

2006

The ability of food stamp households in Southeast Louisiana to meet the 2005 Dietary Guidelines for Americans

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THE ABILITY OF FOOD STAMP HOUSEHOLDS IN SOUTHEAST LOUISIANA TO MEET
THE 2005 DIETARY GUIDELINES FOR AMERICANS

A Thesis
Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
requirements for the degree of
Master of Science

In
The School of Human Ecology

by
Laura Stewart
B.S., Louisiana State University, 2005
December 2006

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my major professor, Dr. Carol E. O'Neil who has helped me in all areas of my academic work. She has been a wonderful professor, and I am lucky to have been under her supervision during my graduate work. I could not have accomplished this project without her leadership and encouragement.

I would also like to thank my committee members, Dr. Pamela A. Monroe and Dr. Kevin McCarter for their enthusiasm and encouragement. I am extremely appreciative of the knowledge and expertise of Dr. Kevin McCarter who explained linear programming and helped with the data analysis. I would also like to thank Dr. Jeffery Gillespie for his help on the project before leaving for Washington DC.

I am appreciative of all who took part in data collection, especially my brother, Evan Stewart, for taking the time to help me. I would like to thank Vicky Tiller for the hard work and support she provided throughout the project. I am very grateful for the help and encouragement of Blair Buras who made the entire process more enjoyable.

Very special thanks is also extended to the author's parents and brother for their patience, understanding, and support in all aspects of my life. Finally, the author would like to thank all her friends and classmates who offered encouragement and support.

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ABSTRACT

Prices of a market basket of 149 foods that could be combined to meet the 2005 Dietary Guidelines for Americans (DGA) were surveyed in 29 stores in an eight parish area of Southeast (SE) Louisiana. Two-week cycle menus and recipes were planned to meet the 2005 DGA in a culturally acceptable way. Linear Programming (LP) analysis was also performed on the market basket to determine the cost-minimizing combination of foods that will sufficiently meet the 2005 DGA. The study used dietary recommendations for a reference family of four: a 40 year old male, 40 year old female, 9 year old female and 7 year old male.

The maximum Food Stamp (FS) benefit for a family of four is \$471/month, and the average FS benefit for a family of four is \$326/month. The cost of the 2-week menus was \$615.89, \$144.89 higher than the maximum, and \$289.89 higher than the average FS benefit for a family of four. The cost of the LP market basket was \$325.50, \$145.50 lower than the maximum, and \$0.50 lower than the average FS benefit for a family of four. The LP market basket was characterized by a limited variety of foods that will be difficult to organize into menus. The high cost of the two-week menus compared to the cost of the LP Market basket is probably due to their increased amount of dietary variety and consumer acceptability.

FS recipients in SE Louisiana may not be able to afford to follow the 2005 DGA recommendations.

CHAPTER 1

INTRODUCTION

Statement of the Research Problem

The purpose of this study is to determine the ability of Food Stamp (FS) families in Southeast (SE) Louisiana to meet the 2005 Dietary Guidelines for Americans (DGA).

Introduction

The Food Stamp Program (FSP) is the cornerstone of all federal nutrition assistance programs and is designed to help low-income households afford a more nutritious diet in order to alleviate hunger and malnutrition (Food Stamp Act of 1977; PL 106-580) ¹. FS benefits are determined by the cost of the USDA's Thrifty Food Plan (TFP) for the person's family size and are awarded in the form of electronic benefit transfer (EBT) cards ^{1, 2}. In January 2005, 25.5 million people received food stamps ².

"Food insecurity", defined as the limited access to sufficient food or the inability to acquire sufficient foods in socially acceptable ways for all household members due to economic constraints ³, is associated with poor health and nutritional status ^{4, 5}, and in the absence of hunger, overweight and obesity ^{4, 6}. Low-income individuals are more likely than higher-income individuals to experience food insecurity ⁶. Despite receipt of food stamps, the most commonly cited reason for food insecurity is "not enough money to buy food" ^{7, 8}. Approximately 11.9% of, or 38.2 million Americans are food insecure ⁹. Diets of low-income individuals are of considerably lower nutrient quality than those of higher socio-economic status ^{5, 10, 11}. The diets of low-income individuals are lacking many nutrients, including calcium, iron, and vitamins A, C, D, and B vitamins such as folate ^{8, 12, 13}.

The DGA provide science-based recommendations for healthy Americans ages 2 and older to achieve a healthy lifestyle, and are the foundation for all federal nutrition policies and programs ¹⁴. Recommendations of the 2005 DGA may be more difficult for the general public to meet than those of previous editions, as they emphasize fruits, vegetables, and whole grains and low-fat dairy. Recommendations for a 2000 kcal diet include 4-5 servings each of fruits and vegetables, 7-8 servings of grains with at least 3 being whole grain, 3 cups of low-fat or fat-free dairy, and 5.5 ounces of meat ¹⁴. Although the DGA provide the foundation for all federal nutrition programs, increased recommendations may make the DGA unreachable for many groups in the U.S. population ¹⁵. Studies have not yet been conducted that show the ability of low-income, FS participants to meet the 2005 DGA ^{15, 16}.

Objectives

Objectives of this study are the following: 1) create a market basket and plan menus of culturally relevant, low-cost, healthy foods that, collectively, will allow individuals to meet the 2005 DGA; 2) conduct a price survey of all foods in the market basket in a sample of grocery stores to obtain prices that are representative of the prices people in this region actually pay; 3) determine the lowest cost combinations of these foods to meet the 2005 DGA and 4) compare the cost of meeting the 2005 DGA with resources available to low-income families.

Hypothesis

It is hypothesized that low-income families who receive food stamps are unable to meet the 2005 DGA with the FS benefits available to them.

Assumptions

Assumptions that were made in the design and implementation of the study were the following:

1. That people will accept and eat the foods and recipes used in the market basket and data analysis.
2. The sample size of stores and foods surveyed was adequate to examine the ability of low-income families to meet the 2005 DGA.
3. Prices obtained are representative of typical prices.
4. Meeting the 2005 DGA food recommendations will also fulfill nutrient requirements as promulgate in the Dietary Reference Intakes (DRI).

Limitations

Limitations in the study are the following:

1. Results may not be generalized to the entire United States (U.S.) population because prices were studied in SE Louisiana.
2. Foods included were chosen by the researchers, and may not reflect food choices of all consumers.
3. Not all of the stores accepted food stamps.

CHAPTER 2

REVIEW OF THE LITERATURE

Dietary Guidelines

The Dietary Goals for the United States were issued to the American public in 1977; however, there was much debate over how scientific the goals were. Scientists from the U.S. Department of Agriculture (USDA) and the Department of Health, Education, and Welfare, now the U.S. Department of Health and Human Services (HHS), joined to examine the existing scientific evidence, and, in 1980, produced the first edition of the DGA. By law (PL 101-445, Title III, 7 U.S.C. 5301 et seq.), the DGA are issued jointly by the Secretaries of the USDA and the HHS every five years. A Dietary Guidelines Advisory Committee (DGAC) of experts in nutrition and health is appointed to review current scientific and medical knowledge and recommend revisions of the Dietary Guidelines to the Secretaries ^{14, 17}.

The overarching goal of the DGA is to improve the health and wellbeing of healthy Americans aged two years and older ^{14, 17}. The DGA serves to guide policymakers and educate consumers by providing science-based dietary advice to promote health and reduce the risk of chronic disease ^{14, 17, 18}. Federal agencies such as the USDA and HHS are required to promote the DGA in all federal food, nutrition, or health programs (PL 101-445, Title III, 7 U.S.C. 5301 et seq.) to ensure uniformity of nutrition information provided by the government ^{14, 17, 19}.

The 2005 DGAC is the first to use a systematic review of the scientific evidence in formulating recommended revisions to the 2000 DGA, which resulted in ambitious recommendations for food and nutrient intake and physical activity ^{14, 20, 21}. The 2005 DGA emphasize fruits, vegetables, whole grains, and dairy more than previous editions. The new recommendations for a 2000 kcal diet include 4-5 servings each of fruits and vegetables,

including specific subgroups of fruits and vegetables, which are considerably more than the 2 servings of fruits and 3 servings of vegetables recommended in the 2000 DGA ¹⁴. Americans currently consume between 3.1 and 3.7 servings of vegetables daily, which is considerably less than the 2005 DGA recommendations ²². The 2005 DGA are the first to specify 3 servings of whole grains as part of the recommended 7-8 servings of grains. The 2005 DGA increased the number of low-fat or fat-free dairy servings from 2-3 servings daily to 3 cups per day ²³.

The 2005 DGA also includes recommendations about behaviors and practices related to diet and health. Food safety is an important issue in both the 2000 and 2005 DGA, and recommendations for food preparation and handling to prevent food borne illness are given. The 2005 DGA stresses the use of food labels to help individuals make food choices and identify sources of whole grains, fats, added sugar, and sodium. The public needs to understand portion sizes and how they compare to serving sizes in order to follow the DGA. The 2005 DGA recommends 30-90 minutes of physical activity on most days of the week, depending on the individual person. Recommendations in the 2005 DGA are considerably different than previous editions, and although clearly based on scientific evidence, they may not be easy for all of the population to meet ¹⁴.

The DGA should be examined for feasibility, affordability, and factors or barriers that might inhibit self-management of diet and nutrition ^{18, 24}. The DGA are difficult for consumers to follow because they lack practical and usable information, as they are general guidelines that require translation by dietetic professionals ^{25, 26}. In order to be effective, dietary messages, such as the DGA, should be geared toward and easily accessible to individuals and groups that generally have low levels of nutrition knowledge and little motivation for dietary change ²⁷.

Many factors influence food knowledge and choices, including income, demographics, nutrition knowledge, and food prices^{27, 28}. The DGA requires consumers to have adequate knowledge of food label use, measurements, portion sizes, and understanding of difficult concepts, such as discretionary calories²⁶. This knowledge and understanding is uncommon in the general population, and even less common among low-income individuals; therefore, understanding the DGA requires the expertise and teaching skills of dietetics professionals, that not everyone is willing or able to access^{26, 27, 29, 30}. Many Americans claim to be concerned about nutrition and health and are aware of an association between diet and health; however, only about one third of Americans are aware of the DGA¹⁹. Americans could be more aware of the DGA if they were exposed to them in a form they could understand³¹. The 2005 DGA are more stringent than previous editions, creating a “daunting challenge” for Americans, in terms of both understanding and compliance^{20, 32}.

Diet Quality of Low-Income Individuals

The diets of low-income individuals tend to be less nutritious than those of higher-income individuals^{5, 10-13, 33, 34}. One's diet quality is positively correlated with the amount of money spent on food, and low-income individuals spend fewer total dollars on food than do higher income individuals, leaving them with a smaller amount of and less nutritious food³⁵. Low-income individuals are at risk for inadequate dietary and nutrient intake because they generally have a limited food selection^{36, 37}. Low income individuals have been shown to generally have diets conducive to poor health^{8, 38, 39}.

Low-income individuals consume fewer meals than those of higher income. The consumption of fewer meals results in low energy intake and poor nutrient intake^{40, 41}. Low-income women and preschool children are particularly less likely to eat breakfast than those of

higher income ⁴². Breakfast has been recognized as the most important meal of the day, because individuals who skip breakfast do not compensate for nutrient inadequacies in other meals. Breakfast consumption has been associated with favorable nutrient intake, better food choices throughout the day, and lower BMI, while skipping breakfast has been associated with poor nutrient intakes and overweight and obesity ^{43, 44}. Similarly, low-income elderly are less likely to eat both lunch and dinner, and therefore consume less food and nutrients than higher-income elderly ⁴⁵.

Fruit and vegetable consumption declines drastically as food insecurity increases ^{8, 46, 47}. Only 28% and 49% of Americans meet the recommended servings of fruits and vegetables, respectively, but low-income individuals eat even less ^{8, 22, 48, 49}. Low-income individuals are less likely to choose fruits and vegetables high in vitamin A, vitamin C, and folate ⁴⁶. Starchy vegetables, especially French fries and potato chips, account for the majority of servings of vegetables among low-income individuals ^{13, 50}. Low fruit and vegetable intake among low-income individuals results in suboptimal levels of many nutrients; especially vitamin C and beta-carotene ^{35, 51, 52}.

Low-income women consume less fish and chicken than higher-income women. Low-income individuals generally consume more meat, processed pork products, fried foods, table sugar, pasta, and potatoes than higher-income households ^{12, 28}. Low-income individuals eat 40% fewer servings of whole grains and less dietary fiber than higher income individuals ^{13, 50, 53, 54}. As a result, low-income individuals have low intakes of iron, calcium, folate and vitamins A, C, and D ^{8, 12, 13}. Less than 20% of one low-income population met the Dietary Reference Intakes (DRI's) for calcium and fiber ¹³.

Cost of Food/Nutrients

Studies have not reported how much it will cost to meet the 2005 DGA, although increasing fruit and vegetable consumption and limiting fats and sweets results in higher food costs, which is one of the most important considerations for low-income households,^{16, 35, 55, 56}. Fruits and vegetables are likely to be perceived as too expensive by low-income individuals, especially in terms of preparation, storage, and perishability, and this perception may discourage their purchase^{46, 57}. A linear programming model showed that reducing diet cost greatly reduced the nutrient content of diets³⁵. Lower diet costs are also associated with increased consumption of energy dense (ED) foods such as sweets, starches, and fats⁵⁸.

Energy dense (ED) diets are high in fats, sugar, and fast foods, and provide large amounts of energy at a low cost^{55, 58, 59}. The water content of food contributes to energy density, and foods with high water contents, such as fruits and vegetables, have low energy densities, but foods with low water contents, such as cookies, donuts and potato chips, are energy dense^{55, 58-60}. ED foods generally have stable shelf lives, resulting in lower costs in terms of transport, storage and waste than more nutrient dense foods^{57, 59}. Nutrient dense (ND) diets that are high in fruits, vegetables, whole grains, and low in fat, have been associated with increased diet costs^{2, 55, 56, 59, 61, 62}. For example, replacing refined grain items with whole wheat items was associated with a 30% increase in food costs⁵⁰. Some studies, however, have shown that ND diets do not cost more than ED diets^{42, 57, 59, 63, 64}. Some of these differences may be due to study designs; for example, one longitudinal study⁵⁷ found that transition from a high fat to a lower fat diet did not increase diet costs^{55, 59, 61, 62}. Three studies examined the effects of reducing fat content of diets on diet cost, rather than the effects of increasing overall ND of diets^{57, 62, 64}. One study compared prices of market baskets of different NDs².

Recent technological advances have made ED foods available to the consumer at low prices³. Compared to refined sugar and vegetable oil, the cost per kilocalorie of fresh produce is higher by several thousand percent⁵⁸. In 1999, the energy cost (\$/2390 kcal) of sucrose was \$0.23, vegetable oil was \$0.50, potato chips were \$2.00, soft drinks were \$2.40-\$3.70, fresh carrots was about \$9.50, and frozen concentrated orange juice was about \$14.00⁵⁸. The price of gaining one extra pound of body weight from added sugars and fats was estimated at \$0.10⁶⁵.

From 1982 to 1997, retail prices in the United States increased 93% for fruits and vegetables, although retail prices increased only 47% for fats and oils, and 52% for sweets^{50, 58}. From January 2004 to January 2005, the price increases were 8.1% for fresh fruits, 4.1% for potatoes, 9.5% for milk, and 5.3% for poultry. During the same period, the prices of sugars remained steady, and the prices of fats and oils increased 6.0%. Over that period, price increases for healthy, ND foods were greater than for more ED foods^{66, 67}. In order to save money, low-income individuals may choose diets high in inexpensive, palatable, ED foods⁶⁷. Meat, fish, fruits, and vegetables, the foods that tend to be lacking in the diets of low-income individuals, are the most expensive foods in western diets³⁵.

Barriers to Eating Healthy

Low-income individuals face many barriers to following a healthy diet and leading a healthy lifestyle^{46, 58}. The predominant barriers among low-income individuals are economic constraints and education level^{16, 35, 46, 56, 58, 68}. The high cost of healthy foods is a barrier to eating them and having a healthy diet among low-income women⁶⁹. Major barriers to fruit consumption include perishability, inconvenience of storage and preparation, high cost when out of season, difficulty of selecting good fruit, skills required for preparation, and preferences of family members. Many barriers to the consumption fruits and vegetables are the same, including

not liking specific fruits and vegetables, preferring other, more tasty foods, tie and difficulty in preparation, perishability, and cost ²².

The DGA stress the use of food labels, because labels provide the information necessary to make healthy food choices; therefore, the success of nutrition education programs depends, in part, on a consumer's knowledge of and use of food labels ^{14, 70}. Low-income individuals are less likely to use food labels to make food choices than individuals of higher incomes. Food label use is a barrier to healthy eating among low-income individuals because food label use is an important part of following the DGA ⁷⁰.

Knowledge/Attitudes about Food and Health

Focus group discussions revealed that most low-income women are aware of some relationship between diet and health; however, their awareness does not impact their food expenditures. Additionally, awareness of "some relationship" does not equal knowledge of any specific relationship ²⁹. Research has shown that many low-income individuals are not aware of the etiology of chronic disease or of a relationship between diet and chronic disease ^{46, 71, 72}. Because of this lack of knowledge of a diet-disease link, low-income individuals may not understand why they should change their diets ⁴⁶. High-income families have demonstrated more knowledge and understanding of food, nutrition, and health than low-income families ³⁰. Seventy-five percent of low-income women claim to be aware of health problems related to being overweight and excess salt intake, but slightly fewer claim to be aware of health problems related to fat and cholesterol intake. Considerably fewer claim aware of health problems related to insufficient fiber, calcium, or iron intakes or excess saturated fat intake ⁴⁶.

Many low-income individuals are uncertain of the healthfulness of their own diets ²⁹. Low-income individuals are less likely to be aware of dietary recommendations concerning

chronic disease than higher SES groups^{46, 73}. Further, low-income individuals are largely unaware of food sources of various nutrients such as vitamins A and C and folate^{46, 74}. Low-income women may be confused about what constitutes 100% fruit juice, saying their favorites are fruit punch, Kool-Aid, or lemonade²². Food safety knowledge is also lacking among low-income individuals. FSP participants are largely unaware of how long food can be left out safely, whether meat can be refrozen after being thawed, and whether it is ever safe to buy dented cans^{75, 76}.

Low-income women believe advantages of eating fruit are that it is good for digestion, protective against cancer, good for kids, and good for women who are pregnant or on a diet. Vegetables are viewed as “good for you,” “light,” and “filling;” but the major disadvantage is that they spoil quickly²². Low-income individuals report various beliefs about fruit and vegetable consumption; however, barriers to eating healthy, as discussed above, are more strongly related to nutrition behavior than the individuals knowledge and beliefs of the benefits of eating healthy⁷⁷.

Low-income women tend to be more concerned about their children’s health than their own, and will allow their diet to suffer before allowing their children’s to do so. The idea of being a good role model for their children may be a motivational factor in their own food choices. Low-income women are also more concerned with the healthfulness of their diets during pregnancy than after delivery, expressing a need to eat healthy for the baby’s health²².

Food Purchasing Behavior

Low-income individuals spend significantly less money, but a higher percentage of disposable income, on food than those of higher income^{36, 53}. Low-income individuals report food price as being the most important consideration in purchasing food^{29, 78}. Low-income

individuals are less likely than those of higher-incomes to purchase foods that collectively adhere to dietary recommendations¹⁰. Although food choices of low-income individuals may seem misguided and uninformed, their choices may be rational from an economic viewpoint¹⁶. Low-income groups tend to choose the most palatable foods among the cheapest foods available, confirming the hypothesis that people tend to maximize multidimensional pleasure experiences when, in this case, buying food^{78, 79}. Specifically, low-income households purchase fewer servings of fruits, vegetables and milk products compared with higher-income households^{2, 36}. Low-income individuals often limit their purchases of fruits and vegetables to ones that are on sale²². FS recipients report purchasing the largest quantity of food possible, regardless of quality, so that no one in the household experiences hunger^{2, 29, 78}.

