EXPLORING A COMBINED QUANTITATIVE AND QUALITATIVE RESEARCH APPROACH IN DEVELOPING A CULTURALLY COMPETENT DIETARY BEHAVIOR ASSESSMENT INSTRUMENT

A Dissertation
Presented to
The Academic Faculty

By

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In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy in
Industrial and Systems Engineering

Georgia Institute of Technology

August 2009

EXPLORING A COMBINED QUANTITATIVE AND QUALITATIVE RESEARCH APPROACH IN DEVELOPING A CULTURALLY COMPETENT DIETARY BEHAVIOR ASSESSMENT INSTRUMENT

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ACKNOWLEDGEMENTS

First of all, I want to thank my Lord and Savior Jesus Christ for the faithfulness He has shown me throughout this Ph.D. journey. There have many bright peaks and dark valleys throughout this process, but through it all, the Lord has been with me and sustained me. I am tremendously grateful for the opportunity to study at one of the highest institutions in the land, and even more appreciative for the fact that God has seen me through to the end. Thank you, Lord. I dedicate this doctoral dissertation to You for the glory of Your Kingdom, in Jesus' Name.

Secondly, I want to thank my Mom and Dad for their love and support over the years. This Ph.D. is really the culmination of all of the hard work, dedication, provision, and encouragement that you have given me since before I even knew I existed. Thank you for all that you have done and continue to do, and I love you both very much!

I want to thank my advisor, Brani Vidakovic, for his guidance in helping me successfully complete the dissertation, and my previous advisors Paul Griffin and François Sainfort for the roles they played in the beginning and middle parts of my journey respectively. I extend additional thanks to Alicia Sánchez, Sofia Espinoza, and Crystal Serrano for the help they provided in translating the Spanish versions of the questionnaire responses. I also must thank Nancy Kennedy and Carmel Cowart of the Northwest Georgia Healthcare Partnership for allowing me to conduct my research study alongside the nutrition and physical activity health promotion program they sponsored. Additionally, I thank Mary Thelma Norris and Judy Hayes of Friendship House Childcare for hosting my focus group discussion sessions at their facility.

Finally, I especially want to thank the AT&T Labs Fellowship Program (ALFP) for providing me with abundant financial support for most of my Ph.D. journey, and Mehdi Hosseini for his invaluable contribution to me as my ALFP mentor. Mehdi, your constant guidance and support – even after my ALFP Fellowship had expired – demonstrated that your commitment to me was not only professional, but personal. You are a mentor in the truest sense of the word. It would have been much more difficult to complete this Ph.D. journey without your help. There are not enough words to express the depth of gratitude I have for your mentorship. I pray that God grants a tremendous blessing to you and your family for all that you have done for me. Thank you!

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LIST OF ABBREVIATIONS

FFQ	Food Frequency Questionnaire
QFFQ	Quantitative Food Frequency Questionnaire
SFFQ	Semi-quantitative Food Frequency Questionnaire
SWFFQ	Southwestern Food Frequency Questionnaire

SUMMARY

According to statistics and reports recently released by the U.S. Census Bureau, communities in the United States are becoming increasingly ethnically diverse. This changing dynamic in the U.S. population is creating new opportunities for all Americans to broaden and deepen their cross-cultural awareness, while simultaneously augmenting existing challenges facing the nation concerning racial/ethnic disparities and inequality. These opportunities and challenges are woven throughout the fabric of American society – including into the health and social services realms.

One particular challenge concerning racial/ethnic disparities within health and healthcare relates to overweight/obesity prevalence among American adults, as studies have shown that ethnic minority adults have disproportionately high overweight/obesity prevalence. Health and human services professionals often utilize survey research applications such as dietary assessments to obtain the data necessary to promote goals such as the reduction and elimination of overweight/obesity across all ethno-cultural groups. Survey research applications such as dietary assessments that target diverse cultural and ethnic groups are complex endeavors fraught with numerous challenges, however. It has been suggested that certain qualitative research techniques derived from Cognitive Anthropology be combined with survey research in order to improve the quality of surveys intended for culturally-diverse audiences, and to ensure that findings generated by the surveys are culturally relevant and accurate.

The primary objective of this research study was to develop, test, and evaluate a culturally-competent dietary behavior assessment instrument by effectively synthesizing

qualitative methods from Cognitive Anthropology with appropriate survey research and quantitative statistical methods. Specifically, a quantitative methods triangle of hierarchical cluster analysis, binary logistic regression, and Poisson regression in conjunction with the free listing qualitative research technique from Cognitive Anthropology was explored as a possible combined methodological approach for researchers and public health professionals wishing to develop a comprehensive understanding of dietary behaviors at the local community level. The study was conducted in the Murray/Whitfield county region – an ethno-culturally-diverse Georgia community with a considerably large Hispanic subpopulation.

There is limited evidence demonstrating the utility of meal-based dietary recalls among certain populations; thus, a dietary behavior assessment protocol in the form of a meal-based free listing dietary recall was developed that elicits typical foods eaten by individuals primarily according to meals and snacks. The protocol was constructed in a manner to elicit typical foods eaten by adults according to three culturally-based consumption models: workday versus non-workday eating habits, Saturday eating habits, and Sunday eating habits.

Binary logistic regression and Poisson regression enabled the relationship between selected food categories and certain demographic/cultural indicators to be modeled, while hierarchical cluster analyses enabled modeling of the distinct patterns of food category groupings that comprise the collective diet of the target population. Additionally, initial qualitative analyses of the raw data promoted an understanding of the influence of the local fast food and dine-in restaurant environment on the dietary behaviors of the target population.

The performance of the free listing dietary recall protocol was compared with that of the Southwestern Food Frequency Questionnaire (SWFFQ), an established dietary assessment tool that has been used in multicultural communities within the United States with a substantial percentage of Hispanic residents. Because of time and resource constraints, each participant's food item entry was projected onto the Southwestern Food Frequency Questionnaire as if he or she completed the SWFFQ themselves. Then, based on the "pseudo-data" generated by this process, hierarchical cluster analyses and binary logistic regression analyses were conducted in the same manner as for the free listing-generated data. (Poisson regression analyses were not performed on the SWFFQ "pseudo-data" because of the incomparability between some free listing-generated food categories and SWFFQ food categories.)

Although a primary aim of this research study was to construct a comprehensive eating model that explains local food use and consumption in the community, a small sample size of 32 participants that was necessitated by limited time and financial resources precluded this objective from being fully achieved. Although the participant demographics were very similar to those of the region as a whole, there were simply not enough participants to justify the generalization of the results to the community at large. Additionally, the small sample size rendered some of the results generated by the binary logistic and Poisson regression analyses unstable. Furthermore, because the "pseudo" data generated for the instrument comparison analyses was projected by the researcher and not directly elicited from the participants themselves, there may be unintentional researcher bias incorporated into the results.

Despite these limitations, there were several illuminating results from the study. Although the sample size was small, several results from the binary logistic regression and Poisson regression analyses seemed to meet expectations based on conjecture. Additionally, there was utility gained by conducting the comparative analyses, as they provided understanding of the relative performance of the selected quantitative methodologies with respect to each of the dietary behavior assessment instruments – despite concerns about the introduction of unintentional researcher bias.

The results of this study suggest that a quantitative methods triangle of hierarchical cluster analysis, binary logistic regression analysis, and Poisson regression analysis founded upon qualitative research principles has potential for use as a combined methodological approach for researchers and public health professionals wishing to develop a comprehensive understanding of dietary behaviors at the local community level. By employing these techniques, researchers can analyze individual dietary behaviors and eating patterns from a multifaceted perspective. In turn, public health professionals can develop community-based, cross-culturally relevant programs and interventions that are equally effective across all ethno-cultural groups in their target population.

CHAPTER 1

INTRODUCTION

Communities in the United States are becoming increasingly ethnically diverse. In the 2000 census, approximately 30 percent of the total population was comprised of racial and ethnic minorities; this figure is projected to increase to nearly 50 percent by 2050 (U.S. Census Bureau, 2004). Persons of Hispanic origin are the fastest growing ethnic minority group in the United States (U.S. Census Bureau, 2007b). Hispanics represented 12.6 of the United States population in the 2000 census; this percentage is projected to increase to 24.4 percent by 2050 (U.S. Census Bureau, 2004). In fact, the United States Census Bureau estimates that, as of 2003, Hispanics have surpassed African-Americans as the nation's largest minority ethnic group (U.S. Census Bureau, 2003).

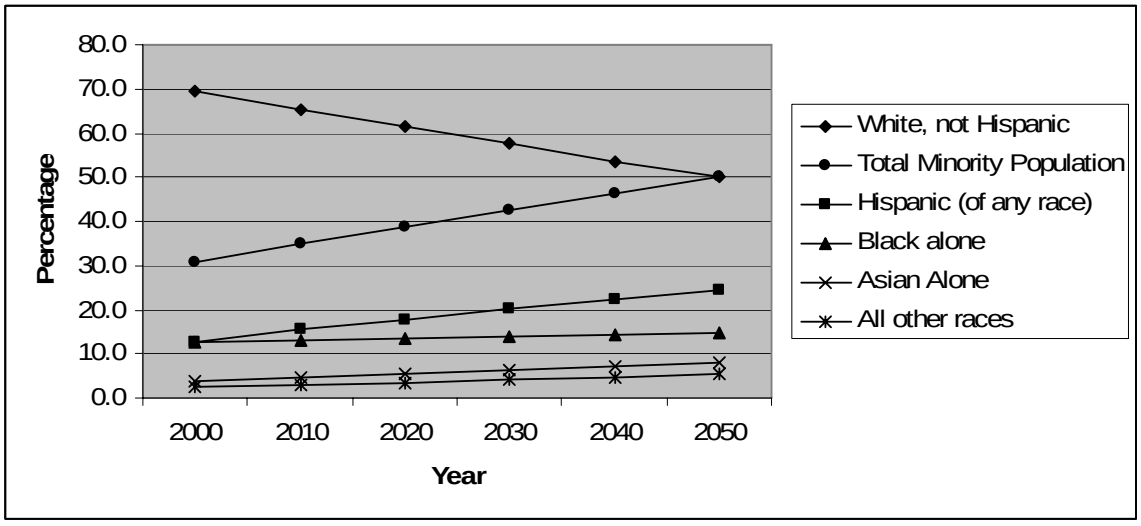

Figure 1.1 Projected U.S. Population By Race and Hispanic Origin
(U.S. Census Bureau, 2004)

This societal transformation presents new and exciting challenges for all Americans to broaden and deepen their cultural awareness in order to effectively communicate with new friends and neighbors that may be of a different cultural origin than they, while simultaneously augmenting existing challenges concerning racial/ethnic disparities and inequality. These challenges are woven throughout the fabric of American society – including into the health and social services realms.

Health and human services professionals often obtain the data necessary to promote goals such as the reduction and elimination of overweight/obesity by utilizing survey research techniques. One particular survey research application important in the public health battle against obesity is dietary assessment (National Institutes of Health, 2000).

Survey research applications such as dietary assessments that target diverse cultural and ethnic groups are complex endeavors fraught with numerous challenges, however. These challenges include linguistic and conceptual equivalence, measurement, and the socio-cultural dimensions of the survey/interview process. It has been suggested that certain qualitative research techniques derived from cognitive science, specifically Cognitive Anthropology, be combined with survey research in order to improve the quality of surveys intended for culturally-diverse audiences and to ensure that findings generated by the surveys are culturally relevant and accurate (Hines, 1993).

There is a burgeoning overweight and obesity crisis in the United States, and racial and ethnic minority groups are disproportionately affected (Heyman et al., 2008). Additionally, there is a widespread view that cultural competence is an essential strategy for reducing health disparities (Goode et al., 2006). Thus, a dietary behavior assessment

aimed at providing culturally relevant and accurate data to support obesity prevention and intervention initiatives is a relevant and contemporary application of survey research in the healthcare field. Accordingly, the primary objective of this research study was to develop, test, and evaluate a culturally competent dietary behavior assessment instrument by effectively synthesizing qualitative methods from Cognitive Anthropology with appropriate survey research and quantitative statistical methods. The study was conducted in a mid-sized, ethno-culturally-diverse Georgia community with a considerable Hispanic subpopulation.

CHAPTER 2

BACKGROUND

Quantitative research enables researchers to gain insight into relationships among concepts derived from a priori theoretical schemes (Filstead, 1979). These insights are usually gained by the translation of observations into numbers using counting and measuring techniques (Filstead, 1979; Hines, 1993), and subsequent assertions made based on these numbers and the systematic, statistical relationships between them (Alasuutari, 1995). The quantitative research paradigm assumes that reality is stable or fixed, and is generally characterized by objective rather than subjective measurement. Techniques associated with quantitative methods include, but are not limited to, randomized experiments, multivariate statistical analyses, and sample surveys (Richardt and Cook, 1979).

2.1 Survey Research

Survey research is one of the most widely used methods of data collection in social research for both descriptive and explanatory purposes (Hines, 1993; Houtkoop-Steenstra, 2000; Singleton et al., 1993; Sudman and Bradburn, 1974). The basic idea of a survey is to measure variables by, first, asking questions of people chosen as a representative sample of a particular population of interest and, then, examining the relationships among the measures (Singleton et al., 1993). Traditional applications associated with this research tradition include studies of public opinion, voting, attitudes and beliefs, morale, and economic behavior (Warwick, 1973). Although an increasing percentage of surveys are computer-assisted (e.g. Web-based surveys, e-mailed

questionnaires, and one-on-one interviews conducted with personal digital assistant (PDA) devices), many are still traditionally conducted over the telephone or in person with paper and pencil (Bradburn et al., 2004).

2.1.1 Sampling

Sampling is used by scientists across diverse disciplines to establish broad generalizations that are applicable to large classes of events; therefore, it is usually necessary in the social sciences realm because researchers often want to know something about a specific social group or population that cannot be studied in its entirety due to factors such as size, time, cost, and inaccessibility. Tasks associated with sampling include clearly defining the target population, determining an appropriate sampling size, and choosing a sampling design (Singleton et al., 1993).

2.1.1.1 Defining the Target Population

The target population is the population to which the researcher wishes to generalize his or her results. Relevant criteria for defining the target population include the type of unit being studied (e.g. individual people, groups, organizations, or families) and the research topic at hand. If groups or an organization is the unit of interest, the target population might be defined by variables such as number of members or employees and organizational type and size. When individual people are the units being studied, the target population is often defined according to demographic variables such as age, gender, race, martial status, and education in combination with the locale of the study. Studies of families might include presence or absence of children and single- or two-parent home as part of the target population definition (Singleton et al., 1993).

2.1.1.2 Sample Size

The sample size associated with a particular survey can vary depending on factors including the quantity of resources available to the research team conducting the study, the heterogeneity of the population being studied, and the purpose for which the research is conducted. Surveys administered by professional research teams typically make use of larger samples chosen through scientific sampling procedures in order to ensure precise estimates of population characteristics. On the other hand, independent researchers and smaller research teams may elect to use smaller samples due to lack of resources in time, money, and personnel (Singleton et al., 1993).

2.1.1.3 Sampling Design

The sampling design of a research study refers to the method by which the specific units are selected to represent the population of interest. There are two general classes of sampling designs: probability sampling and non-probability sampling (Singleton et al., 1993).

In probability sampling, representative units of the target population are chosen for inclusion in the study by random selection. This random selection is not "haphazard or non-deliberate" but, rather, a scientific process by which each unit in the population has a known probability (ideally an equal chance) of being included in the sample. It is typically achieved with either computer programs that provide random selection or specially prepared tables of mechanically generated random numbers that each represent a unit from the entire target population (Singleton et al., 1993).

In contrast, units for analysis are selected purposefully and subjectively in non-probability sampling (Doherty, 1994; Singleton et al., 1993), without regard for equal

opportunity of inclusion in a sample. Hence, it is very prone to selection bias on both the part of the investigator and (in cases when the units of analysis are people) the individual subjects themselves.

Generally, probability sampling methods are more advantageous than non-probability sampling techniques for two reasons. First, probability sampling removes the possibility of sampling bias on the part of the investigator. Secondly, the laws of mathematical probability can be applied in probability sampling, enabling the investigator to both estimate the accuracy of the sample and know the limits to which the sample can be generalized to the population of interest. Non-probability methods may be preferable, however, in situations when very few units can be included in the sample or when an investigation is in its early stages and the primary objective of the study is to become more informed about the problem itself (Singleton et al., 1993).

Probability-based sampling methods include random sampling, cluster sampling, and systematic sampling. Examples of non-probability sampling techniques include purposive sampling, quota sampling, and convenience sampling (Singleton et al., 1993).

2.1.2 Study Designs

The design selected to incorporate in a survey research study is heavily dependent upon the purpose of the study. Since the objectives of the study will often specify research strategies and narrow the range of choices, the specific purpose of the survey may imply the basic conceptual framework most appropriate for the objectives at hand (Pareek and Venkateswara Rao, 1980).

Survey research designs may be segmented into two broad categories: cross-sectional designs and longitudinal designs. In a cross-sectional survey research design,

questions are asked at one point in time of a "cross section" of respondents chosen to represent the population of interest. This is the most commonly used design in survey research. One of the major weaknesses of a cross-sectional design, however, is that the information that individual respondents can capably report about the groups to which they belong is often limited. Because the data collection occurs at one point in time, cross-sectional designs do not always show clearly the direction of causal relationships, nor are they well suited to the study of process and change (Singleton et al., 1993).

In response to this problem, survey researchers have developed longitudinal designs, which provide stronger inferences about causal direction and more accurate studies of change. In a longitudinal design, questions are asked at two or more points in time of a set of individuals that may either remain unchanged (measuring the exact same individuals each time) or be a random "cross section" of the population being studied (as in the cross-sectional design) at each point in time that the measurement is made. Despite the clear advantage longitudinal designs offer in terms of understanding causal direction and processes of change however, they still only represent a small fraction of survey research in comparison with cross-sectional studies, primarily due to economic concerns (Singleton et al., 1993).

2.1.3 Data Collection Methods

Surveys typically employ systematic questionnaire or interview procedures for data collection (Houtkoop-Steenstra, 2000; Pareek and Venkateswara Rao, 1980; Singleton et al., 1993). Researchers may make use of interviews only, questionnaires only, or some combination of the two (Singleton et al., 1993). Regardless of the procedures used, they tend to be standardized for all respondents in order to enhance the

reliability of the data by reducing measurement errors that may be attributable to either the measurement instrument or measurement procedure (Houtkoop-Steenstra, 2000; Singleton et al., 1993).

2.1.3.1 Self-Administered Questionnaires

Self-administered questionnaires are completed primarily by the respondent, with little or no assistance from the survey researcher. They may be given in the home, at a school, or at an organization where they may be hand-delivered and filled out either in a group or individually. One of their primary advantages is that they allow a single researcher to gather data from a large, representative sample of respondents, at relatively low cost per datum. Additional advantages include:

1. All respondents get the same questions with a self-administered questionnaire, eliminating concerns about interviewer bias.
2. Researchers can ask more complex and longer batteries of questions with a self-administered questionnaire than in a personal interview. .
3. Respondents are more willing to report socially undesirable behaviors and traits (presumably more accurately) in self-administered questionnaires than in personal interviews (Bernard, 1988).

A primary disadvantage of the self-administered questionnaire concerns the control the researcher has over how accurately respondents interpret questions. Opportunities to clarify any questions respondents may have or to probe for more adequate answers may be limited (Singleton et al., 1993). Other disadvantages include:

1. In some cases, the researcher might want a respondent to answer a question without him or her knowing what's coming next, which is impossible in a self-administered questionnaire.
2. Self-administered questionnaires are not useful for studying people that cannot provide written responses (e.g. respondents who are illiterate or blind).
3. Respondents may make choices that are culturally inappropriate, despite researcher efforts to aid the contrary (Bernard, 1988).

2.1.3.2 Personal Interviews

Personal, face-to-face interviewing is the oldest and most highly regarded method of survey research. It requires the interviewer to be trained and proficient in the use of an interview schedule, which consists of instructions to the interviewer, the questions to be asked, and, if appropriate, response options. A major advantage associated with face-to-face interviewing is that several different data collection techniques may be used with the same respondent during an interview session. One portion of the interview might consist of open-ended questions; another part may require the use of visual aids such as graphs or cue cards; in a third part, the researcher might hand the respondent a self-administered questionnaire and stand by to help clarify items that are potentially ambiguous. Additional advantages associated with face-to-face interviewing include:

1. It can be used with informants who could not otherwise provide information (i.e. informants who are not literate, blind, bedridden, or very old).
2. If a respondent doesn't understand a question in a personal interview or the interviewer senses that he or she is not answering fully, the interviewer has the liberty to fill him or her in and, if necessary, probe for more complete data.

3. Face-to face interviewing permits unobtrusive observations that may be of interest to the researcher (Bernard, 1988; Singleton et al., 1993).

One disadvantage attributable to personal interviews is that they can be intrusive and reactive. It can be challenging for a researcher to conduct an interview without subtly telling the respondent which answers are favorable or unfavorable. Other disadvantages include:

1. Personal interviews are costly in both time and money. In addition to the time spent in interviewing people, locating respondents in a representative sample may require several revisits. Also, the budget for a face-to-face survey should account for recruiting, training, and supervising personnel, as well as for interviewer wages and travel expenses, which may include lodging and meals.
2. When compared with self-administered questionnaires, the number of people that a researcher can contact per time unit is much smaller.
3. Personal interview surveys conducted over a long period of time run the risk of being overtaken by major events (i.e. natural disasters or government interventions associated with the population being studied) that are out of the researcher's control (Bernard, 1988; Hines, 1993; Singleton et al., 1993).

Interviews may be structured – in which a carefully worded questionnaire is administered – or in-depth – in which the interviewer does not follow a rigid form. In structured interviews, an emphasis is on the uniformity of survey administration; therefore, interviewers rarely deviate from the established question wording. During in-depth interviews, however, the interviewers relax strict adherence to the interview guide

in order to encourage free and open responses. This enables researchers to capture respondents' perceptions in their own words and from their perspectives. However, in-depth exploration usually limits the set of questions that can be covered, which presents a tradeoff between comprehensive coverage of topics and depth of understanding. In-depth interviews may be conducted with individuals or with a small group (Mohoney, 1997).

Table 2.1 Advantages and Disadvantages of Survey Research Data Collection Methods

Survey Research Data Collection Method	**Advantages**	**Disadvantages**
Self-Administered Questionnaires	• All respondents get the same questions, eliminating concerns about interviewer bias • Longer and more complex questions can be asked • Respondents more willing to report socially undesirable behaviors	• Researchers cannot employ the element of surprise in questioning • Not useful for querying illiterate respondents • Culturally inappropriate responses may be made by respondents despite researchers efforts to the contrary
Personal Interviews	• Can be used with illiterate respondents • Researchers can probe respondents for more complete data if necessary • Permits unobtrusive observations that may be of interest	• Costly in both time and money • Number of people that can be contacted per time unit is much smaller than for self-administered questionnaires • May be overtaken by major events if conducted over a long period of time

2.1.3.3 Closed-Ended Versus Open-Ended Questioning

The questioning in surveys may be either open-ended or closed-ended. Closed-ended, or fixed-choice, questions force respondents to choose responses from among those provided by the researcher. Open-ended questions, on the other hand, do not limit

respondents' response alternatives, and allow them to answer in their own words either in written form on a questionnaire or verbally to an interviewer; hence, they are also known as "free response" questions (Houtkoop-Steenstra, 2000; Singleton et al., 1993).

The advantage of closed-ended questions is that they require less effort and less facility with words by the respondent. The disadvantage of this format, however, is that good closed questions may be difficult to develop, and closed questioning limits freedom of response (Singleton et al., 1993)

According to Singleton et al. (1993), the freedom in answering provided to the respondent is the greatest advantage to open-ended questioning. This freedom may result in a wealth of information that reveals the logic or thought processes of respondents in addition to the amount of information they possess about the subject being queried. Responses to open-ended questions frequently clarify and sometimes completely change researchers' understanding of the topic.

While the wealth of information generated from open-ended questions can be extremely valuable, the coding process of summarizing and analyzing this complex and large amount of data can be very time consuming and costly. Coding consists of assigning numbers or symbols to variable categories for computer analysis. It is relatively straightforward for closed-ended questions, since there are relatively few categories and the researcher simply needs to assign a different code to each category; however, it becomes considerably more complicated for open-ended questions due to the fact that the quantity of unique responses may number in the hundreds. In the latter case, the goal of the researcher is develop a coding scheme that puts the data in a manageable

form by adequately reflecting the full range of responses without requiring a separate code for each respondent (Singleton et al., 1993).

A central challenge for researchers regarding coding, therefore, becomes to establish enough categories such that as much information as is practically possible is retained and meaningful differences between categories are not overlooked, but to not create too many categories such that meaningful analyses cannot be conducted. Thus, coding schemes should effectively balance detail (Singleton et al., 1993). This may be particularly challenging in surveys that measure a population comprised of heterogeneous cultures, due to the linguistic and conceptual differences across cultures, the diversities in vocabulary and belief structures that are almost certain to accompany them, and the plethora of possible categories that the responses might generate.

In addition to the attempted balancing acts associated with coding, challenges associated with the open-ended questioning approach include difficulties with inarticulate or semiliterate respondents, the varying lengths of responses depending on the respondents, and the reluctance of many people to reveal detailed information or socially unacceptable opinions or behaviors (Singleton et al., 1993).

Most survey researchers prefer closed-ended items to open-ended ones because of the level of efficiency that is associated with the former (Bernard, 1988). However, it is possible to work out compromises between open-ended and closed-ended questions in order to capture additional complexities in the data (Warwick, 1973). Since there is no rule that prevents a researcher from mixing question types, Bernard (1988) claims that putting a few open-ended items in what would otherwise be a completely closed-ended questionnaire is a good idea to help break potential monotony for the respondent.

2.1.4 Quantitative Data Analysis Methods

Once the data is collected, then it is analyzed to assess and model relationships between and among the variables of interest. After the data has been coded and cleaned (thoroughly checked for errors), various statistical analyses may be performed on it in order to assess variable relationships and draw sound conclusions.

There are two primary functions of statistics: descriptive and inferential. Descriptive statistics summarize the data at hand, while inferential statistics are used to indicate the extent to which the researcher can generalize beyond the given data. With respect to modeling relationships among key variables, statistics are used to generate estimates of various hypothesized effects in a model and to evaluate how well the data fits a given model. A special class of statistics termed regression analysis is often used to analyze the effects of independent variables (explanatory variables that influence and explain a dependent variable) on a dependent variable (the variable the researcher in interested in explaining and predicting) (Neter et al., 1996; Singleton et al., 1993).

2.1.5 Cross-Cultural Survey Research

Survey research that involves diverse cultural and ethnic minority groups is also known as cross-cultural survey research. There are many potential challenges associated with cross-cultural survey research (Hines, 1993; Pareek and Venkateswara Rao, 1980). These challenges can be categorized into three distinct problem types: problems with linguistic and conceptual equivalence; problems with measurement; and problems arising from the nature of the survey/interview process. These three areas must be addressed for research with culturally-diverse and ethnic minority groups to be more effective, and the responses obtained to be more accurate (Hines, 1993).

Conceptual equivalence is an issue in cross-cultural survey research because some concepts have meaning in one culture but not in others. The terms 'social welfare' and 'identity', for example, do not have a directly equivalent meaning in Japanese. In addition, the levels of meaning for concepts such as 'mother', 'illness', and 'socialization' may vary depending on culture. Linguistic equivalence concerns accurate translation of words across cultures, but does not take into account potential differences in levels of meaning for a word (Hines, 1993).

Even if a cross-cultural survey researcher is confident of attaining conceptual and linguistic equivalence in his or her study, measurement problems may require him or her to employ different indicators in order to measure the same concept across cultures. In addition, problems of scale equivalence may occur when the tasks or methodological techniques presented to respondents are unfamiliar or confusing. Irrelevant, taboo, culturally insensitive, or painful topics may also result in measurement problems due to difficulty in obtaining information from the respondents (Hines, 1993).

For some cultural and ethnic groups, the survey and interviewing process may be an uncomfortable and unfamiliar social situation (Hines, 1993). Surveys involve encounters and exchange of information with strangers, and there are cultural variations associated with the interactions and language used in these kinds of exchanges (Hines, 1993; Warwick, 1973). If people in a culture have not been exposed to interviews, it is possible that their responses may not be genuine. Pareek and Venkateswara Rao (1980) characterize this critical problem as one of "authenticity", which they define as the "capability of the interview to get the genuine responses from the respondents."

