The Meaning of Dietary Diversity: Cultural Ideals and Food Insecurity in Nicaragua

THESIS

Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts in the Graduate School of the Ohio State University

By

Adelaide S. Cary

Graduate Program in Anthropology

The Ohio State University

2017

Master's Examination Committee:

Dr. Barbara A. Piperata, advisor

Dr. Mark Hubbe

Dr. Douglas E. Crews
Abstract

Food insecurity (FI) is often associated with lower dietary diversity (DD), which can have important implications for human health. In this thesis, I tested the relationship between perceived household food security status and DD in a sample of Nicaraguan households, considering how the cultural meaning of different food items shapes maternal perceptions of household food security. Data were collected from 455 households in urban and rural zones within the municipality of León, Nicaragua. The Latin American and Caribbean Food Security Scale (ELCSA) was used to measure household FI. The Nicaraguan 48-item food frequency questionnaire was used to measure DD over a 7-day period. Data from focus group interviews were used to explore notions of ideal foods and meal composition. Households were classified according to their level of FI: food secure (24.6%); mildly FI (49.7% of households); moderately FI (15% of households); and severely FI (11% of households). Results of Kruskal–Wallis tests showed significant differences between FI groups in DD, as gauged by both aggregated and disaggregated measures. Spearman’s Rank Correlation analysis revealed a negative correlation between greater FI and DD using both an aggregated and disaggregated measure (correlation coefficients -0.364 and -0.246, respectively). Moreover, ordinal regression analysis indicated that higher levels of household FI were significantly associated with a lower frequency of consumption of 9 of the 48 foods including: red meat, poultry, tortillas, and
milk. I considered the cultural value of these foods in effort to advance our understanding of the link between perceived FI, DD, and dietary preference among these Nicaraguan households.
Acknowledgments

I would like to thank my advisor, Dr. Piperata, for her guidance and patience. I would also like to thank my committee members, Dr. Crews and Dr. Hubbe, for their comments and my family and my lab mates, the Pips, for their constant support. I am also grateful to my family for their encouragement, especially my husband, Chris, without whom I could not have completed this project. Finally, I would like to express my gratitude to the women who participated in this study for sharing their experiences with us.
Vita

May 2004 ......................................................... Wooster High School, Wooster, Ohio

2008 ......................................................... B.A. Philosophy, the College of Wooster

2015-2016 ...................................................... Dean’s Distinguished University Fellow

2016-Present ........................................... Graduate Teaching Associate, Department of Anthropology, The Ohio State University

Publications


Fields of Study

Major Field: Anthropology
Table of Contents

Abstract ............................................................................................................................ ii
Acknowledgments........................................................................................................ iv
Vita...................................................................................................................................... v
Table of Contents ........................................................................................................ vi
List of Tables ................................................................................................................... viii
List of Figures ................................................................................................................ ix
Introduction .................................................................................................................... 1
   Evolution of the Concept of Food Security ................................................................. 2
   Dietary Composition..................................................................................................... 6
   Food and Culture: A Role for Nutritional Anthropology ......................................... 8
   Summary ....................................................................................................................... 16
Study Objectives ............................................................................................................ 16
Materials and Methods ................................................................................................. 18
   Study Location ........................................................................................................... 18
   Sample ...................................................................................................................... 20
   Quantitative Data Collection ..................................................................................... 21
   Food Security ............................................................................................................ 22
   Dietary Diversity ....................................................................................................... 24
Quantitative Data Analysis ................................................................. 25
Qualitative Data Collection .................................................................. 27
Dietary Preferences in the Food Security Experience ...................... 27
Qualitative Data Analysis .................................................................. 29
Ethics .................................................................................................. 29
Results ................................................................................................ 31
Household Infrastructure and Assets .................................................. 34
Income and Expenditures ................................................................. 35
Food Security Status ........................................................................ 36
Food Variety and Dietary Diversity ................................................... 37
Qualitative Results ........................................................................... 44
Discussion ........................................................................................ 51
Food Insecurity and the Scarcity of the Mixed Methods Approach ...... 56
Conclusion ......................................................................................... 59
Implications for Future Research in Nutritional Anthropology .......... 59
References ....................................................................................... 61
List of Tables

Table 1. The 15-Questions of the ELCSA in Spanish and English................................. 23
Table 2. The Nicaraguan FFQ Foods Grouped by the UN FAO HDDS Categories ....... 26
Table 3. Sociodemographic and Household Characteristics of Study Participants ........ 31
Table 4. Anthropometric Characteristics of Study Participants...................................... 34
Table 5. Household Food Security Status Classification by Number of Affirmative
Answers to the 15 Questions of the ELCSA................................................................. 36
Table 6. Number of Households Eating Each of the 48 Foods on the FFQ with Number
of Days Eaten.................................................................................................................. 37
Table 7. FVS and DDS Mean and Range by Food Security Status................................ 40
Table 8. Kruskal-Wallis Test Results for Food Variety Score and Dietary Diversity Score
by Household Food Security Status................................................................................. 41
Table 9. Spearman’s Rank Correlation Coefficients of Household Food Security and
Two Measures of Dietary Diversity.................................................................................. 42
Table 10. Individual Foods Associated with Household Food Security Status using
Ordinal Regression............................................................................................................ 43
Table 11. Individual Foods Associated with Household Food Security Status using
Ordinal Regression, continued....................................................................................... 43
List of Figures

Figure 1. The Four "Pillars" of Food Security .............................................................. 4

Figure 2. Map of Nicaragua (Source: http://www.wikicommons.com) ......................... 19
Introduction

The most widely-used definition of food security comes from the 1996 World Food Summit’s Declaration on World Food Security (FAO 1996) which states that, “food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” Despite its inclusion within this commonly used definition and the recent movement towards the use of perceived measures of food insecurity instruments (Coates 2013), dietary preference remains a highly neglected area of food security research. Currently, economic and public health perspectives dominate food security research. These perspectives tend to emphasize nutritional sufficiency and/or the nutritional status of human populations, which has resulted in the neglect of food preference, and other cultural elements of the food security experience (Coates et al. 2006). This is often the case even when the research utilizes a perceived food security instrument – in other words, an instrument that enquires about people’s experiences accessing food. The lack of attention to food preferences in studies of food security may be due to the fact that an understanding of the cultural nature of food preferences requires more contextualized knowledge of the food environment gathered through longer-term qualitative research.

In addition, most studies treat food security as an independent variable, much like other cultural or behavioral factors (Himmelgreen 2002). For example, Shamah-Levy and
colleagues (2014) published a study linking food insecurity with malnutrition in children and decreased dietary diversity in children. By assuming the directionality of the relationship to be that food insecurity causes decreased dietary diversity this study, and others like it, tend to neglect the dialectical relationship that exists between the ability to access a diverse, culturally appropriate diet and the perception of food security. While studies have explored food security ethnographically (Kruger and Lourens 2016; Wentworth 2016; Piperata et al. 2016; Dhokarh et al. 2011), few have done so with the aim of understanding how the lack of access to culturally important foods relates to perceptions of food security (exceptions include: Dufour et al. 1997a; Dufour et al. 1997b). When the topic of culturally important foods is considered, it is typically done in the context of the “other” - such as immigrants, migrants, and First Nations – and very rarely in the context of a dominant ethnic group within a population (Schuster et al. 2011; Dhokarh et al. 2011; Kilanowski 2010; Grauel and Chambers 2014). This gap in the literature leaves open important questions about the ways in which the inability to meet dietary preferences can affect perceptions of food security among populations outside of these “othered” groups.

To understand why culture is an important, if neglected, area of concern for food security research, one must understand both how the current definition of food security developed over time and the role of culture in shaping food preferences.

**Evolution of the Concept of Food Security**

Today the FAO recognizes four “pillars” of food security (Figure 1): 1) the availability of sufficient food to feed a population, 2) the economic ability to access available food, 3) the ability to effectively utilize available resources for nutrition (FAO
1996), and 4) the stability of each of the former (Coates 2013). However, these aspects of food security were not always recognized; the current understanding of the concept of food security is the result of four decades of research on the topic.

“Food security” became a common term during the mid-1970s, as researchers braced for the impact of a looming global food crisis (Maxwell and Smith 1992; Jones et al. 2013). During this time period, the availability of food, i.e. having enough food to feed the exponentially growing global population, was a major concern (Erlich 1968). The Green Revolution, which heralded major advances in agricultural technology and a subsequent increase in grain production, especially in Asia, helped to assuage such fears (Wharton 1969). As the adequacy of the global food supply improved, focus shifted to the economic ability of individuals and families to access available food resources (Coates 2013). The work of Amartya Sen (1981) on poverty, entitlements, and hunger was instrumental in enacting this shift. Indeed, the definition of food security as access to sufficient food for a healthy, active life, adopted by the World Bank (Reutlinger 1986) a few years later, reflected this shift in emphasis. As Coates (2013) points out, this definition also reflected new concerns within the research community, namely access to sufficient caloric intakes among the world’s poor. It was not until the early 1990s, when the concept of utilization, defined as the ability of the individual or household to properly prepare, store, and metabolize food resources to gain access to nutrition, became part of the discussion, that nutritional concerns beyond caloric needs became part of the conversation surrounding food security (USAID 1992). Jones et al. (2013) argue that the domain of stability was previously implied by the phrase “at all times.”
<table>
<thead>
<tr>
<th>Availability</th>
<th>Access</th>
<th>Utilization</th>
<th>Stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global, National, or Regional-levels Affected</td>
<td>Household or Individual-level Affected</td>
<td>Household or Individual-level Affected</td>
<td>All levels can be Affected</td>
</tr>
<tr>
<td>Sufficient food supply to feed the population.</td>
<td>Ability to purchase available foods.</td>
<td>Intra-household food use or distribution, intra-individual metabolism.</td>
<td>Consistency of availability, access, and utilization of food.</td>
</tr>
</tbody>
</table>

**Figure 1.** The Four "Pillars" of Food Security

Coates (2013) describes the evolution of the term food security as applied to developed and developing settings as separate, but following a similar evolutionary course. For instance, in the early 1990s Radimer and colleagues (1990) began adopting ethnographic methods to understand the experience of food insecurity in the United States. Shortly thereafter, Maxwell (1996) began agitating for a concentration on the subjective experience of food insecurity in developing countries. This shift towards an emic perspective prompted the Life Sciences Research Office to integrate “the ability to acquire acceptable foods in socially acceptable ways” to its definition of food security (Life Sciences Research Office 1995). This addition was significant in its recognition of the argument of Radimer et al. (1990) that the common methods for measuring food insecurity at the time, such as income, participation in food assistance programs,
unemployment, dietary intake, and health and nutritional status, were all “indirect” measures. Such measures, according to the authors, neglected to measure the actual experience of food insecurity. Likewise, Maxwell (1996) argued that objective measurement of food security using quantitative data such as nutritional adequacy, measured as meeting caloric targets set by the WHO, omitted the equally important, qualitative aspects of food security involving cultural appropriateness, local food consumption patterns, and human dignity. In the end, he argued, “…nutritional adequacy is a necessary but not sufficient condition for food security” (Maxwell 1996, 159).

