy density between food secure and food insecure adults in their study. The researchers did not state which food security survey they used to classify individuals as food secure or insecure and did not report evaluations for participation in food assistance programs (Champagne et al., 2007).

Kendall and colleagues surveyed 193 women with children in 1993 to compare the frequency of consumption of fruits and vegetables to food security / insecurity status (utilizing the Radimer / Cornell measures of food insecurity) (Kendall, Olson & Frongillo, 1996). They report that the "frequency of consumption of fruit, salad, carrots, vegetables, and all six fruit and vegetable categories combined declined significantly as food insecurity status worsened." The researchers also found that, although only a small percentage of food secure and food insecure persons consumed recommended daily servings of fruit and vegetables, there were statistically significant fewer food insecure persons consuming ≥ 5 daily servings of fruit and vegetables (3.7 percent) versus food secure persons (9.0 percent); likewise, there were significantly more food insecure participants (74.4 percent) who consumed only 0–2 daily servings of fruit and vegetables versus the food secure (54.6 percent) (Kendall et al., 1996).

Maternal depression is a potential outcome mediated or exacerbated by food insecurity (Cook, 2002). Maternal depression is a common expression of poverty-related stress in families; Cook explains that rationing, within the framework of the “managed process” understanding of food insecurity, may result in undereating and resorting to other adaptive behaviors. These behaviors may lead to further detriment to physical and psychological health (Cook, 2002).

Whitaker and associates evaluated data from a cross-sectional survey of 2,870 mothers of 3-year-old children in 18 US cities in 2003 to assess associations of maternal major depression and generalized anxiety disorder and child behavioral problems to household food insecurity (Whitaker, Phillips & Orzol, 2006). Food security / insecurity status was determined by the 10 household- and adult-referenced questions in the US National Household Food Security Survey Measure (Table 4, page 50); maternal mental health outcomes were determined from the World Health Organization Composite International Diagnostic Interview–Short Form; and child behavioral problems were classified according to the Child Behavior Checklist. After adjusting for sociodemographic characteristics, maternal physical health, alcohol use, drug use, prenatal smoking, and prenatal intimate partner violence, the researchers found 16.9 percent of food secure mothers, 21 percent of marginally food secure, and 30.3 percent of food insecure mothers suffered from either depression or anxiety. They also report that childhood behavioral problems increased over the three categories of food security / insecurity: 22.7 percent of 3-year-olds in food secure households, 31.1 percent of those in marginally food secure households, and 36.7 percent in food insecure households had one or more problems with aggression, anxiety / depression, or inattention / hyperactivity (Whitaker et al., 2006).

Borders and researchers assessed the impact of various external stressors in low-income women associated with delivering low birth weight babies (Borders, Grobman, Amsden & Holl, 2007). They followed 1,363 women, 294 of whom became pregnant and 39 of whom delivered low-birth singletons in nine Illinois counties from 1999 to 2004. They found that, after adjusting for maternal age, women classified with “food insecurity” were 2.6 times more likely to give birth to a low birth weight neonate relative to women who were food secure (Borders et al., 2007).

Health outcomes of food insecurity within adult populations were studied in the Delta region of Arkansas, Louisiana, and Mississippi (Stuff et al., 2004). The study uti-
lized a population-based representative sample of 1,488 households to examine the association between household food insecurity (measured by the US Food Security Survey Module) and self-reported physical and mental health (measured by the Short Form 12-item Health Survey, or SF-12). Logistic and linear regressions were conducted with health status as the outcome variable and a number of independent variables (age, income, sex, food security status, and an interaction between race and food security status). Analyses showed adults in food insecure households were significantly more likely to rate their health as poor / fair and scored significantly lower on both the physical and mental health scales of the SF-12. Interestingly, the association of food security to general health status was dependent on race—within the food insecure group, physical scores and general health were reported to be higher in the blacks than in the whites; the authors posit a number of explanations for these differential findings by race (Stuff et al., 2004).

Miller and colleagues performed a cross-sectional descriptive study of older, inner-city black Americans to determine nutritional risk and to identify factors associated with such risks (Miller et al., 1996). Compared to a sample population (mostly white, from New England), members of two St. Louis communities (mostly black) were more likely to report on the Nutrition Screening Initiative Checklist that an illness affected their diet. The researchers also found that inner-city black Americans were more likely than their northeastern white geriatric counterparts to have lower consumption of fruits, vegetables, or milk products; to suffer from dentition or mouth problems that impaired eating; to have limited finances available for food; to consume most meals alone; and to take multiple medications that impaired proper eating. They also found that inner-city black Americans were less able to shop, cook, and / or feed themselves than their white elderly counterparts. The researchers found several associated factors in the St. Louis subjects: 1) diminished affective status (Geriatric Depression Scale of ≤ 10); 2) self-reported health as “fair or poor” (as opposed to “excellent, very good, or good”); 3) income perception as “inadequate”; and 4) a higher total number of these predisposing factors (Miller et al., 1996).

Lee and Greif evaluated food insecurity in the context of homelessness, but they report findings that are contrary to commonly held notions about homelessness and food insecurity (B. A. Lee & Greif, 2008). Arguing that “neither conventional nor the counterintuitive views [that homelessness and hunger go hand in hand or not] should be accepted uncritically,” the researchers evaluated information from the 1996 National Survey of Homeless Assistance Providers and Clients (associations with food insecurity are reported in the “Magnitude and Predictors of Food Insecurity” section, above). The researchers contend that, in their sample of 2,898, hunger and food security were not a priority of the homeless—“assistance getting food” was coded for only 16 percent of respondents replying to the open-ended question of “what are the things you need the most now?” This ranked sixth of 27 categories and was far behind “finding a job” (44 percent), “finding affordable housing” (39 percent), and “assistance with rent, mortgage, or utility costs” (34 percent); the authors assert that although getting enough to eat is not irrelevant for homeless individuals, it is not a top priority (B. A. Lee & Greif, 2008). They do not, however, present data indicating the validity of the test questions and methodologies employed.

Lee and Frongillo evaluated data from the Third National Health and Nutrition Examination Survey (1988–94) and the Nutrition Survey of the Elderly in New York State (1994) to compare food insecurity in the elderly relative to their nutrient intake, skinfold thickness, and self-reported health status (J. S. Lee & Frongillo, 2001b). They found that food insecure elders were significantly more likely to consume fewer calories, protein, iron, zinc, magnesium, riboflavin, vitamin B-6, vitamin B-12, and niacin than food secure elders. The sum of skinfold thickness measures (an indication of body energy stores) of the food insecure group was found to be significantly less than that of the food secure group. Finally, the food insecure elders were more than twice as likely to self-report “fair/poor” health status (the lowest category in their study) compared to their food secure counterparts (J. S. Lee & Frongillo, 2001b).

Dietary intake can be considered a mediating factor between food insecurity and health outcomes, but few studies have explored this relationship (Knol, Haughton & Fitzhugh, 2004). Knol and colleagues studied the relationship between food sufficiency and dietary variety among children aged 2–8 in low-income families by using data from the US National Continuing Survey of Food Intakes by Individuals (Knol et al., 2004). Surprisingly, mean variety scores were found not to differ by food sufficiency status in the study population. Possible explanations posited by the authors include sparing of childhood dietary restrictions at the adult’s expense and the lack of
Rose found adult women and the elderly belonging to food insufficient households had lower intakes of nutrients (Rose, 1999). Adult women in food insufficient households were found to consume less than 50 percent of the Recommended Daily Allowance (RDA) for eight nutrients, including energy and vitamins A, B-6, C, and E. The elderly in food insufficient households were also found to consume less than 50 percent of their RDAs for eight nutrients, including protein, calcium, and vitamins A and B-6. Rose also presents evidence that the “child preference” observation (wherein food insecurity, as a managed process, results in children being the last to suffer from decreased food consumption because adults sacrifice for the benefit of children) extends beyond the initial ethnographic work to a sample in the 1989–91 Continuing Survey of Food Intake by Individuals (Rose, 1999). Bhargava and Amialchuk confirmed decreases in nutrient intake in an analysis of 937 food stamp participating households throughout the US in 1996–97: they report a statistically significant decrease in protein and iron consumption in those who were food insecure in the prior month (Bhargava & Amialchuk, 2007).

During their analysis of the validity of the Radimer / Cornell measurements of hunger, Kendall and colleagues found that the “weekly consumption of fruit, salad, vegetables, fruit juice, carrots, and the sum of all six fruit and vegetable categories declined progressively as food insecurity status worsened” (Kendall, Olson & Frongillo, 1995). They also report that the amount of household food supplies declined and that participation in food assistance programs increased as food insecurity increased (as measured by the instrument). The researchers report an inverse relationship between income and food insecurity (Kendall et al., 1995).

Zizza and associates evaluated the connection between food insecurity and total daily energy intake using 1999–2002 National Health and Nutrition Examination Survey (NHANES) data (Zizza, Duffy & Gerrior, 2008). Food security status was assessed with the HFSSM; dietary intake was collected through a 24-hour dietary recall method. The researchers limited the study to non-pregnant, non-breastfeeding Americans aged 18–60; there were 2,707 women and 2,933 men studied. No statistically significant differences in total energy intake were detected among the groups. The researchers report, however, that food insecure women had significantly fewer meals than food secure women, but the energy contribution of meals and the energy obtained from snacking was greater for food insecure women without hunger relative to food secure women. Men who were food insecure without hunger had significantly fewer meals but greater number of snacks and energy intake from snacks compared to men who were food secure. Major energy sources of meals were grains, meats, poultry, and fish, whereas sugars, sweets, and beverages dominated the energy sources in snacks of study participants (Zizza et al., 2008).

In an overview of food security Holben includes “suboptimal quality of life” among the outcomes of food insecurity (Holben, 2002). Anxiety about not having enough to eat is not only a measure of food insecurity but an outcome in itself. Other outcomes of food insecurity and hunger include physical impairments (e.g., fatigue and / or illness), psychological disturbances (e.g., stress at home), and socio-familial problems (e.g., disruption of household relationships). Alienation, an increased need for health care, and increased feelings of powerlessness are also cited as consequences of lack of food security (Holben, 2002). More broadly, Harrison and colleagues, analyzing data from the California Health Interview Survey, report that 40 percent of low-income (< 200% of FPL) California adults who reported fair or poor health lived in food insecure households, compared to 25 percent of those reporting good, very good, or excellent health (G. G. Harrison et al., 2007).

Seligman and associates performed a cross-sectional analysis of NHANES data from 1999–2000 and 2001–2002 to determine if there is an association between food insecurity and diabetes mellitus (Seligman, Bindman, Vittinghoff, Kanaya & Kushel, 2007). The researchers evaluated data on 2,690 non-pregnant women and 2,532 men, all aged 20 years or older and in households with income ≤300% of the FPL. NHANES used the HFSSM to determine food security levels; the authors grouped individuals in three categories (food secure, mild food insecurity, and severe food insecurity). They used body mass index (BMI) and waist circumference as measured by NHANES examiners. Self-reported diabetes was the marker for presence of diabetes mellitus, with the researchers noting that the specificity of such reports is as high as 97 percent. They found that, after adjusting for age, race / ethnicity, parity, income, education, and physical activity, women classified with mild food insecurity had twice the odds of being obese compared to food secure women; mild
food insecure women also had higher mean BMIs and mean waist circumferences. There were no statistically significant associations for women who were classified with severe food insecurity or for men with either level of food insecurity compared to men with food security. For all adults in the study with severe food insecurity, the odds of having diabetes were twice those of adults who were food secure—after adjusting for gender, age, race/ethnicity, parity, income, family history of diabetes, education, physical activity (and with and without adjusting for BMI, and with and without adjusting for daily caloric and carbohydrate intake) (Seligman et al., 2007).

There have been numerous studies focused on the linkages between obesity and food insecurity. For example, Olson notes that skeptics and some policy-makers argue that the high prevalence of obesity in low-income populations controverts the high prevalence of food insecurity in this same subgroup of the population (C. M. Olson, 1999). She reports on a study which revealed a higher mean body mass index (BMI) and a greater percentage of obese women in households experiencing food insecurity compared to food secure households; other studies that demonstrated the same findings resulted in suggestions that poverty contributes to high rates of obesity in unknown ways, perhaps through food choices and/or physiologic adaptations (C. M. Olson, 1999). See the “Obesity and Food Insecurity” section for further discussion of this topic.

Feinberg and fellow researchers performed a cross-sectional survey to evaluate compensatory behaviors of black subpopulations in a pediatric primary care clinic of a Boston teaching hospital from 2003 to 2005 (Feinberg, Kavanagh, Young & Prudent, 2008). Their study involved 278 mother-child dyads to determine if any of five maternal feeding practices—parental restriction of foods, pressuring a child to eat, use of high-energy supplements, use of added sugar, and use of appetite stimulants—was different among those who were food insecure versus those who were food secure. They used the Six-Item Short Form of the Household Food Security Scale (see Table 9 in the “Food Security Measurement Tools” section) for classifications of food secure and food insecure. After adjusting for child age and child weight, for ethnicity (Haitian and African American), and for maternal weight (normal versus overweight or obese), food insecure study participants were 2 times more likely to feed their children high-energy boosters and more than 3 times more likely to give them perceived appetite stimulants. The authors suggest that these results might be secondary to two factors. First, local WIC offices use clinically specific methods to define children as underweight (and underweight children were excluded from the study). Second, mothers’ misperceptions that these feeding practices are protective against undernutrition led to their being utilized (Feinberg et al., 2008).

Quandt and colleagues evaluated four studies involving 317 Latino immigrant families in different seasons and in different regions of North Carolina to assess the prevalence and experiences of food insecurity in this subpopulation—these cross-sectional studies were conducted in 2002–2004 (Quandt et al., 2006). They found quantitative, qualitative, psychological, and socioeconomic components to these Latino immigrant experiences of food insecurity. Quantitatively, cycles of income, as well as the cyclical demand for winter fuel expenditure, create seasonal cycles of food insecurity. Qualitatively, the cyclic shortages affect the types of food available. The psychological component included fear of applying for assistance because of lack of documents, embarrassment of having persons in their community being aware of food insecurity, loneliness and homesickness, and worry about competing expenses. The socioeconomic component included being treated with disrespect when applying for assistance and lack of transportation to food pantries. The authors note that many issues are unique to immigrants and their families (including ineligibility for some forms of assistance, such as the food stamp program), and that strategies to address food insecurity in these subpopulations should consider such issues (Quandt et al., 2006).

In 2003, Weigel and colleagues performed a site-based, convenience sampling, cross-sectional survey on 100 migrant and seasonal farmworkers living on the US-Mexico border (Weigel et al., 2007). They did not find any statistically significant associations between food insecurity and overweight/obesity and abdominal obesity; elevated cholesterol, triglycerides, blood glucose, or low HDL cholesterol; metabolic syndrome; elevated blood pressure, or iron-deficiency anemia. They did find statistically significant associations between food insecurity and a number of other self-reported conditions: depression, childhood learning disabilities, and symptoms of gastrointestinal infections (Weigel et al., 2007).

Contrary to Weigel's findings, above, and focusing on outcomes in children, Skalicky and researchers did find statistically significant association of iron deficient anemia with
food insecurity (Skalicky et al., 2006). They performed a cross-sectional survey of 626 caregivers of children ≤ 36 months of age using Boston emergency department services from 1996 to 2001 as part of the Children's Sentinel Nutrition Assessment Program (C-SNAP) study and evaluated concomitant hematologic data. Children with certain medical conditions predisposing them to anemia (e.g., HIV / AIDS, sickle cell disease) were excluded; food insecurity was measured by the Children's Food Security Scale (see Table 5, page 51). After adjusting for caregiver nation of birth, education, employment and welfare status, as well as household size and child ever breastfed, children classified as food insecure were 2.4 times more likely to have iron deficiency anemia compared to food secure children (Skalicky et al., 2006).

Iowa women's perceived barriers to a community-based cardiovascular risk reduction program were evaluated by Gatewood and associates (Gatewood et al., 2008). Their study of 1,160 women from 2003 to 2006 revealed various perceptions and attributes that were associated with lack of participation. The researchers did not find, however, any significant differences among participation groups for food security / insecurity (Gatewood et al., 2008).

Weiser and associates were interested in the effect of food insecurity on viral load suppression and antiretroviral adherence in a cross-sectional study performed in 2006 in San Francisco (Weiser et al., 2008). They found, among their 104 participants, that 25 percent were severely food insecure and 24 percent were mildly or moderately food insecure as measured by the Household Food Insecurity Access Scale (see Table 12, page 59). The authors report that severely food insecure participants were less likely to be adherent to their medical regimen and that they had 77 percent lower odds of viral suppression than those who were food secure or experiencing mild or moderate food insecurity (Weiser et al., 2008).

Zekeri reports on data from a qualitative and quantitative project assessing the coping strategies and psychological impacts of food insecurity on 100 African American women in five Alabama counties in 2005–2006 (Zekeri, 2007). Coping strategies included employment (51 percent); informal support, such as cash from absent fathers, boyfriends, or relatives (45 percent); government assistance (44 percent); community groups, churches, and social agencies (42 percent). Mechanisms also included cohabiting, doubling up, eating at a senior meal program, and eating less. Psychological components experienced by this group included worrying about money running out (65 percent), feelings of sadness (57 percent), restless sleep (50 percent), feelings of depression (48 percent), and trouble focusing (48 percent) (Zekeri, 2007).

Chilton and Booth, noting that African American women suffer some of the worst burdens of food insecurity, conducted a qualitative study of 34 African American women recruited from three Philadelphia food pantries in 2002–2003 to explore their perceptions of food insecurity (as well as health and violence) (Chilton & Booth, 2007). The authors assert that their phenomenological approach, grounded in the analysis of everyday, lived experience, reaches to the core of the experience of suffering and thereby requires consideration of the moral implications of food insecurity. The researchers share descriptions of the physical, bodily sensations of hunger (“can’t lay with yourself comfortable” and “the struggling parts of wanting nourishment and substance in your body”) as well as the psychological aspects. These psychological aspects were divided into three areas: 1) stress and depression, 2) deliberate (self-inflicted) hunger—because of stress and depression, and 3) violence and the concomitant inability to eat. The authors argue that the dimensions of “hunger of the mind” encompass a broader range of social problems that are associated with food insecurity and that such psychological issues demand greater consideration. They note that the “victimization of women and the feminization of poverty” contribute immensely to the hunger and poor health of African American women—and the “breadth of the experience of deprivation from food deserves to be explored, acknowledged, and treated comprehensively” (Chilton & Booth, 2007).