Cultural factors that might affect interview authenticity include courtesy norms, reticence, and game playing norms. Courtesy norms occur when respondents give answer that they believe will please or satisfy the interviewer. The likelihood of this problem increases if the interview is not seen as being particularly relevant to the respondents' lives. It has been suggested that interviewers reduce courtesy bias by employing simple measures such as dressing similarly to the people in the culture and readily accepting offers of hospitality. Reticence occurs when respondents do not talk much, or are slow to give responses. This can also result in responses that are not authentic. Finally, game playing norms occur in some cultures when people enjoy playing games with the strangers (i.e. interviewers) and leading them astray with responses that are not genuine (Pareek and Venkateswara Rao, 1980).

2.2 Qualitative Research

Qualitative research is an inductive investigative approach in which researchers make inferences or generalized conclusions without imposing "preexisting expectations or preformulated theories" (Hines, 1993). Instead of identifying causal relationships among a priori theoretical schemes, qualitative researchers prefer the theory to emerge from the data itself (Filstead, 1979). Unlike the quantitative research paradigm, the qualitative research paradigm assumes that the world is shifting, changing, and dynamic, which presents researchers with multiple realities (Hines, 1993).

Qualitative research methods may be used to obtain intricate details about phenomena such as feelings, thought processes, and emotions that are generally difficult to extract and learn about. Investigators who practice this kind of research often attempt

to understand the nature of people's experiences by going "out into the field" to find out what they are thinking and doing (Strauss and Corbin, 1990). Thus, qualitative research is also synonymous with the term "field research" (Singleton et al., 1993).

2.2.1 Data Collection Methods

There are three predominant data collection methods associated with qualitative research: observations, in-depth interviews, and focus groups (Mohoney, 1997; Strauss and Corbin, 1990).

2.2.1.1 Direct Observations

Direct observation of operations and activities concerning the phenomena of interest enables the researcher to develop an understanding of the context within which it takes place. This allows researchers to collect first-hand data on a variety of behaviors, capture a diversity of interactions, and openly explore the research topic. Furthermore, by employing observational techniques, researchers may uncover latent factors that influence the topic of interest (Mohoney, 1997).

In addition to these advantages, however, there are several disadvantages. First, this method can be very expensive and time consuming. Secondly, the presence of the observer may cause participants to alter their behavior patterns, such that what is being observed does not truly reflect the topic of interest. Finally, observers who are well-trained in the content area of interest are needed to collect the data (Mohoney, 1997).

2.2.1.2 Interviews

Interviewing methods employed in qualitative research are the same as those used in survey research. See the subsection entitled "Personal Interviews" in Section 2.1.3.2 for discussion.

2.2.1.3 Focus Groups

A focus group is a special case of the group interview. It combines elements of both interviewing and observation. Focus groups convene eight to 12 people who are typically paid for attendance and provided refreshments for their time. The hallmark of these sessions is the use of group dynamics to generate data and insights that might not emerge apart from a group interaction (Mohoney, 1997).

Focus groups are especially useful for exploratory research when little is known about the topic of interest; therefore, they are often employed during the early stages of a research project. Common uses of focus groups include:

1. Obtaining general background information about a topic of interest
2. Stimulating new ideas and creative concepts
3. Learning how respondents talk about the phenomenon of interest

The latter use may facilitate the design of questionnaires and other survey instruments, which is why survey developers frequently use focus groups during instrument development as a method to pretest topics or ideas (Mohoney, 1997; Stewart and Shamdasani, 1990). Toward that end, one major advantage of focus groups is its open response format. This presents the researcher with an opportunity to obtain rich data in the respondents' own words. In turn, this enables the researcher to discover deeper levels of meaning and make important connections that might be useful in a survey development process. Other advantages of focus groups include the following:

1. Data can be collected from a group of people quicker and at less cost than with individual interviews.

2. Focus groups provide a space for direct interaction between the researcher and respondents, which affords opportunities for the clarification of responses, follow-up questions, and probing of responses if necessary.
3. A synergy is often created in a focus group setting as respondents react to and build upon the responses of each other, resulting in data and ideas being uncovered that may not have been if individual interviews were employed (Stewart and Shamsadani, 1990).

In addition to these advantages, however, there are also several disadvantages, which include the following:

1. The small number of participants in focus groups and the convenience sampling method associated with most focus group recruiting practices significantly limit generalization to a larger population.
2. Results obtained in a focus group may be biased by very dominant or opinionated personalities, as reserved group members may be hesitant to talk and provide an equal contribution to the data collection process.
3. The moderator may unknowingly providing cues about responses and answers that are desirable to him or her, resulting in response bias among the participants (Stewart and Shamsadani, 1990).

2.2.2 Qualitative Data Analysis

Qualitative data analysis concerns the discovery, examination, and interpretation of meaningful patterns or themes within the data, where meaningfulness is determined by the particular goals and objectives of the project at hand. When examined qualitatively,

Table 2.2 Advantages and Disadvantages of Qualitative Research Data Collection Methods

Qualitative Research Data Collection Methods	Advantages	Disadvantages
Direct Observations	• Allow researchers to collect first-hand data • Enables researchers to understanding the context within which the topic of interest takes place • Latent factors that influence topic of interest may be uncovered	• Can be very expensive and time consuming • Participants may alter their behavior patterns due to presence of the researcher • Observers who are well-trained in the content area of interest are needed to collect the data
Interviews	See Table 2.1	See Table 2.1
Focus Groups	• Data can be collected quicker and at less cost than with individual interviews • Researchers can clarify responses, follow-up questions, and probe for additional information if necessary • Synergy among respondents results in data being uncovered that may not have been otherwise	• Small number of participants and the convenience sampling method typically employed significantly limits generalization to a larger population • Results may be biased by very dominant personalities • Moderator may unwittingly promote response bias by indicating responses he or she approves of

data can be analyzed from a variety of angles and perspectives according to the particular research or questions being addressed. There are a variety of qualitative data analysis approaches (e.g. ethnography, narrative analysis, and textual analysis) that correspond to different types of data, disciplinary traditions, and philosophical orientations (Berkowitz, 1997).

In quantitative analysis, the basis of analysis is numbers while, in contrast, the basis of qualitative analysis is words. There are also fewer universal rules and standardized procedures for qualitative analysis than for quantitative, statistical analysis. Although the fewer rules and procedures provide great versatility, they are also a source of great contention within the research community. Some researchers question whether an analysis can be truly rigorous apart from systematic standardization. Hence, many characterize qualitative research are undisciplined and subjective, but there are many others who believe otherwise (Berkowitz, 1997)

According to Berkowitz (1997), the following questions should guide a qualitative analysis:

1. What patterns and common themes emerge in responses dealing with specific items? How do these patterns (or lack thereof) help to illuminate the broader study question(s)?
2. Are there any deviations from these patterns? If yes, are there any factors that might explain these atypical responses?
3. What interesting stories emerge from the responses? How can these stories help to illuminate the broader study question(s)?
4. Do any of these patterns or findings suggest that additional data may need to be collected? Do any of the study questions need to be revised?
5. Do the patterns that emerge corroborate the findings of any corresponding qualitative analyses that have been conducted? If not, what might explain these discrepancies?

One major aspect of qualitative data analysis is data reduction. During the data reduction process, the researcher decides which aspects of the data should be emphasized based on the objectives of the research study. Although initial categorizations of the data may be determined by pre-established study questions, qualitative researchers should be open to the possibility that new meanings will emerge from the data collected (Berkowitz, 1997).

2.3 Cognitive Anthropology and the Notion of "Culture"

Some qualitative techniques are derived from the cognitive science area of Cognitive Anthropology. Cognitive scientists study ways that people classify and categorize information, as well as the underlying processes for responding to questions and retrieving information (Hines, 1993). Bernard (1988) defines Cognitive Anthropology as "the study of how people of different cultures acquire information about the world, how they process that information and reach decisions, and how they act on that information in ways that other members of their culture consider appropriate." Thus, Cognitive Anthropology may be thought of as cognitive science with an emphasis and focus on "culture".

Within Cognitive Anthropology, there are two schools of thought regarding the definition of culture. Some anthropologists, most notably Clifford Geertz, argue that culture is a symbolic meaning system that exists *between* the minds of individuals as opposed to within them individually. Other anthropologists however, including most prominently Ward H. Goodenough, maintain that "culture is an idealized cognitive system – a system of knowledge, beliefs, and values – that exists in the minds of

individual members of society" and "is the means by which society members generate appropriate social behavior and interpret appropriately the behavior of others" (Casson, 1981).

Casson (1981) characterizes the difference between these two paradigms in the following manner:

> "These theoretical perspectives differ most significantly with respect to where they locate culture. For Geertz, culture is a system of shared symbols that exists outside the individual. Although each individual society member has his or her own perception of it, culture, as such, is independent of individual human minds. Culture is an autonomous system of symbols that the individual is free to deal with as he or she sees fit . . . . For Goodenough, on the other hand, culture exists in the minds of individual human beings. Individuals, however, do not share exactly the same model of their culture, just as they do not share exactly the same model of their language (that is, individuals differ in dialect and idiolect). Because of differences in biological heritage, unique personal histories, and the different roles individuals occupy in society, individual society members have varying cognitive models of society's culture."

Therefore, because culture from the Geertz perspective is viewed as existing independently apart from individual human minds, it is not necessary for anthropologists working from this tradition to be concerned with whether or not society members' perceptions of a society's culture are the same or divergent. On the contrary, because the Goodenough perspective characterizes individual society members as having varying cognitive models of the society's culture based on factors such as biological heritage and unique personal histories, anthropologists who operate from this school of thought characterize a society's culture in terms of "an idealized composite of the cognitive models of individual society members" (Casson, 1981). Thus, it becomes important for researchers to understand each individual's cognitive model of culture when operating from the Goodenough perspective.

2.4 State-of-the-art Dietary Assessment Approaches

There are three predominant dietary assessment approaches currently being employed: food records, 24-hour recalls, and food frequency questionnaires (National Institutes of Health, 2006; Johnson, 2002). Other dietary assessment approaches include brief dietary assessments and diet histories (Thompson and Byers, 1994). Each of these methodologies utilize respondents' self-reports (Johnson, 2002); thus, they may be considered as types of interviews and/or self-administered questionnaires from survey research.

2.4.1 Food Records

Food records are typically used to measure dietary intake over a single time period that usually spans three to seven days (National Institutes of Health, 2006; Johnson, 2002; Thompson and Byers, 1994). In this approach, respondents are asked to provide written accounts detailing information about their dietary intake, such as foods and beverages consumed (including brand names), estimates of amounts consumed, ingredients of mixed dishes, and food preparation methods (McPherson et al., 2000; Thompson and Byers, 1994). This data is typically collected in an open-ended form (Thompson and Byers, 1994).

Because respondents typically record the requested data at or immediately after mealtime, the accuracy of respondent self-reporting is considered the major strength of the food record dietary assessment approach. Foods eaten are likely to be described more fully and are less likely to be omitted due to memory loss (McPherson et al., 2000; Thompson and Byers, 1994). Additionally, Thompson and Byers (1994) contend that the estimates of amounts of food consumed at each eating occasion should provide the

researcher with a more accurate representation of portion sizes than if respondents were recalling portion sizes of food eaten during previous occasions, which is the case with other predominant dietary assessment approaches (Thompson and Byers, 1994).

Although the "real time" nature of food record reporting is believed to facilitate a higher degree of accurate responses, there are other aspects of this approach that severely limits its effectiveness. First, respondents need to be literate and motivated in order for the records to be reasonably accurate (National Institutes of Health, 2006; Johnson, 2002; Thompson and Byers; 1994). This may limit the effectiveness of this approach in some population groups such as those with low socioeconomic status, recent immigrants, children, and the elderly (Thompson and Byers, 1994). Secondly, research has consistently indicated that respondents tend to modify their eating habits in order to represent their diet in a more "positive" way (National Institutes of Health, 2006). This is a phenomenon known as social desirability bias (Bradburn et al., 2004). Respondents may also see the need to change their eating habits in order to make the food recording task easier (National Institutes of Health, 2006).

Additionally, research has shown that the quality of reporting decreases with increasing number of days of the recording period (National Institutes of Health, 2006; Thompson and Byers, 1994). Thompson and Byers (1994) reason that the occurrence of this phenomenon may be due to respondents developing the practice of filling out the record at one time (i.e. morning) for a previous period (i.e. previous evening's meal). Finally, underreporting of true intake often occurs with food records (National Institutes of Health, 2006).

2.4.2 Twenty-four Hour Recalls

Twenty-four hour recalls are used to elicit all food and beverages consumed by a person during the previous 24 hours or preceding day (National Institutes of Health, 2006; Thompson and Byers, 1994). They are often structured interviews that use specific probes to help respondents recall all foods and beverages consumed during the previous day (Thompson and Byers, 1994). These interviews may be conducted either in person or over the telephone (Tran et al., 2000), via paper records or with a computer-assisted program (McPherson et al., 2000; Thompson and Byers, 1994).

There are several advantages associated with the 24-hour recall dietary assessment approach. Because the instrument is typically administered by an interviewer, literacy of the respondent is not a requirement as with the food record, enabling this approach to be applicable across low-income and low-literacy groups (Johnson et al., 1998; Thompson and Byers, 1994). In addition, the memory burden on the respondent is less for the 24-hour recall than for the food record because the recall time period is typically much shorter (Johnson, 2002; Thompson and Byers, 1994). Furthermore, because 24-hour recalls occur after food has been consumed and is often unannounced, they typically do not cause respondents to alter their eating habits (Johnson, 2002; McPherson et al., 2000; Thompson and Byers, 1994). Finally, the immediacy of the recall period is believed to produce a high level of response accuracy (Thompson and Byers, 1994).

Due to variability in individual dietary intake (both between people and from day-to-day for each person), data from a single 24-hour recall should not be used to characterize someone's usual dietary intake (National Institutes of Health, 2006;

Thompson and Byers, 1994). Instead, multiple 24-hour recalls are needed to ascertain usual intake (National Institutes of Health, 2006; McPherson et al, 2000). Additionally, 24-hour recalls are prone to underreporting due to problems concerning memory, difficulty in reporting portion size, and respondent bias (National Institutes of Health, 2006; Thompson and Byers, 1994).

2.4.3 Food Frequency Questionnaires (FFQs)

The food frequency questionnaire is the most common dietary intake assessment method employed in epidemiologic research (Quandt et al., 2007; National Institutes of Health, 2006; Stark, 2002; Subar et al., 2001; Willett, 1998). They are interviewer- or self-administered questionnaires used to assess respondents' usual frequency of food consumption over a specific period of time – typically one week, one month, multiple months, or one year (National Institutes of Health, 2006; Johnson, 2002; McPherson et al., 2000; Subar et al., 1995; Thompson and Byers, 1994). FFQs can be classified as quantitative, semi-quantitative, or non-quantitative (McPherson et al., 2000).

In addition to estimating the *frequency* of food consumption over a specific period of time, quantitative food frequency questionnaires (QFFQ) estimate the *quantity* of food consumed using instruments such as weights, measures, or food models. Semi-quantitative food frequency questionnaires (SFFQ) also estimate quantity of food consumed in addition to frequency of consumption, but uses a standard portion size, serving, or predetermined amount to elicit the estimates. Non-quantitative food frequency questionnaires estimate frequency of food consumption only (McPherson et al., 2000).

The many advantages of FFQs include ease of administration, cost-effectiveness, and adaptability for population studies (National Institutes of Health, 2006; McPherson et al., 2000). Additionally, they can be used to rank respondents based on their usual intake and are suited for predicting health outcomes at both the individual and group level (McPherson et al., 2000), rendering it an ideal assessment instrument for diet-focused programs and interventions.

Despite its numerous strengths and commonality of use among epidemiologists and other public health professionals, the food frequency questionnaire dietary assessment approach is also fraught with many weaknesses. Responses elicited from FFQs do not have the same level of detail and specificity as food records or 24-hour recalls (National Institutes of Health, 2006; Thompson and Byers, 1994) with respect to foods consumed, cooking methods, and portion size (Subar et al., 2001). Perhaps this is because FFQ responses are not open-ended as those elicited from food records and 24-hour recalls. Instead, FFQs provide respondents with a food list from which they select the foods they usually eat, the frequency they eat them over a specified time period, and (in the case of QFFQs and SFFQs) the quantity of selected foods eaten per meal. Thus, there may also be inaccurate reporting resulting from an incomplete listing of all possible foods, incorrect frequency estimation, and (for QFFQs and SFFQs) errors in serving size estimation (National Institutes of Health, 2006; Thompson and Byers, 1994).

Table 2.3 Advantages and Disadvantages of State-of-the-art Dietary Assessment Approaches

Dietary Assessment Approach	Advantages	Disadvantages
Food Record	• Accuracy of responses • Foods eaten likely to be described more fully by respondents	• Respondents need to be literate • Possibilities of social-desirability bias exist • Quality of self-reports decreases with increasing number of days
24-Hour Recall	• Respondent literacy not a requirement • Recall time period shorter than food record or FFQ, resulting in less respondent burden • Occurs after food has been consumed and is often unannounced, reducing social desirability bias • Produces high level of response accuracy due to immediacy of recall period	• Should not be used to characterize someone's usual dietary intake due to variability in individual dietary intake • Prone to underreporting due to problems concerning memory, difficulty in reporting portion size, and respondent bias
Food Frequency Questionnaire (FFQ)	• Ease of administration, cost-effectiveness, and adaptability for population studies • Can be used to rank respondents based on their usual intake • Suited for predicting health outcomes at both the individual and group level	• Responses elicited do not have the same level of detail and specificity as food records or 24-hour recalls • Inaccurate reporting may also result from an incomplete listing of all possible foods

CHAPTER 3

MOTIVATION

3.1 Overweight/Obesity: A National Health Crisis

The percentage of American adults that can be classified as overweight or obese has risen dramatically in recent years. Results from the 1999-2002 National Health and Nutrition Examination Survey (NHANES) conducted by the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC) characterized an estimated 65 percent of American adults as being overweight or obese, an increase from 47 percent during the 1976-1980 time period (CDC, 2004). Furthermore, the Georgia Department of Human Resources (DHR) reports that the prevalence of overweight and obesity among adults in the state increased from 37 percent in 1984 to 61 percent by 2003 (Georgia DHR, 2005).

Disparities exist in the percentage of United States adults classified as being obese based on race or ethnicity. For example, early estimates from the 2008 National Interview Survey reveal that more than 30 percent of Hispanic male adults aged 20 and older are obese, compared to approximately 26 percent of non-Hispanic white males. Among Hispanic females in this same age bracket, over 33 percent are obese compared to only 24 percent of non-Hispanic white female adults. (Heyman et al., 2008).

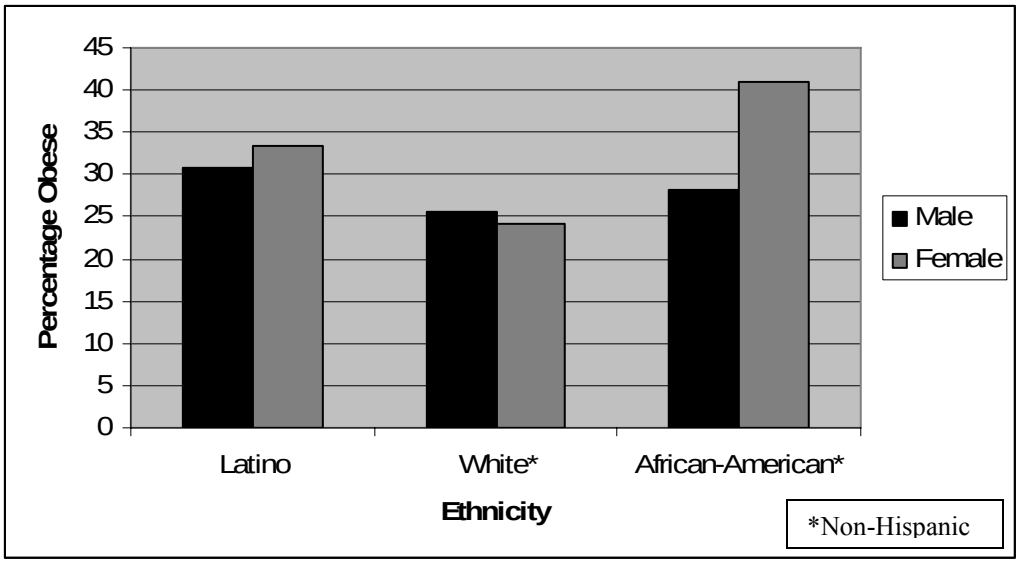

Figure 1.2 Early Release of Obesity Estimates Based on Data from the January-June 2008 National Health Interview Survey (Adapted from Heyman et al., 2008)

3.2 Eliminating Health Disparities: A National Priority

Healthy People 2010 is a United States Department of Health and Human Services initiative that serves as a comprehensive, nationwide health promotion and disease prevention agenda. The vision for this initiative, "Healthy People in Healthy Communities," is founded upon the underlying premise that an individual's health is virtually inseparable from the health of the larger community, and that the health of every community in every state and territory determines the overall health of the nation. One of Healthy People 2010's two overarching goals is to eliminate health disparities among segments of the population, including those based on race or ethnicity (U.S. Department of Health and Human Services, 2000).

It is widely recognized that cultural competence is both a fundamental aspect of quality in healthcare for diverse patient populations and an essential strategy for reducing health disparities (Goode et al., 2006). Betancourt et al. (2003) define cultural

competence in health care as "understanding the importance of social and cultural influences on patients' health beliefs and behaviors; considering how these factors interact at multiple levels of the health care delivery system; and, finally, devising interventions that take these issues into account."

3.3 The Need for Culturally Competent Dietary Assessment Tools

The ability to measure dietary intake accurately is important for nutritional surveillance and intervention research (Thompson et al., 2002). Additionally, measurements of past and present intake of foods and nutrients can be utilized to identify long-term effects of diet on the development of overweight/obesity (Shahar et al., 2003). Furthermore, results from dietary assessments can be used to determine whether or not certain health promotion goals related to food consumption are being met (Domel et al., 1994).

Dietary intake assessment instruments that work well for one population subgroup often perform poorly for another, however (Cassidy, 1994). Consequently, the National Institutes of Health asserts that there is a continuing need to adapt dietary assessment instruments for conducting research in diverse and distinct socio-cultural populations (National Institutes of Health, 2006).

3.3.1 Suggested Solutions from the Literature

Jerome and Pelto (1981) advocate the use of ethnography to improve dietary intake measurement methodology. Ethnography is a qualitative research method that incorporates culture. In its traditional form, ethnography involves a researcher collecting data by observing and/or participating in people's daily lives over an extended period of

time. The data collected is based on whatever context the research is being conducted in, such as to shed light on the topic of focus (Hammersley and Atkinson, 1995). An effective integration of ethnographic research with nutrition studies can enable researchers to identify major socio-cultural characteristics that affect intra-community differences in food intake, while simultaneously eliciting culturally- and socially-sensitive aspects of food use (Jerome and Pelto, 1981).

Few researchers have suggested linking quantitative and qualitative research methods (Hines, 1993). Perhaps this is due to the inherent philosophical conflicts between the respective research paradigms. However, Cassidy (1994) suggests mixing qualitative and quantitative research designs in order to promote cultural sensitivity in dietary assessment. Additionally, Hines (1993) recommends that quantitative survey research applications be combined with qualitative methods from cognitive anthropology in order to improve the quality of cross-cultural surveys and ensure that the findings are culturally-relevant and accurate.

Specialized techniques derived from Cognitive Anthropology can produce a wealth of information about specific cultural and ethnic groups that can also be compared across cultures. These strategies are particularly useful for addressing problems related to linguistic and conceptual equivalence and measurement. They produce specific, focused data that can easily be combined with survey research. One of the techniques from Cognitive Anthropology that can be incorporated into the production of culturally competent dietary assessments is free listing.

3.3.2 Employing Free Listing to Elicit "Listable" Culturally-Specific Domains

Free listing is a technique that is commonly used in research on native taxonomies – the study of how different cultures categorize "discrete domains with listable contents" such as types of kin, animals, plants, and diseases (Bernard, 1988). Researchers use free listing to define culturally specific domains by asking respondents to list all of the items that they believe are included in a group-recognized domain. Individual cultural experts such as key informants and/or collective cultural experts in the context of focus groups may be used to identify potential domains. Once data associated with the topic of interest is collected from designated cultural experts, results generated from free listing techniques may be used to construct culturally-relevant items to be incorporated into surveys (Hines, 1993).

3.3.3. Example of Free Listing Applied in Dietary Assessment

Blum et al. (1997) incorporated the free listing technique from Cognitive Anthropology in the development of guidelines for an ethnographic protocol to conduct a community assessment of natural food sources of Vitamin A. These guidelines suggest that researchers employ ethnographic techniques in key-informant interviews using the free-listing technique to elicit a list of key vitamin A-rich and staple foods in communities. Information elicited from these interviews can then be used to explain local food use and consumption as well as to determine food preparation techniques, enabling the researcher to understand the basic eating model of people within the community.

Kuhnlein and Pelto (1997) reported on the application of these techniques for the assessment of natural food sources of vitamin A in the Philippines, Niger, China, Peru,

and India. These countries represent a cross-section of diverse environments and cultures. Among the findings, some research teams found it advisable to adapt certain aspects of the protocol based on the particulars of the community they were studying.

CHAPTER 4

SPECIFIC AIMS

The Healthy People 2010 goal of eliminating health disparities among racial and ethnic minority groups is applicable to the overweight/obesity epidemic. Additionally, the reduction and elimination of overweight and obesity is a contemporary goal among public health professionals for *all* United States ethno-cultural groups.

Thus, for this doctoral dissertation, my objective was to develop a culturally competent dietary assessment instrument by effectively synthesizing qualitative, ethnography-based methods from cognitive anthropology with survey research and quantitative statistical methods. This objective was comprised of three specific aims:

1. Develop "culturally competent" survey questionnaire and interview procedures by utilizing the free listing technique from cognitive anthropology.
2. Construct a comprehensive eating model that explains local food use and consumption in the community by applying appropriate quantitative statistical methods to the data collected.
3. Compare performance of statistical methodologies applied to results generated by my assessment instrument with that of an industry standard.

In accordance with the Betancourt et al. (2003) definition of cultural competence, I sought to develop a dietary behavior assessment instrument that takes into account relevant social and cultural influences on individual regular eating habits in its construction. Additionally, the comprehensive eating model was to be constructed based

on statistical analyses of the elicited data according to selected demographic and socio-cultural indicator variables.

CHAPTER 5

METHODS

5.1 Selection of Study Community

The community of focus for this study was the Murray/Whitfield county region in the rural, southern Appalachian mountains of northwest Georgia – approximately 100 miles northwest of Atlanta. In the 2000 census, the population of the state of Georgia was only 5.3 percent Hispanic – more than seven percent *less* than the national average. However, the combined population of Murray and Whitfield counties was approximately 17 percent Hispanic, nearly five percent *more* than the national average. In particular, Whitfield County had the largest percentage of Hispanics of all 159 Georgia counties, with slightly more than 22 percent of its residents being of Hispanic origin (U.S. Census Bureau, 2000b). An overwhelming majority of the Hispanic subpopulation in this region is of Mexican descent, while the region's accompanying majority non-Hispanic population is predominantly White.

The predominant work occupation in this region is carpet manufacturing. Eighty percent of the United States carpet market is supplied by carpet mills located within a 65-mile radius of Dalton, Georgia (Carpet and Rug Institute, 2005). This radius includes both Murray and Whitfield counties. Accordingly, more than half of the Dalton labor force (approximately 54 percent) is employed in carpet manufacturing (Regional Technology Strategies, 2003).

5.2 Research Study Context

This research project was conducted in parallel with CPAN (Childhood Physical Activity and Nutrition) – a health promotion initiative that was being facilitated by the Northwest Georgia Healthcare Partnership in Dalton, Georgia for the Murray/Whitfield county region during the time this research study was conducted. At the commencement of the research study, CPAN was a school-centered nutrition and physical activity health promotion initiative targeting school children and their families.

All elementary schools in Murray and Whitfield counties – including those in the City of Dalton – along with other local childcare and youth-centered organizations participated in CPAN. The population demographics of these schools and the communities they serve varied across the ethno-cultural spectrum, with some schools having high majority Hispanic populations, others with high majority White populations, and others that are more evenly distributed. (The African-American population in the region is minimal.) Participants in both the pilot and field study phases of the research were recruited from parent outreach initiatives from select CPAN schools, and all data collection procedures were conducted within the context of CPAN events targeted for adults.