Low-income individuals may economize their food purchases by taking advantage of discounts and by buying generic products, which have been found to be as nutritionally adequate as branded items^{16, 80, 81}. Compared to wealthier households, low-income households purchase more, but lower quality, meats, and choose less-expensive fruits and vegetables, such as bananas rather than berries¹⁶.

Access to Healthy Food

Low-income individuals often have restricted access to retailers that offer lower prices on healthy foods^{53, 82, 83}. Fruit consumption tends to increase with easy food store access, but fresh fruits and vegetables are less likely to be readily available in low-income neighborhoods^{67, 68, 79, 81, 84, 85}. Low-income neighborhoods tend to have fewer supermarkets and those supermarkets tend to offer a smaller variety of foods than those in wealthier areas^{79, 84}. One low-income neighborhood in Los Angeles was shown to offer a smaller variety of fresh fruits and vegetable, low-fat dairy, nonfat cheese, and whole grain pasta compared with wealthier areas⁸⁶. A study of

42 towns in Australia found that 15 of them had only a single independent grocery store that was significantly less likely than supermarkets to offer a variety of healthy foods⁸⁷.

Families living in rural areas, which tend to be low-income, generally have poor access to a healthy diet⁸⁷. In the U.S., consolidation of grocery stores over the past two decades has closed many rural small town grocery stores, increasing travel distance to stores by rural residents, and forcing low-income households to devise various coping strategies to compensate for poor food store access. The term “food desert” has been given to areas where few or no grocery stores exist.. Food deserts force rural residents to expend greater resources to access food, which is difficult if there are financial and transportation constraints⁸⁸.

Sufficient access to a variety of foods that are necessary to meet the DGA depends largely on the affordability of the foods⁵⁰. Supermarkets in urban and rural areas have been shown to charge higher prices for food, offer less variety, and offer lower quality foods than those in suburban areas where households tend to be more affluent^{89, 90}. The cost of the USDA’s Thrifty Food Plan (TFP) is 36% higher than the national average cost of the TFP in small and medium grocery stores in poor areas of rural America⁹⁰. Stores serving low-income shoppers, with high FS redemption rates, are sometimes thought to have higher operating costs; however, this has been shown to be untrue. While these stores do have lower sales margins, they also have lower payroll costs, so although they differ from stores in higher-income areas in cost structure, their operating costs are generally the same⁹¹.

Low-income heads of household who work or raise children have limited time and may experience difficulty accessing food stores⁸⁹. Use of public transportation is limited when caring for children, and it is difficult for single mothers with no personal transportation to walk to stores and shop while watching their children^{75, 76, 79}. Many FSP participants do not have

personal transportation, and are often forced to shop in small convenience stores where food is more expensive^{75, 76}. Less than half of all low-income households in the U.S. own a car, and must rely on friends, neighbors, family, or public transportation for food shopping^{92, 93}. Forty-five percent of one low-income group had no access to a car, although most found it easy to visit a supermarket³⁴.

Food Preparation

Low-income women frequently prepare meals at home⁹⁴. Meals are commonly prepared with inexpensive ingredients, such as packaged meal mixes, generic items, flour, rice, pasta, and soup bones^{75, 94}. Low-income women generally exhibit a high level of skill and resourcefulness in meal preparation⁹⁴. In the absence of adequate food resources, many low-income women will pool food with family or neighbors to cook a complete meal^{75, 76}. Frequency and complexity of at-home food preparation has been shown to have a positive relationship to energy and nutrient intake, although there is concern as to whether food preparation skills can compensate for incomes that cannot afford enough healthy foods⁹⁴. Low-income families may also face time constraints, such as multiple jobs, which make cooking meals from scratch difficult¹⁶.

Food Management Practices

Low-income individuals engage in various food management practices to maintain food sufficiency^{75, 95}. Many food management practices focus on making food last longer, although many of them are unsafe and could compromise health⁷⁵. Food items are consumed regardless of spoilage or expiration; slime is washed off lunchmeat; bugs are removed from cereals; foods including soup, juice, milk and baby formula are often diluted; and refrigerated items, such as eggs and butter, are often stored out of the refrigerator due to lack of storage space. Parents have been reported to make their children skip breakfast because they will get a hot lunch at school⁷⁵.

On the other hand, parents will sometimes go without food in order for their children to eat ^{75, 95}.

Pica, the practice of eating non-food items, has been observed in extreme cases of food insufficiency ⁷⁵. These food management practices suggest that survival takes priority over safety in food-insecure groups ⁷⁵.

Food Stamp Program and Food Insecurity

The FSP was begun in 1964 and is the major food assistance program available to Americans ^{96, 97}. The USDA recognizes the FSP as “the most critical component in the safety net against hunger” ¹. The FSP was designed to help low-income households afford a more nutritious diet in order to alleviate hunger and malnutrition (Food Stamp Act of 1977; PL 106-580). One longitudinal study examining food stamp use over the life course found that over half (51%) of Americans aged 20-65 may participate in the FSP at least once during their life ⁹⁷. The same study found that at age 20, 9.6% of the adult population may have received food stamps and by age 65, 50.8% of Americans may have received food stamps ⁹⁷. In the January 2005, 35.5 million Americans received food stamps ².

FS benefits are awarded in the form of EBT cards to help participants afford a more nutritious diet ⁹⁶. The maximum quantity of FS benefits is determined by household income and size, and is designed to help households afford the USDA’s TFP; however, the average household FS benefit is only 40% of the maximum allotment ^{1, 2}. Further, one study ⁹⁸ found the cost of the TFP to be significantly higher in rural areas than the estimated cost by the USDA, which may put low-income residents in rural areas at particular risk for food insecurity, the limited access to sufficient food or the inability to acquire sufficient foods in socially acceptable ways for all household members due to economic constraints ³.

In 2004, 11.9% (38.2 million) of Americans were food insecure⁹. There is a strong relationship between poverty and food insecurity^{41,99}. The most frequently reported reason for food insecurity is “not enough money to buy food”^{7,8}. Food insecurity is associated with poor health and undernutrition or overnutrition^{2,4-6,100}. At least 42% of Americans will have experienced at least one year of food insecurity by age 65⁹⁷. Single parent households with children are three times as likely to be food insecure as married-couple households with children, and married-couple households with children are twice as likely to be food insecure as those without children¹⁰⁰.

Food insecurity can occur with or without hunger, which is defined as “the painful or uneasy sensation that results from not having enough food”^{85,101}. In 2004, 11.9% of U.S. households were food insecure while one third (3.9%) of those households experienced hunger⁹. Although the prevalence of chronic hunger and undernutrition in the U.S. is low, low-income populations tend to experience intermittent episodes of prolonged food insecurity and hunger that may be difficult to assess by biochemical, anthropometric, and clinical measures because they generally do not develop severe undernutrition¹⁰². Household hunger can be moderate, occurring in adults, but not in children, or severe, in which hunger occurs in adults and in children, but it is more severe among adults¹⁰⁰. More than two thirds of all low-income children may experience hunger over the course of a year¹⁰². Despite governmental assistance programs, food insecurity and hunger remain a challenge for many Americans⁷.

In the present times of economic prosperity in the U.S., the growing number of Americans in poverty is often overlooked^{4,5,45}. The official poverty rate in 2004 was 12.7%, up from 12.5% in 2003¹⁰³. Poverty is often thought of as something that happens to other people; however, the reality is that two-thirds of Americans may experience at least one year of their

adult life in poverty¹⁰⁴. The fact that the poverty rate is rising poses a concern for the ability of many Americans to meet federal nutrition guidelines⁹⁷.

Monthly Food Stamp Cycle

There is evidence of a “monthly FS cycle” among FSP participants^{37, 47, 76, 92, 105}. Mean daily expenditure per person on food in FSP participating households peaks during the first three days of the month, then flattens out at a much lower level as the month progresses¹⁰⁵. Energy intake and the amount of food consumed generally decline as households move further along in the FS resource cycle^{33, 37, 106}. A significant decline in energy intake has been shown in households that shop for food once each month. Households that shop more than once per month tend to have steadier energy intakes throughout the month. Many FS recipients report that they are unable to purchase food by the end of the month because they run out of money⁷⁵. Most of the FS recipients report that they do their grocery shopping once a month when they receive food stamps, whereas few budget their resources throughout the month^{75, 105}.

The monthly FS cycle suggests that fruits and vegetables may be more available in the household at the beginning of the month and less so at the end, because they are difficult to store, highly perishable, and expensive^{22, 37}. Much of the food purchased by FSP participants tends to be non-perishable, such as canned goods and grains such as pasta and rice, and can easily be stored for the month,¹⁰⁵. Use of emergency food supplies, such as soup kitchens and food banks, greatly increases at the end of the month⁷⁵.

Food Stamp Management

Poor management of food stamps may explain part of the monthly food stamp cycle^{75, 76}. FSP participants spend a large amount of money on food when they receive their food stamps, leaving them with little if any money to buy food later in the month⁷⁵. FSP participants have

reported many practices that are not economical, such as spending money on “junk food”, and buying ready-prepared foods that they must use their own money to purchase, such as barbequed chicken and cakes from the bakery, rather than foods that require cooking. Convenience foods, such as cookies, and snack cakes comprise much of FSP participant’s purchases^{75, 76}.

Diet and Health

Nutritional status is a key indicator of health¹⁰⁷. Good nutrition plays a major role in maintaining health and quality of life and can prove to be cost effective over the long-term; however, low-income individuals are less likely to participate in dietary behaviors that improve health and reduce risk of chronic disease^{40, 57, 94, 108}. Poor diet has been linked to four of the ten leading causes of death in the US^{13, 34, 53, 87, 109}. Conversely, diets that follow the DGA have been associated with increased nutrient adequacy, lower prevalence of coronary heart disease (CHD), cancer, type 2 diabetes mellitus (DM), obesity, diverticulitis, age-related eye conditions, and decreased risk of early mortality^{34, 39, 56}. Socioeconomic inequalities in health are well recognized^{10, 37, 46, 65}. Dietary risk among low-income individuals may be due to poor availability of healthy foods, or the high cost of more nutrient dense diets^{46, 55, 87}.

CHD/All Cause Mortality

Cardiovascular disease and cancer are the two most prevalent diet-related diseases and they account for nearly two-thirds of all deaths in the US^{46, 110}. American dietary patterns, characterized by high intakes of red meat, processed meat, refined grains, desserts, French fries, and high-fat dairy products, have been shown to increase CHD risk^{111, 112}. High intakes of folate, vitamin E, and fiber, all of which are associated with healthy dietary patterns, are associated with a lower risk of CHD¹¹¹. Healthy dietary patterns, characterized by high intakes of fruits, vegetables, whole grains, and fish, and low intakes of red meat, high-fat dairy products

and other animal products, are associated with low rates of CHD in Mediterranean and Asian populations ¹¹¹.

Prevalence of metabolic syndrome was reduced by half in subjects following a Mediterranean-style diet of at least 400 grams (g) of whole grains, 250 g of fruits, 125-150 g of vegetables and 25-50 g of walnuts for 2 years when compared to a control group. Individuals following the Mediterranean-style diet also had significantly reduced waist circumference, plasma glucose, serum insulin levels, total cholesterol, triglycerides, and an increase in high-density lipoproteins (HDL) ¹¹³. Fruits, vegetables, and olive oil in the Mediterranean diet have been shown to protect against hypertension (HTN), which contributes to lower morbidity from HTN-related diseases, such as CHD and stroke ¹¹⁴.

Consumption of ND plant based food promotes optimal health ¹¹⁵. Fruit and vegetable intake is inversely related to risk of chronic disease, including CHD, DM, and some cancers, as well as all cause mortality ^{35, 40, 46, 55, 115, 116}. One study found that each serving of fruit and vegetables was associated with a 6% reduction in risk for total mortality and a similar reduction in CHD mortality ¹¹⁷. Alternatively, consumption of ED foods is associated with higher risk of CHD and type 2 DM ^{55, 111}.

Studies have repeatedly shown strong associations between whole-grain intake and total mortality and CHD risk ^{50, 54, 115, 118}. There is a positive correlation between refined-grain intake and total mortality risk; however, the relation of whole-grain intake to risk is independent of refined-grain intake ⁵⁴. Intake of total grains, whole grains, dietary fiber, cereal fiber, and dietary magnesium also has a strong inverse association with DM prevalence ¹¹⁹. Dietary fiber contains antioxidants that are anti-inflammatory and can reduce macronutrient induced oxidative stress ¹¹³.

Obesity

In 2001, over 107 million Americans were overweight¹²⁰. From 1976-90 to 1999-02, the proportion of American adults who were either overweight or obese has increased from 47% to 65%, and the percentage of overweight children has increased from 6% to 16%^{2, 121}. Obesity, a consequence of over consumption of energy relative to energy expenditure, is a predictor of several poor health outcomes, such as high blood pressure, DM and CHD^{2, 121, 122}. Low-income women are particularly likely to be obese^{11, 33, 65, 123, 124}. The differences in adult weight gain among women of different races are largely explained by SES status¹²¹. One study showed that women who were food insecure were, on the average, ~ 2 body mass index (BMI) units heavier than women who were food secure, which is associated with a 25% increase in risk of mortality¹²⁵. Obesity is more prevalent in low-income individuals and obesity rates are higher in low-income areas^{67, 76}.

An increased intake of ED foods, technological advances in food production, and decline in physical activity are believed to be contributing to the obesity epidemic^{37, 58, 65, 100}. There is concern that ED diets pose metabolic consequences, including reduced satiation, overeating, and weight gain⁶⁵. Diets that lack a variety of all food groups or diets composed mainly of a variety of ED foods have been shown to predict body fatness. For example, a varied diet of sweets, snacks, condiments, entrees and carbohydrates was positively associated with body fat, while a varied diet of fruits, vegetables, low-fat or fat-free dairy and whole grains was negatively associated with body fat¹²⁶. Whole grain intake has been associated with a lower BMI and waist-to-hip ratio⁵⁴.

FSP participants have reported overeating when food was available for fear of future shortages, and identify this as the reason their children were overweight^{75, 76}. The rationale for

this is “I have to store up as much as I can, because I don’t know when I’m going to have the next meal”⁷⁵. There are statistical links between social class and both average BMI and the prevalence of obesity¹²³. Being in a low-income family is a predictor for childhood obesity¹²⁷.

Market Baskets

A market basket is a research tool used to measure the amount of money required for a given household to meet their basic needs¹²⁸. Market baskets can be used to measure food affordability, and are helpful in assessing populations that may be at risk for food insecurity due to economic constraints^{68, 81}. Market baskets generally contain specified quantities and qualities of goods or services¹²⁸. Food security largely depends on food availability and affordability; therefore, market basket research is used to determine whether sufficient quantities of healthy foods are available to low-income groups at prices they can afford¹²⁹.

Existing Market Baskets

The USDA’s four meal plans, the TFP, the Low-Cost, Moderate-Cost, and Liberal Food Plans are maintained by the Center for Nutrition Policy and Promotion (CNPP)^{130, 131}. Each food plan has a market basket that specifies types and quantities of foods that can be consumed to achieve a healthy diet at varying costs. Each food plan consists of 12 market baskets based on age-gender groups, including children ages 1, 2, 3-, 6-8, and 9-11; females ages 12-19, 20-50, and 51 and older; and males ages 12-14, 15-19, 20-50, and 51 and older¹³¹.

The USDA’s TFP market basket provides the basis for FS allotments¹³¹. The TFP is representative of a nutritious diet at minimal cost for low-income groups or FSP participants^{2, 132}. The TFP market basket is based on the DGA and the Recommended Dietary Allowance (RDA), and diet costs were estimated using the 1989 Continuing Survey of Food Intakes by Individuals¹³⁰. The TFP provides market baskets of low-cost, nutritious foods and meal plans

appropriate for 1 of 12 age-gender groups ^{2, 132}. The TFP can be achieved at a low cost because of limited food choice within food groups, that limits dietary variety; however, the USDA acknowledges the fact that a healthy diet with more variation and convenience than the TFP would cost more ^{16, 133}. Menus provided with the TFP were tested only on 8 families in Pennsylvania; therefore, cannot be generalized to the entire country, where people tend to adhere to cultural and ethnic traditions in purchasing and preparing foods ^{29, 132}. The chief limitation of the TFP is that it was last updated in 1999 to meet the 1995 DGA and 1989 RDA and may not be sufficient to meet the 2005 DGA or the Dietary Reference Intakes (DRI) ¹³².

The Illawarra Healthy Food Basket was defined to monitor price and availability of a healthy diet in the Illawarra region of Australia ^{68, 81}. The goal was to create a basket that was both socially acceptable and healthy. This was achieved by obtaining data on product sales volume from supermarkets in August of 2004 and basing food items around what people most often purchase. The supermarket data was used to compile a list of foods that are most often consumed. This list was compared against national guidelines, and when possible, healthier alternatives replaced unhealthy items. Seven-day menu plans were made from the food basket. All menus were compared against the Recommended Dietary Intakes and Dietary Guidelines for Australians to ensure compliance. The baskets were revised by deleting, substituting, or adding foods until no nutrient inadequacies or excesses remained ^{68, 81}.

Development and Pricing of Market Baskets

The USDA's Economic Research Service (ERS) has developed a "Food Store Survey Instrument" for research on availability and affordability of food in retail outlets, which will be explained in the following section. The first step is store selection, taking into consideration type, size, location, and number of stores to be surveyed ¹²⁹. Stores have previously been located

using the Yellow Pages® telephone directory ⁸⁷. A letter of introduction should be sent to store managers explaining the research and asking permission to conduct research in their store. A follow-up phone call should be made about a week before data collection to reiterate the purpose of the research and guarantee permission to use their store ¹²⁹.

The items to be priced should be carefully defined by the researcher, considering brand, price, pricing unit and size ^{81, 129}. The inclusion of generic items should be considered, taking into account the fact that some smaller independent stores may not carry generic brands; other options include choosing the cheapest item available, the cheapest brand item, or the leading brand item ^{81, 87}. Product sales volume from supermarkets can provide data on local sales patterns and consumer preferences. Desired nutritional content should be determined before choosing which foods to include. When developing a market basket, researchers should take into account the edible portion of foods. A “draft basket” can be developed and tested for nutritional content, making modifications when necessary to meet nutritional goals ⁸¹.

Data collectors should be carefully selected and trained prior to data collection, finishing with an opportunity to practice data collection in a simulated session to assess reliability and inter-observer variation. Food pricing should be executed within a short, defined time frame to control for seasonal pricing variations ^{81, 129}.

Data should be analyzed in the manner in which the researcher decides ¹²⁹. The unit to analyze should be specified for calculations; previous research has used price per kilogram ⁸¹. It may be necessary to specify a minimum percentage of items available at each store to decide which stores should remain in the final sample. The mean cost of an item for the total sample can be substituted for any missing items ⁸⁷.

CHAPTER 3

MATERIALS AND METHODS

Study Design



Figure 1: Study Design: Resources will be compared to the price of a healthy market basket to determine if food stamps provide enough money to meet the 2005 DGA.

The study compared average and maximum FS benefits available to a reference family of four in Louisiana with the cost of meeting the food recommendations for the 2005 DGA. This was done by determining the cost of a 2-week cycle menu that meets the 2005 DGA, as well as the cost-minimizing price of a market basket that meets the 2005 DGA using average food prices in eight parishes in SE Louisiana. The menus and market basket were created from a market basket consisting of all foods included in the TFP, as well as low-cost foods that could be used to meet the 2005 DGA.