The Children's Sentinel Nutrition Assessment Program (C-SNAP) is a research and public policy center concerned with the health and nutrition of children aged 0–3. Since 1998, it has sponsored ongoing research in six US medical centers, three of which are acute care and primary care centers (Baltimore, Minneapolis, and Washington, DC) and three are hospital emergency departments (Boston, Little Rock, and Philadelphia) (C-SNAP, 2008). The research is an ongoing, cross-sectional convenience survey that uses the Household Food Security Scale to measure food security status and various other measures to determine predictors and / or outcome variables relative to food insecurity. C-SNAP–sponsored research concerned with predictors of food insecurity is reported above; following is a discussion of C-SNAP–sponsored research concerned with outcomes of food
insecurity (Cook et al., 2006; Meyers et al., 2005; Neault et al., 2007; Rose-Jacobs et al., 2008).

Rose-Jacobs and colleagues analyzed C-SNAP data to assess potential association of food insecurity with developmental risk in 4- to 36-month-old children in low-income households (Rose-Jacobs et al., 2008). Two thousand and ten caregivers from five pediatric clinic / emergency department sites (Little Rock, Boston, Baltimore, Minneapolis, and Philadelphia) were surveyed using the HFSSM and the Parents’ Evaluations of Development Status. After adjusting for child-related covariates of gender, age at time of interview, weight-for-age z score, low birth weight, ever breastfed, history of hospitalizations and type / absence of health insurance, as well as adjusting for caregiver-related covariates of education, marital status, employment, positive depressive symptoms, country of birth, and geographic site of interview, the researchers found that children from food insecure households were two-thirds more likely to experience developmental risk (Rose-Jacobs et al., 2008).

Neault and fellow researchers analyzed C-SNAP data collected from 1998 to 2004 on 3,592 immigrant mothers of infants aged 0-12 months to assess breastfeeding and health outcomes (Neault et al., 2007). They report that household food insecurity modified the association between breastfeeding and infant health outcome. They found that there was not a statistically significant difference in food secure breastfed and food secure non-breastfed infants in terms of child health status being reported “fair / poor” or in terms of hospital admissions. The researchers did find, however, that food insecure breastfed infants were less likely to be in “fair / poor” health compared to food insecure non-breastfed counterparts (47 percent odds ratio) and were less likely to have been hospitalized (44 percent odds ratio) (Neault et al., 2007). Thus food insecurity appears to be a tipping point toward adverse health outcomes in non-breastfed versus breastfed infants.

Meyers and associates report on C-SNAP data obtained on 11,723 children in the six C-SNAP sites (Meyers et al., 2005). They found that there was no statistically significant difference in weight-for-age in children in food secure homes that received housing subsidies compared to those in food secure homes not receiving housing subsidies. There was a statistical difference, however, for children in food insecure homes: Children in food insecure homes receiving housing subsidies had higher weight-for-age than those who were food insecure and not receiving housing subsidies; thus, public housing subsidies are associated with enhanced nutritional status in those suffering from food insecurity (Meyers et al., 2005). Again, food insecurity appears to be a tipping point in health outcomes when comparing low-income children not receiving housing subsidies to those receiving housing subsidies.

Cook and researchers looked at C-SNAP data from all sites collected from 1998 to 2004 to assess household and childhood food insecurity, their impact on children’s health and whether participation in the food stamp program has a mitigating effect on health outcome (Cook et al., 2006). They studied 17,158 caregivers’ surveys. Compared to children classified as food secure, children in household food insecure environments were 1.5 times more likely to have “fair / poor” health, while children classified as child food insecure were twice as likely to have “fair / poor” health as their food secure counterparts. Also compared to food secure children, children classified as household food insecure and those classified as child food insecure were 1.2 times more likely to have been hospitalized. Participation in the food stamp program did not mitigate either of these health outcome variables (Cook et al., 2006).
Poverty and Food Insecurity

Linkages between poverty and food insecurity are complex and at times can be counterintuitive. The term poverty itself is contentious: increasingly it is not considered solely in financial terms (income or resources) but also in wider terms, including, for example, social factors such as the presence or absence of food stores in a neighborhood. Each dimension of poverty has a particular bearing on food security. If this multidimensional nature of poverty (and its effects on food security) as well as the coping mechanisms of impoverished families and communities are elucidated, then multiple potential entry points can be postulated to enhance food security. The literature presented in this section aims to inform such thinking.

Macrosocial and microsocial factors influence poverty-related malnutrition. Karp et al. state the essence of this relationship when they write,

Macrosocial phenomena (food costs and food culture), distal from the life of family and child, affect the prevalence of poverty related malnutrition. Which specific families are affected, however, is highly dependent on microsocial factors in the family related to how well resources are used in the proximal or microsocial environment. (Karp, Cheng & Meyers, 2005)

The authors go on to assert that a lack of discretionary income (funds available after paying obligatory and necessary payments) affects food choices and ultimately nutritional status (both under- and overnutrition). They posit that under- and overnutrition are less likely when new income is free of obligation (at approximately 3 times the Federal Poverty Level) (Karp et al., 2005).

Ernst Engel, a 19th-century economist, evaluated the economic effects of food purchases. Engel’s law maintains that the proportion of income spent on food, on both the individual and aggregate level, diminishes as income level increases (Drewnowski, 2003). Karp explains a related trend, “Engel’s Phenomenon,” in which chronic poverty may have particular effects on food-related behavior: food selection narrows to food items with the most energy at the lowest cost (Karp et al., 2005).

Nelson reports on studies that evaluated children’s consumption patterns in their first two decades (M. Nelson, 2000). Comparisons were made between children from low-income families and from higher-income families: infants from the former group were breastfed less frequently, had higher consumption of biscuits and soft drinks, and had lower consumption of breast milk, cow’s milk, and fruit. Toddlers from poorer families were found to have diets lower in dietary fiber and higher in fats and sugar. Schoolchildren from low-income families consumed more white bread, chips, and sugar, and less milk and fruit (M. Nelson, 2000).

Using data from the US National Health and Nutrition Examination Survey III conducted between 1988 and 1994, Bhattacharya and colleagues utilized multiple regression methodology to examine the extent to which poverty and food insecurity are predictive of nutritional status in distinct age groups (Bhattacharya, Currie & Haider, 2004). The results point to several conclusions, some of which are unexpected. First, poverty was found to be predictive of poorer nutritional outcomes among preschoolers and adults, but this was not the case for school-age children. Second, little difference in diet was found between the poor and the non-poor as well as the food secure and food insecure, among school-age children. Third, food security measures were found to have little predictive power on nutritional outcomes once poverty had been controlled for. Fourth, food insecurity was found to be a significant predictor of nutritional outcomes among adults. Lastly, important differences existed in these relationships when race and ethnicity were considered. While postulating possible explanations for these findings, the authors point out the need for caution in assuming connections between food insecurity and nutritional outcomes, particularly among children (Bhattacharya et al., 2004).

Diez Roux and colleagues report findings from the Atherosclerosis Risk in Communities Study conducted in four US communities, one with a significant African American population (Diez Roux et al., 1999). The study consisted of a cross-sectional analysis of the relation between neighborhood median household income and food and nutrient intakes, before and after adjustment for individual-level variables. Block groups (subdivisions of census tracts) were used as proxies for neighborhoods. The researchers report four key findings. First, persons living in lower-income neighborhoods consumed less fruits, vegetables, and fish but more meat than those living in higher-income neighborhoods. Second, the association of neighborhood income with food intake persisted after adjustment for individual-level income, but associations were weak and often not statistically significant. Third,
individual-level income was generally a more consistent predictor of diet than neighborhood income. Fourth, findings were not always what was expected: for example, African American men living in poorer neighborhoods were found to have increased, rather than decreased, fruit intake after adjustment for other factors. The authors conclude that individual and neighborhood income may contribute to social class differences in diet and that income may interact with a multitude of other neighborhood factors to determine dietary choices. Further, patterns of consumption for African American populations may differ from those in white populations, and it is crucial to examine neighborhood effects in detail within sociocultural contexts. The importance of using block group measures, rather than census tracts, as indicators of the immediate socioeconomic environment is emphasized (Diez Roux et al., 1999).

In another article, Diez Roux further discusses residential physical and social environments and resultant cardiovascular risk (Diez Roux, 2003). Pertaining to the effects of neighborhoods’ environments on diets, she notes the complexities involved, including difficulties in systematically comparing food availability and costs across multiple areas; the lack of evaluation of the effects of availability and variety of dining places on dietary patterns; and the difficulty of disentangling physical and social environment effects on individual behavior. She calls for longitudinal studies that would examine the “relationship between changes in food availability and subsequent changes in dietary habits” to strengthen the case of causation between food accessibility and diet (Diez Roux, 2003).

Morland and colleagues evaluated the association between physical availability of food stores and food service places to adherence to aspects of the Dietary Guidelines for Americans (Morland, Wing & Diez Roux, 2002). In their study of 221 census tracts in various states, they found that “the presence of supermarkets was associated with meeting dietary recommendations among Black Americans.” Increased vegetable and fruit consumption was associated with a local supermarket even after adjusting for education and income, but the presence of a small grocery store did not have associations with dietary intake (Morland, Wing & Diez Roux, 2002).

Townsend and colleagues also demonstrated the association of food insecurity with poverty. Additionally, they demonstrated in their study that, between low-income groups, those classified as mildly food insecure had higher incomes than those who were less food secure (Townsend et al., 2001).

In a study of the distribution of type of food stores and type of food service places across neighborhoods categorized by wealth and by racial segregation in Mississippi, North Carolina, Maryland, and Minnesota, Morland and colleagues found that there were “over 3 times as many supermarkets in wealthier neighborhoods compared to the lowest wealth areas” after adjusting for population density (Morland, Wing, Diez Roux & Poole, 2002). After adjusting for population density again, they found that supermarkets were 3 times more common in racially mixed neighborhoods and 4 times more common in predominantly white neighborhoods. Considered another way, the ratio of supermarkets to residents was 1:3,816 in predominantly white neighborhoods and 1:23,582 for predominantly black areas. The importance of these findings is underscored by other studies noted by Morland and colleagues demonstrating that, while supermarkets offer more healthy foods, fewer households in poor and black neighborhoods have access to private transportation; thus locality of food store and food service types may hinder impoverished people’s ability to access healthy foods (Morland, Wing, Diez Roux & Poole, 2002).

Sloane and researchers report on a community-directed research project in three areas of Los Angeles, all experiencing health disparities; these areas had a high percentage of African Americans and lower-income persons. The project compared several parameters to a “contrast area” which had a lower percentage of African Americans and higher percentage of wealthier residents (Sloane et al., 2003). The parameters evaluated included store type, ratings of cleanliness and of service, and availability of various healthy foods. The researchers discovered that 94 percent of stores in the wealthier “contrast area” sold fruits and vegetables, but these were available in only 70 percent of the low-income regions; additionally, the fruits and vegetables in the lower-income regions were less commonly placed in the front of the store (53 percent) compared to the wealthier “contrast area” (87 percent). Other disparities that were found to be statistically significant between the wealthier “contrast area” and the low-income areas included “not a chain store” (47 percent vs. 69 percent); “excellent” or “good” rating for service (100 percent vs. 70 percent); availability of low-fat snacks (70 percent vs. 42 percent); and availability of nonfat milk (80 percent vs. 38 percent) (Sloane et al., 2003).
Obesity and Food Insecurity

Human history recounts that obesity is associated with wealth and abundance (and even overconsumption) while the conditions that are associated with what is now called “food insecurity” could not simultaneously be associated with being overweight or obese. The modern era, with rapid changes in the types of food that are mass-produced and consumed, along with the social and political mechanisms that have been introduced to address food insecurity and hunger, has experienced dramatic changes. Now, those who are food insecure are frequently overweight and obese, contributing to the health inequities suffered by those in lower socioeconomic classes. An array of explanations has evolved: methodological, adaptive, sociological, physiological, biological, psychosocial, discriminatory practices, and cultural forces have been proposed and researched. To date, there is no single coherent framework that satisfactorily explains the phenomenon to everyone. Below is a compilation of scientific literature concerned with obesity in people suffering from food insecurity.

Overweight and obesity are one of 10 leading health indicators in Healthy People 2010 because these conditions substantially raise the risk of illness from high blood pressure, high cholesterol, type 2 diabetes, heart disease and stroke, gallbladder disease, arthritis, sleep disturbances and problems breathing, and certain types of cancers. Obese individuals also may suffer from social stigmatization, discrimination, and lowered self-esteem. (Office of Disease Prevention and Health Promotion, US Department of Health and Human Services, 2001b)

The first three specific objectives in the “Nutrition and Overweight” chapter of Healthy People 2010 are concerned with overweight and obesity (Office of Disease Prevention and Health Promotion, US Department of Health and Human Services, 2001a). Objective 19-1 is to increase the proportion of adults who are at healthy weight to 60 percent (from a baseline of 42 percent); objective 19-2 is to reduce the proportion of adults who are obese to 15 percent (from a baseline of 23 percent); and objective 19-3 is to reduce the percentage of children and adolescents who are overweight or obese to 5 percent (from a baseline of 11 percent) (Office of Disease Prevention and Health Promotion, US Department of Health and Human Services, 2001a). While more than half the US population is overweight or obese, Healthy People 2010 notes that “the proportion of adolescents from poor households who are overweight or obese is twice that of adolescents from middle- and high-income households” and that “obesity is especially prevalent among women with lower incomes and is more common among African American and Mexican American women than among white women (Office of Disease Prevention and Health Promotion, US Department of Health and Human Services, 2001b).

In a seminal letter in 1994, Dietz discusses the seemingly paradoxical finding that both hunger and obesity occur more frequently in US poorer populations than in wealthier populations (Dietz, 1995). While noting that “environmental, social, behavioral or physiologic mechanisms could cause both problems independently, an alternative possibility is that hunger and obesity are causally related.” Dietz presents a case study of a poor, overweight pediatric patient and posits two possibilities: increased fat consumption by the family to prevent hunger and “an adaptive response to episodic food insufficiency.” Dietz states that the large cross-sectional and prospective studies that would be required to confirm whether food choices or adaptations cause obesity in the poor had not been adequately performed (Dietz, 1995).

Shortly after the Dietz letter, Jeffery and French summarize three general causal hypotheses for the strong gradient between social class and prevalence of obesity in US women (Jeffery & French, 1996). The discrimination hypothesis contends that obesity in women drives or keeps them in lower socioeconomic status because of discriminatory social forces. The access hypothesis suggests that lower socioeconomic status exacts penalties (e.g., lower knowledge, skills, options) leading to adverse behaviors regarding weight control. The culture hypothesis proposes that lower socioeconomic status exacts penalties (e.g., lower knowledge, skills, options) leading to adverse behaviors regarding weight control. The culture hypothesis proposes that lower socioeconomic status exacts penalties (e.g., lower knowledge, skills, options) leading to adverse behaviors regarding weight control. 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study calls for further evaluations of the discrimination and access hypotheses while casting doubt on the cultural hypothesis (Jeffery & French, 1996).

Still, cultural views of “obesity” and “normal weight” may still be considered by some when approaching the issue of causation of obesity in food insecure persons. Arfken and Houston performed a cross-sectional telephone study to gather data including self-reported height and weight and self-perception of being overweight in inner-city African Americans to compare their subjects’ views relative to the medical perception of overweight and obesity (Arfken & Houston, 1996). They found that 70 percent of those who would be classified clinically as obese correctly perceived themselves accordingly and that 66 percent of the obese were making efforts to lose weight. Additionally, they found that 68 percent of the obese reported utilizing both exercise and diet in their effort to lose weight (Arfken & Houston, 1996). Thus the majority of inner-city African Americans in this study had personal views of obesity consistent with current medical classification schemes, and the majority were working to improve their condition.

Wilde and Peterman note that the relationship between food insecurity and obesity / overweight has resulted in conflicting results (Wilde & Peterman, 2006). This can largely be attributed to the cross-sectional nature of the data sets utilized in analyses. In a study utilizing data from the 1998 and 1999 California Women’s Health Survey, obesity was found to be more prevalent in food insecure (31 percent) than in food secure women (16.2 percent); this increased risk was found to be greatest in the non-white population (Adams, Grummer-Strawn & Chavez, 2003). Self-reported concern about food security was found to be associated with obesity in a study conducted by the Washington State Department of Health that analyzed statewide data from the 1995–1999 Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention [CDC], 2003). However, other cross-sectional studies have led to alternative findings (Wilde & Peterman, 2006).

Cognizant of such methodological limitations, Wilde and Peterman report on a study of individual weight change associated with household food security status, utilizing longitudinal information on both weight and food security status from the National Health and Nutritional Examination Survey between 1999 and 2001 (Wilde & Peterman, 2006). Multivariate analyses were conducted after adjusting for race / ethnicity, household income, education level, and current health status. Three key findings were reported (Wilde & Peterman, 2006):

- Compared with women in fully food secure households, those in households that were marginally food secure and food insecure without hunger were significantly more likely to be obese;
- Compared with women in fully food secure households, those in households that were marginally food secure were significantly more likely to gain weight; and
- Compared with men in households that were fully food secure, men in households that were marginally food secure were more likely to be obese and to gain weight, but these effects were smaller in magnitude than those for women.

The study thus corroborated previous cross-sectional associations between intermediate levels of food insecurity and obesity / weight gain (Wilde & Peterman, 2006).