It was this shift towards an emic perspective and the understanding that food insecurity was a subjective experience which led to the development of the U.S. Household Food Security Survey Module (HFSSM). The HFSSM is an 18 question survey about household-level experiences and attitudes involving food, which is used to classify household-level food insecurity (USDA Economic Research Service 2012). The U.S. HFSSM inspired the creation and validation of similar instruments for use in other world regions, including the Latin American and Caribbean Food Security Scale, or ELCSA (Pérez-Escamilla et al. 2004), the instrument used in this study.

However, even with the high adoption rate of perceived measures of food security, much of the literature on this topic continues to focus on dietary sufficiency and nutritional status, while largely failing to address elements of the experience of food security related to food as culture. For instance, responses to the ELCSA, which has been validated across Latin America (Lynn et al. 2014, Jones et al. 2013), are commonly compared with nutritional outcomes, such as under- or over-weight (Shamah-levy 2014) or socioeconomic variables (Mundo-Rosas et al. 2014). On occasions when the
administration of a perceived instrument is complemented with qualitative data, the focus is rarely on the relationship between perceived food security and culturally-determined food preferences (Schuster et al. 2011).

**Dietary Composition**

Key to understanding the cultural component of food security is a firm understanding of the composition of people’s diets. Dietary composition can be studied in several ways, including the use of dietary recalls or food frequency questionnaires (FFQ). Dietary recalls, the method suggested by the FAO for calculating a Household Dietary Diversity Score (HDDS), typically ask the respondent, usually the female head of household, to list the foods eaten either by herself or all members of her household over the previous 24 hours (Kennedy, Ballard, and Dop 2011; Khan and Martorell 1997). Food frequency questionnaires, on the other hand, ask the respondent, answering either on behalf of herself or her household, to confirm whether specific food items were consumed within a set time period, often the past seven days (Torheim et al. 2003; Torheim et al. 2004). Such questionnaires must be tailored to the diet of each region, inquiring about as many foods as possible to ensure the completeness of the dietary record without overwhelming the respondent with an untenable number of questions (Hodgson, Hsu-Hage, and Wahlqvist 1994). Food frequency questionnaires have been used extensively by epidemiologists and other researchers concerned with nutritional sufficiency, as the method is easy and inexpensive to apply (Kristal, Peters, and Potter 2005).

Data collected, by either dietary recall or a FFQ, is then used to examine dietary variety, commonly referred to as dietary diversity. Dietary diversity is commonly used to
assess food security status, specifically as it relates to the quality and/or nutritional or energetic sufficiency of the diet as it has consistently been shown to represent a good proxy for actual dietary intakes and children’s nutritional status, measured via anthropometry (Ruel 2002). Dietary diversity has also been shown to correlate with socioeconomic factors commonly associated with food insecurity. No set definition of dietary diversity exists in cross cultural contexts, due to unique diets in different areas of the world, which creates challenges when trying to measure the same phenomenon cross-culturally (Jones et al. 2013).

Dietary diversity is often quantified by either raw counts of the number of foods eaten or aggregated measures of food groups eaten over a period of time, both of which can be measured at the individual or household-level, depending on the focus of the study (Kennedy et al. 2011). While measures of dietary diversity based on raw counts of foods eaten have been common since the 1980s, it was not until the early 1990s that aggregated scores came to be used to gauge dietary diversity (Ruel 2002). Kant and Thompson (1997) were among the pioneers of this method, grouping foods according to the USDA Food Guide Pyramid nutritional guidelines, and applying this method to their research in U.S.-based populations. Several derivations of this method exist, with most researchers tailoring the food groups to match the diet of the study population (Ruel 2002; Torheim et al. 2001). As Ruel (2002), points out aggregated scores have been shown to correspond more accurately to nutritional status than raw counts, making such categorizations important. With this in mind, the FAO released guidelines for the measurement of both individual and household-level dietary diversity, which includes recommendations for grouping foods to create aggregated scores (Kennedy et al. 2011)
Some of the most-cited research into the nutritional effects of dietary diversity come from Torheim and colleagues’ work in Mali. To carry out this work, Torheim et al. (2001) created a 7-day FFQ to measure the dietary diversity of individuals. This instrument was based on data collected about the local diet through focus groups and previous surveys of local dietary patterns. The original version of the instrument was then tested in three villages near the community where the focus groups were held and adjusted according to new information the questionnaire revealed about the local diet. The final version of the FFQ instrument contained 69 food items. Respondents who confirmed eating any given food were then asked to describe the times it was eaten daily and weekly, along with the average serving size. The method was then validated by comparison with data acquired through weighed and recalled dietary records for the same respondents. The FFQ data were subsequently used in other studies to calculate aggregated and disaggregated scores of dietary diversity, known as a Dietary Diversity Score (DDS) and Food Variety Score (FVS) respectively. The FVS is a simple count of the number of food items eaten during the test period, which in this case would be represented by a score between 0-69. The DDS, by contrast, is calculated by first aggregating foods into groups or categories. Torheim et al. (2003), for example, classified foods into 10 categories: cereals, legumes, oil and sugar, fruit, vegetables, meat, milk, fish, eggs, or green leaves in order to calculate this score. The DDS was thus assigned as the number of food groups eaten during the test period, as represented by a score between 0-10.

*Food and Culture: A Role for Nutritional Anthropology*
Nutritional anthropologists are in a unique position to combine the study of food security with a deep understanding of the cultural importance of food. As Mintz and DuBois (2002) point out, the literature on food in anthropology is quite deep, dating back to the 19th century. Indeed, the authors argue that food is such a widely explored topic within anthropology because, "next to breathing, eating is perhaps the most essential of all human activities, and one with which much of social life is entwined" (Mintz and DuBois 2002, 102). Lalonde (1992) points out that food is part of nearly all human celebrations and major events, from Passover to children's birthday parties. In this way food becomes about more than sustenance and survival, and meals come to encompass both a sensory experience and cultural expression.

Indeed, the connection between food and culture is so strong that Himmelgreen (2002) proposes that the motto of nutritional anthropology should be Brillat-Savarin's 1825 statement, "tell me what you eat and I will tell you who you are." As a discipline, nutritional anthropology is concerned with the intimate connections between culture, food, and biology. Much of food choice and avoidance, Himmelgreen (2002) argues, is culturally determined. Culture, in turn, is involved in a dialectical relationship with human biology, political economic forces, and the physical environment, such that you really are what you eat.

In this way, food forms a large part of our identity. Our food preferences, as well as our dietary realities, reveal aspects of our cultural identity, as well as our social and economic status. In fact, according to Bourdieu (1984), food is inextricably tied to social status and class. Taste in food, Bourdieu claims, is the preference most rooted in early experience. As such, it is the form of taste most associated with maternal care, which is
described by Bourdieu (1984, 79) as "the archetypal cultural good." These early experiences with food form the basis of our taste for life, including our propensities for specific flavors. Additionally, these early exposures form the basis of our food traditions and shape our *habitus*.

Bourdieu (1984) posits that when it comes to tastes in food, the primary determining factor is income. While cultural capital (Bourdieu 1986) also plays a role in shaping our dispositions toward food, economic capital plays the biggest role in determining diet. Indeed, in his 1984 study on taste Bourdieu describes that food choices change dramatically by level of socioeconomic status (SES). Bourdieu presents quantity and quality as antithetical conditions, which correlate with social status, such that the lower one’s status, the more priority is given to quantity, while those with greater means can focus on quality of food. Bourdieu links this opposition to what he calls "distances from necessity." Those without means, have tastes characterized by necessity, and favor the most economical foods - those which are both cost effective and filling. Thus Bourdieu labels these practical food choices “tastes of necessity.” By contrast, those with greater means are able to choose more luxurious fare, with the focus shifted from economy towards style and presentation. These food choices, made without the restriction of enforced thrift, are labeled “tastes of freedom” (Bourdieu 1984, 56).

Food preferences - and more importantly food choices - are then both the product and marker of social and economic status. Through taste, SES is literally embodied, both physiologically and psychologically, through the act of choosing, consuming, and assimilating food. Thus, as Bourdieu (1984, 190) argues, the body is the "most
indisputable materialization of class taste," which manifests through bodily dimensions (anthropometry), shapes, and maintenance.

There is, as Bourdieu (1984, 178) aptly notes, a tendency on the part of those not consigned to the lower classes to perceive all taste as taste of freedom, and those lower SES individuals as having a "pathological or morbid preference for (basic) essentials, a sort of congenital coarseness," which forms "the pretext for a class racism which associates the populace with everything heavy, thick and fat." However, this is a misguided notion, for as Bourdieu (1984, 178) so eloquently explains, "Taste is amor fati, the choice of destiny, but a forced choice, produced by conditions of existence which rule out all alternatives as mere daydreams and leave no choice but the taste for the necessary." Thus, it is SES which shapes the diet more than a person’s true food preferences. In order to avoid hunger, those with the lowest SES must choose economical, filling foods for their families. This is why it is so critical to ask, rather than assume, what people prefer to eat. This ethnographic undertaking is, of course, the realm of anthropologists, who have been probing the relationship between people and food for decades.

Examples of anthropological exploration of food are nearly endless. Human ecology studies within nutritional anthropology, such as Rappaport's (1967) classic study on the ritual cycle of pig raising and slaughtering among the Maring of New Guinea, helped to expand our understanding of the cultural aspects of the material systems of food production. Other research, such as Dufour’s (1989) explanation of the detoxifying effects of traditional methods of cassava processing, have shown that cultural knowledge
can form a crucial part of human food systems through the transmission of information necessary to adapt otherwise toxic plants to human needs.

Despite the depth of anthropological literature surrounding food, taste has not been as well explored. Much more has been done to study the nutritional status of people and adequacy of their diets, without regard for the fact that when they eat people make choices about foods, not nutrients. These choices are largely based in the cultural cuisine in which an individual has been steeped. Thus, early experiences with sour foods such as tamarind or spicy foods like chili peppers can, through the accumulation of positive social associations of eating them, become an exorable part of an individual’s food preferences (Messer 1984).

Lalonde (1992, 81) posits that the family is the major source of food enculturation, wherein our eating patterns are introduced and solidified, thereby creating "emotional and cognitive associations that extend into our adult life." These familial dietary patterns, in turn, are reflections of larger cultural and societal influences. Food and identity are, thus, closely linked.