The reference family was based on that used in the TFP¹³³: a man and woman age 40, a male age 7, and a female age 9. The maximum FS benefit for a family of four in the continental United States is \$471; however, the average household payment for the fiscal year of 2005 was \$92.72/week or \$370.88 for a family of four per month¹³⁴. Stores were surveyed during the two-week time frame from January 9, 2006 to January 22, 2006 in 8 parishes in and around Baton Rouge: East Baton Rouge (EBR), West Baton Rouge (WBR), East Feliciana, Livingston, Assumption, Point Coupee, Iberville and St. James.

Store Selection

All grocery stores in the above parishes were identified using the Real Pages® website (www.realpageslive.com). The “Grocery” section of the Real Pages® was printed, and store names, addresses, and telephone numbers were entered into an Excel spreadsheet. Stores were required to meet three criteria to be eligible for the study: (1) they must be a full service grocery store, meaning they offer a wide variety of all foods; (2) they must have more than 10 employees; and (3) they must not be a specialty store. Contacting stores was done in accordance with the protocol outlined in the USDA Community Food Security Assessment Toolkit²⁰. Each store was telephoned to determine if it met the inclusion criteria. A telephone script (Appendix A) was provided to simplify this process and to make sure that the correct information was given to the stores and collected by researchers. Of the stores initially contacted by telephone, 81 met the inclusion criteria and were entered into a new spreadsheet. During the first contact, stores that met the inclusion criteria were asked for the name of the store manager for future contact by letter.

The store managers were contacted by letter (Appendix B) in late October 2005 to ask permission to survey their store. The letter provided more information about the study to the store managers, including an explanation of the study, and assurances that all store names and data collected would be stripped of individual identifiers. A self-addressed and stamped postcard (Appendix C) was included in the letter so that the store managers could reply easily. A second round of letters was sent out in early December to the store managers that did not respond to the first letter. After a two week period, the stores that had not yet responded to the letters were contacted by telephone. At this time the content of the letter was reinforced, and the managers were asked for permission to survey their store.

At the end of the store selection process, 29 stores met the three inclusion criteria and agreed to participate in the study (Appendix D). Stores were excluded for one or more of the following reasons: (1) contact with the store could not be made, (2) managers denied permission to survey the store, or (3) upon arrival it was determined that the store did not meet the inclusion criteria.

Data Collection Sheet

The data collection sheet (Appendix E) was designed based on an instrument included in the Community Food Security Assessment Toolkit¹³¹. Foods on the data collection sheet were organized by grocery store section, such as produce, dairy, meat and canned goods. All items from the TFP market basket, as well as the market basket designed for this study were included on the form. A column was included for unit of measure and package size, which were specified for each food item; for example raisin bran was priced as a 14.5 ounce box and frozen broccoli was priced as a 16 ounce bag. This was done to ensure uniformity of data collection. Other columns included were total price, price per unit, and additional comments. The “additional comments” column was provided to record instances in which the specified package size or brand was not available, or any other comments the data collectors deemed necessary.

Data Collection

Store managers were contacted one week before the survey visit to confirm a date and time that was convenient for the manager. The store managers were told who would be surveying their store, and arrangements were made for the data collectors to meet briefly with the manager before and after the survey.

The prices of all the foods in the market basket were collected during the two-week time frame from January 9, 2006 to January 22, 2006 to minimize the effect of systemic price changes

that would occur over a longer period of time. Pricing guidelines for each item were provided on the data collection sheet to ensure the uniformity of data collection. Eight data collectors were trained (Appendix G) during the week before data collection to ensure reliability of data collection.

All data were recorded on the data collection sheets provided. The least expensive item in the specified package size for each food was recorded. Data collectors were instructed to record the lowest priced item available, and to consider generic items, store specials, and sale items. Items that were not available were recorded as “NA” in the price column of the data collection sheet. If the specified size of an item was unavailable, the price of the next closest size was recorded.

Determination of Dietary Requirements

The MyPyramid interactive program (<http://www.mypyramid.gov>) was used to determine the 2005 DGA requirements for each member of the reference family to meet the 2005 DGA. The age, gender, and estimated amount of physical activity performed daily were entered into MyPyramid for each participant. The DGA recommend 30 minutes of physical activity on most days of the week, so “30 to 60 minutes” was entered into MyPyramid to determine requirements for each member of the reference family. This gave the number of calories and how many servings of each food group each person in the reference family should consume daily and weekly for vegetables (Tables 1a and 1b).

Menu Planning

Two-week cycle menus were created and were designed with foods that are commonly consumed in SE Louisiana (Appendix G). Serving sizes for each menu item were specified for the man, woman, and children, because the DGA requirements are different. The menus were

Table 1a: Breakdown of daily DGA recommendations

	Total Energy	Grain	Vegetables	Fruit	Milk	Meat & Beans	Oils	Extras
Male 40 years	2600 kcal	9 oz	3.5 c	2 c	3 c	6.5 oz	8t	410 kcal
Female 40 years	2000 kcal	6 oz	2.5 c	2 c	3 c	5.5 oz	6t	265 kcal
Male 9 years	1800 kcal	6 oz	2.5 c	1.5 c	3 c	5 oz	5t	195 kcal
Female 7 years	1600 kcal	5 oz	2 c	1.5 c	3 c	5 oz	5 t	130 kcal

Table 1b: Breakdown of weekly vegetable recommendations

	Dark Green	Orange	Dry Beans & Peas	Starchy	Other
Male 40 years	3c	2½ c	3½ c	7 c	8½ c
Female 40 years	3 c	2 c	3 c	3 c	6½ c
Male 9 years	3 c	2 c	3 c	3 c	6½ c
Female 7 years	2 c	1½ c	2½ c	2½ c	5½ c

entered into Nutritionist Pro (2.2-041504, San Bruno, CA) for each family member and analyzed for energy content. The menus were entered into Nutritionist Pro for each family member to ensure that each person was given the appropriate number of calories. Amounts of food were adjusted when energy levels deviated 10% from the DGA requirement to achieve an appropriate energy level each day. This was done by evaluating the foods included in a single day and determining what foods could be reduced or increased without reducing the number of servings required for the DGA. When energy levels were too high, serving sizes of meats that contributed

a large amount of fat to the menus were reduced because the DGA requirements for meat were exceeded. Fruits and vegetables were commonly added when energy was slightly too low because they contribute a small amount of energy and the DGA requirement for fruits and vegetables is high. Food items that contributed to whole grains intake were sometimes increased when more energy was needed to meet the DGA recommendation. The number of servings for each food group was determined using serving size charts from the MyPyramid website (www.mypyramid.gov). Changes to the menus were made when shortages were revealed in number of food group servings, and the menus were revised until they conformed to the 2005 DGA food recommendations.

Menus and recipes (Appendix H) were evaluated to minimize food waste and cost. Leftovers were included whenever necessary to ensure each recipe was consumed completely and the FS resources were used as efficiently as possible. The menus were also analyzed for sensory appeal. Researchers were careful to combine complementary textures, such as crunchy and soft. Plate appearance was also considered so that the food would appear appealing on the plate. Menus were finalized and re-entered into Nutritionist Pro to make sure energy content was appropriate.

Data Analysis

Data analysis was conducted two ways. First, the cost of the two-week was determined using the statistical analysis program SAS 9.1. Second, linear programming (LP) was used to determine the cost-minimizing combination of foods in the market basket that meet the 2005 DGA.

The data were first organized into a master spreadsheet with each row designating a food item and each column designating data collected from each individual store. Data were entered

into the spreadsheet as a standard price per unit for each item, for example, price per ounce, price per pound, or price each for foods such as hamburger buns and bagels. Fresh produce and meat were generally recorded as price per pound; however, price per ounce was calculated by dividing the price per pound by 16. Packaged items, including canned goods, were recorded as a price for the entire unit; however price per ounce was entered into the master spreadsheet. In most cases the price tag on the shelf at the grocery store gave the price per ounce; if not, the total price was divided by the number of ounces in the package to get price per ounce for data analysis. Blank spaces were left where N/A was entered in the data collection sheet. Once the data were entered an average price per specified unit of each food item was calculated.

2-Week Menus

An Excel spreadsheet was created with a column for each food item, and rows for price per unit and a lower-bound for amount of each food item (Appendix I). The spreadsheet was saved in the “comma delimited”, or “CSV” format so that it could be imported into SAS 9.1 for analysis. For the purposes of this analysis, as purchased (AP) prices were used, because they are what the consumer actually pays. AP price is the price of the raw food as it is available to purchase, not taking into account the amount of waste in a given food. The “edible portion” (EP) cost of a food is adjusted to account for any waste a food might have during preparation (<http://riskfactor.cancer.gov/pyramid/>). EP also takes into account the difference in number of servings of foods when raw vs. cooked. For example, a whole chicken that weighs 8 pounds may cost \$5, but 50% is waste. Therefore, \$5 will only buy 4 pounds of edible chicken. For fruits, vegetables, and meat, the EP price is higher than the AP price.

It was already determined that the menus conformed to the food recommendations of the 2005 DGA, so the only analysis needed was a calculation of cost. This was done by setting up a

spreadsheet similar to the one used when performing LP, but instead of multiple constraints, only price was used. The spreadsheet consisted of three rows: one listing all the foods, one listing the price per unit, and one specifying the amount of each food. Price was entered as price per unit, which was generally in ounces. The amount of each food was entered as ounces in an entire item as it would be purchased, for example a can of green beans is 14.5 ounces, so if 2 cans of green beans were needed for the recipes, 29 was entered in the amount column. If only half of a can of green beans was used in the recipes, the entire can was included in the price of the menus, because consumers would purchase an entire can rather than half a can; however, this was minimized as much as possible during the menu revision process by making sure to use items and recipes entirely.

Cost-Minimizing Market Basket

Before running LP, AP prices per unit were converted to EP price per serving using conversion factors from the Pyramid Servings Database for NHANES III (<http://riskfactor.cancer.gov/pyramid/>). The database provided conversion factors for foods that allowed calculation of the EP of foods. All prices were converted into EP, and they were entered into an Excel spreadsheet with a column for each food item and rows for each of 14 constraints, including an upper bound and lower bound for calories, a lower bound for each of grains, whole grains, dark green vegetables, orange vegetables, dry beans and peas, starchy vegetables, other vegetables, fruit, milk, meat and beans, and lower-bound for amount of the food item (Appendix J). The spreadsheet was saved in the comma delimited, or CSV, format so that it could be imported into SAS 9.1. Data were imported into SAS 9.1, and LP was run to determine the combination of foods that met the 2005 DGA for the lowest cost (Appendixes K and L).

The spreadsheet was revised, adding two more constraints: a lower bound for calories, and an upper bound for amount of servings for each food item. Some foods were forced in using the lower bound constraint for amount to follow the 2005 DGA recommendation to eat a variety of foods. LP was repeated until the market basket provided conformed to the food recommendations in the 2005 DGA.

CHAPTER 4

RESULTS

A cross-sectional survey of the of food costs was conducted at 29 food stores (Appendix D) in eight parishes in SE Louisiana. The average food costs were used to plan low-cost, 2-week menus, and to determine a cost-minimizing market basket that will meet 2005 DGA recommendations for a reference family of four.

Grocery Stores

Of the stores that met the inclusion criteria, only 29 stores (35.8%) were included in the study. Breakdown of grocery stores by parish is shown in the Table 1; a complete list of the final grocery stores surveyed is shown in Appendix D.

Table 2: Number of grocery stores from selected parishes

Parish	# of Stores Surveyed	# of Stores Not Surveyed
East Baton Rouge	15	31
West Baton Rouge	2	3
East Feliciana	1	0
Livingston	4	4
Assumption	3	0
Point Coupee	2	2
Iberville	1	4
St. James	1	1

Prices

Average prices for each food priced across the 29 grocery stores surveyed are shown in Appendix K. Prices are shown as AP price per ounce, or in other units as specified.

Menus

The market basket (Table 4) for the two-week cycle menus (Appendix G) that were planned using recipes (Appendix H) was compared with the 2005 DGA recommendations

(Tables 4, 5, and 6). The final market basket consists of foods that, collectively, meet all 2005 DGA recommendations.

Table 3: Market Basket for Menus

Apples	6 lbs
Bananas	11.5 lbs
Grapes, red or white seedless	5.5 lbs
Oranges, naval (1lb=3.5ea)	3.5 lbs
Cabbage (1head=4lbs)	1 head
Carrots, whole	3 lbs
Cauliflower (1head=1lb)	1 head
Celery (1bag=1lb)	1 bag
Bell pepper, green (1lb=2.5 ea)	1 pepper
Garlic (1lb=12 ea)	1 head
Lettuce, romaine (1head=2lbs)	1 head
Onions, green (1bunch = 6oz)	1 bunch
Onions, yellow (1lb=4.5 ea)	10.5 lb
Potatoes, baking (1lb=3ea)	3 lbs
Potatoes, red	1 lb
Tomatoes (1lb=2.5ea)	1 tomato
Zucchini	.5 lb
Fruit cocktail, lite syup	2- 15 oz cans
Peaches, lite syrup	1- 15 oz can
Pears, lite syrup	1- 15 oz can
Pineapple, chunk, lite syrup	1- 20 oz can
Raisins	1- 15 oz container
Corn, whole kernel	7- 15 oz cans
Green beans, cut	3- 15 oz cans
Tomato paste	1- 6 oz can
Tomato sauce	1- 15 oz can
Tomatoes, diced	4- 14.5 oz cans
Tomatoes, stewed	3- 14.5 cans
Beans, baked, canned	1- 28 oz can
Beans, black, canned	4- 15.5 oz cans
Beans, kidney, canned	5- 15.5 oz cans
Beans, garbanzo (chickpeas), canned	4- 15 oz cans
Cream of mushroom soup, reduced fat	1- 10.75 oz can

(table continued)

Orange juice, concentrate	5- 12 oz containers
Broccoli, chopped	5- 16 oz bags
Peas	3- 16 oz bags
Spinach, chopped	5- 16 oz bags
Bagels, plain, enriched (price each)	6
Bread crumbs	1- 15 oz container
Bread, whole wheat	7 loaves
Rolls, dinner, enriched (price each)	3 packages of 12
Tortillas, whole wheat (price each)	1 package of 10
Crackers, graham	1- 14 oz box
Crackers, whole wheat	1- 4-sleeve box
Grits	1- 2 lb bag
Oatmeal, old fashioned	1- 42 oz tub
Ready-to-eat cereal (raisin bran)	1- 20 oz box
Pasta, fettuccini	1- 12 oz bag
Popcorn, stovetop, unpopped	1- 32 oz bag
Rice, brown	1- 28 oz bag
Milk, 1% lowfat	9 gallons
Eggs, large (price each)	2 dozen
Cheese, neufchatel	1- 8 oz block
Cheese, processed (velveeta-type)	2- 4 lb blocks
Yogurt, lowfat	18- 8 oz containers
Beef, chuck roast, boneless	1.5 lb
Beef, stew meat	2 lb
Beef, ground, 15% fat	2.5 lb
Chicken, leg quarters	18 lb
Pork, chops	2 lb
Tuna, chunk-style, water packed, canned	2- 6 oz cans
Turkey ham	2.5 lb
Cornbread, mix	2- 8.5 oz boxes
Flour, enriched	1- 5 lb bag
Peanut butter, creamy	1- 40 oz jar
Margarine, tub, 40% lite spread	1- 32 oz tub
Oil, canola	1- 48 oz bottle
Jam, strawberry or grape	1- 32 oz jar
Pancake syrup, lite	1- 24 oz bottle
Mayonnaise, reduced fat	1- 32 oz jar
Salad dressing, Italian, fat-free	1- 32 oz bottle

(table continued)

Salad dressing, ranch, fat-free	1- 32 oz bottle
Soy sauce, reduced sodium	1- 10 oz bottle

Table 4: Comparison of weekly 2005 DGA energy recommendations and energy in menus

	Energy Recs kcal	Week 1 Energy Actual kcal	Week 2 Energy Actual kcal
M 40 yrs	18200	18468	17346
F 40 yrs	14000	14126	13461
Male 7 yrs/ Female 9 yrs	11200	11700	10712

Cost Comparison of Two-Week Menus With Food Stamps

The final average cost for the two-week cycle menus was \$284.86, or an average of \$142.43 a week or \$5.09 per day per person. For a family of four, this is \$615.89/month. The maximum FS benefit for a household of four is \$471, and the average FS benefit is \$326¹³⁵. The cost of the two-week menus exceeds the maximum FS allotment for a family of four by \$144.89/month, and exceeds the average FS allotment for a family of four by \$289.89/month (Table 7).

Linear Programming Analysis

Linear programming analysis resulted in a market basket (Table 8) that met 2005 DGA recommendations for a 2-week period for the reference family of four, as seen in Table 9. Food amounts are listed in purchasable units.

Cost Comparison of LP Market Basket With Food Stamps

The final average cost for the LP market basket was \$147.00, or an average of \$73.50 a week or \$2.63 per day per person. For a family of four, this is \$317.63/month. The maximum FS benefit for a household of four is \$471, and the average FS benefit is \$326¹³⁵. The LP market basket can be purchased with both the maximum FS allotment and the average FS allotment for a family of four (Table 10).

Table 5: Comparison of weekly 2005 DGA recommendations and menu content

	Grain Recs oz	Grain Actual oz	WG* recs oz	WG* Actual oz	Veg Recs c	Veg Actual c	Fruit Recs c	Fruit Actual c	Milk Recs c	Milk Actual c	Meat & Beans recs oz	Meat & Beans Actual oz
<u>Week 1</u>												
M 40 yrs	31.5	31.8	31.5	43.5	24.5	32	14	15.5	21	21	45.5	52
F 40 yrs	21	21.1	21	27.8	17.5	26.3	14	15.5	21	21	38.5	39.5
Male 7 yrs/ Female 9 yrs	14	15.9	21	24.5	14	19.8	10.5	13.9	21	21	35	34.4
<u>Week 2</u>												
M 40 yrs	31.5	34	31.5	36	24.5	32.4	14	15	21	22.8	45.5	52.4
F 40 yrs	21	25.5	21	24	17.5	29.7	14	15	21	22.3	38.5	38.1
Male 7 yrs/ Female 9 yrs	14	20.3	21	21	14	21.5	10.5	14.3	21	22.3	35	35.3

***WG = Whole Grain**

Table 6: Comparison of specific vegetable recommendations and menu content

	Dark Green recs	Dark Green Actual	Orange Recs	Orange Actual	Beans & Peas Recs	Beans & Peas Actual	Starchy Recs	Starchy Actual	Other Recs	Other Actual
<u>Week 1</u>										
Male 40 years	3	5.85	2.5	3.5	2.5	6.6	7	7	8.5	10.7
Female 40 years	3	5.65	2	3.4	3	4.6	3	4.5	6.5	7.1
Male 7 yrs/ Female 9 yrs	2	2.4	1.5	2.9	2.5	4	2.5	4	5.5	5.2
<u>Week 2</u>										
Male 40 years	3	5.85	2.5	2.5	3.5	4	7	7	8.5	11.6
Female 40 years	3	5.35	2	2.0	3	3.9	3	5	6.5	11.3
Male 7 yrs/ Female 9 yrs	2	3.85	1.5	2.0	2.5	2.9	2.5	4	5.5	7.7

Table 7: Comparison of maximum and average food stamps with the cost of the menus.