The choice of instrument used to measure food security has been shown to influence detected relationships between food insecurity and obesity in another study, particularly among immigrant populations (L. L. Kaiser, Townsend, Melgar-Quinonez, Fujii & Crawford, 2004). Kaiser and colleagues compared the results of two scales used in a cross-sectional study of Latino women. They detected a relationship between food insecurity and obesity when using the 18-item US Household Food Security Scale; this relationship was not present, however, when current food insufficiency was assessed using a single item question (L. L. Kaiser et al., 2004), emphasizing the need to be aware of the validity of survey instruments when considering nonlinear, and often reciprocating, dimensions of complex issues such as food insecurity and obesity.

In examining the association of food insecurity on children enrolled in the Early Childhood Longitudinal Study, Jyoti and colleagues employed longitudinal data to evaluate the relationship between food insecurity and obesity in 21,260 kindergarten and third grade children from 1998 to 2002 (Jyoti et al., 2005). They found that “children from persistently food insecure households had a 0.35 kg/m² greater gain in body mass index (BMI) and a 0.65 kg greater gain in weight compared with children from persistently food secure households after controlling for time-invariant and time-varying covariates.” The authors caution that there was limited clarity as to conclusions
that could be drawn from the data, partially because of the long lag between cause and effect (Jyoti et al., 2005). Another analysis of 7,635 US children in first, third, and fifth grades in the Early Childhood Longitudinal Study (1999–2003) by Bhargava and colleagues indicated that household food insecurity was not a statistically significant predictor of higher weights and suggested that the difference in the two studies was secondary to differences in modeling between the two studies (Bhargava, Jolliffe & Howard, 2008).

Gunderson and colleagues examined data from the Welfare, Children and Families: A Three-City Study to determine if there was an association between food insecurity and child overweight (Gundersen, Lohman, Eisenmann, Garasky & Stewart, 2008). The data they analyzed was from 1999 involving children in low-income households in Boston, Chicago, and San Antonio; the authors explain that their study was unique in that it evaluated food security and height/weight data in the same child. They used three of the eight child-focused questions from the 18-item Household Food Security Survey Measure (see Table 4, questions 13, 14, and 15) to classify 1,031 children aged 10–15 as food insecure or food secure and used Centers for Disease Control and Prevention (CDC) and International Obesity Task Force weight categorizations to classify them as underweight, normal, at risk for overweight, or overweight. The researchers did not find a statistically significant difference in the prevalence of overweight or risk of overweight in the food secure versus food insecure in this sample (Gundersen, Lohman, Eisenmann, et al., 2008).

Other studies have also demonstrated inconsistent results between food insecurity and overweight/obesity in children within the same study. A study conducted using the Third National Health and Nutrition Examination Survey found a higher prevalence of overweight among white girls aged 8 to 16 years from low-income food insufficient households than from low-income, food sufficient households; risk of overweight, however, was not found to be related to food insufficiency in any other age or ethnic group (Jones, Jahns, Laraia & Haughton, 2003). Another study utilizing data from the Continuous Survey of Food Intake by Individuals (1994–1996) found significantly higher risk of overweight among children from low-income food insufficient households than in high-income food sufficient households; however, no differences were found in the risk of overweight between food sufficient and food insufficient low-income households (Jones et al., 2003).

Alaimo, Olson, and Frongillo present a conceptual framework that postulates the relationship of overweight in children to food insufficiency, exercise risks, and health care risks (and, distally, how these three are influenced by demographics and family resources) as well as genetic factors and past nutrition/health/social risks (Alaimo, Olson & Frongillo, 2001b). This framework is reproduced in Figure 6.
Using data from the Third National Health and Nutrition Examination Survey, Alaimo, Olson, and Frongillo conducted an ecological study of the relationship of obesity and food security by comparing the prevalence of food insufficiency to income category and the prevalence of overweight to income (Alaimo, Olson & Frongillo, 2001b). They found that non-Hispanic white boys and girls aged 8–16 in low-income families were more likely to be overweight than their counterparts in high-income families; the researchers did not find this to be true for non-Hispanic children aged 2–7 or for black and Mexican-American children in either age group. After adjusting for confounders presented in their theoretical model (see Figure 6, above), they found that food insufficiency was not positively associated with overweight in any groups studied except in older, non-Hispanic white girls. They concluded that “there is epidemiological evidence for the paradox only in one race-ethnic and age group of the US child population” (Alaimo, Olson & Frongillo, 2001b).

Recently, a large, nationally representative sample of young schoolchildren was analyzed to explore the association between food insecurity and overweight status (Rose & Bodor, 2006). In this study the relationship between overweight and food insecurity was assessed using multivariate logistic regression and controlling for potential demographic, socioeconomic, and behavioral factors. The key finding was that children from food insecure households were 20 percent less likely to be overweight than their food secure counterparts (Rose & Bodor, 2006). Thus, in this study, food insecurity does not appear to be associated with overweight status in children; the authors

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**Figure 6. Theoretical Model of Relationships Between Family Resources, Food Insufficiency, Exercise Risks, Health Care Risks, Past Nutrition / Health / Social Risks, Genetic Factors, and Overweight: Third National Health and Nutrition Examination Survey, 1988 to 1994**

(Alaimo, Olson & Frongillo, 2001b)
note that this finding is in opposition to the effects of food insecurity in adult women found in other studies. The authors suggest two possible explanations: young children are protected by adults in food insecure households; or the means by which food insecurity affects individual weight status may take years to develop (Rose & Bodor, 2006).

Another possible explanation for these inconsistent results in children is the differential effect of participation in food assistance programs in food secure and food insecure households; this was explored by Jones and colleagues (Jones et al., 2003). Data from the 1997 Panel Study of Income Dynamics Child Development Supplement were utilized to compare the risk of children aged 5 to 12 years being overweight in food insecure and food secure low-income households while accounting for participation in food assistance programs. The main study finding was that food insecure girls who participated in food assistance programs had a 68 percent reduced odds of being at risk of overweight when compared with food insecure girls in nonparticipating households; this association was not found in boys. The results support the study hypothesis that food assistance programs moderate the relationship between food security status and child weight status (Jones et al., 2003).

Townsend and colleagues documented a positive linear relationship between the prevalence of overweight and the degree of food insecurity in low-income women in the United States (Townsend et al., 2001). Despite an association between food insecurity and overweight / obesity for women, they did not find such an association for men. The researchers suggest two possible explanations for this gender difference. First, there is more social pressure for women to be thin, and this leads them to be more sensitive to detecting an overweight / food insecurity relationship. Second, food insecure women are more likely to be heads of households with children while men who report food insecurity are more likely to be single. Importantly, they found that food insecurity was a significant predictor of overweight status for women (after adjusting for potential confounders of demographic and lifestyle variables) (Townsend et al., 2001).

Townsend and colleagues continue by exploring a seemingly paradoxical finding in their study: The prevalence of overweight was lower at the two extremes of food insecurity (i.e., the “no food insecurity” and the “severe insecurity” had lower prevalence rates of overweight compared to the two groups between these extremes, “mild insecurity” and “moderate insecurity”). They suggest that the “no food insecurity” low-income women may take actions (e.g., restrict consumption) in order to prevent weight gain while the “severe insecurity” group may involuntarily restrict consumption because of lack of resources. They suggest that overweight in low-income, mild, and moderate food insecure women may be related to an involuntary, temporary food restriction during the end of the food stamp cycle, followed by a period of overeating after food stamp acquisition. This pattern of disordered eating, therefore, apparently contributes to high prevalence rates of obesity in food insecure women. Townsend and colleagues used Urie Bronfenbrenner’s concept of the ecology of human development in developing a conceptual framework that hypothesizes the relationship of food insecurity to overweight (see Figure 7). According to their model, food insecurity influences overweight directly as well as indirectly through lifestyle features (Townsend et al., 2001).
Using data from the Panel of Income Dynamics, Jones and Frongillo performed longitudinal, cross-sectional analyses of more than 5,000 women aged 18–34 from 1999 to 2001 to estimate the direction and timing of the relationship between food insecurity and obesity (Jones & Frongillo, 2006). They found that the exposure of food insecurity was associated with weight loss over the two-year period while the interaction effect of participation in the federal Supplemental Nutrition Assistance Program, or SNAP (formerly the Food Stamp Program, or FSP), was associated with weight gain. In discussing the hypothetical causes of their findings, the researchers state:

It is very likely that the weight gain that leads to obesity, full participation in the FSP [SNAP], and persistent food insecurity are the results of a long-standing process that were not adequately captured by the covariates in our models.

They suggest that long-standing psychological stress should be studied as a possible contributing mechanism of obesity in the food insecure (Jones & Frongillo, 2006). The psychological stress of being concerned about having enough food to eat, and other socioeconomic variables and their influence on obesity / overweight, was the focus of a study by Laraia and colleagues (Laraia, Siega-Riz & Evenson, 2004). The researchers evaluated the association between concern about enough food and obesity in an adult population at the state level in Louisiana and New York utilizing a cross-sectional analysis of 1999 data from the Behavioral Risk Factor Surveillance System, Social Context Module (n = 3,945). Concern about enough food was found to be positively associated with morbid obesity in both states, but this association became non-significant after controlling for education, income, race / ethnicity, marital status, and general health. The authors conclude that a very strong apparent relationship between concern about enough food and obesity could be entirely accounted for by the influences of socioeconomic variables (thus emphasizing the need for further longitudinal research studies) (Laraia et al., 2004).

Gundersen and colleagues were also concerned about the relationship of psychological stress to obesity: They studied associations of food security, maternal stressors, and
overweight in low-income children by evaluating National Health and Nutrition Examination Survey (NHANES) data from 1999 to 2002 (Gundersen, Lohman, Garasky, Stewart & Eisenmann, 2008). Food security classification was determined for both households and for children using the US National Household Food Security Survey Measure (HFSSM, Table 4, page 50); maternal stress was established by creating a total cumulative stressors index from four indices (mental stressors, physical stressors, financial stressors, and family structure stressors); and classification of weight status was accomplished by height/weight measurements leading to BMI calculations and utilization of CDC growth charts. The study involved data on 841 children aged 3–17 in 425 households. The researchers report that 37 percent of the children were overweight or obese, and that 26 percent of households were food insecure while 18 percent of the children were food insecure (at the child level). The researchers report findings contrary to their original hypothesis that maternal stressors would exacerbate the relationship between food insecurity and childhood obesity. Instead, they found that, for children aged 3–10, maternal stressors were more likely to be associated with child overweight and obesity in food secure households than in those experiencing food insecurity. They postulate that children aged 11–17 have compensatory mechanisms not available to younger children and offer possible reasons for their unexpected finding in younger children, including that children in food secure environments may have a greater opportunity to eat in response to maternal stressors compared to those in food insecure environments and that the stress levels, combined with sufficient or excess caloric intake, may produce metabolic disturbances that contribute to obesity (Gundersen, Lohman, Garasky, et al., 2008).

The relationship between gender and marital status, and food security and body weight, was studied by Hanson and associates (Hanson, Sobal & Frongillo, 2007). They used cross-sectional data from NHANES, 1999–2002, to evaluate 4,338 men and 4,172 women, classified according to marital status, various sociodemographic characteristics, and one of four food security groups (fully food secure, marginally food secure, low food security, and very low food security). The researchers state that “there were no significant interactions between marital status and any food insecurity in relation to body weight for men”; for women, however, they report that, after controlling for demographic characteristics, “the interaction of being married and food insecure was related to a higher likelihood of obesity among married women.” The researchers postulate that differential perceptions, coping strategies, and availabilities to social support may explain the differences described (Hanson et al., 2007).

Kim and Frongillo examined two longitudinal survey data sets—the Health and Retirement Study (HRS) and the Asset and Health Dynamics Among the Oldest Old (AHEAD), both sponsored by the National Institute on Aging—from 1995 to 2002 (Kim & Frongillo, 2007). They found that food insecurity was positively associated to weight among the 9,481 elders in the HRS study and to weight and depression in the 6,354 elders in the AHEAD study. Some of their analyses indicated that participation in food assistance programs had salutary effects on weight and depression (Kim & Frongillo, 2007).

Matheson and co-workers examined the associations between mothers’ food-related parenting and children’s dietary intake and BMI for 108 Mexican-American fifth-graders enrolled in eight California elementary schools from 1999 to 2000 (Matheson, Robinson, Varady & Killen, 2006). Their correlation analyses revealed that parental pressure-to-eat was positively associated with consumption of vegetables in food secure homes but not in food insecure homes and that these differences were statistically significant. Statistical significance was also discovered in differences in parental attitude about making healthful foods available and subsequent child percentage consumption of energy from fat. In food secure households, healthful attitudes were negatively associated with percentage of caloric consumption from fat, but in food insecure homes healthful attitudes were negatively associated with the degree of fat intake (Matheson et al., 2006).

Polivy writes about the psychological consequences of food restriction (Polivy, 1996). Noting historical studies of conscientious objectors and of prisoners of war during World War II, she reports increasing irritability, apathy, and lethargy during periods of food restriction. After resumption of food intake, previously healthy eaters were noted to gorge themselves: “Food restriction actually appeared to produce binge eating in previously normal eaters.” Polivy goes on to note that human food restriction, whether voluntary or involuntary, will cause a tendency toward heightened emotional responsiveness, a focus on food and eating, and excessive food consumption after removal of the restriction. Polivy states that “persons who are food deprived for whatever reason suffer more than simply not getting sufficient or preferred food; they
exhibit a variety of cognitive, emotional, and behavioral changes” (Polivy, 1996).

In their research of the relationship between a history of child abuse and obesity, Alvarez and researchers evaluated data from the California Women’s Health Survey (Alvarez, Pavao, Baumrind & Kimerling, 2007). Their data set consisted of 11,115 California women interviewed by telephone from 2002 to 2004, and, as part of their study, they used the Six-Item Short Form of the Household Food Security Scale (see Table 9, page 55) to assess food insecurity. They report that, after adjusting for age, race/ethnicity, education, fruit/vegetable consumption, physical inactivity, and self-perceived stress, women who were food insecure were roughly 1.5 times more likely to be obese than women who were not experiencing food insecurity. They discuss the need for continued research to clarify the interplay of psychological distress across the life span on obesity (Alvarez et al., 2007).

Drewnowski and Specter postulate a potential link between poverty/food insecurity and obesity via interconnections of the limited resources for food and the low cost of energy-dense foods (Drewnowski & Specter, 2004). They hypothesize that energy density (MJ/kg) and energy costs ($/MJ) are inversely linked, such that the selection of energy-dense foods by food-insecure or low-income consumers may represent a deliberate strategy to save money. (Drewnowski & Specter, 2004)

The consumption of these energy-dense foods may in turn lead to obesity. Given this hypothesis, the authors assert that attempts at increasing consumption of healthier foods by low-income families can be thought of as an elitist approach to public health. A wider approach, taking into consideration disparities in income and wealth, declining value of the minimum wage, food imports, tariffs, and trade, is required to fully understand the issue and design appropriate interventions (Drewnowski & Specter, 2004).

Drewnowski and Darmon conducted further work to explore the economics of obesity (Drewnowski & Darmon, 2005). The authors reviewed the links between dietary energy density, food prices, and diet costs. Modeling techniques were used to explore the relationship with data from France and data on food price changes in the US. The analysis indicated that the highest obesity rates are found in lower-income groups and that the observed link may be related to dietary energy density and energy cost. The authors highlight an inverse relationship between energy density of foods and their energy cost. They go on to reassert that attempts at increasing consumption of healthier foods by low-income families can be thought of as an elitist approach to public health and that a wider approach is essential (Drewnowski & Darmon, 2005).

French and colleagues report on a study that “grocery store purchases in high-income markets are less energy dense than in low-income markets” because more fruits and vegetables are purchased in the former compared to the latter (French, Story & Jeffery, 2001). They also report on studies in adolescents and adults demonstrating that the lowering of prices increases the number of purchases of low-fat snacks from vending machines and promotes the purchase of fresh fruits and vegetables (French et al., 2001).

Because of the relationship of diet structure to diet costs, Drewnowski argues that obesity in the United States may be more of a socioeconomic phenomenon as opposed to a medical problem (Drewnowski, 2003). He reports that fats and sweets “are the lowest-cost dietary option available” and that attempts to replace these options with more healthful foods would be coupled with higher food costs for individuals and families (Drewnowski, 2003).

Stolley and Fitzgibbon assert that, because nearly one-third of individuals living in poverty in the United States are African American, “culturally relevant intervention programs addressing obesity prevention among low-income African American females are needed” (Stolley & Fitzgibbon, 1997). Comparing baseline and post-test measurements between a treatment group and an attention placebo group, they demonstrated that a program utilizing increasing parental support and role modeling for daughters resulted in statistically significant differences in decreased consumption of saturated fat and decreased percentage of fat calories consumed. Stolley and Fitzgibbon emphasize that several components were essential to the success of the program: 1) involving parents; 2) carrying out the program in a safe and familiar community location; 3) incorporating culturally appropriate music, dance, and media; 4) learning about and acknowledging local shopping conditions; 5) including foods commonly consumed by families (identified by 24-hour recalls); and 6) addressing the challenges of implementing and maintaining a low-fat dietary plan within a strict financial budget. They believe that other components should be considered for further programs: 1) long-term interventions;
2) follow-up maintenance sessions; 3) incorporation of an exercise component; and 4) preparing low-fat meals during school class times (Stolley & Fitzgibbon, 1997).

Martin and Ferris conducted a cross-sectional, retrospective study on 200 parents and 212 of their children aged 2–12 (via convenience sampling) in Hartford, Connecticut, in 2003–2004 (Martin & Ferris, 2007). After adjusting for adult age (≤ 35 or > 35), being a single parent, education (≤ high school or > high school), income relative to the Federal Poverty Level (FPL), (≤ 100% FPL or ≥ 100% FPL), and ethnicity, they found that food insecure adults were 2.45 times more likely to be obese than food secure adults; food insecurity, however, did not increase the odds of children being overweight. Girls in their sample were nearly 3 times more likely to be overweight than boys, and children with obese parents were more than 2.5 times more likely to be overweight than children with parents who were not obese. Children from families with incomes < 100% FPL were half as likely to be overweight as children from families with higher incomes (Martin & Ferris, 2007).