5.3 Instrument Development

The first specific aim of the research project was to develop "culturally competent" survey questionnaire and interview procedures by utilizing the free listing technique from Cognitive Anthropology. This was accomplished in three stages. First, a questionnaire and interview protocol was proposed based on conjecture regarding the relationship between selected socio-cultural factors and individual eating habits. Second,

a pilot study was conducted to test the effectiveness of the protocol and to refine it. Third, a final, refined version of the protocol was developed based on results from the pilot study.

5.3.1 Proposed Protocol: Eliciting Meal and Snack Contents Via Free Listing

There is limited evidence demonstrating the utility of meal-based dietary recalls among certain populations. Studies have shown that dietary recalls among men may be more accurate when elicited according to meals, and that the elderly have difficulty recalling foods independent of meals (Quandt et al., 2007; Thompson et al., 2002). Thus, I developed a dietary behavior assessment protocol in the form of a meal-based free listing dietary recall that elicits typical foods eaten by individuals primarily according to meals and snacks.

The advantage of this method is that typical foods eaten across the whole diet can be queried at once, as opposed to only eliciting foods eaten during the previous 24 hours. Additionally, smaller sample sizes might potentially be needed to generate a representative list of typical foods eaten by a population than would be necessary using a 24-hour dietary recall.

5.3.1.1 Structure of Protocol

The protocol was based on the administration of self-administered questionnaires in a focus group format. This structure promotes the effective synthesis of self-administered questionnaire advantages (e.g. all respondents getting the same questions, longer and more complex questions being asked, respondents being more willing to report socially undesirable behaviors) with advantages of focus groups (e.g. cost-effectiveness of data collection, opportunities for clarification and additional probing of

questions and responses, and synergy resulting from interactions among respondents). In particular, the willingness of respondents to report socially undesirable behaviors on self-administered questionnaires and the cost-effectiveness of focus group data collection were especially important. It has been reported that the notion of social desirability bias is particularly important in dietary studies (Lissner, 2002). Additionally, there were resource constraints in this doctoral dissertation study that made cost-effectiveness of questionnaire administration a major concern.

5.3.1.2 Rationale for Protocol Construction

The meal-based, free listing dietary recall constructed for this study was designed to elicit typical foods eaten according to three distinct dietary behavior patterns that may be dependent upon certain culturally-based consumption models: workday versus non-workday eating habits, Saturday eating habits, and Sunday eating habits.

Because carpet manufacturing is the centerpiece of the region's economy, eating patterns among working adults in our study community may be influenced by their "factory mill work culture". For example, breakfast and/or lunch during the work week may be of the "grab-and-go" type or in a plant/campus cafeteria. Additionally, because carpet mills also employ many executives and administrators, restaurant dining may be a staple of some people's work week eating habits as well.

Research has found that weekend eating in the United States is associated with greater energy and fat intake than weekday eating (Haines et al., 2003). It can be conjectured that weekend (Saturday and Sunday) dining may differ from weekday eating according to "socioeconomic culture", as more wealthy residents may be able to eat out and have more diversity in their diets than less wealthy ones. Additionally, certain

ethnically-, religiously-, and geographically-defined cultures have traditional meals only on Sundays that differ from other meal patterns during the rest of the week but, because of their frequency, remain a staple of the overall diet.

Preliminary evidence from trial runs of the protocol suggested that a meal-based, free listing dietary recall might needed to have been supplemented with certain food groups that may not be readily recalled (e.g. desserts and fruits) in order to elicit a more complete picture of an individual's typical eating habits. Thus, a pilot study of the protocol was conducted prior to its administration in the field in order to empirically justify the inclusion and/or exclusion of supplementary questions that query eating habits according to certain food groups, and to refine the protocol accordingly.

5.3.2 Pilot Study

A pilot study was conducted approximately three months prior to the field study in order to test the utility of the meal-based, free listing dietary behavior recall protocol. Focus groups of parents, child caregivers, and school employees were convened at two Whitfield County elementary schools participating in CPAN: Antioch Elementary School and Pleasant Grove Elementary. The first discussion was held at Antioch Elementary on May 21, 2008, with the second one occurring at Pleasant Grove Elementary two days later. Authorization to conduct the pilot study at the two schools was given by the Superintendent of Whitfield County Schools.

5.3.2.1 Pilot Study Administration

Both focus groups were structured in three phases. In the first phase, the meal-based, free listing dietary behavior recall exercise was given in the form of a paper-based survey questionnaire (See Appendix A). The questionnaire had three parts, with each

part being administered separately to each individual upon completion of the previous part. In addition to an English version of the questionnaire, a Spanish version was available for native Spanish-speaking participants who preferred a questionnaire in their native language.

Part one of the survey collected demographic information from the respondent (e.g. gender, age, native language, ethnicity, etc.). Part two queried each respondent about what they normally eat and drink during weekdays according to five meal and snack categories: breakfast, lunch, dinner, other meals, and snacks. Within the space provided below each meal and snack category were three sections in which the respondents were instructed to write (1) the time that they normally had the meal in question, (2) foods they normally eat during that particular meal, and (3) beverages they normally drank during the meal.

There were spaces provided for each of the five aforementioned meal and snack categories for each of the five days of the week; hence, there were 25 possible columns of information for part two of the survey. Additionally, respondents were asked whether or not each of the five workdays was a typical workday. There was also additional space on the back of part two in which respondents could write (1) any additional foods and beverages they normally eat or drink (in case the space already provided was insufficient) and (2) any additional comments they may have for foods normally eaten and beverages normally drank on weekdays. Part three of the questionnaire queried respondents about what they normally eat or drink on weekends. It was structured exactly like part two minus the overflow space for additional foods and beverages.

The second stage of the focus group was a break during which participants were provided refreshments, while the third and final stage was a group discussion designed to understand how easy or difficult the questionnaire was. Both focus groups were planned to last for 90 minutes. While the Pleasant Grove focus group fit within that time frame, the Antioch focus group lasted nearly two hours. All participants were compensated $20 for their time.

5.3.2.2 Pilot Study Results

There were 15 total participants in the pilot study; nine participated at Antioch Elementary and six participated at Pleasant Grove Elementary. Only one of the 15 participants was male; the remaining 14 were female. Twelve of the 15 participants were between the ages of 25 and 44, with seven of the 12 being between the ages of 25 and 34. Thirteen of the 15 participants reported Spanish as their native language; all 13 of these participants requested the Spanish version of the questionnaire. Correspondingly, the same 13 participants reported their ethnicity as Latino, with the other two classifying themselves as Caucasian. The two Caucasian participants along with one of the Latino participants reported spending the majority of their lives in the United States prior to age 18; the remaining 12 participants – all Latino – reported spending the majority of their lives outside of the United States prior to age 18.

Among participants who were not born in the United States, the amount of time they have now lived in the United States ranged from 2-31 years, with the average being 11.5 years. It should be noted that five of the six Pleasant Grove participants – none of whom were born in the United States – reported having now lived in the country between eight and 16 years. The amount of time participants reported having lived in Dalton –

including natives – was an average of slightly more than 10 years. Eight of the 15 participants were housewives, two worked in carpet manufacturing, two were plant operators, one was a custodian, and one was a bus driver.

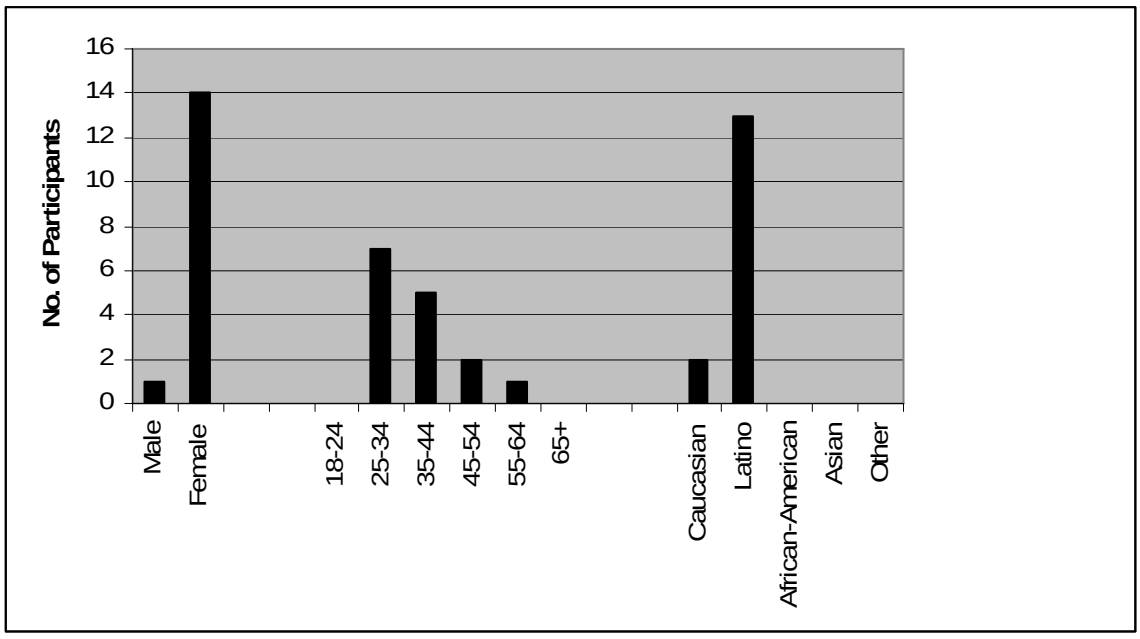

Figure 5.1 Selected Demographics of Pilot Study Participants

There were two primary results from the pilot study that affected the refinement of the protocol. First, data analysis revealed that adding supplementary questions that query eating habits according to certain food groups would not be necessary, as a diverse cross-section of foods were elicited by the questionnaire. Although there were only 15 participants in the pilot study, a comprehensive list of foods representing a broad spectrum of food categories was elicited. These included sweets and desserts, which the trial runs indicated might not be readily recalled by participants and, hence, need supplementary questions for additional prompting. (See Appendix B for complete listing of foods and associated categories mentioned by at least two respondents in pilot study.)

Furthermore, the data revealed that it was not necessary to query foods for each day of the week, as several participants wrote the same food items for multiple days of the week; thus, querying for foods weekly and on weekends based on "workdays" and "non-workdays" would be sufficient.

5.3.2.3 Revisions to Protocol

Based on the results of the pilot study, the protocol was refined as follows:

1. The "weekday" portion of the questionnaire was streamlined. Instead of querying for foods normally eaten each day Monday through Friday and asking whether or not each day was a "typical workday" or not, the worksheet was reduced to two sections "weekday workdays" and "weekday non-workdays". A cursory examination of the responses in the pilot study revealed that there were few differences in the foods eaten by participants across the week. As a result, querying for foods normally eaten each day of the week essentially caused unnecessary complication and redundancy for the respondent.
2. The overflow space in which respondents could write additional foods and beverages they normally eat or drink was eliminated. An examination of the written responses revealed that the space provided was sufficient, as no one needed to utilize the extra space.
3. Two demographic questions (length of time lived in the United States, length of time lived in the Dalton community) were converted from open-ended to closed-ended, in order to promote ease of analyses.

4. Two additional questions ("Were you born in the USA?" and "Were you born in or around the Dalton community?") were added as precursors to the aforementioned demographic questions concerning length of time lived in the United States and length of time lived in the Dalton community respectively, in order to facilitate clarity of understanding among the respondents.

5.4 Field Study

The field study was conducted in the context of a preliminary focus group for adult nutrition and physical activity classes sponsored by the CPAN that were held at Friendship House Childcare just outside of Dalton, Georgia in Whitfield County. Friendship provides childcare for children from six weeks of age through kindergarten. It was selected because the ethnic background of the children it serves was representative of the region as a whole. Of 184 children enrolled at the start of 2008, 99 were White (53.8 percent), 58 were Hispanic/Latino (31.5 percent), 10 were Asian/Pacific Islander (5.4 percent), nine were multi-racial (4.9 percent), and eight were Black/African American (4.3 percent).

One-year estimates from the American Community Survey conducted by the U.S. Census Bureau in 2007 (most recent available) indicated that 64.2 percent of the Whitfield County population was non-Hispanic White, 30.2 percent were Hispanic/Latino, 3.9 percent were Black/African American, and 1.3 percent were Asian (U.S. Census Bureau, 2007a). Thus, the population demographics of parents with children attending Friendship House was comparable to the most recent U.S. Census data for Whitfield County for the three most predominant ethnic groups (White, Latino, and

African American), affording the possibility for a representative sample to be selected from one location as opposed to multiple locations – which would have been the case had the elementary schools been selected. (Most of the elementary school demographics were heavily skewed in favor of either one ethnic group (White) or another (Latino); thus, multiple schools would have had to been selected in order to achieve a representative mixture of children and parents.) The Director of Friendship House provided the authorization for the field study to be conducted onsite at the facility.

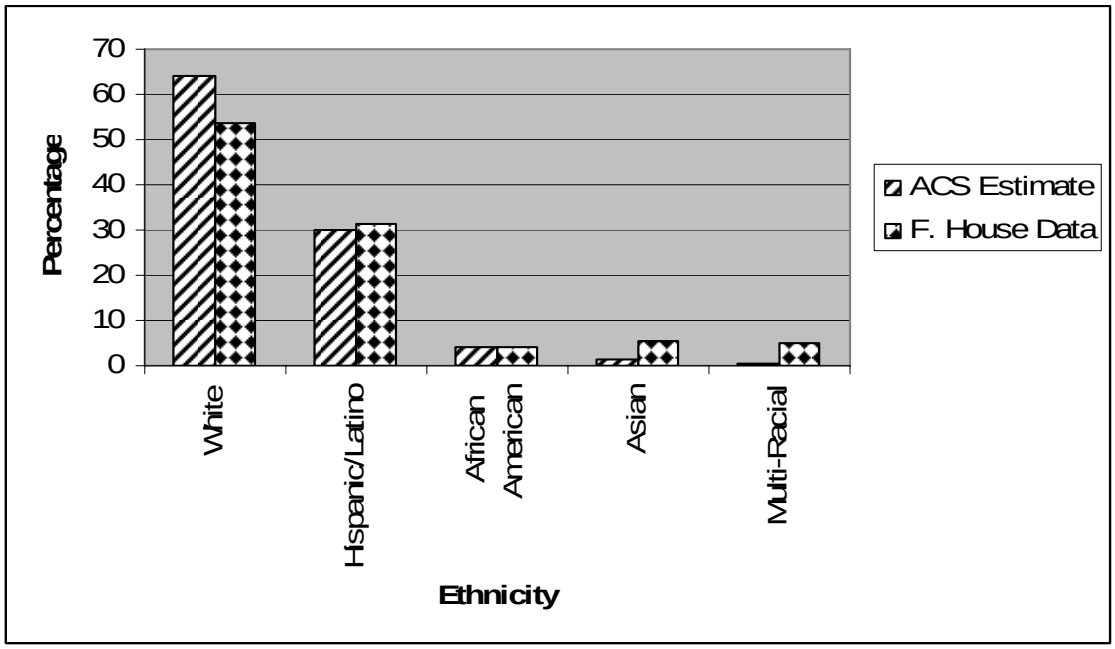

Figure 5.2 Comparison Graphic of 2007 American Community Survey and 2008 Friendship House Data Demographic Percentages

5.4.1 Participant Recruitment and Sample Selection

I was allotted approximately five minutes to introduce myself, give an overview of the research study, and verbally recruit potential participants by the Friendship House Parent Resource Coordinator at their orientation for new parents on August 5 and 7 of

2008. Of the 40 parents that participated in the orientation sessions over the course of the two-day period, 32 indicated they were interested in participating in the study by providing their names and contact information on interest sheets. An additional five adults who had children, grandchildren, or other family members that had previously been enrolled at Friendship House were recruited to participate in the study by the Parent Resource Coordinator herself. Thus, a total of 37 adults signed up to participate in the study.

Based on information provided by the adults who completed the interest sheets, four discussion sessions were planned on dates and at times that best accommodated the schedules of all interested parties. Wednesday evening, Thursday evening, Friday morning, and Friday evening sessions were held on September 3-5, 2008. The three evening sessions began at 5:30 P.M. and lasted until 7:30 P.M., while the one morning session began at 8:00 P.M. and ended at 10:00 A.M. Twelve participants signed up to participate in the Wednesday evening session, nine signed up for the Thursday evening session, seven signed up for the Friday morning session, and eight signed up for the Friday evening session. Of these, 11 adults actually came and participated in the Wednesday evening session, seven came for the Thursday session, five participated in the Friday morning session, and seven showed up to participate in the Friday evening session. Additionally, a Thursday evening participant and a Friday evening participant were each accompanied by husbands who had not previously indicated an interest in participating in the study. Both men were allowed to participate.

Thus, a non-probability-based convenience sample of 32 adults participated in the study: 11 on Wednesday evening, eight on Thursday evening, five on Friday morning,

and eight more on Friday evening. Of these, 16 participants classified themselves as White, 14 were Latino, and two were African American. Additionally, there were eight married couples (total of 16 participants) among the 32 participants. Each participant was compensated $20 for his or her time.

5.4.2 Instrument Administration

Prior to the start of each session, information was read to the participants that explained the research study's purpose, procedures, risks, and benefits, along with the rights of each subject. This information was read from a consent form approved by the Institutional Review Board at the Georgia Institute of Technology. At the conclusion of each reading, the participants were given the option to leave and not participate in the study without penalty if they were uncomfortable with any of the information presented. It was also made clear that by participating in the discussion session, participants were – in effect – giving consent. (Verbal consent, as opposed to written consent, was solicited.) Everyone present prior to the start of each session opted to participate in the study.

At each session, participants were administered questionnaires that prompted them to recall foods they normally eat according to meal and snack patterns on weekday workdays, weekday non-workdays, Saturdays, and Sundays. The questionnaire administered during the field study was a revised version of the questionnaire administered during the pilot study. (See Appendix C for field study questionnaire.)

As in the pilot study, the questionnaires were administered in a "focus group discussion" format. This format had three phases. First, participants completed the aforementioned self-administered questionnaire. On average, this took approximately 45 minutes across the four sessions. Then, participants were given a break lasting

approximately 15-20 minutes during which they were provided food. Finally, each session concluded with a group discussion lasting around 40-45 minutes during which the participants gave feedback regarding the ease/difficulty of the questionnaire as well as supplementary information concerning the individual eating habits queried for by the questionnaire. This portion of the session was audio taped.

The average length of each session was approximately two hours. Because the community in which the study was conducted has a substantial percentage of native Spanish-speaking Mexican-American immigrants, Spanish-translated versions of all materials, documents, and procedures were provided. Three of the 32 participants opted to complete the Spanish versions of the materials.

5.5 Data Analysis

Both qualitative and quantitative methods were utilized in data analysis. Qualitative methods were primarily used to organize the data into meaningful categories in preparation for quantitative analyses. Quantitative methods were used to construct a comprehensive eating model that explains local food use and consumption among the participants, and to compare results generated by the free listing assessment protocol with that of an industry standard. Specific techniques employed from these methodologies are detailed in the following subsections.

5.5.1 Constructing Food Categories from Qualitative Data Analysis

In the first phase of data analysis, participant responses from the questionnaires were thoroughly examined in search of patterns and common themes regarding individual

eating habits. However, instead of a common pattern regarding *what* participants ate, what emerged was a consistency in *how they articulated* their regular eating habits.

Prior to the start of each session, participants were instructed to be as detailed and thorough as possible when describing their regular eating habits. In order to help facilitate a thorough descriptiveness from the participants, specific examples were given in order to give them an idea of what was expected of them. For example, participants were told to not "only write 'cereal', but name the specific kind of cereal eaten. Don't just write 'bread' or 'sandwich', but please indicate what type of bread (white, wheat, etc.) and write all of the components of the sandwich (turkey, lettuce, tomato, white bread, mayonnaise, etc.). Don't just write 'fruit', but indicate specifically what kind of fruit you normally eat." This level of detail was specifically asked for because responses offered by several participants in the pilot study were not detailed enough for meaningful analyses.

As a result of these instructions, the manner in which participants conceptualized their foods when recalling them became salient. Three common themes emerged upon which these conceptualizations were based: food type (e.g. fruits, vegetables, and sandwiches), method of preparation (e.g. baked, fried, and grilled), and food item components and compliments (e.g. lettuce, jelly/jam, and turkey). Based on these themes resulting from the participants' own conceptualizations and recall processes, the food item data collected from the participant's questionnaires was classified into 30 distinct categories. Common food item conceptualizations and themes elicited from participants are presented in Table 5.1. The full list of 30 categories and their prominence among the participants' eating habits are presented and discussed in more detail in Chapter 6.

Table 5.1 Common Food Item Conceptualization Themes and Examples from Participants

Theme	Examples	
Food Type	Biscuits Fruits Pizza	Salads Sandwiches Vegetables
Method of Preparation	Baked Boiled Fried	Grilled Raw Steamed
Food Item Components and Compliments	Ham Jelly/Jam Lettuce	Peanut Butter Pepperoni Ranch Dressing

5.5.2 Hierarchical Clustering Analysis

In order to construct a comprehensive eating model that explains local food use and consumption in the community, three quantitative statistical analysis methods were used in addition to traditional descriptive statistics: hierarchical clustering analysis, binary logistic regression, and Poisson regression.

5.5.2.1 Overview of Hierarchical Cluster Analysis

Hierarchical cluster analysis is a type of statistical methodology used to reveal natural groupings (or clusters) within a data set that may not otherwise be apparent. It is most useful when the number of objects under consideration is small (less than a few hundred). These objects can either be cases or variables, depending on whether the objective of the analysis is to classify cases or examine relationships between the variables (SPSS for Windows, 2007c). This type of analysis has been utilized in such problems as the optimal sampling of traffic count data for the purpose of estimating mobile emissions, as well as the identification of different tutoring styles for online tutors engaged in computer-supported collaborative learning (De Smet et al., 2006; Niemeier et al., 2002).

There are two types of hierarchical clustering methods: agglomerative and divisive. Agglomerative hierarchical clustering begins with each object serving as its own cluster. As the method proceeds, the two most "similar" objects are grouped or "linked" according to a specified similarity measure and linkage function. This process repeats itself in successive stages until a complete classification tree is produced. Divisive hierarchical clustering is the exact opposite, as it begins with all objects in one cluster and proceeds to divide the two most "dissimilar" objects in successive stages (Johnson and Wichern, 1988; SPSS for Windows, 2007c).

The similarity measure used in hierarchical clustering analysis is generally a distance function that attributes "similarity" between clusters based on the calculated relative closeness of the clustered objects. Examples of distance functions commonly employed in hierarchical clustering are squared Euclidian distance for interval and binary data and Chi-square between sets of frequencies for count data. Once similarities of clusters have been determined, they are either linked together or subdivided (depending on whether or not an agglomerative or divisive method is employed) according to the rules specified by the selected linkage function. Examples of linkage functions are nearest neighbor, furthest neighbor, and Ward's method (SPSS for Windows, 2007c; Ward, 1963).

The general algorithm for hierarchical clustering analysis is as follows:

1. Start with N clusters, each containing a single object and an N x N symmetric matrix of distance "similarities"

$$D = \{d_{ij}\}.$$

2. Search D for the most similar pair of clusters X and Y, and let the distance between these clusters be d_{XY}.
3. Merge clusters X and Y. Label the newly formed cluster (XY). Update D by deleting the rows and columns corresponding to X and Y and adding a column that gives the distances between (XY) and the remaining clusters.
4. Repeat steps 2 and 3 $N - 1$ times until all objects are in a single cluster (Johnson and Wichern, 1988).

5.5.2.2 Application of Hierarchical Clustering Analysis to Identify Eating Patterns

In this study, hierarchical clustering analysis was used to quantify meal patterns according to 24 of the 30 categories of foods established by the aforementioned qualitative data analysis. Thus, using the aforementioned algorithm notations, $N = 24$, and X and Y were pairs of food categories evaluated at each stage of the analysis. This technique was used to explore which categories of foods were grouped together across the collective diet of the participants. The purpose of conducting the analysis in this way was to gain a general understanding of the relative balance of foods across the eating habits of the target population.

The hierarchical clustering analysis procedure on the data collected in this research study was performed using SPSS Version 16.0. The data within each food category was discrete numeric (count), as the number of individual food items eaten by participants for each food category was recorded. SPSS exclusively employs agglomerative hierarchical clustering, and provides two similarity measure options for count data: chi-square (default) and phi-square. The default chi-square measure was selected for this analysis. In SPSS, this measure is based on the chi-square test of

equality for two sets of frequencies (i.e. chi-square test for independence) (SPSS for Windows, 2007c).

5.5.2.3 Overview of Chi-square Test of Equality for Two Sets of Frequencies

The chi-square test of equality for two sets of frequencies generally tests the following hypotheses:

H_0: The two sets of frequencies x and y are independent.

H_a: The two sets of frequencies x and y are related.

This test is accomplished by, first, calculating the chi-square (χ^2) statistic using the formula

$$\chi^2_{calc} = \sum_i \frac{[x_i - E(x_i)]^2}{E(x_i)} + \sum_j \frac{[y_j - E(y_j)]^2}{E(y_j)},$$

where i and j are the ith and jth observed values of variables x and y respectively, and E is the expected value of those observations. Then, a significance level α must be chosen based on which the null hypothesis H_0 will be accepted or rejected. (The significance level α is also equivalent to the probability of a Type I error, which is the probability of incorrectly rejecting H_0 when it is, in fact, true.) Finally, the number of degrees of freedom for the chi-square distribution associated with random variables x and y are calculated. In the case of the chi-square test for independence, this is accomplished using the formula

$$\nu = (r-1)(c-1),$$

where υ is the number of degree of freedom, r is the number of distinct levels associated with variables x and y, and c is the number of variables being evaluated. In the case of

the chi-square test for independence of two variables, c = 2; therefore, the degrees of freedom formula is reduced to

$$\nu = r - 1.$$

In order to perform the hypothesis test, χ^2_{calc} is compared with the chi-square critical value evaluated at υ degrees of freedom and a level of significance of α. If

$$\chi^2_{calc} > \chi^2_{\nu,\alpha},$$

then H_0 is rejected, and the conclusion is drawn that the two sets of frequencies *x* and *y* are related (Hayter, 2002).

5.5.2.4 Selection of Hierarchical Cluster Analysis Linkage Function

Because the chi-square measure was selected as the distance criterion due to the count nature of the data, maximum distance implies similarity for the set of food category frequencies being evaluated, as a large χ^2_{calc} value implies a strong relationship between sets of frequencies. Therefore, the furthest neighbor linkage method was selected to establish clusters of food categories according to participant eating habits. Also known as complete-linkage clustering, furthest neighbor ensures that the objects in a cluster are within some maximum distance of each other.

5.5.2.5 Standardization of Data

Standardization allows the effect of variables measured on different scales to be equalized. Some of the food categories examined in the analysis are innately more populous than others. For example, the number of possible fruit and vegetable individual food items that a participant might name is much greater than the number of possible biscuit items they might name. Therefore, the food categories were of inherently different scales, with the number of possible individual food items being much smaller

(or greater) for some than others. To account for these discrepancies, the count data for each food category was rescaled to range 0-1.

5.5.3 Binary Logistic Regression and Poisson Regression

Regression analysis is a statistical methodology used to understand the relationship between two or more quantitative variables. Its deliverable is a statistical model that can be used to quantify the relationship between one variable (known as a *dependent* or *response* variable) and another or others (known as *predictor* variables). This model is primarily used for predictive purposes (Neter et al., 1996). In this study, we were interested in regressing demographic characteristics and cultural indicators to selected food categories.

The general regression model for *p-1* predictor variables is

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_{p-1} X_{i,p-1} + \varepsilon_i ,$$

where Y_i is the value of the response variable at the *i*th trial; $\beta_0, \beta_1, \ldots, \beta_{p-1}$ are calculated coefficients of the predictor variables; $X_{i1}, X_{i2}, \ldots, X_{i,p-1}$ are values of each of the predictor variables at the *i*th trial; and ε_i is a random error term with mean $E\{\varepsilon_i\}=0$, variance $\sigma^2\{\varepsilon_i\} = \sigma^2$, and covariance $\sigma\{\varepsilon_i, \varepsilon_j\} = 0$ for all trials $i \neq j$. Since the response variable Y_i is the sum of the constant term $\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_{p-1} X_{i,p-1}$ and the random error term ε_i, then Y_i itself (and, accordingly, *Y*) is also a random variable.

There are two general postulates embodied in a regression model.

