Nutrient-to-cost comparisons of daily dietary intake, food security status, and body mass index in female food stamp recipients residing in Southeast Louisiana

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NUTRIENT-TO-COST COMPARISONS OF DAILY DIETARY INTAKE, FOOD SECURITY STATUS, AND BODY MASS INDEX IN FEMALE FOOD STAMP RECIPIENTS RESIDING IN SOUTHEAST LOUISIANA

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LIST OF ACRONYMS

AHA= American Heart Association

AI= adequate intake

AIN = American Institute of Nutrition

AP = as purchased

ATP= Adult Treatment Panel

BMI = body mass index

CCHIP = Community Childhood Hunger Identification Project

CFSM = Core Food Security Module

CHD= coronary heart disease

CNF = Calories-for-nutrient

CSFII= Continuing Survey of Food Intakes by Individuals

DFE= dietary folate equivalents

DGA = Dietary Guidelines for Americans

EFNEP = Expanded Food and Nutrition Education Program

EP = edible portion

FAO = Food and Agriculture Organization

FDA = Food and Drug Administration

FF = fast food

FFQ = food frequency questionnaire

FGP = Food Guide Pyramid

FIF = food-insufficient

FIS= food insecure

FNS = Food and Nutrition Service

FS = food secure

FSF= food-sufficient

FSP = Food Stamp Program

g = gram

hdi = healthy diet indicator

HEI = Healthy Eating Index

kcals = kilocalories

kg = kilogram

kg/m^2 = kilograms per meters squared

lb = pound

LDL= low-density lipoprotein

LP = linear programming

LSRO = Life Science Research Organization

m = meter

MAR = mean adequacy ratio

ml = milliliter

MUFA= monounsaturated fatty acids

NAR = nutrient adequacy ratio

NCHS = National Center for Health Statistics

NHANES = National Health and Nutrition Examination Survey

NNR = naturally nutrient rich

PPU= price per unit

PUFA= polyunsaturated fatty acids

RDA = recommended dietary allowance

SE= southeast

SES = socioeconomic status

SFA= saturated fatty acids

SS= salt sensitive

U.S. = United States

USDA = United States Department of Agriculture

oz = ounce

ABSTRACT

Diets are typically poorer and risk of chronic disease is greatest in low-income populations. A relationship has been established in the literature between food costs and diet quality, where lower cost diets are generally those of the poorest quality. Food group intake, energy/nutrient intake, and diet cost were assessed in 64 female food stamp recipients in Southeast Louisiana. From one 24-hour dietary recall collected at the beginning of the monthly resource cycle (Day 1) and one at the end (Day 2), nutrient intakes and diet costs were able to be analyzed between different time frames. Participants were divided among food security status (food secure [FS] or food insecure [FIS]), weight status (obese or non-obese), and fast food consumption (consumed or did not consume fast food [FF]) groups for all analyses. Diet costs were shown to be significantly different between the days for several groups (whole sample, obese, no FF consumption). It was for these groups that a greater number of nutrient differences were detected between the days. Similarly, a greater number of nutrient differences were detected among groups which had significantly different diet costs.

One component of a healthy diet, as defined by the 2005 Dietary Guidelines for Americans (DGA), is a diet which emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products. From the results of food group intake analyses, we found that participants were least likely to meet recommendations for whole grains and milk, followed by fruit and vegetables. Low intakes of these groups, in combination with high intakes of refined grains and low-quality meats, as seen among participants, place them at high risk for vitamin/mineral deficiencies. Mean intakes of vitamins/minerals in all groups failed to meet the established Dietary Reference Intakes (DRIs) for fiber; vitamins A and C; folate; potassium; calcium; and iron.

CHAPTER 1

INTRODUCTION

Food insecurity (FIS) is defined as the "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" (1). National prevalence rates from 2004 indicated that the following five groups had rates of food insecurity that were higher than the national average of 11.9%: households with incomes below the official poverty line (36.8%); households with children, headed by a single woman (33.0%) or a single man (22.2%); black households (23.7%); and Hispanic households (21.7%) (2). The most important predictors of food insecurity are black female head of household and low-income status.

The Food Stamp Program (FSP) is a federally funded assistance program which originated in the 1930's. The program was implemented with one major goal: to provide a nutritional safety net for low-income households in order to reduce hunger in these individuals (3). Recently however, an unanticipated trend has emerged, which is that participation in the FSP increases the likelihood of being overweight, at least among women (3-4). Using data from the 1988-94 National Health and Nutrition Examination Survey (NHANES), it was found that 42% of women who participated in food stamps were obese. Rates of obesity among FSP participating women were 12% and 20% higher than rates of obesity found among eligible and ineligible non-participants, respectively. According to NHANES data from 1999-2002, differences in the prevalence of obesity among the three groups of women disappeared (3). Despite this finding, other studies continue to show higher rates of obesity among FSP participating women than among non-participating women (4). The most important predictors of obesity among women appear to be low income and low education status (5-9).

One explanation for the high rates of obesity found in FSP participants could be the variation in food consumption over the food stamp benefit cycle, which is referred to as food cycling (3, 10-11). Food cycling can be defined as a situation in which families overeat when their monthly benefits arrive and are then left with limited resources for the purchase of food near the end of the month (3, 10-11). The result of food cycling is generally a decrease in both the variety and quality of meals at the end of the monthly resource cycle (11-12), which is followed by a period of binge eating when food again becomes plentiful (10). This behavior is believed to contribute to weight gain, independent of the amount and form of benefit (3).

Food choices are made on the basis of taste, cost, and convenience and, to a lesser degree, health and variety (13). However, the main determinant of food choice, and thus diet quality, in low-income households is food cost (14-18). Studies have shown that low-income individuals spend less per day on food than the average American (19-20), even when faced with higher food prices (12, 21). There is support for the concept that nutrient-dense diets are higher in cost than energy-dense diets commonly consumed by low-income individuals (13, 15, 17-18, 22-23). And as low-income (10, 13, 20-21, 24-25) and food insecure populations (26-28) have been shown to have some of the poorest diets in the United States (U.S.), one potential explanation may be the higher costs associated with nutrient-dense diets. The Lower Mississippi Delta (LMD) is a region of the U.S. which borders Arkansas, SE Louisiana, and Mississippi, and is characterized by high poverty and food insecurity levels, and low educational attainment (29-31). A high prevalence of diet-related chronic diseases has been found among this region (30).

Objectives

This study branches off from a larger study which was completed in May 2005. The study was conducted on 64 primarily black female FSP participants who resided in SE

Louisiana. The main objective of the larger was to look at energy and nutrient intakes at the beginning and end of the monthly resource cycle among participants who were: food secure (FS), food insecure (FIS), and food insecure with hunger (FISH). Using the same participants, our study also examines nutrient intakes among groups by food security status, weight status, and fast food consumption. In addition, our study examines diet costs in relation to nutrient intake among participants. Our objectives were to: (1) compare mean intakes of each food group from the MyPyramid plan between the days for study participants; (2) calculate and compare money spent on food and beverages consumed on Day 1 and Day 2 of the monthly resource cycle for female FSP participants; (3) compare energy and nutrient intakes of study participants between the days and among groups on the basis of food security status, weight status, and fast food (FF) consumption groups; (4) calculate and compare nutrient-to-cost ratios between the days and among groups on the basis of food security status, weight status, and FF consumption.

Hypotheses

Ho1: Mean food group intake will decline from the beginning of the monthly resource cycle to the end for the majority of participants representing less varied diets.

Ho2: Study participants spend more on food items at the beginning than at the end of the month.

Ho3: FF consumers will have higher diet costs than participants not consuming FF.

Ho4: FF consumers will have higher energy intakes than participants not consuming FF.

Ho5: Obese participants will have lower nutrient-to-cost ratios on Day 2 representing fewer nutrients consumed per dollar spent.

Ho6: FF consumers will have lower nutrient-to-cost ratios than those not consuming FF.

Assumptions

Assumptions made in the design and implementation of this study were:

1. The sample size was adequate (n=64) to describe nutrient intake in this population.
2. Data obtained from 24-hour recalls were representative of usual dietary behavior.
3. Participants involved in the study provided accurate descriptions of portion sizes.
4. Price discrepancies between the location where participants reported shopping and where price collection for the study actually took place were kept at a minimum since prices were obtained from five grocery stores and averaged for each item on the food list.

Limitations

Limitations in this study were:

1. A non-probability sample was used.
2. 24-hour dietary recalls rely on memory.
3. Underreporting of energy intake is associated with self-reported diet measures and is more commonly seen in women than in men and in overweight individuals of both sexes. Underreporting decreases the accuracy of any diet study.
4. The study was conducted on primarily black FSP women living in SE Louisiana; therefore findings may be applicable only to this population.
5. The prices of the food items may vary based on the season and the place of purchase. The food intake data used in this study were originally collected in the fall of 2004, while the food price data for this study were collected in January 2006.
6. For full-service restaurant meals, there was no way of knowing who actually purchased the food items that participants reported consuming. Therefore, all food costs associated with restaurant meals were eliminated from daily diet costs calculated for participants.

Justification

This study is important for several reasons. First, by calculating the amount spent on food for an average day, this will extend the literature available on spending patterns of FSP participants in SE Louisiana. Previous investigations revealed that FSP participants spend far less than what the average American spends on food (19-20). Also, by determining the cost of participant's daily food consumption at both the beginning and end of the monthly resource cycle, we can determine if there are differences in spending patterns on food between the two time frames. FSP participants engage in behaviors such as buying expensive meats and excessive groceries when food stamps are first distributed, and later rely heavily on inexpensive, energy-dense foods when available resources are low (11-12). In addition, by separating individuals based on food security and weight status, we can better understand the differences which may exist in terms of daily spending and nutrients consumed per dollar spent in different segments of the FSP population. Lastly, by examining individuals on the basis of FF consumption, we can see differences in both spending and nutrient intakes among those who consume FF in comparison to those who prepare meals at home.

Overall, by examining nutrient-to-cost differences at the beginning and end of the month in this population, this will allow us to see differences which may exist among groups and between different time frames, in terms of nutrients obtained per dollar spent. This may allow for future efforts to educate the segments of the FSP population who are in most need of improving food shopping practices and budgeting.

CHAPTER 2

REVIEW OF LITERATURE

Food Security/Insecurity

Background

During the 1990's, the United States (U.S.) Government undertook the development of a comprehensive national measure on the severity of food insecurity and hunger (32). Since the 1960's, hunger has been recognized as a major social concern (33). One significant problem was that until the 1990's, there were no publicly-accepted definitions of food "secure" or "insecure," making it difficult to understand the full impact of hunger (33). In 1990, the Life Science Research Organization (LSRO) of the Federation of American Societies for Experimental Biology, under contract for the American Institute of Nutrition (AIN), proposed and published definitions for food security, food insecurity, and hunger (1, 33-33). These definitions have been widely adopted (33).

Concepts and Definitions

The LSRO expert panel defined food security as "access by all people at all times to enough food for an active, healthy life (1, 33-34)." Food security must include, at a minimum: "1) the ready availability of nutritionally adequate and safe foods and 2) the assured ability to acquire acceptable food in socially acceptable ways (35)." The term "socially acceptable ways" excludes such behaviors as resorting to emergency food supplies, scavenging, stealing, or engaging in other coping strategies in order to obtain adequate amounts of food (1, 33-35).

Food insecurity is "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" (1). Households are characterized as "food insecure with hunger" if one or more members of the

household complain of being hungry at any point throughout the year, due to an inability to afford enough food (2).

Food insecurity and hunger are related terms but are not synonymous (34). Hunger is defined as "the uneasy or painful sensation caused by a lack of food." The key here which distinguishes food insecurity with hunger from other forms of hunger is that it is involuntary and arises primarily from financial resource constraint (1, 33, 35-36). It is not the same as being "hungry" as a result of dieting to lose weight, fasting for religious reasons, or being too busy to eat (1, 35). Hunger is a potential, although not necessary, consequence of food insecurity (1). The deprivation of basic need represented by food insecurity and hunger is a possible precursor to nutritional, health, and developmental problems (1).

Measures

Once the definitions of food insecurity and hunger were established in the early 1990's, the focus began to turn toward appropriate ways to measure the prevalence of these phenomena in society (1, 33). The Food and Nutrition Service (FNS) and the National Center for Health Statistics (NCHS) sought advice and participation from researchers in the field on obtaining an appropriate national measure for food insecurity (32, 36-37). Throughout 1994, they worked toward developing, testing and refining a food security measure to be included in the U.S. Census Bureau's April 1995 Current Population Study (38).

The Community Childhood Hunger Identification Project (CCHIP) developed an eight question screening instrument for measuring the prevalence of childhood hunger (33, 38). The instrument was created to be relatively simple yet valid and was intended for families with children under the age of 12 (33, 38). Based on answers provided by parents, the instrument categorizes families as "hungry," "at-risk for hunger," or "not hungry" (38). The CCHIP found

that hunger is most prevalent in children from the lowest income families, with prevalence rates in this group nearly three times those found in the population as a whole (33).

The Cornell Hunger and Food Insecurity Measurement Group developed a 10 question screening instrument referred to as the Radimer/Cornell scale (36). The instrument differentiates among household, individual, and child food insecurity (36, 39). The instrument assumes that food insecurity unfolds in a predictable series of events as problems worsen (36, 39). Although not all households fit into this pattern in exactly the same way, there is a high degree of commonality in the patterns of U.S. households with regard to perceptions and responses to increased severity of food inadequacy (34). In the Radimer/Cornell conceptual framework, household food insecurity is experienced first, followed by compromises in the quantity and quality of foods consumed by the adults (36). This has been shown to be particularly true of low-income single mothers, where quality is first affected in the mother's diet in attempt to spare the child from going hungry (40).

The Core Food Security Module (CFSM) was adapted in part from the CCHIP and Radimer/Cornell scale (33, 41). Consistent with the definitions and descriptions of food security as set by LSRO, the CFSM was also intended to measure food security status (33). Specifically, the measure was intended to determine the extent and severity of household food insecurity during a 12 month period (41). The CFSM is composed of 18 items that are hierarchically arranged to increase as the severity of the food situation increases (33, 41). Of the 18 items within the CFSM, eight pertain specifically to households with children (33). The categories of severity that an individual could be placed in are: marginally food-secure, food-insecure without hunger, food-insecure with moderate hunger, or food-insecure with severe hunger (33, 41).