Contrary to many other researchers, Whitaker and Sarin argue that their research does not support causal associations between food security and obesity (Whitaker & Sarin, 2007). The two researchers followed 1,707 mothers of preschool children in 20 US cities in a longitudinal cohort study from 2001–2003 and 2003–2005. Participants were English- and Spanish-speaking women giving birth in hospitals; they were surveyed in person shortly after delivery, were followed periodically by phone, and had final in-home assessments. BMI was calculated from direct measurements; food security status was evaluated using the 10 adult-focused items of the HFSSM, and study participants were classified as food secure, marginally food secure, and food insecure; both of these measurements were done at baseline and follow-up. The researchers placed participants in categories according to weight change over the two years each participant was followed: loss (≥ 2.0 kg lost), stable (-1.9–+1.9 kg), moderate gain (2.0–4.9 kg gained), and large gain (≥ 5.0 kg gained). They then categorized the women according to food security at baseline and at follow-up (e.g., food secure at baseline and follow-up; food secure at baseline; and not food secure at follow-up, etc.). The authors adjusted for baseline BMI, income-poverty ratio, education, race/ethnicity, relationship status, number of children in household, material hardship, and employment. They found that there were no statistically significant associations between food security status and changes in weight. Mean weight gains did not differ significantly in women who were food secure at baseline and follow-up compared to women who were food secure changing to food insecure. Similarly, mean weight changes did not differ significantly in women who were food insecure at baseline and follow-up compared to women who were food insecure changing to food secure. These findings were true for both moderate and large gains as well as when analyses were performed for continuous outcome measure. The researchers state that the baseline and follow-up obesity associations in food security were not significant after controlling for sociodemographic factors (Whitaker & Sarin, 2007).
Human Rights and Food Security

Broadly considered, food security as a human right goes back centuries; the historical roots of food security rights started with the rights declared by revolutionary governments and guaranteed in their constitutions. Such declarations recognized the inherent dignity of humanity and called for the conditions to pursue health, as defined in the modern era’s broad context, to be respected and protected constitutionally. The modern human right to food security has its roots in post–World War II movements and continues to evolve to guarantee the fulfillment of this right. This section reviews core human rights instruments that directly address food security.

Hamm and Bellows assert that the concept of community food security significantly expands the concept of food security by utilizing a rights-based approach, which focuses on community empowerment and the understanding of entire food systems (Hamm & Bellows, 2003). Their definition of community food security, a condition in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance, social justice, and democratic decision-making, addresses the core of human rights. Their definition is all-inclusive and universal but also calls for respecting diverse expectations and tolerances according to local norms. The inclusion of “democratic decision-making” is in alignment with the International Covenant on Civil and Political Rights, by which nation states (including the US) have fully agreed that “all peoples have the right of self-determination” (Office of the United Nations High Commissioner for Human Rights, 2008c). And their addition of “social justice” indicates that, in a community that is food secure, the otherwise disenfranchised have a voice, the marginalized are integrated, and every individual shares in the benefits of the system. The authors state that “social and economic justice may provide the strongest frame for both understanding the source of diverse issues addressed by community food security actors and activists and developing coalition-based strategies to act on the issues” (Hamm & Bellows, 2003).

Such human rights–based approaches to food security flow from key human rights instruments including the 1948 Universal Declaration of Human Rights and the 1966 International Covenant on Economic, Social, and Cultural Rights, which articulate the human right to food (Hamm & Bellows, 2003). The 1996 International Food and Agriculture Summit in Rome, sponsored by the United Nations Food and Agriculture Organization, gave further momentum to a rights-based approach to food security. From a human rights perspective, food security sits within the context of economic, social, and cultural rights. These considerations are integral to the Universal Declaration of Human Rights, which mandates that nations secure the “universal and effective recognition and observance” of such economic, social, and cultural rights vital for the “dignity and the free development” of each individual (Office of the High Commissioner for Human Rights, 2008). The Universal Declaration states that “everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including foods.” The declaration also affirmed the right to earn an adequate compensation for work “ensuring…an existence worthy of human dignity, and supplemented, if necessary, by other means of social support” (Office of the High Commissioner for Human Rights, 2008). Therefore, conditions in which people cannot live healthfully (including, as specifically stated, having food adequate for health and well-being) are not acceptable. And the failure of the government to provide, when necessary, social support for healthful living is a violation of fundamental human rights. The declaration was ratified by the United Nations General Assembly on December 10, 1948 (with the United States voting for ratification).

Article 11 of the International Covenant on Economic, Cultural and Social Rights (CECSR) asserts “the right of everyone to an adequate standard of living…including adequate food” and calls for “the continuous improvement of living conditions” (Office of the United Nations High Commissioner for Human Rights, 2008d). Moreover, this covenant recognizes “the fundamental right of everyone to be free from hunger” and specifies actions to be undertaken by nations to ensure freedom from hunger. These actions include improvement of “methods of production, conservation and distribution of food” while also achieving “the most efficient development and utilization of natural resources” through improvement in the production side of food systems. The covenant also called for “an equitable distribution of world food supplies” (Office of the United Nations High Commissioner for Human Rights, 2008d).
The United States signed this covenant on October 5, 1977.

In order to more fully explore and explicate the subjects contained within the CESCR, the United Nations Committee on Economic, Social and Cultural Rights promulgates general comments. In 1999 the committee published General Comment 12, which contends with substantive issues of Article 11 of the CESCR (the right to adequate food). The committee acknowledged that hunger is not solely an experience of people in developing countries, and that the cause is “not lack of food but lack of access to available food...because of poverty” (Office of the United Nations High Commissioner for Human Rights, 2008b). The committee asserted the inseparable nature of the right to food and social justice; the component of sustainability (incorporating concepts of long-term accessibility, including access for future generations) as part of this right; the importance of cultural and consumer acceptability of food; that accessibility entails both economic and physical aspects; that dietary needs depend on varying human physiological needs (different stages of the life cycle, gender, pregnancy, work status); the importance of food safety to prevent contamination; and that the right to adequate food should be realized by all people progressively (Office of the United Nations High Commissioner for Human Rights, 2008b).

The Convention on the Rights of the Child maintains the “right of the child to the enjoyment of the highest attainable standard of health” and calls for “the provision of adequate nutritious foods” in order to combat disease and to provide the conditions for the highest attainable measure of health (Office of the United Nations High Commissioner for Human Rights, 2008a). The United States signed this convention on February 16, 1995.

As a participant in the World Food Summit 1996, via the Rome Declaration on World Food Security, the United States, along with other nations reaffirmed

the right of everyone to have access to safe and nutritious food, consistent with the right to adequate food and the fundamental right of everyone to be free from hunger [and pledged] our political will and our common and national commitment to achieving food security for all. (US Department of Health and Human Services and US Department of Agriculture, 2005)

The interface between food security and human rights continues to develop. One aspect of this development is the International Food Security Treaty campaign, an effort to promote food security based on four principles (International Food Security Treaty Campaign, 2008). First, the treaty would require nations to provide access to a minimum standard of nutrition, as declared by the United Nations. Second, all nations with adequate capacity would contribute to a world food reserve and resource center for assistance to nations with emergency needs. Third, the treaty would call for nations to establish and provide mechanisms for the enforcement of laws aimed at detecting violations of the first principle. Finally, all the nations would support the United Nations’ enforcement of the treaty in nations that are unable or unwilling to do so. The treaty has numerous congressional supporters (International Food Security Treaty Campaign, 2008).
Health Care and Food Security

Access to medical and health care can be affected by food insecurity, and there is a gradually developing pool of knowledge in this area. Patient encounters with the health care system provide an opportunity for both assessment and interventions focused on food security. These encounters can focus on children, adults, or the elderly population but can also take a family and community health approach. Primary care can be considered the natural setting for working at the interface between health care and food insecurity. Surprisingly, this potential entry point to food security is somewhat neglected in the food security literature. However, some relevant literature does exist on the subject and is summarized in this section.

Numerous studies have demonstrated medical and health care access conditions associated with food insecurity. Kaiser and colleagues evaluated data on 4,037 adult women who participated in the 2004 California Women’s Health Survey (L. Kaiser et al., 2007). Food security status was determined by the Six-Item Short Form of the Household Food Security Scale (see Table 9, page 55). The researchers found the women who were food insecure had statistically significant, independent associations with experiencing one of the following variables: two or more days per month feeling sad/depressed; feeling overwhelmed in the past 30 days; physical or mental illness interfering with normal activities in the past 30 days; and general poor health (L. Kaiser et al., 2007).

Ma and associates used the National Survey of America’s Families data, a 2002 cross-sectional, nationally representative survey of 12,746 children in low-income households, to determine, among other things, associations between food insecurity and health care access for low-income children (Ma, Gee & Kushel, 2008). They used four of the 18 questions of the US National Household Food Security Survey Measure (HFSSM), asserting that one or two affirmative responses would be indicative of food insecurity. They report that 39 percent of the children lived in food insecure homes (23 percent had “mild-to-moderate” food insecurity while 16 percent had “severe” food insecurity). After adjusting for housing instability, insurance status, child’s age, household income, maternal citizenship status, current health status, health compared to prior year, number of children in household, participation in WIC, and participation in food stamps, they report that 39 percent of the children lived in food insecure homes (23 percent had “mild-to-moderate” food insecurity while 16 percent had “severe” food insecurity). After adjusting for housing instability, insurance status, child’s age, household income, maternal citizenship status, current health status, health compared to prior year, number of children in household, participation in WIC, and participation in food stamps, they report that children from food insecure homes were 60 percent more likely to have postponed needed care in the past year and 150 percent more likely to have postponed medications; they also report food insecure children were 40 percent more likely to have failed to receive the recommended number of well-child care visits in the past year (Ma et al., 2008).

Nelson and colleagues evaluated NHANES III data (1988–94) to examine the relationship of food insufficiency to health status and health care utilization in 1,503 diabetic adults (K. Nelson, Cunningham, Andersen, Harrison & Gelberg, 2001). Respondents were classified into the “food insufficiency” category if they reported they were “sometimes” or “often” not able to get enough food to eat or if they had to cut down the size of meals secondary to limited resources. The researchers report statistically significant increased likelihood of self-reported “fair” or “poor” health (63 percent vs. 43 percent) in food insufficient diabetics compared to food sufficient diabetics. The food insufficient diabetics also reported a higher number of prior year physician encounters (12 vs. 7) than their counterparts, and this higher utilization remained higher even after controlling for age, gender, race, education, increasing burden of disease, and worsening health status (K. Nelson et al., 2001).

Focusing on low-income families, Kushel and fellow researchers performed secondary analyses of the 1999 National Survey of American Families data of 16,651 adults aged 18–64 with family incomes < 200% FPL (Kushel, Gupta, Gee & Haas, 2006). Defining food insecurity as a positive response to any of three questions they pre-selected from the HFSSM, the researchers found that 42.7 percent of their sample was food insecure. After adjusting for multiple confounding factors (gender, race / ethnicity, marital status, health status, change in health, work-limiting conditions), they found that food insecure low-income persons were 1.7 times more likely to postpone needed medical care and 2.2 times more likely to postpone medications than their food secure counterparts. The researchers also report that food insecure persons were 1.4 times more likely to have an emergency department visit and 1.4 times more likely to have been hospitalized than food secure low-income persons (Kushel et al., 2006).

Holben and Myles describe the potential role of primary care physicians, particularly family physicians, in enhancing food security for those attending their offices (Holben & Myles, 2004). Factors that can be considered by the
physician and the primary care team include addressing the balance between the costs of food and medication; participation and guidance in food assistance programs; determination of alternative means of acquiring food; and nutrition education to help preserve food resources and reduce food waste. Community involvement by the physician is also suggested as a beneficial intervention to build food security (Holben & Myles, 2004).

Although Holben cautions that the Household Food Security Survey Measure (HFSSM) has not been evaluated and validated for use in clinical settings, he asserts dietitians should be aware of patients’ food insecurity factors that may prevent patients from following dietary advice (Holben, 2002). Messer and Ross provide steps that physicians and clinicians should include to capture the problems of food insecurity in their patients (Messer & Ross, 2002). “Diagnosing” food insecurity at the primary health care level includes targeting at-risk patients and exploring the impact of financial stress secondary to medical expenses. The researchers recommend using questions tailored from other validated instruments (such as the Household Food Security Survey). While Messer and Ross recommend that clinicians question their patients about financial difficulties that cause a change in eating patterns, they caution that the approach must be nonjudgmental and sensitive in order to avoid embarrassing patients, who might then be led to deny their problems (Messer & Ross, 2002).

Kleinman and colleagues set out to determine if a single question—“In the past month, was there any day when you or anyone in your family went hungry because you did not have enough money for food?”—could adequately screen for hunger (Kleinman et al., 2007). They describe their use of a brief screening tool to identify family hunger, administered to 1,750 families in an inner-city pediatric primary health care setting in Massachusetts. Parents were asked to complete a screening tool for hunger during a routine visit with their children to their neighborhood health center. The single-question screening, above, was evaluated against results of application of the HFSSM on a sub-sample of parents. The single-question screening tool had acceptable sensitivity (83 percent), specificity (80 percent), and reliability compared to the HFSSM in the study’s urban, low-income, predominantly bilingual population. Interestingly, hungry families underused all types of food assistance programs. The authors assert that “taken together, these findings suggest that screening for hunger could become an important addition to routine pediatric health care in low-income neighborhoods” (Kleinman et al., 2007).

In parallel with their assertion for clinicians to ask patients about food security, Biggerstaff and colleagues call for social workers to include queries of food security in their client assessments and to include sites of food pantries and soup kitchens in their lists of community resources for clients in need (Biggerstaff et al., 2002).

Fleegler and associates performed a cross-sectional, descriptive study to evaluate pediatric patients’ families’ experiences regarding screening and referral, and acceptance of screening and referral, for health-related social problems (HRSP) in 205 Boston families in 2003 (Fleegler, Lieu, Wise & Murat-Wagstaff, 2007). The screening rate in the prior year for food security, 17 percent, was the lowest for all of the HRSP domains (intimate partner violence was 36 percent; housing was 31 percent; access to health care was 23 percent; income security was 21 percent). Food security was reported by 39 percent of participants in the study, and comorbidity was high: nearly one-third experienced two HRSPs, and more than one in five had three or more HRSPs. The study found that 88 percent of respondents would “welcome” or “not mind at all” inquiries regarding food security (questions about intimate partner violence were rated acceptable by 81 percent of respondents; all other domains were 90 percent or greater); 92 percent of the parents responded that they would “welcome” or “not mind at all” a computer system to screen and refer families for HRSPs at the pediatrician’s office during a well-child visit (Fleegler et al., 2007).

Holben and Myles summarize particular household risk factors for food insecurity for use by primary care physicians and medical providers in patient encounters (Holben & Myles, 2004). The authors suggest that households at highest risk are those “whose income falls below the official poverty line; those headed by a single woman with children; those with black or Hispanic members; those with children; and those located in central cities or rural areas, or in Southern and Western states” (Holben & Myles, 2004).

Wellman and colleagues focus on hunger and malnutrition in the elderly (Wellman et al., 1997). The authors suggest multifaceted reasons for the high risk of hunger in this age group (see “Magnitude and Predictors of Food Insecurity” section). They further postulate that enhancing food security in the elderly population will reduce frequency and
length of hospitalizations as well as co-morbidities with acute and chronic illnesses (Wellman et al., 1997).

Utilizing randomized trials in the United Kingdom, studies have explored how primary care settings provide an opportunity for behavioral counseling focused on dietary change (Steptoe et al., 2003). A primary health center in a deprived ethnically mixed inner-city area was used to test the intervention of behavioral counseling by the primary care team in comparison with basic nutrition education counseling to increase consumption of fruits and vegetables in adults. Behavioral counseling was based on the stages of change model. Biomarkers were also examined as outcome measures. Sustained increases in consumption of fruits and vegetables as well as increases in certain biomarkers were seen in both groups, but the changes were greater in the behavioral counseling group (Steptoe et al., 2003). The study demonstrates benefits of a primary care–based dietary intervention in a low-income setting and can be adapted for enhancing community food security in low-income inner-city settings.

Gruen et al. report that more than 90 percent of US physicians rated “community participation,” individual “political involvement,” and “collective advocacy” through professional organizations as “important” or “very important” in addressing health-related issues beyond the provision of medical care to individual patients (Gruen, Campbell & Blumenthal, 2006). Additionally, nutrition was rated as “very important” by more physicians than were access to care and unemployment (Gruen et al., 2006). Thus physicians’ perceptions of their activities outside the examining room and their prioritizing nutrition as a critical issue present a natural linkage to engage the health care system into increasing involvement in community food security.

It is critical to note that inclusion of consideration of food insecurity within the context of the provision of medical care is not medicalizing food insecurity. As noted in the Acheson Report on health inequalities in the United Kingdom, complex social conditions require that action “address[es] all of the layers of influence on health (e.g., social, environmental, economic, etc.), as well as ensuring that access to and use of health care services improves among those who have previously been underserved” (UK Department of Health, 1998). By including food insecurity in the parameters of medical care, health care providers are able to provide linkages to vital resources for those suffering from this complex social issue, not unlike what is commonly accomplished for such matters as intimate partner violence, alcohol and drug use, elder abuse and neglect, among others.
Food Security Measurement Tools

To completely and validly capture the range of human and community experiences of food security and insecurity through measurement surveys is a herculean undertaking. But the tasks have been undertaken because, quite simply, food security is a critical element for individual, community, societal, and government survival. Regardless of their motivation (social justice, political necessity, or moral directive) various individuals and organizations have developed and used assessments to determine the degree of food insecurity. Measurement tools to assess hunger and food insecurity / security have evolved with the change in understanding by researchers, advocates, and government agencies of the complex issues involved.