	Cost of Menus	Max FS Benefits	Avg FS Benefits
Daily	\$5.09	\$3.89	\$2.69
Weekly	\$142.43	\$108.99	\$75.44
Bi-weekly	\$284.86	\$217.98	\$150.88
Monthly	\$615.89	\$471	\$326
Difference/month		-\$144.89	-\$289.89

Table 8: Market Basket for Linear Programming

<u>Item</u>	<u>Amount</u>	<u>Item</u>	<u>Amount</u>
Apple	1.5 lb	Green Beans, frozen	1-16 oz bag
Banana	13.15 lb	Peas, frozen	1-16 oz bag
Grapes	1.6 lb	Spinach, canned	2-14 oz cans
Orange	3.4 lb	White Bread	3 loaves
Cabbage, raw	1	Bread, Whole Wheat	5 loaves
Cabbage, cooked	3 cups	Grits	32 ounces
Carrots, raw	.8 lb	Oatmeal	48 oz tub
Carrots, cooked	1.12 lb	Raisin Bran	1-20 oz box
Cauliflower	1.3 lb	Macaroni	1-12 oz bag
Celery	1.3 lb	Spaghetti	2-12 oz bags
Collard Greens	.75 lb	Ramen	12 packs
Romaine Lettuce	1 lb	Popcorn, stovetop	1-16 oz bag
Yellow Onions	2 lb	Brown Rice	2-28 oz bag
Potatoes, baking	2.1 lb	Rice, White	1-16 oz bag
Potatoes, red	1.7 lb	Milk, 1% Reduced Fat	10 gallons
Fruit Cocktail, canned	19 oz	Eggs	5 dozen
Peaches, canned	19 oz	Cheese, Processed	1-1lb blocks
Pears, canned	17 oz	Orange Juice	1 gallon
Pineapple, canned	21 oz	Beef, ground, 15% fat	16 oz
Corn, canned	22 oz	Chicken Fryer	4 lb
Tomato Paste	5 oz	Chicken Leg Quarters	3 lb
Baked Beans, canned	28 oz	Pork Chops	1 lb
Black Beans, canned	23 oz	Tuna, canned	2-6 oz cans
Kidney Beans, canned	23 oz	Turkey Breast	1 lb

(table continued)

Great Northern Beans, canned	31 oz	Flour	1- 32 oz bag
Garbanzo Beans, canned	18 oz	Canola Oil	1-28 oz container
Orange Juice Concentrate	3-12 oz cans	Peanut Butter	1-40 oz container
Broccoli, chopped, frozen	1-16 oz bags	Margarine	1-28 oz container
		Sugar, granulated	1-32 oz bag

Table 9: Breakdown of LP Market Basket servings vs. 2005 DGA recommendations

<u>Category</u>	<u>DGA Recommendation</u>	<u>Market Basket Amount</u>
Calories	109200 kcal	98280 kcal
Grains	161 oz	189.25 oz
Whole Grains	189 oz	236 oz
Dark Green Vegetables	10 c	10.5 c
Orange Vegetables	7.5 c	7.5 c
Beans and Peas	11.5 c	11.5 c
Starchy Vegetables	15 c	15 c
Other Vegetables	26 c	26 c
Fruits	98 c	98 c
Milk	168 c	176 c
Meat and Beans	180 oz	268 oz

Table 10: Cost comparison of LP market basket with Food Stamps

	<u>Cost of Market Basket</u>	<u>Max FS Benefits</u>	<u>Avg FS Benefits</u>
Daily	\$2.69	\$3.89	\$2.69
Weekly	\$75.40	\$108.99	\$75.44
Bi-weekly	\$150.79	\$217.98	\$150.88
Monthly	\$325.50	\$471	\$326
Difference/month		+\$145.50	+\$0.50

CHAPTER 5

DISCUSSION

The study compared average FS benefits, as well as maximum benefits available to a reference family of four in SE Louisiana, with the cost of meeting the food recommendations for the 2005 DGA. A market basket of 149 food items was priced at 29 food stores in eight parishes in SE Louisiana, and two-week menus were planned to appeal to the target population and meet the 2005 DGA.

Grocery Stores

Most of the stores listed in the “grocery” section of the yellow pages were small food marts or corner stores, often in gas stations. The target population often shops in these small stores; however, they were excluded from the study because it is unlikely they carried enough foods that would meet the DGA. Of the 81 stores that met the inclusion criteria, 29 (35.8%) were included in the study. The main reason stores were excluded from the study was that the store managers did not consent to participate. Store managers may have been too busy with administration activities, such as personnel, inventory, meetings and daily issues related to running the store; therefore, they didn’t have free time to devote to anything else. It is possible that some stores with a limited number of employees were too busy to allow research to be conducted in their store. Some large supermarket chains were especially difficult to obtain consent from. Of the final 29 stores, 5 stores that were supermarket chains consented to participate, but requests were usually directed to the corporate office, often in a different state. This may be due to concerns regarding competition from other stores.

Large chain supermarkets have been found to offer lower food prices than small independent stores, although they tend to not be located in or near poor areas^{82, 136-139}. In 1997,

the USDA published a report showing low-income shoppers spend less money in supermarkets, live in suburban areas where food prices are higher, and that supermarkets in low-income neighborhoods tend to charge higher prices than those in higher-income neighborhoods^{136, 137}. It is probable that low-income households face higher food prices because of the lack of availability of chain supermarkets in low-income areas^{82, 136-139}. Because supermarkets generally offer lower food prices and only 5 of the stores surveyed were supermarkets, prices obtained for our study may be higher than would be found in large chain supermarkets; however, these prices probably accurately reflect what low-income households pay for food.

A less common reason for exclusion was that upon arrival, it was clear that the store did not meet the study criteria. Although inclusion criteria were clearly explained over the telephone, some employees may not have understood, or may have had a different understanding of the criteria. Usually these were smaller stores in more rural areas, and they did not have enough items for the survey. Food availability, or lack thereof, may impact the ability of low-income households to follow dietary recommendations. Low-income neighborhoods tend to have fewer supermarkets and stores in these areas have been shown to smaller variety of foods than those in wealthier areas^{67, 68, 78, 79, 81-84, 87-91, 137-140}. Fresh fruits and vegetables are less likely to be available in low-income areas, and are often of poor quality if they are available¹⁴⁰.

Store managers who did not respond to both letters were contacted by telephone. Often the manager had not seen the letters, and during the phone call, permission was granted by some managers. Reasons managers may not have seen the letters because the wrong address was listed in the yellow pages or that the letter simply never arrived. Managers may have overlooked this piece of mail because it did not appear important to their business.

Data Collection

Data collection was done over a two-week period to minimize systemic price changes that could affect the results of the study ⁸¹. Some foods have distinctive seasonal demand peaks that are influenced by religious practices, climate conditions, and harvest times ¹⁴¹. Prices of fresh fruits and vegetables are influenced by harvesting season, as prices are generally lower when an item is in season. Fresh fruits and vegetables that were in season at the time of data collection for this study included apples, carrots, cauliflower, onions, and potatoes, reflecting a lower price than would be faced when they were out of season. Similarly, prices obtained for fruits and vegetables that were out of season were probably higher and availability was probably lower than would be faced when they were in season. Prices of 31 food items, including baking ingredients, items commonly consumed during the holidays, and items typically consumed in cold weather months, such as oatmeal and canned tomato products, have been shown to peak in December-January ¹⁴¹. Because of known food price fluctuations, data collection was restricted to a two-week period to obtain average food prices at a single point in time.

Data collection could have been repeated at different times throughout the year to obtain a yearly average of food prices or to examine the effects of seasonal variation on food costs. The study could have been performed multiple times to determine if the cost of meeting the 2005 DGA recommendations varies throughout the year. Fresh produce is probably cheaper during the summer; therefore, reducing the cost of consuming a variety of fruits and vegetables. Lower prices of fresh produce may reduce the frequency of including canned goods in the menus. This could possibly reduce sodium intake and increase taste acceptability of the diet. The principal reason this was not done is that repeating the data collection process would have taken more time and resources than were available as well as prolonged the study duration.

Prices were studied in eight parishes of SE Louisiana to determine whether FS recipients in SE Louisiana are able to meet the food recommendations of the 2005 DGA. A similar study examined food prices in three low-income Boston communities to determine if FS recipients can afford a healthy diet in their neighborhoods ². Food prices are regionally specific; therefore, results can only be generalized to the eight parishes surveyed, although the concept can be applied to other areas.

ACNielsen Homescan data has been used previously to determine how much Americans pay for food ¹⁴². Use of these data could have allowed generalization to the United States; however, results may not have been applicable to the target population in the study, because national data is not regionally specific. Food prices from independent stores may not be included in Homescan data, therefore, use of this data may provide an inaccurate estimate of average prices in areas with a large number of independent food stores. To obtain prices that consumers in Southeast Louisiana face, stores were surveyed in the eight-parish area chosen rather than using ACNielsen Homescan data.

For pricing, the item closest in size to that specified on the data collection sheet was used; however, sometimes only one size was available, if the item was available at all. Smaller stores in rural areas often did not carry the specified size of an item on the data collection sheet, and offered limited variety. Small stores in low-income areas offer little variety, often limiting options for pricing ^{68, 69, 84, 86-90}. A previous study found that 49% of stores surveyed were unable to provide the majority (>88%) of foods in a healthy food basket, but over 90% of stores surveyed carried meat pies, Coke, chocolate, spaghetti, and cigarettes ⁸⁷. Lack of availability limited the data that could be collected, which may have caused the average food prices collected to be incorrect.

Determination of Dietary Requirements

For the purposes of this study, the food requirements of the 2005 DGA were determined for a reference family of four: a man age 40, a woman age 40, and two children, a male age 7 and female age 9; therefore, the results cannot be generalized to all families, because dietary requirements will be different for families of different sizes and compositions. The reference family used in the TFP consists of one male and female aged 20-50, one child aged 6-8 and one child aged 9-11 ¹³⁰. MyPyramid was used to determine dietary requirements, and required input on age, gender, and physical activity. The reference family used for this study was chosen to be similar to that in the TFP, but because the 2005 DGA recommendations are age and gender specific, these were specified to obtain precise dietary recommendations. The reference family for this study may not represent a typical FS family. The average FS household averaged 2.3 people, and with children averaged 3.3 people in fiscal year 2004 ¹³⁵. The same methods used in this study; however, can be used to study families of different compositions.

The level of physical activity impacts dietary requirements. When determining dietary requirements, “30 to 60 minutes” was entered as the amount of daily physical activity. It is not clear how much FS recipients exercise on average, but family income has been associated with physical activity and inactivity: low-income families are more likely to be less physically active and more inactive ^{143, 144}. Our own experience looking at low income women suggests a low level of activity ^{11, 33}. It is likely that “30 to 60 minutes” overestimates physical activity for most people in the target population; however, this was used because the 2005 DGA recommend at least 30 minutes of physical activity most days of the week ¹⁴.

Menu Planning

The two-week cycle menus were designed to appeal to residents in SE Louisiana; therefore, they may not be acceptable by people in other areas of the United States. Foods in the south tend to incorporate more spices and flavors than those in the north. Popular cuisines in SE Louisiana that are not as common in other areas of the country include Cajun, creole, and soul food. Foods used in the menus that specifically appeal to residents of SE Louisiana included red beans and rice, cajun jambalaya and cajun chicken. Menus included these foods, but still they may be biased towards the tastes and preferences of researchers. The TFP was tested on eight families in Pennsylvania, and many menu items, such as the combination of white bread and chickpea dip, are unlikely to appeal to tastes of many residents in SE Louisiana. It is important to conduct taste testing and menu acceptability with the target population before it is fully known if these menus would be suitable. There is much regional and cultural diversity in the United States; therefore, any national program should include flexible options to increase acceptability.

Recipes using few ingredients and very little preparation were chosen because at-home food preparation has been shown to have a positive relationship to energy and nutrient intake⁹⁴. Lower food costs have also been associated with less food preparation^{75, 76, 96}. Further, low-income women frequently prepare meals at home and generally exhibit a high level of skill and resourcefulness in meal preparation⁹⁴. It is possible; however, that the target population will not have the time required to prepare food.

Many of the recipes incorporate vegetables to increase the number of vegetable servings in the menus. This is important because 2005 DGA requirement for vegetables was increased from previous editions¹⁴. Because low-income families tend to combine low-cost ingredients in food preparation⁷⁵, incorporating vegetables into the menus in simple, low-cost ways was

important. Low-income individuals consume few servings of vegetables, and consumption declines drastically as severity of food insecurity increases^{8, 22, 46-49}. Therefore, a goal of the menu planning process was to incorporate an assortment of vegetables into the menus and recipes to in low-cost ways to increase their consumption to meet the 2005 DGA recommendations.

Menu planning is difficult, requiring a considerable level of skill, as well as nutrition knowledge and time. It is unclear whether FS participants have these skills and the knowledge appropriate to plan menus that will meet the 2005 DGA recommendations, since previous studies suggest their diet quality is so poor^{5, 11-13, 33, 34, 46} and their nutrition knowledge is limited^{11, 30, 46, 71, 72}. Cost of food is a major barrier to eating healthy among low-income populations, and was a major barrier in menu planning^{16, 35, 46, 56, 58, 68, 69}. Low-income consumers often purchase ED foods at the expense of ND foods such as fruits, vegetables, low-fat dairy and whole grains^{55, 58, 65, 67}. FS recipients report purchasing the largest quantity of food possible, regardless of quality, so that no one in the household experiences hunger^{2, 29, 78}.

Determination of Cost: 2-Week Menus

The final cost of the two-week menus was \$144.89 higher than the maximum, and \$289.89 higher than the average monthly FS allotment for a family of four. This suggests that in SE Louisiana, FS benefits alone may be insufficient to meet the 2005 DGA. This is consistent with the hypothesis that low-income, FS recipients are unable to meet the 2005 DGA with the FS benefits available to them. It is likely that FS households use other resources to purchase nutritious food; however, in 2004 the average FS household had a gross income of \$643 per month¹³⁵.

The final menu cost includes some items that will not be completely used in two weeks, including pancake syrup, flour, oil, mayonnaise, margarine, jam, and soy sauce. Pro-rating the cost of these items will slightly reduce menu costs; however the total average cost of these items was \$14.77, which is not enough to reduce menu costs significantly. Menu costs could possibly be reduced by changing menu items to cheaper foods such as canned vegetables, snack cakes, eggs and peanut butter. This would likely cause a reduction in diet quality, as diet quality is positively correlated with the amount of money spent on food ³⁵. For example, meat could be reduced or replaced with cheaper sources of protein, such as beans or peanut butter. Meat intake should not be reduced too much; however, because meat provides important nutrients, such as vitamin B₁₂ and heme iron, that are difficult to obtain from plant protein sources ¹⁴⁵. Eggs could be added as a cheap protein source; however because one large egg yolk contains 213 mg of cholesterol, the total number of eggs cannot exceed 1 egg/person/day because the cholesterol recommendation of 300 mg/day could easily be exceeded.

Energy requirements could have been met by adding low-cost, nutrient poor foods such as snack cakes and cookies, although few were priced for this study ^{78, 79}. Nutrient poor items that were priced, but not used in the menus include ice cream, chocolate milk mix, sugary fruit drinks, sugar, pudding mix, jello mix, and chocolate chips. Similar foods are common in diets of low-income individuals, and may increase acceptability of the menus ⁶⁷. Foods like snack cakes tend to be ED; therefore, if they were to be added to the menus, care must be taken to ensure that all dietary recommendations are met, while not exceeding the energy requirement or daily allowance for discretionary calories.

Fresh vegetables could be replaced with canned vegetables to lower menu costs; however unless low sodium varieties of canned vegetables are available and purchased, sodium intake

may exceed the recommendations of 2300 mg/day¹⁴. High intakes of dietary sodium may be associated with increased risk of hypertension and CHD¹⁴⁶⁻¹⁴⁸ and a worsening of hypertension. The 2005 DGA specifically recommends no more than 1500 mg/day of sodium for individuals with hypertension, blacks, and middle-age and older adults¹⁴. Louisiana has one of the highest death rates in the United States from cardiovascular disease¹⁴⁹; therefore, sodium content of foods is important to this population and should be considered in menu planning. Some canned vegetables, such as spinach and carrots, are less palatable than fresh varieties, which may discourage people from eating them.

Ramen noodles, a very low cost grain, were priced, but were not included in the menus. Inclusion of ramen noodles in place of higher cost grains, such as dinner rolls or bread crumbs, could reduce the cost of the menus. Ramen noodles; however, unlike most other grain products, are not fortified.

The 2005 DGA recommend 3 cups of low-fat or non-fat dairy per day per person¹⁴. The menus fulfill the dairy requirement with reduced fat milk, processed cheese, and yogurt which are all relatively expensive; although they were the most inexpensive sources of dairy priced. Powdered dry milk was not priced, but could have provided a cheaper source of low-fat dairy, although consumer acceptability would likely be lower than that of fluid milk.

Menu costs could be decreased by increasing the amount of food preparation required for the menus. Bread could be baked in the home rather than purchased. Pasta could even be made from flour, water, and eggs rather than purchased. Although reducing menu costs is desirable, the menus are already preparation-intensive. Many FS recipients work and may not have enough time to devote to labor intensive food preparation¹³⁵.

Determination of Cost: LP Market Basket

LP optimizes a linear function of a set of decision variables, while respecting multiple linear constraints to find the optimal solution from among the many potential solutions¹⁵⁰. LP analysis resulted in a market basket that cost \$145.50 less than the maximum, and \$0.50 less than the average monthly FS allotment for a family of four. Thus, a family of four could afford this market basket. The LP market basket does not include the same variety as the market basket for the menus, which probably explains the price difference. The foods in the LP market basket are limited, and menus created from this market basket would be and probably less acceptable than those planned for the study. Dietary variety is difficult to obtain using LP. This is especially difficult because there is no formal definition of dietary variety¹⁵¹. It may be possible to include a constraint for variety; however variety would have to be defined first.

The LP market basket is cheaper and less varied than the 2-week menus, and lower diet costs and lower dietary variety are associated with lower diet quality^{16, 35, 60, 152}. A cost constraint alone has been shown to reduce dietary variety, and thus diet quality³⁵. Diets characterized by a variety of fruits, vegetables, whole grains, fish, and low-fat dairy products have been associated with an overall decreased risk of mortality¹⁵³. Long-term weight management has also been associated with consuming a variety of foods from all food groups¹⁵⁴.

Results of the LP analysis are in terms of servings, not purchasable units. The price of the LP market basket likely underestimates what the consumer will actually pay for the foods since the price does not take into consideration purchasable units. For example, 2 servings of canned peaches are included in the LP market basket, which equals 19 ounces of canned peaches. Peaches were priced in 15 oz cans; therefore, 2 cans must be purchased to get 2 servings of fruit. In this case, the LP market basket underestimates the cost of 2 cups of peaches

by 11 oz, or \$0.71. Adjusting the price of the LP market basket for the purchasable units needed could increase the cost above the average monthly FS benefit.

Conclusion

The 2005 DGA will prove difficult for the general public to meet, because of ambitious food recommendations. Specific food groups that may be difficult to meet include fruit, vegetables, low-fat dairy and whole grains. The 2005 DGA are the first to include specific weekly recommendations for types and amounts of vegetables. There is concern that low-income individuals may not be able to afford to meet the 2005 DGA recommendations because of increased recommendations for fruits, vegetables, low-fat dairy, and whole grains, which tend to be the most expensive menu items. Most families do not receive the maximum allotment of FS benefits, and the national average household FS benefit is only 40% of the maximum allotment; therefore, the likelihood that FS households can afford to meet the 2005 DGA may be reduced ².

This study found that FS benefits alone may be insufficient for FS recipients in SE Louisiana to meet the 2005 DGA. This conclusion is consistent with that of a previous study conducted in Boston ². The LP market basket can be afforded with both maximum and average FS benefits; however, it is limited in variety and organizing the foods into palatable menus will be difficult. A more acceptable diet, in terms of diet quality and consumer acceptability, would result in increased diet costs.

Meeting the 2005 DGA with limited resources requires a high level of skill in menu planning, food preparation and shopping, as well as enough time to perform these tasks. Low-income individuals generally have less nutrition knowledge and are less likely to be aware of dietary recommendations than higher-income individuals ^{30, 46, 73}. Without adequate nutrition

knowledge, it is unlikely that FS households can plan and shop for healthy menus that meet 2005 DGA recommendations.

Future Directions

Insufficient data are available on regionally specific benefit calculations and food costs to determine whether FS benefits are enough to meet the 2005 DGA. This study is one of the first to examine the ability of FS recipients to meet the 2005 DGA. The same type of study has been conducted in Boston, and similar conclusions were reached ². More studies should be conducted in different areas of the country to determine whether FS recipients can afford to meet the 2005 DGA.