All of the CFSM questions share common elements (1). Each question incorporates the phrase “because we couldn’t afford that” or “because there wasn’t enough money for that food,” to ensure that the reported behavior or condition actually occurred because of household financial constraints (1). Also, the wording of each question is intended to indicate the time frame in which the screener is seeking reported information, by beginning each question with “in the last 12 months (1).”

A 6-item short form CFSM was adapted from the longer 18-item CFSM. The short form is intended for use when time constraints are an issue (33). Although the short form cannot gather as detailed information as can the full CFSM, prevalence rates of food security/insecurity have been shown to be highly comparable with that obtained from using the full CFSM (33). In fact, when compared with that of the full CFSM, the short form was shown to classify 97.7% of households correctly (42). However, the shorter version is not without its limitations. Three of the reported limitations of the short form include: lack of measuring capacity for all the aspects of food insecurity, lack of items that refer specifically to children (thus reducing the ability to provide data specific to children), and an inability to measure the more severe forms of hunger. With the short form, when classifying households as “food insecure with hunger,” one cannot obtain any further detail on the extent of severity of the hunger experienced (33).

Prevalence Estimates

United States

Approximately 88.1% of households in the U.S. were considered food secure in 2004. This is a decline from the 2003 estimates, where 88.8% of U.S. households were found to be food secure. The remaining 11.9% of households were classified as food insecure (13.5 million households). Approximately 3.9% (4.4 million households) of these food insecure households

were classified as food insecure with hunger. Households were given this classification if one or more members went hungry at any point in the year due to an inability to afford enough food. The remaining 8.0% of food insecure individuals avoided hunger throughout the year by resorting to various coping mechanisms, such as eating a less varied diet, participating in federal food assistance programs, or obtaining emergency food supplies from food pantries or emergency kitchens. These individuals were classified as food insecure without hunger (2).

National prevalence rates from 2004 for food insecurity were shown to vary considerably among different household types. Food insecurity rates were found to be substantially higher than the national average of 11.9% in five groups. These groups were: households with incomes below the official poverty line (36.8%); households with children, headed by a single woman (33.0%) or a single man (22.2%); black households (23.7%); and Hispanic households (21.7%). Households with children were shown to have food insecurity rates that were two times the rates found among households without children (17.6 vs. 8.9%). The most important predictors of food insecurity appear to be black female head of household and low-income status (2).

Louisiana

Prevalence estimates from data at the state level (years 2002-2004) were combined to allow for increased reliability of statistical analysis. Louisiana's average prevalence estimate for food insecurity was shown not to exceed that of the national estimate (11.8% vs. 11.9%). The same was true of households categorized as food insecure with hunger. Louisiana's prevalence estimate for this parameter was found to be 2.6%; whereas, the national average for 2004 was found to be 3.9% (2). Although these estimates show Louisiana's estimates of food insecurity to be lower than national average, it is important to note that these estimates are at the state-level only, and they do not indicate regional and racial differences which exist in food

security/insecurity rates among Louisiana, such as those found among individuals living in the rural LMD (43). Assumption, Iberia, Iberville, and West Baton Rouge parishes are examples of the 37 nonmetro parishes which make up the Louisiana portion of the LMD (44). Results from a study examining food security/insecurity rates of individuals living within the rural LMD indicate that approximately 21.0% of Lower Delta households were food insecure, with the highest rates of food insecurity found among households with income levels below $15,000, black households, and households with children. The prevalence of hunger in Lower Delta households with white children was 3.2%, whereas the prevalence of hunger among households with black children was 11.0% (43). Therefore, individuals who are at greatest risk for food insecurity within this area appear to be those living in low-income black households with children.

The Food Stamp Program

Overview

The Food Stamp Program (FSP) is a federally funded assistance program providing aid to low-income households (45). The origin of the program dates back to the 1930's, during the time of the Great Depression (3, 46). In the 1970's, after the government's declared war on poverty, there was an expansion of the program which converted it into a nationwide program (3, 45-46). The current program structure was implemented in 1977 with one major goal: to provide a nutrition safety net for low-income households, thus reducing hunger and malnutrition, while at the same time, boosting the demand for domestic agricultural products (3, 45). The idea was to allow low-income households the opportunity to purchase nutritious foods by providing monthly coupons that were good for the purchase of food items (4, 24, 45). Today, Electronic Benefit Transfer cards have replaced the use of coupons, and can be used at grocery stores to purchase

most kinds of food (3, 45-46). Examples of items that cannot be purchased with FSP benefits include: alcohol, foods eaten in the store or hot foods prepared at the store, nonfood items, or vitamins and medicine (3, 46).

The FSP is an entitlement program, thus the program's benefits are available to anyone, so long as certain eligibility criteria are met (3). In the FSP, eligibility criteria are based on households, where a household is defined as a person or group of people living together who purchase and prepare food together (3, 45). Members of a household do not have to be related (45). The eligibility and benefits are based on household size, household assets, and gross and net income, where gross income cannot exceed 130% of the federal poverty guidelines, unless the household contains an elderly or disabled member (3, 45-46). The same exemption applies for countable resources as well. Unlike most households that are allowed no more than $2,000 in countable resources (checking/savings, cash, stocks/bonds), households with at least one member who is disabled or 60 years of age or older are allowed up to $3,000 in countable resources. Net income does not have the same exemptions as gross income and countable resources. Net income must fall below 100% of the federal poverty guidelines in all households to meet eligibility requirements (45).

If a family is found to have no net income, after deductions, then the family may receive the maximum food stamp benefit. The maximum benefit level equals the value of the federal government's "Thrifty Food Plan," which varies according to household size. However, if the family has some net income, the maximal food stamp benefit cannot be obtained. Instead, the benefit level is reduced at a rate of 30 cents for every dollar of net income (46).

Characteristics of the FSP

The FSP assists millions of people and is the Nation's largest food assistance program (3, 45-46). The national average monthly participation in the fiscal year (FY) 2004 was approximately 23.9 million people, with an annual cost of $27 billion (3, 47). The monthly average food stamp benefit in FY 2004 was $86 per person and $200 per household (3). Currently, program benefits provide an average of nearly 90 cents a meal per person (45). Participation in the program continues to rise. Compared with the participation level in FY 2000, there was an increase of 6 million participants in the program by FY 2004 (47). In Louisiana, there was an observed increase of 200,000 participants from 2000 to 2004 (47).

In FY 2004, the characteristics of Food Stamp Households were determined. It was found that the majority of food stamp participants were children (50%). The second largest portion of the FSP population was found to be working-age women (28%), followed by working-age men (13%) and individuals 60 years of age or older (8%). Many food stamp households were shown to have little income, if any at all. In fact, 13% of FSP participants reported no cash income at all. Approximately 12 % were above the poverty line, with 40% having incomes that either fell at half of the poverty line or below. It was also found that most food stamp households are quite small. Households with children were shown to have about 3.3 persons, on average; whereas households with elderly members tended to be smaller, averaging about 1.3 persons per household. In addition, food stamp households possess few resources. The average FSP household was shown to possess only about $143.00 in countable resources (48).

Obesity in the U.S.

Obesity Trends

The 2003-04 NHANES estimated that 66% of U.S. adults ages ≥ 20 years were overweight or obese (49). Body mass index (BMI) is a mathematical ratio taking into account an individual's weight, in kilograms, and height, in meters squared (kg/m^2) (49-50). It is used to describe an individual's relative weight for height and is significantly correlated with total body fat content. Overweight is a state defined as having a BMI between 25 and 29.9, whereas obesity is a state defined as having a BMI ≥ 30 (49-50).

The 2003-04 NHANES estimates show that currently approximately 32% (over 66 million) of the U.S. population is obese. When comparing the 2003-04 age-adjusted prevalence estimates of weight status for adults to that of the 1976-80 estimates, the greatest increases were noted in the obesity category. Obesity rates more than doubled during this time frame. The findings also show that obesity rates vary by racial or ethnic group. For adults, the prevalence of obesity is highest among non-Hispanic blacks. These estimates indicated that approximately 45.0% of adult non-Hispanic blacks are obese, 36.8% of adult Mexican Americans are obese, and 30.0% of adult non-Hispanic whites are obese. Differences in obesity rates by racial or ethnic group were also noted among adolescent girls and boys, where the prevalence of overweight was highest in girls who were either Mexican American or non-Hispanic black and in boys who were Mexican American (49).

In the U.S., high obesity rates are associated with low-income, low education, minority status, and high incidence of poverty (5, 13, 51). Among women, high obesity rates tend to be associated specifically with low incomes and low education levels (5, 6-9). Regardless of racial or ethnic background, women of lower socioeconomic status are approximately 50% more likely

to be obese than are women of higher socioeconomic status (10). In Healthy People 2010, it was acknowledged that obesity rates were higher among adolescents from poor households than those from middle and high income households, among black women than among white women, and among the low-income than among the more affluent (51).

The Cost of Obesity

Overweight and obesity are serious conditions which increase the likelihood of developing heart disease, certain types of cancer, type 2 diabetes, stroke, arthritis, breathing problems, and psychological disorders, such as depression (50, 52-54). Overweight and obesity are the result of an imbalance between energy consumed and energy used by the body (53-54). This imbalance is often the result of changes in the environment which favor both excess energy consumption and inadequate physical activity, although overweight and obesity can result from either (52-54). Obesity is a costly condition in the general sense that it increases the risk of morbidity and mortality (53-54). It is also costly in a more literal sense. The economic cost of obesity in the U.S. was found to be approximately $117 billion in 2000 (52). With the increasing rates of overweight and obesity seen across all ages, racial and ethnic groups, and genders over the past 30 years, medical costs associated with complications from excess weight are only expected to rise (47-49, 52).

Obesity and the FSP

<u>Higher Rates Found in FSP Participants</u>

A significant relationship between food insecurity status and overweight for women has been found (55-58). Similar findings have been found among food insufficient households, where food insufficiency is defined as "an inadequate amount of food intake due to lack of resources (59)." Food insufficiency is a narrower concept than food insecurity and is

distinguished from this broader definition by the following: restricted household food stores, too little food intake among adults or children in the household, and direct reports or perceptions of hunger among household members. Where food insecurity includes food insufficiency in the scope of its definition, it also includes resource insufficiency, the inability to acquire enough nutritious food through culturally normalized means, and anxiety about this inability, along with various attempts to augment or stretch the food supply (60).

Analyses of NHANES III data indicated that women, but not men, in food-insufficient households were more likely to be overweight than were food-sufficient women (5, 59). The difference in the prevalence of overweight between the food insufficient and food sufficient females was found to be 11% (58% compared with 47%) (5, 59). Prevalence rates of food insecurity are much higher among low-income communities when compared with middle-income communities (2, 56). Because the majority of FSP recipients live within low-income communities (56), it seems logical that obesity rates would be higher among FSP recipients than among non-participants.

Obesity rates have been found to be higher among female FSP participants than among female non-participants. Using national health and nutrition data from the1988-94 NHANES, it was found that 42% of women who participated in the FSP were obese. This was significantly higher than obesity rates in both eligible and ineligible non-participants, which were 30% in eligible nonparticipating women and 22% in ineligible women whose incomes exceeded the eligibility limit (3). This finding has been supported by another study where FSP participation in each of the previous five years, when compared with no participation over that time, was associated with a 20.5% increase in the predicted probability of current obesity (4).

Potential Explanations of Obesity Rates in FSP Participants

One explanation for the greater rates of obesity found in FSP participants could be the variation in food consumption over the Food Stamp benefit cycle, which is referred to as food cycling (3-4, 10-11). Food cycling can be defined as a situation in which families overeat when their monthly benefits first arrive. It is a practice which has the potential of leading to food deprivation, and thus, food insecurity, when benefits are near depletion (3-4, 10-11). The result is a pattern of eating which mirrors the cyclic availability of food for the household (3). With periods of binge eating, as seen when food again becomes plentiful, weight gain is a likely outcome over time (3-4, 10-11). If in fact, this is the case in many FSP participants, then the monthly cycle of food stamps may contribute to weight gain, independent of the amount and form of the benefit (3).

In a recent study of the New Jersey Expanded Food and Nutrition Education Program (EFNEP) and Food Stamp Nutrition Education Program, nutrition educators were selected and interviewed regarding the food management practices of program participants (11). Well-documented strategies of program participants included overeating when food was available and engaging in cycling monthly eating patterns (11). Participants commonly bought expensive meats and excessive groceries when food stamps and public assistance checks were first distributed and then had to rely heavily on a limited number of inexpensive, energy-dense foods toward the end of the month when available resources were low (11-12).

The consumption of energy-dense foods, such as refined grains, fats and sweets are likely due to their inexpensive, highly palatable, and convenient nature, making them particularly appealing choices when funds are at their lowest (13-14, 16, 24, 61). With recent technological advancements in the production of sugar and fat, the costs of producing foods notably high in

added sugars and fat are remarkably low (13-14). Additionally, price increases over the past years have been instrumental in widening the gap between the costs of energy-dense foods with those that are nutrient-dense (14). For example, the energy cost of potato chips is $0.08/100 kcal, and the energy cost of soft drinks is $0.09 to 0.16/100 kcal. The energy costs of fresh carrots and frozen orange juice are $0.40/100 kcal and $0.59/100 kcal, respectively (14). At a minimum, the juice and fresh carrots were about three times higher in cost. Limited financial resources are one reason people are not eating more healthfully (13). And, with the inability of individuals to compensate for changes in energy density in the diet by altering the volume of food consumed, as seen in short-term experimental studies, it is understandable that energy-dense diets have been linked to the increased rates of obesity in the U.S. (62-64). This may, in part, be a component in the explanation of why higher rates of obesity and diabetes are found among low-income and minority populations (14, 62).

Food Consumption Practices

Among the Low-Income

Households with low education and income levels are likely to consume poor diets, due in part to a limited understanding of nutrition requirements and also due to a lack of access to healthy foods and lifestyle choices (24). This is a significant problem for Louisiana considering that 2005 estimates revealed that poverty and low education levels are higher in the state than for the nation (65). Food choices are generally made on the basis of taste, cost, and convenience, and, to a lesser degree, health and variety (13). However, the main determinant of diet quality in low-income households has been shown to be food costs (14-18). Diet quality has been shown to decline when less money is spent on food (15, 18), and several studies have supported the finding that low-income individuals spend less on food than does the average American (19-20),

even when faced with higher food costs (21).