1. A probability distribution for response variable *Y* exists for each level (or value) of *X* (i.e. X_i).
2. The means of these probability distributions vary with *X* in a systematic manner.

Because of this, the mean of each value of the response variable Y_i at the ith trial is

$$E\{Y_i\} = E\{\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + ... + \beta_{p-1} X_{i,p-1} + \varepsilon_i\} =$$
$$E\{Y_i\} = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + ... + \beta_{p-1} X_{i,p-1} + E\{\varepsilon_i\} =$$
$$E\{Y_i\} = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + ... + \beta_{p-1} X_{i,p-1}.$$

Since the regression function relates the means of the probability distributions of the response variable Y for a given predictor variable X to the level of those predictor variables, then it follows that

$$E\{Y\} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_{p=1} X_{p-1}$$

(Neter et al., 1996).

5.5.3.1 Overview of Binary Logistic Regression

Binary logistic regression is a regression technique used when the response variable is binary, taking on the value of either 0 or 1. Because of this, Y_i can be considered to be a Bernoulli random variable such that the probabilities $P(Y_i=1) = \pi_i$ and $P(Y_i = 0)= 1- \pi_i$. This may alternatively be written as

$$f(Y_i) = \pi_i \mid Y_i=1,$$

$$f(Y_i) = 1-\pi_i \mid Y_i=0.$$

Since Y_i is a random variable, then

$$E\{Y_i\} = \sum_{i=1}^{k} Y_i f(Y_i),$$

which means that

$$E\{Y_i\} = 1(\pi_i) + 0(1 - \pi_i) = \pi_i.$$

Thus, the mean response of the ith value of the response variable $E\{Y_i\}$ reduces to the probability that $Y_i = 1$ at predictor variable level X_i. This probability is defined as

$$\pi_i = \frac{e^{\beta_0+\beta_1 X_{i1}+\beta_2 X_{i2}+\ldots+\beta_{p-1} X_{i,p-1}}}{1+e^{\beta_0+\beta_1 X_{i1}+\beta_2 X_{i2}+\ldots+\beta_{p-1} X_{i,p-1}}}$$

for binary logistic regression. Accordingly, the relationship between the response variable and the predictor variables in binary logistic regression is expressed in terms of natural logarithms.

If desired, it is possible to add or delete predictor variables from the regression equation based on whether or not its score statistic (i.e. alpha level of significance) meets a certain criteria. This process is called stepwise logistic regression, and is a technique often employed in logistic regression model building when studies are exploratory in nature. It is often used in situations when the number of key predictor variables are few, such as is the case in epidemiologic studies (Neter et al., 1996; SPSS for Windows, 2007a).

5.5.3.2 Application of Binary Logistic Regression to Understand Relationships Between Selected Demographic and Cultural Variables and Food Categories

In this study, binary logistic regression was used to understand the relationships between each of several selected demographic and cultural indicators and the 24 food categories analyzed in the hierarchical clustering procedure. (These demographic and cultural indicators were coded as 0-1 binary response variables, which is why the binary logistic regression analysis procedure was employed.) SPSS Version 16.0 was used for the analyses. A stepwise approach was employed to build the regression models. The Hosmer-Lemeshow goodness-of-fit test, "pseudo" coefficient of determination statistics, and classification tables illustrating percentages of correct predicted responses from the constructed models were used to determine how well each model describes the data. The

selected demographic and cultural variables, food categories, and resulting binary logistic regression models are discussed in more detail in Chapter 6.

5.5.3.3 Overview of Poisson Regression

Poisson regression is a regression technique used when the data associated with the response variable are discrete counts, as is the case with the food category data in this study. The probability distribution of a Poisson response variable Y may be written as

$$f(Y) = \frac{\mu^Y e^{-\mu}}{Y!} \quad ,$$

where $Y! = Y(Y-1)\cdots 3\cdot 2\cdot 1$, and μ is both the mean and variance of Y. Therefore, for Poisson regression,

$$E(Y) = \mu .$$

As with all regression models, the ith value of the mean response μ is assumed to be a function of the set of predictor variables $X_1, X_2, \ldots, X_{p-1}$. The notation $\mu(X_i, \beta)$ is used to denote the function that relates the mean response μ_i to the predictor variables' values for each trial i (X_i) and the values of each of the regression coefficients (β). Commonly used functions in the development of Poisson regression models include

$$\mu_i = \mu(X_i, \beta) = X_i'\beta$$
$$\mu_i = \mu(X_i, \beta) = e^{X_i'\beta}$$
$$\mu_i = \mu(X_i, \beta) = \log_e(X_i'\beta),$$

where $X_i'\beta$ is the matrix of multiplied coefficient and predictor variable values at the ith trial (Neter et al., 1996).

5.5.3.4 Application of Poisson Regression to Understand Relationships Between Selected Food Categories and Certain Demographic and Cultural Variables

In this study, Poisson regression was used to understand the relationships between five of the original 30 food categories constructed from the free listing data and three primary demographic variables. (The data associated with the food categories are discrete counts.) SPSS Version 16.0 was used for the analysis.

A link function relates the predictor variables in the regression model to the response variable (Neter et al., 1996). SPSS uses a log link function of the form

$$f(x) = \log(x)$$

in the development of Poisson regression models (SPSS for Windows, 2007b). The selected food categories, demographic variables, and resulting Poisson regression models are discussed in more detail in Chapter 6.

5.5.4 Comparisons with an Established Instrument

For comparative purposes, the aforementioned statistical analysis techniques were also applied to pseudo-data generated for an industry standard dietary assessment tool. The Southwestern Food Frequency Questionnaire (SWFFQ) has been used in multicultural communities within the United States with a substantial percentage of Hispanic residents. Developed in the early 1990s, the SWFFQ is an adaptation of the Arizona Food Frequency Questionnaire (AFFQ), which itself was an adaptation of the original 1986 National Cancer Institute/Block Food Frequency Questionnaire (Block et al., 1986). It is a bilingual questionnaire with instructions in both English and Spanish. The SWFFQ's 158 food line items are also listed in both languages (Arizona Diet, Behavior, and Quality of Life Assessment Lab, 1993).

Like the original 1986 NCI/Block FFQ, the basic food list for the SWFFQ came from NHANES II, which was conducted from 1976-1980. However, this basic food list was supplemented with additional foods unique to the Hispanic diet in the Southwestern United States. These additional foods were determined from a series of 24-hour dietary recalls conducted in Tucson, Arizona. Using results from these recalls, researchers identified foods that were reported eaten by the target population, but that were not included on the AFFQ. This information was then supplemented with additional data from discussions with focus groups and experts in Southwestern diets to produce a final list of 158 food line items (Garcia et al., 2000).

Taren et al. (2000) evaluated whether or not the SWFFQ provided equally reliable nutrient information for a Hispanic (primarily Mexican-American) and non-Hispanic population in the Southwestern United States. They found that the instrument was more reliable for the Hispanic population, but produced more valid results for the non-Hispanic population. They suggest, however, that the lower validity for the Hispanic population may have resulted from an inability to provide accurate information about portion size.

The population demographics of Georgia's Murray and Whitfield counties are quite similar to the one in the Tucson, Arizona area where the Southwestern Food Frequency Questionnaire was developed, tested, and validated. Most Hispanic residents in the Tucson area are of Mexican descent, while most non-Hispanic residents there are White (Taren et al., 2000; U.S. Census Bureau, 2000a). Because of these similarities between the two regions, the Southwestern Food Frequency Questionnaire is an appropriate instrument to use as a comparison standard.

In order to carry out the comparative analysis, each participant's food item entry was projected onto the Southwestern Food Frequency Questionnaire as if the participant completed the SWFFQ themselves. (This was done because time and resource constraints precluded the possibility of reconvening the 32 participants for a second round of questionnaire administrations.) Then, based on the "pseudo-data" generated by this process, hierarchical cluster analyses and binary logistic regression analyses were conducted in the same manner as discussed in the preceding sections. (Poisson regression analyses were not performed on the SWFFQ "pseudo-data" because of the incomparability of the "Fast Food/Eating Out" free listing-generated category with any of the categories listed on the SWFFQ.) The results of these analyses and corresponding comparisons with the data generated by the meal-based, free listing technique employed in this doctoral dissertation study are discussed in more detail in Chapter 6. (See Appendix D for a full-length version of the Southwestern Food Frequency Questionnaire.)

CHAPTER 6

RESULTS

6.1 Demographics of Field Study

There were 32 participants in the field study. Eleven participants were between the ages of 18-24, and 12 were between the ages of 25-34. Four participants indicated they were 35-44 years of age, three were between the ages of 45-54, two were between the ages of 55-64, and there were no participants over the age of 65. Ten participants were male and 22 participants were female. There were 15 Caucasians, 14 Latinos, and two African-Americans in the study, with one participant identifying herself as "other". Seventeen participants selected English as their native language, nine participants selected Spanish, and six participants selected "Both English and Spanish" as their native language.

Twenty-one of the 32 participants were born in the United States, while the remaining 11 were not. Of the 11 participants not born in the United States, three have lived here 5-10 years, seven have lived here 10-20 years, and one has lived here for more than 20 years. Twenty-six of the 32 participants indicated they spent most of their life before age 18 inside of the United States. Four participants indicated they spent most of their life outside of the United States prior to age 18, and two participants indicated that most of their life prior to age 18 was spent both inside and outside of the United States.

Twelve participants were natives of the Dalton area, 20 were not. Of the 20 participants not native to the Dalton area, one had lived in the area 1-5 years, eight had lived in the area 5-10 years, an additional eight had lived in the area 10-20 years, and two

had lived in the area for more than 20 years. (One Dalton non-native did not respond to the follow up question regarding the length of time they had lived in the area.)

One participant selected "Grades 1-6" as the number of years of schooling she had completed. One participant selected "Grades 7-9", 16 participants selected "Grades 10-12", and 13 participants selected "College/University". (One participant did not select any of the response options for the education question.) Fourteen participants indicated they had "blue collar" jobs (e.g. fork lift operator, construction, creeler), 15 participants indicated they had "white collar" jobs (e.g. bank teller, accounting manager, customer service), and three participants identified themselves as homemakers.

The average number of persons living in the households of the participants was 4.3. Nineteen participants identified themselves as the main person that purchased food for their family, 12 indicated they were not the primary person that purchased food for the home, while one participant indicated that this activity was undertaken "as a family". There were also 20 participants that identified themselves as the primary cook in the home. Ten participants indicated they were not the primary cook in the home, one participant indicated they were the primary cook in the home "sometimes", while another participant indicated that the primary cooking in his home was done "as a family". (It should be noted that there was a very strong correlation of responses for these two questions on the demographics survey. Eighteen participants indicated "yes" for being both the main purchaser of food for the home and the primary preparer of meals in the home. Similarly, the 10 participants who indicated they were not the primary cook in the home also indicated they were not the primary purchaser of food for the home.) Figure 6.1 displays selected demographics of participants in the field study.

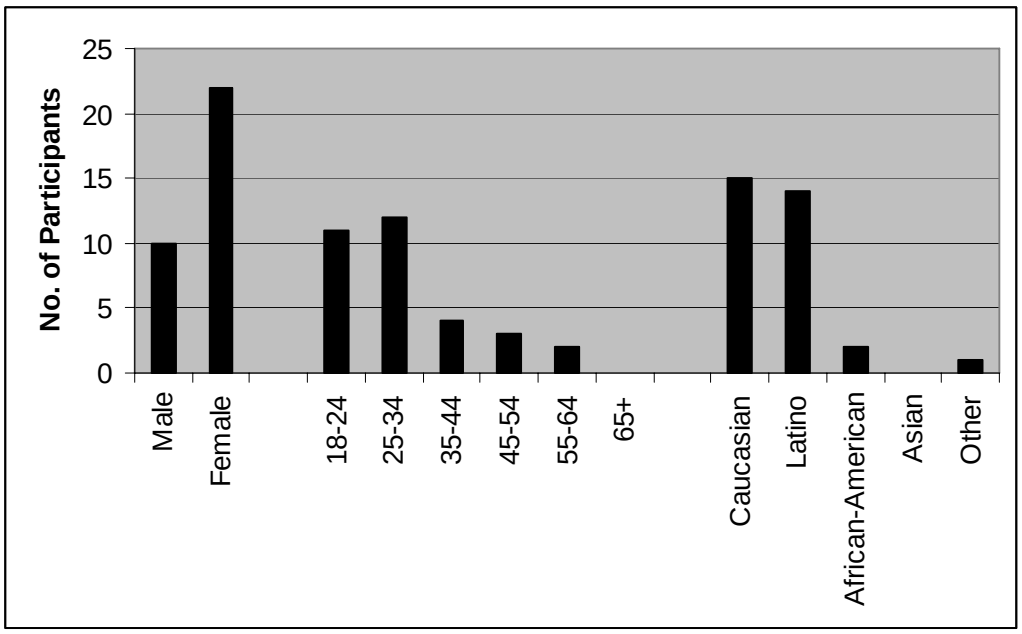

Figure 6.1 Selected Demographics of Field Study Participants

6.2 List of Food Categories Constructed from Free Listing Data

The individual food item data collected from the participants in the research study was classified into 30 distinct categories based on the common themes resulting from the respondents' food item conceptualizations and recall processes discussed in Chapter 5. For example, burgers, sandwiches, and hot dogs were grouped together into a single category because of their similarities in construction: bread or buns, some type of meat or vegetable, and toppings such as lettuce, tomatoes, mayonnaise, and mustard. Pizza was classified into its own category because of its uniqueness among foods with respect to components, preparation, and toppings. Food items such as macaroni and cheese, spaghetti with meatballs, and rice and gravy were all grouped into the category "Rice and Pastas" because of similarities in nutritional content.

In addition to eliciting data on specific food categories, the structure of the questionnaire enabled the participants to provide data related to the "context" of foods

they normally eat. For example, an entire category entitled "Fast Food/Eating Out" was able to be constructed based on the responses given by the respondents. Additionally, the categories "Boxed and Pre-packaged Meals" and "Frozen/TV/Microwaveable Dishes" were constructed from the data. A complete listing of all food categories constructed from the free listing dietary recall data is in Table 6.1 below.

Table 6.1 List of Food Categories Constructed from Free Listing Data

Biscuits and Croissants	Fruits
Boxed and Pre-packaged Meals	Grits and Oatmeal
Breads, Rolls, Tortillas, and Crackers	Jams, Jellies, and Syrup
Burgers, Sandwiches, and Hot Dogs	Ice Cream and Yogurt
Candies, Cookies, Pastries, and Desserts	Meat, Poultry, and Fish
Casserole, Stuffing, and Dumplings	Others (Miscellaneous)
Cereal/Cereal Bars	Pancakes, Waffles, and French Toast
Cheese and Dairy Products	Pizza
Chips, Pretzels, Nuts, and Popcorn	Rice and Pastas
Eggs	Salads
Ethnic Chinese	Sandwich Spreads and Salad Dressings
Ethnic Mexican	Sauces, Dips, and Gravy
Fast Food/Eating Out	Soups, Stews, and Chili
Fried Potatoes/Onion Rings/Fried Cheese	Spices, Herbs, and Seasonings
Frozen/ TV/ Microwaveable Dishes	Vegetables

Although there were 30 food categories constructed from the free listing data, only 25 of them were selected for inclusion into the comprehensive eating model. The number of individual food items classified within "Jams, Jellies, and Syrup", "Sauces, Dips, and Gravy", and "Spices, Herbs, and Seasonings" were too few for analysis. Additionally, "Boxed and Pre-packaged Meals" and "Frozen/TV/Microwaveable Dishes" were not selected for inclusion because they are not food types as most of the other food categories are, but are, rather, the "states" of food items prior to preparation. Hence, the

determination was made that they should not be included with the 25 remaining food categories when conducting the statistical analyses.

6.3 Hierarchical Cluster Analysis Results

Of the 25 food categories statistically analyzed to be included in the comprehensive eating model, hierarchical cluster analysis was performed on 24 of them. One of them, "Fast Food/Eating Out", was not included in the hierarchical cluster analysis because it is not a food "type" as the other 24 food categories but, rather, a meal "context" at the time of consumption. However, because data associated with "Fast Food/Eating Out" represent an important barometer in understanding the effect of the local fast food/restaurant environment on personal eating behaviors, statistical analyses were performed on it -- unlike for the categories "Boxed and Pre-packaged Meals" and "Frozen/TV/Microwaveable dishes". Results associated with "Fast Food/Eating Out" are discussed in Section 6.5.

6.3.1 Hierarchical Cluster Analysis on Free Listing Data

Hierarchical cluster analysis was performed on the food categories in Table 6.2, which were elicited from the free listing exercises conducted during the research study.

6.3.1.1 Agglomeration Schedule

Recall that there are N - 1 stages in the cluster analysis, as the technique proceeds from all N categories being in individual clusters to each of the N categories being in a single cluster. The agglomeration schedule provides a numerical summary of each of these stages. It outlines the two clusters combined at each stage of the analysis, along with the distance coefficients (calculated using the chi-square measure) associated

Table 6.2 Free Listing-Generated Food Categories Selected for Hierarchical Cluster Analysis

Biscuits and Croissants	Fruits
Breads, Rolls, Tortillas, and Crackers	Grits and Oatmeal
Burgers, Sandwiches, and Hot Dogs	Ice Cream and Yogurt
Candies, Cookies, Pastries, and Desserts	Meat, Poultry, and Fish
Casserole, Stuffing, and Dumplings	Others/Miscellaneous
Cereal/Cereal Bars	Pancakes, Waffles, and French Toast
Cheese and Dairy Products	Pizza
Chips, Pretzels, Nuts, and Popcorn	Rice and Pastas
Eggs	Salads
Ethnic Chinese	Sandwich Spreads and Salad Dressings
Ethnic Mexican	Soups, Stews, and Chili
Fried Potatoes/Onion Rings/Fried Cheese	Vegetables

with the clustered objects. At each stage, the furthest neighbor clustering algorithm searches for the maximum distance among all pairs of objects and then combines the corresponding object pairs into a cluster. The pairs of objects evaluated at stage one are all food categories, as the algorithm begins with each food category serving as its own cluster. However, the pairs of objects evaluated from stages two through N - 1 are the clusters established during previous stages and the remaining, unassigned food categories. Thus, at each stage of the cluster analysis, an unassigned food category may be merged into an existing cluster or two existing clusters may themselves be merged into a single cluster – depending on which object pairs the maximum value in the distance coefficient matrix corresponds to.

The agglomeration schedule in Table 6.3 can be interpreted in the following manner: For the hierarchical clustering analysis performed on the free listing dietary recall data collected during this research study, food categories 10 and 17 ("Ethnic Chinese" and "Others/Miscellaneous") were combined in stage 1. This new cluster next appears in stage 4, identified as object 10 (arbitrarily assigned the smallest identification

Table 6.3 Agglomeration Schedule for Hierarchical Cluster Analysis on Free Listing Data

Stage	Clusters Combined		Coefficients	Stage Cluster First Appears		Next Stage New Cluster Appears
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	10	17	1.396			4
2	3	16	1.405			6
3	8	24	1.666			6
4	5	10	1.775		1	9
5	2	21	1.904			10
6	3	8	2.031	2	3	15
7	9	20	2.073			14
8	1	22	2.349			18
9	5	15	2.351	4		17
10	2	12	2.390	5		20
11	6	13	2.478			16
12	11	23	2.493			16
13	18	19	2.565			20
14	4	9	2.573		7	15
15	3	4	2.717	6	14	19
16	6	11	2.744	11	12	19
17	5	14	2.825	9		21
18	1	7	2.951	8		21
19	3	6	3.042	15	16	22
20	**2**	**18**	**3.088**	**10**	**13**	**23**
21	**1**	**5**	**3.317**	**18**	**17**	**22**
22	1	3	3.516	21	19	23
23	1	2	3.556	22	20	

number of the two objects combined in stage 1) and is clustered with food category object 5 (“Casserole, Stuffing, and Dumplings”). This new three-category cluster of “Ethnic Chinese”; “Others/Miscellaneous”; and “Casserole, Stuffing, and Dumplings” next appears in stage 9, when it incorporates food category 15 (“Ice Cream and Yogurt”). Likewise, food categories 3 and 16 (“Burgers, Sandwiches, and Hot Dogs” and “Meat, Poultry, and Fish”) are clustered together in stage 2, while food categories 8 and 24 (“Cheese and Dairy” and “Vegetables”) are clustered together in stage 3. The clusters

formed in both stages 2 and 3 next appear in stage 6, when they are both merged into a single, four-category cluster.

The values in the "coefficients" column of the agglomeration schedule correspond to the chi-square values calculated for the sets of frequencies (i.e. individual and/or clustered food categories) clustered at each stage. Note the "gap" in coefficient values between stages 20 and 21. This indicates a "good" solution exists at the stage before the gap (SPSS for Windows, 2007c).

Let G be a good solution in terms of number of clusters, and S be the stage immediately preceding the gap in coefficient values. Then,

$$G = N - S ,$$

where N is the total number of objects under consideration in the hierarchical clustering procedure. Thus, for the food categories being analyzed according to the aforementioned hierarchical clustering procedure, $G = 24 - 20 = 4$. Therefore, a "good" solution for the data collected in this study being analyzed according to this procedure is four clusters of food categories. Another "good" solution is three clusters of food categories, as another "gap" in coefficient values exists between stages 21 and 22 (although this gap is not quite as large as the one between stages 20 and 21). Therefore, in order to gain a general understanding of the relative balance of foods among participant eating habits, both a three- and four-cluster solution of food categories were examined.

6.3.1.2 Three- and Four-Cluster Solutions of Eating Patterns

Tables 6.4 and 6.5 summarize the three- and four-cluster solution of eating patterns generated by the hierarchical cluster analysis conducted on the 24 food "type" categories constructed from the free listing data.

Table 6.4 Three-Cluster Solution of Eating Patterns from Free Listing Data

Cluster 1: "Exotic Diversity"	**Cluster 2: "Starches and Salads"**	**Cluster 3 "Balanced Dieters"**
Biscuits and Croissants	Breads, Rolls, Tortillas, and Crackers	Burgers, Sandwiches, and Hot Dogs
Casserole, Stuffing, and Dumplings	Fried Potatoes/Onion Rings/Fried Cheese	Candies, Cookies, Pastries, and Desserts
Chips, Pretzels, Nuts, and Popcorn	Pancakes, Waffles, and French Toast	Cereal/Cereal Bars
Ethnic Chinese	Pizza	Cheese and Dairy Products
Grits and Oatmeal	Salads	Eggs
Ice Cream and Yogurt		Ethnic Mexican
Others (Miscellaneous)		Fruits
Sandwich Spreads and Salad Dressings		Meat, Poultry, and Fish
		Rice and Pastas
		Soups, Stews, and Chili
		Vegetables

Table 6.5 Four-Cluster Solution of Eating Patterns from Free Listing Data

Cluster 1: "Biscuits, Snacks, and Spreads"	**Cluster 2: "Starches and Salads"**	**Cluster 3: "Balanced Dieters"**	**Cluster 4: "Grits, Mixed Dishes, and Ice Cream"**
Biscuits and Croissants	Breads, Rolls, Tortillas, and Crackers	Burgers, Sandwiches, and Hot Dogs	Casserole, Stuffing, and Dumplings
Chips, Pretzels, Nuts, and Popcorn	Fried Potatoes/Onion Rings/Fried Cheese	Candies, Cookies, Pastries, and Desserts	Ethnic Chinese
Sandwich Spreads and Salad Dressings	Pancakes, Waffles, and French Toast	Cereal/Cereal Bars	Grits and Oatmeal
	Pizza	Cheese and Dairy Products	Ice Cream and Yogurt
	Salads	Eggs	Others (Miscellaneous)
		Ethnic Mexican	
		Fruits	
		Meat, Poultry, and Fish	
		Rice and Pastas	
		Soups, Stews, and Chili	
		Vegetables	

Note there are no differences in clusters 2 and 3 for both solutions, but that the four-cluster solution splits cluster 1 of the three-cluster solution into two clusters (clusters 1 and 4) that are more refined. Thus, the four-cluster solution does a slightly better job than the three-cluster solution of discriminating among participant eating patterns. Furthermore, despite there being only 32 participants in the research study, the clustered food categories are subjectively "reasonable" with respect to individual food items people might group together as a part of their regular diets.

6.3.1.3 Dendrogram

Graphical representations of hierarchical cluster solutions are often presented in the form of dendrograms. The left vertical axis lists the objects (in the case of this particular study, variables) that were included in the analysis, while the top horizontal axis shows the distances between clusters when they are joined (SPSS for Windows, 2007c). This enables the researcher to get a visual sense of the relative closeness of the objects within clusters. For example, although cluster 2 is comprised of five food categories, there is a greater similarity between "Breads, Rolls, Tortillas, and Crackers" and "Salads" than between any other combination of categories. This suggests that participants who normally eat breads, rolls, tortillas, or crackers at mealtime are much more likely to also eat a salad at mealtime than pancakes, waffles, and French toast, even though all three food categories are grouped in the same cluster. However, a combined interpretation of the dendrogram and cluster solutions suggest that a person that normally eat breads and salads as a regular part of their diet is much more likely to also normally eat pancakes at mealtime as opposed to biscuits and croissants. See Appendix E for the

dendrogram associated with the hierarchical cluster analysis of 24 food categories constructed from the free listing dietary recall data.

6.3.1.4 Interpretation of Clusters

The clusters should be viewed as the likelihood that individual food items from certain food categories will be grouped together across a given participant's diet. For example, in both the three and four cluster solutions, "Balanced Dieters" tend to eat a variety of both unhealthy and healthy foods: "Candies, Cookies, Pastries, and Desserts", "Fruits", "Vegetables", and "Burgers, Sandwiches, and Hot Dogs" are all clustered together along with several other food categories into one grouping. On the other hand, individual food items categorized within the food categories "Breads, Rolls, Tortillas, and Crackers", "Fried Potatoes/Onion Rings/Fried Cheese", "Pancakes, Waffles, and French Toast", "Pizza", and "Salads" were likely to be mentioned by a given participant. It should be noted that the food categories that comprise these clusters are not mutually exclusive, as there are certainly participants who indicate they eat both "Fruits" and "Salads". However, participants who eat salads as a regular part of their diet also tend to include pizza in their diet as opposed to fruits.

6.3.2 Comparison with Southwestern Food Frequency Questionnaire

The Southwestern Food Frequency Questionnaire's 158 food line items are classified into 11 food categories. Additionally, individual "complementary" food items such as salt, pepper, and salad dressings are queried for in a supplementary section. Thus, the "pseudo-data" generated by projecting each participant's food item entry from the free listing dietary recall questionnaire onto the SWFFQ was assigned into the categories listed in Table 6.6.

Table 6.6 Southwestern Food Frequency Questionnaire Categories Analyzed in Hierarchical Cluster Analysis

Breads	Salty Snacks and Spreads
Cereals	Side, Mixed Dishes, and Soups
Dairy Products	Supplementary
Fruits	Sweets
Meats and Eggs	Tortillas
Poultry and Fish	Vegetables

There are several notable similarities and differences between the 24 free listing-generated food categories and the 12 Southwestern Food Frequency Questionnaire categories:

1. In the free listing-generated food categories, "Breads, Rolls, Tortillas, and Crackers" are combined into one category, whereas "Tortillas" are treated as a separate category in the SWFFQ.
2. "Meat, Poultry, and Fish" are grouped into one category among the free listing-generated categories, while the SWFFQ distinguishes meats (i.e. beef) from poultry and fish. Additionally, eggs are included with meats in one category on the SWFFQ, but are separated in the free listing-based generation.
3. Rice, various pastas, soups, and several traditional ethnic Mexican dishes (e.g. chimichangas, tostadas, and burritos) are all included in the SWFFQ "Side, Mixed Dishes, and Soups" category, while rice and pastas, soups, and ethnic Mexican dishes are represented by three distinct categories in the free listing-based analyses.
4. Common food items elicited by the free listing dietary recall such as biscuits, grits, and sandwiches are not specifically queried for by the SWFFQ, but are salient among the free listing-generated categories.

The following agglomeration schedule summarizes the hierarchical cluster analysis performed on the 12 categories from the SWFFQ:

Table 6.7 Agglomeration Schedule for Hierarchical Cluster Analysis on SWFFQ "Pseudo-Data"

Stage	Clusters Combined		Coefficients	Stage Cluster First Appears		Next Stage New Cluster Appears
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	1	2	1.785			2
2	1	3	1.990	1		6
3	6	11	2.196			8
4	5	7	2.246			7
5	4	10	2.517			6
6	1	4	2.710	2	5	9
7	5	12	2.715	4		9
8	6	9	2.735	3		10
9	1	5	2.957	6	7	10
10	1	6	3.256	9	8	11
11	1	8	3.793	10		

Note that the largest "gaps" in this case occur after stages 9 and 10, suggesting a two- and three-cluster solution for this data. These are summarized in Tables 6.8 and 6.9.