Future studies should include more food items in data collection. Sweet potatoes were not included in the study, yet they are relatively inexpensive, and are commonly consumed in SE Louisiana. Sweet potatoes are classified as an orange vegetable in the 2005 DGA. During the menu planning process it was discovered that the only orange vegetable included in the market basket was carrots, providing no variety in the orange vegetable category. Including sweet potatoes would have increased variety in the orange vegetable group, and possibly increased acceptability of the menus. Although they are nutrient poor, ED foods should be included in data collection, because these foods are already consumed by FS recipients, and can be used to increase the amount of energy in the diet for a low cost when all recommendations have been met.

Future studies may choose to examine more thoroughly nutrient content of menus and market baskets. Food group recommendations alone were considered for this study with the assumption that meeting all 2005 DGA food recommendations will fulfill all nutrient recommendations as well. Sodium recommendations, for example, could have been considered,

as sodium relates to hypertension, a common problem in the United States¹⁴⁶⁻¹⁴⁸. This may have increased the price of the menus. Canned vegetables, which are less expensive than fresh vegetables, are often very high in sodium, so their use would be limited. Canned beans and processed cheese also tend to be high in sodium and their consumption would also have to be limited.

It may be beneficial to survey a larger number of stores. Conducting data collection at different times of the year would provide a more accurate estimate of average food prices, as well as provide the opportunity to compare food prices. This would likely provide a better representation of the ability to afford the 2005 DGA at different times during the year.

Future studies may find it helpful to define “variety” for research purposes. It is difficult to determine the adequacy of a market basket without a definition of variety. This would simplify the LP analysis, as well as provide a clear standard the market basket must meet.

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APPENDIX A: GROCERY STORE PHONE SURVEY

Grocery Store Phone Survey

***If a store is *italicized*, we only need the name of the store director:**

“I am a student at LSU calling about research that the LSU Ag Center will be conducting. May I please have the name of your store director so that we can send a letter explaining our research?”

***If a store is not italicized, we need to know if it meets our criteria:**

“I am a student at LSU calling about research that the LSU Ag Center will be conducting. May I have a few minutes of your time to ask you a few questions about your store?”

- 1) Is this a full-service grocery store? (i.e.: do you carry a variety of fruits, vegetables, meats, canned goods, etc)
- 2) Do you have more than 10 employees?
- 3) Is this a specialty store?

IF YES, ASK: May I have the name of your store director so that we can send them a letter explaining our research?

***ALWAYS THANK THEM FOR THEIR TIME!**

APPENDIX B: LETTER TO MANAGERS

October 13, 2005

[Click **here** and type recipient's address]

Dear

I am a graduate student at LSU, and we are conducting research to determine whether low-income, food stamp participants in SE Louisiana have sufficient resources to afford a diet that meets the 2005 Dietary Guidelines for Americans. We will create a market basket of 100-200 foods, for example, fruits, vegetables, meats, and canned goods, which we hope to price in your store and others in this region during the second and third weeks of January. Our goal is to collect enough data during this time to determine average food prices in the region. We will use these data to determine the lowest cost market baskets that meet the 2005 Dietary Guidelines. This will help us determine if food stamp benefits are sufficient for participants to afford a healthy diet and meet the 2005 Dietary Guidelines.

The purpose of this letter is to request permission to conduct a pricing survey in your store. All information will be kept confidential; meaning the name of your store will not be identified. Information gathered from individual stores will either be stripped of individual modifiers or combined with that from many other stores and presented in statistical form only.

If you agree to allow us to survey your store, please reply with a letter of permission on a company letterhead. Thank you for your time.

Sincerely,

Laura Stewart
LSU, Graduate Student

APPENDIX C: POSTCARD

Laura Stewart
Louisiana State University
Knapp Hall, Room 287
Baton Rouge, LA 70803

Store Name: _____

___ Yes, I grant the LSU AgCenter permission to
conduct a price study in this store.

___ No, I do not grant permission.

Signature: _____

Comments: _____

APPENDIX D: CONFIRMED STORES

<u>Store</u>	<u>Address</u>	<u>City</u>	<u>Zip</u>	<u>Phone #</u>	<u>Parish</u>
Albertson's	4857 Government St.	Baton Rouge	70806	216-7226	EBR
Calandro's Supermarket	4142 Government St.	Baton Rouge	70806	383-7815	EBR
Hi Nabor Supermarket	7201 Winbourne Ave	Baton Rouge	70805	357-1448	EBR
Matherne's Supermarket	7580 Bluebonnet Blvd	Baton Rouge	70810	819-0430	EBR
Matherne's Supermarket	7355 Highland Rd	Baton Rouge	70808	767-0074	EBR
Sav A Center	4530 S Sherwood Forest Blvd	Baton Rouge	70816	292-9805	EBR
Super Saver Food Center	11321 Florida Blvd	Baton Rouge	70815	275-8116	EBR
Winn-Dixie	5555 Burbank Dr.	Baton Rouge	70820	757-0501	EBR
Winn-Dixie	13002 Coursey Blvd	Baton Rouge	70816	756-7102	EBR
Winn-Dixie	6800 Greenwell Springs Rd	Baton Rouge	70805	216-1217	EBR
Reeves Supermarket	10770 N Harrell's Ferry Rd.	Baton Rouge	70816	925-5371	EBR
Piggly Wiggly	5932 Airline Hwy	Baton Rouge	70805	355-0025	EBR
Hi Nabor Supermarket	5383 Jones Creek Rd	Baton Rouge	70817	751-3380	EBR
Wal-Mart	2171 Oneal Ln	Baton Rouge	70816	751-3505	EBR
Benedetto's Market	6651 Hwy 1 S	Brusly	70710	749-7309	WBR
Trabona's IGA	9201 Hwy 67	Clinton	70722	683-8287	East Feliciana
Live Oak Supermarket	33135 Hwy 16	Denham Springs	70706	665-5743	Livingston
Live Oaks Supermarket Inc	35015 Old Hwy 16	Denham Springs	70706	664-5511	Livingston
Parker Supermarket	20009 Walker South Rd.	Denham Springs	70726	698-6368	Livingston
Pierre Part Store LLC	3241 HWY 70	Pierre Part	70339	985-252-6261	Assumption

Sav A Center	14485 Greenwell Springs Rd.	Greenwell Springs	70739	261-1095	EBR
Jones Market	29700 Frost Rd	Livingston	70754	686-3291	Livingston
Langlois' Grocery	419 E Main St.	New Roads	70760	638-6340	Point Coupee
Piggly Wiggly	510 Olinde St.	New Roads	70760	618-1300	Point Coupee
Chedotal's A G Grocery	3260 Hwy 70	Pierre Part	70339	985-252-6321	Assumption
Leblanc's Pay-Less Food Store	58440 Belleview Rd	Plaquemine	70764	685-0422	Iberville
Pay-Less Supermarket	260 Hwy 79 Spur	Plattenville	70393	985-369-3200	Assumption
Hubben's Supermarket	560 N Alexander Ave	Port Allen	70767	344-0574	WBR
Bodin's Supermarket	2566 Hwy 20	Vacherie	70090	265-4891	St. James

APPENDIX E: DATA COLLECTION SHEET

Data Collection Sheet				
<u>Item</u>	<u>Criteria</u>	<u>Price</u>	<u>Price per unit</u> (oz, lb, gal, etc.)	<u>Comments</u> :
Fruits and Vegetables				
Fresh:				
Apples	3lb Bag, 2.5 in diameter			
Bananas				
Grapes, red or white seedless				
Lemons	loose			
Melon	cantaloupe			
Oranges, naval	loose, baseball sized			
Cabbage	head			
Carrots, whole	2lb bag			
Cauliflower	head			
Celery	bag, not hearts			
Collard greens	loose			
Bell pepper, green	individual			
Bell pepper, red	individual			
Bell pepper, yellow	individual			
Garlic	loose			
Lettuce, iceberg	head			
Lettuce, romaine	head			
Onions, green	bunch			
Onions, red	individual			
Onions, yellow	individual, medium			
Potatoes, baking	individual			
Potatoes, red	5lb bag			
Squash, yellow	individual			
Tomatoes	loose, cheapest available, specify type			
Zucchini	individual			
Canned:				
Applesauce, unsweetened	3lb 2oz jar			
Fruit cocktail, lite syrup	15 oz can			
Oranges, mandarin	11 oz can, lite syrup			
Peaches, lite syrup	1lb 13oz can			
Pears, lite syrup	1lb 13oz can			
Pineapple, chunk, lite syrup	1lb 4oz can			

Raisins	15oz container, next closest size if n/a			
Corn, whole kernel	15.25 oz can			
Green beans, cut	14.5 oz can			
Mushrooms, stems and pieces	4oz			
Spinach	14 oz can			
Tomato paste	12 oz can			
Tomato sauce	15 oz can			
Tomatoes, diced	14.5 oz can			
Tomatoes, stewed	14.5 oz can			
Beans, baked, canned	28 oz			
Beans, black, canned	15.5 oz			
Beans, kidney, canned	15.5 oz			
Beans, lima, dry	large, 16 oz bag			
Beans, northern, canned	15.5 oz; other white bean if n/a			
Beans, garbanzo (chickpeas), canned	15 oz			
Beans, vegetarian (Navy Beans)	15.5 oz; other vegetarian bean if n/a			
Peas, Blackeyed	15.5 oz			
Tomato soup	10.75 oz can			
Cream of mushroom soup, reduced fat	10.75 oz can			
Frozen:				
Orange juice, concentrate	12 oz, cheapest			
Broccoli, chopped	16oz			
Green beans, cut	16 oz			
Okra, cut	16oz			
Peas	16 oz			
Spinach, chopped	16oz			
French Fries	2 lb bag, plain			
Frozen Hash Browns	32 oz bag			
Fish, breaded portions, frozen	specify # of portions			
Ice cream, vanilla	1/2 gallon			
Fudgesicles, ice milk				

Bread, cereals, and other grains				
specify number of slices of bread or # of bagels/english muffins/tortillas				
Bagels, plain, enriched	check bread and dairy sections			
Bread crumbs	15 oz			
Bread, white, enriched	specify # of slices and oz's			
Bread, whole wheat	cheapest, whole wheat flour			
English muffins	check bread and dairy sections			
French Bread	1 lb			
Hamburger buns, enriched				
Rolls, dinner, enriched	12 brown and serve, bakery			
Tortillas, whole wheat	package of 10			
Barley, pearl				
Crackers, graham	14 oz box			
Crackers, whole wheat	4 sleeve, whole wheat if available			
Grits	2lb bag, or equivalent boxes			
Oatmeal, old fashioned	42oz tub			
specify serving size and # of servings per box				
Ready-to-eat cereal (corn flakes)	18 oz box			
Ready-to-eat cereal (toasted oats)	2lb bag			
Ready-to-eat cereal (raisin bran)	2lb bag			
Macaroni, enriched	16 oz			
Noodles, yolk-free, enriched	12 oz			
Pasta, fettuccini	12 oz			
Pasta, spaghetti, enriched	16 oz			
Pasta, whole wheat, ziti or penne	12 oz			
Spaghetti sauce	26.5 oz can			
Popcorn, stovetop, unpopped	2 lb bag			
Popcorn, microwave, unpopped	6 pk, butter flavor			
Rice, brown	28oz			
Rice, white, enriched	5 lb bag, long grain			
Dairy				
Margarine, tub, 40% lite spread	48oz			
Margarine, stick	16 oz (4 sticks)			
Milk, 1% lowfat	1 gallon			

Milk, whole	1 gallon			
Eggs, large	1 dozen			
Cheese, cheddar	8 oz block			
Cheese, cottage	24 oz container			
Cheese, mozzarella	8oz block			
Cheese, neufchatel (light cream cheese)	8oz block, 1/3 less fat			
Cheese, processed (velveeta-type)	2lb block			
Orange juice	1 gallon jug (128oz each)			
Yogurt, lowfat	8oz or 6 oz; cheapest			
Meat and Meat Alternates				
Bacon, turkey	12oz			
Beef, chuck roast, boneless	3lb			
Beef, stew meat	closest to 2lb, beef chuck			
Beef, ground, 15% fat	closest to 2.5 lb			
Chicken, fryer	whole, only record price/lb			
Chicken, leg quarters	10lb bag (or closest size)			
Chicken, thighs	only record price per pound			
Pork, chops	2.5-3.5lb, thin cut, economy chops			
Pork, ground				
Sausage, smoke turkey	link, 14 oz			
Tuna, chunk-style, water packed, canned	6oz			
Turkey breast	3 lb; only record price/lb			
Turkey, ground	record price per pound, 15% fat			
Turkey ham	2-3lb whole, unsliced (plain ham if n/a)			
Baking				
Baking powder	10oz			
Baking soda	1lb box			
Cooking spray, canola	6oz			
Cornstarch	16oz box			
Chocolate chips, semi-sweet	12 oz bag			
Chocolate pudding, instant, sugar-free	3oz box			
Cornbread, mix	8.5oz box (jiffy or cheaper)			
Flour, enriched	5lb bag all purpose (gold medal)			
Jello, strawberry, sugar-free	3oz box			

Jello, cherry sugar-free	3oz box			
Shortening	42 oz			
Oil, canola	48oz			
Oil, vegetable	48 oz			
Sugar, light brown	16oz box			
Sugar, granulated	5lb bag			
Sugar, powdered	32 oz box			
Other Food Items				
Chocolate drink mix, powdered	30 oz			
Coffee, instant	8 oz jar			
Evaporated Milk	20 oz can			
Tea bags	100 count plain			
Fruit drink	1 gallon jug			
Lemon drink	1 gallon jug			
Jam, strawberry or grape	32oz			
Molasses	smallest available			
Pancake syrup, lite	24oz			
Peanut butter, creamy	40oz			
Ketchup	24oz			
Mayonnaise, reduced fat	32oz			
Mustard, yellow	32oz			
Pickle relish	smallest and cheapest			
Salad dressing, Italian, fat-free	16oz			
Salad dressing, ranch, fat-free	16oz			
Soy sauce, reduced sodium	10oz (Kikkoman)			

APPENDIX F: DATA COLLECTOR TRAINING

Arrival:

Meet with store manager

Explain purpose

Data Collection:

Explain data collection sheet

Pricing Guidelines – on Data collection Sheet

Record Sale Prices

Record shelf prices, even if item is not available

Record specific information for packages when specified item is unavailable

Departure:

Meet with store manager

Thank them for their time

APPENDIX G: TWO-WEEK MENUS

<u>Monday 1</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Oatmeal	1 cup	.5 cup	1 cup	2 cups
Raisins	2 T	2T	2T	6 T
Lite margarine spread	1 T	2 t	4 t	4 T
Whole Wheat Toast	2 slices	1 slice	2 slices	5 slices
Orange Juice	6 oz	6 oz	12 oz	24 oz
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Sandwich				
Whole Wheat Bread	4 slices	2 slices	4 slices	10 slices
<i>Tuna Salad</i>	1 serving	.5 serving	1 serving	2.5 servings
<i>Potato Salad</i>	1.5 serving	.5 serving	1 serving	4 servings
Carrot sticks	1 cup	1 cup	2 cups	4 cups
Ranch dressing	1 T	1 T	2 T	4 T
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Cajun Spiced Chicken</i>	1 serving	1 serving	2 serving	4 servings
<i>Green Bean Casserole</i>	1.5 servings	.5 serving	1 serving	3 servings
Sauteed Canned Chickpeas with Onion	1 cup	1 cup	1.5 cup	3.5 cups
Dinner Roll	2	1	2	4
Lite margarine spread	1 t	1 t	2 t	4 t
<i>Banana Orange Salad</i>	1 serving	1 serving	1 serving	3 servings
Graham Crackers	4	2	4	10
1% Reduced Fat Milk	8 oz	8 oz	8 oz	12 oz
<u>Tuesday 1</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Bagel	1	1	1	3
Cream Cheese, reduced fat	1 oz	1 oz	1 oz	3 oz
Banana	1	1	2	4
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Whole Wheat Bread	3 slices	2 slices	4 slices	9 slices
Turkey Ham	2 oz	1 oz	3 oz	6 oz

Mayo, light	2 t	1 t	2 t	5 t
Baked Beans	1 cup	.5 cup	1 cup	2 cups
<i>Chicken and Vegetable Stir Fry</i>	1 serving	1 serving	1 serving	3 servings
Steamed Brown Rice	1 cup	.5 cups	1 cups	2.5 cups
Cooked Green Beans	.5 cup	.5 cup	1 cup	2 cups
Lite margarine spread	1 T	1 t	2 t	4 t
Dinner Roll	2	1	2	5
Lite margarine spread	1 t	1 t	2 t	4 t
<i>Easy Peach Crisp</i>	1 serving	1 serving	2 servings	4 servings
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Tuna Salad	.5 servings			.5 serving
Cheese	1 oz	1 oz	2 oz	3 oz
Crackers	10	5	10	25
<u>Wednesday 1</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Whole Grain Cereal	1 cup	1 cup	2 cups	4 cups
Banana	1	1	2	4
Orange Juice	6 oz	6 oz	12 oz	24 oz
Whole Wheat Toast	2 slices	1 slice	2 slices	5 slices
Lite margarine spread	2 t	1 t	2 t	2 T
Jam	1 T	1 T	2 T	4 T
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Sandwich				
Whole Wheat Bread	4 slices	2 slices	4 slices	10 slices
Ham	3 oz	2 oz	4 oz	9 oz
Processed cheese, sliced	1 oz	1 oz	2 oz	4 oz
Mayo, light	2 t	1 t	2 t	5 t
Romaine Lettuce	1 leaf	1 leaf	2 leaves	4 leaves
<i>Peach Crisp (leftover)</i>	1 serving	1 serving	2 servings	4 servings
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Chicken Alfredo with Vegetables</i>	2 servings	1.5 servings	2 servings	4.5 servings
<i>Cooked Carrots</i>	.5 cup	.5 cup	1 cup	2 cups

Dinner Roll	2	1	2	5
Lite margarine spread	1 T	1 t	2 t	4 t
<i>Yogurt</i>	1 cup	1 cup	2 cups	4 cups
<u>Thursday 1</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Whole Grain Cereal	1 cup	1 cup	2 cups	4 cups
Whole Wheat Toast	2 slices	1 slice	2 slices	4 slices
Lite margarine spread	2 t	1 t	2 t	5 t
Jam	1 T	1 T	2 T	4 T
Orange Juice	6 oz	6 oz	12 oz	24 oz
1% Reduced Fat Milk	8 oz	8oz	16 oz	32 oz
Peanut butter and Raisin Sandwich				
Whole Wheat Bread	4 slices	2 slices	4 slices	10 slices
Peanut butter	4 T	2 T	4 T	10 T
Raisins	2 T	1 T	2 T	5 T
1% Reduced Fat Milk	8 oz	8oz	16 oz	32 oz
Apple	1	1	2	4
<i>Beef Pot Roast with Vegetables</i>	1 servings	1 serving	1 servings	3 servings
Brown Rice	1 cup	.5 cup	1 cup	2.5 cup
Green Peas	1 cup	.5 cup	1 cup	2.5 cups
Dinner Roll	2	1	2	5
Lite margarine spread	1 T	1 t	2 t	4 t
1% Reduced Fat Milk	8 oz	8oz	16 oz	32 oz
Banana	1	1	2	4
Oatmeal Raisin Cookies	3	2	4	9
<u>Friday 1</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Omelet				
Eggs	2	2	2	6
Onion	1 tsp	1 tsp	1 tsp	3 tsp
Processed cheese	1 oz	1 oz	1 oz	3 oz