In response to reports of increasing reliability on emergency food sources by families in the early 1980s, the Community Childhood Hunger Identification Project (CCHIP) was designed to verify the prevalence of hunger in families that were ≤185% of the Federal Poverty Level and that had one or more children under the age of 12 (Wehler et al., 1992). This measurement, reproduced in Table 3 below, consists of eight questions, four of which are child-focused. Households were placed in one of three categories based on the number of positive responses to the questions: “no hunger” meant all answers were negative; “at risk for hunger” meant the household respondent answered affirmatively for one to four of the questions; and “hungry” meant that five or more of the responses confirmed some aspect of what is now called “food insecurity.” The researchers emphasize that, with this survey, the categorization of “hungry” for a household explicitly included direct impact on a child in the household (as four of the eight questions are focused on the child’s experience or the household’s adaptive behavior directly affecting child food consumption) (Wehler et al., 1992). The CCHIP measurement instrument has been enormously influential in the promulgation of definitions used in the field of food security (see “Definitions” section) and, more importantly, on subsequent domestic household food insecurity measures (see “Food Security Frameworks” section).

Table 3. The Community Childhood Identification Project Questionnaire (Wehler et al., 1992)

<table>
<thead>
<tr>
<th>Household Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your household ever run out of money to buy food?</td>
</tr>
<tr>
<td>Do you ever rely on a limited number of foods to feed your children because you are running out of money to buy food for a meal?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adult Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you or adult members of your household ever eat less than you feel you should because there is not enough money for food?</td>
</tr>
<tr>
<td>Do you or adult members of your household ever cut the size of meals or skip meals because there is not enough money for food?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do your children ever say they are hungry because there is not enough food in the house?</td>
</tr>
<tr>
<td>Do your children ever eat less than you feel they should because there is not enough money for food?</td>
</tr>
<tr>
<td>Do any of your children ever go to bed hungry because there is not enough money to buy food?</td>
</tr>
<tr>
<td>Do you ever cut the size of your children’s meals or do they ever skip meals because there is not enough money to buy food?</td>
</tr>
</tbody>
</table>
In 1990 the Life Sciences Research Office produced definitions (see “Definitions” section) and descriptions of food insecurity. Its description of food insecurity is a useful context for discussions on measurement tools:

At the individual and household levels, four dimensions (quantity, quality, psychological acceptability, and social acceptability) need to be measured to identify food insecurity. At the individual level, these measures are adequacy of energy intake, adequacy of nutrient intake, feeling of deprivation or restricted choice, and normal meal patterns. At the household level, they are repleteness of household stores, quality and safety of available foods, anxiety about food supplies, and sources of food. (Life Sciences Research Office, Federation of American Societies for Experimental Biology, 1990)

Thus, from the individual and household experience, the aspects of acceptability—both psychological and social—came into the forefront, and subsequent measurement tools would need to address the spheres.

In the early 1990s, with leadership from the United States Department of Agriculture (USDA) and the Department of Health and Human Services, the US Food Security Measurement project was initiated (Nord & Hopwood, 2007b). This project culminated in the US national Household Food Security Survey Measure (HFSSM), also referred to as the Household Food Security Survey Module, with the same acronym, in, for example, Gundersen, Lohman, Eisenmann et al., 2008. This instrument has been used to report national food insecurity prevalence experienced by households since 1995 (Coates et al., 2006). The 18 questions used in the survey are presented in Table 4, below.

The survey asks respondents 18 items (15 direct and three skip pattern, follow-up questions) in an attempt to capture the range of experiences related to food insecurity. The questions capture qualitative and quantitative dimensions of household food supply as well as household members' psychological and behavioral responses (Bickel, Nord, Price, Hamilton & Cook, 2000). The questions are either in the form of a statement (made by survey conductors), where respondents are asked whether the statement was often, sometimes, or never true in the last 12 months; direct yes / no questions; or frequency questions related to a particular question. Four kinds of situations are covered by the questions: anxiety or perception that the household food budget or food supply was inadequate (questions 1 and 2); perceptions that the food eaten by adults or children was inadequate in quality (questions 3, 4, and 5); reported instances of reduced food intake, or consequences of reduced intake, for adults (questions 7, 7a, 8, 9, 10, 11, 11a); and reported instances of reduced food intake or its consequences for children (questions 6, 12, 13, 13a, 14, 15) (Bickel et al., 2000). Importantly, the HFSSM incorporates the psychological and social acceptability components required by the 1990 Life Sciences Research Office definition.
Table 4. The US National Household Food Security Survey Measure (HFSSM)  
(Bickel et al., 2000)

<table>
<thead>
<tr>
<th>Stage 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each response based on “was that often, sometimes, or never true for you in the last 12 months?”</td>
</tr>
<tr>
<td>1. “I worried whether our food would run out before we got money to buy more”</td>
</tr>
<tr>
<td>2. “The food that we bought just didn't last, and we didn't have money to get more.”</td>
</tr>
<tr>
<td>3. “We couldn’t afford to eat balanced meals.”</td>
</tr>
<tr>
<td>4. “We relied on only a few kinds of low-cost food to feed the children because we were running out of money to buy food.”</td>
</tr>
<tr>
<td>5. “We couldn't feed the children a balanced meal because we couldn't afford that.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. “The children were not eating enough because we just couldn't afford enough food.” Was that often, sometimes, or never true for you in the last 12 months?</td>
</tr>
<tr>
<td>7. In the last 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?</td>
</tr>
<tr>
<td>7a. How often did this happen—almost every month, some months but not every month, or in only one or two months?</td>
</tr>
<tr>
<td>8. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?</td>
</tr>
<tr>
<td>9. In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?</td>
</tr>
<tr>
<td>10. Sometimes people lose weight because they don't have enough to eat. In the last 12 months, did you lose weight because there wasn't enough food?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. In the last 12 months, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?</td>
</tr>
<tr>
<td>11a. How often did this happen—almost every month, some months but not every month, or in only one or two months?</td>
</tr>
<tr>
<td>12. In the last 12 months, did you ever cut the size of any of the children's meals because there wasn’t enough money for food?</td>
</tr>
<tr>
<td>13. In the last 12 months, did any of the children ever skip meals because there wasn’t enough money for food?</td>
</tr>
<tr>
<td>13a. How often did this happen—almost every month, some months but not every month, or in only one or two months?</td>
</tr>
<tr>
<td>14. In the last 12 months, were the children ever hungry but you just couldn’t afford more food?</td>
</tr>
<tr>
<td>15. In the last 12 months, did any of the children ever not eat for a whole day because there wasn’t enough money for food?</td>
</tr>
</tbody>
</table>

Response to questions with “often” or “sometimes,” where applicable, are coded as affirmative
The Children's Food Security Scale, composed of the eight child-referenced items in the HFSSM, was proposed in 1999 (Nord & Bickel, 2002) and is presented in Table 5, below. When evaluating data from 1995–99, they found that “the prevalence of hunger among children as measured by the children's food security scale was higher than that measured by the severe hunger category” of the HFSSM. For example, using the Children's Food Security Scale as the standard, the HFSSM, for 1999, misclassifies 40 percent false negatives (i.e., 88,000 households of the 219,000 households with hunger) and misclassifies 23 percent false positives (i.e., 51,000 households that, by the standard, did not have hunger). They attribute this difference to “a non-trivial second dimension [that] exists in the food security scale [HFSSM], a dimension measuring the extent to which children are protected from hunger at the cost of more severe hunger among adults.” Thus the HFSSM “understates the prevalence of hunger among children by about 20 percent at the national level” (Nord & Bickel, 2002).

Nord and Hopwood further explain that the essential problem with use of the HFSSM for characterization of childhood food insecurity is that children's food security, even within a household otherwise the same, “depends critically upon the ages of the children” under consideration (Nord & Hopwood, 2007b). They state that the “severe hunger range” of the HFSSM overestimated by nearly 50 percent the prevalence of children's hunger in households with no children >5 years of age, while underestimating the prevalence of children's hunger in both the 6–14 year group (by 33 percent) and the 15–17 year group (by 20 percent). They maintain that the Children’s Food Security Scale has excellent internal validity and that responses are strongly ordered (i.e., a household that affirms an item is likely to affirm all items that are less severe and a household that does not affirm an item is unlikely to affirm more severe items).

### Table 5. The Children’s Food Security Scale
(Nord & Bickel, 2002; Nord & Hopwood, 2007b)

| Statements marked with an asterisk are then followed with the question “Was that often, sometimes, or never true for your household in the last 12 months?” (“Often” or “sometimes” coded as affirmative) |
| Questions marked with two asterisks are coded affirmative for “yes” answers. |
| 1. * “We relied on only a few kinds of low-cost food to feed the children because we were running out of money to buy food.” |
| 2. * “We couldn’t feed our children a balanced meal because we couldn’t afford that.” |
| 3. * “The children were not eating enough because we just couldn’t afford enough food.” |
| 4. ** In the last 12 months, did you ever cut the size of any of the children’s meals because there wasn’t enough money for food? |
| 5. ** In the last 12 months, were the children ever hungry but you couldn’t afford more food? |
| 6. ** In the last 12 months, did any of the children ever skip a meal because there wasn’t enough money for food? |
| 7. (Asked if #6 was affirmative): How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months? (“almost every month” or “some months but not every month” are coded affirmative) |
| 8. ** In the last 12 months, did any of the children not eat for a whole day because there wasn’t enough money for food? |
Nord and Hopwood note that USDA originally did not report statistics based on thresholds and scores, but that the National Health and Nutrition Examination Survey (NHANES), in their 1999–2000 and 2001–2002 public-use data, distinguished the following classifications according to the ranges based on the Children’s Food Security Scale:

- Raw Score = 0 “Child food quality and quantity unaffected”
- Raw Score = 1 “Child marginally food secure”
- Raw Score = 2-4 “Child reduced quality or quantity [of food]”
- Raw Score = 5-8 “Child food insecure with hunger” (Nord & Bickel, 2002)

They go on to report that USDA provided new labels for children’s food security in 2006:

- Raw Score = 0-1 “High or marginal food security among children”
- Raw Score = 2-4 “Low food security among children”
- Raw Score = 5-8 “Very low food security among children”

They made these changes in response to the Committee on National Statistics of the National Academies expert panel’s recommendation that USDA convey the severity of food insecurity without using the word hunger. Evaluation of hunger, since it is an individual physiological experience as opposed to household phenomena, would require compilation of considerably more information than the HFSSM and the Child Food Security Survey Module could collect (Nord & Hopwood, 2007b).

Prior to November 2006 survey responses were utilized by the USDA to classify households into four categories: food secure; food insecure without hunger; food insecure with hunger, moderate; and food insecure with hunger, severe. See Table 6 for descriptions of these categories.

Table 6. Four USDA Household Food Security Classifications (used before November 2006) (Bickel et al., 2000)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food secure</td>
<td>Households show no or minimal evidence of food security.</td>
</tr>
<tr>
<td>Food insecure without hunger</td>
<td>Food insecurity is evident in household members’ concerns about adequacy of the household food supply and in adjustments to household food management, including reduced quality of food and increased unusual coping patterns. Little or no reduction in members’ food intake is reported.</td>
</tr>
<tr>
<td>Food insecure with hunger (moderate)</td>
<td>Food intake for adults in the household has been reduced to an extent that implies that adults have repeatedly experienced the physical sensation of hunger. In most (but not all) food-insecure households with children, such reductions are not observed at the stage for children.</td>
</tr>
<tr>
<td>Food insecure with hunger (severe)</td>
<td>At this level, all households with children have reduced the children’s food intake to an extent indicating that the children have experienced hunger. For some other households with children, this already has occurred at an earlier stage of severity. Adults in households with and without children have repeatedly experienced reductions in food intake.</td>
</tr>
</tbody>
</table>

The USDA determined household food security status by using the household’s raw score: the number of affirmative responses to the 18 module items in the HFSSM (see Table 4, page 50) would place them in one of four categories (Bickel et al., 2000). Table 7, below, summarizes the translation of the scores to the previously used food security categories and is adapted from the work of Martin and colleagues (Martin et al., 2004).
Table 7. Affirmative Responses Needed for Classification into Food Security Status Categories Used Before November 2006
(Martin et al., 2004)

<table>
<thead>
<tr>
<th>Household with Child</th>
<th>Household with No Child</th>
<th>Food Security Status Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>0-2</td>
<td>Food secure</td>
</tr>
<tr>
<td>3-7</td>
<td>3-5</td>
<td>Food insecure without hunger</td>
</tr>
<tr>
<td>8-12</td>
<td>6-8</td>
<td>Food insecure with moderate hunger</td>
</tr>
<tr>
<td>13-18</td>
<td>9-12</td>
<td>Food insecure with severe hunger</td>
</tr>
</tbody>
</table>

Placement into categories depended on two components: the raw threshold score and the presence or absence of children in the household. Threshold scores for the more profound categories of food insecurity were higher for households with children because fewer questions were asked of households without children. Thus, the threshold raw score for classification as “food insecure” was 3 in households with children and 3 in households without children. The threshold raw score for being classified as “food insecure with hunger” was 8 in households with children and 6 in households without children (Bickel et al., 2000). To equate food security status in households with and without children, the USDA used a statistical model (the Rasch model); however, challenges to the validity of this model have been asserted (Wilde, 2004).

Carlson and colleagues provide an explanation for the formerly used categories (Carlson et al., 1999). The “food insecure without hunger” categorization was meant to include households in which there were concerns expressed about the adequacy of their food supply, there was a reduction in the quality and variety of foods, and there was substitution of cheaper food but without a reduction in food intakes. “Food insecure with moderate hunger” was designed to capture households in which there was some reduction in food intake secondary to inadequate resources by one or more members (mainly adults). “Food insecure with severe hunger” was intended to include households where inadequate resources caused reductions in food intakes for both children and adults, and one or more of the adults had a significant reduction in food intake (Carlson et al., 1999).

The Household Food Security Survey Measure is carried out by US Bureau of the Census as a census instrument through its Current Population Survey. Its questions have also been included in other national surveillance activities: the National Health and Nutrition Examination Survey (NHANES), the Early Childhood Longitudinal Survey–Kindergarten Cohort and Birth Cohort, the Survey of Program Dynamics, and the Panel Survey of Income Dynamics (Guthrie & Nord, 2002). Nord and Hopwood evaluated data from the Current Population Surveys from 2001 to 2004 and determined that telephonic mode of interviewing versus in-person interviewing did not differ substantially between the two modes (Nord & Hopwood, 2007a).

The Behavioral Risk Factor Surveillance System (BRFSS) is a Centers for Disease Control and Prevention (CDC)–supported survey system to track health conditions and risk behaviors throughout the United States. Current and past survey instruments are available on the CDC website (Centers for Disease Control and Prevention [CDC], 2007). A few cursory questions on the consumption of fruits and vegetables have been asked in five of the surveys, 2001–2007, but the questions are designed to strictly assess the intake and not to uncover underlying reasons for consuming or failing to consume foods. Table 8, below, presents the 2007 BRFSS food consumption–related questions.
Table 8. Behavioral Risk Factor Surveillance Survey 2007
(Centers for Disease Control and Prevention [CDC], 2007)

SECTION 16: Fruits and Vegetables

These next questions are about the foods you usually eat or drink. Please tell me how often you eat or drink each one, for example, twice a week, three times a month, and so forth. Remember, I am only interested in the foods you eat. Include all foods you eat, both at home and away from home.

16.1 How often do you drink fruit juices such as orange, grapefruit, or tomato?
16.2 Not counting juice, how often do you eat fruit?
16.3 How often do you eat green salad?
16.4 How often do you eat potatoes not including French fries, fried potatoes, or potato chips?
16.5 How often do you eat carrots?
16.6 Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat?
   (Example: A serving of vegetables at both lunch and dinner would be two servings.)

[Respondents are to provide the frequency of consumption or the number of servings via:]

   _____ Per day
   _____ Per week
   _____ Per month
   _____ Never
   _____ Don’t know / Not sure
   _____ Refused

Utilization of an 18-question measurement survey, such as the HFSSM used in the Current Population Survey conducted by the US Census Bureau, can be burdensome. Blumberg and colleagues determined that a shortened form of the HFSSM could be effective (Blumberg, Bialostosky, Hamilton & Briefel, 1999). Refer to Table 9, below. The questions are taken from the Household Food Security Scale Measure (Table 4, page 50). The Six-Item Short Form of the Household Food Security Scale does not distinguish between the two most severe forms of food insecurity (formerly “insecure with moderate hunger” and “insecure with severe hunger”). The Short Form was slightly better in concordance with the complete scale in households without children: it correctly identified food security / insecurity for 95.6 percent of households with children compared to 99.0 percent of households without children (being correct for 97.7 percent of all households). Blumberg and colleagues present the Short Form as a viable tool in place of the complete scale if the research does not necessitate distinguishing the more severe forms of food insecurity and if utilization of the full scale is not possible. They caution that the Short Form does not address some critical food insecurity components: 1) communitywide availability, 2) cultural acceptance, and 3) geographic accessibility of foods (which are better examined in the complete scale) (Blumberg et al., 1999).
Table 9. Six-Item Short Form of the Household Food Security Scale
(Blumberg et al., 1999)

Six-Item Short Form of the Household Food Security Scale

(Instructions: These next questions are about the food eaten in your family. People do different things when they are running out of money for food to make their food or their food money go further.)

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

2. [Ask only if #1 = YES] How often did this happen—almost every month, some months but not every month, or in only one or two months?

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

4. In the last 12 months, since (date 12 months ago) were you ever hungry but didn’t eat because you couldn’t afford enough food?

(Instructions: Now I’m going to read you 2 statements that people have made about their food situation. For these statements, please tell me whether the statement was often, sometimes, or never true for you [or the other members of your household] in the last 12 months.)

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

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

(Scoring: Total the number of affirmative responses. [Often and sometimes are considered affirmative responses to Questions 5 and 6; almost every and some months are considered affirmative responses to Question 2.] Two or more affirmatives indicate food insecurity; 5 or more affirmatives indicate hunger.

Radimer notes, before Kleinman’s work, that there is increasing use by researchers of a smaller set of questions than presented by the HFSSM (Radimer, 2002). She recommends the use of the Six-Item Short Form of the Household Food Security Scale when necessary, instead of random selection from the full 18-item module, but points out two central limitations of the Short Form—the lack of any items referring specifically to children and the inability to measure more severe levels of hunger. She asserts the importance of including all 18 items to measure food insecurity and hunger comprehensively and points out that use of the full 18 items enables comparison of findings with multiple national and subnational surveys that employ the full 18-item module (Radimer, 2002).