Low fruit and vegetable consumption is common in low socioeconomic status (SES) groups and suboptimal nutrient intakes, particularly for vitamin C and ß-carotene are often the result (10, 15). Increased risks of cancer and cardiovascular disease have been observed in individuals who consume very low amounts of fruit and vegetables (15). There is a strong inverse relationship between vitamin C status and all-cause mortality (24). In addition to vitamin C and ß-carotene, low intakes of folate and potassium have been reported in low SES compared with high SES groups (15). Important sources of folate in the diet include whole-grain cereals, fortified grain products, animal products, and in particular, dark-green leafy vegetables (66). Important sources of potassium in the diet include dairy items, such as yogurt and milk, fruit, vegetables, and meat (67).

Low-income households frequently confront the following constraints when attempting to purchase foods: lack of nearby supermarkets, limited selection in nearby stores, lack of transportation to stores of their choice, lack of child care, and limited time to do food shopping (68). In addition, some studies have found that the poor face higher prices for food due to their greater representation in urban and rural locations (as opposed to suburban locations), where food prices tend to be higher (12, 21). Large supermarkets not only offer a greater variety of foods, but they also offer these foods at lower costs than other types of grocery stores. When compared with large supermarkets, the average market basket costs 33% more in small grocery stores and 50% more in convenience stores. In one study, which examined all 200,000 FSP authorized food retailers in 1995, it was found that approximately 40% of the rural population resided in localities without a supermarket or large grocery store (68). Despite facing higher prices, low-income shoppers still spend less than higher income shoppers for food purchases in

grocery stores (21).

A recent U.S. Department of Agriculture (USDA) study analyzed grocery store checkout scanner data and identified four economizing practices that help low-income households reduce their food expenditures (12, 21). These practices include: (1) purchasing a greater proportion of discounted food products; (2) purchasing more generic or store-brand products than do higher income shoppers; (3) purchasing larger package sizes in order to take advantage of volume discounts; (4) purchasing less expensive food products within a product class (for example, lower grades of meat) (12, 21, 68). The result of purchasing less expensive food products within a product class is generally a decrease in food quality. The study revealed that fruits and vegetables, along with meat were the prime targets chosen by low-income individuals to purchase at lower quality to economize (12, 21). On a per-capita basis, low-income households purchased 7.6% more meat and poultry (combined) than middle-income households and 6.7% more meat and poultry than high-income households (21). These low-income households did, in fact, purchase more meat and poultry than the higher income households, but because they chose lower quality cuts over the more expensive and lean higher quality cuts, they were able to buy more meat and poultry at a lower cost (12, 21).

Similar trends were seen with the purchase of fruits and vegetables, where lower-income households paid less per pound than did higher-income households. But, unlike meat and poultry, low-income households did actually purchase less fruit and vegetables than the higher-income households. It was reported that of the fruits and vegetables purchased within low-income households, the majority were those items normally available at the lowest cost. For example, low-income households purchased 4% more bananas, which is a relatively cheap fruit, than did high-income households. In contrast, high-income households purchased 18% more

berries, which are relatively expensive fruits. Results of this study indicate that although low-income households are buying more meat than higher income households and are purchasing fruits and vegetables, they are still doing so at a lower cost than higher income households. This is because low-income households are choosing items of lower quality, and thus lower cost, within certain food groups (12, 21).

Among the Food-Insecure

In addition to low-income versus higher income households, differences in quality of diet also exist between adults from food-insufficient families when compared with those from food-sufficient families (28). Previous studies have supported the finding that differences in diet quality do in fact exist among children, women of child-bearing age, and elderly members of food-insufficient households when compared with their food-sufficient counterparts (26-27). However, these studies did not include serum concentrations of nutrients, which reflect longer-term nutritional status and are less prone to measurement errors of nutrients than from the collection of 24-hour dietary recalls alone (28).

In a recent study addressing these discrepancies in nutrient intakes between adults of food-insufficient (FIF) and food-sufficient families (FSF), both dietary intakes and serum nutrient concentrations were examined (28). The study revealed that when compared to their food sufficient counterparts, younger adults (aged 20-59 y) from FIF had lower intakes of calcium and were more likely to have calcium and vitamin E intakes below 50% of the recommended amounts on any given day (28). Adults of FIF also reported a lower one-month frequency of consumption of milk and milk products, fruits and fruit juices, and vegetables. In addition, they had lower serum concentrations of vitamin A and α-carotene, ß-cryptoxanthin and lutein/zeaxanthin, which are most abundantly found in yellow fruits and vegetables (28).

In addition to discrepancies in diet quality between adults of FIF and FSF, discrepancies in diet quality have been found between adults with children from FIF and adults not having children from FIF. Adults with children have been shown to have worse diets than adults without children. This finding is in agreement with the Radimer/Cornell conceptual framework (36, 39). Diet quality is first affected as the variety of meals purchased within the household declines as an attempt to stretch available funds; however, as the severity of the resource constraint increases quantity declines as well (10, 27). In this case, there are no longer enough funds to purchase adequate amounts of food for the household, and thus, both adults and children in the household go hungry (10, 27).

Among households with children, adults generally compensate for insufficient food by decreasing their intake and giving their share to the children in the household, which affects only the quality of the adults' diets at this point (2, 25, 36, 38). The next event which occurs as severity increases is a decrease in diet quality for the child (36). Adults of the family are unable to purchase nutritious foods and food choices are based on limited choices (68). Child hunger represents the last stage, indicative of the most severe problems with household food insufficiency, where both quality and quantity of the diet are affected for the child (36, 39).

All of the previous findings support the idea that adults from FIF have diets that may compromise their health. Since food insecurity plagues low-income communities to a much larger degree than middle-income communities (12), this lends support to the belief that low-income individuals, and specifically food insecure individuals, suffer from diets of poor quality.

What Defines Diet Quality?

Guidelines for Americans

For decades, there have been measures gauging the nutritional quality of diets (69-73). The knowledge that diet quality largely predicts the risk for disease has become increasingly evident (74-77). With more and more investigations on diet and disease, and on how specific nutrients act and interrelate with one another in the body, dietary recommendations have been improved. The 2005 Dietary Guidelines for Americans (DGA) illustrate this, providing information on the importance of nutrients within specific food groups (78). The term "choose a variety of" is often used when pertaining to food such as fruits and vegetables, since the nutritional quality of these foods is known to differ among different foods within the groups. The concept of nutrient-dense foods is discussed often, along with the importance of frequently including these items in the diet (78). However, not everyone is able to adopt this lifestyle. This is particularly true of many low-income (10, 13, 15, 20-21, 24-25) and food insecure (26-28) Americans. Whether due to the cost of implementing such a diet (8-10, 15-16), the inability to receive access often enough to grocery stores to purchase perishable items recommended within this diet (12, 79), or the lack of education on how to implement such a diet (24, 65), low-income individuals suffer from poor diet quality.

Nutrient/Energy Density

Distinguishing Factors

Energy density of foods is defined as the energy per unit weight or volume (kcal/100 g or kcal/ml) (13, 17). Cost refers to the purchase cost per unit of energy (dollars/kcal) or the purchase cost of a daily diet (dollars per day) (13). It has been suggested that energy density (in kcal/kg) and energy costs (in $/kcal) are inversely linked, such that the selection of energy-dense

foods by low-income and food insecure consumers may be a deliberate attempt to keep costs down (5). The irony is that experimental studies have actually found that these palatable energy-dense foods are associated with diminished satiation and satiety, "passive over consumption" of fats and sweets, and higher energy intakes overall (5, 62). In contrast, foods with high water content, such as fruits and vegetables, are said to promote a feeling of fullness, which leads to reduced energy intakes throughout the day (5, 16).

With the rising rates of obesity and type 2 diabetes in the U.S. continuing to be linked to a growing consumption of added fats, added sugars, and refined grains, more and more, recommendations aim to limit these high energy foods in the diet. Instead, it is recommended that they be replaced with lower energy, nutrient packed foods, such as whole grains, fruits, vegetables and low fat dairy (5, 13, 24, 80). The current U.S. diet has been estimated to derive close to 50% of energy from added sugars and fat (5). This is particularly relevant for low-income and minority populations, as the burden of obesity and diabetes have been shown to fall disproportionably on them (14). The economics of food choice are thought to help explain why low-income families have the highest rates of obesity, with the explanation largely focused on the inexpensive nature of energy-dense foods commonly consumed by this population (14).

Some examples of foods which provide substantial amounts of energy at the lowest cost include: fats and oils, sugar, refined grains, and potatoes. The problem with foods that are described as energy dense is that they are sometimes poor in important vitamins and minerals (5). This is particularly true of foods with added fats and sugars. Foods that are described as energy-dense are in direct opposition to what is believed to constitute a "healthy diet," and have been suggested to be "obesity promoting" foods available to the public at the lowest cost (5).

Dietary recommendations of the past have focused on items that should be limited within the diet, such as too much fat, saturated fat, cholesterol, sugar, and sodium (13). For example, in the late 1990's the World Health Organization (WHO) cautioned against the excessive consumption of energy-dense foods, notably those high in sugar and fat. The recent advice to limit the consumption of energy-rich foods is based on the assumption that energy-density and nutrient-density are inversely related. Although this may be the case in many situations, it is important to note that it is not the case in all situations. For example, potato chips and candy are often described as energy-dense food items; however, some definitions of energy-density place whole grains and cereals as energy-dense items as well. Therefore, it is important to note that not all foods that are dense in energy are necessarily poor in nutrients (16). Although it is generally true that foods dense in energy are those foods high in sugars, starches, and fats, some believe that there is a more distinguishing characteristic which separates foods that are energy-dense from foods that are nutrient dense. This characteristic is the water content of a food. Whereas foods that are energy-dilute and generally dense in nutrients are heavily hydrated, foods that are energy-dense are dry (16).

Building Criteria for a Nutrient Dense Diet

The defining characteristics of what constitutes "a healthy diet" have changed throughout the years (69-71, 72-73). With the appearance of the notion that "all foods can fit," many found it unnecessary to address single foods contributed to the overall composition of a diet (69). Instead, most measures of nutritional quality focused on total diets only (70-71). The focus is now increasingly turning towards which foods contribute to a healthy diet, and the term "nutrient density" is gaining attention (78, 81-82). The nutrient density standard of a food, as set by the Food and Drug Administration (FDA), is the ratio of the amount of beneficial nutrients relative

to the food's energy content and is based on the recommended serving size of that particular food in question (81). Although energy-dense food items are often agreed upon by society as refined grains, and foods high in added fat and sugars, nutrient-dense items aren't always as clearly defined (81).

Traditional ways of evaluating the nutritional adequacy of diets were based on comparisons of nutrient intakes with that of the established Recommended Dietary Allowances (RDAs). The two key measures used were the nutrient adequacy ratio (NAR) and the mean adequacy ratio (MAR). The NAR is simply the ratio of the intake of a given nutrient relative to the RDA for that nutrient. The MAR could then be calculated by averaging the sum of the NARs for a given number of nutrients under investigation within a diet (81). The use of the RDA in determining diet quality was, at least in part, based on the belief that individuals consume a variety of food items throughout the day, making it possible to reach the RDA within energy needs. This is not always the case with differing levels of income, as diet variety is often an expendable component of diet. When incomes diminish, diet quality does as well (83-84).

Previous studies on diet quality have shown that by increasing the number of servings within the different food groups in the food pyramid, the probability of nutrient adequacy within the diet is increased. Moreover, by increasing the variety of foods within the food groups this further increases the likelihood of achieving a nutritionally adequate diet (83). With the prevalence of energy-dense nutrient-poor foods increasing in the diets of the poor, low diet quality, characterized by inadequate nutrient intake, is the result. For diets like these, in order to meet the RDAs, much higher energy intakes would be needed (14, 83-84).

With this in mind, the Food and Agriculture Organization (FAO) of the United Nations suggested replacing these preexisting RDA measures of diet quality with the nutrient density

approach, stating that nutrient-to-calorie ratios provide a more direct comparison between the intake of essential nutrients and the amount of energy that the given food provides (85). This idea was raised in effect, to help consumers maximize their nutrient-to-calorie ratio, since the overwhelming majority of Americans are not meeting the criteria for a healthy diet, as shown in studies which analyzed diets using the Healthy Eating Index (HEI) (86).

Earlier approaches to index the nutritional quality of certain foods focused only on one nutrient at a time within the food in relation to the total daily requirements of that nutrient (81). A broader approach focusing on a collection of nutrients within a food was needed. Thus, the calories-for-nutrient (CFN) and the naturally nutrient rich (NNR) scores were created. The CFN score is defined as the cost in energy that was required to gain an additional 1% daily value for a range of nutrients of 13 nutrients. The nutrients were as follows: protein, vitamin A, vitamin C, thiamine, riboflavin, niacin, folic acid, vitamin B-6, vitamin B-12, calcium, iron, magnesium, and zinc. Lower CFN scores translated to a lower cost in energy to obtain the nutrients associated with a given food and foods such as skim and low-fat milk had lower scores than did milkshakes or ice cream (81).

The NNR score is a nutrient-to-calorie ratio which initially included measures of 14 key nutrients within a given food (81). More recent versions of the NNR have expanded this list to include the following 16 nutrients: protein, fiber, monounsaturated fat, vitamin A, vitamin C, vitamin D, vitamin E, thiamine, riboflavin, vitamin B-5, folate, vitamin B-12, calcium, iron, potassium, and zinc (81). Consistent with the FDA's nutrient density standard of foods, the NNR score assessed the nutrients that a food contained in relation to the food energy it provided. The 2005 DGA stress the importance of choosing nutrient-dense foods and have went as far as identifying foods within particular food groups that are more nutrient dense than others. The

NNR was used in order to determine which foods scored higher within the food groups of MyPyramid. For example, it was found that within the fruit group, fresh grapes, fruit in light syrup, and other fresh fruits had a higher nutrient density (receiving a higher NNR score) than the more caloric items, such as raisins or fruit in heavy syrup (81).

Interests in redesigning the labels of food items as to incorporate a nutrient density standard and the nutrient-to-energy ratio have been expressed by the FDA. With this in place, consumers will be able to evaluate individual food items at the store based on their nutrient density and maximize the nutrient content of their diets with the fewest number of calories. Studies are currently underway evaluating the NNR score to determine if it is, in fact, in accordance with such diet quality measures as the HEI (22).