Without a firm understanding of the ways in which tastes reflect culture and identity, Himmelgreen (2002) warns that food education and public health programs may fail due to lack of cultural savvy. Culture is a strong influencer of food decision-making and thus any efforts to improve nutritional outcomes must be culturally sound, for as Welsch (1971, as quoted in Lalonde 1992, 83) wrote, "It is clear from this that foods… transcend simple nourishment; they carry with them clear implications for the body and soul..."
In line with Himmelgreen’s (2002) warning described above, Koenig et al. (2012) argue that food choice is an under-recognized aspect of cultural identity, which when ignored, can lead to culturally tone-deaf medical care and advice. In a qualitative study of diet and health in Indian Americans, Koenig and colleagues found that a major issue subject’s had with the U.S. healthcare system was that recommendations about dietary change and weight management presumed that they ate like other Americans, a misguided and culturally insensitive assumption. A lack of understanding of the dietary patterns of this demographic led one doctor to recommend that his patient stay away from pizza and burgers, a prescription the patient described as "way off," as these are foods this demographic tends not to eat. Culture, according to the authors, was articulated for this participant through "his ability to make practical, normative dietary choices..."(Koenig et al. 2012, 823). Thus the consumption of traditional Indian foods was a way for him to assert and reaffirm his Indian cultural identity.

As a crucial component of human culture and identity, as well as the definition of food security, the study of food preference and the cultural acceptability of foods is critical to a full understanding of the experience of food insecurity. However, the link between food security status and access to culturally appropriate and preferred foods is terribly understudied within the food security literature (Coates et al. 2006). The few studies that do make use of this connection tend to do so within “othered” contexts, particularly minority groups such as migrant farm workers (Kilanowski 2010; Grauel and Chambers 2014) and Canadian First Nations.

For instance, Schuster et al. (2011) found that while the absence of caribou in the diet of the average Canadian of European descent may not be perceived as lacking,
among members of the First Nations of the Yukon, the lack of caribou – a traditional and highly valued food – may be deeply felt and contribute to feelings of food insecurity. The experience of having insufficient food to feed oneself or one’s family is distressing, but the inability to fully participate in a cultural norm, such as culturally ideal meals, may also lead to feelings of food insecurity.

Meal structure is also culturally dictated and intimately related to the meaning of the foods being consumed. For instance, Murrieta’s (2000) research among Caboclos in Brazil, found that both fruits and coffee were considered “non-food” items. This is not to say that they were not eaten, but rather that the meaning attributed to these consumables was not that of food, even though they contributed nutrients to the diet. Eating fruit, then, for Caboclos, is not the same as eating a meal. The meanings of these items dictate when they are eaten and define the context in which they are consumed.

Along the same lines, Dufour and colleagues (1997), held focus groups in which they asked women in Cali, Colombia about the meals that should ideally be eaten throughout the day. These inquiries uncovered that lunch was the most important meal and should contain meat, preferably beef. When beef was out of financial reach, it was acceptable to substitute pork, chicken, or fish. When these stand-in foods were beyond the budget, egg or viscera were viewed as viable, if less desirable, substitutes. In times of extreme want, lunch could be served without any animal foods, although lunch without animal protein failed to meet the cultural standard of a complete meal. Through ethnography, Dufour et al. (1997a) discovered that without meat, lunch is incomplete, with some meats being more desired and culturally acceptable in meeting this standard than others.
Nutritional sufficiency, then, is not equivalent to cultural sufficiency. Indeed, Dufour et al. (1997a) found that on 17.1% of all days their study participants were unable to meet the cultural standard of having meat or fish with their midday meal. However, perhaps because of the substitution of eggs and viscera for idealized protein sources, no significant difference was found in either total protein or animal protein intake on such days. This substitution strategy, in other words, may help to maintain nutritional adequacy, but would not meet cultural standards for a sufficient meal. Thus, the lack of meat or fish represents not a nutritional hazard, but rather a cultural one. Food insecurity, as part of its definition, is a subjective experience, which can be felt as a lack of food or, in this case, as an inability to fully observe cultural norms regarding food.

Dufour and colleagues (1997a, 1997b) are unfortunately the exception rather than the rule, with few, if any other, studies taking a similar approach. In fact, I was unable to find any other study examining the issue of access to culturally mandated or preferred foods within the context of Latin America. Most studies of food security in Latin Americans focus on the nutritional status of the population or sufficiency of the diet (Shamah-levy 2014), dietary change as the result of migration (Dhokarh et al. 2011; Himmelgreen et al. 2004; Himmelgreen et al. 2007; Grauel and Chambers 2014) or globalization (Himmelgreen et al. 2014), the relationship of household demographics to diet (Cantor 2013; Mundo-Rosas et al. 2014), and mental health (Piperata et al. 2016). While these are all worthwhile topics, it seems odd that dietary preference, a fundamental part of the experience of food insecurity, is so commonly ignored.

In short, dietary preference, an integral part of cultural identity, presents an understudied topic of no small importance for the experience of food insecurity. I argue
that this intersection between diet and culture is an area where nutritional anthropologists can contribute a great deal, as we are uniquely qualified to study the biocultural aspects of diet. Additionally, it is an area that requires further study for, as Barrett (2010, 826) writes, “Measurement drives diagnosis and response.” A continued lack of measurement of food preference and taste will only perpetuate a cycle of nutritional interventions which ignore this issue.

Summary

The cultural aspects of food insecurity generally, and taste and food preference in particular, are understudied. Most studies that aim to understand the cultural components of the experience of food insecurity do so within minority or “othered” populations. In this study, I aim to address this gap in the literature using data collected from homes within both urban and rural areas, and spanning the socioeconomic spectrum within the municipality of León, Nicaragua with the aim of understanding how the cultural ideals of meal composition and the meaning of individual foods, combined with limited access among some households, helps explain variation in women’s perceptions of household-level food security.

Study Objectives

This study addresses the lack of reference to culture and food preference in the study of food security. Using both quantitative and qualitative data, I seek to understand the biocultural, dialectic relationship between food security, diet, and cultural participation. To this end, I tested the following hypotheses:
H1: There is a negative relationship between perceived household-level food insecurity and household-level dietary diversity.

H2: Perceived food security status is related to the consumption of specific foods.

A further aim of this study was to use qualitative data to identify the cultural meaning of foods in the local diet. I used these data to address the following research question:

Q1: How does the cultural meaning of food shape women’s perceptions of their households’ food security status?
Materials and Methods

Study Location

To test my study hypotheses and explore my research question, I utilized data from the Study of Food Insecurity and Maternal/Child Health initiated in 2012. This larger study aimed to understand the connections between household resources, food security, and maternal and child health in households with young children in the municipality of León, Nicaragua (Schmeer et al. 2015). Nicaragua is the poorest country in Central America and the second poorest country in the Western Hemisphere (CIA 2017). As of 2009, 46% of the population was living on less than US $1 per day, while 15% subsisted on less than US $0.50 each day (Dhur 2009). These high rates of poverty limit household access to food, making food insecurity a critical national issue. Indeed, the most recent USAID report on Nicaragua states that the “principal food security problem in Nicaragua is access to food, as a result of widespread poverty” (Sahley et al. 2005, 23). As of 2009 it was estimated that roughly 30% of the Nicaraguan population was undernourished (Dhur 2009), defined by the FAO (2015) as the inability to access sufficient calories to meet daily energy requirements.
León was chosen as the locale for this study, for several reasons. First, it provided an opportunity to collaborate with researchers at the National Autonomous University of Nicaragua at León (UNAN-León) who have extensive expertise in health and demography research. Second, the existence of Latin America’s only Health and Demographic Surveillance System (HDSS) provided the necessary infrastructure and a sampling frame to support the study.

Situated near the Pacific coast of Nicaragua, within the Department of the same name, León is the second largest municipality in Nicaragua. The municipality has a population of 201,100 (Instituto Nacional de Información de Desarrollo 2012), 70% of whom live in urban areas, and is home to the original campus of UNAN, which was established in 1813. Of the urban populous 40% lives in poverty, while in rural areas 70% of the population is impoverished (Instituto Nacional de Información de Desarrollo 2006). Food insecurity in the region is thought to be more moderate than in eastern areas of Nicaragua (Dumazer and Castillo 2008), however the disastrous legacy of the cotton agro-industry has left the region with virtually no subsistence farming tradition. Indeed, this study found that 97% and 86% of all food consumed is purchased, in urban and rural households, respectively.
This study targeted households with young children (3.0 – 10.9 years). No longer nutritionally buffered by breastmilk, but still highly dependent on the household for food. Children in this age range are particularly vulnerable to the effects of food insecurity (Schmeer and Piperata 2016; Jyoti et al. 2005). Unmet nutritional needs during this critical period of growth and development can have both physical and social consequences later in life (Herman et al. 2014). Thus, food insecurity in households with young children is of particular concern.

The study sample was randomly selected from the 10,994 households that make up the HDSS-León sampling frame (Peña et al. 2008). The HDSS provided representative data for the municipality of León, as collected by the Center for Health and Demographic Research (CIDS) at UNAN-León. The HDSS-León was initiated in 1993, and includes information on demography, migration, household infrastructure, and education (Peña et al. 2008). However, rapid population growth within the municipality over time made the original sample less representative. For example, between 2002 to 2012 the population of the municipality of Léon grew by nearly 25,000 individuals (Peña et al. 2008; Instituto Nacional de Información de Desarrollo 2012). Thus, in order to maintain a representative sample of the population, the area was resampled in 2009. This refreshed sample served as the sampling frame for this study.

In collaboration with statisticians from CIDS, a power analysis was conducted estimating levels of food insecurity at 50% and an error rate of 5%. An additional 10% was added to account for the cluster design effect and 15% for potential non-response. This yielded a target sample of 500 households.
between the ages of 3.0 and 10.9 years, 500 households were randomly selected from the refreshed 2009 sampling frame. The urban/rural boundaries of the municipality were drawn in 1993. As the urban area has expanded since that time, the researchers oversampled the rural zone (n=200) to ensure the adequate representation of rural households in the final sample. Of the 500 households, 45 were either nonresponsive or did not meet the criteria of the study. This resulted in a final sample size of 455 households (268 urban, 187 rural).

**Quantitative Data Collection**

The data I utilize here were collected as part of a 7-module survey. The first module included data on household demography and infrastructure (access to water, electricity and improved sanitation, as well as home building materials). The second module consisted of questions regarding household economy, including household resources (e.g., livestock, and other assets), gender dynamics (e.g., who makes the important decisions?), income, and spending habits. The third module was the 15-question Latin American and Caribbean Food Security Measurement Scale (ELCSA), which was used to measure perceived food security. The national Nicaraguan Food Frequency Questionnaire (FFQ) made up the fourth module of the survey. This module collected data on household-level consumption patterns. The fifth module consisted of questions regarding maternal and child health. Finally, the sixth and seventh modules recorded anthropometric measurements of the mother and child, respectively (e.g., height, sitting height, weight, and anemia status).