Food insufficiency, defined as “sometimes’ or ‘often’ not having enough food to eat” is a quantitative component of food security measured in the Third National Health and Nutrition Examination Survey (NHANES III) (Alaimo et al., 1998). NHANES III was a cross-sectional representative sample of US civilian population living in households conducted in two phases between 1988 and 1994. Alaimo and colleagues note that these questions do not measure the quality, the uncertainty, or the psychological components of food insecurity (Alaimo et al., 1998). The NHANES III questions related to food insufficiency are reproduced in Table 10.
(Alaimo et al., 1998)

Family Food Insufficiency Question

1. Describe food eaten by family
   a. Enough food to eat
   b. Sometimes not enough to eat
   c. Often not enough to eat

   Food insufficiency = “sometimes” + “often”

   (If answer was “enough,” respondent skipped to question 4)

2. No. days in previous month with no food or money to buy food
   a. 0
   b. 1-4
   c. 5-9
   d. 10-14

   (If answer was “0,” respondent skipped to question 4)

3. Reasons for no food or money to buy food
   a. Lack of transportation
   b. No working appliances
   c. Not enough money, food stamps, or WIC vouchers
   d. Any other reason

4. Adults cut size of meals because of not enough money

5. Children cut size of or skipped meals because of not enough money

Note: Questions 1, 2 and 3 were administered from 1988 through 1994; questions 4 and 5 were administered from 1991 through 1994.

The USDA Food Sufficiency Indicator has been widely used for decades in numerous surveys and is therefore worth considering in relation to the food security module. Three variations exist to this indicator (listed in Table 11) (Radimer, 2002).
Table 11. Variations of the USDA Food Sufficiency Indicator
(Radimer, 2002)

Single question, four-part response:
Which of these statements best describes the food eaten in your household?
- Enough of the kinds of food you want to eat?
- Enough but not always the kinds of food you want to eat?
- Sometimes not enough to eat?
- Often not enough to eat?

Single question, three-part response:
Which of the following statements best describes the food eaten in your household?
- Enough food you want to eat?
- Sometimes not enough to eat?
- Often not enough to eat?

Two-question version:
Which of these statements best describes the amount of food eaten in your household?
- Enough food to eat?
- Sometimes not enough food to eat?
- Often not enough to eat?

If the respondent answers “enough food to eat,” she is asked:
- Do you have enough of the kinds of food you want to eat? Or
- Do you have enough but not always the kinds of food you want to eat?

Radimer points out the following key points in using the USDA Food Insufficiency Indicator (Radimer, 2002):
There is no time reference in these indicators and thus previous food insecurity earlier in the year may be omitted.
- Comparative analysis has shown that about half of those who indicate that they “sometimes” or “often” do not have enough to eat are classified as "food-insecure with hunger."
- The four-part response is reasonably accurate in estimating food insecurity, but underestimates moderate hunger and overestimates severe hunger.
- The two-question version overestimates both hunger and food insecurity.
In 1999 Frongillo asserted that

The Food Security Supplement provides valid measurement of food insecurity and hunger for population and individual uses. The construction of the national food security measure is well grounded in our understanding of food insecurity and hunger, its performance is consistent with that understanding, it is precise within usual performance standards, dependable, accurate at both group and individual levels within reasonable performance standards, and its accuracy is attributable to the well-grounded understanding. (Frongillo, 1999)

Despite Frongillo’s 1999 assertion, the nomenclature of food insecurity and hunger at the individual versus household levels underwent significant changes in 2006. In efforts to ensure scientific rigor on this subject, the USDA asked the National Academy of Sciences to evaluate the methods for estimating food insecurity and hunger in the United States. In October 2006, the panel released its report: “Food Insecurity and Hunger in the United States: An Assessment of the Measures” (Panel to Review the US Department of Agriculture’s Measurement of Food Insecurity and Hunger, 2006). One of the panel’s conclusions was:

Hunger is a concept distinct from food insecurity, which is an indicator of and possible consequence of food insecurity that can be useful in characterizing severity of food insecurity. Hunger itself is an important concept that should be measured at the individual level distinct from, but in the context of, food insecurity. (Panel to Review the US Department of Agriculture’s Measurement of Food Insecurity and Hunger, 2006)

The USDA subsequently adopted a classification scheme that places US households into one of three categories: food secure, low food security, very low food security. The panel recommended further work to define and measure individual hunger as a separate concept from household food insecurity (Panel to Review the US Department of Agriculture’s Measurement of Food Insecurity and Hunger, 2006). The USDA’s report on the status of food insecurity for the year 2007, however, continued to document food insecurity status with the new nomenclature (Nord et al., 2007), ostensibly because a new instrument to accurately reflect the degree of hunger in the United States has not yet been developed.

Hamm and Bellows point out that refinement of measurement tools for use at the individual and household level has been the focus of the development of measurement instruments but that no such tools exist for the measurement of community food security (Hamm & Bellows, 2003). The authors articulate the utility of such an approach and the urgent need for the development of such tools.

In the context of global health, attempts have been made to document commonalities in household food insecurity and its measurement (Coates et al., 2006; Swindale & Bilinsky, 2006). Food security measurement in New Zealand, Australia, and Canada is summarized by Radimer (Radimer, 2002). Coates and colleagues report that insufficient food quantity, inadequate food quality, uncertainty / worry, and social unacceptability are the four core domains of the food insecurity experience of households in 15 different countries (Coates et al., 2006). They suggest a three-level method of food insecurity measurement (core domains, subdomains, and items). Swindale and Bilinsky report attempts to construct a universal household food insecurity measurement tool that is applicable across countries and cultures (Swindale & Bilinsky, 2006). A set of domains is identified in an attempt to measure the “access” component of household food insecurity; the nine generic questions used within the three domains are reproduced in their Household Food Insecurity Access Scale, Domains and Generic Questions in Table 12, below. Respondents are offered either six possible responses or a collapsed two-response version (0=never or rarely; 1=sometimes, often, mostly, always) (Swindale & Bilinsky, 2006).
Table 12. Household Food Insecurity Access Scale, Domains, and Generic Questions
(Swindale & Bilinsky, 2006)

A. Anxiety and uncertainty about household food access:
1. Did you worry that your household would not have enough food?

B. Insufficient quality (includes variety, preferences, and aspects of social acceptability):
2. Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3. Did you or any household member eat just a few kinds of food day after day because of a lack of resources?
4. Did you or any household member eat food that you did not want to eat because of a lack of resources to obtain other types of food?

C. Insufficient food intake and its physical consequences:
5. Did you or any household member eat a smaller meal than you felt you needed because there was not enough food?
6. Did you or any household member eat fewer meals in a day because there was not enough food?
7. Was there ever no food at all in your household because there were no resources to get more?
8. Did you or any household member go to sleep at night hungry because there was not enough food?
9. Did you or any household member go a whole day without eating anything because there was not enough food?

Hampl and Hall point out that “social desirability” can distort the results of food security measurements (Hampl & Hall, 2002). As they define it, social desirability is “the tendency to respond in a manner consistent with societal expectations.” They warn that some individuals who are on food assistance programs might overreport food insecurity issues if these individuals are not certain that the survey instrument is not a mechanism to justify continued support (Hampl & Hall, 2002).

Kuyper and fellow researchers present pilot-test results that indicate a 7-item tool they developed has validity and reliability in measuring past food insecurity in immigrant mothers from Latin America (Kuyper et al., 2006). Their 7-item questionnaire is reproduced in Table 13, below, and they note that further testing is needed. The researchers affirm that “a life course perspective provides a multidisciplinary framework for understanding how personal history and food environments influence food choices and health.” They propose using tools, like the one they developed, in future research in order to provide information on how past food insecurity experiences influence current choices among our increasingly culturally diverse immigrant populations (Kuyper et al., 2006).
Table 13. A Tool to Assess Past Food Insecurity of Immigrant Latino Mothers
(Kuyper et al., 2006)

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you feel you need to give your child certain foods that you didn’t have as a child?</td>
</tr>
<tr>
<td>2. Did your family eat the same foods every day because there was not enough money or resources for other foods?</td>
</tr>
<tr>
<td>3. Were there times of the month or year when your family ran low on food?</td>
</tr>
<tr>
<td>4. Did you have to divide very small amounts of meat among family members because there wasn’t enough for everyone?</td>
</tr>
<tr>
<td>5. Did you work as a child to earn money to help your family buy food?</td>
</tr>
<tr>
<td>6. When you were a child, were there times when your parents did not have enough to eat?</td>
</tr>
<tr>
<td>7. When you were a child, were there times when you did not have enough to eat?</td>
</tr>
</tbody>
</table>

Noting that Spanish is the second most common language in the United States, that national prevalence data consistently demonstrate high rates of food insecurity in US Hispanic populations, and that no standardized Spanish-language food security version has been sanctioned by federal agencies, Harrison and colleagues evaluated eight Spanish-language versions (G. G. Harrison, Stormer, Herman & Winham, 2003). Paraphrasing Behling and Law’s guide on translation with regard to the difficulties in translations, the authors mention three fundamental difficulties: “lack of semantic equivalence across languages, lack of conceptual equivalence across cultures, and lack of normative equivalence across societies.” They found variability of vocabulary, verb tenses, or phrases in all 18 questions of the HFSSM among the eight versions. Harrison and researchers then developed separate instruments: one was created by professional translators who translated the English version into “standard” Spanish, and the other was developed by focus groups consisting of Spanish-speaking participants from Mexico, Central America, Puerto Rico, and Cuba. The researchers found that the focus group developed an instrument that was simpler in language and proved to have better back translation integrity. The instrument that they have presented for consideration of studying its validity is reproduced in their article (G. G. Harrison et al., 2003).
Agriculture and Food Security

Agriculture—the science, art, or occupation concerned with cultivating land, raising crops, and feeding, breeding, and raising livestock—is intuitively linked with community food security. A multitude of complex agricultural issues at the local, national, regional, and global levels affect the community food security of economically deprived urban neighborhoods. A complete review of these issues is outside the scope of this document, but a few salient points from the peer-reviewed, public health literature focusing on urban agriculture and local production of food are presented below.

Food insecurity and hunger exist alongside declining farmland for food production in the United States; Hamm and Bellows report “30 million acres of farmland, or 3.1% of the total, were lost in the United States from 1987 to 1998” and that “the decline in the number of farms is even greater, with 7.1% lost during the same period” (Hamm & Bellows, 2003). The authors go on to state that increasing conflict over natural resources is superimposed on the decline in farmland (Hamm & Bellows, 2003).

Brown and Jameton maintain that urban agriculture is increasingly being recognized by public health professionals, urban planners, community organizations, and policy-makers as a valuable tool for economic development, preservation of green space and improvement of food security (Brown & Jameton, 2000). They cite a 1991 report stating that 33 percent of all US farms (696,000 of 2 million) are within metropolitan areas, and another report estimating that $38 million is produced annually via urban agriculture. Urban agriculture comprises community gardens, school gardens, and entrepreneurial gardens. Congress allocated $1.5 million for the Urban Gardening Program for six cities in 1977 and $3.6 million for 23 cities in 1993. Unfortunately this funding was discontinued because of lack of political support for such programs, while vast US federal support for agribusiness operations continued. The United States Department of Agriculture (USDA) funds some urban agriculture efforts through the Cooperative Extension Service. The authors refer to several reports that affirm positive aspects of urban agriculture: decreased transportation costs, positive physical aspects for individuals, positive psychological features for individuals and communities, and leadership development and community organizing—all of which build the social capital of the community and enhance its food security. They caution that pollution from the environment can be harmful to the produce (which can be alleviated through “phytoremediation”), and they also warn that improper gardening practices can add pollution to the community environment. The authors provide policy recommendations for urban planners, public health officials, and policy-makers to promote urban agriculture through provision of crop insurance; education about proper handling, preparation, and storage of fresh foods, as well as culturally appropriate recipes; securing land tenure agreements; and education about downstream pollutants and enforcement of regulations and environmental safety laws (Brown & Jameton, 2000).

The importance of “local food production resources” (specifically, community gardens, local producers, and community-supported agriculture) is underscored by a report sponsored by USDA’s Economic Research Service. The “Community Food Security Assessment Toolkit” includes a simple algorithm in which the absence of these local food production resources results in the warning that “potential food systems problems” exist (Cohen, 2002). A similar warning applies if one or more of these components exist but are not politically and financially supported by the community or if locally produced food is not available and affordable to all community members (Cohen, 2002).
Community and Institutional Interventions to Build Food Security and / or Eliminate Hunger

Enhanced understanding of the multiple dimensions of food security—the focus of many sections of this document—can inform interventions that build food security and / or eliminate hunger. This section concentrates specifically on these interventions: the frameworks, strategies, time frames, institutions, and detailed mechanisms involved in such endeavors.

The multidisciplinary nature of the interventions necessary to build community security in economically deprived neighborhoods requires emphasis. This section presents a range of community and institutional interventions, as well as resources from which details of further interventions can be accessed (for individual adaptations, the reader is referred to social and behavioral works, like Lee and Greif’s overview [B. A. Lee & Greif, 2008]). Those responsible for intervention planning and implementation need to make strategic choices in their selections to maximize effectiveness—a systems approach is critical. They need to be future-oriented, recognizing that basing their choice of interventions solely on a current situational analysis is unlikely to result in a significant shift in the level of food insecurity and hunger. A clear shared vision is thus critical for all those involved.

Continuous evaluation of interventions and sharing findings from these evaluations in readily accessible formats are priorities in building effective coalitions around the issue of food security.

The concept of community food security is rooted in a number of disciplines: community nutrition, nutrition education, public health, community planning and development, and sustainable agriculture (Kantor, 2001). McCullum and colleagues provide a framework of evidence-based strategies by which communities and organizations can incorporate “food system” approaches to building community food security from the United States, Canada, and Europe (McCullum et al., 2005). The framework (presented in Table 14) is arranged by time frame: initial food systems change, food systems in transition, and food systems redesign for sustainability (McCullum et al., 2005). Although directed toward dietetic professionals, aspects of their framework can be utilized by those involved in building community food security.
Table 14. Evidence-based Strategies and Activities Associated with a Three-Stage Community Food Security Continuum
(McCullum et al., 2005)

<table>
<thead>
<tr>
<th>Stage of Continuum</th>
<th>Stage 1: Initial Food Systems Change</th>
<th>Stage 2: Food Systems in Transition</th>
<th>Stage 3: Food Systems Redesign for Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies and Activities</td>
<td>Counsel clients to maximize access to existing programs providing food and nutrition assistance, social services, and job training.</td>
<td>Connect emergency food programs with local urban agriculture projects.</td>
<td>Advocate for minimum wage increase and more affordable housing.</td>
</tr>
<tr>
<td></td>
<td>Document the nutritional value of emergency foods.</td>
<td>Create multi-sector partnerships and networks.</td>
<td>Advocate for food labeling standards about product history (e.g., place of origin, organic certified, Fair Trade certified).</td>
</tr>
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<td></td>
<td>Identify food quality and price inequities in low-income neighborhoods.</td>
<td>Facilitate participatory decision making and policy development through serving on food policy councils and organizing community-mapping processes and multi-stakeholder workshops.</td>
<td>Through participatory decision making and policy development, mobilize governments and communities to institutionalize:</td>
</tr>
<tr>
<td></td>
<td>Educate consumers and institutions about the benefits of local, seasonal, and organic foods.</td>
<td></td>
<td>1. Land use policies that facilitate large-scale urban agriculture;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2. Market promotion and subsidies as a way to increase a community's food self-reliance and achieve nutrition goals; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Tax incentives and financing mechanisms to attract local food businesses to low-income neighborhoods.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Short term</th>
<th>Medium term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>Data collection, monitoring, and evaluation are conducted at all stages of the community food security continuum.</td>
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<td>Data collection, monitoring, and evaluation are conducted at all stages (McCullum et al., 2005).</td>
</tr>
</tbody>
</table>

McCullum and colleagues’ summary description of the stages of building community food security is reproduced in its entirety as it provides a useful guide to action:

In stage 1, participants create small but significant changes to existing food systems. Data collected at this stage can be used to inform the work undertaken in subsequent stages. In stage 2, food systems change is progressing, and efforts are directed toward facilitating and stabilizing that change. In stage 3, efforts are made to institutionalize food systems change through advocacy and policy instruments that integrate different policy fields. Data collection, monitoring, and evaluation are conducted at all stages (McCullum et al., 2005).

Hamm and Bellows also emphasize the necessity of utilizing a systems approach in order to consider food security holistically, but they point out the inherent difficulties in challenging problems “enmeshed in the very structure of our society” (Hamm & Bellows, 2003). The authors describe the work of Winne et al. in comparing and differentiating between anti-hunger and community food security programs (see Table 15).
Table 15. Comparison of Anti-Hunger Food Programs and Community Food Security Programs (Hamm & Bellows, 2003)

<table>
<thead>
<tr>
<th></th>
<th>Anti-Hunger</th>
<th>Community Food Security</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>Treatment, social welfare</td>
<td>Prevention, community development</td>
</tr>
<tr>
<td><strong>Unit of analysis</strong></td>
<td>Individual / household</td>
<td>Community</td>
</tr>
<tr>
<td><strong>Time frame</strong></td>
<td>Shorter term</td>
<td>Longer term</td>
</tr>
<tr>
<td><strong>Goals</strong></td>
<td>Reduce societal costs, improve individual health, advance social equity</td>
<td>Build community resources, “healthy cities,” individual empowerment</td>
</tr>
<tr>
<td><strong>Conduit system</strong></td>
<td>Emergency food, federal food programs</td>
<td>Marketplace, self-production, local / regional food</td>
</tr>
<tr>
<td><strong>Actors</strong></td>
<td>USDA, HHS, social services agencies, charitable institutions</td>
<td>Community organizations, multi-sector partnerships</td>
</tr>
<tr>
<td><strong>Agriculture</strong></td>
<td>Commodities, cheap food prices</td>
<td>Support local agriculture, fair prices for farmers</td>
</tr>
<tr>
<td><strong>relationships</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Policy</strong></td>
<td>Sustain food resources</td>
<td>Community planning</td>
</tr>
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</table>

Drewnowski and Rolls discuss approaches to modify the food environment in an introduction to a food environment symposium (Drewnowski & Rolls, 2005). They assert the current food environment effectively promotes energy intake, whereas the physical environment limits opportunities for energy expenditure. They point out that there are multiple entry points to the issue, but little consensus exists on what ought to be done. The need for collaboration among four key disciplines—biological sciences, behavioral sciences, epidemiology, and public health—is highlighted (Drewnowski & Rolls, 2005).