Clearly, the hierarchical cluster analysis procedure is not as discriminatory for the SWFFQ "pseudo-data" as for the free listing generated data. For the two-cluster solution, the procedure separates only tortillas from the remainder of the food categories. The three-cluster solution is slightly better, with breads, salty snacks and spreads, and vegetables being grouped together. Tortillas remain in their own category however, which suggests a strong distinction between participants who eat tortillas and participants who eat foods from the other categories. A graphic depiction of the cluster groupings for the SWFFQ "pseudo-data" is in Appendix E.

Table 6.8 Two-Cluster Solution of Eating Patterns from SWFFQ "Psuedo-Data"

Cluster 1		Cluster 2
Breads	Salty Snacks and Spreads	Tortillas
Cereal	Side, Mixed Dishes, and Soups	
Dairy Products	Supplementary	
Fruit	Sweets	
Meats and Eggs	Vegetables	
Poultry and Fish		

Table 6.9 Three-Cluster Solution of Eating Patterns from SWFFQ "Psuedo-Data"

Cluster 1		Cluster 2	Cluster 3
Cereal	Poultry and Fish	Breads	Tortillas
Dairy Products	Side, Mixed Dishes, and Soups	Salty Snacks and Spreads	
Fruit	Supplementary	Vegetables	
Meats and Eggs	Sweets		

6.4 Binary Logistic Regression Analysis

After gaining an insight into the eating patterns among participants in the research study using hierarchical cluster analysis, binary logistic regression was one of two regression techniques used to identify predictor variables that are significant with respect to selected demographic and cultural indicator response variables (each taking on values 0 or 1). These demographic and cultural response variables, along with the meanings of their indicator values, are presented in Table 6.10.

Binary logistic regression analyses were performed on these six response variables regarding the 24 free listing-generated food category variables and the 12 SWFFQ food category variables examined in the aforementioned hierarchical cluster analysis respectively. A forward stepwise approach based on the likelihood ratio (LR) score statistic was employed. This approach adds and deletes variables from the model of significant predictors based on whether or not the significance

Table 6.10 Selected Demographic and Cultural Response Variables and Corresponding Meanings of 0-1 Indicators

Response Variable	Meaning of "0" Indicator	Meaning of "1" Indicator
Age	18-34 Years of Age	35+ Years of Age
Gender	Male	Female
Ethnicity	Non-Latino	Latino
Born in US	No	Yes
Length of time in US	20 Years or Less	21 Years or More
Occupation	"Blue Collar" (e.g. factory workers, hourly employees)	"White Collar and Housewives" (e.g. administrative, salaried workers, housewives)

value of the score statistic is less than the selected criterion for entry or greater than the selected criterion for removal (SPSS for Windows, 2007a). In these analyses, the significance value entry criterion was set at 0.05, while the corresponding removal criterion was 0.10.

In order to test the goodness-of-fit for each, three criteria were used: (1) the Hosmer-Lemeshow goodness-of-fit test, (1) the Cox and Snell and Nagelkerke "pseudo" coefficient of determination (i.e. R-squared) statistics, and (3) classification tables which indicate the number and corresponding percentage of participants that the model classifies correctly according to the response variable of interest. The Hosmer-Lemeshow Goodness-of-Fit test was employed at each stage of the stepwise binary logistic regression analysis (entry or removal of predictor values for the model). Hosmer-Lemeshow values of 0.05 or greater indicate that the model is a good fit (SPSS for Windows, 2007a).

In linear regression models, the coefficient of determination (R-squared) assesses the proportion of variability in the response variable attributable to the predictor variable(s). The larger the R-squared value, the more variation is explained by the

predictor variable(s) entered into the model and, thus, the better of a fit the model is perceived to be. However, for regression models such as binary ones that have a categorical response variable, it is not possible to compute coefficients of determinations that have all of the characteristics as the linear regression model R-squared values. Therefore, coefficient of determination approximations such as the Cox and Snell and Nagelkerke R-squared values are computed and utilized to assess response variable variability for regression models with categorical response variables. These "pseudo" R-squared statistics are designed to have similar properties to "true" R-squared statistics calculated for linear regression models; thus, the assessments can be interpreted in similar fashions, with larger R-squared values indicating better fits of the model (SPSS for Windows, 2007a). Although what constitutes a "good" R-squared value differs depending on the area of application, a critical value of 0.5 was arbitrarily selected for the models constructed in this study, as R-squared values of 0.5 or greater indicate that at least 50 percent of the response variable variability can be explained by the predictor variable(s) entered into the model.

6.4.1 Binary Logistic Regression on Free Listing Data

The following binary logistic regression results were generated for the 24 food categories examined in the hierarchical cluster analysis.

6.4.1.1 Age

The stepwise binary logistic regression procedure entered two of the 24 free listing-generated food categories were entered into the predictive model for "Age": Breads, Rolls, Tortillas, and Crackers and Fried Potatoes/Onion Rings/Fried Cheese. The β value for Breads, Rolls, Tortillas, and Crackers is positive, while the β value for Fried

Potatoes/Onion Rings/Fried Cheese is negative. In the binary logistic regression procedure, these values are calculated with respect to a response variable indicator value of "1". Thus, in the case of this analysis, the β values are with respect to a person being "35 Years of Age or Older" as opposed to "18-34 Years of Age".

Interpretations of binary regression analysis are typically attained by examining the e^{β} (or Exp(β)) values associated with each predictor. Exp(β) is the factor by which the response variable increases or decreases given a one-unit increase in the value associated with the corresponding predictor variable. If β is negative, then the odds of the "1" value of the response variable occurring decreases by a factor of $1/e^{\beta}$ given a one-unit increase in the predictor variable value. Conversely, if β is positive, then a one-unit increase in the predictor variable value prompts an increase in the odds of the response variable "1" value occurring by a factor of e^{β}.

Consider the results in Table 6.11, which summarizes the binary logistic regression analysis results for "Age" with respect to the 24 free listing-generated food categories. The Wald statistic for each of the food category variables and the constant is the ratio of β to the standard error, squared. If the significance level of the Wald statistic is less than 0.05, then the corresponding parameter is useful to the model (SPSS for Windows, 2007a). Thus, of all 24 food categories under consideration "Breads, Rolls, Tortillas, and Crackers" and "Fried Potatoes/Onion Rings/Fried Cheese" were the only two that had a Wald statistic significance level less than 0.05 while remaining within the entry and removal boundaries of the forward stepwise logistic regression procedure.

Table 6.11 Binary Logistic Regression Summary Table – "Age" Model

Food Categories/ Constant	B	Standard Error	Wald Statistic	Signifi-cance Level	e^{β}	95% Lower C.I.	95% Upper C.I.
Breads, Rolls, Tortillas, and Crackers	1.114	0.460	5.880	0.015	3.048	1.238	7.502
Fried Potatoes/Onion Rings/Fried Cheese	-1.564	0.719	4.728	0.030	0.209	0.051	0.857
Constant	-1.567	0.767	4.173	0.041	0.209		

Table 6.11 should be interpreted as follows:

1. The odds of a participant being aged 35 years of age or older increases by a factor of 3.048 for each unit increase in the number of "Breads, Rolls, Tortillas, and Crackers" individual food items that a participant indicates is a regular part of his or her diet, controlling for all other variables in the model.
2. The odds of a participant being aged 35 years of age or older decreases by a factor of 4.785 (1/0.209) for each unit increase in the number of "Breads, Rolls, Tortillas, and Crackers" individual food items that a participant indicates is a regular part of his or her diet, controlling for all other variables in the model.

(Note that the 95 percent confidence intervals of the e^{β} values are quite wide. This is because a sample size of 32 is small for a binary logistic regression analysis. Small sample sizes tend to reduce the stability of binary logistic regression analysis results.)

Although Table 6.11 indicates that "Breads, Rolls, Tortillas, and Crackers" and "Fried Potatoes/Onion Rings/Fried Cheese" are reasonable predictors for "Age" among the participants in this research study, additional metrics suggest that this model does not

fit the data very well. The Hosmer-Lemeshow goodness-of fit statistic is only 0.097, which is barely above the critical value of 0.05 for a "good" fit. Additionally, the Cox and Snell R-Squared value is 0.282 and the Nagelkerke R-Squared value is 0.406, indicating that the proportion of variance associated with these two predictor variables for age is well less than 50 percent. The classification table, however, shows better results in comparing observed and predicted values using this model. When attempting to predict age according to the preceding model, 22 of the 23 participants aged 18-34 were classified correctly, while six of the nine participants aged 35 and older were classified correctly. This is an overall "correct" classification percentage of 87.5 percent. Table 6.12 summarizes the goodness-of-fit measures for the age binary logistic regression model with respect to the free listing-generated categories.

Table 6.12 Goodness-of-Fit Metric Summary for "Age" Binary Logistic Regression Model

<table>
<tr><th>Goodness-of-Fit Metric</th><th>Relevant Statistics</th></tr>
<tr><td>Hosmer-Lemeshow Goodness-of-Fit Test</td><td>Chi-Square Value: 12.098
Degrees of Freedom: 7
Significance Level: 0.097</td></tr>
<tr><td>Cox and Snell R-Squared Value</td><td>R^2=0.282</td></tr>
<tr><td>Nagelkerke R-Squared Value</td><td>R^2=0.406</td></tr>
<tr><td>Classification Table</td><td>
<table>
<tr><th>Indicator Variable</th><th>Observed</th><th>Predicted</th><th>Percent Correct</th></tr>
<tr><td>0</td><td>23</td><td>22</td><td>95.7</td></tr>
<tr><td>1</td><td>9</td><td>6</td><td>66.7</td></tr>
<tr><td colspan="4">Overall Percentage 87.5</td></tr>
</table>
</td></tr>
</table>

6.4.1.2 Gender

There were no significant predictors entered into the model for "Gender" via stepwise binary logistic regression. This also suggests that there is not a strong enough

relationship between any of the 24 free listing-generated food categories and gender such that gender category (i.e. male or female) can be reasonably predicted given any of the free listing-generated food categories.

6.4.1.3 Ethnicity

The stepwise binary logistic regression procedure entered two of the 24 free listing-generated food categories into the predictive model for "Ethnicity": "Biscuits and Croissants" and "Meat, Poultry, and Fish". The β values for both "Biscuits and Croissants and "Meat, Poultry, and Fish" are negative. Table 6.13 summarizes the binary logistic regression analysis results for ethnicity with respect to the 24 free listing-generated food categories.

Table 6.13 Binary Logistic Regression Summary Table – "Ethnicity" Model

Food Categories/ Constant	**B**	**Standard Error**	**Wald Statistic**	**Signifi-cance Level**	**e^{β}**	**95% Lower C.I.**	**95% Upper C.I.**
Biscuits and Croissants	-1.502	.653	5.295	0.021	0.223	0.062	0.800
Meat, Poultry, and Fish	-0.520	.232	5.021	0.025	0.595	0.377	0.937
Constant	3.629	1.462	6.158	0.013	37.676		

Since the "1" value of the response variable corresponds to a participant being "Latino", the model should be interpreted as follows:

1. The odds of a participant being Latino decreases by a factor of 4.484 (1/0.223) for each unit increase in "Biscuit and Croissant" individual food items that a participant indicates is a regular part of his or her diet, controlling for all other variables in the model.

2. The odds of a participant being Latino decreases by a factor of 1.681 (1/0.595) for each unit increase in "Meat, Poultry, and Fish" individual food items that a participant indicates is a regular part of his or her diet, controlling for other variables in the model.

Table 6.14 summarizes the goodness-of-fit measures for the binary logistic regression model for "Ethnicity" with respect to the free listing-generated categories. In this table, both the Cox and Snell and Nagelkerke R-squared values are below 0.5 – indicating that these two predictor variables account for less than half of the variability associated with "Ethnicity". However, the Hosmer-Lemeshow goodness-of-fit statistic is a relatively high 0.919, and the model correctly classifies participants' ethnicity 75 percent of the time. Therefore, the goodness-of-fit metrics associated with the binary logistic regression model for "Ethnicity" with respect to the free listing-generated categories suggest that the model is a "reasonably" good fit.

Table 6.14 Goodness-of-Fit Metric Summary for "Ethnicity" Binary Logistic Regression Model

<table>
<tr><th>Goodness-of-Fit Metric</th><th>Relevant Statistics</th></tr>
<tr><td>Hosmer-Lemeshow Goodness-of-Fit Test</td><td>Chi-Square Value: 3.227
Degrees of Freedom: 8
Significance Level: 0.919</td></tr>
<tr><td>Cox and Snell R-Squared Value</td><td>R^2=0.370</td></tr>
<tr><td>Nagelkerke R-Squared Value</td><td>R^2=0.496</td></tr>
<tr><td>Classification Table</td><td>
<table>
<tr><th>Indicator Variable</th><th>Observed</th><th>Predicted</th><th>Percent Correct</th></tr>
<tr><td>0</td><td>18</td><td>15</td><td>83.3</td></tr>
<tr><td>1</td><td>14</td><td>9</td><td>64.3</td></tr>
<tr><td colspan="4">Overall Percentage 75.0</td></tr>
</table>
</td></tr>
</table>

6.4.1.4 Born in US

Three of the 24 free listing-generated food categories were entered into the predictive model for the cultural proxy indicator "Born in US": Breads, Rolls, Tortillas, and Crackers; Cereal/Cereal Bars; and Vegetables. The summary table of this model is presented in Table 6.15.

For the binary logistic regression analysis associated with "Born in US", the β values are with respect to a person being born in the United States. Thus, the odds of a participant being native born to the United States increases by a factor of 3.041 for each unit increase in "Breads, Rolls, Tortillas, and Crackers" individual food items, decreases by a factor of 3.610 (1/0.277) for each unit increase of "Cereal/Cereal Bars" individual food items, and increases by a factor of 3.602 for each unit increase in the number of "Vegetables" individual food items a participant indicates is a regular part of his or her diet – controlling for all other variables in the model.

Table 6.15 Binary Logistic Regression Summary Table – "Born in US" Model

Food Categories/ Constant	B	Standard Error	Wald Statistic	Signifi-cance Level	e^{β}	95% Lower C.I.	95% Upper C.I.
Breads, Rolls, Tortillas, and Crackers	1.112	0.537	4.291	0.038	3.041	1.062	8.711
Cereal/Cereal Bars	-1.282	0.565	5.149	0.023	0.277	0.092	0.840
Vegetables	1.282	0.524	5.999	0.014	3.605	1.292	10.057
Constant	-3.079	1.463	4.428	0.035	0.046		

The goodness-of-fit metrics suggest that this model fits the data very well. The 0.885 value for the Hosmer-Lemeshow goodness-of-fit metric is high, and the Cox and

Snell and Nagelkerke R-squared values are a moderate 0.439 and 0.606 respectively. Additionally, the predictive model for "Born in US" based on these five food categories correctly classifies 84.4 percent of the participants. A summary of these goodness-of-fit metrics is presented in Table 6.16.

Table 6.16 Goodness-of-Fit Metric Summary for "Born in US" Binary Logistic Regression Model

<table>
<tr><th>Goodness-of-Fit Metric</th><th>Relevant Statistics</th></tr>
<tr><td>Hosmer-Lemeshow Goodness-of-Fit Test</td><td>Chi-Square Value: 4.018
Degrees of Freedom: 8
Significance Level: 0.885</td></tr>
<tr><td>Cox and Snell R-Squared Value</td><td>R^2=0.439</td></tr>
<tr><td>Nagelkerke R-Squared Value</td><td>R^2=0.606</td></tr>
<tr><td>Classification Table</td><td>
<table>
<tr><th>Indicator Variable</th><th>Observed</th><th>Predicted</th><th>Percent Correct</th></tr>
<tr><td>0</td><td>11</td><td>8</td><td>72.7</td></tr>
<tr><td>1</td><td>21</td><td>19</td><td>90.5</td></tr>
<tr><td colspan="3">Overall Percentage</td><td>84.4</td></tr>
</table>
</td></tr>
</table>

6.4.1.5 Length of Time in US

One food category was entered into the binary logistic regression model for "Length of Time in US": "Meat, Poultry, and Fish". The summary table for this model is presented in Table 6.17. According to results in this table, the odds of a participant living in the US for 21 years or longer increases by a factor of 1.619 for each unit increase in "Meat, Poultry, and Fish" individual food items a participant indicates is a regular part of his or her diet.

Although the binary logistic regression model for "Length of Time in US" classifies nearly 72 percent of participants correctly according to whether or not they are native born to the United States, only 40 percent of those who were not born in the

Table 6.17 Binary Logistic Regression Summary Table – "Length of Time in US" Model

Food Categories/ Constant	B	Standard Error	Wald Statistic	Signifi-cance Level	e^{β}	95% Lower C.I.	95% Upper C.I.
Meat, Poultry, and Fish	0.482	0.227	4.485	0.034	1.619	1.037	2.528
Constant	-1.344	0.980	1.883	0.170	0.261		

United States are classified correctly. Furthermore, the Cox and Snell and Nagelkerke R-Squared values are both far less than 0.500 at 0.192 and 0.271 respectively, and the Hosmer-Lemeshow goodness-of-fit significance level is a modest 0.415. These goodness-of-fit metrics, which are summarized in Table 6.18, indicate that this model is a questionable fit at best.

Table 6.18 Goodness-of-Fit Metric Summary for "Length of Time in US" Binary Logistic Regression Model

Goodness-of-Fit Metric	Relevant Statistics
Hosmer-Lemeshow Goodness-of-Fit Test	Chi-Square Value: 5.010 Degrees of Freedom: 5 Significance Level: 0.415
Cox and Snell R-Squared Value	R^2=0.192
Nagelkerke R-Squared Value	R^2=0.271
Classification Table	Indicator Variable / Observed / Predicted / Percent Correct 0 / 10 / 4 / 40.0 1 / 22 / 19 / 86.4 *Overall Percentage* 71.9

6.4.1.6 Occupation

There were two food categories entered into the binary logistic regression model for "Occupation": "Breads, Rolls, Tortillas, and Crackers" and "Soups, Stews, and Chili". However, the confidence intervals for the associated e^{β} values are very wide,

suggesting that the result may be too unstable to deem trustworthy. The summary table for this model is presented in Table 6.19 below. Because of the instability of this model, goodness-of-fit metrics are not presented.

Table 6.19 Binary Logistic Regression Summary Table – Attempted "Occupation" Model

Food Categories/ Constant	B	Standard Error	Wald Statistic	Signifi-cance Level	e^{β}	95% Lower C.I.	95% Upper C.I.
Breads, Rolls, Tortillas, and Crackers	0.838	0.474	3.129	0.077	2.311	0.913	5.845
Soups, Stews, and Chili	2.457	0.964	6.493	0.011	11.664	1.763	77.167
Constant	-2.354	0.958	6.041	0.014	0.095		

6.4.2 Binary Logistic Regression on SWFFQ "Psuedo-Data"

Results of the Southwestern Food Frequency Questionnaire "pseudo-data" binary logistic regression models were not nearly as discriminatory as those generated for the free listing dietary recall data. Of the six demographic and cultural response variables upon which binary logistic regression analyses were performed for the SWFFQ, the forward stepwise procedure entered food categories into a model for only two of them – gender and occupation – and each of them had only one predictor respectively. There was not a strong enough relationship between the other four response variables ("Age", "Ethnicity", "Born in US", and "Length of Time in US") and any of the 12 SWFFQ food categories such that these response variables could be reasonably predicted given any of the SWFFQ food categories.

6.4.2.1 Gender

Only one SWFFQ food category was entered into the binary logistic regression model for "Gender": "Meats and Eggs". The odds of a participant being a female is reduced by a factor of 1.531 (1/0.653) for each unit increase in the number of "Meats and Eggs" individual food items from the SWFFQ, controlling for all other variables in the model.

The goodness-of-fit metrics suggest that this model is a reasonably good fit for the data. The Hosmer-Lemeshow goodness-of-fit statistic is 0.394, which is well above the critical value of 0.05 for a "good" fit. Additionally, the classification table indicates that the model correctly classifies 71.9 participants based on gender. (It should be noted, however, that only 40 percent of male participants are correctly classified by the model.) The Cox and Snell and Nagelkerke R-Squared values are 0.156 and 0.219 respectively, indicating that the proportion of variance in the SWFFQ "pseudo-data" for gender associated with "Meats and Eggs" is relatively low. The summary tables for the model and goodness-of-fit metrics are presented in Tables 6.20 and 6.21.

Table 6.20 Binary Logistic Regression Summary Table – "Gender" Model (SWFFQ)

Food Categories/ Constant	**B**	**Standard Error**	**Wald Statistic**	**Signifi-cance Level**	**e^{β}**	**95% Lower C.I.**	**95% Upper C.I.**
Meats and Eggs	-0.426	0.204	4.358	0.037	0.653	0.438	0.974
Constant	2.883	1.147	6.324	0.012	17.871		

Table 6.21 Goodness-of-Fit Metric Summary for "Gender" Binary Logistic Regression Model (SWFFQ)

Goodness-of-Fit Metric	Relevant Statistics
Hosmer-Lemeshow Goodness-of-Fit Test	Chi-Square Value: 6.268 Degrees of Freedom: 6 Significance Level: 0.394
Cox and Snell R-Squared Value	R^2=0.156
Nagelkerke R-Squared Value	R^2=0.219
Classification Table	Indicator Variable / Observed / Predicted / Percent Correct 0 / 10 / 4 / 40.0 1 / 22 / 19 / 86.4 *Overall Percentage* 71.9

6.4.2.2. Occupation

"Side, Mixed Dishes, and Soups" was the only SWFFQ food category entered into the binary logistic regression model for "Occupation". According to the results from the model, the odds of a participant being a "white collar" worker or a "housewife" increases by a factor of 1.759 for each unit increase in the number of "Side, Mixed Dishes, and Soups" individual items from the SWFFQ, controlling for all other variables.

The model's goodness-of-fit metrics, however, suggest it may not be a good fit for the data. The Hosmer-Lemeshow goodness-of-fit statistic is only 0.093, which is just slightly above the critical value of 0.05 for a "good" fit. The classification table does indicate that the model correctly classifies 62.5 participants based on occupation, but only 42.9 percent of "blue collar" workers are correctly classified. Finally, the Cox and Snell and Nagelkerke R-Squared values are 0.216 and 0.290 respectively, indicating that the proportion of variance in the SWFFQ "pseudo-data" for "Occupation" associated with "Side, Mixed Dishes, and Soups" is well below 50 percent. The summary tables for the model and goodness-of-fit metrics are presented in Tables 6.22 and 6.23.

Table 6.22 Binary Logistic Regression Summary Table – "Occupation" Model (SWFFQ)

Food Categories/ Constant	B	Standard Error	Wald Statistic	Signifi-cance Level	e^{β}	95% Lower C.I.	95% Upper C.I.
Side, Mixed Dishes, and Soups	0.565	0.261	4.690	0.030	1.759	1.055	2.934
Constant	-3.338	1.654	4.074	0.044	0.036		

Table 6.23 Goodness-of-Fit Metric Summary for "Occupation" Binary Logistic Regression Model (SWFFQ)

Goodness-of-Fit Metric	Relevant Statistics
Hosmer-Lemeshow Goodness-of-Fit Test	Chi-Square Value: 10.850 Degrees of Freedom: 6 Significance Level: 0.093
Cox and Snell R-Squared Value	R^2=0.216
Nagelkerke R-Squared Value	R^2=0.290
Classification Table	See nested table below

Indicator Variable	Observed	Predicted	Percent Correct
0	14	6	42.9
1	18	14	77.8
Overall Percentage			62.5

6.5 Poisson Regression Analyses

The final phase in the development of a comprehensive eating model was the use of Poisson regression to identify demographic variables that are significant with respect to five selected free listing-generated food categories: "Candies, Cookies, Pastries, and Desserts"; "Ethnic Mexican"; "Fast Food/Eating Out"; "Fruits"; and "Vegetables". This is the first and only quantitative analysis technique in which the category "Fast Food/Eating Out" was incorporated. Although it is not a food "type" like the other 24 free listing-generated categories analyzed via hierarchical cluster analysis and binary logistic regression, an appropriate analysis of "Fast Food/Eating Out" might give important insight with respect to the influence of the local restaurant environment on

dietary behavior according to certain demographic characteristics. Additionally, two "healthy" food categories ("Fruits" and "Vegetables"), one "unhealthy" food category ("Candies, Cookies, Pastries, and Desserts"), and one food category deemed important to a large segment of the population ("Ethnic Mexican") were selected for analysis. The demographic predictor variables under consideration for these models were "Age", "Gender", and "Ethnicity".

6.5.1 Ethnic Mexican

Of the three demographic predictor variables under consideration, "Ethnicity" is the only one with a significance level of less than 0.05 for the "Ethnic Mexican" Poisson regression model. Therefore, the Poisson regression analysis indicates that ethnicity is a significant predictor of whether or not Ethnic Mexican is a regular part of a participant's diet. Table 6.24 summarizes the Poisson regression model for "Ethnic Mexican".

Table 6.24 Poisson Regression Summary Table – "Ethnic Mexican" Model

Demographic Variable/ Constant	B	Standard Error	95% Lower C.I.	95% Upper C.I.	Wald Chi-Sq. Statistic	Significance Level
Intercept	1.264	.2629	0.748	1.779	23.095	0.000
Age (Value = 0)	-0.200	.2634	-0.716	0.316	0.575	0.448
Gender (Value = 0)	0.042	0.2579	-0.464	0.547	0.026	0.872
Ethnicity (Value = 0)	**-0.743**	**0.2481**	**-1.230**	**-0.257**	**8.978**	**0.003**

The model summarized in Table 6.24 can be interpreted as follows. The "1" value categories associated with each demographic variable (see Table 6.10) are the reference categories against which the results in the table are compared. Therefore, because of the negative β value associated with the "0" Ethnicity value and the fact that

the significance level associated with this variable is less than 0.05, it is concluded that non-Latino participants ("Ethnicity" value = 0) have statistically significant fewer "Ethnic Mexican" individual food items as a regular part of their diets than their Latino counterparts ("Ethnicity" value = 1). (It should be noted that, should the "0" value categories associated with the demographic variables have been selected as the reference categories, all of the significance levels exception that of the intercept would have remained the same, but the signs of the β values would have changed. Thus, in this case, the equivalent but opposite conclusion would have been drawn that Latino participants have significantly more "Ethnic Mexican" individual food items as a regular part of their diets than their non-Latino counterparts.)

To evaluate the goodness-of-fit for Poisson regression, two ratios were calculated: (1) the ratio of the calculated Deviance statistic and its associated number of degrees of freedom and (2) the ratio of the calculated Pearson chi-square statistic and its associated number of degrees of freedom. Both of these ratios should be near 1.0 for the model to be deemed a "good" fit. Ratios greater than 1.0 indicate that there is over-dispersion of the response variable (i.e. greater variability in the data set than would be expected), while ratios less than 1.0 indicates an under-dispersion of the response variable (i.e. less variability in the data set than would be expected). Ratios greater or less than 1.0 may still indicate a reasonable fit, however, if the values are reasonably close to 1.0. Table 6.25 summarizes the goodness-of-fit statistics for the "Ethnic Mexican" Poisson regression model.

Table 6.25 Goodness-of-Fit Metric Summary for "Ethnic Mexican" Poisson Regression Model

Statistic	Value	Degrees of Freedom	Value/Degrees of Freedom
Deviance	67.892	28	2.425
Pearson Chi-Square	67.642	28	2.416

6.5.2 Fast Food/Eating Out

In the case of the "Fast Food/Eating Out" food category, both "Age" and "Gender" had significance levels less than 0.05. This suggests that both age and gender are important demographic predictors with respect to the amount of food purchased at fast food and dine-in restaurants that are a part of participants' diets. Based on the results in the model presented in Table 6.26, participants aged 18-34 have significantly fewer foods from fast food and dine-in restaurants as a regular part of their diet than their counterparts aged 35 years of age or older. Similarly, male participants have significantly fewer foods from fast food and dine-in restaurants as a regular part of their diet than female participants. Tables 6.26 and 6.27 are summaries of the Poisson regression model and corresponding goodness-of-fit statistics for "Fast Food/Eating Out".