During the summer of 2012, researchers from The Ohio State University, in collaboration with colleagues from CIDS, selected and trained five teams of local
interviewers. Each team was comprised of one nurse and one social worker, all of whom were local women. The researchers trained each team in research ethics, the administration of the survey, gathering anthropometric data, and field testing for anemia. The Nicaraguan team members also assisted in the development of the survey instrument, including the phrasing of survey questions and a review of the foods included in the FFQ. Researchers also trained a field coordinator and a team of data entry personnel in quality control procedures and data entry protocols. The finalized survey instrument was validated and field tested in a randomly-selected sample of households located in the study area but not included in the final study sample.

The mother within each household was the targeted respondent to the survey instrument. An alternative respondent was used in cases where the mother was absent or not the person primarily responsible for food preparation.

**Food Security**

A locally validated version of the ELCSA was used to gauge perceived household food security. The questions that comprise the ELCSA instrument were derived from the USDA HFSSM (FAO 2012). The ELCSA is one of many international adaptations of the USDA HFSSM (Melgar-Quiñónez and Hackett 2008) and has been validated across Latin America (Coates 2015; Jones et al. 2013). The 15 questions posed by the ELCSA (see Table 1) pertain to household experiences and concerns regarding food scarcity due to lack of money or resources in the previous three months.
### Table 1. The 15-Questions of the Latin American and Caribbean Food Security Measurement Scale Instrument in Spanish and English

<table>
<thead>
<tr>
<th>Spanish</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>En los últimos 3 meses, por falta de dinero u otros recurso…</td>
<td>In the last 3 months, for lack of money or other resources…</td>
</tr>
<tr>
<td>1. ¿usted se ha preocupado de que la comida se acabara?</td>
<td>have you been worried that the food would run out?</td>
</tr>
<tr>
<td>2. ¿se quedaron sin comida?</td>
<td>have you gone without food?</td>
</tr>
<tr>
<td>3. ¿no obtuvieron una alimentación sana?</td>
<td>have you been unable to obtain a healthy diet?</td>
</tr>
<tr>
<td>4. ¿usted o algún adulto en su hogar tuvo una alimentación basada en muy poca variedad de alimentos?</td>
<td>have you or another adult in your house had a diet with little variety?</td>
</tr>
<tr>
<td>5. ¿usted o algún adulto en su hogar dejó de desayunar, almorzar o cenar?</td>
<td>have you or another adult in your house gone without breakfast, lunch, or dinner?</td>
</tr>
<tr>
<td>6. ¿algún adulto en su hogar comió menos de lo que Usted piensa que debía de comer?</td>
<td>has an adult in your house eaten more than you think they should?</td>
</tr>
<tr>
<td>7. ¿usted o algún adulto de este hogar sintió hambre pero no comió?</td>
<td>have you or another adult in your house felt hungry without eating?</td>
</tr>
<tr>
<td>8. ¿usted o algún adulto en su hogar solo comió una vez al día o dejó de comer todo un día?</td>
<td>have you or another adult in your house eaten only once a day or not at all?</td>
</tr>
<tr>
<td>9. ¿algún menor de 18 años en su hogar dejó de tener una alimentación sana?</td>
<td>has a minor under age 18 in your house not had a healthy diet?</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>¿algún menor de 18 años en su hogar tuvo una alimentación basada en muy poca variedad de alimentos?</td>
<td>has a minor under age 18 in your house had a basic diet with little variety?</td>
</tr>
<tr>
<td>11</td>
<td>¿algún menor de 18 años en su hogar dejó de desayunar, almorzar o cenar?</td>
<td>has a minor under age 18 in your house gone without breakfast, lunch, or dinner?</td>
</tr>
<tr>
<td>12</td>
<td>¿algún menor de 18 años en su hogar comió menos de lo que debía?</td>
<td>has a minor under age 18 in your house eaten less than you think they should?</td>
</tr>
<tr>
<td>13</td>
<td>¿tuvieron que disminuir la cantidad servida en las comidas a algún menor de 18 años del hogar?</td>
<td>have you had to decrease the quantity of food served to a minor under age 18 in your house?</td>
</tr>
<tr>
<td>14</td>
<td>¿algún menor de 18 años sintió hambre pero no comió?</td>
<td>has a minor under age 18 felt hungry but gone without eating?</td>
</tr>
<tr>
<td>15</td>
<td>¿algún menor de 18 años solo comió una vez al día o dejó de comer todo un día?</td>
<td>has a minor under age 18 eaten only once a day or not at all?</td>
</tr>
</tbody>
</table>

The FAO (2012) guide for the use of the ELCSA stratifies households into 4 levels of food security defined by the number of affirmative responses to the instrument’s 15 questions. Food secure households are classified by no affirmative responses to any ELCSA questions, while households experiencing low food insecurity are those that answer 1-5 questions affirmatively. Affirmative responses to 6-10 of the questions classify a household as moderately food insecure, and severe food insecurity is indicated by affirmative responses to 11 or more of the 15 ELCSA questions (FAO 2012).

**Dietary Diversity**
For this study, I measured dietary diversity using the FFQ data. The FFQ was comprised of 48 individual foods. For each food, interviewers asked respondents whether the food had been consumed within the home in the last seven days. Affirmative responses were coded as “1” and negative responses were coded as “0”. Interviewers followed each affirmative response with a second question regarding the number of days in the previous week that the food was consumed. Responses to this question were coded as a number between 1 and 7, corresponding to the number of days the food was consumed. Thus, each household could answer affirmatively to 0-48 questions regarding the consumption of the listed foods. Each food was then specified as being eaten on 0-7 days within the past week.

**Quantitative Data Analysis**

I used the data described above to test my two research hypotheses:

H1: There is a negative relationship between perceived household-level food insecurity and household-level dietary diversity.

H2: Perceived food security status is related to the consumption of specific foods.

To test Hypothesis 1, I first categorized households based on their food security status (secure, mildly insecure, moderately insecure or severely insecure) following the FAO guidelines described above. I then calculated a food variety score (FVS) for each household utilizing the FFQ data to identify how many of the 48 listed foods were eaten over the previous seven days. To calculate the dietary diversity score (DDS), I first grouped the 48 foods that comprised the FFQ into twelve food categories, based upon the FAO standards for the measurement of household dietary diversity (Kennedy, Ballard, and Dop 2011). These groupings are outlined below in Table 2. I then assigned each
household a DDS from 0-12 corresponding with the number of food groups consumed
during the previous 7-day period.

Table 2. The Nicaraguan Food Frequency Questionnaire Foods Grouped by the United
Nations Food and Agriculture Organization Categorization Household Dietary Diversity
Categories

<table>
<thead>
<tr>
<th>Food Group</th>
<th>FFQ Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>Corn tortilla, corn flour, rice, pasta, bread, hot cereal, breakfast</td>
</tr>
<tr>
<td></td>
<td>cereal, other cereals, pinolillo and other grain-based beverages, cosa</td>
</tr>
<tr>
<td></td>
<td>de horno and sopa de leche</td>
</tr>
<tr>
<td>White tubers and roots</td>
<td>Potatoes, yuca, plantains</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Sweet potatoes, salsa vegetables, tomatoes, bell peppers and chiles,</td>
</tr>
<tr>
<td></td>
<td>leafy greens, yellow vegetables, other vegetables</td>
</tr>
<tr>
<td>Fruits</td>
<td>Bananas, peach palm, coconut, yellow fruits, citrus fruits, other</td>
</tr>
<tr>
<td></td>
<td>fruits</td>
</tr>
<tr>
<td>Meat</td>
<td>Red meats, beef liver, chicken and rabbit, beef organs, chicken and</td>
</tr>
<tr>
<td></td>
<td>rabbit organs</td>
</tr>
<tr>
<td>Eggs</td>
<td>Eggs</td>
</tr>
<tr>
<td>Fish and other seafood</td>
<td>Fish and other seafood</td>
</tr>
<tr>
<td>Legumes, nuts and seeds</td>
<td>Beans</td>
</tr>
<tr>
<td>Milk and milk products</td>
<td>Powdered milk, milk, cheese, sour cream</td>
</tr>
<tr>
<td>Oils and fats</td>
<td>Oils, butter and margarine</td>
</tr>
</tbody>
</table>

(Continued)
Table 2. Continued

<table>
<thead>
<tr>
<th>Sweets</th>
<th>White sugar, brown sugar and honey, sweets and desserts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spices, condiments and beverages</td>
<td>Fruit-flavored sweetened beverages (e.g. Tang), sodas,</td>
</tr>
<tr>
<td></td>
<td>beer, liquor, coffee</td>
</tr>
</tbody>
</table>

To identify differences in FVS and DDS between households of different levels of food security status, I used a Kruskal-Wallis non-parametric ANOVA. I tested the directionality of the relationship using a Spearman’s non-parametric correlation model.

I also used a quantitative analysis to test my second hypothesis:

H2: Perceived food security status is related to the consumption of specific foods.

To test this hypothesis, I utilized an ordinal regression model, wherein the number of days each food was eaten on the FFQ was set as the independent variable, while food security status was tested as the dependent variable.

Qualitative Data Collection

To address my research question:

Q1: How does the cultural meaning of food shape women’s perceptions of their households’ food security status?

I drew upon data collected via focus group interviews.

Dietary Preferences in the Food Security Experience

The research team collected qualitative data on dietary ideals, food preferences, and notions of healthy foods via six focus group discussions (FGD) with mothers of young children between the ages of 3.0-10.9 years living within the study area, but
outside of the sampling frame of the HDSS. Three of the focus groups were held in rural areas and three in urban zones. Rural groups were convened in private rooms at local health clinics while urban FGDs were held in a conference room at ULAN-Léon.

Between 8-13 participants took part in each of the six FGDs, resulting in a total of 45 participants. Community leaders and public health clinic workers facilitated the recruitment of study participants. Researchers from OSU and UNAN-León jointly led these focus groups (Piperata et al. 2016).

FGD leaders used a semi-structured interview guide to facilitate the discussion. Discussion topics included, “cross-cultural domains of FI (worry, perceptions of food quality, experiences with inadequate quantity of food, and coping strategies including socially unacceptable means of obtaining food) (see Coates et al. 2006), definitions of a healthy diet, women’s responsibilities and daily work patterns, ideals regarding social support, family and, living conditions” (Piperata et al. 2016, 12). Of particular relevance for this thesis were questions including, “Have you sometimes felt that you could not permit yourselves the luxury of eating well? Can you describe what that looked like in your house? What were your meals lacking?” This series of questions aimed to elicit notions of culturally appropriate and ideal meals. Other topics explored in the focus groups that were of interest for this project included the desirability of certain foods over others, the perceived healthiness of foods, and access to preferred foods.