Utilization of the social-ecological model has been suggested as a framework for evaluating nutrition education interventions and social marketing programs used in the Supplemental Nutrition Assistance Program (formerly called the Food Stamp Program) with low-income audiences (Gregson et al., 2001). The model suggested by the authors views the social world in five levels: social structure, policy, and systems; community; institutional / organizational; interpersonal; and individual. The model provides a framework for considering individual change in the context of wider contexts and can be adapted for food security-enhancing interventions. The authors provide useful measures and indicators for each of the five levels of influence that can be used to examine food security interventions utilizing a systems perspective (Gregson et al., 2001).

Nelson provides three broad strokes by which a government can improve the food security of children (M. Nelson, 2000). The first is to provide funds to parents through several methods: increase financial support, provide food stamps, increase child benefits, and reduce taxes for the poorest. The second is to feed the children: implementation / continuing school meals, provision of fruit at school, establishing breakfast clubs at schools and nurseries, and establishing and enforcing school meal guidelines for programs that fall under this category. The third method is to improve geographic and affordable access to nutritious foods by identifying food deserts and creating means to improve accessibility to health foods; one such proposal is to support stores in such food deserts by reducing their taxes, thereby improving their competitiveness (M. Nelson, 2000).

With original development roots in the Great Depression, the United States Department of Agriculture’s (USDA) Supplemental Nutrition Assistance Program (SNAP) is federally administered by the USDA Food and Nutrition Service and operated by states, generally at local welfare offices (Trenkamp & Wiseman, 2007). The program helps beneficiaries to purchase food by providing grocery credit; unlike many social assistance programs, the eligibility unit is the household, characterized by one or more persons who live, buy food, and prepare meals together (Trenkamp & Wiseman, 2007). Eligibility is determined...
by total household assets and income (after allowable deductions), and special rules apply for the elderly and disabled. Employment requirements, including training for employment, exist for non-disabled persons, and most non-disabled, non-elderly persons without dependent children are limited to three months of benefits every 36 months (Food and Nutrition Service, 2008). SNAP has grown from 2.9 million participants and total costs of $251 million in 1969 to 28.4 million participants and total costs of $37.7 billion in 2008 (preliminary data) (Food and Nutrition Service, US Department of Agriculture, 2009b).

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is another federally funded supplemental food program. It “is based on the premise that many low-income people are at risk of poor nutrition and health outcomes because of insufficient nutrition during the critical growth and developmental periods of pregnancy, infancy, and early childhood” (Institute of Medicine, 1996). WIC is federally administered by the Food and Nutrition Service of the USDA and locally administered through grants to states; services are provided in diverse sites, such as county health departments, community centers, hospitals, schools, migrant camps, and Indian Health Service facilities (Food and Nutrition Service, US Department of Agriculture, 2009a). Five categories of low-income individuals may be eligible: women who are pregnant, postpartum, or breastfeeding; infants; and children up to five years of age, if they are identified as nutrition risks. WIC has grown from 88,000 participants and costs of $10 million in 1974 to 8.7 million participants and costs of $6.2 billion in 2008 (preliminary data). Seventy-three percent of the 2008 costs were for provision of supplemental foods; 27 percent of the costs were for other WIC services: eligible participants (or their caregivers) are provided nutrition education and counseling, as well as screening and referrals to health, welfare, and social services (Food and Nutrition Service, US Department of Agriculture, 2009a).

Food assistance programs targeted at reducing food insecurity and hunger warrant careful evaluation to assess effectiveness in enhancing household food security. One such assessment was conducted among food stamp recipient families in Maryland (Oberholser & Tuttle, 2004), where 245 households with children that received food stamps were interviewed using a modified version of the US Household Food Security Survey Measure. The majority of the respondents were single, female, and African American. Sixty-six percent of the 245 participants experienced some level of food insecurity. Further breakdown of these food insecure households revealed a number of features: 38 percent experienced food insecurity without hunger; 21 percent experienced food insecurity with moderate hunger; and 7 percent experienced food insecurity with severe hunger. Additionally, food security status was similar in urban and rural counties (Oberholser & Tuttle, 2004). These data clearly indicate that food assistance alone is insufficient in tackling food insecurity and that alternative strategies are needed to supplement such food assistance programs.

Part of the USDA Supplemental Nutrition Assistance Program strategy is nutrition education and health promotion. Therein, critics have identified opportunities for improvement. Noting that one of the core elements of education in the USDA’s Food Stamp Nutrition Education Program (FSNEP) is food security, Tolma et al. evaluated the availability and quality of FSNEP printed material addressing food security (and particularly targeted for special populations—Native Americans, Hispanics, African Americans, and the elderly) (Tolma, John & Garner, 2007). They found a “lack of readily available USDA-sponsored materials on food security issues that can be retrieved electronically and at no cost.” The researchers also found a lack of food security materials targeting ethnic populations, poor readability of materials, and a general lack of cultural relevance. They also identified strengths, including short length, good overall organization, use of attention-getters, and inclusion of clear statements of purpose and summaries (Tolma et al., 2007).

Modeling from data collected from a study of low-income participants in a Continuing Survey of Food Intake by Individuals survey was performed by the US Department of Agriculture’s Economic Research Service to estimate the effect of participation in the Food Stamp and WIC programs on dietary quality (Wilde, McNamara & Ranney, 2000). The researchers found that participants in the Supplemental Nutrition Assistance Program (formerly the Food Stamp Program) eat “more meats, added sugars and total fats than they would in the absence of the program” while fruit, vegetable, dairy, and grain consumption remained the same. Participants in the WIC program, on the other hand, were found to consume significantly less added sugars; the researchers hypothesize that this finding among WIC participants may be a result of WIC policies. The researchers suggest that education of household food decision-makers may improve dietary quality.
One should consider interpretations by Lee and Frongillo (as well as their report of Edwards’ research), below, when considering the findings of the modeling performed by the USDA.

In April 2005 the National Academy of Sciences’ Institute of Medicine issued new recommendations to the US Department of Agriculture Food and Nutrition Service to make available food packages that include a monthly voucher for fresh or processed fruits and vegetables for WIC participants; Kropf and colleagues performed a cross-sectional survey of 228 women participating in the WIC program in Athens County, Ohio, to determine the impact of participation in the Farmers’ Market Nutrition Program (Kropf, Holben, Holcomb & Anderson, 2007). Sixty-one of the 228 women were also participating in the Farmers’ Market Nutrition Program. While food security status did not differ, statistically, between the two groups, vegetable intake, perceived benefit of vegetable and fruit intake, and perceived diet quality were all statistically greater in women participating in the WIC / Farmers’ Market Nutrition Program compared to women in the WIC program alone (Kropf et al., 2007).

Fuller-Thomson and Redmond analyzed 2003 American Community Survey data to identify characteristics of eligible older adults not receiving food stamps (Fuller-Thomson & Redmond, 2008). They analyzed data representative of US citizens aged 65 and older living at or under the Federal Poverty Level (FPL); this involved 14,724 persons, 2,796 of whom had received food stamps at some point in the prior 12 months preceding the survey. While women, African Americans, and Hispanics were classified as having “predisposing characteristics” and found to have the highest rates of food stamp use, utilization rates even in these groups were less than two-thirds of those persons eligible. Another predisposing characteristic, older age, was found to be statistically significant: older respondents (85 and older) were three times less likely to use food stamps than those aged 65–74. Limited English proficiency, lower educational attainment, one or more children in the home, and being a welfare recipient were “enabling characteristics” and were all associated with higher food stamp utilization. “Need characteristics” that were found to have higher food stamp use included having a mortgage or rent for cash, having severe vision or hearing difficulty, having functional limitations, or having difficulty with working. Older adults in the severe poverty category (<25% of the FPL, 25–49% of FPL, and 50–74% of FPL) were, surprisingly, underutilizing the food stamp program. Fuller-Thomson and Redmond called for targeting older adults living in poverty, using sites in low-income neighborhoods, implementing methods to streamline the application process, educating stakeholders about the Supplemental Nutrition Assistance Program (formerly the Food Stamp Program), and collaborating with community partners to enhance elders’ use of food stamps (Fuller-Thomson & Redmond, 2008).

Lee and Frongillo examined data from the Third National Health and Nutrition Examination Survey (NHANES III), the Nutrition Survey of the Elderly in New York State, and the Longitudinal Study of Aging (LSOA) to evaluate the impact of participation in food assistance programs (the Elderly Nutrition Program in New York State) by elders (J. S. Lee & Frongillo, 2001c). Their study did not reveal the expected differences in nutritional and health status of participants when compared to nonparticipants. Lee and Frongillo state two interpretations: 1) food assistance participation did not have a significant impact on nutritional or health status, or, more plausibly, 2) participation in food assistance programs keeps participants from additional deterioration in nutritional and health status (and could not be measured by the constructs of their study). The authors report on another study (Edwards, Frongillo, Rauschenbach & Roe, 1993) which demonstrated positive impacts of home-delivered meals on both nutrition and health incomes, stating that “as groups become more comparable in terms of their needs for food assistance programs, the impact of food assistance programs among the elderly persons can be more accurately measured” (J. S. Lee & Frongillo, 2001c).

Knol and colleagues maintain that food assistance programs are necessary and effective. They report that the mean food variety scores in children aged 2–8 have been found to be enhanced by participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (Knol et al., 2004).

A list of food assistance programs with relevant websites is provided in Table 16, below, and is adapted from position papers of the American Dietetic Society in 2002 (C. M. Olson & Holben, 2002) and in 2006 (Holben & American Dietetic Association [ADA], 2006), from the work of Holben and Myles (Holben & Myles, 2004), and from Guthrie and Lin (Guthrie & Lin, 2002).
Table 16. Programs, Organizations and Resources Concerned with Food Security and Hunger in the United States (websites accurate as of February 22, 2009)

<table>
<thead>
<tr>
<th>Program</th>
<th>Website</th>
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</thead>
<tbody>
<tr>
<td>America’s Second Harvest ¹</td>
<td><a href="http://www.secondharvest.org">www.secondharvest.org</a></td>
</tr>
<tr>
<td>Bread for the World ¹</td>
<td><a href="http://www.bread.org">www.bread.org</a></td>
</tr>
<tr>
<td>Child and Adult Care Food Program ²</td>
<td><a href="http://www.fns.usda.gov/cnd/CARE/CACFP/cacphome.htm">www.fns.usda.gov/cnd/CARE/CACFP/cacphome.htm</a></td>
</tr>
<tr>
<td>Commodity Supplemental Food Program ²</td>
<td><a href="http://www.fns.usda.gov/fdd/programs/csfp">www.fns.usda.gov/fdd/programs/csfp</a></td>
</tr>
<tr>
<td>Community Food Security Coalition ¹</td>
<td><a href="http://www.foodsecurity.org">www.foodsecurity.org</a></td>
</tr>
<tr>
<td>Community Food Security Initiative ¹</td>
<td><a href="http://www.attra.ncat.org/guide/a_m/cfsi.html">www.attra.ncat.org/guide/a_m/cfsi.html</a></td>
</tr>
<tr>
<td>Congressional Hunger Center ¹</td>
<td><a href="http://www.hungercenter.org">www.hungercenter.org</a></td>
</tr>
<tr>
<td>The Emergency Food Assistance Program</td>
<td><a href="http://www.fns.usda.gov/fdd/programs/tefap">www.fns.usda.gov/fdd/programs/tefap</a></td>
</tr>
<tr>
<td>Expanded Food and Nutrition Education Program ¹</td>
<td><a href="http://www.csrees.usda.gov/nea/food/efnep/efnep.html">www.csrees.usda.gov/nea/food/efnep/efnep.html</a></td>
</tr>
<tr>
<td>Food Research and Action Center ¹</td>
<td><a href="http://www.frac.org">www.frac.org</a></td>
</tr>
<tr>
<td>Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) ²</td>
<td><a href="http://www.fns.usda.gov/wic">www.fns.usda.gov/wic</a></td>
</tr>
<tr>
<td>WIC Farmers’ Market Nutrition Program ¹</td>
<td><a href="http://www.fns.usda.gov/wic/WMNP/WMNPfaqs.htm">www.fns.usda.gov/wic/WMNP/WMNPfaqs.htm</a></td>
</tr>
<tr>
<td>Food Distribution Programs*</td>
<td><a href="http://www.fns.usda.gov/fdp">www.fns.usda.gov/fdp</a></td>
</tr>
<tr>
<td>Child Nutrition Commodity Support; Nutrition Services Incentive Program; State Processing Program; Homeless Children Nutrition Program; Food Assistance in Disaster Situations; Food Distribution Programs on Indian Reservations ¹²</td>
<td><a href="http://www.fns.usda.gov/fsp">www.fns.usda.gov/fsp</a></td>
</tr>
<tr>
<td>Food Security in the US Briefing Room ¹</td>
<td><a href="http://www.ers.usda.gov/briefing/foodsecurity">www.ers.usda.gov/briefing/foodsecurity</a></td>
</tr>
<tr>
<td>Mazon: A Jewish Response to Hunger ¹</td>
<td><a href="http://www.mazon.org">www.mazon.org</a></td>
</tr>
<tr>
<td>Meals on Wheels Association of America ¹</td>
<td><a href="http://www.mowaa.org">www.mowaa.org</a></td>
</tr>
<tr>
<td>National School Lunch and School Breakfast Programs ²</td>
<td><a href="http://www.fns.usda.gov/cnd/lunch/default.htm">www.fns.usda.gov/cnd/lunch/default.htm</a></td>
</tr>
<tr>
<td>Kids Cafe ⁴</td>
<td><a href="http://www.feedingamerica.org/">www.feedingamerica.org/</a></td>
</tr>
<tr>
<td>Senior Farmers’ Market Nutrition Program ²</td>
<td><a href="http://www.fns.usda.gov/wic/seniorFMNP/SFMNPmenu.htm">www.fns.usda.gov/wic/seniorFMNP/SFMNPmenu.htm</a></td>
</tr>
<tr>
<td>Share Our Strength ¹</td>
<td><a href="http://www.strength.org">www.strength.org</a></td>
</tr>
<tr>
<td>Special Milk Program ¹</td>
<td><a href="http://www.fns.usda.gov/cnd/Milk/Default.htm">www.fns.usda.gov/cnd/Milk/Default.htm</a></td>
</tr>
<tr>
<td>Summer Food Service Program ²</td>
<td><a href="http://www.summerfood.usda.gov">www.summerfood.usda.gov</a></td>
</tr>
<tr>
<td>World Hunger Year ¹</td>
<td><a href="http://www.yhunger.org">www.yhunger.org</a></td>
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</tbody>
</table>

¹ Adapted from position papers of American Dietetic Society in 2002 and in 2006 (Holben & American Dietetic Association (ADA), 2006; C. M. Olson & Holben, 2002)
² Adapted from Holben and Myles (Holben & Myles, 2004)
³ Adapted from Guthrie and Lin (Guthrie & Lin, 2002)
⁴ Adapted from Tapper-Gardzina (Tapper-Gardzina & Cotugna, 2003)

*Note: There are other food distribution programs operated by the Food & Nutrition Service of the United States Department of Agriculture listed elsewhere in this table (e.g., Food Stamp Program, WIC Program)
When formulating interventions aimed at building community food security, organizations should consider the food management practices that have been adopted by households receiving food assistance in their effort to maintain food sufficiency. Kempson and colleagues conducted interviews with nutrition educators in New Jersey in order to summarize the food management practices of program participants (Kempson, Palmer Keenan, Sadani, Ridlen & Scotto Rosato, 2002). These practices were grouped into either “managing the food supply” or “regulating eating patterns.” Practices to manage the food supply included strategizing food preparation, rationing household food supply, conserving food, and preserving food. Practices to regulate eating patterns included restricting personal food intake, overeating during periods of food availability, eating expired or nonfood items, obtaining food opportunistically, cyclic monthly eating patterns, and eating low-cost foods. The authors noted several features: many of the food management practices constitute a food safety or nutritional risk; food assistance programs need refinement in light of the findings; and measurement of food insecurity should consider these food management practices (Kempson et al., 2002).

Hoisington and colleagues advocate gleaning as one mechanism for addressing food security at the local level (Hoisington et al., 2001). In a case study of 29 gleaners, they found that the vast majority stated that gleaning allowed them to use fresher produce and that more than half of the gleaners could not get as much produce as they desired when they were not gleaning. The researchers found that less than 10 percent of gleaned produce was taken home by gleaners; more than three-fourths of gleaned produce was donated to the local emergency food network, and nearly 14 percent was given to neighbors. Obstacles to gleaning included physical / environmental features inherent in the gleaning process, time constraints, and the need for child care (Hoisington et al., 2001).

Broughton and colleagues studied predictors and outcomes of household food insecurity among inner-city families in Vancouver. The authors suggest collaboration between government, social planners, and public health practitioners to increase the number of food outlets as well as improve food selection and quality at these small stores in low-income neighborhoods (Broughton et al., 2006).

Hunger-associated symptoms have been shown to be reduced in schoolchildren by implementing a midmorning nutrition break (Sweeney, Tucker, Reynosa & Glaser, 2006). A nine o’clock morning nutrition break was implemented for one academic year at an inner-city high school, and hunger-associated symptoms were assessed. The frequency of a number of hunger-associated symptoms (ability to focus, tiredness, headache, stomachache, midmorning hunger) decreased as the frequency of participation in the program rose (Sweeney et al., 2006). The study demonstrates the ability of a single universally available intervention to have an impact on hunger and hunger-associated symptoms.