Table 6.26 Poisson Regression Summary Table – "Fast Food/Eating Out" Model

Demographic Variable/ Constant	B	Standard Error	95% Lower C.I.	95% Upper C.I.	Wald Chi-Sq. Statistic	Significance Level
Intercept	1.303	0.2474	0.818	1.788	27.712	0.000
Age (Value = 0)	**-0.678**	**0.2232**	**-1.115**	**-0.240**	**9.211**	**0.002**
Gender (Value = 0)	**-0.682**	**0.2784**	**-1.227**	**-0.136**	**5.992**	**0.014**
Ethnicity (Value = 0)	0.410	0.2369	-0.054	0.874	2.995	0.084

Table 6.27 Goodness-of-Fit Metric Summary for "Fast Food/Eating Out" Poisson Regression Model

Statistic	Value	Degrees of Freedom	Value/Degrees of Freedom
Deviance	67.094	28	2.396
Pearson Chi-Square	68.355	28	2.441

6.5.3 Fruit

In the Poisson regression model for "Fruit", the demographic variable "Ethnicity" had a significance level slightly less than 0.05, as indicated in Table 6.28. Based on the results presented in the model below, a negative relationship exists between a participant classifying himself or herself as non-Latino, and the number of fruits that are a regular part of his or her diet. Thus, non-Latino participants have a slightly significantly lower number of fruits as a regular part of their diets than Latino participants. Tables 6.28 and 6.29 are summaries of the Poisson regression model and corresponding goodness-of-fit statistics for "Fruit".

Table 6.28 Poisson Regression Summary Table – "Fruit" Model

Demographic Variable/ Constant	B	Standard Error	95% Lower C.I.	95% Upper C.I.	Wald Chi-Sq. Statistic	Significance Level
Intercept	0.931	0.3129	0.317	1.544	8.843	0.003
Age (Value = 0)	0.035	0.3126	-0.578	0.648	0.013	0.910
Gender (Value = 0)	-0.566	0.3375	-1.228	0.096	2.812	0.094
Ethnicity (Value = 0)	**-0.553**	**0.2762**	**-1.095**	**-0.012**	**4.014**	**0.045**

Table 6.29 Goodness-of-Fit Metric Summary for "Fruit" Poisson Regression Model

Statistic	Value	Degrees of Freedom	Value/Degrees of Freedom
Deviance	73.947	28	2.641
Pearson Chi-Square	70.715	28	2.526

6.5.4 Vegetables

For the "Vegetables" food category, none of the three demographic variables had a significance level of less than 0.05 (although "Ethnicity" was close with a value of 0.053). This suggests that none of the three demographic variables of interest are reasonable predictors of the number of vegetable items that are a regular part of a participant's diet. The calculated parameters for the attempted "Vegetable" Poisson regression model are displayed in Table 6.30. (Because there were no significant predictors in the model, goodness-of-fit statistics are not shown.)

Table 6.30 Poisson Regression Summary Table – Attempted "Vegetable" Model

Demographic Variable/ Constant	B	Standard Error	95% Lower C.I.	95% Upper C.I.	Wald Chi-Sq. Statistic	Significance Level
Intercept	1.020	0.2389	0.551	1.488	18.220	0.000
Age (Value = 0)	0.096	0.2121	-0.320	0.512	0.203	0.652
Gender (Value = 0)	-0.171	0.287	-0.580	0.239	0.668	0.414
Ethnicity (Value = 0)	0.383	0.1980	-0.005	0.771	3.743	0.053

6.5.5 Candies, Cookies, Pastries, and Desserts

Like "Vegetables", none of the three demographic variables of interest had a significance level of less than 0.05 for the attempted "Candies, Cookies, Pastries, and

Desserts" Poisson regression model. Thus, the number of "sweets" that are a part of a participant's diet cannot be reasonably predicted from the collected data given the three demographic variables of interest. The calculated parameters for the attempted "Candies, Cookies, Pastries, and Desserts" Poisson regression model are displayed in Table 6.31.

Table 6.31 Poisson Regression Summary Table – Attempted "Candies, Cookies, Pastries, and Desserts" Model

Demographic Variable/ Constant	**B**	**Standard Error**	**95% Lower C.I.**	**95% Upper C.I.**	**Wald Chi-Sq. Statistic**	**Significance Level**
Intercept	-0.057	0.4163	-0.873	0.759	0.019	0.891
Age (Value = 0)	0.194	0.3862	-0.563	0.951	0.253	0.615
Gender (Value = 0)	0.302	0.3396	-0.364	0.967	0.790	0.374
Ethnicity (Value = 0)	-0.082	0.3328	-0.735	0.570	0.061	0.804

CHAPTER 7

DISCUSSION

7.1 Critique of Study

The second of the three specific aims of this research study was to construct a comprehensive eating model that explains local food use and consumption in the community by applying appropriate quantitative statistical methods to the data collected. However, the small sample size necessitated by limited time and financial resources precluded this objective from being fully achieved. Although the participant demographics were very similar to those of the region as a whole (see Section 5.4), there were simply not enough participants to justify the generalization of the results to the community at large. Additionally, small sample sizes present particular problems for binary logistic and Poisson regression analyses (Hosmer and Lemeshow, 2000; UCLA Academic Technology Services, 2009), which may cause the results associated with these to be unstable and unreliable. Therefore, the aforementioned binary logistic regression and Poisson regression results in Chapter 6 must be viewed with caution. Finally, 16 of the 32 participants were actually married couples. This further reduces the ability to generalize the results to the overall community population as – in effect – only 16 distinct households in the Dalton-area community were represented among the participants.

There are also concerns regarding the comparative analyses between the free listing-generated results and the Southwestern Food Frequency Questionnaire "pseudo" data. Because the "pseudo" data was projected by the researcher and not directly elicited from the participants themselves, there may be unintentional researcher bias incorporated

into the results. Furthermore, there were several free listing-generated categories (e.g. "Biscuits and Croissants", the "sandwich" component of "Burgers, Sandwiches, and Hot Dogs", and "Fast Food/Eating Out") that are not directly represented on the SWFFQ. Thus, there were several free listing-generated data points that were not represented in the comparative analyses.

It should also be noted that inter-scorer reliability comparisons of the free listing-generated food categories would have been useful. This is the degree to which two or more scorers (or coders) agree with respect to a particular measurement (Cohen and Swerdlik, 2002). In addition to establishing the validity of food categories by ensuring that at least two independent coders would have coded the individual food item data the same way, inter-scorer reliability comparisons also would have helped mitigate potential cultural bias on the part of the researcher with respect to food item categorization. Furthermore, implementation of this technique during the "pseudo" comparative analysis would have helped alleviate the aforementioned possible unintentional researcher bias associated with it as well.

In spite of these concerns, there were several illuminating results from the study. First, despite the aforementioned possibility of researcher-introduced bias, there was utility gained by conducting the comparative analyses, as they provided understanding of the relative performance of the selected quantitative methodologies with respect to each of the dietary behavior assessment instruments. In particular, the hierarchical cluster analysis technique performed quite well for the free listing-generated data in spite of the limited number of participants in the sample.

Secondly, despite the small sample size, several results generated by the statistical analyses seem to meet expectations based on conjecture. For example, it might be expected that the likelihood of a participant being a young adult (aged 18-34) increases for each unit increase in the number of "Fried Potatoes/Onion Rings/Fried Cheese" a participant regularly consumes, especially since a visual inspection of the data indicates that the item "French fries" comprises a large number of individual food items within this category. Additionally, one might expect that the odds of a participant being Latino will decrease for each unit of "Biscuits and Croissants" consumed, since this is a decidedly American cuisine popular in the southeastern United States. (An overwhelming majority of the individual food items in the "Biscuits and Croissants" category were biscuits.) Furthermore, one might also expect that "Ethnicity" is a significant predictor of whether or not "Ethnic Mexican" individual food items are a regular part of a participant's diet, and that non-Latino participants will have statistically significant fewer "Ethnic Mexican" individual food items as a regular part of their diets than their Latino counterparts. Finally, it is not surprising that there were no significant predictors of "Candies, Cookies, Pastries, and Desserts", since these food items are often enjoyed by everyone – regardless of age, gender, or ethnicity.

7.2 Practical Implications

The fact that meaningful and realistic results were generated from this study despite the small participant sample size suggests that a quantitative methods triangle of hierarchical cluster analysis, binary logistic regression, and Poisson regression founded upon qualitative research principles is a useful combined methodological approach for

researchers and public health professionals wishing to develop a comprehensive understanding of dietary behaviors at the local community level. This enables individual dietary behaviors and eating patterns to be analyzed from a multifaceted perspective. In fact, this approach presents four distinct cornerstones upon which a comprehensive eating model can be constructed:

1. Likelihood of demographic "background" based on foods regularly eaten. In this study, coding the demographic and cultural "proxy" indicators as 0-1 binary response variables provided an opportunity to model each indicator variable as a function of food categories by applying binary logistic regression to the data.
2. Likelihood of eating certain foods based on demographic indicators. Conversely, by treating the food categories' count data as response variables, Poisson regression enabled models of selected food categories as a function of selected demographic indicators to be constructed.
3. Understanding of individual eating patterns. Hierarchical cluster analyses of the dietary behavior data enabled the distinct patterns of food category groupings that comprise the collective diet of the participants to be modeled.
4. Impact of the local food environment on dietary behaviors. The initial qualitative analysis of the raw data suggested that "Fast Food/Eating Out" was prevalent enough among the participants to have its own distinct category; thus, the qualitative analysis was critically necessary in order for this additional level of detail to be salient enough to be added to the overall model.

Each of these cornerstones supports different, but equally important, aspects of the comprehensive eating model. Cornerstones one and two enables public health professionals such as nutrition educators and health promotion specialists to develop focused, targeted initiatives based on demographic and ethno-cultural background and/or specific food categories. Messages related to certain food groups can be targeted to certain demographic or ethno-cultural subpopulations in the community based on specific deficiencies or over-saturation of particular food groups revealed by the results of the model. For example, if the model generated by these analyses was generalizable to the Dalton-area community at large, a nutrition educator might want to consider working with local high schools to educate high school students about healthy alternatives to French fries, onion rings, and the like, since young adults in the age bracket they are about to enter into eat a disproportionately higher percentage of "Fried Potatoes/Onion Rings/Fried Cheese" than the rest of the adult population. Similarly, health promotion specialists might consider reminding non-Latino residents in the community of the need to eat foods such as biscuits and croissants in moderation. Finally, public awareness about the importance of limiting sugar intake from sources such as candies, cookies, pastries, and desserts would be deemed appropriate for all segments of the population.

Cornerstone three provides a general assessment about the groupings of food categories that comprise a regular part of individual's diets. This enables interested health professionals to gain a high-level understanding of the kinds of dietary balance being achieved by individuals within the population of interest. This type of information might be particularly useful in the design and implementation of nutrition education classes that have an emphasis on teaching participants how to effectively build balance

into their diets. Nutrition educators might utilize this cornerstone by, first, conducting a hierarchical cluster analysis on a target population of interest and, then, incorporating the resulting eating habit clusters into educational materials. Then, during counseling sessions with individual members of the target population, the educators might show the results of the cluster analysis to the counselees and ask them to consider which set(s) of food category groupings best characterizes their normal eating patterns while discussing the pros and cons of each.

Cornerstone four exclusively concerns the "Fast Food/Eating Out" food category variable. Analyses concerning this variable would enable researchers to understand the influence of the local fast food and dine-in restaurant environment on the dietary behaviors of the target population. This is a significant departure from most standard food frequency questionnaires, which do not query for the distinction between foods eaten at restaurants versus foods prepared and eaten in the home environment. This may have major implications on regular individual nutritional content – particularly with respect to food preparation. Because the nutritional contents of foods served in restaurants are often not readily obtained, this aspect of an individual's diet typically remains latent. Thus, the more foods from fast food and dine-in restaurants are a part of a person's regular eating patterns, the more incomplete the picture will be of that person's regular nutritional intake. As a result, nutrition educators and health promotion specialists might use the analyses related to "Fast Food/Eating Out" to understand which segments of the target population eat at fast food and dine-in restaurants on a regular basis. They might then consider targeting education materials to these groups on the importance of choosing healthy alternatives when eating at these places. They might

even consider developing a supplementary questionnaire that queries individuals on which local restaurants they normally frequent and which individual food items they normally consume when eating at these places. This would give these professionals a more complete picture of the dietary habits of their target population, and provide a basis of information upon which more robust and relevant nutrition education and health promotion programs can be developed. Furthermore, results related to the "Fast Food/Eating Out" analyses might be of interest to local policymakers and businesspeople, as it might indicate a need and a market for restaurants of a "healthier" genre. Table 7.1 summarizes the aforementioned four cornerstones of a comprehensive eating model and the types of analysis that generate each one.

Table 7.1 Summary of Comprehensive Eating Model Cornerstones

Cornerstone of Eating Model	Type of Analysis Generated By
Likelihood of demographic "background" based on foods regularly eaten	Binary Logistic Regression
Likelihood of eating certain foods based on demographic indicators	Poisson Regression
Understanding of individual eating patterns	Hierarchical Cluster Analysis
Impact of the local food environment on dietary behaviors	Qualitative Analysis/ Identification of Common Themes

7.3 Future Work and Directions

The purpose of our research was to understand, formalize, and model the eating patterns of adults living in the Dalton community. Because the results from this study could not be generalized to the Dalton-area at large due to the small sample size, a second, better-funded study should be undertaken with a larger sample size of at least 50 to 100 participants. These participants should be selected in such a manner that the

overall demographic breakdown of the group is reflective of the community at large. This would enable the results to be generalized to the entire community with some degree of confidence. It would also make the binary logistic regression and Poisson regression results more trustworthy, since neither of these techniques performs well with small sample sizes. Additionally, researchers may also consider establishing implication boundaries for the study results by focusing on a limited number of cultural/demographic parameters among the demographic variables of interest (e.g. ethnicity, native/immigrant status, occupation) and generalizing the results to populations represented by those indicators.

Researchers might also consider adding questions to the demographics section of the questionnaire that query for socioeconomic status in future studies. They might consider constructing salary ranges for participants to choose from on the questionnaire that are broad enough to be considered non-intrusive, yet specific enough to yield meaningful data. For example, salary ranges "$0-$25000/year", "$25000-$50000/year", "$50000-$100000/year", and "$100000/year+" might be constructed to correspond to the categories "low income", "low-medium income", "medium-high income" and "high income" respectively.

As mentioned in Section 5.5.1, three common themes emerged regarding how participants conceptualized their foods when recalling them: food type, method of preparation, and food item components and compliments. In the future, researchers might consider exploring these themes for potential use in building training and health promotion initiatives aimed at increasing healthy eating behaviors. Additionally, researchers might consider examining the "method of preparation" theme in greater depth

in order to better understand the cooking practices of their target population and to develop pertinent programs that facilitate healthier meal preparations.

Statistical analyses in future studies of this kind should be expanded to assess correlations between the "contextual" food categories (e.g. "Fast Food/Eating Out", "Boxed and Pre-packaged Meals", "Frozen/ TV/ Microwaveable Dinners") and the food "type" categories (e.g. "Pizza", "Rice and Pastas", "Burgers, Sandwiches, and Hot Dogs"), in order to gain an understanding of individual dietary behaviors when eating foods not prepared at home. Moreover, researchers might consider ways to expand assessment of the "Fast Food/Eating Out" category in order to understand the relationship between local grocery stores and individual dietary behaviors. This might be of particular importance in a culturally-diverse community setting, where ethnic enclaves often patronize ethno-centric grocery stores that specialize in providing foods and beverages from their home cultures. In addition, because adequate and accurate understandings of drink and beverage intake can have major impacts on dietary interventions and health promotion programs aimed at combating obesity, individual drink and beverage item data should be coded and analyzed in the same manner as the individual food items. (Data regarding individual drink and beverage intake was collected in this research study, but was not coded and analyzed due to time and resource constraints.)

Results from food frequency questionnaires are typically validated by comparing them with multiple 24-hour recalls or food records administered during the same time frame as the FFQs referent period (Subar 2004; Hankin and Wilkens, 1994; Thompson and Byers, 1994). Thus, instead of comparing the free listing-based FFQ results with

"pseudo-data" of an existing, well-established FFQ, this multiple 24-hour recall validation method should be undertaken in a future, revised study. Because the free listing-based dietary recall methodology utilized in this study asks respondents for foods normally eaten across a typical week, the referent period would need to be defined as one week with, ideally, seven 24-hour recalls administered for each day of the week across an extended period of time. This "extended period of time" might be a little as one month or as much as one year, depending on the amount of time available to conduct the study. Preferably, this period of time should extend as long as possible in order to capture possible seasonal variations in dietary behaviors.

Finally, the results generated in this doctoral dissertation study as well as in any future studies should lead to the development of multiple-choice, self-report dietary assessment instruments that are streamlined, yet more comprehensive. Well-established, existing questionnaires such as the Southwestern Food Frequency Questionnaire, the National Cancer Institute/Block Food Frequency Questionnaire, and the Harvard University/Willett Food Frequency Questionnaire (Willett et al., 1985) might be modified and/or extended to include the additional categories suggested by the free listing dietary recall data. Additionally, an entirely new food frequency questionnaire might be created based on these categories.

Food frequency questionnaires typically contain 100 or more items in order to capture the range of foods contributing to the many different nutrients in the diet (Thompson and Byers, 1994). Additionally, an FFQ should contain 160 individual food items or less in order to prevent burnout or lack of concentration from becoming an issue among respondents (Garcia et al., 2000). Therefore, the number of individual food items

contained within a food list for any new food frequency questionnaire created on the basis of these or future free listing-generated results should remain within a boundary of approximately 100 to 160.

APPENDIX A

PILOT STUDY QUESTIONNAIRE MATERIALS

GEORGIA TECH HEALTH SYSTEMS INSTITUTE RESEARCH STUDY ON FAMILY EATING HABITS
Demographics Survey

1. Please Circle Your Gender: **MALE** **FEMALE**
2. Please Circle Your Age Range: **18-24** **25-34** **35-44** **45-54** **55-64** **OVER 65**
3. Please Circle Your Native Language: **ENGLISH** **SPANISH** **BOTH ENGLISH AND SPANISH** **OTHER**
4. Please Circle Your Ethnicity: **CAUCASIAN** **LATINO** **AFRICAN-AMERICAN** **ASIAN** **OTHER**
5. Please Circle Where You Spent Most Of Your Life Before Age 18: **INSIDE USA** **OUTSIDE USA** **BOTH**
6. How many years of school have you completed?
   NONE **GRADES 1-6** **GRADES 7-9** **GRADES 10-12** **COLLEGE/UNIVERSITY**
7. If you were not born in the USA, how long have you lived in the USA? (Please indicate in months or years) _____
8. How long have you lived in the Dalton community? (Please indicate in months or years) _____
9. What kind of work do you do? (non-paid work such as housewife or community volunteer included) _____
10. How many people live in your household? _____
11. Are you the main person that buys food and groceries for your household? **YES** **NO**
12. Do you cook and prepare meals for your household? **YES** **NO**

Figure A.1 Pilot Study Demographics Questionnaire (English Version)

GEORGIA TECH HEALTH SYSTEMS INSTITUTE
ESTUDIO DE INVESTIGACION DE LOS HABITOS ALIMENTICIOS FAMILIARES
Encuesta Demográfica

1. Por favor, encierre Su genero: **MASCULINO** **FEMENINA**
2. Por favor, encierre Su Rango de Edad: **18-24** **25-34** **35-44** **45-54** **55-64** **OVER 65**
3. Por favor, encierre Su Idioma Nativo: **INGLES** **ESPAÑOL** **INGLES Y ESPANOL** **OTRO**
4. Por favor, encierre Su Origen Étnico: **CAUCASICO** **LATINO** **AFRO-AMERICANO** **ASIATICO** **OTRO**
5. Por favor, encierre donde paso la mayor parte de su vida antes de los 18 años:
   DENTRO DE USA **FUERA DE USA** **AMBOS**
6. Cual es el nivel de educación más alto que ha completado?
   NINGUNO **GRADOS 1-6** **GRADOS 7-9** **GRADOS 10-12** **INSTITUTO/UNIVERSIDAD**
7. Cuanto tiempo ha vivido en los Estados Unidos? (Por favor, indique en meses o años) _____
8. Cuanto tiempo ha vivido en la comunidad de Dalton? (Por favor, indique en meses o años) _____
9. Que clase de trabajo realiza? (incluya trabajos no pagados como ama de casa o voluntario en la comunidad) _____
10. Cuantas personas viven en su hogar? _____
11. Es Ud. la principal persona que compra comidas y abarrotes para su hogar? **SI** **NO**
12. Ud. cocina y prepara las comidas para su hogar? **SI** **NO**

Figure A.2 Pilot Study Demographics Questionnaire (Spanish Version)

WEEKDAY FREE LISTING DIETARY RECALL WORKSHEET

INSTRUCTIONS:
Think of an average, ordinary week. Please write down what you normally EAT AND DRINK for meals and snacks each day in the spaces provided. You do not have to write down every single piece of food that you ever eat. Just write down as many foods and beverages as you can remember for each day. Please be as specific as possible when writing foods, food dishes, and drinks. Please be sure to write responses for the days listed on the back of this form and on the front and back of the second page as well. Thank you. ☺

Day	**Typical Workday? (Please circle response)**	**Breakfast**	**Lunch**	**Dinner**	**Other Meals**	**Snacks**
Monday	YES NO	Time:________ Foods:________ Drinks:________	Time:________ Foods:________ Drinks:________	Time:________ Foods:________ Drinks:________	Time:________ Foods:________ Drinks:________	Time:________ Foods:________ Drinks:________

Figure A.3 Pilot Study Weekday Free Listing Dietary Recall Worksheet (English Version)

Day	**Typical Workday? (Please circle response)**	**Breakfast**	**Lunch**	**Dinner**	**Other Meals**	**Snacks**
Tuesday	YES NO	Time:____ Foods:____ Drinks:____	Time:____ Foods:____ Drinks:____	Time:____ Foods:____ Drinks:____	Time:____ Foods:____ Drinks:____	Time:____ Foods:____ Drinks:____
Wednesday	YES NO	Time:____ Foods:____ Drinks:____	Time:____ Foods:____ Drinks:____	Time:____ Foods:____ Drinks:____	Time:____ Foods:____ Drinks:____	Time:____ Foods:____ Drinks:____

Figure A.3 Continued

Day	**Typical Workday? (Please circle response)**	**Breakfast**	**Lunch**	**Dinner**	**Other Meals**	**Snacks**
Thursday	YES NO	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____
Friday	YES NO	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____	Time:____ ____ Foods:____ ____ ____ ____ ____ ____ ____ Drinks:____ ____ ____

Figure A.3 Continued

INSTRUCTIONS: Please write any additional foods and beverages you normally eat and drink in the spaces provided below. *(Examples are provided in italics.)*

Day	Time	Meal or Snack	Food Eaten	Beverage Drank
Tuesday	*6:00 P.M.*	*Dinner*	*Rice and Chicken*	*----------*
Friday	*3:00 P.M.*	*Snack*	*Baked Lay's Potato Chips*	*Diet soda*

Please write any additional comments you may have for foods normally eaten and beverages normally drank on weekdays: _____
_____
_____
_____

Figure A.3 Continued

HOJA DE TRABAJO DEL LISTADO DE LA DIETA COMPLETA DADO LIBREMENTE SEGUN SE RECUERDA PARA LOS DIAS LABORABLES

INSTRUCCIONES:
Piense en una semana regular y comun. Por favor, escriba en los espacios en blanco lo que Ud. normalmente come y bebe cada dia durante las comidas y meriendas. Ud. no tiene que escribir todos y cada uno de los alimentos que come. Solo escriba tantos alimentos y bebidas como Ud recuerde para cada dia. Por favor, asegurese de escribir respuestas para los dias escritos en la parte de atras de este formulario y tambien en el frente y parte de atras de la segunda pagina. Gracias. ☺

Dia	**Tipico dia de trabajo?Por favor, encierre su respuesta)**	**Desayuno**	**Almuerzo**	**Cena**	**Otras Comidas**	**Meriendas**
Lunes	SI NO	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________

Figure A.4 Pilot Study Weekday Free Listing Dietary Recall Worksheet (Spanish Version)

Dia	Tipico dia de trabajo? (Por favor, encierre su respuesta)	Desayuno	Almuerzo	Cena	Otras Comidas	Meriendas
Martes	SI NO	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____
Miercoles	SI NO	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____

Figure A.4 Continued

Dia	**Tipico dia de trabajo? (Por favor, encierre su respuesta)**	**Desayuno**	**Almuerzo**	**Cena**	**Otras Comidas**	**Meriendas**
Jueves	SI NO	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____
Viernes	SI NO	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Hora:____ Alimentos:____ Bebidas:____	Horas:____ Alimentos:____ Bebidas:____

Figure A.4 Continued

INSTRUCCIONES: Por favor, escriba en los espacios de abajo cualquier alimento o bebida adicional que Ud. Normalmente come o bebe. *(Ejemplos estan dados en letra cursiva.)*

Dia	Hora	Comida o Merienda	Alimento consumido	Bebida tomada
Martes	*6:00 P.M.*	*Cena*	*Fideos con albondigas*	----------
Viernes	*3:00 P.M.*	*Merienda*	*Baked Lay's Papas fritas*	*Gaseosa de dieta*

Por favor, escriba cualquier comentario adicional que Ud. tenga sobre los alimentos que normalmente come y las bebidas que normalmente toma durante los dias laborables:

Figure A.4 Continued

WEEKEND FREE LISTING DIETARY RECALL WORKSHEET

INSTRUCTIONS:
Think of an average, ordinary weekend. Please write down what you normally EAT AND DRINK for meals and snacks on Saturdays and Sundays in the spaces provided on the front and back of this form. You do not have to write down every single piece of food that you ever eat. Just please write down as many foods and beverages as you can remember for each day. Please be as specific as possible when writing foods, food dishes, and drinks. Thank you. ☺

Day	Typical Workday? (Please circle response)	Breakfast	Lunch	Dinner	Other Meals	Snacks
Saturday	YES NO	Time:________ Foods:________ Drinks:________	Time:________ Foods:________ Drinks:________	Time:________ Foods:________ Drinks:________	Time:________ Foods:________ Drinks:________	Times:________ Foods:________ Drinks:________

Figure A.5 Pilot Study Weekend Free Listing Dietary Recall Worksheet (English Version)

Day	Typical Workday? (Please circle response)	Breakfast	Lunch	Dinner	Other Meals	Snacks
Sunday	YES NO	Time:___ ___ Foods:___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ Drinks:___ ___ ___ ___ ___	Time:___ ___ Foods:___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ Drinks:___ ___ ___ ___ ___	Time:___ ___ Foods:___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ Drinks:___ ___ ___ ___ ___	Time:___ ___ Foods:___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ Drinks:___ ___ ___ ___ ___	Times:___ ___ ___ Foods:___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ Drinks:___ ___ ___ ___ ___

Please write any additional comments you may have for foods normally eaten and beverages normally drank on weekends: ______________________________

____

____

____

Figure A.5 Continued

HOJA DE TRABAJO DEL LISTADO DE LA DIETA COMPLETA DADO LIBREMENTE SEGUN SE RECUERDA PARA LOS DIAS DE FIN DE SEMANA

INSTRUCCIONES:
Piense en un fin de semana regular y comun. Por favor, escriba en los espacios en blanco de la parte delantera y trasera de este formulario, lo que Ud. normalmente COME Y BEBE los Sabados y Domingos durante las comidas y meriendas. Ud. no tiene que escribir todos y cada uno de los alimentos que come. Solo escriba tantos alimentos y bebidas como Ud recuerde para cada dia. Gracias. ☺

Dia	**Tipico dia de trabajo? (Por favor, encierre su respuesta)**	**Desayuno**	**Almuerzo**	**Cena**	**Otras Comidas**	**Meriendas**
Sabado	SI NO	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________

Figure A.6 Pilot Study Weekend Free Listing Dietary Recall Worksheet (Spanish Version)

Dia	Tipico dia de trabajo? (Por favor, encierre su respuesta)	Desayuno	Almuerzo	Cena	Otras Comidas	Meriendas
Domingo	SI NO	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________	Hora:________ Alimentos:________ Bebidas:________

Por favor, escriba cualquier comentario adicional que Ud. tenga sobre los alimentos que normalmente come y las bebidas que normalmente toma durante los dias de fin de semana:

Figure A.6 Continued

APPENDIX B

COMPLETE LISTING OF FOOD CATEGORIES MENTIONED BY AT LEAST TWO RESPONDENTS IN PILOT STUDY

Table B.1 Pilot Study Free Listing-Generated Food Categories and Individual Food Items