Each focus discussion group lasted approximately two hours. The conversations were digitally recorded and transcribed by a Nicaraguan nurse. Participant names were not used in the transcription. The focus group transcripts were not translated, thus I analyzed the qualitative data in the original Spanish.
**Qualitative Data Analysis**

Focus group discussions were analyzed using qualitative content analysis (Bernard 2006). Specifically, I first identified each passage within the FGD data referring to a specific food, with particular attention paid to foods whose consumption was found to be significantly associated with food security status by the ordinal regression. Next, I coded each passage about these foods according to the context of the discussion. For instance, passages about meat were lumped together, then grouped according to the context in which the food was mentioned. Passages identifying meat as part of an ideal lunch, for example, were grouped separately from passages wherein the lack of meat in the diet was lamented. I grouped passages with similar contexts together and reexamined the passages as a group to determine any underlying meanings. Groups with similar underlying meanings were then grouped into larger categories. Finally, by considering the similarities in the meanings between categories, I determined the overall cultural meaning of each food.

The results of the FGD data analysis were then used to aid in the interpretation of the quantitative results, by providing the cultural context for the observed differences in food consumption patterns between households at differing levels of food insecurity.

**Ethics**

This study was carried out in accordance with the Declaration of Helsinki guidelines (World Medical Association 2001). All research involving human subjects was approved by the Institutional Review Board at the Ohio State University and the Medical School ethics committee at the National Autonomous University of Nicaragua – León. Each respondent to the household survey gave informed verbal consent, as
witnessed and recorded by the interview team. Subjects were reminded throughout the interview of their right to refuse to respond any question and end the interview at their discretion.

Researchers reminded FGD participants at the start of each discussion of the importance of keeping the information discussed within the group confidential. Subjects were informed that, due to the nature of the focus groups, the researchers could not guarantee the confidentiality of the information they shared. Participants were also reminded that they had the right to refrain from participating in any part of the conversation and were free to leave the group discussion at any time.
Results

Characteristics of study participants

Table 3. Sociodemographic and Household Characteristics of Study Participants

<table>
<thead>
<tr>
<th></th>
<th>Full Sample (n=455)</th>
<th>Urban (n=268)</th>
<th>Rural (n=187)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>1.9%</td>
<td>3.0%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Married</td>
<td>41%</td>
<td>42.2%</td>
<td>39.0%</td>
</tr>
<tr>
<td>Separated</td>
<td>17%</td>
<td>20.1%</td>
<td>12.3%</td>
</tr>
<tr>
<td>Domestic Partnership</td>
<td>38%</td>
<td>32.5%</td>
<td>45.5%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 5 years</td>
<td>4.2%</td>
<td>1.9%</td>
<td>7.5%</td>
</tr>
<tr>
<td>6-10 years</td>
<td>35.2%</td>
<td>22.5%</td>
<td>53.5%</td>
</tr>
<tr>
<td>11-15 years</td>
<td>35%</td>
<td>45.2%</td>
<td>20.4%</td>
</tr>
<tr>
<td>≥ 1 years University</td>
<td>7.8%</td>
<td>10.8%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Professional training</td>
<td>12.3%</td>
<td>19.4%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Illiterate</td>
<td>4.2%</td>
<td>0.0%</td>
<td>10.2%</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>18.5%</td>
<td>22.8%</td>
<td>12.3%</td>
</tr>
<tr>
<td>2</td>
<td>40.2%</td>
<td>42.9%</td>
<td>36.4%</td>
</tr>
<tr>
<td>3</td>
<td>21.9%</td>
<td>18.3%</td>
<td>27.3%</td>
</tr>
<tr>
<td>4</td>
<td>7.9%</td>
<td>8.2%</td>
<td>7.5%</td>
</tr>
<tr>
<td>5-9</td>
<td>4.2%</td>
<td>2.2%</td>
<td>6.4%</td>
</tr>
<tr>
<td><strong>Pregnant</strong></td>
<td>3.0%</td>
<td>2.1%</td>
<td>3.7%</td>
</tr>
<tr>
<td><strong>Household Size</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-5</td>
<td>28.1%</td>
<td>19.4%</td>
<td>40.7%</td>
</tr>
<tr>
<td>6-10</td>
<td>45.1%</td>
<td>48.5%</td>
<td>40.1%</td>
</tr>
<tr>
<td>&gt;10</td>
<td>26.8%</td>
<td>31.9%</td>
<td>19.1%</td>
</tr>
<tr>
<td><strong>Rooms</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>34.3%</td>
<td>25.7%</td>
<td>46.5%</td>
</tr>
<tr>
<td>2</td>
<td>34.1%</td>
<td>32.5%</td>
<td>36.4%</td>
</tr>
<tr>
<td>3</td>
<td>19.6%</td>
<td>25.7%</td>
<td>10.7%</td>
</tr>
<tr>
<td>4</td>
<td>8.6%</td>
<td>10.8%</td>
<td>5.3%</td>
</tr>
<tr>
<td>5-8</td>
<td>3.5%</td>
<td>5.2%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

(Continued)
To understand the household dynamics, including socioeconomic status, responses to a number of questions related to demographics, education, and household resources were recorded as part of the survey instrument (see Table 3). The average age of study participants was 33, with a mean age of 32 for urban subjects and 33 for rural subjects.
My analysis revealed that approximately 41% of participants were married, an additional 38% were living in domestic partnerships, and another 17% were separated. A greater percentage of rural women were living in a domestic partnership than urban women, while a greater percentage of urban women were married than rural women.

Rates of education varied widely, with the majority of rural women (53.5%) having completed 10 or fewer years of school, while nearly half (45.2%) of urban women had completed 11-15 years of school. Additionally, a greater percentage of urban women reported having some higher education or professional training than rural women. Just over 10% of rural women reported being illiterate, while none of the urban sample reported an inability to read.

The majority of the urban sample reported having 1 or 2 children (just over 65%) and over 70% of rural women had 1-3 children. Household size varied greatly, ranging from 3 inhabitants to greater than 15. In fact, 31.9% of urban and 19.1% of rural respondents lived in a household with 10 or more residents. Moreover, 85.5% of all subjects lived in households with 5 or more residents, however few lived in houses with more than three rooms. In fact, more than half (58.2%) of urban subjects lived in houses with 1 or 2 rooms and nearly half (46.5%) of rural subjects lived in houses of just one room.
Table 4. Anthropometric Characteristics of Study Participants

<table>
<thead>
<tr>
<th></th>
<th>Total Sample Mean (n=454)</th>
<th>Std. Dev.</th>
<th>Rural Mean (n=187)</th>
<th>Std. Dev.</th>
<th>Urban Mean (n=267)</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>154.7</td>
<td>5.6</td>
<td>155.3</td>
<td>5.8</td>
<td>154.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>68.0</td>
<td>14.6</td>
<td>67.5</td>
<td>15.2</td>
<td>68.3</td>
<td>14.1</td>
</tr>
<tr>
<td>BMI</td>
<td>28.3</td>
<td>5.9</td>
<td>27.9</td>
<td>5.8</td>
<td>28.6</td>
<td>5.9</td>
</tr>
<tr>
<td>Anemia</td>
<td>27%</td>
<td>N/A</td>
<td>28.9%</td>
<td>N/A</td>
<td>26.4%</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 4 reports basic anthropometric data on the women included in the sample. The average BMI of women in this sample was 28.30, which, according to the WHO (2000) falls within the “pre-obese” category of overweight. Rural women were found to have an average BMI below that of the full sample with a mean BMI of 27.94. Urban women, meanwhile, had an average BMI of 28.6, slightly above the mean for the full sample (see Table 4 for standard deviations). Field anemia testing showed that 27% of participating mothers had some form of anemia. Rates of anemia were slightly higher for rural mothers (28.9%) than urban mothers (26.4%).

**Household Infrastructure and Assets**

The majority of participants’ houses had walls made of cement or brick (83.5%). Floor type varied, with dirt floors being most popular (36%; 17.2% urban, 63.1% rural), followed by cement brick (27.7%; 44.4% urban, 3.7% rural), and tile (25.7%). The vast majority of households (98%) had access to electric lighting. Many also had access to either piped water within the home (69%; 97.8% urban, 27.8% rural) or their own well (16.9%; 1.5% urban, 39.0% rural).
In terms of assets, 77.1% of the women owned a radio and 92.5% owned a television. The majority (57.6%; 83.2% urban, 20.9% rural) had access to a gas or electric stove. While 47.3% of women used gas as their main source of cooking fuel, the majority relied upon firewood. This was particularly the case in rural areas, where 86.1% of women reported using firewood as their main source of fuel. Women in urban households were more reliant on gas (70.9%) for cooking. Less than half of the women owned a refrigerator (63.4% urban, 26.2% rural) and only ~10% (17.9% urban, 0.5% rural) had a washing machine. While only 17.1% (28% urban, 1.6% rural) of women reported owning a computer, 88.4% had a cell phone. Fewer than 10% of respondents (13.8% urban, 2.1% rural) owned a car.

**Income and Expenditures**

For the many women, the major source of income in their households was a husband or partner’s salary (47.5%). However, just over half of the women (53.2%) reported being employed outside the home. In addition, over half (59.6%) of women stated that they were the principle money managers in their households. Few respondents (5.5%) reported receiving any government aid. Remittances were also uncommon, with only 14% of women reporting the receipt of remittances from family members living elsewhere. The receipt of remittances was more common among women in urban zones than those living in rural areas (18.7% vs. 8%).

The majority of respondents (56.4%) reported spending 75-100% of their household income on food. Just over a quarter of women reported buying food daily, and 21.3% bought groceries once a week. An additional 32.5% purchased food bi-monthly and just under 17% reported shopping for food only once a month. A greater percentage
of urban women purchased their groceries daily (34.7% vs. 13.4%), while more rural residents shopped bi-monthly (42.8% vs. 25.4%).

**Food Security Status**

Table 5 summarizes the food security status of the sample households. Just under a quarter (24.6%) of participant households were food secure, while nearly half (49.7%) reported being mildly food insecure. Moderately food insecure households made up 14.9% of the sample. The remaining 10.8% of households were severely food insecure.

Table 5. Household Food Security Status Classification by Number of Affirmative Answers to the 15 Questions of the Latin American and Caribbean Food Security Measurement Scale Instrument

<table>
<thead>
<tr>
<th>Food Security Status</th>
<th>Total</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total N = 455</td>
<td>24.6%</td>
<td>26.9%</td>
<td>21.4%</td>
</tr>
<tr>
<td>Food Secure (0 affirmative answers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mildly Food Insecure (1-5 affirmative answers)</td>
<td>49.7%</td>
<td>56.0%</td>
<td>40.6%</td>
</tr>
<tr>
<td>Moderately Food Insecure (6-10 affirmative answers)</td>
<td>14.9%</td>
<td>11.6%</td>
<td>19.8%</td>
</tr>
<tr>
<td>Severely Food Insecure (11-15 affirmative answers)</td>
<td>10.8%</td>
<td>5.6%</td>
<td>18.2%</td>
</tr>
</tbody>
</table>

Urban households were more food secure than rural households. For instance, nearly 27% of urban households reported being food secure compared to 21% of rural households. Furthermore, the rate of severe food insecurity was three times higher in the rural sample.
**Food Variety and Dietary Diversity**

Descriptive statistics on the 48 individual foods included in the food frequency questionnaire (FFQ) are reported in Table 6.