Current Recommendations

Although defined in several ways, nutrient dense foods are often thought of as "those foods that provide substantial amounts of vitamins and minerals and relatively few calories (78)." Through stressing the importance of maximizing one's intake of nutrient-dense food choices such as fruits and vegetables, whole grain products, and fat-free or low fat milk products or milk equivalents, the 2005 DGA aim for achieving "adequate nutrients within calorie needs." In addition, a high intake of these foods has been associated with a lower risk of coronary heart disease (CHD) and better health status overall (87). A high consumption of energy-dense foods is believed to encourage the opposite, which is an "inadequate amount of nutrients within calorie needs." Inadequate nutrient intake is often still the case even when consuming these foods in excess of energy needs (14, 81).

If public health recommendations are focused on increasing the nutrient density of diets and if the message of replacing fats and sweets with vegetables and fruits is emphasized, then

following these recommendations should be accessible to all members of society (87). However, several studies provide support for the finding that, on a cost per calorie basis, fruits and vegetables, lean meats, and dairy foods are more expensive than fats (oil, shortening, margarine and butter); snack foods; beans; sugars; and refined grains (white rice, bread, pasta) (5).

<u>The Cost of Healthy Eating</u>

Studies Relating to Higher Costs

Studies on the relation of food costs to diet quality have been emerging in the literature (5, 15, 17-18, 22-23). There is substantial evidence that food choices are largely dependent on food costs, which is particularly true of low-income households (13-18). In a study of FSP participants, it was reported that food cost alone was the most important consideration in making food choices and that "the most important factor in choosing and preparing foods was to ensure that no one would complain that they are still hungry (88)." Engel's law (1857) states that the proportion of income that is spent on food diminishes as incomes increase; supporting the finding that cost is a more important consideration for low-income families (14).

In agreement with this law is the finding that low-income households spend a higher proportion of their income on food than do higher income households (14, 19). Households with incomes greater than $70,000/year spent 8.7% of after-taxes income on food. In contrast, low-income families with incomes between $5,000 and $9,999/year spent approximately 34.2% of their after-taxes income on food (89). Although a higher proportion of income is spent on food in low-income households, this may still translate to less money spent per day on food than in higher-income families (14, 89). Whereas the average American spends less than $8.00/d on food and beverages, low-income families spend as little $3.50 spent per person each day (11, 19-20). Since diet quality declines as less money is spent on food, this finding provides further

support for the concept that the low-income suffer from diets of low quality (24). Diet quality is even further affected in low-income households if, in fact, healthier diets do cost more (15).

The question of whether it is more expensive to consume a healthy diet was addressed by a group of researchers in Germany (22). Using data from the UK Women's Cohort Study, researchers were able to collect detailed food frequency questionnaires (FFQ) on study participants. Diet quality was predicted by developing a healthy diet indicator (hdi), with values from 0 to 8, which was in accordance with the dietary recommendations of the WHO. Individuals with the highest diet quality received a total score of 8; whereas, individuals with the lowest diet quality received a total score of 0. This was done for all diet parameters. When comparing the highest diet quality group with that of the lowest diet quality group, researchers found that women in the healthy diet group were almost four times as likely to be vegetarian and have a higher educational level. Also, it was found that total energy intake increased and BMI decreased with increasing hdi group. In fact, women with the healthiest diets (hdi 8) ate approximately 1,000 more kcal per day and had the lowest BMI of the participants (22.9 kg/m^2) (22). For individuals with the lowest BMIs consuming 1,000 more calories, on average, than individuals with higher BMIs, it seems probable that there was a great deal of underreporting taking place in this study among the overweight.

Upon examining differences in cost, it was found that the difference between the extreme hdi groups (0 and 8) was $2.75 per day, which translated to a difference in spending of about $1,000.00 per year on food between the two groups. The unhealthiest diet group (0) spent more money on meat, fish and eggs than the healthiest diet group. Meat accounted for the majority of spending in hdi group 0, followed by vegetables; whereas, fruit and vegetables were found to occupy the largest percentage of the budget in hdi group 8. Individuals falling into the healthiest

diet group were generally: older individuals who were vegetarians and those with low BMIs, higher energy intakes and the ability to spend more money on food items (22). Because individuals with the lowest BMIs in the study reported higher energy intakes than individuals in other weight classifications, this suggests underreporting of energy intake among obese subjects.

Another study examined the relationship between energy density and the cost of freely chosen diets (23). The study analyzed the food consumption of 837 adults and focused on 57 food items that were reportedly consumed, after excluding such items as drinking water, alcoholic beverages, and baby formula. Dietary energy density was calculated by dividing energy intake by the estimated edible portions of all foods and caloric beverages reportedly consumed by individuals. Diet costs were determined by attaching a price to each of the food items that study participants reported consuming, which was provided by the French National Institute of Statistics. The study concluded that energy density of the diet and diet costs were inversely related. Women within the study were found to have the highest energy costs, as they reportedly consumed more energy-dilute, nutrient dense diets (23).

Although the previous two studies do provide support for the finding that lower quality, higher energy dense diets are available at lower costs, they did not look at how different incomes affect purchasing ability. In a French study, linear programming (LP) was used to predict whether a cost constraint would have effects on food selection and nutrient density (15). Although the main application of LP in human nutrition has been to identify low cost nutritious diets for populations, it was used as an alternative method to simulate the impact of varying diet cost on other variables, such as food composition and nutrient density of the diet. Researchers found that as the cost constraint was strengthened, the proportion of energy contributed by fruits and vegetables, meat, and dairy products decreased; whereas, the proportion of energy from

cereals, sweets, and added fats increased. Nutrients which appeared to be most largely affected when comparing the diet with the largest imposed cost constraint to the diet without a cost constraint were shown to be vitamin C and ß-carotene. These two nutrients have been shown by previous research to be key nutrients lacking in the diets of low-income populations. In effect, the study illustrated that by imposing a simple cost constraint, the result was a diet closely reflecting what is consumed in low SES groups (15). These results were further supported by a similar study which, through use of LP, found that by forcing the costs of the LP diets to decrease, a strong increase in the energy densities of the corresponding diets was induced (12).

In another study, which stratified adults by quartiles of diet energy costs (in $/10 MJ), it was found that participants in the lowest quartile of energy costs had the highest energy intakes, the most energy-dense diets, and the lowest intakes of key vitamins and other micronutrients. In contrast, participants in the highest quartile of energy costs had lower energy intakes, with diets higher in nutrients and lower in energy density. Participants in the highest quartile, with the highest quality diets, also encountered the highest diet costs. On average, their daily diet costs were 165% higher than participants in the lowest quartile, furthering support for the existing belief that nutrient-dense diets are associated with higher diet costs (90).

Lastly, a study was conducted which examined the cost of fats and sweets in the diet versus the cost of vegetables and fruits. The researchers wanted to determine if it was more expensive to replace fats and sweets in the diet with the same amount of fruits and vegetables by weight. The study further supported the idea that energy-dense foods, and thus energy dense diets, are less expensive than nutrient-dense foods. For differing levels of energy intake examined in the study, each additional 100 g (approximately 3.5 oz) of fats and sweets was associated with a 0.05 to 0.40 cent reduction in diet costs; whereas, each additional 100 g of fruit

and vegetables was associated with a 0.18 to 0.29 cent increase in diet costs (87).

However, diet quality is still a function of social class. It is generally recognized that older and wealthier consumers have higher quality, healthier, and more varied diets, with a higher proportion of high-quality meats, seafood, vegetables, and fruit; whereas lower-income households have a higher proportion of low-cost meats, inexpensive grains, added sugars, and added fats (13-14). Dating back to the late 1800's, it was recognized that wheat flour and dry beans provided energy and protein at a lower cost than did food items such as meat and fruit (13). It is still agreed upon that dry foods with a stable shelf life are less costly (per 1,000 kcal) than are perishable meats, fish, dairy, or fresh produce (13). However, the relationship between energy density and energy cost is not fully understood, and due to a lack of an updated food price database for the U.S., the link remains unclear (13, 16, 18).

With several studies showing that healthy diets are costly, the low-income will likely have the most difficulty in achieving one. With recommendations, such as those seen in the Healthy People 2010 report, mentioning the importance of consuming a healthful assortment of vegetables, fruit, whole grains, low-fat milk products and fish, lean meat, poultry or beans, one must question how such a diet could be achievable in low-income communities (51).

CHAPTER 3

SUBJECTS AND METHODS

Study Approval

This study was approved by the Institutional Review Board by Louisiana State University Agricultural Center on July 10, 2003. It was given approval number H03-05.

Description of Prior Study

This study was part of a larger study: *Food security status, nutrient intake at the beginning and end of the monthly resource cycle, and body mass index in female food stamp recipients*. A brief summary of the initial study design is necessary to include in this study. Complete details can be found in the unpublished Master's thesis (91).

Participants

Seventy-two adult female food stamp recipients were interviewed in their homes in Assumption, East Baton Rouge (EBR), Iberia, Iberville, Orleans, St. Mary, St. Tammany, and West Baton Rouge (WBR) parishes. Study participants were predominantly black (94%) between 19 and 75 years of age who resided in rural areas.

Data Collection

Interviews were conducted at the participant's home in the fall of 2004 at the time of month when food stamp benefits were first received. It was at this time that initial 24-hour dietary recalls (Day 1) were collected. Approximately 3½ weeks later, a telephone-administered interview was conducted as a means to collect follow-up 24-hour dietary recalls (Day 2). After interviewing the participants, eight were excluded from analyses: five were pregnant, two were older than 70 years, and one reported an energy intake greater than 13,000 kcal. Therefore, a total of 64 participants were used in the study.

Stated height and three measurements of body weight were recorded for each participant during the initial interview (Appendix A). An average of the weight measurements was taken and BMI was calculated. Food security status was also determined during the initial interview using a modified USDA short form (Appendix B).

Current Study

In order to determine the cost of all FSP participants' diets within the study, all items that participants reported consuming in their 24-hour dietary recalls needed to be priced. Because study participants resided in different areas throughout SE Louisiana, several locations would have to be visited in order to obtain food prices that reflected the actual prices of food found in the areas where study participants resided. Another diet study was being conducted at this time which required averages of food prices from grocery stores as well. Through that study, grocery stores were contacted in SE Louisiana and, with the approval of the general manager of the store, were placed into a list of possible locations to visit. Managers were asked when they would prefer the price collection and were told that they would receive a call from the student visiting their store confirming the time and date. From the full list of stores that agreed to participate, the following five full-service grocery stores were selected to be used in this study: Albertson's, Piggly Wiggly, Morales, Midway, and Schexnayder's (Appendix C). After contacting managers at each grocery store and setting up a date and time, price collection began. Price collection occurred from Tuesday, January 10, 2006 to Friday, January 13, 2006. Albertsons and Piggly Wiggly were visited first (January 10th), followed by Morales on January 12th, and Midway and Schexnayder's on January 13th.

Recording and Classification of Raw Data

Collection of Prices

For this study, Day 1 and Day 2 dietary recalls were examined, and all food/beverage items that participants reported consuming on both days were combined into a single food list. The food list was divided into the following food sections: produce; canned; frozen; breads and other grains; milk and cheese; meat and meat alternatives; and "baking," "beverages," and "snacks" (Appendix D). This was done to increase the ease of finding food items and decrease the time spent per grocery store. Both the product name and any criteria which may have been necessary to identify the correct product (e.g. individual, per pound) were included on the food list. Price per unit (PPU) (e.g. cents/oz), and any additional comments which were deemed helpful in distinguishing serving sizes (e.g. 12 packets/container) were recorded for each food item at each of the five locations. When PPU was not provided on the food labels at the grocery store, it was later manually calculated by taking the total price of the package and dividing by its weight or yield (e.g. per ounce or packet). Once all price information was collected, PPU was entered into Excel by grocery store location and average PPU was determined for each item (Appendix E). Therefore, the final averages of each food item reflected food prices obtained at five grocery stores in most cases, with fewer prices used to determine the average in instances where grocery stores did not have a particular food item in stock.

Determination of Daily Diet Costs

Before individual 24-hour dietary recalls could be priced, and thus, daily diet costs determined, several areas first had to be addressed. The first area concerned the fresh fruit/vegetable section and the meat section of the food list. Prices collected from grocery stores for these items reflected the as purchased (AP) and not the edible portion (EP) cost/lb of produce

and meat. The AP of a food accounts for the whole product, including portions which are typically not consumed (e.g. the core of an apple, the bones of chicken); whereas, the EP accounts for only the portion of the food which is consumed. Therefore, a conversion from AP to EP was necessary prior to calculating daily diet costs. The EP was determined by dividing AP (edible plus discard material) of the food that was to be priced (e.g. 1 lb tomatoes) by the edible portion (e.g. .90 lb EP per lb AP) found in one pound of that item (92). From this calculation, the amount needed in AP to yield 1 lb EP was determined. Finally, the EP amount was multiplied by the price per pound for the particular food item. The results of this calculation gave the final adjusted price for one pound of EP. This calculation was done for all produce and meat items listed from each store and average PPU was re-calculated, as shown in Appendix D.

The second area which needed to be addressed prior to calculation of daily diet costs were the fast food (FF) and restaurant items that some participants reported consuming on their 24-hour dietary recalls. All fast food items in which participants reported consuming were collected and entered into an Excel file, along with the participants' name and the location at which the food was purchased (e.g. Burger King/Subway). One FF establishment for each location was visited and prices were recorded for each item that had been reported on the 24-hour dietary recalls. Restaurant food items were not accounted for in the same way. Initially, restaurants were to be visited in the same manner as FF establishments (when available in the area); however, later it was decided that because there was no way of determining who actually purchased the restaurant food in which participants reported consuming (which was often expensive), food costs associated with restaurants, but not FF establishments, were omitted from daily diet cost calculations.

The final area necessary to address prior to calculation of daily diet costs was for foods consumed in the 24-hour recalls which were prepared by a recipe. For some participants, the recipe was documented, allowing the total recipe cost to be calculated, and then the price per serving. However, not all participants were able to provide a recipe, as they either ate food prepared by a family member or simply could not recall all of the types and amounts of ingredients. For these participants, standard recipes were used, and the total recipe cost was calculated, along with the price per serving (Appendix F).

After addressing these concerns, the 24-hour diet recalls were ready to be priced. This was done by determining the price of a particular serving for each food item that participants reported consuming, and then totaling the calculated prices for each food item on the corresponding 24-hour dietary recall. Once this was completed for all dietary recalls, there was a set of daily diet costs (n= 64) for Day 1 and Day 2.