Beans		**Hamburgers**	
Unspecified	10	Hamburger	6
With Pork Meat	1	**Honey**	
Beef		Honey	2
Steak	7	**Ice Cream and Yogurt**	
Unspecified	6	Ice Cream	3
Albondigas	2	Yogurt	2
Breaded	2	**Jam**	
Grilled	2	Unspecified	2
Ground Beef	2	Strawberry	1
Biscuits		**Meat**	
Gravy Added	1	Ham	5
Chicken	1	Unspecified	3
Bread		Grilled	2
Unspecified	8	Pork (Non-descript)	1
Toast	7	**Pancakes (Hot Cakes)**	
Pastry/Sweet	3	Pancakes	4
Wheat	2	**Pie**	
Cake		Unspecified	1
Unspecified	2	Cheese	1
Cheese Cake	1	Key Lime (Low Fat)	1
Chocolate	1	**Pizza**	
Candy		Pizza	4
Unspecified	1	**Quesadilla**	
Chocolate	1	Unspecified	4
Cereal		Cheese and Ham	1
Unspecified	9	Potato	1
Corn Flakes	2	**Restaurant Food**	
Cheerios	1	Chinese	4
Grape Nuts	1	Chicken	1
Honey Bunches	1	Other	1
Kellogg's	1	Unspecified	1
Low Fat	1	**Rice**	
Maizoro	1	Rice	12
Wheat	1		

Table B.1 Continued

Cheese		**Salad**	
Unspecified	9	Unspecified	7
American	1	Cheese Added	1
Cottage	1	Meat Added	1
Chicken		**Salsa**	
Unspecified	10	Unspecified	5
Baked	2	Hot	1
Fried	2	Roja	1
Grilled	2	**Sandwiches**	
Breast	1	Unspecified	3
Chips		Ham	2
Chips	2	Turkey Ham	1
Cookies		Egg	1
Unspecified	8	**Shrimp**	
Chocolate Chip	1	Shrimp	2
Crackers		**Soup**	
Unspecified	1	Unspecified	5
Trisquits	1	Vegetable	3
Wheat	1	Pasta	2
Cream		Beans	1
Cream	2	Beef	1
Eggs		Chicken	1
Unspecified	11	Chicken Noodle	1
Egg Whites	1	Cream	1
Enchiladas		Pea Cream	1
Unspecified	2	**Spaghetti (Pasta)**	
With Chicken and Salsa Verde	1	Spaghetti	3
With Salsa	1	**Tacos**	
Fish		Chicken	1
Fish	5	Steak	1
Fried Potatoes		**Tortilla**	
French Fries	5	Unspecified	5
		Corn	1
		Wheat	1

Table B.1 Continued

Fruit		**Tostadas**	
Apple	14	Unspecified	1
Banana	12	Chicken	1
Orange	10	**Vegetables**	
Mango	9	Tomato	8
Papaya	6	Chili	7
Unspecified	5	Lettuce	6
Melon	4	Potato	6
Peach	4	Broccoli	4
Watermelon	4	Carrots	4
Avocado	3	Corn	4
Pear	3	Nopales (Nopalitos)	4
Strawberries	3	Cucumber	3
Canned	1	Green Beans	3
Grapefruit	1	Onion	3
Grapes	1	Zucchini	3
Jicama	1	Unspecified	3
Lemon	1	Peas	2
Pina	1	Campana Chili	1
Pineapple	1	Chayote	1
Tangerine	1	Col	1
Fruit Mix	1	Pinto Beans	1
Gorditas		**Wieners**	
Cheese	1	Unspecified	1
Meat	1	Hot Dog	1

APPENDIX C

FIELD STUDY QUESTIONNAIRE MATERIALS

GEORGIA TECH HEALTH SYSTEMS INSTITUTE RESEARCH STUDY ON FAMILY EATING HABITS
Demographics Survey

1. Please Circle Your Gender: **MALE** **FEMALE**

2. Please Circle Your Age Range: **18-24** **25-34** **35-44** **45-54** **55-64** **OVER 65**

3. Please Circle Your Native Language: **ENGLISH** **SPANISH** **BOTH ENGLISH AND SPANISH** **OTHER**

4. Please Circle Your Ethnicity: **CAUCASIAN** **LATINO** **AFRICAN-AMERICAN** **ASIAN** **OTHER**

5. Please Circle Where You Spent Most Of Your Life Before Age 18: **INSIDE USA** **OUTSIDE USA** **BOTH**

6. How many years of school have you completed?
NONE **GRADES 1-6** **GRADES 7-9** **GRADES 10-12** **COLLEGE/UNIVERSITY**

7. Were you born in the USA? **YES** **NO**

8. If you were not born in the USA, please circle how long have you lived in the USA.
LESS THAN ONE YEAR **1-5 YEARS** **5-10 YEARS** **10-20 YEARS** **MORE THAN 20 YEARS**

9. Were you born in or around the Dalton community? **YES** **NO**

10. If you were not born in or around the Dalton community, please circle how long you have now lived in this community.
LESS THAN ONE YEAR **1-5 YEARS** **5-10 YEARS** **10-20 YEARS** **MORE THAN 20 YEARS**

11. What kind of work do you do? (non-paid work such as housewife or community volunteer included) _____

12. How many people live in your household? _____

13. Are you the main person that buys food and groceries for your household? **YES** **NO**

14. Do you cook and prepare meals for your household? **YES** **NO**

Figure C.1 Field Study Demographics Questionnaire (English Version)

GEORGIA TECH HEALTH SYSTEMS INSTITUTE
ESTUDIO DE INVESTIGACION DE LOS HABITOS ALIMENTICIOS FAMILIARES
Encuesta Demográfica

1. Por favor, encierre Su genero: **MASCULINO** **FEMENINO**

2. Por favor, encierre Su Rango de Edad: **18-24** **25-34** **35-44** **45-54** **55-64** **SOBRE 65**

3. Por favor, encierre Su Idioma Nativo: **INGLES** **ESPAÑOL** **INGLES Y ESPANOL** **OTRO**

4. Por favor, encierre Su Origen Étnico: **CAUCASICO** **LATINO** **AFRO-AMERICANO** **ASIATICO** **OTRO**

5. Por favor, encierre donde paso la mayor parte de su vida antes de los 18 años:
   DENTRO DE USA **FUERA DE USA** **AMBOS**

6. Cual es el nivel de educación más alto que ha completado?
   NINGUNO **GRADOS 1-6** **GRADOS 7-9** **GRADOS 10-12** **INSTITUTO/UNIVERSIDAD**

7. Nacio Ud. en los Estados Unidos? **SI** **NO**

8. Si no nacio en los Estados Unidos, por favor, encierre cuanto tiempo ha vivido en los Estados Unidos
   MENOS DE UN AÑO **1-5 AÑOS** **5-10 AÑOS** **10-20 AÑOS** **MAS DE 20 AÑOS**

9. Nacio Ud. en o cerca de la comunidad de Dalton? **SI** **NO**

10. Si no nacio en o cerca de la comunidad de Dalton, por favor, encierre cuanto tiempo ha vivido en esta comunidad
    MENOS DE UN AÑO **1-5 AÑOS** **5-10 AÑOS** **10-20 AÑOS** **MAS DE 20 AÑOS**

11. Que clase de trabajo realiza? (incluya trabajos no pagados como ama de casa o voluntario en la comunidad) _____

12. Cuantas personas viven en su hogar? _____

13. Es Ud. la principal persona que compra comida y abarrotes para su hogar? **SI** **NO**

14. Ud. cocina y prepara las comidas para su hogar? **SI** **NO**

Figure C.2 Field Study Demographics Questionnaire (Spanish Version)

WEEKDAY FREE LISTING DIETARY RECALL WORKSHEET

INSTRUCTIONS:
Think of an average, ordinary week (Monday – Friday). Please write down what you normally EAT AND DRINK for meals and snacks on workdays in the spaces provided below. You do not have to write down every single piece of food that you ever eat. Just write down as many foods and beverages as you can remember for each meal or snack. Please be as specific as possible when writing foods, food dishes, and beverages. When you are done, please complete the worksheet on the back of this page. Thank you. ☺

WORKDAYS

Breakfast	Lunch	Dinner	Other Meals	Snacks
Time:_____	Time:_____	Time:_____	Times:_____	Times:_____
Foods:_____	Foods:_____	Foods:_____	_____	_____
_____	_____	_____	Foods:_____	Foods:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Beverages:_____	Beverages:_____	Beverages:_____	Beverages:_____	Beverages:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Please write any additional comments you may have for foods normally eaten and beverages normally drank on workdays: _____
_____
_____

Figure C.3 Field Study Weekday Free Listing Dietary Recall Worksheet (English Version)

INSTRUCTIONS:
Think of an average, ordinary week (Monday – Friday). Please write down what you normally EAT AND DRINK for meals and snacks on non-workdays in the spaces provided below. You do not have to write down every single piece of food that you ever eat. Just write down as many foods and beverages as you can remember for each meal or snack. Please be as specific as possible when writing foods, food dishes, and beverages. (If you normally work each day Monday – Friday, please leave this sheet blank.) Thank you. ☺

NON-WORKDAYS

Breakfast	**Lunch**	**Dinner**	**Other Meals**	**Snacks**
Time:_____	Time:_____	Time:_____	Times:_____	Times:_____
Foods:_____	Foods:_____	Foods:_____	_____	_____
_____	_____	_____	Foods:_____	Foods:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Beverages:_____	Beverages:_____	Beverages:_____	Beverages:_____	Beverages:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Please write any additional comments you may have for foods normally eaten and beverages normally drank on non-workdays: _____
_____
_____

Figure C.3 Continued

HOJA DE TRABAJO DEL LISTADO DE LA DIETA ALIMENTICIA DADO LIBREMENTE SEGUN SE RECUERDA PARA LOS DIAS DE SEMANA

INSTRUCCIONES:
Piense en una semana regular y comun (Lunes a Viernes). Por favor, escriba en los espacios en blanco lo que Ud. normalmente COME Y BEBE en los dias laborables durante las comidas y meriendas. Ud. no tiene que escribir todos y cada uno de los alimentos que come. Solo escriba tantos alimentos y bebidas como Ud recuerde para cada comida o merienda. Por favor, sea tan especifico como le sea posible cuando escriba los alimentos, comidas y bebidas. Cuando termine, por favor, complete la hoja de trabajo en la parte de atras de esta pagina. Gracias. ☺

DIAS LABORABLES

Desayuno	**Almuerzo**	**Cena**	**Otras Comidas**	**Meriendas**
Hora:_____	Hora:_____	Hora:_____	Hora:_____	Hora:_____
Alimentos:_____	Alimentos:_____	Alimentos:_____	_____	_____
_____	_____	_____	Alimentos:_____	Alimentos:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Bebidas:_____	Bebidas:_____	Bebidas:_____	Bebidas:_____	Bebidas:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Por favor, escriba cualquier comentario adicional que Ud. tenga sobre los alimentos que normalmente come y las bebidas que normalmente toma durante los dias laborables:
_____
_____

Figure C.4 Field Study Weekday Free Listing Dietary Recall Worksheet (Spanish Version)

INSTRUCCIONES:
Piense en una semana regular y comun (Lunes a Viernes). Por favor, escriba en los espacios en blanco lo que Ud. normalmente COME Y BEBE en los dias no laborables durante las comidas y meriendas. Ud. no tiene que escribir todos y cada uno de los alimentos que come. Solo escriba tantos alimentos y bebidas como Ud recuerde para cada comida o merienda. Por favor, sea tan especifico como le sea posible cuando escriba los alimentos, comidas y bebidas. (Si Ud normalmente trabaja todos los dias de Lunes a Viernes, por favor deje esta pagina en blanco). Gracias. ☺

DIAS NO LABORABLES

Desayuno	**Almuerzo**	**Cena**	**Otras Comidas**	**Meriendas**
Hora:_____	Hora:_____	Hora:_____	Hora:_____	Hora:_____
Alimentos:_____	Alimentos:_____	Alimentos:_____	_____	_____
_____	_____	_____	Alimentos:_____	Alimentos:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Bebidas:_____	Bebidas:_____	Bebidas:_____	Bebidas:_____	Bebidas:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Por favor, escriba cualquier comentario adicional que Ud. tenga sobre los alimentos que normalmente come y las bebidas que normalmente toma durante los dias no laborables:
_____
_____
_____

Figure C.4 Continued

WEEKEND FREE LISTING DIETARY RECALL WORKSHEET

INSTRUCTIONS:
Think of an average, ordinary weekend. Please write down what you normally EAT AND DRINK for meals and snacks on Saturdays and Sundays in the spaces provided on the front and back of this form. You do not have to write down every single piece of food that you ever eat. Just write down as many foods and beverages as you can remember for each day. Please be as specific as possible when writing foods, food dishes, and beverages. Thank you. ☺

SATURDAY

Breakfast	Lunch	Dinner	Other Meals	Snacks
Time:_____	Time:_____	Time:_____	Times:_____	Times:_____
Foods:_____	Foods:_____	Foods:_____	_____	_____
_____	_____	_____	Foods:_____	Foods:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Beverages:_____	Beverages:_____	Beverages:_____	Beverages:_____	Beverages:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Is Saturday a typical workday? (Please circle): YES NO

Figure C.5 Weekend Free Listing Dietary Recall Worksheet (English Version)

SUNDAY

Breakfast	Lunch	Dinner	Other Meals	Snacks
Time:_____	Time:_____	Time:_____	Times:_____	Times:_____
Foods:_____	Foods:_____	Foods:_____	_____	_____
_____	_____	_____	Foods:_____	Foods:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Beverages:_____	Beverages:_____	Beverages:_____	Beverages:_____	Beverages:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Is Sunday a typical workday? (Please circle): **YES** **NO**

Please write any additional comments you may have for foods normally eaten and beverages normally drank on weekends (Please specify any differences between Saturdays and Sundays):_____
_____
_____

Figure C.5 Continued

HOJA DE TRABAJO DEL LISTADO DE LA DIETA ALIMENTICIA DADO LIBREMENTE SEGUN SE RECUERDA PARA LOS FINES DE SEMANA

INSTRUCCIONES:
Piense en un fin de semana regular y comun. Por favor, escriba en los espacios en blanco lo que Ud. normalmente COME Y BEBE los Sabados y Domingos durante las comidas y meriendas. Ud. no tiene que escribir todos y cada uno de los alimentos que come. Solo escriba tantos alimentos y bebidas como Ud recuerde para cada comida o merienda. Por favor, sea tan especifico como le sea posible cuando escriba los alimentos, comidas y bebidas. Gracias. ☺

SABADO

Desayuno	**Almuerzo**	**Cena**	**Otras Comidas**	**Meriendas**
Hora:_____	Hora:_____	Hora:_____	Hora:_____	Hora:_____
Alimentos:_____	Alimentos:_____	Alimentos:_____	_____	_____
_____	_____	_____	Alimentos:_____	Alimentos:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Bebidas:_____	Bebidas:_____	Bebidas:_____	Bebidas:_____	Bebidas:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Es Sabado un tipico dia de trabajo ? (Por favor encierre) : SI NO

Figure C.6 Weekend Free Listing Dietary Recall Worksheet (Spanish Version)

DOMINGO

Desayuno	Almuerzo	Cena	Otras Comidas	Meriendas
Hora:_____	Hora:_____	Hora:_____	Hora:_____	Hora:_____
Alimentos:_____	Alimentos:_____	Alimentos:_____	_____	_____
_____	_____	_____	Alimentos:_____	Alimentos:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Bebidas:_____	Bebidas:_____	Bebidas:_____	Bebidas:_____	Bebidas:_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____				

Es Domingo un tipico dia de trabajo ? (Por favor encierre) : **SI** **NO**

Por favor, escriba cualquier comentario adicional que Ud. tenga sobre los alimentos que normalmente come y las bebidas que normalmente toma durante los fines de semana (Por favor, especifique cualquier diferencia entre Sabados y Domingos) : _____
_____
_____

Figure C.6 Continued

APPENDIX D

SOUTHWESTERN FOOD FREQUENCY QUESTIONNAIRE (SWFFQ)

CUESTIONARIO SOBRE PRATICAS DE ALIMENTACION DE LA POBLACION©
(LISTA LARGA)

Southwestern Food Frequency Questionnaire©
(Long List)

UNIVERSITY OF ARIZONA
Tucson, Arizona

Version 5.0
May 1994

NAME
STUDY # _____ **DATE** _____/
/
I.D. # _____ **SEX** (Male)
(Female)
AGE IN YEARS _____ **PREF. LANGUAGE**
(English) (Spanish)
WEIGHT _____ **HEIGHT**
INTERVIEWER
PREGNANT? ____ Yes ____ No RACE
CURRENTLY SMOKING? ____ Yes ____ No

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
GUISADOS Y SOPAS **Side, Mixed Dishes, and Soups**											
FRIJOLES REFRITOS. Refried Beans					d			S			
FRIJOLES DE LA OLLA, CHARROS BAYOS, NEGROS, PINTOS, ALUBIAS. Baked / Cooked Beans, "Charro-Style" Beans, Black, Pinto, and Kidney Beans					d			S			
ARROZ BLANCO O A LA MEXICANA. Plain or Mexican Rice					d			S			
SOPAS DE PASTA / FIDEO (SIN QUESO Y SIN CARNE). Noodle Soup, Pastas without Cheese or Meat					d			S			
PAPAS FRITAS, PAPITASO, O PAPAS A LA FRANCESA. French Fries and					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l								
Fried Potatoes											
PAPAS HERVIDAS, AL HORNO, PURE DE PAPA, OTRAS PAPAS. Other Potatoes, including Boiled, Baked, Mashed					d			S			
CHILES RELLENOS CON QUESO O PICADILLO. Chiles Rellenos with Cheese or Meat and Potato Dish					d			S			
TAMALES DE CARNE. Meat Tamales					d			S			
TAMALES DE ELOTE. Green Corn Tamales					d			S			
QUESADILLAS DE HARINA O DE MAIZ. Flour or Corn Quesadillas					d			S			
CHIMICHANGAS					d			S			
TACOS SUAVES. Soft Tacos					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
TOSTADAS					d			S			
BURRITOS					d			S			
ENCHILADAS, CHILAQUILES, PASTEL AZTECA					d			S			
FLAUTAS / TACOS DORADOS. Crispy Tacos					d			S			
SALSA MEXICANA, SALSA PARA TACOS, OTRAS SALSAS. Mexican Sauce, Taco Sauce, Other					d			S			
POZOLE, MENUDO, GALLINITA PINTA					d			S			
CAZUELA, SOPA DE ALBONDIGAS. Cazuela Soup, Meatball Soup					d			S			
CALDO DE QUESO. Cheese Soup					d			S			
SOPA DE VERDURAS, SOPA DE VERDURAS CON CARNE, COCIDO,					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
MINESTRONE, SOPA DE TOMATE, CALDO DE ZANAHORIAS, Y SOPA DE TORTILLA. Vegetable Soup, Vegetable Beef, Cocido, Minestrone, Tomato Soup, Soups with Carrots, and Soups with Tortillas											
OTRAS SOPAS. Other Soups					d			S			
ESPAGUETI, LASAGNA, OTRAS PASTAS CON PURE O SALSA DE TOMATE. Spaghetti, Lasagna, Other Pasta with Tomato Sauce					d			S			
PIZZA					d			S			
PLATILLOS QUE CONTENGAN QUESO COMO MACARRONES CON QUESO. Mixed Dishes with Cheese, like Macaroni and Cheese					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
CARNES Y HUEVOS Meats and Eggs											
HUEVOS. Eggs					d			S			
TOCINO. Bacon					d			S			
CHORIZO Y SALCHICHON. Mexican Sausage and Sausage					d			S			
HAMBURGUESAS, HAMBURGUESAS CON QUESO, PASTEL DE CARNE, MILANESA DE TERNERA, PICADILLO. Hamburgers, Cheeseburgers, Meat Loaf, Veal Dishes					d			S			
JAMON, MORTADELA, BOLOGNA, SPAM, Y SALCHICHAS. Ham, Lunch Meats, Spam, and Hot Dogs					d			S			
CARNES DE RES, ROJAS: BISTEC DE RES, ASADO AL HORNO, CARNE					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
ASADA, MACHACA. Red Meats: Beef-Steaks, Roasts, Carne Asada, Machaca											
GUISADOS DE CARNE CON ZANAHORIA Y OTRAS VERDURAS, CARNE CON CHILE (ESTILO SONORA), CHILE CON CARNE DE RES, DE PUERCO, O DE TERNERA, BIRRIA. Beef with Chile ("Sonoran-style"), Pork or Veal with Chile, Birria. Beef Stew or Pot Pie with Carrots and Other Vegetables					d			S			
HIGADO DE RES, POLLO, TERNERA. Liver: Beef, Chicken, Veal					d			S			
PUERCO: INCLUYENDO CARNITAS CHULETAS, AL HORNO, MILANESAS. Pork, including Carnitas Chops, Roasts, Fried					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
AVES, PESCADOS, Y MARISCOS **Poultry and Fish**											
POLLO EMPANIZADO O FRITO. Fried Chicken					d			S			
POLLO O PAVO AL HORNO, COCIDO O A LA PARRILLA. Chicken or Turkey: Baked, Stewed, or Broiled					d			S			
PESCADO FRITO, EMPANIZADO O SANDWICH DE FILETE DE PESCADO. Fried Fish or Fish Sandwich					d			S			
ATUN, ENSALADA DE ATUN, ATUN AL HORNO O GUISADO. Tuna Fish, Tuna Salad, Tuna Casserole					d			S			
MARISCOS: CAMARONES, LANGOSTA, JAIBA, OSTIONES, ETC. Shell Fish: Shrimp, Lobster, Crab, Oysters, etc.					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
CEVICHE, ESCABECHE DE PESCADO. Ceviche, Pickled Herring					d			S			
OTRO TIPO DE PESCADOS: ASADOS, A LAS BRASAS, ETC. Other Fish: Broiled, Baked, etc.					d			S			
DERIVADOS DE LA LECHE Dairy Products											
QUESO FRESCO, PANELA, QUESOS DE UNTAR / JACK, CHEDDAR, ASADERO, Y OTROS. Fresh Cheese, Other Cheeses, and Cheese Spreads					d			S			
YOGURT					d			S			
QUESO COTTAGE O REQUESON. Cottage Cheese					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
CREMAS. Creams (Sour, Semi-Sweet, Sweet, etc.)					d			S			
CEREALS **Cereals**											
AVENA U OTROS CEREALES COCIDOS TALES COMO ATOLE, CHAMPURRADO. Oatmeal or Other Cooked Cereals					d			S			
¿CON QUE FRECUENCIA COME CEREALES INSTANTANEOS? How often do you eat cold cereals?					d			S			
¿CUALES SON LOS CEREALES QUE COME CON MAS FRECUENCIA? Which cereals do you usually eat?					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l								
1. 2. 3. 4.											
¿LE AÑADE AZUCAR A LOS CEREALES QUE COME? Do you add sugar to cereal?					d			S			
VERDURAS **Vegetables**											
CALABACITAS. Zucchini					d			S			
CALABAZA COCIDA, AL HORNO. Winter Squash, Baked Squash					d			S			
ELOTES. Corn					d			S			
ZANAHORIAS. Carrots					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
CAMOTES. Sweet Potatos, Yams					d			S			
EJOTES. String Beans					d			S			
CHICHAROS. Peas					d			S			
COLIFLOR O COLES DE BRUSELAS. Cauliflower or Brussels Sprouts					d			S			
ESPINACAS COCIDAS, ACELGAS, VERDOLAGAS, QUELITES. Cooked Spinach, Mustard Greens, Turnip Greens, Collards					d			S			
CHILES VERDES, JALAPEÑOS, POBLANOS, SERRANOS, EN RAJAS, CHILE PIMIENTO / MORRON. Chiles: Jalapeño, Serrano, etc., including Bell Peppers					d			S			
AGUACATE, GUACAMOLE. Avocado, Guacamole					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l								
NOPALES. Cactus Leaves					d			S			
ENSALADA DE COL. Cole Slaw					d			S			
REPOLLO O COL, COL AGRIA. Cabbage, Sauerkraut					d			S			
BROCOLI. Broccoli					d			S			
ESPINACAS CRUDAS, BERROS. Raw Spinach, Watercress					d			S			
LECHUGA. Lettuce					d			S			
TOMATE CRUDO. Raw Tomato					d			S			
JICAMA. Hicama					d			S			
PEPINO. Cucumber					d			S			
CEBOLLA. Onion					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l								
FRUTAS Fruits											
NARANJAS, MANDARINAS, TORONJAS. Oranges, Tangerines, Grapefruit					d			S			
LIMONES Y JUGO DE LIMON. Limes and Lime Juice					d			S			
MANZANAS, PERAS, GUAYABAS. Apples, Pears, Guavas					d			S			
MANGOS Y PAPAYAS EN TEMPORADA. Mangoes and Papayas in Season					d			S			
DURAZNOS, CHABACANOS, ALBARICOQUES, Y NECTARINAS FRESCOS EN TEMPORADA, CONGELADOS, O ENLATADOS. Fresh, Canned, or Frozen Peaches,					d			S			

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			3 O MAS VECES AL DIA (3 or more times a day)	1 O 2 VECES AL DIA (1 or 2 times a day)	4 A 6 VECES POR SEMANA (4 to 6 times a week)	2 A 3 VECES POR SEMANA (2 to 3 times a week)	UNA VEZ POR SEMANA (1 time a week)	2 A 3 VECES AL MES (2 or 3 times a month)	MENOS DE UNA VEZ AL MES (Less than 1 time a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l								
Apricots, and Nectarines											
SANDIA EN TEMPORADA. Watermelon in Season					d			S			
MELON EN TEMPORADA. Cantaloupe in Season					d			S			
FRESAS FRESCAS O CONGELADAS. Fresh or Frozen Strawberries					d			S			
UVAS. Grapes					d			S			
PASAS, CIRUELAS PASAS, HIGOS. Raisins, Prunes, Figs					d			S			
CIRUELAS FRESCAS. Fresh Plums					d			S			

EN LAS SIGUIENTES SECCIONES AGRUPAMOS ALIMENTOS QUE PUEDEN CONSUMIRSE EN GRANDES CANTIDADES. POR ESA RAZON LA FRECUENCIA DE CONSUMO VA AHORA DESDE 6 O MAS VECES AL DIA HASTA RARA VEZ O NUNCA. EN EL CASO DE LAS TORTILLAS QUEREMOS QUE NOS DIGA

APROXIMADAMENTE CUANTAS COME REGULARMENTE Y DE QUE TAMAÑO EN EL CASO DE LAS TORTILLAS DE HARINA. POR EJEMPLO, 2 TORTILLAS DE HARINA MEDIANITAS (APROXIMADAMENTE 10 PULGADAS DE DIAMETRO).

In the following sections, we have grouped food items that can be eaten in large quantities. For that reason, the frequency of consumption now goes from 6 or more times a day to rarely or never. In regards to tortillas, we want you to specify approximately how many you usually eat and the size in the case of flour tortillas. For example, 2 medium size flour tortillas (about 10 inches in diameter).