Whole Wheat Toast	2 slices	1 slice	2 slices	5 slices
Lite margarine spread	1 T	1 t	2 t	5 t
Orange Juice	6 oz	6 oz	12 oz	24 oz
1% Reduced Fat Milk	4 oz	4 oz	8 oz	16 oz
Black Bean and Corn Burritos				
Black Beans	1 cup	1 cup	1.5 cups	3.5 cups
Corn	1.625 cup	.5 cup	2 cups	4.125 cups
Whole Wheat Tortillas	2	1	2	5
Romaine Salad				
Romaine Lettuce	2 cups	2 cups	2 cups	6 cups
Carrots	.25 cups	.25 cups	.5 cups	1 cup
Fat-free Italian Dressing	1 T	1 T	2 T	4 T
<i>Chili & Rice</i>	1 serving	.75 servings	1 servings	2.75 servings
Saltine Crackers	10	5	5	20
Sauteed Frozen Spinach with garlic and lemon	1 cup	1 cup	1 cups	4 cups
Yogurt	1 cup	1 cup	2 cups	4 cups
Peanut Butter	2 T	2 T	4 T	8 T
Celery	.5 cup	.5 cups	1 cup	2 cups
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<u>Saturday 1</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Whole Grain Cereal	1.5 cups	1 cup	2 cups	4.5 cups
Whole Wheat Toast	2 slices	1 slice	2 slices	5 slices
Lite margarine spread	2 t	1 t	2 t	5 t
Jam	1 T	1 T	2 T	4 T
Pineapple, canned	.5 cup	.5 cup	.75 cup	1.75 cups
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Chili and Rice (leftover)</i>	1 serving	.5 serving	1 serving	2.5 servings
<i>Saltine Crackers</i>	10	5	5	20
Romaine Salad				
Romaine Lettuce	2 cup	2 cup	2 cups	4 cups

Carrots	.25 cup	.25 cup	.5 cup	1 cup
Fat-free Ranch Dressing	1 T	1 T	2 T	4 T
Grapes	1 cup	1 cup	1 cups	3 cups
<i>Mama's Meatloaf</i>	1 serving	1 serving	1 serving	3 servings
Mashed Potatoes	1 cup	1 cup	1 cup	3 cups
Broccoli	1 cup	1 cup	1 cup	3 cups
Cheese, Processed (melted)	2 oz	2 oz	4 oz	8 oz
Dinner Roll	2	1	2	5
Lite margarine spread	1 T	1 t	2 t	6 t
Yogurt, low fat	1 cup	1 cup	1 cups	3 cups
<u>Sunday 1</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Oatmeal	1 cup	1 cup	1 cups	3 cups
Raisins	2 T	2T	2T	6 T
Whole Wheat Toast	2 slices	1 slice	2 slices	5 slices
Lite margarine spread	2 t	1 t	2 t	5 t
Banana	1	1	2	4
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Mama's Meatloaf Sandwich</i>	1 serving	1 serving	1 serving	3 servings
Whole Wheat Bread	2 slices	2 slices	4 slices	8 slices
<i>Apple and Carrot Salad</i>	2 servings	1.5 servings	2 servings	5.5 servings
1% Reduced Fat milk	8 oz	8 oz	16 oz	32 oz
<i>Red Beans</i>	1.75 servings	1 serving	2 servings	4.75 servings
Cornbread	2 servings	2 serving	2 servings	6 servings
Romaine Salad				
Romaine Lettuce	2 cups	2 cups	2 cups	6 cups
Carrots	.25 cups	.25 cups	.25 cups	.75 cups
Fat-free Italian Dressing	1 T	1 T	2 T	4 T
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz

Grapes	1 cup	1 cup	1 cups	3 cups
<u>Monday 2</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
<i>Banana Pancakes</i>	4 servings	3 servings	5 servings	12 servings
Light Syrup	2 T	2 T	2 T	6 T
Orange Juice	6 oz	6 oz	12 oz	24 oz
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Sandwich				
Whole Wheat Bread	4 slices	2 slices	4 slices	10 slices
Turkey Ham	3 oz	2 oz	6 oz	11 oz
Processed cheese, sliced	1 oz		2 oz	3 oz
Mayo, light	1 t	1 t	2 t	4 t
<i>Vegetable Medley</i>	1 serving	1 serving	2 servings	4 servings
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Mardi Gras Chicken</i>	2 servings	1 serving	2 servings	5 servings
<i>Garden Stuffed Potatoes</i>	1 serving	1 serving	1 servings	3 servings
Green Peas	.5 cup	.5 cup	1 cup	2 cups
Dinner Roll	1	1	2	4
Lite margarine spread	2 t	1 t	2 t	5 t
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Popcorn	1.5 cups	1.5 cup	3 cups	6 cups
<u>Tuesday 2</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Grits	1 cup	1 cup	2 cups	4 cups
Whole Wheat Toast	2 slices	2 slice	4 slices	8 slices
Lite margarine spread	1 T	2 t	4 t	7 t
Orange Juice	6 oz	6 oz	12 oz	24 oz
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Tuna Salad</i>	1.5 servings	1 serving	1 serving	3.5 servings
Whole Wheat Bread	4 slices	2 slices	4 slices	10 slices

Romaine Salad				
Romaine Lettuce	2 cups	2 cups	2 cups	6 cups
Carrots	.25 cup	.25 cup	.5 cup	1 cup
Fat-free Ranch Dressing	1 T	1 T	2 T	4 T
Yogurt	1 cup	1 cup	2 cups	4 cups
<i>Black Bean and Corn Soup</i>	1 serving	1 serving	1 serving	3 servings
<i>Chicken Quesadillas</i>	2 servings	1 serving	2 servings	5 servings
Apple	1	1	2	4
Oatmeal Raisin Cookies	3	1	2	5
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<u>Wednesday 2</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Bagel	1	1	1	3
Cream Cheese, Reduced Fat	1 oz	1 oz	1 oz	3 oz
Orange Juice	6 oz	6 oz	12 oz	24 oz
Grapes	1 cup	1 cup	1 cups	3 cups
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Whole Wheat Bread	2 slices			2 slices
Turkey Ham	3 oz			3 oz
Processed cheese, sliced	1 oz			1 oz
<i>Black Bean and Corn Soup (leftover)</i>	1 serving	1.5 servings	2.5 servings	5 servings
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Oven Baked Chicken</i>	1 serving	1 serving	1 serving	3 servings
<i>Vegetable Pasta Casserole</i>	1 serving	.5 serving	1 serving	2.5 servings
Green Peas, frozen	1 cup	.5 cup	1 cup	2 cups
<i>Bread Pudding</i>	1 serving	.5 serving	1 serving	2.5 servings
Canned Peaches	.5 cup	.5 cup	.5 cup	1.5 cups
Yogurt, low-fat	1 cup	1 cup	1 cup	3 cups

<u>Thursday 2</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Scrambled Eggs	2	1	2	5
Toast, Whole Wheat	2 slices	2 slices	4 slices	8 slices
Lite margarine spread	2 t	1 t	2 t	5 t
Jelly	2 T	1 T	2 T	5 T
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Vegetable Pasta Casserole (leftover)</i>	1 serving	1 serving	1.5 servings	3.5 servings
Carrot sticks	.5 cup	.5 cup	1 cup	2 cups
Fat-free Ranch Dressing	1 T	1 T	2 T	4 T
Grapes	1 cup	1 cup	1 cups	3 cups
<i>Ham and Black-eyed Pea Soup with Greens</i>	1 serving	1 serving	1.5 servings	3.5 servings
Cornbread (2 x 2 in. square)	2	2	2	6
Lite margarine spread	2 t	1 t	2 t	5 t
<i>Apple Cake</i>	1 serving	.5 servings	1 serving	2.5 servings
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Oatmeal Raisin Cookies	3	1	4	8
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<u>Friday 2</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Raisin Bran	1 cup	1 cup	2 cups	4 cups
Whole Wheat Toast	2 slices	2 slices	2 slices	6 slices
Lite margarine spread	2 t	1 t	2 t	5 t
Orange Juice	6 oz	6 oz	12 oz	24 oz
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Peanut butter and Jelly Sandwich				
Whole Wheat Bread	4 slices	2 slices	4 slices	10 slices
Peanut butter	4 T	2 T	4 T	10 T
Raisins	2 T	2 T	4 T	8 T
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Apple Cake (leftover)</i>	1 serving	.5 serving	1 serving	2.5 serving

<i>Cajun Jambalaya</i>	2 servings	1 serving	1 serving	4 servings
Corn	1 cup	.5 cup	2 cups	3.5 cups
Dinner roll	1	1	2	4
Lite margarine spread	1 t	1 t	2 t	4 t
Fruit Cocktail, canned	1 cup	1 cup	1.5 cups	3.5 cups
1% Reduced Fat Milk	8 oz	4 oz	8 oz	20 oz
<u>Saturday 2</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
Raisin Bran	1 cup	1 cup	2 cups	4 cups
Toast, Whole Wheat	1 slices	1 slice	2 slices	4 slices
Lite margarine spread	1 t	1 t	2 t	4 t
Orange Juice	6 oz	6 oz	12 oz	24 oz
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Tuna salad</i>	1 serving	1 serving	1.5 serving	3.5 serving
Whole Wheat Bread	4 slices	2 slices	4 slices	10 slices
<i>Garden Coleslaw</i>	1 serving	1 serving	1 serving	3 servings
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
Kidney Bean Salad	.5 cups	.5 cups	1.5 cups	2.5 cups
<i>Vegetable Beef Soup</i>	2 servings	1.5 servings	2 servings	5.5 servings
Cornbread	2 servings	2 servings	2 servings	6 servings
<i>Creamed Spinach</i>	1 serving	1 serving	1 serving	3 servings
Grapes	1/2 cup	1/2 cup	1 cup	2 cups
Apple	1	1	2	4
Peanut butter	2 T	2 T	4 T	8 T
Saltine Crackers	10	5	5	20
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<u>Sunday 2</u>	<u>Man</u>	<u>Woman</u>	<u>Children</u>	<u>Total</u>
French Toast	4 servings	3 servings	6 servings	13 servings
Syrup	2 T	1 T	2 T	6 T

Orange Juice	6 oz	6 oz	12 oz	24 oz
Pears, canned	1/2 cup	1/2 cup	1 cup	2 cups
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Vegetable Beef Soup (leftover)</i>	2 servings	1.5 servings	2 servings	5.5 servings
Saltine Crackers	10	5	5	20
Romaine Salad				
Romaine Lettuce	2 cups	2 cups	2 cups	6 cups
Carrots	.25 cup	.25 cup	.5 cup	1 cup
Garbanzo Beans	0.5 cups	.5 cups	1 cup	2 cups
Fat-free Ranch Dressing	1 T	1 T	2 T	4 T
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Oven Fried Pork Chops</i>	1 serving	1 serving	2 serving	4 servings
<i>Broccoli, Rice and Cheese Casserole</i>	2 servings	1 servings	1 servings	4 servings
<i>Smothered Cabbage</i>	1 serving	1 serving	1 serving	3 servings
Dinner Roll	1	1	2	4
Lite margarine spread	1 t	1 t	2 t	4 t
1% Reduced Fat Milk	8 oz	8 oz	16 oz	32 oz
<i>Apple Cake (leftover)</i>	1 serving		1 serving	2 servings

APPENDIX H: RECIPES

Cajun Spiced Chicken

Makes 4 servings

Modified from Allrecipes.com

1/2 cup all-purpose flour	1 cup 1% milk
1 Tablespoon salt	4 chicken leg quarters
1/8 teaspoon cayenne pepper	

- 1 Preheat oven to 350°F.
- 2 In a shallow plate or bowl, mix together the flour, salt and cayenne pepper. Pour milk for into a separate bowl.
- 3 Remove skin and cut fat from the chicken. Dip the chicken into the milk. Dredge the chicken through the flour mixture, coating evenly on both sides and around the edges.
- 4 Place the chicken in a lightly greased 9x13 inch baking dish and bake in the preheated oven for 35 minutes.

Green Bean Casserole

Makes 3 servings

Modified from Cookinglight.com

1 15.5oz cans green beans, drained and rinsed	3/4 cups bread crumbs
1/3 cup 1% milk	1 teaspoons lite margarine spread, melted
1/2 (10.75 ounce) can reduced fat cream of mushroom soup	1 egg white, lightly beaten
	salt and pepper to taste

- 1 Preheat oven to 350°F.
- 2 In a medium casserole dish mix together green beans, milk, and cream of mushroom soup.
- 3 Combine bread crumbs, lite margarine spread, and egg white in a bowl; stir well, and sprinkle over green bean mixture.
- 4 Bake for 30 minutes in the preheated oven, until heated through and bubbly. Season with salt and pepper to taste.

Garden Coleslaw

Makes 6 servings

Modified from Cookinglight.com

1/2 cup Italian dressing
1 tablespoon sugar
1/2 teaspoon salt
juice of 1 lemon
4 cups shredded cabbage

1 cup shredded carrots
1/3 cup chopped green bell pepper
1/3 cup chopped green onions
salt and pepper to taste

- 1 In a mixing bowl, combine first 4 ingredients. Stir until blended. Add cabbage, carrots, bell pepper, and green onion. Season with salt and pepper. Toss, cover, and refrigerate.

Tuna Salad

Makes 4 servings

Modified from Allrecipes.com

3 eggs
2 (6 ounce) cans tuna, drained and flaked
3 tablespoons reduced fat mayonnaise

2 stalks celery, chopped
2 tablespoons sweet pickle relish
1 pinch ground black pepper

- 1 Place eggs in a saucepan and cover with cold water. Bring water to a boil and immediately remove from heat. Cover and let eggs stand in hot water for 10 to 12 minutes. Remove from hot water, cool, peel and chop.
- 2 In a medium bowl, mix together tuna and mayonnaise. Mix in egg, celery, relish, and black pepper.

Chicken and Vegetable Stir-Fry

Makes 3 servings

Modified from Mealtime.org

1/3 cup water
2 teaspoon cornstarch
2 tablespoons reduced-sodium soy
sauce
2 tablespoons canola oil
1 small onion, sliced

2 celery stalks, sliced
1 carrot, sliced
1 green bell pepper, sliced
3 chicken leg quarters, skinned,
cooked, and chopped
2 green onions, roots trimmed, sliced

- 1 Combine the water, cornstarch and soy sauce in a bowl; set aside.
- 2 Place a large pan over a high heat. Add the oil and heat until smoking. Add the onions, mushrooms, celery, carrots and pepper. Stir-fry for 2 to 3 minutes or until the vegetables are barely tender. Add the chicken and stir-fry another minute to heat through.
- 3 Add the soy sauce mixture and stir until the sauce is simmering. Cover and cook for 30 seconds. Serve immediately; sprinkle each serving with green onion, if desired.

Peach Crisp

Makes 8 servings

Modified from Kidsacookin.ksu.edu

2 cans sliced peaches lite, drained	1/2 cup brown sugar
1/3 cup lite margarine spread	1/2 teaspoon salt
1/3 cup flour	1 teaspoon cinnamon
1 cup uncooked oats, old fashioned	

- 1 Preheat the oven to 325°F.
- 2 Spray an 8-inch square glass baking dish with cooking spray and arrange peaches on bottom.
- 3 Melt lite margarine spread in a small glass dish in microwave for 45 seconds.
- 4 Mix flour, oats, brown sugar, salt, and cinnamon in a bowl. Add melted lite margarine spread and mix until crumbly. Sprinkle mixture over peaches.
- 5 Bake in preheated oven for 22 - 25 minutes, or until golden brown and bubbly.

Chicken Alfredo with Vegetables

Makes 5 servings

Modified from Recipestoday.com

12 ounces fettuccine	1/2 teaspoon garlic powder
4 ounces reduced-fat cream cheese	Salt and pepper to taste
2 tablespoons lite margarine spread	4 chicken leg quarters, skinned, cooked, and chopped
1/2 cup 1% milk	1/2 cup chopped green bell pepper
1 16oz package frozen chopped broccoli, thawed and drained	16 oz frozen green peas
2 small zucchini, cut into strips	

- 1 Cook fettuccine according to package directions. Do not overcook. Drain.
- 2 While the pasta cooks, melt the cream cheese and lite margarine spread in a skillet until smooth. Stir in the milk, garlic powder, salt, and pepper. Cook about 3 minutes or until slightly thickened, stirring constantly. Add the chicken, broccoli, zucchini, red pepper and mushrooms. Cook about 5 minutes, or until vegetables are crisp-tender.
- 3 To serve, pour sauce over fettuccine.

Pot Roast

Makes 4 servings—with leftover meat

Modified from Cookinglight.com

2 teaspoons canola oil	1/4 cup ketchup
24 oz boneless chuck roast, trimmed	1 14.5oz can diced tomatoes, undrained
1 tablespoon salt	1 1/4 pounds small red potatoes
1 tablespoon black pepper	1 pound carrots, peeled and cut into 1-inch pieces
2 cups coarsely chopped onion	
2 cups water	

- 1 Preheat oven to 300°.
- 2 Heat oil in a large dutch oven over medium-high heat. Sprinkle roast with salt and pepper. Add roast to pan, browning on all sides (about 8 minutes). Remove from pan.
- 3 Add onion to pan; sauté 8 minutes or until browned. Return roast to pan. Combine water and ketchup; pour over roast. Add tomato; bring to a simmer.
- 4 Cover and bake at 300° for 2 1/2 hours or until tender. Add potatoes and carrots; cover and bake an additional 30 minutes or until vegetables are tender.

Sautéed Yellow Squash

Makes 4 servings

Modified from Cdc.gov

2 cups yellow squash, sliced	1/4 tsp, salt
cooking spray	1/4 tsp, pepper
1 small onion, minced	

- 1 Spray sauté pan with cooking spray. Add onions and sauté until golden brown.
- 2 Add squash and cook until tender, about 10 minutes, stirring carefully to keep squash from sticking.
- 3 Season with salt and pepper and serve.

Chili and rice

Makes 6 servings

Modified from Cooks.com

1 lb ground beef	6oz tomato paste
1 green pepper, chopped	2 cloves of garlic, minced
1/2 onion, chopped	Salt and pepper to taste
1 15.5oz can kidney beans, drained and rinsed	Chili powder to taste
1 15oz can tomato sauce	2 cups brown rice, cooked

- 1 In a skillet over medium heat, brown beef with onions and peppers. Drain.
- 2 Add remaining ingredients (kidney beans through chili powder) and simmer for 10 minutes.

Mama's Meat Loaf

Makes 6 servings

Modified from Cookinglight.com

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- | | |
|------------------------------|---|
| 1 small onion, chopped | 1 slice wheat bread, torn into small pieces |
| 1 green bell pepper, chopped | 1 ½ pounds ground beef |
| 1 teaspoon pepper | Cooking spray |
| ¾ teaspoon salt | 1/3 cup ketchup |
| 2 garlic cloves, minced | |
| 1 egg, lightly beaten | |

- 1 Preheat oven to 350°.
- 2 Combine first 7 ingredients in a large bowl, tossing to moisten bread. Crumble meat over onion mixture, and stir just until blended. Pack mixture into a 9 x 5-inch loaf pan coated with cooking spray. Spread ketchup over top of loaf.
- 3 Bake at 350° for 1 hour. Let loaf stand in pan 10 minutes.
- 4 Remove meat loaf from pan; cut loaf into 6 slices.

Creamed Spinach

Makes 6 servings

Modified from Kraftfoods.com

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- | | |
|---|-------------------------|
| 4 oz reduced fat cream cheese, softened | ½ teaspoon black pepper |
| 1/4 cup 1% milk | 1 16 oz canned spinach |
| ½ teaspoon salt | |

- 1 Preheat oven to 350°F.
- 2 Mix first 4 ingredients in large bowl. Stir in spinach. Spoon into greased 1-quart baking dish.
- 3 Bake in preheated oven for 25 to 30 minutes or until heated through.