Determination of Daily Nutrient Intakes

Daily nutrient intakes were determined by entering the food/beverages of each 24-hour dietary recall individually into the MyPyramid Tracker available on the USDA's MyPyramid website (93). MyPyramid Tracker required the age, gender, height and weight of each participant prior to allowing entry of food/beverages. Once all food/ beverages were entered for the corresponding day, serving sizes were selected for each food item, according to the amount participants reported consuming on their 24-hour dietary recall. With dietary information and serving sizes selected, individual diets were analyzed and the following information was provided: the total for each nutrient consumed that day (along with recommended values for the corresponding nutrient), the number of cup/ounce equivalents consumed from each food group for that day, the percent of recommendations met for each food group within the MyPyramid

plan, and whether the diet fell within recommendations for total fat, saturated fat, cholesterol and sodium. The nutrients included in the final analysis were: protein, total carbohydrates, fiber, total fat, saturated fat, cholesterol, vitamin A, vitamin C, folate, potassium, calcium, iron, and sodium. For each individual, these nutrients were entered into Excel for both Day 1 and Day 2, along with cup/oz equivalents and percent recommendation met for the following food groups: grains, fruit, vegetables, milk, and meat/beans.

In addition to the 5 food groups from MyPyramid Tracker, two more groups were added. These two groups were adjusted vegetables and whole grains. The adjusted vegetable group is the daily vegetable intake of participants minus French fry consumption. It was determined for any participants reporting having consumed French fries on their recall and was done by re-entering dietary recalls into MyPyramid Tracker (at the exclusion of French fries). After examining the 24-hour dietary recalls and noting the high prevalence of refined grains among the diets, daily whole grain intake for participants was calculated. The whole grains group was created by entering each dietary recall containing whole grain foods into MyPyramid tracker. This time all refined grains were omitted from the analysis. However, unlike adjusted vegetable intake, which remained the same as unadjusted vegetable intake had the participant not consumed French fries; participants who did not consume whole grains received a zero in the adjusted grains (whole grains) category.

<u>Nutrient-to-Cost Calculations</u>

Nutrient-to-cost ratios were determined by taking each nutrient and dividing that amount (either in grams, milligrams, or micrograms) by the daily diet cost determined for the corresponding day. There were 13 values for each participant for both Day 1 and Day 2. Each of these values represented the amount of nutrient consumed per dollar spent for that day.

Data Analysis and Reporting

In the initial study, each of the 64 participants were classified in one of three groups: food secure (FS), food insecure (FIS), or food insecure with hunger (FISH). Because of its small size (n=8), the FISH group was collapsed into the FIS group for all analyses in this study. In addition, the initial study classified individuals on the basis of weight status in the following six ways: underweight, normal weight, overweight, or obese class I, II, or III, where the three obesity classes were defined as having a BMI between 30.0-34.9, 35-39.9, or ≥ 40.0, respectively (91). Because of the small size, underweight (n= 3) and normal weight (n=7) were collapsed with overweight and classified as non-obese for all data analyses in this study. Similarly, class I, II, and III obesity were collapsed into one category and classified as obese. The last classification used for data analyses in this study placed participants in one of two groups: FF consumption or no FF consumption. Any individual reporting having consumed FF on one or more occasion on Day 1 was placed into the FF consumption group; the same was true of individuals reporting consuming any FF on Day 2. All descriptive statistics and t-tests reported within the study were calculated using Microsoft Excel for Windows. Because of the exploratory nature of this study, in all t-test analyses, a probability value of p= 0.10 was considered significant.

Mean cup/oz intakes were determined for each of the five food groups in MyPyramid, along with the adjusted vegetable and whole grain groups, on Day 1 and Day 2. This was done for the whole sample and on the basis of food security status, weight status, and FF consumption. Mean age was calculated for each group and from this, the recommended number of servings for each food group was determined. Mean intakes of food groups were compared between the days for all groups using the paired t-test statistical analysis tool in Excel. Mean intake was also

compared among groups (e.g. FS vs. FIS) using the two-sample equal variance t-test statistical option. Data on mean food group intake are presented as mean ± SD in all corresponding tables. The number and % of participants meeting recommendations for grains, whole grains, vegetables (before and after adjustment), fruit, milk, and meat/beans were also determined for each group.

Mean daily diet costs were calculated for the whole sample, and for groups on the basis of food security status, weight status, and FF consumption using the descriptive statistics option in Excel. Using the paired t-test statistical analysis tool, daily diet costs were analyzed between the days for the whole sample, the obese, non-obese, FS, FIS, those who consumed FF and for those who did not consume FF. Using the two-sample equal variance t-test statistical analysis tool, daily diet costs were analyzed among groups by food security status, weight status, and FF consumption for each day. Diet costs data are presented as mean ± SD in all tables.

Mean energy intake was calculated for both Day 1 and Day 2 for the whole sample and by food security status, weight status, and FF consumption. Day 1 energy intakes were compared with Day 2 energy intakes for the whole sample, FS, FIS, obese, non-obese, those consuming, and not consuming FF using the paired t-test statistical analysis tool. In addition, differences in energy intake were analyzed among groups on the basis of food security status, weight status, and FF consumption using the two-sample equal variance t-test.

Mean nutrient intakes were determined for the whole sample and on the basis of food security status, weight status, and FF consumption for the following nutrients: protein, carbohydrates, fiber, total fat, saturated fat, cholesterol, vitamin A, vitamin C, folate, potassium, calcium, iron, and sodium. Nutrient intakes were compared between the days using the paired t-test statistical analysis tool for the whole sample, FS, FIS, obese, non-obese, those consuming FF, and those not consuming FF. In addition, differences in nutrient intake were analyzed

among groups on the basis of food security status, weight status, and FF consumption on Day 1 and Day 2 using the two-sample equal variance t-test statistical analysis tool. All data on energy and nutrient intake are presented as mean ± SD in the tables.

Mean nutrient-to-cost ratios were calculated for both Day 1 and Day 2 for the whole sample and for participants on the basis of food security status, weight status, and FF consumption using the descriptive statistics option in Excel. Using the paired t-test statistical analysis tool, the amount of nutrient consumed per dollar spent was analyzed for each of the 13 nutrients between the days for each group. In addition, nutrient-to-cost comparisons were analyzed among groups for each of the 13 nutrients on both days using the two-sample equal variance t-test statistical analysis tool. All data on nutrient-to-cost ratios are presented as mean ± SD in the tables.

CHAPTER 4

RESULTS

The majority of our study participants were overweight or obese (80%) and FIS (55%). Unlike the larger study, we divided participants on the basis of weight status into one of two groups: obese (62%) or non-obese (38%). Approximately 61% of participants in the non-obese group were overweight. In our study, participants were separated on the basis of food security status into one of two groups: FS (45%) or FIS (55%) groups. Participants were also separated on the basis of FF consumption into one of two groups: those who consume FF or those who do not consume FF. Approximately 25% of our study participants reported having consumed FF on at least one of their dietary recalls. A breakdown of FF consumption is presented in the following table for Days 1 and 2.

Table 1: Number and % of study participants consuming FF, along with the frequency of FF consumption for Day 1 and Day 2

	Consumes FF n (%)	1 x/day	2 x's/day	≥ 3 x's/day
Day 1	6 (9)	5	0	1
Day 2	11 (17)	10	1	0

Table 1 shows the number and % of study participants consuming FF on Day 1 and Day 2. It also breaks participants down by frequency of FF consumption on each day. Approximately 9% of study participants were shown to consume FF on Day 1, with the majority of these participants (83%) consuming FF only once. On Day 2, there was an increase in FF consumption. Approximately 17% of study participants were shown to consume FF on Day 2, with the majority of participants (91%) consuming FF only once for this day as well.

Table 2: Mean age of study participants by food security status, weight status, and FF consumption; data presented as mean ± SD

	Age
Whole Sample	39 ± 1.32
FS	40 ± 1.63
FIS	38 ± 1.53
Obese	42 ± 1.40[a]
Non-obese	36 ± 1.84[a]
FF consumption	31 ± 1.48[b]
No FF consumption	42 ± 1.44[b]

[a] mean age p= 0.096 obese non-obese; [b] mean age p= 0.006 FF No FF

Table 2 shows the mean age of study participants for the whole sample and on the basis of food security status, weight status, and FF consumption. A breakdown of mean age by group was necessary to include as food group intake recommendations are based on age. Significant differences were seen in age between weight status groups (p= 0.096) and FF consumption groups (p= 0.006). No significant differences were detected between food security status groups.

Food Group Intake

Tables 3 through 5 show the mean intake of each food group on Day 1 and Day 2 for the whole sample and for participants on the basis of food security status, weight status, and FF consumption. Recommended food group intakes were based on the mean age of each group. All food group recommendations were the same regardless of group breakdown.

Table 3 shows the mean intake of grains and whole grains on Day 1 and Day 2. Regardless of Day (1 or 2) or group breakdown, mean intakes for grains and whole grains did not

meet the recommended intakes as set by the 2005 DGA. In the whole sample, the FS, FIS, obese, non-obese, and those not consuming FF, no significant differences were shown between the days for mean intake of grains and whole grains. Significant differences were detected between the days for whole grain intake ($p = 0.06$), but not grain intake, in those who consume FF. No significant differences were detected between food security status (FS vs. FIS), weight status (obese vs. non-obese), or FF consumption (FF vs. No FF) groups for grain intake regardless of Day (1 or 2).

Table 4 shows the mean intake of vegetables and fruit on Day 1 and Day 2. Vegetables were analyzed in the following 2 ways: vegetable intake including French fry consumption and vegetable intake excluding French fry consumption. Regardless of Day (1 or 2) or group breakdown, mean intakes of vegetables (including and excluding French fries) and fruit did not meet the recommended intakes for vegetables and fruit as set by the 2005 DGA. In all groups, no significant differences were shown between the days for mean intake of vegetables and fruit. In addition, no significant differences were detected between food security status (FS vs. FIS) or weight status groups (obese vs. non-obese) for mean intake of vegetables and fruit. Significant differences were found between FF consumption groups (FF vs. No FF) for vegetable intake (including French fries) ($p = 0.096$) on Day 2, where those who consumed FF were shown to have higher mean intakes of vegetables. No significant differences were found for fruit intake between FF consumption groups regardless of day.

Table 5 shows the mean intake of milk and meat/beans on Day 1 and Day 2. Regardless of Day (1 or 2) or group breakdown, mean intakes of milk did not meet the 2005 DGA recommendations for milk intake. In contrast, mean intakes of meat/beans were shown to meet the recommended intake for meat/beans, regardless of Day (1 or 2) or group breakdown.

Table 3: Recommended and actual grain intake on Days 1 and 2; data presented as mean ± SD

	2005 DGA Grains (Ounces/Day)	Day 1 Grains	Day 2 Grains	2005 DGA Whole Grains (Ounces/Day)	Day 1 Whole Grains	Day 2 Whole Grains
Whole sample	6 ounces	4.96 ± 2.46	4.97 ± 3.46	3 ounces	0.27 ± 0.81	0.16 ± 0.51
FS	6 ounces	5.10 ± 2.55	5.07 ± 3.57	3 ounces	0.21 ± 0.56	0.17 ± 0.54
FIS	6 ounces	4.84 ± 2.41	4.88 ± 3.42	3 ounces	0.33 ± 0.98	0.14 ± 0.49
Obese	6 ounces	5.03 ± 2.61	4.51 ± 2.59	3 ounces	0.34 ± 0.96	0.13 ± 0.48
Non-obese	6 ounces	4.77 ± 2.32	5.34 ± 3.77	3 ounces	0.09 ± 0.42	0.13 ± 0.46
FF consumption	6 ounces	5.63 ± 2.20	5.80 ± 2.72	3 ounces	0.50 ± 0.84[a]	0.00 ± 0.00[a]
No FF consumption	6 ounces	4.89 ± 2.49	4.80 ± 3.59	3 ounces	0.25 ± 0.81	0.19 ± 0.56

[a] FF consumers: mean intake of whole grains p= 0.06 Day 1 Day 2

Table 4: Recommended and actual vegetable and fruit intake on Days 1 and 2; data presented as mean ± SD

	2005 DGA Vegetables (Cups/day)	Day 1 Vegetables Including French Fries	Day 2 Vegetables Including French Fries	Day 1 Vegetables Excluding French Fries	Day 2 Vegetables Excluding French Fries	2005 DGA Fruit (Cups/day)	Day 1 Fruit	Day 2 Fruit
Whole Sample	2.5 cups	1.32 ± 1.53	1.39 ± 1.41	1.05 ± 0.95	1.09 ± 1.24	1.5 cups	0.53 ± 0.75	0.53 ± 0.70
FS	2.5 cups	1.32 ± 1.15	1.40 ± 1.53	1.10 ± 1.02	1.04 ± 1.18	1.5 cups	0.49 ± 0.90	0.48 ± 0.60
FIS	2.5 cups	1.32 ± 1.81	1.39 ± 1.33	1.01 ± 0.91	1.12 ± 1.30	1.5 cups	0.57 ± 0.62	0.57 ± 0.78
Obese	2.5 cups	1.46 ± 1.85	1.15 ± 1.27	1.21 ± 1.20	1.00 ± 1.22	1.5 cups	0.44 ± 0.63	0.47 ± 0.59
Non-obese	2.5 cups	1.29 ± 1.32	1.56 ± 1.47	1.03 ± 1.16	1.13 ± 1.24	1.5 cups	0.46 ± 0.64	0.59 ± 0.83
FF consumption	2.5 cups	2.28 ± 1.76	2.04 ± 1.08[a]	0.93 ± 1.02	0.85 ± 0.87	1.5 cups	0.68 ± 1.04	0.67 ± 0.74
No FF consumption	2.5 cups	1.22 ± 1.49	1.26 ± 1.45[a]	1.07 ± 0.96	1.13 ± 1.30	1.5 cups	0.52 ± 0.73	0.50 ± 0.69

[a] Day 2: mean intake of vegetables (including French fries) p= 0.096 FF No FF

Table 5: Recommended and actual milk and meat/bean intake on Days 1 and 2; data presented as mean ± SD

	2005 DGA Milk (Cups/day)	Day 1 Milk	Day 2 Milk	2005 DGA Meat/beans (Ounces/day)	Day 1 Meat/beans	Day 2 Meat/beans
Whole Sample	3 cups	0.87 ± 0.95	0.72 ± 0.79	5 ounces	6.99 ± 5.48[a]	5.48 ± 3.69[a]
FS	3 cups	0.90 ± 1.10	0.68 ±0.63	5 ounces	6.48 ± 4.14[b]	5.21 ± 3.58[b]
FIS	3 cups	0.85 ± 0.81	0.75 ±0.91	5 ounces	7.42 ± 6.41	5.71 ±3.82
Obese	3 cups	0.80 ± 0.88	0.70 ± 0.70	5 ounces	6.67 ± 5.87	5.23 ± 4.20
Non-obese	3 cups	1.02 ± 1.09[c]	0.57 ± 0.57[c]	5 ounces	7.66 ± 5.26	6.07 ± 3.07
FF consumption	3 cups	0.77 ± 0.89	0.73 ± 0.73	5 ounces	9.88 ± 6.68	6.15 ± 2.84
No FF consumption	3 cups	0.88 ± 0.94	0.72 ± 0.81	5 ounces	6.69 ± 5.32	5.34 ± 3.86

[a] Whole Sample: Intake of meat/beans p = 0.041 Day 1 Day 2; [b] FS: Intake of meat/beans p= 0.09 Day 1 Day 2; [c] Non-obese: mean intake of milk p= 0.05 Day 1 Day 2

Significant differences were found between the days in non-obese participants (p= 0.05) for mean milk intake. In the whole sample, FS, FIS, obese, those consuming and those not consuming FF, no significant differences were shown between the days for mean intake of milk. Significant differences were observed between the days for mean meat/bean intake in the whole sample (p= 0.041) and the FS (p= 0.09). In FIS, obese, non-obese, those consuming FF and those not consuming FF, no significant differences were detected between the days for mean meat/beans intake. The table also shows mean intakes of milk and meat/beans among groups. However, no significant differences were detected among food security status, weight status, or FF consumption groups for milk or meat/bean intake regardless of day.