**Table 6.** Number of Households Eating Each of the 48 Foods on the Food Frequency Questionnaire with Number of Days Eaten

<table>
<thead>
<tr>
<th>Food</th>
<th>Households Consuming</th>
<th>Average # Days Eaten</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn tortillas</td>
<td>90.1%</td>
<td>5.9</td>
<td>2.51</td>
</tr>
<tr>
<td>Corn Flour</td>
<td>5.5%</td>
<td>3.8</td>
<td>1.03</td>
</tr>
<tr>
<td>Rice</td>
<td>100%</td>
<td>6.8</td>
<td>0.72</td>
</tr>
<tr>
<td>Pasta</td>
<td>45.7%</td>
<td>1.7</td>
<td>1.11</td>
</tr>
<tr>
<td>Bread</td>
<td>90.8%</td>
<td>5.7</td>
<td>2.57</td>
</tr>
<tr>
<td>Hot Cereal</td>
<td>60%</td>
<td>4.9</td>
<td>2.97</td>
</tr>
<tr>
<td>Breakfast Cereal</td>
<td>26.8%</td>
<td>5.4</td>
<td>2.63</td>
</tr>
<tr>
<td>Other Cereals</td>
<td>6.8%</td>
<td>3.5</td>
<td>1.09</td>
</tr>
<tr>
<td>Pinolillo</td>
<td>81.8%</td>
<td>4.5</td>
<td>2.69</td>
</tr>
<tr>
<td>Sopa de Leche</td>
<td>19.6%</td>
<td>2</td>
<td>0.99</td>
</tr>
<tr>
<td>Plantains</td>
<td>58.2%</td>
<td>3</td>
<td>2.06</td>
</tr>
<tr>
<td>Potatoes</td>
<td>46.2%</td>
<td>1.8</td>
<td>1.18</td>
</tr>
<tr>
<td>Root Vegetables</td>
<td>50.8%</td>
<td>1.7</td>
<td>1.17</td>
</tr>
<tr>
<td>Eggs</td>
<td>80.4%</td>
<td>3.4</td>
<td>2.18</td>
</tr>
<tr>
<td>Red Meat</td>
<td>64.4%</td>
<td>2.6</td>
<td>1.76</td>
</tr>
</tbody>
</table>

(Continued)
Table 6. Continued

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Percentage</th>
<th>Score</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef Liver</td>
<td>20.2%</td>
<td>1.4</td>
<td>0.65</td>
</tr>
<tr>
<td>Poultry</td>
<td>84%</td>
<td>3</td>
<td>1.96</td>
</tr>
<tr>
<td>Red Meat Organs</td>
<td>6.2%</td>
<td>1.5</td>
<td>0.47</td>
</tr>
<tr>
<td>Poultry Organs</td>
<td>16.9%</td>
<td>1.6</td>
<td>0.76</td>
</tr>
<tr>
<td>Sea Food</td>
<td>46.4%</td>
<td>1.6</td>
<td>1.12</td>
</tr>
<tr>
<td>Beans</td>
<td>97.8%</td>
<td>5.5</td>
<td>2.16</td>
</tr>
<tr>
<td>Powdered Milk</td>
<td>46.8%</td>
<td>6.4</td>
<td>3.38</td>
</tr>
<tr>
<td>Milk</td>
<td>60.2%</td>
<td>4.8</td>
<td>3</td>
</tr>
<tr>
<td>Cheese</td>
<td>92.1%</td>
<td>4.5</td>
<td>2.42</td>
</tr>
<tr>
<td>Sour Cream</td>
<td>52.5%</td>
<td>2.2</td>
<td>1.58</td>
</tr>
<tr>
<td>Sweet Potato</td>
<td>0.4%</td>
<td>1.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Salsa Vegetables</td>
<td>94.3%</td>
<td>6.6</td>
<td>1.97</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>95.4%</td>
<td>5.6</td>
<td>2.33</td>
</tr>
<tr>
<td>Peppers</td>
<td>82.9%</td>
<td>6.3</td>
<td>2.78</td>
</tr>
<tr>
<td>Leafy Vegetables</td>
<td>3.1%</td>
<td>3.6</td>
<td>0.77</td>
</tr>
<tr>
<td>Orange Vegetables</td>
<td>42%</td>
<td>2.3</td>
<td>1.54</td>
</tr>
<tr>
<td>Other Vegetables</td>
<td>60.4%</td>
<td>2.4</td>
<td>1.78</td>
</tr>
<tr>
<td>Bananas</td>
<td>73.8%</td>
<td>3.3</td>
<td>2.29</td>
</tr>
<tr>
<td>Peach Palm</td>
<td>0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Coconut</td>
<td>17.8%</td>
<td>1.8</td>
<td>0.93</td>
</tr>
<tr>
<td>Yellow Fruits</td>
<td>50.5%</td>
<td>3</td>
<td>2.08</td>
</tr>
</tbody>
</table>

(Continued)
Table. Continued

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
<th>FVS</th>
<th>DDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus Fruits</td>
<td>65.5%</td>
<td>4.2</td>
<td>2.73</td>
</tr>
<tr>
<td>Other fruits</td>
<td>78.2%</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>Oils</td>
<td>99.8%</td>
<td>6.9</td>
<td>0.64</td>
</tr>
<tr>
<td>Butter and Margarine</td>
<td>30.5%</td>
<td>3.3</td>
<td>1.95</td>
</tr>
<tr>
<td>White Sugar</td>
<td>75.8%</td>
<td>6.7</td>
<td>3.02</td>
</tr>
<tr>
<td>Brown Sugar or Honey</td>
<td>25.9%</td>
<td>6.3</td>
<td>2.9</td>
</tr>
<tr>
<td>Sweets and Desserts</td>
<td>20.2%</td>
<td>3.2</td>
<td>1.66</td>
</tr>
<tr>
<td>Fruit Drinks</td>
<td>48.8%</td>
<td>3</td>
<td>2.03</td>
</tr>
<tr>
<td>Sodas</td>
<td>65.3%</td>
<td>3.2</td>
<td>2.35</td>
</tr>
<tr>
<td>Beer</td>
<td>1.8%</td>
<td>1.3</td>
<td>0.17</td>
</tr>
<tr>
<td>Liquor</td>
<td>0.9%</td>
<td>1.5</td>
<td>0.16</td>
</tr>
<tr>
<td>Coffee</td>
<td>44.4%</td>
<td>4.9</td>
<td>2.97</td>
</tr>
</tbody>
</table>

_Hypothesis 1._ There is a negative relationship between perceived household-level food insecurity and household-level dietary diversity. To test Hypothesis 1, I first calculated a food variety score (FVS) and dietary diversity score (DDS) for each household using the data collected via the FFQ. Table 7 reports the median and range of both FVS and DDS by household food security category.
<table>
<thead>
<tr>
<th>Food Security Status</th>
<th>FVS</th>
<th>DDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Range</td>
</tr>
<tr>
<td>Food Secure</td>
<td>26.00</td>
<td>17-39</td>
</tr>
<tr>
<td>Mildly Food Insecure</td>
<td>26.00</td>
<td>10-39</td>
</tr>
<tr>
<td>Moderately Food Insecure</td>
<td>22.50</td>
<td>7-34</td>
</tr>
<tr>
<td>Severely Food Insecure</td>
<td>17.00</td>
<td>6-28</td>
</tr>
</tbody>
</table>

Using the Kruskal-Wallis non-parametric ANOVA, I observed a significant difference in both FVS and DDS measures between households with different levels of food security (Table 8). This analysis compared each level of food insecurity, testing the null hypothesis that the distributions of the two samples are the same. The only non-significant inter-group difference I found using the FVS measure was between food secure and mildly food insecure households. However, using the aggregated DDS measure, the variation between food secure and mildly food insecure households, as well as between moderately food insecure and the food secure groups did not reach statistical significance.
Table 8. Kruskal-Wallis Test Results for Food Variety Score and Dietary Diversity Score by Household Food Security Status

<table>
<thead>
<tr>
<th>Food Security Levels Compared</th>
<th>Adjusted Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FVS</td>
</tr>
<tr>
<td>Severely Food Insecure – Food Secure</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Severely Food Insecure – Mildly Food Insecure</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Severely Food Insecure – Moderately Food Insecure</td>
<td>0.002*</td>
</tr>
<tr>
<td>Mildly Food Insecure - Food Secure</td>
<td>1.00</td>
</tr>
<tr>
<td>Mildly Food Insecure – Moderately Food Insecure</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Moderately Food Insecure – Food Secure</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

Significant at the 0.05 level *

Table 9 reports the results of the Spearman’s non-parametric correlation analysis. Using this analysis I found that there was a significant relationship between household-level food security status and both measures of dietary diversity. Additionally, the correlation coefficient of each association is negative, which supports the first hypothesis that greater food insecurity would be associated with lower dietary diversity.
Table 9. Spearman’s Rank Correlation Coefficients of Household Food Security and Two Measures of Dietary Diversity

<table>
<thead>
<tr>
<th>Dietary Diversity Measure</th>
<th>Correlation Coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVS</td>
<td>-0.364</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>DDS</td>
<td>-0.246</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level*.

Hypothesis 2. Table 10 outlines the results of the ordinal regression. While the Goodness-of-Fit indicates a mixed result, with only the Deviance test giving the desired insignificant result (p=1.0), the results of the Model Fitting test (p<0.001) and Test of Parallel Lines (p=.590) indicate that the model is a good fit for these data. The Pseudo R-Square test revealed that in this model the independent variables (frequency of consumption of each food listed on the FFQ) explain 34.2% of the variation in the dependent variable (food security status).

The results show that several foods were significantly associated with higher or lower levels of food insecurity. The negative or positive direction of the estimate indicates either a positive or negative relationship with food security status. For instance, chicken organs, pasta, and leafy greens were positively associated with greater levels of food insecurity, while the consumption of red meat, chicken meat, milk, and bread were all negatively associated with greater food insecurity.
Table 10. Individual Foods Associated with Household Food Security Status using Ordinal Regression

<table>
<thead>
<tr>
<th>Test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Fitting</td>
<td>Final</td>
</tr>
</tbody>
</table>

Table 11. Individual Foods Associated with Household Food Security Status using Ordinal Regression, continued.