Oatmeal Raisin Cookies

Makes 48 cookies

Modified from Allrecipes.com

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- | | |
|---------------------------------------|----------------------------|
| ¾ cup lite margarine spread, softened | 1 teaspoon baking soda |
| ¾ cup white sugar | ¾ teaspoon ground cinnamon |
| ¾ cup packed light brown sugar | 1/2 teaspoon salt |
| 2 eggs | 2 ¾ cups rolled oats |
| 1 teaspoon vanilla extract | 1 cup raisins |
| 1 1/4 cups all-purpose flour | |

- 1 Preheat oven to 375°F.
- 2 In large bowl, cream together lite margarine spread, sugar, and brown sugar until smooth. Beat in the eggs and vanilla until fluffy. Stir together flour, baking soda,

cinnamon, and salt. Gradually beat into lite margarine spread mixture. Stir in oats and raisins. Drop by teaspoonfuls onto ungreased cookie sheets.

- 3 Bake 8 to 10 minutes in the preheated oven, or until golden brown. Cool slightly, remove from sheet to wire rack. Cool completely.

Banana Pancakes

Makes 12 pancakes

Modified from Allrecipes.com

1 cup all-purpose flour	1 egg, beaten
1 tablespoon white sugar	1 cup 1% milk
2 teaspoons baking powder	2 tablespoons canola oil
1/4 teaspoon salt	2 ripe bananas, mashed

1. Combine flour, sugar, baking powder and salt. In a separate bowl, mix together egg, milk, oil and bananas.
2. Stir flour mixture into banana mixture; batter will be slightly lumpy.
3. Heat a griddle or frying pan sprayed with cooking spray over medium high heat. Pour or scoop the batter onto the griddle, using approximately 1/4 cup for each pancake. Cook until pancakes are golden brown on both sides; serve hot.

Breaded Chicken

Makes 3 servings

Modified from Recipestoday.com

3 chicken leg quarters	2 T lite margarine spread, melted
salt and pepper	1 cup breadcrumbs

- 1 Preheat oven to 350°F.
- 2 Combine the melted lite margarine spread and breadcrumbs. Set aside.
- 3 Remove skin from the chicken. Salt and pepper the chicken and place in a 13x9-inch baking dish. Spread the breadcrumb mixture over the top.
- 4 Bake in preheated oven for about 30 minutes.

Vegetable Medley

Makes 4 servings

Modified from Kraftfoods.com

1/2 cup fat-free Italian dressing, divided	1 head of cauliflower, chopped
1-1/2 cups thinly sliced carrots	1/2 cup processed cheese, chopped
1 16oz package frozen chopped broccoli	

- 1 Bring 1/4 cup of the dressing and carrots to boil in medium saucepan. Reduce heat to low; cover and simmer 4 minutes

- 2 Stir in broccoli and cauliflower; cover and continue to simmer 4 minutes or until crisp-tender.
- 3 Add remaining dressing and cheese with hot vegetables in saucepan.

Family Style Red Beans and Rice

Makes 5 servings

Modified from Delmonte.com

-
- 2 cans (14.5 oz each) stewed tomatoes, undrained
 - 2 cans (14.5 oz each) kidney beans, drained and rinsed
 - 2 cups brown rice, uncooked
 - 3 ½ cups water
 - 2 tbsp chili powder

- 1 Stir all ingredients together in 2 qt. heavy bottomed saucepan; bring to boil.
- 2 Cover and reduce heat; simmer 15 minutes.
- 3 Let stand, covered, 5 minutes; uncover and stir before serving.

Apple and Carrot Salad

Makes 6 servings

Modified from Cdc.gov

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- | | |
|---------------------------|----------------------------|
| 1 cup shredded carrot | 1/2 cup raisins |
| 4 apples, cored and diced | 1/3 cup low-fat mayonnaise |
| 1 tablespoon lemon juice | |

- 1 Combine all ingredients. Chill thoroughly.

Mardi Gras Chicken

Makes 5 servings

Modified from Recipestoday.com

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- | | |
|--------------------------------------|---------------------------------------|
| 5 chicken leg quarters | 1 yellow bell pepper, cut into strips |
| 2 cups fat-free Italian dressing | 1 red onion, sliced into rings |
| 3 tablespoons salt | 2 tablespoons lite margarine spread |
| 1 green bell pepper, cut into strips | |

- 1 Remove skin from chicken. Put the chicken in a baking pan.
- 2 Mix the dressing and salt together and pour over chicken. Marinate in the refrigerator at least 4 hours, or overnight.
- 3 Preheat oven to 350°F.
- 4 Remove the chicken from the marinade. Discard the marinade. Place the chicken in a 13x9-inch baking dish. Bake in preheated oven for about 30 minutes.
- 5 While they are cooking, sauté the peppers and onion in the 2 tablespoons lite margarine spread until crisp-tender. Pour over chicken and serve immediately.

Garden Stuffed Baked Potatoes

Makes 3 servings

Modified from Allrecipes.com

3 large potatoes	1 16oz package chopped frozen
2 tablespoons lite margarine spread	broccoli, thawed and drained
1 small onion, chopped	1 tablespoon canola oil
1/2 cup fat-free ranch salad dressing	salt and pepper to taste

- 1 Preheat oven to 425°F.
- 2 Pierce the skin of the potatoes with a fork. Microwave pierced potatoes on HIGH for 12 minutes. Place partially baked potatoes in the preheated oven and bake for 15 minutes.
- 3 Slice off potato tops, scoop out the bulk of the interior of the potato being careful to leave the potato skins intact. In a medium bowl, mash the removed potato interior.
- 4 Heat a small skillet over medium heat, stir in lite margarine spread. Sauté onions in the skillet until tender, about 5 minutes.
- 5 Combine onions, ranch dressing, and broccoli with the mashed potato. Brush the outside of the potato skins with oil. Spoon potato mixture into the skins. Arrange stuffed potatoes on a cookie sheet.
- 6 Bake potatoes for 15 minutes in the preheated oven, or until heated through. Season with salt and pepper.

Black Bean and Corn Soup

Makes 8 servings

Modified from Cdc.gov

1 14.5oz can black beans, drained and rinsed	4 green onions, sliced
1 14.5oz can stewed tomatoes, undrained	1 small green pepper, sliced
1 14.5oz can diced tomatoes, undrained	4 ribs celery, diced
1 15oz can whole kernel corn, drained and rinsed	3 tablespoon chili powder
	1 teaspoon ground cumin
	1 garlic clove, minced

- 1 Combine all ingredients in slow cooker. Cover and cook on HIGH for 5-6 hours.

Chicken Quesadillas

Makes 5 servings

Modified from Allrecipes.com

5 (12 inch) flour tortilla	1 diced tomato
2 cup processed cheese, chopped	3 chopped green onion
1 15oz can whole kernel corn, drained and rinsed	2 chicken leg quarters, skinned, cooked, & chopped

- 1 Place a large skillet over medium heat. Spray with cooking spray. Place the tortilla in the skillet allow it to heat for 1 minute.
- 2 Beginning at the center of the tortilla, evenly spread the cheese until half tortilla's surface is covered. Top the cheese with corn, tomatoes, green onion and chicken. Fold the tortilla in half. When the cheese is completely melted, carefully slide the tortilla from the pan onto a cutting board. Slice into 4 wedges and serve warm.

Vegetable Pasta Casserole

Makes 8 servings

Modified from Allrecipes.com

1 tablespoon lite margarine spread	1 16oz package frozen chopped broccoli, thawed and drained
1 onion, chopped	salt and pepper to taste
1 clove garlic, minced	1/3 cup bread crumbs
1/4 cup all-purpose flour	2 tablespoons cheese, grated
4 cups 1% milk	1 cooking spray
1/2 cup mozzarella cheese, grated	
16 ounces whole wheat pasta, cooked	

- 1 Preheat oven to 350°F.
- 2 Melt lite margarine spread in a medium saucepan over medium-high heat. Sauté onions and garlic for 1 to 2 minutes. Stir in flour and milk; cook 5 minutes, or until mixture coats the back of a spoon. Remove from heat and stir in 1/2 cup cheese, salt and pepper.
- 3 In a 9x13 inch baking dish combine pasta, vegetables, milk mixture. Sprinkle with bread crumbs, and 2 tablespoons cheese. Coat with cooking spray.
- 4 Bake in preheated oven for 30 minutes, or until golden brown.

Bread Pudding

Makes 6 servings

Modified from Lowcountryfoodbank.org

2 eggs, beaten	1 teaspoon cinnamon
2 cup 1% milk	1 cup raisins
1/2 cup sugar	3 cups of whole wheat bread cubes

- 1 Preheat oven to 350°F.
- 2 Add the milk, sugar, cinnamon and raisins to the beaten eggs. Gently stir in bread cubes. Pour into an 8-inch square baking dish that has been sprayed with non-stick cooking spray.
- 3 Bake 30 minutes or until golden.

Ham and Black-eyed Pea Soup with Collard Greens

Makes 4 servings

Modified from Epicurious.com

- | | |
|--------------------------|---|
| 1 medium onion | 1/2 pound collard greens |
| 1 garlic clove | 4 cups water |
| 4 ounces cooked ham | 1 can black-eyed peas, drained and rinsed |
| 2 tablespoons canola oil | |
- 1 Chop onion and garlic and cut ham into 1/4-inch dice. In a 3-quart saucepan cook onion, garlic, and ham in oil over moderate heat, stirring occasionally, until onion is pale golden.
 - 2 While onion mixture is cooking, discard stems and center ribs from collards and finely chop leaves. Add collards and water to onion mixture and simmer until collards are tender, about 20 minutes.
 - 3 In a bowl mash half of peas with a fork. Stir mashed and whole peas into soup and simmer 5 minutes. Season soup with salt and pepper.

Apple Cake

Makes 8 servings

Modified from Cookinglight.com

- | | |
|------------------------------|------------------------------|
| 1.5 cups all-purpose flour | 1 cups granulated sugar |
| 1/2 teaspoon salt | 1/2 cup applesauce |
| 1/2 teaspoon baking soda | 1/2 teaspoon vanilla extract |
| 1/2 teaspoon ground cinnamon | 2 large eggs |
| 2 cups diced apples | Cooking spray |
- 1 Preheat oven to 325°.
 - 2 Lightly spoon flour into dry measuring cups; level with a knife. Combine flour and next 3 ingredients (flour through cinnamon) in a large bowl; stir with a whisk. Add apple; toss gently to combine. Make a well in center of mixture. Combine granulated sugar, applesauce, 1 teaspoon vanilla, and eggs in a bowl; beat with a mixer at medium speed until well-blended. Add to flour mixture. Stir just until moist. Spoon batter into a 13 x 9-inch baking pan coated with cooking spray. Bake at 325° for 55 minutes or until a wooden pick inserted in center comes out clean. Cool completely on a wire rack.

Makes 4 servings
Modified from Allrecipes.com

- 1 Heat oil in a large pot over medium high heat. Sauté chicken and sausage until lightly browned, about 5 minutes.
- 2 Stir in onion, bell pepper, celery and garlic. Season with cayenne, onion powder, salt and pepper. Cook 5 minutes, or until onion is tender and translucent.
- 3 Add rice and stir in water. Bring to a boil, then reduce heat, cover, and simmer 20 minutes, or until rice is tender.

Makes 4 servings
Modified from Cdc.gov

Cooking spray
1 chopped cup onion
4 small (6-in/15cm) zucchini, thinly sliced
Salt and pepper to taste

- 1 Heat a large nonstick skillet over medium heat; coat with cooking spray and add onions; cook, stirring until softened.
- 2 Add zucchini and cook for 5 to 7 minutes or until zucchini is tender-crisp. Season to taste with salt and pepper.

Makes 6 servings
Modified from Cookinglight.com

1 cup 1% milk	2 large egg whites
2 eggs	6 slices whole-grain bread
2 tablespoons sugar	Cooking spray
1/2 teaspoon ground cinnamon	1 teaspoon lite margarine spread,
1/2 teaspoon vanilla extract	divided

- 1 Combine milk and next 5 ingredients (through egg whites) in a medium bowl, stirring well with a whisk. Pour milk mixture into shallow dish.

- 2 Working with 1 bread slice at a time, place bread slice into milk mixture, turning to coat both sides. Let bread stand in milk mixture 2 to 3 minutes. Remove bread slice from milk mixture. Repeat with remaining slices.
- 3 Heat a large nonstick skillet over medium heat. Coat pan with cooking spray. Melt 1/2 teaspoon lite margarine spread in pan; swirl to coat bottom of pan. Add 3 soaked bread slices; cook 2 minutes on each side or until lightly browned. Repeat procedure with cooking spray, remaining lite margarine spread, and remaining coated bread slices.

Vegetable Beef Soup

Makes 12 servings

Modified from Betterbudgeting.com

2 pounds cubed beef stew meat	1 can of kidney beans, drained and rinsed
1 can of corn, drained and rinsed	
1 can of green beans, drained and rinsed	1 can of diced tomatoes, undrained salt and pepper

- 1 Fill a large 4-5 qt pot half way with water. Add stew meat. Bring to a boil. Reduce heat to low, cover and cook for 2 hours.
- 2 Add drained and rinsed corn, green beans, and kidney beans. Add entire can of tomatoes. Cook until everything is heated through, about 30 minutes. Season with salt and pepper.

Oven Fried Pork Chops

Makes 4 servings

Modified from Allrecipes.com

4 thick cut pork chops, fat trimmed	2 tablespoons 1% milk
2 tablespoons lite margarine spread, melted	1/4 teaspoon black pepper
1 egg, beaten	1 cup bread crumbs

- 1 Preheat oven to 425°F.
- 2 Pour lite margarine spread into a 9x13 inch baking pan.
- 3 Stir together egg, milk and pepper. Dip pork chops in egg mixture, coat with bread crumbs and place in pan.
- 4 Bake in preheated oven for 10 minutes. Turn chops and bake for another 10 minutes, or until no pink remains in the meat and juices run clear.

Smothered Cabbage

Makes 4 servings

Modified from 5aday.gov

- | | |
|------------------------|---------------------------|
| 1 onion, sliced | 1/4 teaspoon salt |
| 1 teaspoon canola oil | 1/4 teaspoon black pepper |
| 1 pound sliced cabbage | |

- 1 In large sauté pan, heat oil over medium heat. Sauté onion until light brown, about 5-6 minutes. Add sliced cabbage, salt, and black pepper. Stir and cook for 30 minutes.

Potato Salad

Makes 4 servings

- 1 medium potatoes
- 4T Fat Free Italian Dressing
- 1/4 cup celery, chopped
- 1/4 cup onions, chopped
- 2 Boil Potatoes, then cut up
- 3 Combine all ingredients in a large bowl and mix thoroughly

Broccoli, Cheese, and Rice Casserole

Makes 8 servings (1/2 cup each)

Modified from Cookinglight.com

- | | |
|---|--|
| 1 cup cooked brown rice | 2 tablespoons lite margarine spread, softened |
| 1/2 cup chopped onion | |
| 1/4 cup 1% milk | 1 16oz packages frozen chopped broccoli, thawed and drained |
| 4 ounces processed cheese, cubed (such as Velveeta Light) | 1 can condensed reduced-fat, reduced-sodium cream of mushroom soup |

- 4 Preheat oven to 350°F.
- 5 Combine all ingredients in a large bowl, and spoon into a 2-quart casserole. Bake at 350° for 45 minutes.

APPENDIX I: LP SPREADSHEET FOR TWO-WEEK MENUS

Row	Apples	Bananas	Grapes, red or white seedless	Lemons	Melon	Oranges, naval	Cabbage	Carrots, whole	Cauliflower	Celery	Collard greens	Bell pepper, green
Cost	42.56	28.8	76.61	292.27	62	150.13	46.4	191.52	214.08	102.24	0.05775	101.056
ATLEAST	16	20	14	0	0	3	4	1	1	1	0	1

Bell pepper, red	Bell pepper, yellow	Garlic	Lettuce, iceburg	Lettuce, romaine	Onions, green	Onions, red	Onions, yellow	Potatoes, baking	Potatoes, red	Squash, yellow	Tomatoes	Zucchini
0.24	0.24	26	59	134.4	96	1.039615	848.4	217.92	55.68	154.24	100.52	71.28
0	0	1	0	2	1	0	1	1	1	1	1	1

Applesauce, unsweetened	Fruit cocktail, lite syup	Oranges, mandarin	Peaches, lite syrup	Pears, lite syrup	Pineapple, chunk, lite syrup	Raisins	Corn, whole kernel	Green beans, cut	Mushrooms, stems and pieces	Spinach	Tomato paste
5.288965517	112.2	7.123571	97.05	104.25	106.4	211.5	52.65	56.25	16.9431035	5.195862	49.5
0	2	0	1	1	1	1	7	3	0	0	1

Tomato sauce	Tomatoes, diced	Tomatoes, stewed	Beans, baked, canned	Beans, black, canned	Beans, kidney, canned	Beans, lima, dry	Beans, northern, canned	Beans, garbanzo (chickpeas), canned	Beans, vegetarian (Navy Beans)	Peas, Blackeyed	Tomato soup
55.5	75.4	75.11	137.2	80.76	62.26	110.24	71.92	82.8	84.32	63.55	70.3
1	4	3	1	4	5	0	0	4	0	0	0

Cream of mushroom soup, reduced fat	Orange juice, concentrate	Broccoli, chopped	Green beans, cut	Okra, cut	Peas	Spinach, chopped	French Fries	Frozen Hash Browns	Fish, breaded portions, frozen	Ice cream, vanilla	Bagels, plain, enriched	Bread crumbs
105.46	141.96	149.12	133.44	152.64	133.92	162.08	539.2	619.36	24.09828	18.40034	27.14348	9.469643
10.75	5	5	0	0	3	5	0	0	0	0	6	15

Bread, white, enriched	Bread, whole wheat	English muffins	French Bread	Hamburger buns, enriched	Rolls, dinner, enriched	Tortillas, whole wheat	Barley, pearl	Crackers, graham	Crackers, whole wheat	Grits	Oatmeal, old fashioned
5.031379	9.063462	24.84545	8.887692	13.541071	15.20179	18.8937	10.06364	15.9169	11.14786	3.906897	6.886552
0	148	0	0	0	36	10	0	16	16	16	18

Ready-to-eat cereal (corn flakes)	Ready-to-eat cereal (toasted oats)	Ready-to-eat cereal (raisin bran)	Macaroni, enriched	Noodles, yolk-free, enriched	Pasta, fettuccini	Pasta, spaghetti, enriched	Pasta, whole wheat, ziti or penne	Ramen	Spaghetti sauce	Popcorn, stovetop, unpopped	Popcorn, microwave, unpopped
26.40345	14.73759	10.97655	5.653103	11.76107	8.422069	5.406897	13.939	5.55	4.570345	4.995862	15.638966
0	0	20	0	0	12	0	0	0	0	32	0

Rice, brown	Rice, white, enriched	Margarine, tub, 40% lite spread	Margarine, stick	Milk, 1% lowfat	Milk, whole	Eggs, large	Cheese, cheddar	Cheese, cottage	Cheese, mozzarella	Cheese, neufchatel (light cream cheese)	Cheese, processed (velveeta- type)
5.163448	6.261034	3.685172	7.064138	2.714138	2.783103	10.1931	22.95966	10.96214	29.162069	19.24103	15.425517
28	0	48	0	1152	0	24	0	0	0	8	64

Orange juice	Yogurt, lowfat	Bacon, turkey	Beef, chuck roast, boneless	Beef, stew meat	Beef, ground, 15% fat	Chicken, fryer	Chicken, leg quarters	Chicken, thighs	Pork, chops	Pork, ground	Sausage, smoked turkey	Tuna, chunk- style, water packed, canned
3.722069	7.982759	20.48	17.82	20.84	16.96	4.3	4.57	6.52	12.91	9.14	8.16	11.04
0	144	0	24	32	40	0	288	0	32	0	0	12

Turkey breast	Turkey, ground	Turkey ham	Baking powder	Baking soda	Cooking spray, canola	Cornstarch	Chocolate chips, semi-sweet	Cornbread, mix	Flour, enriched	Jello, strawberry, sugar-free (.3oz)	Jello, cherry sugar-free (.3oz)
9.38	8.97	16.05	15.51036	3.810357	30.86	28.6125	17.3475	4.7227586	2.08	26.525172	26.52517
0	0	40	0	0	0	0	0	19	80	0	0

Shortening	Oil, canola	Oil, vegetable	Sugar, light brown	Sugar, granulated	Sugar, powdered	Chocolate drink mix, powdered	Coffee, ground	Coffee, instant	Evaporated Milk	Tea bags
6.2296552	5.141724	4.269655	7.901379	4.6651724	5.146207	11.32276	16.91364	54.23138	6.1751724	2.017586
0	48	0	0	0	0	0	0	0	0	0

Fruit drink	Lemon drink	Jam, strawberry or grape	Molasses	Pancake syrup, lite	Peanut butter, creamy	Ketchup	Mayonnaise, reduced fat	Mustard, yellow	Pickle relish	Salad dressing, Italian, fat-free
4.265357	4.338519	4.467586	20.43692	6.787931	9.48931	18.43172	8.744827586	3.489655	11.89103	11.50966
0	0	32	0	24	40	0	32	0	10	32

Salad dressing, ranch, fat-free	Soy sauce, reduced sodium	_Type_	_RHS_
11.59448	18.71111	MIN	.
32	10	LOWERBD	.