Table 6 shows the number and % of participants meeting recommended grain and whole grain intakes on Day 1 and Day 2. The percent of participants meeting recommendations for grains is poor on both days, with the highest proportion meeting recommendations for grains and whole grains on either day being 50% and 3%, respectively.

Table 7 shows the number and % of participants meeting recommendations for vegetable intake (including and excluding French fries) on Day 1 and Day 2. The percent of participants meeting recommendations for vegetables, both before and after adjustment, is poor on both days, with the highest proportion of participants meeting recommendations for vegetables on either day being 35%. After removing French fries from vegetable intake, the proportion of participants meeting the recommended intake for vegetables was even lower than before.

Table 8 shows the number and percent of participants meeting recommendations for fruit, milk, and meat/beans on Day 1 and Day 2. The percent of participants meeting recommendations for fruit and milk was poor on both days, with the highest percentage of participants meeting recommendations shown to be 18% and 9%, respectively. The

Table 6: Number and % of study participants meeting the 2005 DGA recommendations for grain intake on Day 1 and 2

	Day 1 Grains	Day 2 Grains	Day 1 Whole Grains	Day 2 Whole Grains
Whole Sample	17 (27)	16 (24)	1 (2)	0 (0)
FS	8 (28)	7 (24)	0 (0)	0 (0)
FIS	9 (26)	9 (26)	1 (3)	0 (0)
Obese	8 (22)	5 (13)	1 (3)	0 (0)
Non-obese	9 (39)	11 (48)	0 (0)	0 (0)
FF consumption	3 (50)	4 (36)	0 (0)	0 (0)
No FF consumption	14 (24)	12 (23)	1 (2)	0 (0)

Table 7: Number and % of study participants meeting the 2005 DGA recommendations for vegetable intake on Day 1 and 2

	Day 1 Vegetables Including French Fries	Day 2 Vegetables Including French Fries	Day 1 Vegetables Excluding French Fries	Day 2 Vegetables Excluding French Fries
Whole Sample	9 (14)	11 (17)	7 (11)	8 (13)
FS	3 (10)	5 (17)	2 (7)	4 (14)
FIS	6 (17)	6 (17)	5 (14)	4 (11)
Obese	4 (11)	3 (8)	3 (8)	2 (5)
Non-obese	5 (22)	8 (35)	4 (17)	6 (26)
FF consumption	2 (33)	3 (27)	1 (17)	1 (9)
No FF consumption	7 (12)	8 (15)	6 (10)	7 (13)

Table 8: Number and % of study participants meeting the 2005 DGA recommendations for fruit, milk and meat/bean intake on Day 1 and 2

	Day 1 Fruit	Day 2 Fruit	Day 1 Milk	Day 2 Milk	Day 1 Meat/beans	Day 2 Meat/beans
Whole Sample	5 (8)	6 (9)	4 (6)	1 (2)	33 (52)	27 (42)
FS	3 (10)	2 (7)	2 (7)	0 (0)	15 (52)	9 (31)
FIS	2 (6)	4 (11)	2 (6)	1 (3)	18 (51)	18 (51)
Obese	2 (5)	2 (5)	2 (5)	0 (0)	17 (46)	13 (35)
Non-obese	3 (13)	4 (17)	2 (9)	1 (4)	16 (69)	14 (61)
FF consumption	1 (17)	2 (18)	0 (0)	0 (0)	4 (67)	5 (45)
No FF consumption	4 (7)	4 (7)	4 (7)	1 (2)	29 (50)	22 (41)

proportion of participants meeting recommendations for meat/beans was much higher than the proportion who met recommendations for fruit or milk regardless of day.

Diet Costs

Table 9 shows mean diet costs on Day 1 and Day 2 for the whole sample and for participants by food security status, weight status, and FF consumption. Significant differences in mean diet costs were seen for the whole sample (p = 0.038), the obese (p = 0.026), and those not consuming FF (p = 0.016) between the days. In the FS, FIS, non-obese, and FF consumption groups, no significant differences were seen between the days for diet costs.

Table 9: Daily diet costs by food security status, weight status, and FF consumption for Day 1 and Day 2; data presented as mean ± SD.

	Day 1	Day 2
Whole sample	4.94 ± 2.88[a]	4.08 ± 2.57[a]
Food Secure	4.94 ± 3.09	4.06 ± 2.39
Food Insecure	4.94 ± 2.74	4.10 ± 2.75
Obese	4.56 ± 2.51[b]	3.46 ± 2.34[b, d]
Non-obese	5.63 ± 3.44	4.94 ± 2.75[d]
FF consumption	8.81 ± 3.95[e]	7.14 ± 1.67[f]
No FF consumption	4.72 ± 2.53[c, e]	3.44 ± 2.25[c, f]

[a] Whole sample: daily diet costs p = 0.038 Day 1 Day 2; [b] Obese: daily diet costs p = 0.026 Day 1 Day 2; [c] No FF daily diet costs p = 0.016 Day 1 Day 2; [d] Day 2: daily diet costs p = 0.029 Obese Non-obese; [e] Day 1: daily diet costs p = $3.4E^{-04}$ FF No FF; [f] Day 2: daily diet costs p = $2.9E^{-06}$ FF No FF.

Significant differences in mean diet costs were detected between those who consume and do not consume FF (p = $3.4E^{-04}$) on Day 1. No significant differences were shown between groups on the basis of food security status or weight status on Day 1. Significant differences in mean diet costs were also seen between obese and non-obese participants (p = 0.029) and between those who consume and do not consume FF (p = $2.9E^{-06}$) on Day 2. No significant differences were shown between food security status groups on Day 2.

Energy Intakes

Table 10 shows mean energy intake on Day 1 and Day 2 for the whole sample and for participants on the basis of food security status, weight status, and FF consumption. Significant differences were seen in energy intake between the days for obese participants (p= 0.06), but not for non-obese participants. In the whole sample, FS, FIS, those who consume FF and those who do not consume FF, no significant differences were detected between the days for mean energy intake. The table also shows mean energy intakes among groups for each day. Significant differences in mean energy intake were shown between those who consume and do not consume FF on both Day 1 (p=0.07) and Day 2 (p = 0.05). No significant differences in mean energy intake were detected between food security status or weight status groups on either day.

Table 10: Energy intake by food security status, weight status, and FF consumption for Day 1 and Day 2; data presented as mean ± SD

	Day 1	Day 2
Whole sample	1766 ± 799.74	1612 ± 833.47
Food Secure	1799 ± 834.77	1558 ± 853.33
Food Insecure	1739 ± 780.75	1657 ± 826.39
Obese	1724 ± 747.42[a]	1463 ± 715.87[a]
Non-obese	1843 ± 899.83	1777 ± 909.14
FF consumption	2337 ± 984.21[b]	2058 ± 769.55[c]
No FF consumption	1707 ± 764.25[b]	1519 ± 822.73[c]

[a] Obese: energy intake p= 0.06 Day 1 Day 2; [b] Day 1: energy intake p = 0.07 FF No FF consumption; [c] Day 2: energy intake p= 0.05 FF No FF

Nutrient Intakes

Table 11 shows the mean intake of protein, total carbohydrates, and dietary fiber for the whole sample and for participants on the basis of food security status, weight status, and FF consumption. Mean nutrient intakes were first examined for each group between the days. Regardless of food security status, no significant differences were shown between the days for mean protein, carbohydrate, or fiber intake. Significant differences were seen between the days

for mean intake of protein (p= 0.06), but not for carbohydrates or fiber, in the obese. No significant differences were noted between the days for mean protein, carbohydrate, or fiber intake among the non-obese. Significant differences were also seen between the days for mean protein (p= 0.10), but not for carbohydrate or fiber intake, in those who do not consume FF. No significant findings were seen between the days among those who consume FF.

The table also shows mean intake of protein, carbohydrate, and fiber between groups for each day. Significant differences in mean carbohydrate intake, but not protein or fiber, were shown between who consume and do not consume FF on both Day 1 (p = 0.019) and Day 2 (p = 0.056). No significant findings were seen among groups on the basis of food security status or weight status for mean intakes of protein, carbohydrate or fiber on either day.

Table 12 shows the mean intake of total fat, saturated fat, and cholesterol for the whole sample and for participants on the basis of food security status, weight status, and FF consumption. Significant differences in mean cholesterol (p= 0.03) intake, but not total fat or saturated fat, were shown between the days for the whole sample. Significant differences were seen between the days for mean total fat (p= 0.044) and saturated fat (p= 0.09) intake, but not for cholesterol intake, among FS participants. No significant differences were seen between the days for FIS participants. Significant differences were also seen between the days for mean total fat (p= 0.024), saturated fat (p= 0.021), and cholesterol (0.07) intake among obese participants. No significant differences were seen between the days for non-obese participants. Significant differences were seen between the days for mean cholesterol intake (p= 0.09), but not for total fat or saturated fat intake, among those who did not consume FF. No significant differences were seen between the days for FF consumers.

Table 11: Mean intake of protein (PRO) (g), carbohydrates (CHO) (g), and fiber (g) by food security status, weight status, and FF consumption on Days 1 and 2; data presented as mean ± SD

	Day 1 PRO	Day 2 PRO	Day 1 CHO	Day 2 CHO	Day 1 Fiber	Day 2 Fiber
Whole sample	77.72 ± 43.79[a]	65.45 ± 35.83[a]	198.00 ± 91.37	192.05 ± 106.95	11.15 ± 6.69	11.45 ± 8.56
FS	74.65 ± 39.05	63.10 ± 33.89	197.10 ± 85.07	194.62 ± 117.93	10.14 ± 5.38	11.93 ± 9.03
FIS	80.26 ± 47.79	67.40 ± 37.73	198.74 ± 97.50	189.91 ± 98.64	12.00 ± 7.58	11.06 ± 8.27
Obese	76.68 ± 45.15[b]	60.49 ± 37.41[b]	196.27 ± 84.11	179.59 ± 94.55	11.84 ± 6.85	11.32 ± 8.21
Non-obese	83.48 ± 43.53	72.04 ± 33.15	198.91 ± 99.67	207.17 ± 120.47	10.04 ± 6.40	11.78 ± 9.76
FF consumption	101.83 ± 49.42	78.27 ± 32.52	280.17 ± 136.21[d]	247.91 ± 109.34[e]	11.00 ± 6.32	9.82 ± 7.12
No FF consumption	75.22 ± 42.87[c]	62.79 ± 36.19[c]	189.50 ± 82.55[d]	180.45 ± 103.73[e]	11.17 ± 6.78	11.79 ± 8.85

[a] Whole Sample: mean protein intake p= 0.06 Day 1 Day 2; [b] Obese: mean protein intake p= 0.064 Day 1 Day 2; [c] No FF: mean protein intake p= 0.10 Day 1 Day 2; [d] Day 1: mean CHO intake p = 0.019 FF No FF; [e] Day 2: mean CHO intake p = 0.056 FF No FF

Table 12: Mean intake of total fat (g), saturated fat (SFA) (g), and cholesterol (mg) by food security status, weight status, and FF consumption on Days 1 and 2; data presented as mean ± SD

	Day 1 Total Fat	Day 2 Total Fat	Day 1 SFA	Day 2 SFA	Day 1 Cholesterol	Day 2 Cholesterol
Whole sample	74.97 ± 41.80	65.45 ± 37.56	24.07 ± 14.41	20.45 ± 12.09	389.86 ± 319.45[a]	290.66 ± 223.58[a]
FS	80.04 ± 49.14[b]	59.70 ± 33.80[b]	25.62 ± 16.34[c]	19.73 ± 11.31[c]	387.86 ± 290.82	299.45 ± 233.31
FIS	70.78 ± 34.77	70.23 ± 40.26	22.79 ± 12.69	21.05 ± 12.83	391.51 ± 345.60	283.37 ± 218.36
Obese	72.95 ± 36.78[d]	56.47 ± 28.51[d,h]	23.82 ± 13.28[e]	17.80 ± 9.00[e]	367.35 ± 299.37[f]	263.32 ± 219.63[f]
Non-obese	80.29 ± 49.57	74.30 ± 41.76[h]	25.25 ± 16.66	22.49 ± 13.06	434.91 ± 354.93	356.09 ± 235.12
FF consumption	91.22 ± 38.39	84.62 ± 35.46[i]	26.20 ± 13.70	23.90 ± 9.46	486.17 ± 359.37	299.54 ± 186.22
No FF consumption	73.29 ± 42.09	61.48 ± 37.06[i]	23.85 ± 14.58	19.74 ± 12.52	379.90 ± 316.84[g]	288.81 ± 232.11[g]