VERDURAS **Vegetables** ¿EN PROMEDIO, QUE TAN SEGUIDO COME VEGETALES SIN INCLUIR ENSALADAS O PAPAS? On the average, how often do you eat vegetables, not including salads or potatoes?	**6 O MAS VECES AL DIA (6 or more times a day)**	**4 O 5 VECES AL DIA (4 or 5 times a day)**	**2 O 3 VECES AL DIA (2 or 3 times a day)**	**UNA VEZ AL DIA (1 time a day)**	**5 O 6 VECES POR SEMANA (5 or 6 times a week)**	**2 A 4 VECES POR SEMANA (2 to 4 times a week)**	**UNA VEZ POR SEMANA (1 time a week)**	**MENOS DE 4 VECES AL MES (Less than 4 times a month)**	**RARA VEZ O NUNCA (Rarely or never)**
				d			S		

FRUTAS **Fruits** ¿EN PROMEDIO, QUE TAN SEGUIDO COME FRUTAS SIN INCLUIR JUGOS DE FRUTAS? On the average, how often do you eat fruits, not including fruit juices?	**6 O MAS VECES AL DIA (6 or more times a day)**	**4 O 5 VECES AL DIA (4 or 5 times a day)**	**2 O 3 VECES AL DIA (2 or 3 times a day)**	**UNA VEZ AL DIA (1 time a day)**	**5 O 6 VECES POR SEMANA (5 or 6 times a week)**	**2 A 4 VECES POR SEMANA (2 to 4 times a week)**	**UNA VEZ POR SEMANA (1 time a week)**	**MENOS DE 4 VECES AL MES (Less than 4 times a month)**	**RARA VEZ O NUNCA (Rarely or never)**
				d			S		

TORTILLAS **Tortillas** ¿EN PROMEDIO, QUE TAN SEGUIDO Y CUANTAS TORTILLAS COME? On the average, how often and how many tortillas do you eat?	**PORCION** Portion Size **7"** **10"** **12"**	**6 O MAS VECES AL DIA (6 or more times a day)**	**4 O 5 VECES AL DIA (4 or 5 times a day)**	**2 O 3 VECES AL DIA (2 or 3 times a day)**	**UNA VEZ AL DIA (1 time a day)**	**5 O 6 VECES POR SEMANA (5 or 6 times a week)**	**2 A 4 VECES POR SEMANA (2 to 4 times a week)**	**UNA VEZ POR SEMANA (1 time a week)**	**MENOS DE 4 VECES AL MES (Less than 4 times a month)**	**RARA VEZ O NUNCA (Rarely or never)**
TORTILLAS DE HARINA (EXCLUYENDO LAS QUE USA EN GUISADOS). Flour Tortillas (excluding use in mixed and side dishes). Record number eaten each time.					d			S		
TORTILLAS DE MAIZ (EXCLUYENDO LAS QUE USA EN GUISADOS). Corn Tortillas (excluding use in mixed and side dishes)					d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			6 O MAS VECES AL DIA (6 or more times a day)	4 O 5 VECES AL DIA (4 or 5 times a day)	2 O 3 VECES AL DIA (2 or 3 times a day)	UNA VEZ AL DIA (1 time a day)	5 O 6 VECES POR SEMANA (5 or 6 times a week)	2 A 4 VECES POR SEMANA (2 to 4 times a week)	UNA VEZ POR SEMANA (1 time a week)	MENOS DE 4 VECES AL MES (Less than 4 times a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l									
PANES Breads												
PAN BLANCO, BIROTE / BOLILLO, GALLETAS SALADAS, ETC., INCLUYENDO EN SANDWICHES. White Bread, Rolls, Crackers, Mexican Bread							d			S		
PAN O PANECILLOS DE TRIGO ENTERO INTEGRAL. Whole Wheat Bread / Rolls							d			S		
PAN DE MAIZ / ELOTE. Corn Bread							d			S		
PANECITOS / BIZCOCHOS DE SALVADO. Bran Muffin							d			S		
PANCAKES Y WAFFLES.							d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			6 O MAS VECES AL DIA (6 or more times a day)	4 O 5 VECES AL DIA (4 or 5 times a day)	2 O 3 VECES AL DIA (2 or 3 times a day)	UNA VEZ AL DIA (1 time a day)	5 O 6 VECES POR SEMANA (5 or 6 times a week)	2 A 4 VECES POR SEMANA (2 to 4 times a week)	UNA VEZ POR SEMANA (1 time a week)	MENOS DE 4 VECES AL MES (Less than 4 times a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l									
Pancakes and Waffles												
MANTEQUILLA, MARGARINA, O CREMA UNTADA EN PANES, PANCAKES, O TORTILLAS. Butter, Margarine, or Sour Cream on Breads, Pancakes, or Tortillas							d			S		
PAN DULCE. Sweet Bread							d			S		
POSTRES Sweets												
NIEVE DE LECHE O HELADO. Ice Cream							d			S		
NIEVE DE AGUA, PALETAS. Sherbert							d			S		
NATILLA O FLAN, BUDIN.							d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			6 O MAS VECES AL DIA (6 or more times a day)	4 O 5 VECES AL DIA (4 or 5 times a day)	2 O 3 VECES AL DIA (2 or 3 times a day)	UNA VEZ AL DIA (1 time a day)	5 O 6 VECES POR SEMANA (5 or 6 times a week)	2 A 4 VECES POR SEMANA (2 to 4 times a week)	UNA VEZ POR SEMANA (1 time a week)	MENOS DE 4 VECES AL MES (Less than 4 times a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l									
Custard or Pudding												
ARROZ CON LECHE Y PASAS. Rice Pudding with Raisins							d			S		
DONAS. Doughnuts							d			S		
GALLETAS. Cookies							d			S		
PASTEL. Cake							d			S		
PASTEL, O DULCE DE CALABAZA, CAMOTE DE DULCE. Pumpkin Pie, Sweet Potato Pie							d			S		
BUÑUELOS, SOPAPILLAS, PASTELILLOS, EMPANADAS, COYOTAS. Pastries, Turnovers, Coyotas							d			S		
CHOCOLATES. Chocolate							d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			6 O MAS VECES AL DIA (6 or more times a day)	4 O 5 VECES AL DIA (4 or 5 times a day)	2 O 3 VECES AL DIA (2 or 3 times a day)	UNA VEZ AL DIA (1 time a day)	5 O 6 VECES POR SEMANA (5 or 6 times a week)	2 A 4 VECES POR SEMANA (2 to 4 times a week)	UNA VEZ POR SEMANA (1 time a week)	MENOS DE 4 VECES AL MES (Less than 4 times a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l									
Candy												
OTROS DULCES, JALEA, MERMELADA, MIEL, PANOCHA. Other Candy, Jelly, Honey, Molasses							d			S		
BOTANAS **Salty Snacks and Spreads**												
PALOMITAS DE MAIZ O ESQUITE. Popcorn							d			S		
MANTEQUILLA O MARGARINA EN LAS PALOMITAS. Butter or Margarine on Popcorn							d			S		
PAPITAS FRITAS DE BOLSA, CUALQUIER TIPO DE "CHIPS". Chips, all types							d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	PORCION Portion Size			6 O MAS VECES AL DIA (6 or more times a day)	4 O 5 VECES AL DIA (4 or 5 times a day)	2 O 3 VECES AL DIA (2 or 3 times a day)	UNA VEZ AL DIA (1 time a day)	5 O 6 VECES POR SEMANA (5 or 6 times a week)	2 A 4 VECES POR SEMANA (2 to 4 times a week)	UNA VEZ POR SEMANA (1 time a week)	MENOS DE 4 VECES AL MES (Less than 4 times a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	M m	G l									
CHICHARRONES DE PUERCO. Pork Rinds							d			S		
NUECES, INCLUYENDO CACAHUATES. Shelled Nuts, including Peanuts							d			S		
MANTEQUILLA DE CACAHUATE. Peanut Butter							d			S		
ADEREZOS PARA ENSALADA, MAYONESA EN ENSALADAS O SANDWICHES. Salad Dressing, Mayonnaise on Salads or Sandwiches							d			S		
JUGO Y/O GRASA DE CARNE CON HARINA. Gravies made with Meat Drippings or White Sauce							d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO TOMA LAS SIGUIENTES BEBIDAS? On the average, how often do you drink the following?	**PORCION** Portion Size			6 O MAS VECES AL DIA (6 or more times a day)	4 O 5 VECES AL DIA (4 or 5 times a day)	2 O 3VECES AL DIA (2 or 3 times a day)	UNAVEZ AL DIA (1 time a day)	5 O 6VECES POR SEMANA (5 or 6 times a week)	2 A 4VECES POR SEMANA (2 to 4 times a week)	UNAVEZ POR SEMANA (1 time a week)	MENOS DE 4 VECES AL MES (Less than 4 times a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l									
BEBIDAS Beverages												
AGUA. Water							d			S		
JUGO DE NARANJA O TORONJA. Orange or Grapefruit Juice							d			S		
LIMONADA. Lemonade							d			S		
HORCHATA. Rice-Based							d			S		
JUGO DE UVA. Grape Juice							d			S		
JUGO DE TOMATE. Tomato Juice							d			S		
TANG, JUGOS EN POLVO INSTANTANEOS. Tang, Start							d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO TOMA LAS SIGUIENTES BEBIDAS? On the average, how often do you drink the following?	**PORCION** Portion Size			6 O MAS VECES AL DIA (6 or more times a day)	4 O 5 VECES AL DIA (4 or 5 times a day)	2 O 3VECES AL DIA (2 or 3 times a day)	UNAVEZ AL DIA (1 time a day)	5 O 6VECES POR SEMANA (5 or 6 times a week)	2 A 4VECES POR SEMANA (2 to 4 times a week)	UNAVEZ POR SEMANA (1 time a week)	MENOS DE 4 VECES AL MES (Less than 4 times a month)	RARA VEZ O NUNCA (Rarely or never)
	P s	**M** m	**G** l									
Breakfast Drinks, Juice Drinks												
REFRESCOS / SODAS NO DIETETICAS. Regular Soft Drinks							d			S		
REFRESCOS / SODAS DE DIETA. Diet Soft Drinks							d			S		
CERVEZA. Beer							d			S		
LICOR. Liquor / Alcohol							d			S		
VINO. Wine							d			S		
CAFE REGULAR. Regular Coffee							d			S		
CAFE DESCAFEINADO. Decaffeinated Coffee							d			S		
TE DE HIERBAS. Herbal Tea							d			S		
TE, HELADO O CALIENTE.							d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO TOMA LAS SIGUIENTES BEBIDAS? On the average, how often do you drink the following?	**PORCION** Portion Size			6 O MAS VECES AL DIA (6 or more times a day)	4 O 5 VECES AL DIA (4 or 5 times a day)	2 O 3VECES AL DIA (2 or 3 times a day)	UNAVEZ AL DIA (1 time a day)	5 O 6VECES POR SEMANA (5 or 6 times a week)	2 A 4VECES POR SEMANA (2 to 4 times a week)	UNAVEZ POR SEMANA (1 time a week)	MENOS DE 4 VECES AL MES (Less than 4 times a month)	RARA VEZ O NUNCA (Rarely or never)
	P S	**M** m	**G** l									
Tea, Hot or Iced												

¿A SU CAFE O TE, LE AÑADE: To your coffee or tea, do you add:												
LECHE EN POLVO? Non-Dairy Creamer?						d			S			
LECHE? Milk?						d			S			
O CREMA? or Real Cream?						d			S			
¿A SU CAFE O TE, LE AÑADE: To your coffee or tea, do you add:												
AZUCAR? Sugar						d			S			
O ENDULZANTE ARTIFICIAL (AZUCAR DE DIETA, AZUCAR ARTIFICIAL)? Diet Sugar or Artificial Sweetener?						d			S			
LECHE ENTERA Y BEBIDAS CON LECHE ENTERA (SIN INCLUIR EN CEREALES). Whole Milk and Beverages with Whole Milk (excluding milk in cereals)						d			S			
LECHE DESCREMADA, LECHE AL 1% O LECHE EN POLVO RECONSTITUIDA. Skim Milk, 1% Milk or Buttermilk, Reconstituted Milk						d			S			

(excluding milk in cereals)										
LECHE AL 2% Y BEBIDAS CON LECHE AL 2%. 2% Milk and Beverages with 2% Milk (excluding milk in cereals)					d			S		
LECHE CONDENSADA. Condensed Milk					d			S		
LECHE EVAPORADA. Evaporated Milk					d			S		

¿EN PROMEDIO, QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS? On the average, how often do you eat the following foods?	**PORCION** Portion Size			**3 O MAS VECES AL DIA (3 or more times a day)**	**1 O 2 VECES AL DIA (1 or 2 times a day)**	**4 A 6 VECES POR SEMANA (4 to 6 times a week)**	**2 A 3 VECES POR SEMANA (2 to 3 times a week)**	**UNA VEZ POR SEMANA (1 time a week)**	**2 A 3 VECES AL MES (2 or 3 times a month)**	**MENOS DE UNA VEZ AL MES (Less than 1 time a month)**	**RARA VEZ O NUNCA (Rarely or never)**
	P s	**M** m	**G** l								
1. ¿HAY ALGUN OTRO ALIMENTO QUE COMA UD. AL MENOS UNA VEZ AL MES Y QUE NO ESTE EN EL CUESTIONARIO? Are there any foods not listed on the questionnaire that you eat at least once a month?											
A.					d			S			
B.					d			S			
C.					d			S			
D.					d			S			
E.					d			S			
F.					d			S			

2. LA SIGUIENTE SECCION, SE REFIERE A LA MANERA DE PREPARAR LA COMIDA. LAS PRIMERAS PREGUNTAS SON SOBRE CONDIMENTOS QUE PODEMOS AÑADIR EN LA MESA. The following section includes questions regarding food preparation. The first questions are about condiments we may add at the table.	SEGUIDO O SIEMPRE. Frequently or Always	ALGUNAS VECES. Sometimes	RARA VEZ O NUNCA. Rarely or Never
A. ¿QUE TAN SEGUIDO AÑADE SAL A SU COMIDA, INCLUYENDO FRUTAS? How often do you add salt to your food, including fruit?			
B. ¿QUE TAN SEGUIDO AÑADE PIMIENTA A SU COMIDA? How often do you add pepper to your food?			
C. ¿QUE TAN SEGUIDO AÑADE CHILES (JALAPEÑOS U OTROS) O SALSA TABASCO A SU COMIDA? How often do you add chiles (jalapeños or others) or Tabasco to your food?			
D. ¿QUE TAN SEGUIDO SE COME EL PELLEJO DEL POLLO? How often do you eat the skin on chicken?			
E. ¿QUE TAN SEGUIDO SE COME LA GRASA DE LA CARNE? How often do you eat the fat on meat?			
F. ¿QUE TAN SEGUIDO PREPARA PLATILLOS ESTILO "RANCHERO" (CON TOMATE, CEBOLLA, AJO, Y/O CHILE)? How often do you prepare dishes "Ranchero" style (with tomato, onion, garlic, or chile pepper)?			

3. ¿POR LO GENERAL, QUE TIPO DE GRASA LE PONE A LAS VERDURAS, ETC.? What kind of fat do you usually add to vegetables, etc.?	
NINGUNA. Don't add Fat	
MARGARINA PARA UNTAR. Soft Margarine	
MARGARINA DE BARRA. Stick Margarine	
MARGARINA BAJA EN GRASA. Low Fat Margarine	
MANTEQUILLA. Butter	
MITAD MANTEQUILLA, MITAD MARGARINA. Half Butter, Half Margarine	
MANTECA O GRASA DE TOCINO. Lard, Fatback, Bacon Fat	
ACEITE VEGETAL. Vegetable Oil	
ACEITE DE ACEITUNA O CANOLA. Olive or Canola Oil	

4. ¿POR LO GENERAL, QUE TIPO DE GRASA LE PONE A LOS PANES? What kind of fat do you usually add to breads and rolls?	
NINGUNA. Don't add Fat	
MARGARINA PARA UNTAR. Soft Margarine	
MARGARINA DE BARRA. Stick Margarine	
MARGARINA BAJA EN GRASA. Low Fat Margarine	
MANTEQUILLA. Butter	
MITAD MANTEQUILLA, MITAD MARGARINA. Half Butter, Half Margarine	

MANTECA O GRASA DE TOCINO. Lard, Fatback, Bacon Fat	
ACEITE VEGETAL. Vegetable Oil	
ACEITE DE ACEITUNA O CANOLA. Olive or Canola Oil	

5. ¿QUE TAN SEGUIDO USA UD. GRASA O ACEITE PARA COCINAR, O COME ALIMENTOS QUE FUERON PREPARADOS CON GRASA O ACEITE? How often do you use fat or oil in cooking, or eat foods that were prepared with fat or oil?	
NO SE O "YO NO COCINO". Don't know or don't cook	
MAS DE UNA VEZ AL DIA. More than once a day	
UNA VEZ AL DIA. Once a day	
4 A 6 VECES POR SEMANA. 4 to 6 times a week	
2 A 3 VECES POR SEMANA. 2 to 3 times a week	
UNA VEZ POR SEMANA. Once a week	
1 A 3 VECES AL MES. 1 to 3 times a month	
MENOS DE UNA VEZ AL MES. Less than once a month	
RARA VEZ O NUNCA. Rarely or Never	

6. ¿POR LO GENERAL, CON QUE TIPO DE GRASA O ACEITE COCINA, O CUAL ES EL TIPO DE GRASA O ACEITE QUE ACOSTUMBRAN USAR EN SU CASA? What kind of fat or oil do you usually cook with, or what kind of fat or oil is used in your home to prepare foods?	
NO SE O "YO NO COCINO". Don't know or don't cook	
MARGARINA PARA UNTAR. Soft Margarine	
MARGARINA EN BARRA. Stick Margarine	
MARGARINA BAJA EN GRASA. Low Fat Margarine	
MANTEQUILLA. Butter	
ACEITE VEGETAL. Vegetable Oil	
ACEITE DE ACEITUNA O CANOLA. Olive or Canola Oil	
MANTECA, MANTECA DE GRASA O TOCINO. Lard, Fatback, Bacon Fat	
PAM O "NO USO ACEITE". Pam or "no oil"	

7. ¿POR LO GENERAL, CON QUE TIPO DE GRASA O ACEITE GUISA LOS FRIJOLES REFRITOS, O CUAL ES EL TIPO DE GRASA O ACEITE QUE ACOSTUMBRAN USAR EN SU CASA? (PUEDE MARCAR 2 OPCIONES) What kind of fat or oil do you usually prepare refried beans with, or what kind of fat or oil is used in your home to prepare refried beans? (May have 2 answers)	
NO COMO FRIJOLES REFRITOS. Don't eat refried beans	
NO SE O YO NO COCINO. Don't know or don't cook	
MARGARINA. Margarine	
MARGARINA BAJA EN GRASA. Low Fat Margarine	
MANTEQUILLA. Butter	
ACEITE VEGETAL. Vegetable Oil	
MANTECA DE PUERCO, RES O GRASA DE TOCINO. Beef or Pork Lard, Fatback, or Bacon Fat	
MITAD MANTECA, MITAD ACEITE. Half Lard, Half Oil	

8. ¿LE PONE QUESO A LOS FRIJOLES REFRITOS? Do you add cheese to refried beans?	
NO SE O "YO NO COCINO". Don't know or don't cook	
SEGUIDO O SIEMPRE. Always	
ALGUNAS VECES. Sometimes	
RARA VEZ O NUNCA. Rarely or Never	

9. ¿QUE CLASE DE ADEREZO ACOSTUMBRA USAR? What kind of salad dressing do you usually use?	
NORMAL, COMO FRANCES O ACEITE Y VINAGRE. Regular, French or Vinegar and Oil	
BAJO EN GRASA. Low Fat	
SIN GRASA (SIN ACEITE). No Fat (No Oil)	
NO ACOSTUMBRA USAR ADEREZO. Don't usually use salad dressing	
NO SE. Don't know	

10. ¿QUE CLASE DE MAYONESA ACOSTUMBRA USAR? What kind of mayonnaise do you usually use?	
NORMAL. Regular	
BAJO EN GRASA. Low Fat	
SIN GRASA. No Fat	
NO ACOSTUMBRA USAR MAYONESA. Don't usually use mayonnaise	
NO SE. Don't know	

11. ¿CUANDO USA LECHE, NATA O CREMA EN EL CAFE O TE, QUE CLASE DE CREMA SOLIA USAR? (MARQUE UNO O DOS) What kind of milk product do you usually use with coffee or tea?	
CREMA O MITAD Y MITAD. Half and Half	
LECHE ENTERA. Whole Milk	
LECHE DE 2%. 2% Milk	
LECHE DE 1%. 1% Milk	
LECHE DESNATADA O DESCREMADA. Skim or No Fat Milk	
LECHE EVAPORADA O LECHE CONDENSADA. Evaporated Milk or Condensed Milk	
LECHE DE SOYA. Soy Milk	
CREMA SIN PRODUCTOS LACTEOS. Non-Dairy Creamers	
NO SE. Don't know	
NO UOS. Don't use	

12. ¿COMO ACOSTUMBRA PREPARAR LAS PALOMITAS DE MAIZ? How do you usually prepare popcorn?	
PREPARADAS CON ACEITE. Prepared with oil	
NORMAL EN MICROONDAS. Regular microwave	
PREPARADOS AL AIRE O DE "DIETA" EN MICROONDAS. Air popped or diet microwave	

13. ¿LLEVA UD. ALGUNA DIETA EN ESPECIAL? Are you currently on a special diet?	
NO. No	
SI, DIETA PARA BAJAR PESO. Yes, Weight Loss	
SI, DIETA POR PROBLEMA DE SALUD. Yes, for Medical Condition	
SI, DIETA VEGETARIANA. Yes, Vegetarian	
SI, DIETA BAJA EN SAL. Yes, Low Salt	
SI, DIETA BAJA EN COLESTEROL. Yes, Low Cholesterol	
SI, DIETA PARA SUBIR DE PESO. Yes, Weight Gain	

14. ¿TOMA VITAMINAS Y/O MINERALES CON REGULARIDAD? Are you currently taking any vitamin and/or mineral supplements regularly?

( ) NO

( ) SI, CONTINUE. Yes, Continue.

¿QUE VITAMINAS / MINERALES ESTA TOMANDO AHORITA? Which supplements are you currently taking?		
MULTI-VITAMINAS Multiple Vitamins	**QUE MARCA Brand Name**	**# PASTILLAS POR SEMANA # of Pills Per Week**
( ) MULTI-VITAMINAS CON MINERALES. Multi-Vitamins with Minerals		
( ) MULTI-VITAMINAS. Multi-Vitamins		
( ) FORMULA TERAPEUTICA O STRESS. Therapeutic or Stress Formula		
( ) COMPLEJO B. B-Complex		
COMPLEMENTOS INDIVIDUALES Individual Supplements	**CANTIDAD Amount**	**VECES POR SEMANA Times Per Week**
( ) BETA-CAROTINA. Beta-Carotene		
( ) VITAMINA A. Vitamin A		
( ) VITAMINA C. Vitamin C		
( ) VITAMINA E. Vitamin E		
( ) VITAMINA B_6. Vitamin B_6		

( ) CALCIO (INCLUYENDO ANTI-ACIDOS CON CALCIO). Calcium (including antacids with calcium) TIPO (Type):		
( ) ZINC		
( ) SELENIO. Selenium		
( ) HIERRO. Iron		
( ) OTRO: EJ. ACEITE DE PESCADO . Other: e.g., Fish Oil		
( ) OTRO. Other:		
( ) OTRO. Other:		

APPENDIX E

HIERARCHICAL CLUSTER ANALYSES DENDROGRAMS

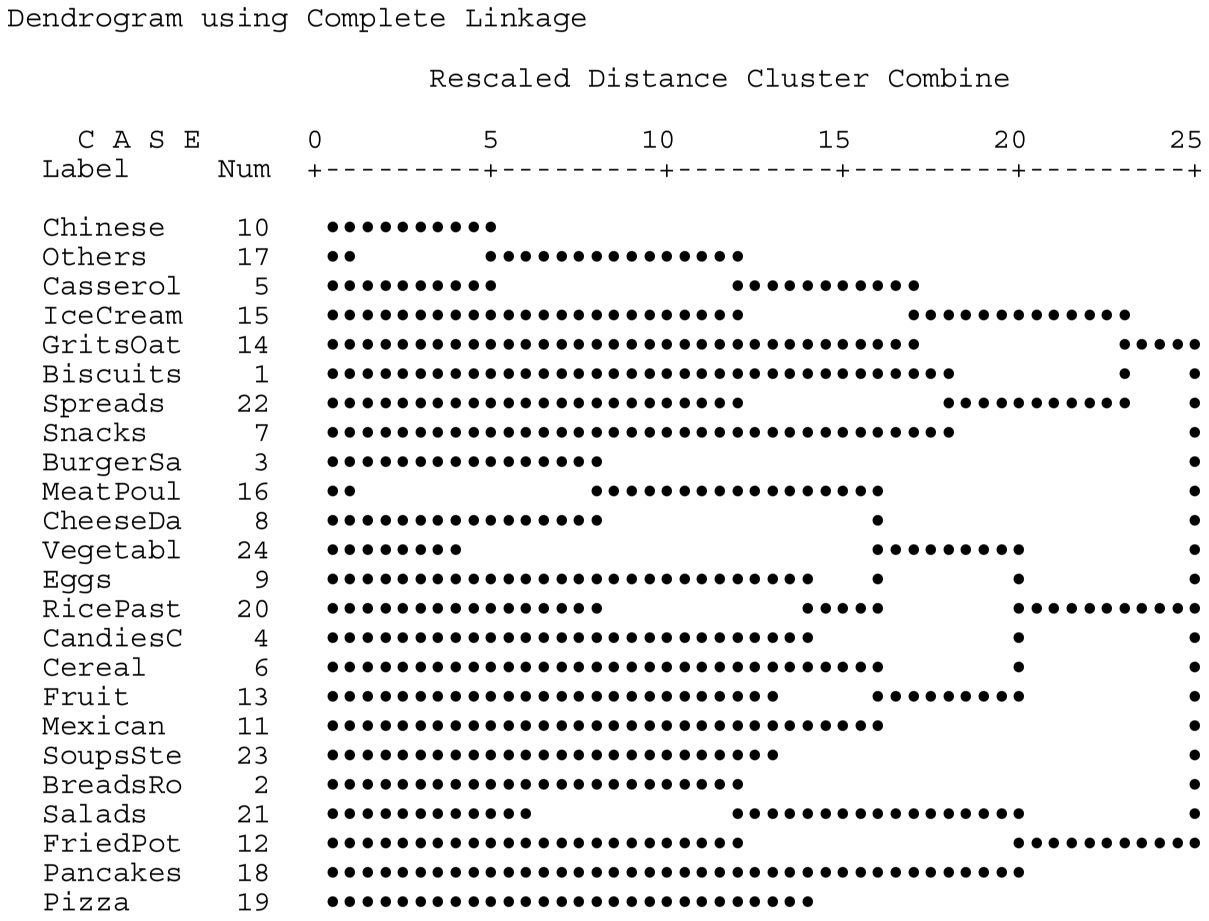

Figure E.1 Hierarchical Cluster Analysis Dendrogram for Free Listing-Generated Food Categories

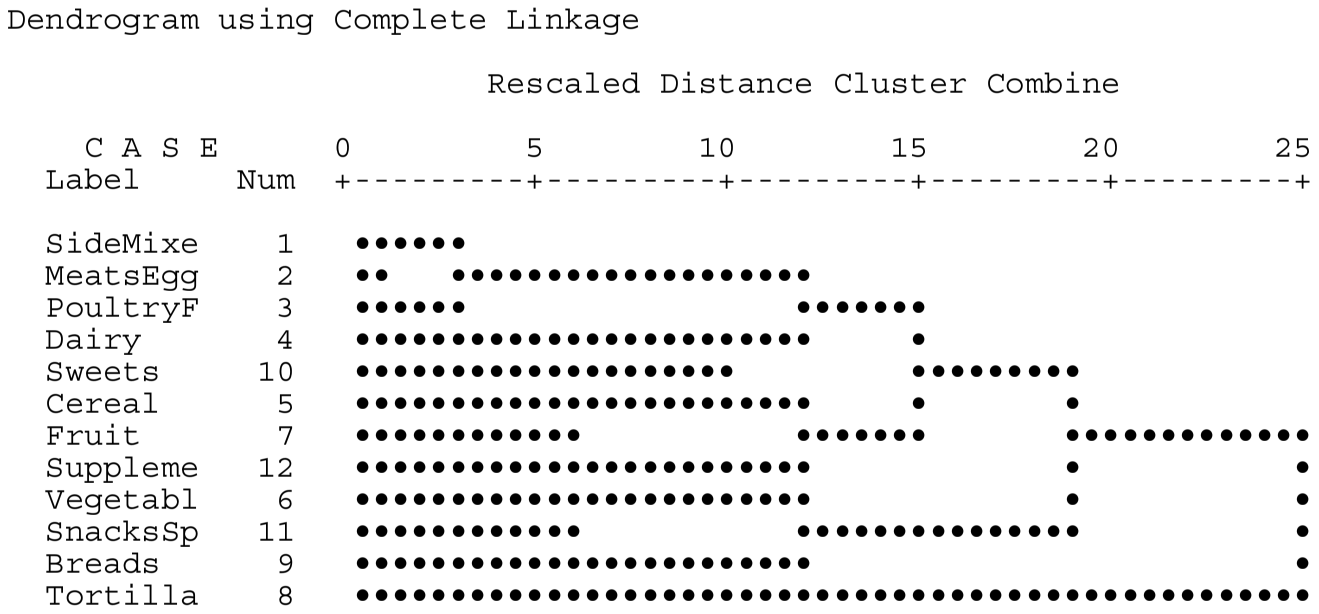

Figure E.2 Hierarchical Cluster Analysis Dendrogram for SWFFQ Food Categories

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