APPENDIX J: LP SPREADSHEET FOR THE MARKET BASKET

Row	Apples	Bananas	Grapes	Lemons	Melon	Oranges	Cabbage, raw	Cabbage, cooked	Carrots, raw	Carrots, cooked	Cauliflower, raw
Cost	38.7	28.8	76.61	292.27	62	150.13	6.35	19.53	17.12	20.43	68.51
Calories	55.13	89.82	55.16	21.21	26.51	45.17	21.36	13.08	26.27	58.51	12.47
Calories	55.13	89.82	55.16	21.21	26.51	45.17	21.36	13.08	26.27	58.51	12.47
Grains	0	0	0	0	0	0	0	0	0	0	0
Whole Grains	0	0	0	0	0	0	0	0	0	0	0
Dark Green Vegetables	0	0	0	0	0	0	0	0	0	0	0
Orange Vegetables	0	0	0	0	0	0	0	0	1	1	0
Dry Beans and Peas	0	0	0	0	0	0	0	0	0	0	0
Starchy Vegetables	0	0	0	0	0	0	0	0	0	0	1
Other Vegetables	0	0	0	0	0	0	1	1	0	0	0
Fruit	1	1	1	1	1	1	0	0	0	0	0
Milk	0	0	0	0	0	0	0	0	0	0	0
Meat and Beans	0	0	0	0	0	0	0	0	0	0	0
ATLEAST	4	4	4	0	0	3	4	0	3.5	4	4
NOMORETHAN	24	24	24	24	24	24	8	8	12	12	8

Cauliflower, cooked	Celery, raw	Celery, cooked	Collard Greens	BellPepperGreen	BellPepperRed	BellPepperYellow	Garlic	Iceburg	Romaine	Green Onion	Red Onion
97.31	54.53	80.19	36.57	68.61	98.31	105.19	49.92	8.03	8.75	24.06	52.33
39.68	8.41	27	14.3	14.91	19.39	20.13	101.38	5.5	16	15.96	3.58
39.68	8.41	27	14.3	14.91	19.39	20.13	101.38	5.5	16	15.96	3.58
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0	0	0
0	1	0	0	1	1	1	1	1	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	4	0	2	0	0	0	0	0	4	0	0
8	8	8	8	3	0	0	0	0	8	8	8

Yellow Onion	Baking Potato	Red Potato	Squash	Tomato	Zucchini	Applesauce	Cfruit Cocktail	Cmandarin Oranges	CPeaches	CPears	CPineapple
46.17	30.59	23.44	77.12	100.52	71.76	47.66	71.24	55	61.04	59.4	56.75
3.58	46.93	43.89	9.03	16.18	9.93	52.42	69	46.57	52.75	70.94	65.45
3.58	46.93	43.89	9.03	16.18	9.93	52.42	69	46.57	52.75	70.94	65.45
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0	0	0
1	0	0	1	1	1	0	0	0	0	0	0
0	0	0	0	0	0	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
4	4	0	0	0	0	0	2	0	2	2	2
8	8	4	4	4	4	24	24	24	24	24	24

Raisins	CCorn	Cgreen Beans	CMushrooms	CSpinach	CTomatoPaste	CTomatoSauce	CTomatoDiced	Ctomatoes Stewed	Cbaked Beans	Cblack Beans	Ckidney Beans
42.17	38.29	45	90.35	72.8	19.13	32.41	43.71	48.93	39.6	58.73	47.46
108.5	68.43	18.71	20.13	21.84	53.7	39.19	21.37	31.18	107.31	74.84	75.18
108.5	68.43	18.71	20.13	21.84	53.7	39.19	21.37	31.18	107.31	74.84	75.18
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1
0	1	0	0	0	0	0	0	0	0	0	0
0	0	1	1	0	1	1	1	1	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	2	0	0	2	0	0	0	0	2	2	2
24	4	2	0	2	2	2	2	2	4	4	4

Lima Beans	CNorthernBeans	Cgarbonzo Beans	Cvegetarian Beans	Cblackeyed Peas	CTomatoSoup	Orange Juice Concentrate	Fbroccoli	FGreen Beans	FOkra	FPeas	Fspinach
46	71.92	49.88	67.46	50.84	117.78	17.75	56.81	50.83	67.09	55.8	115.77
116.09	99.86	100.53	98.99	62.57	178.9	104.58	23.96	22.27	27.64	61.56	20.3
116.09	99.86	100.53	98.99	62.57	178.9	104.58	23.96	22.27	27.64	61.56	20.3
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	1
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	1	1	1	0
0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	2	2	0	0	0	24	2.5	2.5	0	2.5	0
0	4	4	2	2	2	24	4	3	3	6	0

French Fries	Hash Browns	Fish Breaded	IceCream	Bagel	Bread Crumbs	Bread White	Bread WholeWheat	English Muffins	French Bread	Hamburger Buns	Rolls	Tortillas
134.84	321.75	24.1	47.45	27.14	9.47	5.04	9.07	24.85	8.89	13.58	15.06	18.88
44.67	59.51	74.89	597.18	77.96	111.98	75.41	69.74	66.62	77.68	79.1	85.05	92.14
44.67	59.51	74.89	597.18	77.96	111.98	75.41	69.74	66.62	77.68	79.1	85.05	92.14
0	0	0	0	1	1	1	0	1	1	1	1	1
0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	66	110	0	0	0	0	0
0	0	0	0	6	15	66	154	24	24	24	24	20

Barley	Graham Crackers	Crackers	Grits	Oatmeal	Corn Flakes	Toasted Oats	Raisin Bran	Macaroni	Noodles YolkFree	Pasta Fettuccini	Pasta Spaghetti	Pasta WholeWheat
10.06	15.92	11.15	3.91	6.82	9.18	14.74	10.98	5.65	11.76	8.42	5.41	13.94
99.79	119.92	123.04	105.18	108.86	111.83	103.95	88.86	105.36	106.31	105.36	105.36	100.6
99.79	119.92	123.04	105.18	108.86	111.83	103.95	88.86	105.36	106.31	105.36	105.36	100.6
0	1	1	1	0	1	0	0	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	32	34	0	0	20	12	0	0	24	0
24	24	24	32	34	24	24	20	12	12	12	24	12

Ramen	SpaghettiSauce	Popcorn Stovetop	Popcorn Microwave	Rice Brown	Rice White	Milk Lowfat	Milk Whole	Eggs	Cheese Cheddar	Cheese Cottage	Cheese Mozzarella	Cheese Processed
5.55	19.74	5	13.74	5.16	4.84	21.71	22.26	10.19	34.44	175.39	43.74	30.82
103.5	58.79	108.3	113.4	104.9	103.48	102.48	146.4	73.5	171.36	326.59	106.68	164.72
103.5	58.79	108.3	113.4	104.9	103.48	102.48	146.4	73.5	171.36	326.59	106.68	164.72
1	0	0	0	0	1	0	0	0	0	0	0	0
0	0	1	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1	0	1	1	1	1
0	0	0	0	0	0	0	0	1	0	0	0	0
12	0	0	0	56	0	160	0	56	0	0	0	16
12	0	16	0	56	80	160	0	56	0	0	0	32

Orange Juice	Yogurt	Turkey Bacon	Beef Chuck Roast	Beef StewMeat	Beef Ground	Chicken Fryer	Chicken Leg Quarters	Chicken Thighs	Pork Chops	Pork Ground	Turkey Sausage	Ctuna
29.78	63.86	20.48	17.82	20.84	16.96	4.3	4.57	6.52	12.91	9.14	8.16	11.04
111.6	146.75	60.75	70.59	48.19	66.34	31.47	35.44	33.74	56.7	74.56	40	32.89
111.6	146.75	60.75	70.59	48.19	66.34	31.47	35.44	33.74	56.7	74.56	40	32.89
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	16	64	48	0	16	0	0	12
32	12	14	38.5	16	38.5	64	80	38.5	38.5	38.5	14	38.5

Turkey Breast	Turkey Ground	Turkey Ham	Chocolate Pudding	Cornbread Mix	Flour	Evaporated Milk	Peanut Butter	Margarine, tub, 40% lite spread	Oil, canola	Oil, vegetable	Sugar, light brown
9.38	8.97	16.05	0	7.51	1.12	24.7	9.49	29.48138	5.141724	4.269655	63.21103
31.47	42.24	35.72	84.63	119.9	57.79	98.2	169.81	794.88	240	0	0
31.47	42.24	35.72	84.63	119.9	57.79	98.2	169.81	794.88	240	0	0
0	0	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	1	0	0	0	0	0
1	1	1	0	0	0	0	1	0	0	0	0
16	0	0	0	0	16	0	40	3.5	28	0	0
32	32	38.5	0	12	32	0	40	3.5	28	0	0

Sugar, granulated	Sugar, powdered	Chocolate drink mix, powdered	Coffee, ground	Coffee, instant	Evaporated Milk	Tea bags	Fruit drink	Lemon drink	Jam, strawberry or grape	Molasses	Pancake syrup, lite
4.665172	5.146207	11.32276	16.91364	54.23138	6.1751724	2.017586	4.265357	4.338519	4.4675862	20.43692	6.787931
774	0	0	0	0	0	0	0	0	75	0	50
774	0	0	0	0	0	0	0	0	75	0	50
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	32	0	0

Ketchup	Mayonnaise, reduced fat	Mustard, yellow	Pickle relish	Salad dressing, Italian, fat-free	Salad dressing, ranch, fat- free	Soy sauce, reduced sodium	_Type_	_RHS_
18.43172	8.74482759	3.489655	11.89103	11.50966	11.59448	18.71111	MIN	.
0	90	0	28.5	20	45	0	LE	120120
0	90	0	28.5	20	45	0	GE	98280
0	0	0	0	0	0	0	GE	161
0	0	0	0	0	0	0	GE	189
0	0	0	0	0	0	0	GE	10
0	0	0	0	0	0	0	GE	7.5
0	0	0	0	0	0	0	GE	11.5
0	0	0	0	0	0	0	GE	15
0	0	0	0	0	0	0	GE	26
0	0	0	0	0	0	0	GE	98
0	0	0	0	0	0	0	GE	168
0	0	0	0	0	0	0	GE	180
0	0	0	0	0	0	0	LOWERBD	.
0	0	0	0	32	32	0	UPPERBD	.

APPENDIX K: IMPORT PROGRAM

```
LIBNAME STEWART "F:\";

PROC IMPORT OUT= STEWART.LP_DAT
    DATAFILE= "F:\LinearProgrammingData.csv"
    DBMS=CSV REPLACE;
    GETNAMES=YES;
    DATAROW=2;
RUN;
```

APPENDIX L: LP PROGRAM

```
dm 'output;clear;log;clear';
options nodate pageno=1;

LIBNAME STEWART "F:\";

data lp_dat;
set stewart.lp_dat;
run;

title1 "LP Final";
proc lp data=lp_dat;
run;
```

APPENDIX M: AVERAGE AP PRICES OF EACH FOOD ITEM

<u>ITEM</u>	<u>AVERAGE PRICE (CENTS)</u>	<u>UNIT</u>
<u>Fruits and Vegetables</u>		
<u>Fresh:</u>		
Apples	6.65	/oz
Bananas	3.15	/oz
Grapes, red or white seedless	12.09	/oz
Lemons	13.70	/oz
Melon, cantaloupe	4.73	/oz
Oranges, naval	8.21	/oz
Cabbage	2.90	/oz
Carrots, whole	3.99	/oz
Cauliflower	13.38	/oz
Celery	10.65	/oz
Collard greens	6.00	/oz
Bell pepper, green	15.79	/oz
Bell pepper, red	22.58	/oz
Bell pepper, yellow	24.16	/oz
Garlic	2.59	/oz
Lettuce, iceberg	3.68	/oz
Lettuce, romaine	4.28	/oz
Onions, green	16.00	/oz
Onions, red	6.46	/oz
Onions, yellow	5.05	/oz
Potatoes, baking	4.54	/oz
Potatoes, red	3.48	/oz
Squash, yellow	9.64	/oz
Tomatoes	13.35	/oz
Zucchini	8.91	/oz
<u>Canned:</u>		
Applesauce, unsweetened	5.29	/oz
Fruit cocktail, lite syrup	7.48	/oz
Oranges, mandarin	7.12	/oz
Peaches, lite syrup	6.47	/oz
Pears, lite syrup	6.95	/oz
Pineapple, chunk, lite syrup	5.32	/oz
Raisins	14.10	/oz

Corn, whole kernel	3.51	/oz
Green beans, cut	3.75	/oz
Mushrooms, stems and pieces	16.94	/oz
Spinach	5.20	/oz
Tomato paste	8.25	/oz
Tomato sauce	3.70	/oz
Tomatoes, diced	5.20	/oz
Tomatoes, stewed	5.18	/oz
Beans, baked, canned	4.95	/oz
Beans, black, canned	5.21	/oz
Beans, kidney, canned	4.21	/oz
Beans, lima, dry	6.89	/oz
Beans, northern, canned	4.64	/oz
Beans, garbanzo (chickpeas), canned	5.52	/oz
Beans, vegetarian (Navy Beans)	5.44	/oz
Peas, Blackeyed	4.10	/oz
Tomato soup	6.54	/oz
Cream of mushroom soup, reduced fat	9.81	/oz
Frozen:		
Orange juice, concentrate	11.83	/oz
Broccoli, chopped	9.32	/oz
Green beans, cut	8.34	/oz
Okra, cut	9.54	/oz
Peas	8.37	/oz
Spinach, chopped	10.13	/oz
French Fries	33.71	/oz
Frozen Hash Browns	38.71	/oz
Fish, breaded portions, frozen	24.10	/oz
Ice cream, vanilla, regular	18.40	/oz
<u>Bread, cereals, and other grains</u>		
Bagels, plain, enriched	27.14	ea
Bread crumbs	9.47	/oz
Bread, white, enriched	5.03	/oz
Bread, whole wheat	9.06	ea
English muffins	24.85	/oz
French Bread	8.89	/oz
Hamburger buns, enriched	13.54	ea
Rolls, dinner, enriched	15.20	ea
Tortillas, whole wheat	18.89	ea
Barley, pearl	10.06	/oz
Crackers, graham	15.92	/oz
Crackers, whole wheat	11.15	/oz
Grits	3.91	/oz
Oatmeal, old fashioned	6.89	/oz

Ready-to-eat cereal (corn flakes)	26.40	/oz
Ready-to-eat cereal (toasted oats)	14.74	/oz
Ready-to-eat cereal (raisin bran)	10.98	/oz
Macaroni, enriched	5.65	/oz
Noodles, yolk-free, enriched	11.76	/oz
Pasta, fettuccini	8.42	/oz
Pasta, spaghetti, enriched	5.41	/oz
Pasta, whole wheat, ziti or penne	13.94	/oz
Ramen	5.55	/oz
Spaghetti sauce	4.57	/oz
Popcorn, stovetop, unpopped	5.00	/oz
Popcorn, microwave, unpopped	15.64	/oz
Rice, brown	5.16	/oz
Rice, white, enriched	2.80	/oz
<u>Dairy</u>		
Margarine, tub, 40% lite spread	3.69	/oz
Margarine, stick	7.06	/oz
Milk, 1% lowfat	2.71	/oz
Milk, whole	2.78	/oz
Eggs, large	10.19	ea
Cheese, cheddar	22.96	/oz
Cheese, cottage	10.96	/oz
Cheese, mozzarella	29.16	/oz
Cheese, neufchatel (light cream cheese)	19.24	/oz
Cheese, processed (velveeta-type)	15.43	/oz
Orange juice	3.72	/oz
Yogurt, lowfat	7.98	/oz
<u>Meat and Meat Alternates</u>		
Bacon, turkey	20.48	/oz
Beef, chuck roast, boneless	17.82	/oz
Beef, stew meat	21.59	/oz
Beef, ground, 15% fat	16.96	/oz
Chicken, fryer	5.35	/oz
Chicken, leg quarters	4.56	/oz
Chicken, thighs	6.76	/oz
Pork, chops	12.91	/oz
Pork, ground	13.26	/oz
Sausage, smoked turkey	17.37	/oz
Tuna, chunk-style, water packed, canned	11.04	/oz
Turkey breast	11.83	/oz
Turkey, ground	12.38	/oz
Turkey ham	16.05	/oz
<u>Baking</u>		
Baking powder	15.51	/oz

Baking soda	3.81	/oz
Cooking spray, canola	30.86	/oz
Cornstarch	28.61	/oz
Chocolate chips, semi-sweet	17.35	/oz
Cornbread, mix	4.72	/oz
Flour, enriched	2.08	/oz
Jello, strawberry, sugar-free (.3oz)	26.53	ea
Jello, cherry sugar-free (.3oz)	26.53	ea
Shortening	6.23	/oz
Oil, canola	5.14	/oz
Oil, vegetable	4.27	/oz
Sugar, light brown	7.90	/oz
Sugar, granulated	4.67	/oz
Sugar, powdered	5.15	/oz
<u>Other Food Items</u>		
Chocolate drink mix, powdered	11.32	/oz
Coffee, ground	16.91	/oz
Coffee, instant	54.23	/oz
Evaporated Milk (12 oz)	6.18	/oz
Tea bags	2.02	ea
Fruit drink	4.27	/oz
Lemon drink	4.34	/oz
Jam, strawberry or grape	4.47	/oz
Molasses	20.44	/oz
Pancake syrup, lite	6.79	/oz
Peanut butter, creamy	9.49	/oz
Ketchup	18.43	/oz
Mayonnaise, reduced fat	8.74	/oz
Mustard, yellow	3.49	/oz
Pickle relish	11.89	/oz
Salad dressing, Italian, fat-free	11.51	/oz
Salad dressing, ranch, fat-free	11.59	/oz
Soy sauce, reduced sodium	18.71	/oz

VITA

Laura Josephine Stewart was born on June 20, 1983, to parents Marvin and Dianna Stewart. She graduated from Liberty High School in May of 2001, and then went on to attend Louisiana State University. She graduated *magna cum laude* with a Bachelor of Science degree in dietetics in the Spring of 2005. In the fall of 2005, Laura began a graduate program in nutrition at Louisiana State University. Over the past two years, she has worked as a graduate assistant for Dr. Carol O'Neil, and as a nanny for the Keller family. She plans to graduate in December of 2006 with a Master of Science degree in nutrition. She will enter an internship program in either January or April. Once she completes an internship program, she will take the Registered Dietitian exam so that she can be a Registered Dietitian.