[a] Whole sample: mean cholesterol intake p= 0.03 Day 1 Day 2; [b] FS: mean total fat intake p = 0.044 Day 1 Day 2; [c] FS: mean saturated fat intake p= 0.09 Day 1 Day 2; [d] Obese: Mean total fat intake p = 0.024 Day 1 Day 2; [e] Obese: mean saturated fat intake p = 0.021 Day 1 Day 2; [f] Obese: mean cholesterol intake p= 0.07 Day 1 Day 2; [g] No FF: mean cholesterol intake p= 0.09 Day 1 Day 2; [h] Day 2: mean total fat intake p = 0.05 Obese Non-obese; [i] Day 2: mean fat intake p = 0.062 FF No FF

Table 13: Mean intake of vitamin A (mcg), vitamin C (mg), and folate (mcg) by food security status, weight status, and FF consumption on Days 1 and 2; data presented as mean ± SD

	Day 1 Vitamin A	Day 2 Vitamin A	Day 1 Vitamin C	Day 2 Vitamin C	Day 1 Folate	Day 2 Folate
Whole sample	407.02 ± 312.98	318.71 ± 263.34	68.97 ± 60.13	61.36 ± 56.54	318.06 ± 175.47	319.66 ± 227.39
FS	367.90 ± 277.48	337.71 ± 320.79	60.40 ± 54.95	55.08 ± 49.52	304.14 ± 130.78	332.13 ± 211.07
FIS	439.43 ± 340.16[a]	302.97 ± 207.82[a]	76.07 ± 64.02	66.57 ± 61.98	329.60 ± 206.55	309.33 ± 242.65
Obese	386.41 ± 244.04	290.86 ± 212.52	70.55 ± 63.41	55.32 ± 60.34	312.29 ± 157.93	304.06 ± 183.98
Non-obese	454.04 ± 420.45	358.04 ± 338.58	56.89 ± 48.51	67.17 ± 48.51	331.56 ± 213.12	314.47 ± 195.03
FF consumption	255.30 ± 185.50	406.36 ± 497.68	79.22 ± 72.10	72.75 ± 55.45	310.40 ± 102.30	289.74 ± 172.01
No FF consumption	422.71 ± 320.27[b]	300.52 ± 185.53[b]	67.91 ± 59.40	58.99 ± 56.99	318.86 ± 181.95	325.87 ± 238.17

[a] FIS: mean vitamin A intake p = 0.054 Day 1 Day 2; [b] No FF: mean intake of vitamin A p = 0.017 Day 1 Day 2

Table 14: Mean intake of potassium (mg), calcium (mg), iron (mg), and sodium (mg) by food security status, weight status, and FF consumption on Days 1 and 2; data presented as mean ± SD

	Day 1 Potassium	Day 2 Potassium	Day 1 Calcium	Day 2 Calcium	Day 1 Iron	Day 2 Iron	Day 1 Sodium	Day 2 Sodium
Whole sample	2021.50 ± 1126.91	1767.09 ± 953.40	542.91 ± 315.49	477.39 ± 286.56	12.60 ± 6.92	11.69 ± 6.68	3139.70 ± 1638.07	2774.22 ± 1548.64
FS	1899.66 ± 939.03	1812.48 ± 1055.74	526.08 ± 351.54	512.86 ± 270.58	12.20 ± 6.97	12.12 ± 7.01	3112.66 ± 1553.76	2765.72 ± 1749.74
FIS	2122.46 ± 1266.40	1729.49 ± 873.58	556.86 ± 286.73	448.01 ± 299.83	12.93 ± 6.97	11.34 ± 6.47	3162.11 ± 1727.05	2781.26 ± 1386.54
Obese	2008.60 ± 1118.88	1631.46 ± 914.95	538.30 ± 316.24	468.85 ± 254.30	12.78 ± 5.98	11.07 ± 5.76	2944.11 ± 1535.78	2710.54 ± 1486.42
Non-obese	2056.83 ± 1231.89	1933.09 ± 970.32	580.11 ± 328.77[a]	442.98 ± 265.95[a]	12.47 ± 8.72	12.09 ± 6.91	3493.70 ± 1818.87[b]	2805.35 ± 1524.26[b]
FF consumption	2628.67 ± 1062.61	2037.73 ± 745.87	569.57 ± 321.83	472.77 ± 278.82	11.50 ± 4.03	12.55 ± 6.88	3332.50 ± 1172.61	2639.82 ± 1283.02
No FF consumption	1958.69 ± 1123.27	1710.93 ± 987.70	540.15 ± 317.55	478.35 ± 290.74	12.71 ± 7.17	11.51 ± 6.69	3119.76 ± 1685.47	2802.11 ± 1607.62

[a] Non-obese: mean calcium intake p= 0.08 Day 1 Day 2; [b] Non-obese: mean intake of sodium p = 0.05 Day 1 Day 2

The table also shows mean total fat, saturated fat, and cholesterol intake between groups for each day. No significant differences were seen for mean total fat, saturated fat, and cholesterol intake between FS and FIS participants on either day. Significant differences in mean total fat intake (p= 0.05) were shown between obese and non-obese participants on Day 2, but not on Day 1. No significant findings were seen for mean saturated fat or cholesterol intake between obese and non-obese participants on either day. Significant differences in mean total fat intake (p= 0.062) were shown between those who consume and do not consume FF on Day 2, but not on Day 1. No significant findings were seen for mean saturated fat or cholesterol intake between those who consume and do not consume FF on either day.

Table 13 shows the mean intake of vitamin A, vitamin C, and folate for the whole sample and on the basis of food security status, weight status, and FF consumption. Significant differences were noted for mean vitamin A (p= 0.05) intake, but not for vitamin C or folate intake, between the days in FIS participants. No significant findings were seen for mean intake of vitamin A, vitamin C, or folate in FS participants. Regardless of weight status breakdown, no significant differences were seen between the days. Significant differences were seen between the days for mean vitamin A (p= 0.017) intake, but not for vitamin C or folate intake, in those who do not consume FF. No significant differences were seen between the days for FF consumers. The table also shows mean intake of vitamin A, vitamin C and folate between groups on each day. No significant differences were observed between groups regardless of day.

Table 14 shows the mean intake of potassium, calcium, iron, and sodium the whole group and for participants on the basis of food security status, weight status, and FF consumption. No significant differences were seen in mean potassium, calcium, iron, or sodium intake between the days for the whole sample. Regardless of food security status and FF consumption breakdown,

no significant differences were seen between the days for mean potassium, calcium, iron, and sodium intake. Significant differences were seen for mean calcium (p= 0.08) and sodium intake (p= 0.05), but not for mean potassium or iron intake, between the days in non-obese participants. No significant differences were seen for mean intakes of potassium, calcium, iron, or sodium between the days in obese participants, however. The table also shows mean potassium, calcium, iron and sodium intake between groups on each day. However, no significant findings were seen between groups on the basis of food security status, weight status, or FF consumption for mean intake of potassium, calcium, iron or sodium on either day.

Nutrient-to-Cost

Table 15 shows mean protein, carbohydrate, and fiber consumption per dollar spent for the whole sample and on the basis of food security status, weight status, and FF consumption. Significant differences were seen among mean nutrient-to-cost ratios for carbohydrate (p = 0.039) and fiber (p = 0.05), but not for protein, between the days for the whole sample. Significant differences were seen for mean nutrient-to-cost ratios for fiber (p= 0.07), but not for protein or carbohydrates, between the days for FS participants. Significant differences were seen for mean nutrient-to-cost ratios for carbohydrates (p= 0.06), but not for protein or fiber, between the days for FIS participants. Significant differences were seen for mean carbohydrate (p= 0.06) and fiber (p= 0.08) intake, but not protein, between the days among obese participants. Significant differences were seen for mean fiber intake (p= 0.08), but not for protein or carbohydrate intake, between the days in non-obese participants. Significant differences were seen for mean nutrient-to-cost ratios for carbohydrate (p= 0.05) and fiber (p= 0.05), but not for protein intake, between the days for those who do not consume FF. No significant differences were seen between the days for FF consumers.

Table 15: Nutrient-to-Cost Comparisons for Protein (g), Carbohydrates (g), and Dietary Fiber (g) between Day 1 and Day 2 by food security status, weight status, and FF consumption; data presented as mean ± SD

	Day 1 PRO	Day 2 PRO	Day 1 CHO	Day 2 CHO	Day 1 Fiber	Day 2 Fiber
Whole sample	17.83 ± 8.82	20.00 ± 14.95	46.69 ± 22.55[a]	62.42 ± 58.14[a]	2.78 ± 2.02[b]	4.21 ± 6.28[b]
FS	17.40 ± 9.20	17.54 ± 7.79	47.84 ± 25.50	53.87 ± 30.23	2.40 ± 1.26[c]	3.47 ± 2.67[c]
FIS	18.18 ± 8.61	22.03 ± 18.84	45.74 ± 20.11[d]	69.50 ± 73.47[d]	3.10 ± 2.45	4.81 ± 8.14
Obese	18.43 ± 9.04	21.93 ± 18.41	50.61 ± 25.45[e,j]	74.16 ± 72.20[e,k]	3.21 ± 2.40[f]	5.35 ± 7.90[f,l]
Non-obese	16.40 ± 6.48	17.52 ± 8.16	39.21 ± 13.95[j]	47.30 ± 23.59[k]	2.06 ± 1.12[g]	2.69 ± 2.30[g,l]
FF consumption	12.42 ± 6.60	11.84 ± 6.49[m]	32.65 ± 12.92	36.03 ± 17.49[n]	1.42 ± 0.92[o]	1.43 ± 1.13
No FF consumption	18.38 ± 8.88	21.69 ± 15.68[m]	48.14 ± 22.90[h]	67.90 ± 62.12[h,n]	2.93 ± 2.05[i,o]	4.78 ± 6.75[i]

[a] Whole sample: mean intake of CHO /dollar spent p = 0.039 Day 1 Day 2; [b] Whole sample: mean intake of fiber/dollar spent p = 0.05 Day 1 Day 2; [c] FS: mean intake of fiber/dollar spent p= 0.07 Day 1 Day 2; [d] FIS: mean intake of carbohydrates/dollar spent p= 0.07 Day 1 Day 2; [e] obese: mean intake of carbohydrates/dollar spent p=0.06 Day 1 Day 2; [f] obese: mean intake of fiber/dollar spent p= 0.08 Day 1 Day 2; [g] non-obese: mean intake of fiber/dollar spent p= 0.08 Day 1 Day 2; Day 2; [h] No FF: mean intake of CHO/dollar spent p = 0.046 Day 1 Day 2; [i] No FF: mean intake of fiber/dollar spent p = 0.048 Day 1 Day 2

[j] Day1: mean intake of CHO/dollar spent p = 0.05 obese non-obese; [k] Day 2: mean intake of CHO/dollar spent p= 0.09 obese non-obese; [l] Day 2: mean intake of fiber/dollar spent p = 0.035 obese non-obese; [m] Day 2: ,mean intake of protein/dollar spent p= 0.05 FF no FF; [n] Day 2: mean carbohydrate intake/dollar spent p= 0.098 FF No FF; [o] Day 1: mean fiber intake/dollar spent p= 0.08 FF no FF

Nutrient-to-cost ratios were also compared between groups on both days. No significant differences were seen between FS and FIS participants regardless of day. Significant differences were seen among nutrient-to-cost ratios for carbohydrates on Day 1 (p= 0.05) and Day 2 (p= 0.09) and fiber (p= 0.035) on Day 2 between weight status groups (obese vs. non-obese). No significant differences were seen for fiber (on Day 1) or protein (on either day) between obese and non-obese participants. Significant differences were seen among nutrient-to-cost ratios for fiber (p= 0.08) on Day 1 and protein (p= 0.05) and carbohydrates (p= 0.10) on Day 2 between those who consume and do not consume FF. No significant differences were seen for protein or carbohydrates on Day 1 or fiber on Day 2 among those who consume and do not consume FF.

Table 16 shows mean total fat, saturated fat, and cholesterol consumption per dollar spent for the whole sample and on the basis of food security status, weight status, and FF consumption. Regardless of food security status, weight status, or FF consumption breakdown, there were no significant differences seen among mean nutrient-to-cost ratios for total fat, saturated fat or cholesterol between the days. The table also shows mean nutrient-to-cost ratios for total fat, saturated fat, and cholesterol between groups on both days. No significant differences were seen among mean nutrient-to-cost ratios for total fat, saturated fat, or cholesterol between FS and FIS participants and obese and non-obese participants on either day. Significant differences were seen for mean nutrient-to-cost ratios for total fat (p= 0.07) and saturated fat (p = 0.021) between those who consume and do not consume FF on Day 1. No significant differences were seen among mean nutrient-to-cost ratios for total fat and saturated fat on Day 2 or cholesterol on either day between those who consume and do not consume FF.

Table 17 shows mean vitamin A, vitamin C, and folate consumption per dollar spent for the whole sample and on the basis of food security status, weight status, and FF consumption.