<table>
<thead>
<tr>
<th>Goodness-of-Fit</th>
<th>Pearson</th>
<th>&lt;0.001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deviance</td>
<td>1.00</td>
</tr>
</tbody>
</table>

| Pseudo R-Square  | Nagelkerke | .342   |

| Test of Parallel | General | .590   |
|                 | Lines    |        |

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
<th>Food</th>
<th>Estimates</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tortilla</td>
<td>-.116</td>
<td>.006</td>
</tr>
<tr>
<td></td>
<td>Pasta</td>
<td>.292</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>Bread</td>
<td>-.103</td>
<td>.017</td>
</tr>
<tr>
<td></td>
<td>Powdered Milk</td>
<td>-.067</td>
<td>.026</td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td>-.112</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Red Meat</td>
<td>-.236</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Chicken</td>
<td>-.149</td>
<td>.010</td>
</tr>
<tr>
<td></td>
<td>Chicken Organs</td>
<td>.282</td>
<td>.033</td>
</tr>
<tr>
<td></td>
<td>Leafy Greens</td>
<td>.313</td>
<td>.014</td>
</tr>
</tbody>
</table>
**Qualitative Results**

Focus group discussion transcripts were analyzed to answer research question 1: How does the cultural meaning of food shape women’s perceptions of their households’ food security status?

For instance, tortilla consumption was negatively associated with household food security status, indicating that tortillas were consumed less frequently in food insecure homes. Tortillas were mentioned in many contexts within the FGD data; as part of typical meals, idealized meals, and even meals eaten in times of desperation. For example, during the FGD in the community of Lechecheucagos tortillas were mentioned as part of a good breakfast:

Interviewer: What would be a good breakfast you?

Woman: A plate of *gallo pinto* (fried beans and rice) with cheese.

Interviewer: You have to have something solid.

Woman: With tortilla.

During the 21deJunio FGD, one woman described her ideal lunch this way:

Woman: …for lunch a piece of meat, or chicken, or fish with a salad…rice, if there’s *tostón* (smashed, fried green banana) add that, beans, tortilla, and *fresco natural* (fresh fruit juice)…

Women in the Poneloya FGD mentioned tortillas as part of both ideal, light dinners as well as a food eaten at times when they could not grant themselves the luxury of eating well. One woman mentioned that at such times she would serve her family bean soup with tortillas in it.
The overall cultural significance of tortillas was thus interpreted to be that of an inexpensive dietary staple, so common that one woman in the LaLeona FGD indicated that she found them boring:

Interviewer: So, do you don’t eat tortillas often in your house?
Woman 1: In my case, no.
Woman 2: Me, no – they bore me.
Woman 3: Sometimes.

In the FGD with urban, middle class women one mother, in response to a question about their consumption of tortillas said:

Interviewer: You always have tortillas?
Woman 1: Me not often.
Woman 2: We do.
Woman 3: I don’t eat tortillas.
Woman 4: Me neither.

Like tortillas, bread was found to have a significant negative relationship with greater levels of food insecurity and was likewise mentioned frequently by the FGD participants and in many contexts. Bread was mentioned as part of both typical and ideal daily meals, as well as serving as part of meals that were not considered to be “eating well” by the FGD participants.

For instance, women mentioned bread several times in the 19Junio FGD as part of a typical (if less-than-ideal) breakfast. When asked about a typical day’s meals, one woman responded, “It’s like they said, in the morning at least a tiste (grain-based beverage) with bread…”
In fact, women in several FGDs mentioned that bread with some sort of beverage, such as coffee, milk, a *fresco*, or a cereal-based drink, could serve as breakfast, but not the beverage alone. However, this breakfast was not the ideal, as illustrated by an exchange between the interviewer and a woman from the rural community of Poneloya. Asked about what constitutes a perfect breakfast by the interviewer, the woman appeared to misinterpret the question, answering, “For me breakfast is a drink and bread.” The interviewer restated the question, “But what would you like your breakfast to be?” The woman then responded, “*Gallo pinto* (fried beans and rice), with an egg, maybe cheese, curd and a cup of coffee…”

At least two women mentioned bread as a substitute for tortillas, either by choice or when tortillas were not available. For instance, when asked whether or not tortillas are eaten daily one woman stated, “Yes, generally at lunch.” A second woman added, “And when there are no tortillas it’s obligatory to have bread” (21deJunio group).

Interestingly, bread was brought up frequently in the contexts of breakfast and dinner, but only once (see passage above) in the context of lunch. According to the women interviewed in the focus groups, lunch is the most important meal of the day, as illustrated by the following passage from the 19deJunio FDG:

“…lunch is the one we search for because it is the principle [meal]…”

Given the contexts in which it was mentioned, bread, much like tortillas, was attributed the meaning of being an important, inexpensive dietary staple.

The results of the ordinal regression identified milk as another food that is eaten significantly more often in more food secure households. The overall meaning surrounding milk (powdered milk was rarely if ever specified in the FGDs) appeared tied
to it being perceived as a healthy food, particularly for children. Indeed, one woman in FDG 21deJunio expressed it this way:

“In my case, I would like it if my son could drink milk, or eat egg, but eggs give him an allergic reaction and milk irritates his intestines. These are things that give lots of nutrients to the little ones”

Based on their comments in the FGD, women appeared to classify milk as an important food, especially for children, who are the priority in the household. This prioritization of children and, thus, milk is illustrated by this example from a participant in FGD 21deJunio who had two small children:

“…I cannot give myself the luxury of going to a party or to eat a hamburger, because the first thing I have to think is, ‘I don’t have milk, I have to give them something to eat...”.

Based on the ordinal regression analysis, red meat was also found to be associated with food security. Red meat was mentioned frequently in the FGD in the context of ideal meals. When asked about eating well and ideal meal composition participants routinely mentioned meat, however when asked how often they actually consumed it, answers varied greatly. For instance, when participants in the 21deJunio FGD were asked about “eating well” and the ideal composition of daily meals, each respondent mentioned red meat. Indeed, the first woman to respond said, “It’s when meat is not lacking.” This sentiment was echoed by the following exchange from group discussion in the community of el Lechechecuagos:

Interviewer: “For lunch is it sufficient to have rice and beans?”

Woman: “And meat.”
Interviewer: “Meat is eating well?”

Woman: “And a juice to finish filling me up.”

This focus on meat as part of a sufficient lunch was particularly significant given the responses the same group of women gave when asked about the actual frequency of their meat and chicken consumption.

Interviewer: “…And do you eat meat or chicken every day or not?”

Woman 1: “Nooooo.”

Woman 2: “Two or three times a week.”

Woman 3: “Less for me.”

Interviewer: “One less time or more?”

Woman 3: “One or two.”

Interviewer: “Okay and for you?”

Woman 4: “Three times a month is good.”

Given the clear preference for meat indicated by the FGD participants, compared with the infrequency with which many of them consumed it, meat was given the overall meaning of a culturally idealized food. To be a good meal, according to the FGD participants, meat should be included. This ideal, however, appeared to be out of reach for many participants much of the time.

The same was largely true for chicken, which was often mentioned alongside red meat when participants were asked about ideal meal composition. Chicken, another food identified by the ordinal regression analysis as being consumed less frequency in more food insecure homes, although less expensive than beef, still seemed to be out of reach much of the time for many of the FGD participants. Indeed, a common theme of the
interviews was the idea that meat and chicken were eaten only when money was sufficient for their purchase. This was illustrated in the following passage from the FGD 21deJunio FGD transcript:

Interviewer: “How many times a week do you eat meat?”

Woman 1: “When there’s money.”

Woman 2: “The rice and beans never fail.”

Some women indicated that in order to eat well on some days, they had to go without items like meat and chicken on others:

Woman 1: “In my case it’s the same: if one day we eat well the next day we eat normally, because you can’t always have chicken and beef.”

Woman 2: “When there isn’t any there isn’t any.”

This was further elaborated on by a woman from the rural community of Poneloya who explained the situation this way:

Woman: “…if I get 100 córdobas now and they let me eat, I can eat well now and if tomorrow I don’t get 100 córdobas I will have to make do with rice and beans although I won’t eat meat or chicken or anything. It’s variable; if one has money one eats well and if not one makes do with what one has.”

Chicken organs and viscera, foods identified by the quantitative analysis as associated with greater levels of food insecurity, were viewed as less- or undesirable foods. Organ meats were frequently mentioned as substitutes for more expensive kinds of meat. Chicken organs were rarely mentioned, most notably in response to questions about foods eaten in times of desperation. The passage below illustrates this finding:
Interviewer: “…okay, and what are the foods that for you are not very desirable and that you have eaten when it’s necessary. Something you don’t like, but have eaten out of necessity…”

Woman 1: “Sometimes for me the organs.”

Interviewer: “Okay, organs of what animal?”

Woman 1: “Chicken.”

Interviewer: “…what are some of the foods you’ve had to eat that are not very delicious to you?”

Woman 2: “Liver.”

Woman 3: “Chicken organs, chicken liver.”

This passage illustrates that, given the opportunity and funds, these women would not choose to eat chicken organ meats. These are foods eaten only out of necessity.

Leafy green vegetables were the only other food identified by the ordinal regression analysis to be associated with higher levels of food insecurity. Although leafy greens such as spinach were mentioned twice in the context of healthy foods, most mentioned the consumption of spinach and other leafy greens in times of desperation. For instance, women in both the 19deJunio and LaLeona FGDs mentioned that when other foods are lacking, spinach and eggs could serve as a meal. Likewise, women in these same discussions mentioned that foraged leaves such as those of the jocote tree could be combined with eggs and made into tortas, or cakes/patties, during times when other foods are “inaccessible.”
Discussion

To date, most research on food insecurity has neglected to study the relationship between the inability to access culturally appropriate or preferred foods and perceived food insecurity, resulting in a focus on the nutritional, rather than cultural, sufficiency of the diet. This is a particularly egregious omission given that the definition of food security includes the ability to meet dietary preferences (FAO 1996).

Here I aimed to address this important and understudied aspect of food insecurity research, arguing that a better understanding of the cultural meaning of food is required if efforts to reduce food insecurity are to be effective. Tailoring such efforts to the food culture of a given population is of the utmost importance for, as I have explored here, there is good reason to believe that the inability to access preferred and culturally valued foods may contribute to perceptions of food insecurity.

To highlight the dialectical experience of food insecurity, I explored the relationship between dietary diversity, food preference, and food security by testing two hypotheses and a further research question.

*Hypothesis 1:* There is a negative relationship between perceived household-level food insecurity and household-level dietary diversity.

My first hypothesis was supported. Indeed, my analysis revealed that significant differences in dietary diversity do exist between households with differing food security status and that a negative relationship exists between dietary diversity, represented by
both measures and level of food insecurity, indicating that dietary diversity decreased as food insecurity rose.

This finding is in agreement with the literature on the topic of dietary diversity as it relates to food insecurity. Dietary diversity has been found to represent a simple and accurate measure of dietary quality (Torheim et al. 2003). As such, dietary diversity has been used as a proxy for measuring food security as it relates to nutrient adequacy (Coates 2013).