School breakfast programs have also been used successfully in tackling hunger in children. Kleinman and colleagues studied the effects of the introduction of a universal-free school breakfast program in the Boston Public Schools (Kleinman et al., 2002). The program was shown to enhance the nutrient intake of children, and this in turn was associated with decreased hunger as well as improved academic performance and psychosocial functioning (Kleinman et al., 2002).

Feeding programs such as Kids Cafes have also been shown to decrease child hunger and improve overall health as well as learning (Tapper-Gardzina & Cotugna, 2003). America’s Second Harvest Kids Café Program was introduced in 1993 and has rapidly expanded since. The program aims to provide free food and wider input to child development (food preparation lessons, children’s garden, and other tutoring) for needy families in after-school care, in conjunction with existing community programs (Tapper-Gardzina & Cotugna, 2003).

Peer modeling and rewards-based interventions have been shown to have lasting effects on increasing children’s fruit and vegetable consumption in a study conducted in a deprived area of inner-city London (Horne et al., 2004). The intervention used was watching video adventures featuring fruit- and vegetable-loving heroic peers (the Food Dudes) and giving small initial rewards to the children for eating these foods. Video watching took place for 16 days, and the rewards were gradually tapered off. Such an approach was seen to significantly increase fruit and vegetable consumption both at school and at home, particularly in those who initially ate very little (Horne et al., 2004).

Food deserts have been described as locales where poor communities reside and where access to food is inadequate. One proposal is that there are three key elements to food deserts: fruit and vegetable price, socioeconomic
deprivation, and lack of locally available supermarkets (Pearson et al., 2005). In the United Kingdom government policy has focused on eradicating these environments in order to increase food security; the evidence base for such an approach, however, has been largely lacking (Cummins & Macintyre, 2002). In fact, a cross-sectional study in Sheffield, UK, found that the three key elements of a food desert did not influence fruit and vegetable intakes in that community (Pearson et al., 2005). The authors note, however, that in their study the influence of local shops and markets was not considered and car ownership was high (Pearson et al., 2005). The situation in US inner cities may be different, and the elimination of food deserts is intuitively a viable consideration for enhancing food security and therefore may be an attractive approach for researchers and decision-makers alike.

Galvez and fellow researchers found that disparities in food store availability exist by race/ethnicity in East Harlem, New York (Galvez et al., 2008). In a 2004 cross-sectional survey of the minority, low-income census blocks, they found that African American blocks, while having no supermarkets or grocery stores, had a prevalence ratio of 0.25 for convenience stores compared to racially mixed census blocks. Latino census blocks, while generally having more food stores available, were also twice as likely to have fast-food restaurants compared to the racially mixed blocks (Galvez et al., 2008). Clarifying neighborhood-level factors on dietary quality is a relatively novel and ongoing effort within the US scientific community.

The identification and evaluation of sustainable programs to improve urban food security in two local government areas in Australia are informative (Wood, Swinburn & Burns, 2003). Evaluations were conducted across demonstration projects over 18 months in inner-city urban cities. Five intervention strategy themes were identified: local government food security policies, garden programs, local food access programs, local meals access programs, and emergency food relief programs. Evaluations identified the qualities of each strategy and provided a conceptual model for improving food security. Key conclusions included recognition of primary health care and community services and agencies as offering the best opportunities to engage with vulnerable groups at risk of food insecurity; recognition of local government activities as a major setting for improving community food security; and the requirement for state government policy initiatives to support both of the previous approaches (Wood et al., 2003).

Approaches to building social capital within communities have been suggested based on observed associations between household- and neighborhood-level social capital and whether a household has enough food to avoid hunger (Martin et al., 2004). Social capital here is defined as the “perceived sense of social trust and community reciprocity.” The authors assert that innovative methods of supporting interpersonal relationships and strengthening communities should be pursued to increase social capital and thus community food security (Martin et al., 2004).

Hampl and Hall suggest broad expansion of dietetic professionals’ practice as a public health intervention to increase food security (Hampl & Hall, 2002). They reference demographic data which reveals that approximately 60 percent of low-income households were headed by single parents and that children of single mothers are most affected by resource-constrained hunger. From this data they suggest that dietitians could expand their services into activities such as family planning. Further activities which dietetic professionals would perform to enhance population food security are 1) inclusion of home economics in their counseling (to help ensure that nutritious foods are prioritized in household budgets); 2) addition of tobacco prevention and cessation in their counseling (because such behaviors reduce food-purchasing power); and 3) advocating for the expansion of the food packages of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) to include fruits, vegetables, and whole-grain products (Hampl & Hall, 2002).

Power and Tarasuk express some major concerns with the suggestions made by Hampl and Hall (Power & Tarasuk, 2003). Three points are asserted in particular: first, dietitians are not qualified as family planners; second, the suggestions lack an evidence-based approach; and lastly, the suggestions are “intensely individualistic, completely ignoring the important social processes by which women and racialized minorities come to live in poverty, and with food insecurity, in much greater proportions than men and white people” (Power & Tarasuk, 2003).

The Emergency Food Relief System has a history that is traced back 200 years by Biggerstaff and colleagues (Biggerstaff et al., 2002). Historically cyclical in concordance with economic hardships, food pantries and soup kitchens have become integral to the food networks in virtually every locale in the United States. Funding and food for
food pantries come from donations, public monies, and the federal Emergency Food Assistance Program. Soup kitchens typically receive most of their food from local or regional food banks and are staffed by volunteers. Such food banks are nonprofit, community-based organizations that collect and distribute food obtained from producers, retail stores, federal programs, and the food industry and other actors (Biggerstaff et al., 2002).

Calculating that 27 percent of all edible food in the US is lost to waste at the food retail, consumer, and food service establishment level, Kantor and colleagues note that there are a number of food recovery efforts to recover, recycle, and educate the public in attempts to reduce food insecurity (Kantor et al., 1997). Such endeavors include perishable food salvaging, food rescue, and nonperishable food collection—and culminate in direct delivery of the foods to needy persons via food pantries and soup kitchens or indirectly through food banks. The researchers estimate that, in 1996 alone, 150,000 nonprofit organizations delivered foods by these mechanisms thereby providing approximately 10 percent of the US population with part of their nutritional needs (Kantor et al., 1997). Back in 1986 Olson and colleagues noted that “naturally occurring social networks provide an ideal setting to implement outreach” programs (L. M. Olson et al., 1988). They report that 47 percent of responding inner-city Chicago churches managed a food pantry and that 10 percent administered a soup kitchen (L. M. Olson et al., 1988).

Kantor provides a categorization of intervention that community programs utilize to improve food access (Kantor, 2001). She articulates five general program categories: 1) food cooperatives (both buying clubs and retail cooperative food stores), 2) farmers markets, 3) community-supported agriculture, 4) farm-to-school initiatives, and 5) community gardening (Kantor, 2001).

Morrison and associates evaluated human services resources concerned with nutrition, physical health, and behavioral health in Guilford County, North Carolina, in an effort to determine the degree of cultural adaptation resources providing assistance to limited-English-proficient immigrants (Morrison, Haldeman, Sudha, Gruber & Bailey, 2007). The authors found 65 providers of human services, 22 of which gave direct assistance related to food and/or nutrition including immigrants; only 17 were exclusive providers of food and/or nutrition and only two targeted their services to deal with immigrant food insecurity. Noting the often urgent need for food upon emigration, the inherent cultural differences that create barriers to utilization of healthful foods, the limited eligibility for federal food assistance or nutritional supplement programs, and the critical inclusion of social networks in the ecological model for health promotion, the authors emphasize the importance for policy-makers and human service organizations to encompass cultural adaptation resources to assist immigrant individuals or groups to successfully acculturate in US communities (Morrison et al., 2007).

Cook and Frank assert that

Of the many interlocking forms of deprivation experienced by poor and near-poor children in the United States, food insecurity is one of the most readily measured, as well as one of the most rapidly remediable by policy changes. Our country, unlike, many others in the world, clearly can produce and distribute enough healthful food to all its inhabitants, constrained only by political will. (Cook & Frank, 2008)
Stakeholder Engagement

Understanding and engaging the wide range of stakeholders are critical to the success of food security interventions. The use of systematic stakeholder analysis and engagement methods has been increasingly reported in the global literature. Spearheaded by the environmental sector, the use of stakeholder-focused approaches is gaining momentum in the world of food security.

At the heart of community food security is engagement with a “community” of households and individuals, as well as all other relevant actors in the food system as a whole; the identities of these actors vary in different geographical, political, and demographic contexts (Hamm & Bellows, 2003). These actors are all stakeholders in the food system, wherein stakeholders are defined as “organizations and individuals that are involved in a specific activity because they participate in producing, consuming, managing, regulating, or evaluating the activity” (Novick & Mays, 2001). The perspectives of such stakeholders—including individuals, communities, the private sector, agricultural concerns, governments at the local and national levels, and global organizations—allow food security interventions to be considered from different angles, an approach that has several advantages. First, the likelihood of successful food security policy changes can be predicted by understanding the views of decision-makers. Second, individual and community perspectives on the proposed intervention can predict the likely success of the intervention. Third, interventions can be refined to enhance broad acceptability and the probability of success. Fourth, strategic approaches can be formulated in an attempt to influence key stakeholders. Lastly, sharing perspectives between key stakeholders may enhance solidarity around a particular intervention—the construction of coalitions.

Recognizing the importance of considering multiple stakeholder perspectives, the environmental sector has led the field of stakeholder-focused approaches (Beierle, 2002; Goldman, 2002). Lessons from this work can be learned for food security. These include use of stakeholder-focused policy design and implementation in water resource management (Giordano, Passarella, Uricchio, & Vurro, 2006; Nauta, Bongco & Santos-Borja, 2003; Ozesmi & Ozesmi, 2003); stakeholder-driven environmental assessment and management (De Lopez, 2001; Gutrich et al., 2005; Magnuszewski, Sendzimir & Kronenberg, 2005); stakeholder participation in environmental decision making using multi-criteria decision analysis (Kiker, Bridges, Varghese, Seager & Linkov, 2005; Linkov et al., 2006); and stakeholder-focused participatory approaches to environmental management that emphasize community empowerment (Fraser, Dougill, Mabee, Reed & McAlpine, 2006; Srivastava, Kulshreshtha, Mohanty, Pushpangadan & Singh, 2005). Thus, a significant body of methodological knowledge has emerged on stakeholder-focused approaches in the environmental sector; the utility of such approaches has also been demonstrated. Central to these approaches is systematic early and continued engagement of all relevant stakeholders with effective inter-stakeholder information flows.

Methodological approaches to planning, conducting, and analyzing stakeholder analyses utilizing quantitative and qualitative approaches have been summarized (Brugha & Varvasovszky, 2000; Crosby, 1991; Varvasovszky & Brugha, 2000). These techniques can aid in “estimating stakeholder positions, levels of interest, and influence around an issue” (Varvasovszky & Brugha, 2000) and are well-suited for utilization in developing and refining community food security interventions. Such systematic stakeholder analyses can be carried out by an individual or a team, either internal or external to the food security intervention—each has advantages and disadvantages. The systematic methodology includes the use of standardized ways of identifying and approaching stakeholders, qualitative and quantitative data collection methods, and an iterative approach to the data collection process (Varvasovszky & Brugha, 2000). Analysis, presentation, and illustration of the information collected provide a useful tool for managing stakeholders and identifying opportunities to mobilize their support.

Community-based approaches to enhancing food security that engage multiple stakeholders have begun to gain momentum in multiple settings in the United States. The mechanisms of power among stakeholders within such community-based food security planning processes warrants analysis; McCullum and colleagues attempted such an analysis during the planning process of a community-based food security initiative in six upstate New York counties (McCullum, Pelletier, Barr, Wilkins & Habicht, 2004). Power was defined by the authors as “the capacity to produce intended, foreseen, and unforeseen effects...
on others based on ability to control access to valued resources” and a three-dimensional theoretical framework of power—participation in decision making, agenda setting, and shaping perceived needs—was utilized (McCullum et al., 2004). The authors found influences on the three dimensions of power were through the management of four key mechanisms—problem framing, trust, knowledge, and consent. The authors articulate four key implications for practice: first, engagement of a large number of disenfranchised stakeholders is required in formative stages of community-based projects; second, peer groups should be utilized to neutralize actual or perceived status and power differences; third, time devoted to reflection on power processes should be incorporated into planning; and lastly, development of facilitation, negotiation, and conflict resolution skills for community members should be prioritized (McCullum et al., 2004).

In another article, McCullum and colleagues describe their qualitative research in the New York counties to evaluate the extent that stakeholders with divergent interests could find commonalities related to community food security (McCullum, Pelletier, Barr & Wilkins, 2002). They report that, indeed, stakeholders with different opinions and perspectives were able to find common ground on specific aspects of food security: the need to distribute surplus food; education, family and community values; utilizing locally produced foods; and legislative programs and actions (McCullum et al., 2002).

Sloane and fellow researchers collaborated with community residents to promote community-directed interventions aimed at healthy food availability in regions of Los Angeles encountering health disparities (Sloane et al., 2003). Fundamental to this endeavor were the identification and inclusion of key stakeholders in these communities. Community stakeholders participated in many ways: they identified community characteristics related to nutrition resources, participated in the planning and conducting of food market surveys, and contributed to the analysis of the results by developing campaigns to enact interventions. The researchers suggested that the advantages of their community-based approach, particularly the viewpoints and experience of community members, could surpass the limitations of this methodology. They also maintain that having community members involved in research addresses the need for involvement by the disenfranchised, imparts research skills to individuals in the community, and elicits trust of the community toward research organizations (Sloane et al., 2003).
Appendix—Literature Search Methods

A literature search was conducted utilizing a systematic process, in two distinct phases. The first phase included literature identified in the PubMed database until September 2, 2006 (search details provided below). The second phase included literature identified in the PubMed database between September 2, 2006, and December 7, 2008 (search details provided below).

First Phase: PubMed Literature Search—September 2, 2006

The following “free text terms” were searched on PubMed on September 2, 2006, resulting in the following numbers of articles for each of the “free text terms”:
1. Food security → 989
2. Food insecurity → 270
3. Inner city → 5201
4. Food deserts → 32
5. Food poverty → 1748
6. Food access → 4934
7. Fruit and vegetable consumption → 1699
8. Diet → 242,298
9. Hunger → 5140

Three “MeSH terms” were searched on PubMed on September 2, 2006, resulting in the following numbers of articles for each of these “MeSH terms”:
1. Food supply → 5273
2. Nutrition policy → 2853
3. United States → 835,638

Search terms were combined using two distinct themes—inner cities and the United States.

Search combinations with an inner-city focus resulted in 174 articles in total. Numbers of articles in each specific combination are detailed below. Abstracts from each identified article were reviewed by both authors for relevance to the literature synthesis (ARR = abstract reviewed for relevance). In the event of incongruence, the article was deemed relevant. This process resulted in the identification of 19 articles in total. Results for each specific combination are provided below.
1. Food security and inner city → 8 → ARR → 2
2. Food insecurity and inner city → 7 → ARR → 0
3. Food deserts and inner city → 0
4. Food poverty and inner city → 33 → ARR → 3
5. Food access and inner city → 12 → ARR → 0
6. Fruit and vegetable consumption and inner city → 6 → ARR → 3
7. Diet and inner city → 88 → ARR → 8
8. Hunger and inner city → 9 → ARR → 3
9. Food supply and inner city → 6 → ARR → 0
10. Nutrition policy and inner city → 5 → ARR → 0

Search combinations with a focus on the United States utilized three terms—“food security,” “food insecurity,” and “food deserts.” These combinations resulted in 377 articles in total. Numbers of articles in each of the three specific combinations are also detailed below. Abstracts from each identified article were reviewed by both authors for relevance to the literature synthesis (ARR = abstract reviewed for relevance). In the event of incongruence, the article was deemed relevant. This process resulted in the identification of 58 articles in total. Results from this abstract review for each specific combination are also provided below.
1. Food security and United States → 277 → ARR → 38
2. Food insecurity and United States → 98 → ARR → 20
3. Food deserts and United States → 2 → ARR → 0


The following “free text terms” were searched on PubMed on December 7, 2008 (with date limits September 2, 2006, to December 7, 2008) to update the previous first phase literature search. This second phase search resulted in the following numbers of articles for each of the “free text terms”:
1. Food security → 333
2. Food insecurity → 169
3. Inner city → 869
4. Food deserts → 17 → ARR →
5. Food poverty → 456
6. Food access → 1059
7. Fruit and vegetable consumption → 711
8. Diet → 26,572
9. Hunger → 1393
The same three “MeSH terms” used in the first phase were searched on PubMed on December 7, 2008, to update the previous first phase literature search. This second phase search resulted in the following numbers of articles for each of the three “MeSH terms”:

1. Food supply → 1472
2. Nutrition policy → 1165
3. United States → 239,038

As in the first phase, search terms were combined using two distinct themes—inner cities and the United States. Search combinations with an inner city focus utilized exactly the same terms as the first phase literature search did, and resulted in 37 articles in total. Abstracts from each identified article were reviewed by both authors for relevance to the literature synthesis, resulting in six articles in total.

Search combinations with a focus on the United States utilized exactly the same three terms as the first phase literature search did, and resulted in 111 articles in total. Abstracts from each identified article were reviewed by both authors for relevance to the literature synthesis, resulting in 62 articles in total.

Further Comments on the Literature Search

The PubMed literature search (when combining the two phases) resulted in the identification of 699 articles of potential relevance to the literature synthesis. These were scrutinized by both of the authors. Of these 699 articles, 145 articles were deemed relevant to the literature synthesis and thus included in the synthesis.

Scientific articles and other references were also identified by several additional means. First, informal interviews were conducted with key informants and researchers in the field of food security with a specific goal of identifying key relevant resources. Second, a “snowball technique” was utilized whereby articles and resources cited in the resources included in the literature synthesis were analyzed for relevance. These methods resulted in additional articles and resources.
References


COMMUNITY FOOD SECURITY IN UNITED STATES CITIES
A Survey of the Relevant Scientific Literature

Center for a Livable Future
Johns Hopkins Bloomberg School of Public Health

615 N. Wolfe Street, Suite E2150
Baltimore, MD 21205
www.jhsp.h.edu/elf