While dietary diversity seems to be a reliable proxy for food insecurity in children (Ruel 2002) and undernourished populations (Torheim et al. 2003), it does not give an accurate picture of the full experience of food insecurity. Instead, like all proxies for food insecurity, such as income or health status, it represents only what Radimer et al. (1990) refer to as an “indirect” measure. The research community in this country has recognized for over 20 years that such indirect measures are insufficient to capture the experience of being food insecure. A broader, emic perspective on the experience of food insecurity must include data on dietary patterns, such as dietary diversity, as well aspects of the experience related to the cultural appropriateness of foods and the ability to meet dietary preferences. The lack of such information in many studies means that the experience of food insecurity in such populations remains a black box, leaving us with little understanding of the causal direction of the various factors involved. For instance, the literature shows that as markers of food insecurity (such as low income and energy availability) rise, dietary diversity declines (Torheim et al. 2001, Torheim et al. 2003; Ruel 2002; Ruel 2003). It is therefore presumed that food insecurity causes decreases in dietary diversity. However, the relationship between these variables is likely much more
complex than such studies indicate or imply. Moreover, the causal relationship between decreased dietary diversity and perceptions of food insecurity is most likely dialectical, with each affecting the other. Thus, while food insecurity may impede the ability to access a diverse diet, that same inability to access a variety of foods – especially those with particular cultural significance – may contribute to the perception of food insecurity. The experience of food insecurity, which often includes concerns about not having enough food to feed one’s family or running out of food, may, in turn, cause households to focus their limited means on the purchase of fewer, more affordable foods, resulting in decreased dietary diversity.

_Hypothesis 2_: Perceived food security status is related to the consumption of specific foods.

The second hypothesis was also supported by the quantitative data analysis. The results of the ordinal regression showed clear negative and positive correlations between specific foods measured via the FFQ and perceived degree of food insecurity.

These findings are enriched by reference to the qualitative results, which help to illustrate the influence of the cultural meaning on perceptions of food security. The Nicaraguan mothers who participated in this study revealed that their diets often failed to meet their cultural standards for sufficiency. As participants discussed, lunch is the most important meal of the day and should ideally include some form of meat. However, many of these mothers disclosed that they were unable to meet this cultural standard the majority of the time. As the women discussed, chicken organs could be eaten when necessary, perhaps in an attempt to fill the dietary gap left by their inability to purchase more choice cuts of meat. This corresponds with my quantitative results, which showed
both chicken and red meats were more associated with the diets of food secure participants, while the consumption of chicken organs correlated with greater levels of food insecurity.

This finding echoes that of Dufour et al. (1997a) that women in Cali, Colombia would use a substitution strategy to round out their midday meal in the absence of meat. Indeed, Dufour and colleagues found that viscera were mentioned toward the bottom of this substitution hierarchy as a food that was less desirable or culturally appropriate. This seems to be the case for women in León, Nicaragua as well, who mentioned that chicken organs were consumed only as necessary and were a less desirable food item.

My analysis also revealed an association between leafy greens and higher levels of food insecurity. This may be due to the fact that some of these greens are wild, foraged foods. Several FGD participants mentioned that the foraged leaves of the *jocote* plant could be combined with eggs to make a *torta*, or patty, in times when the food supply is particularly low. Other studies have also found leafy green vegetables mentioned as foods tied to poverty. For instance, Booth et al. (1993), in their study of the use of leafy greens among the K'ekchi of Guatemala, found that the consumption of native greens was stigmatized by its association with poverty. The authors mentioned that their respondents were not alone in this perception of wild greens, as such attitudes have also been documented in such disparate regions as India (Jyothi et al. 1963), Swaziland (Ogle and Grivetti 1985), and Mexico (Wilken 1970).

Meanwhile, less frequent consumption of bread and tortillas, both found in my analysis of the qualitative data to be meaningful staples of the diet, was found to be predictive of decreasing levels of food security. In my analysis of the qualitative data I
found that these foods were mentioned in many different contexts, including as part of both ideal and less-than-ideal meals. As inexpensive dietary staples it is not surprising that the lack of these basic foods could contribute to feelings of food insecurity.

Milk, on the other hand, was found to be meaningful primarily due to its perception as an important and healthy part of children’s diets. This point was raised by mothers across FGDs. Because of this perceived importance for the health of children, and the primacy of children in the family, milk was found to be a highly valued food. Women frequently mentioned the importance and primacy of children’s needs above those of themselves and their husbands, including reduction in their own food quantity or quality so that children could eat well. Previous studies exploring the connection between food insecurity and maternal mental health have found similar priority given to children, which has been attributed to cultural mores about mothers as providers of food (Kruger and Lourens 2016; Piperata et al. 2016). Indeed, the maternal role is so bound to the giving of food that Bourdieu (1984, 79) refers to maternal care, as demonstrated through food preparation and provisioning, as the “archetypal cultural good.” In Latin America this concept of the all-giving, all-sacrificing mother is codified into the concept of marianismo (Ellsberg et al. 2000). Women in Nicaragua are expected to embody this concept while fulfilling the duties of the ama de casa (housewife), often while facing tremendous economic and social challenges, including domestic violence (Piperata et al. 2016; Ellsberg et al. 2000). Given their social obligation to provide food for their children, it is not surprising that lower consumption of milk by households with young children would lead to greater levels of perceived food insecurity by these Nicaraguan mothers.
This study contributes to the literature on nutritional anthropology in two important ways: First, it contributes to the sparse literature on dietary preference, the cultural significance of food, and food-based coping strategies amongst food insecure populations in Latin America and second, it calls on nutritional anthropologists to study the relationship between dietary diversity, perceived food insecurity, and dietary preference, demonstrating that an understanding of the dialectical relationship between these variables may improve our understanding of the experience of food insecurity and the quality of subsequent interventions.

Few studies to date on food insecurity in Latin America have examined food preferences and the meanings attributed to food within Latin American cultures. Both Murrieta (2000) and Dufour et al. (1997a) found that the meaning of food was tied to notions of socioeconomic status. Indeed, Dufour et al. (1997a) found that food insecurity among urban women in Cali, Colombia was what Radimer et al. (1990, 1545) described as a “managed process,” with food choices following a hierarchy of desirability, bottoming out with the least expensive, most socially unacceptable foods. My analysis of the data from León, Nicaragua suggests that women in this population manage food insecurity in a similar way, such that increased consumption of red meat and chicken was predictive of greater food security, while more frequent consumption of chicken organs, mentioned as an undesirable food, was predictive of lower food security status.

Additionally, Dufour et al (1997a) found that this management of food insecurity through food choice, appeared to buffer women’s nutritional status and daily caloric intake. It seems likely that this is also the case among the Nicaraguan women who
participated in this study, as the average BMI for women at all levels of food insecurity fell within the overweight category.

Dietary preference and the cultural appropriateness of food is very rarely addressed in the literature on food insecurity generally, and almost completely absent from studies of Latin America. Much more common in the literature on this topic are studies of “othered” populations, such as migrant farm workers (Grauel and Chambers 2014; Kilanowski 2010), immigrants (Himmelgreen et al. 2004; Dhokarh et al. 2011), and Canadian First Nations (Schuster et al. 2011). Many studies that examine the cultural appropriateness of foods within a majority population focus on dietary transitions, such as those associated with the rise of globalization (Cantor, Peña, and Himmelgreen 2013). In fact, aside from Dufour and colleagues’ (1997a, 1997b) 20 year-old study, I was unable to find any other mixed method project within Latin America examining dietary preference and food security.

Without exploring the full range of variables, the experience of food insecurity cannot be fully understood. While some researchers are content with the use of proxies for the experience of food insecurity (Ruel 2003; Torheim et al. 2003), this approach can be problematic. As Radimer et al. (1990) presciently wrote more than 20 years ago, food insecurity is an experience and a process, with many moving parts. Without the use of a mixed-methods approach, much of that experience may be misunderstood or completely ignored.

In the current study, qualitative results were used to illustrate the dialectical relationship that exists between economic access to food, food preference, and perceived food insecurity. The continued focus of many studies of food security on dietary
sufficiency in food insecure populations, ignores the fact that the most widely used
definition of food security includes the ability to meet individual food preferences.
Likewise, by making food security status an independent variable, many studies reify
perceived food security status as a cause of related health conditions, such as overweight
and obesity. However, I would argue that the causal pathway is much more convoluted,
including decreased access to culturally appropriate foods and a diverse diet, which may
in turn have negative effects on health and well-being, which in turn exacerbate
perceptions of food insecurity. Given the results of this study, I argue that by reifying
perceived food security status as an independent variable, many studies obscure this
relationship.
Conclusion

In this study I aimed to explore the relationship between dietary patterns, food preferences, and the cultural meaning of foods. This mixed methods approach revealed several interesting findings. First, I found that dietary diversity varied significantly between different levels of food insecurity, expressed by the negative correlation between dietary diversity and higher levels of food insecurity. Additionally, I found that dietary patterns were predictive of higher and lower levels of food security, with more frequent consumption of tortillas, bread, milk and powdered milk, red meat, and chicken predicting higher degrees of food security and increased consumption of pasta, chicken organs, and leafy greens predicting decreased food security status.

Implications for Future Research in Nutritional Anthropology

This study revealed that increased attention to dietary preference when studying food security is needed. To this end, future research could benefit from the mixed methods approach, helping to expose the full breadth of experience associated with perceived food insecurity, its causes and effects. Future research conducted in this way could help policy-makers and other stakeholders to recognize the complex, dialectical relationship between the variables involved in this multi-faceted experience.

It is of the utmost importance to explore the experience of food insecurity from the emic perspective, and to attempt to understand the mechanisms behind perceptions of food insecurity, for, as Barrett (2010) points out, the way that we measure food security
directly effects the ways in which we diagnose and respond to the issue. If we continue to
treat food security status as an independent variable, we may fail to recognize and
address the full breadth of this experience. The price for such a failure is human
suffering, both physical and emotional, a cost largely paid by women and children.
References

Barrett, Christopher B. 2010. “Measuring Food Insecurity Christopher B. Barrett.”

Bernard, H. Russell. 2006. Research Methods in Anthropology: Qualitative and
Quantitative Approaches. 4thed. Oxford: AltaMira Press.

Intake of Indigenous Leafy Greens by the K’ekchi People of Alta Verapaz,


Distinction: A Social Critique of the Judgment of Taste. doi:10.1007/s13398-014-
0173-7.2.

Handbook of Theory of Research for the Sociology of Education, edited by J.E.


Cantor, Allison, Jenny Peña, and David Himmelgreen. 2013. “We Never Ate Like That,
Not Fast Food, or Junk Foods”: Accounts of Changing Maternal Diet in a Tourist


the Nurtition of Poor Urban Women: Ethnographic and Biological Approaches.”


http://www.fao.org/docrep/003/w3613e/w3613e00.HTM.


doi:10.2993/0278-0771-34.2.228.

Herman, Dena R., Marion Taylor Baer, Elizabeth Adams, Leslie Cunningham-Sabo,


doi:10.1017/CBO9781107415324.004.


Kilanowski, Jill F. 2010. “Migrant Farmworker Mothers Talk About the Meaning of


Governance Dimensions of Food Security in Nicaragua.” Washington, D.C.