Table 16: Nutrient-to-Cost Comparisons for Total Fat (g), Saturated Fat (g), and Cholesterol (mg) between Day 1 and Day 2 by food security status, weight status, and FF consumption; data presented as mean ± SD

	Day 1 Total Fat	Day 2 Total Fat	Day 1 SFA	Day 2 SFA	Day 1 Cholesterol	Day 2 Cholesterol
Whole sample	17.49 ± 9.36	22.72 ± 35.17	5.58 ± 3.17	7.09 ± 10.36	86.28 ± 66.28	94.70 ±114.62
FS	18.64 ± 11.46	16.42 ± 7.77	5.98 ± 3.64	5.47 ± 2.64	88.24 ± 81.21	84.14 ± 73.94
FIS	16.53 ± 7.21	27.95 ± 46.69	5.24 ± 2.74	8.42 ± 13.75	84.66 ± 51.98	103.45 ± 140.24
Obese	18.20 ± 8.89	27.01 ± 45.61	5.90 ± 3.09	8.32 ± 13.38	85.51 ± 46.43	103.90 ± 134.53
Non-obese	15.63 ± 7.25	16.52 ± 7.49	4.97 ± 2.52	5.21 ± 2.56	79.51 ± 52.60	89.76 ± 85.08
FF consumption	10.92 ± 4.74[a]	12.64 ± 6.72	2.77 ± 2.34[b]	3.52 ± 1.66	57.88 ± 47.05	46.92 ± 35.65
No FF consumption	18.17 ± 9.48[a]	24.82 ± 38.26	5.87 ± 3.12[b]	7.83 ± 11.23	89.22 ± 67.58	104.62 ± 122.84

[a] Day 1: mean intake of total fat/dollar spent p= 0.07 FF No FF; [b] Day 1: mean intake of saturated fat/dollar spent p = 0.021 FF No FF

Table 17: Nutrient-to-Cost Comparisons for Vitamin A (mcg), Vitamin C (mg), and Folate (mcg) between Day 1 and Day 2 by food security status, weight status, and FF consumption; data presented as mean ± SD

	Day 1 Vitamin A	Day 2 Vitamin A	Day 1 Vitamin C	Day 2 Vitamin C	Day 1 Folate	Day 2 Folate
Whole sample	103.40 ± 89.17	131.70 ± 267.05	16.86 ± 15.85	22.30 ± 34.71	74.19 ± 41.22[a]	111.17 ± 128.87[a]
FS	87.57 ± 63.60	102.65 ± 91.48	15.90 ± 16.23	15.48 ± 17.86	73.05 ± 42.60	99.62 ± 82.40
FIS	116.51 ± 104.94	155.77 ± 352.05	17.67 ± 15.72	27.96 ± 43.55	75.14 ± 40.64[b]	120.74 ± 158.02[b]
Obese	108.00 ± 97.58	162.48 ± 345.55	18.40 ± 16.92	25.36 ± 42.76	77.67 ± 43.66	135.20 ± 158.12
Non-obese	92.33 ± 77.33	87.79 ± 65.18	12.56 ± 12.66[c]	18.67 ± 20.12[c]	66.15 ± 35.37	74.94 ± 55.19
FF consumption	34.97 ± 31.63[e]	60.78 ± 74.18	11.42 ± 11.61	10.55 ± 8.26	37.92 ± 14.38[f]	43.44 ± 30.46[g]
No FF consumption	110.48 ± 90.32[e]	146.42 ± 289.93	17.43 ± 16.20	24.74 ± 37.56	77.95 ± 41.32[d, f]	125.23 ± 137.00[d,g]

[a] Whole sample: mean intake of folate/dollar spent p = 0.024 Day 1 Day 2; [b] FIS: mean intake of folate consumed/dollar spent p=0.08 Day 1 Day 2; [c] Non-obese: mean intake of vitamin C/dollar spent p= 0.10 Day 1 Day 2; [d] No FF: mean intake of folate/dollar spent p = 0.01 Day 1 Day 2; [e] Day 1: mean intake of vitamin A/dollar spent p = 0.047 FF No FF; [f] Day 1: mean intake of folate/dollar spent p = 0.022 FF No FF; [g] Day 2: mean intake of folate consumed/dollar spent p = 0.05 FF No FF

Significant differences were seen for mean nutrient-to-cost ratios for folate (p= 0.024), but not for vitamin A or C, between the days for the whole sample. No significant differences were seen for mean nutrient-to-cost ratios of vitamin A, vitamin C, or folate between the days for FS participants. Significant differences were also seen for mean nutrient-to-cost ratios for folate (p= 0.08), but not for vitamin A or C, between the days for FIS participants. No significant differences were seen for mean nutrient-to-cost ratios between the days for obese participants. Significant differences were seen among mean nutrient-to-cost ratios for vitamin C (p= 0.10), but not for vitamin A or folate, between the days for non-obese participants. No significant differences were seen among mean nutrient-to-cost ratios between the days for FF consumers Significant differences were seen among mean nutrient-to-cost ratios for folate (p= 0.01), but not for vitamin A or C, between the days in those who do not consume FF.

The table also shows mean nutrient-to-cost ratios for vitamin A, vitamin C, and folate between groups on both days. No significant differences were seen among mean nutrient-to-cost ratios for vitamin A, vitamin C, and folate between food security status or weight status groups on either day. Significant differences were seen among mean nutrient-to-cost ratios for vitamin A on Day 1 (p= 0.05) and folate on Day 1 (p= 0.02) and Day 2 (p= 0.05) between those who consume and do not consume FF. No significant differences were seen for mean nutrient-to-cost ratios for vitamin A (on Day 2) or vitamin C (on both days) between FF consumption groups.

Table 18 shows mean potassium, calcium, iron, and sodium consumption per dollar spent for the whole sample and on the basis of food security status, weight status, and FF consumption. Significant differences were seen for mean nutrient-to-cost ratios for potassium (p= 0.09) and iron (p= 0.07), but not for calcium and sodium, between the days for the whole sample. Regardless of food security status, no significant differences were seen for mean nutrient-to-cost

Table 18: Nutrient-to-Cost Comparisons for Potassium (mg), Calcium (mg), Iron (mg), and Sodium (mg) between Day 1 and Day 2 by food security status, weight status, and FF consumption; data presented as mean ± SD

	Day 1 Potassium	Day 2 Potassium	Day 1 Calcium	Day 2 Calcium	Day 1 Iron	Day 2 Iron	Day 1 Sodium	Day 2 Sodium
Whole sample	464.09 ± 238.37[a]	600.04 ± 700.30[a]	130.31 ± 85.58	168.02 ± 170.86	3.00 ± 1.73[b]	3.88 ± 3.55[b]	712.55 ± 329.08	920.95 ± 982.58
FS	430.70 ± 171.50	510.66 ± 273.65	117.31 ± 74.52	153.93 ± 99.17	2.95 ± 1.69	3.49 ± 2.24	722.35 ± 387.69	749.85 ± 397.22
FIS	491.76 ± 281.65	674.1 ± 913.56	141.08 ± 93.45	179.69 ± 213.75	3.05 ± 1.80	4.19 ± 4.36	704.42 ± 277.01	1062.72 ± 270.17
Obese	500.72 ± 276.48[j]	711.23 ± 891.27	131.86 ± 91.91[c]	201.38 ± 206.13[c,k]	3.22 ± 1.80[d]	4.54 ± 4.39[d,l]	701.86 ± 253.71[e]	1108.57 ± 227.06[e]
Non-obese	391.52 ± 145.85[j]	448.71 ± 226.04	129.61 ± 82.72	115.35 ± 91.44[k]	2.46 ± 1.35	2.92 ± 1.54[l]	682.66 ± 267.23	674.57 ± 376.53
FF consumption	313.72 ± 96.86	298.28 ± 118.32	73.92 ± 57.10[m]	66.94 ± 49.09[n]	1.45 ± 0.80[o]	1.84 ± 1.08[p]	399.03 ±126.96[q]	394.36 ± 229.64[r]
No FF consumption	479.65 ± 243.63[f]	662.67 ± 753.79[f]	136.14 ± 6.25[g,m]	189.00 ± 179.71[g,n]	3.16 ± 1.73[h,o]	4.30 ± 3.75[h,p]	744.98 ± 326.90[i,q]	1030.24 ± 1043.41[i,r]

[a] Whole Sample: mean intake of potassium consumed/dollar spent p= 0.09 Day 1 Day 2; [b] Whole sample: mean intake of iron consumed/dollar spent p = 0.07 Day 1 Day 2; [c] Obese: mean intake of calcium/dollar spent p=0.07 Day 1 Day 2; [d] obese: mean intake of iron/dollar spent p=0.09 Day 1 Day 2; [e] Obese: mean intake of sodium/dollar spent p= 0.06 Day 1 Day 2; [f] No FF: mean intake of potassium/dollar spent p= 0.08 Day 1 Day 2; [g] No FF: mean intake of calcium/dollar spent p= 0.08 Day 1 Day 2; [h] No FF: mean intake of iron/dollar spent p= 0.04 Day 1 Day 2; [i] No FF consumption: mean intake of sodium/dollar spent p= 0.05 Day 1 Day 2

[j] Day 1: mean potassium intake/dollar spent p= 0.09 Obese Non-obese; [k] Day 2: mean intake of calcium/dollar spent p= 0.06 Obese Non-obese; [l] Day 2: mean intake of iron/dollar spent p= 0.09 Obese Non-obese; [m] Day 1: mean intake of calcium consumed/dollar spent p= 0.09 FF No FF; [n] Day 2: mean intake of calcium consumed/dollar spent p= 0.03 FF No FF; [o] Day 1: mean intake of iron/dollar spent p=0.02 FF No FF; [p] Day 2: mean iron intake/dollar spent p= 0.036 FF No FF; Day 1: [q] mean intake of sodium/dollar spent p= 0.01 FF No FF; [r] Day 2: mean intake of sodium/dollar spent p= 0.049 Day 1 Day 2

ratios between the days. Significant differences were seen for mean nutrient-to-cost ratios for calcium (p= 0.06), iron (p= 0.09), and sodium (p= 0.06), but not for potassium, between the days for obese participants. No significant differences among mean nutrient-to-cost ratios were seen between the days for non-obese participants. No significant differences were seen among mean nutrient-to-cost ratios between the days for FF consumers. Significant differences were seen for mean nutrient-to-cost ratios for potassium (p= 0.08) calcium (p = 0.08), iron (p= 0.04), and sodium (p= 0.050) between the days in those who do not consume FF.

The table also shows mean nutrient-to-cost ratios for potassium, calcium, iron, and sodium between groups on both days. No significant differences were found among mean nutrient-to-cost ratios between FS and FIS participants regardless of day. Significant differences were seen among mean nutrient-to-cost ratios for potassium (p= 0.09) on Day 1 and calcium (p= 0.06) and iron (p= 0.09) on Day 2 between obese and non-obese participants. No significant differences were seen among mean nutrient-to-cost ratios for calcium, iron, and sodium on Day 1 and potassium and sodium on Day 2 between obese and non-obese participants. Significant differences were also seen among mean nutrient-to-cost ratios for calcium (p= 0.09; p= 0.03), iron (p= 0.02; p= 0.04), and sodium (p= 0.01; p= 0.05) on Day 1 and Day 2 between those who consume and do not consume FF. No significant differences were seen among mean nutrient-to-cost ratios for potassium on either day.

CHAPTER 5

DISCUSSION

Food Group Intake

In comparison with the 2005 DGA recommendations (93), mean intakes were shown to be low for the majority of food groups examined among study participants. Regardless of Day (1 or 2) or group breakdown, few participants were shown to meet recommendations for whole grains, milk, fruit, and vegetables. Inadequate intakes were particularly pronounced for whole grains, milk, and fruit groups with less than 10% of the whole sample shown to meet recommendations for these food groups on either day. In contrast, the majority of study participants met recommendations for meat/beans (52%) on Day 1, although this proportion dropped on Day 2. Based on the food group intake results and items listed on 24-hour dietary recalls, diet variety appears to be low among study participants. Diet variety is often an expendable component of diet as income diminishes, and as this declines, so too does diet quality (83-84). Those with low diet variety often have the most difficulty in achieving a nutritionally adequate diet (83).

Analysis of Food Groups

Mean intakes of grains and whole grains were analyzed between the days each of the 7 group divisions in our study. No significant differences were detected between the days for grains in any group indicating that the consumption of grains was similar (and low) between the days for each group. Significant differences were noted between the days for whole grain intake only in those who consume FF, with the mean intake shown to be significantly higher on Day 1. The higher mean intake on Day 1 was not due to the large majority of participants consuming whole grains for the day, but rather to the small sample size for this day (n= 6). This allowed the

only two participants who reported whole grain consumption for that day to drive the mean intake up for the rest of the group. In contrast, none of the 11 participants who ate FF on Day 2 reported consuming any whole grains, which allowed a significant difference to be detected between the days. Mean intakes of grains and whole grains were also observed between groups (e.g. FS vs. FIS) on each day. No differences were detected among groups regardless of Day (1 or 2). Therefore, we conclude that mean intakes of grains and whole grains were equally poor between members of the two weight status groups (obese vs. non-obese), food security status groups (FS and FIS), and FF consumption groups (FF vs. No FF).

Mean intakes of vegetables and fruit were analyzed between the days for the same 7 groups; however, no significant differences were found between the days for any food group. This indicates that both fruit and vegetable intake remained similar (and poor) between the days in all groups. Mean intakes of vegetables and fruit was also analyzed between groups on each day. The only significant differences found were for vegetable consumption between those who did and did not consume FF. FF consumers were shown to have significantly higher intakes of vegetables than those reporting no FF consumption on Day 2 only (although findings approached significance on Day 1). To determine whether this higher intake among FF consumers was due to higher intakes of fresh/frozen low-calorie vegetables or higher calorie fried vegetables (French fries), we looked at mean vegetable intake between groups in a different way. Because the majority of FF consumers consumed French fries one or more times on Day 1 (67%) and Day 2 (64%), French fries were removed from the diets of FF consumers. After re-analyzing vegetable intake (without French fries) between FF consumption groups, we found no difference in vegetable intake on either day. Therefore, we conclude that French fries were responsible for the greater intake of vegetables seen among FF consumers on Day 2. The problem with choosing

French fries over other non-fried vegetable sources which are naturally low in calories and dense in nutrients, is that French fries, particularly those obtained from FF establishments, are generally high in energy, sodium, total fat, saturated fat, and *trans* fats.

Mean intakes of milk and meat/beans were the final groups to be analyzed between the days. Mean intakes of milk were significantly different between the days for non-obese participants, with mean milk intake lower on Day 2. From the 24-hour dietary recalls, we were able to see that the proportion of participants not consuming milk was the same between days (56%). Therefore, lower mean intakes of milk on Day 2 were not due to fewer participants consuming milk, but rather from a decreased intake among those who did consume milk. With the high proportion of participants reporting no milk intake, this suggests that they avoid milk products, either on the basis of taste, cost, or possibly from lactose intolerance, which is prevalent among black adults (94).

The mean intake of meat/beans was significantly lower on Day 2 in FS participants and the whole sample. Although intakes were significantly lower on (on Day 2), it is important to note that mean meat/bean intake never fell below recommendations for these groups or any other of the groups analyzed regardless of Day (1 or 2). Because this group had the greatest proportion of participants meeting recommendations, it can be concluded that meat/bean group is one of the more commonly consumed food groups among participants in our study.

Our first hypothesis was that the number of food group servings consumed will decline from the beginning of the monthly resource cycle to the end for the majority of participants (the whole sample). We reject this hypothesis for grains, whole grains, fruit, vegetables, and milk intake as mean intakes were shown to be the same on each day. We accept this hypothesis only for the meat/beans group as mean intake was significantly greater on Day 1. The lack of

differences in food group intake between days is likely explained in part by the poor diet quality seen among study participants regardless of the time frame of the month.

Components of a Healthy Diet

The 2005 DGA describe a healthy diet as one that: emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products; includes lean meats, poultry, fish, beans, eggs, and nuts; and is low in saturated fats, *trans* fats, cholesterol, salt (sodium), and added sugars (78). From the results of MyPyramid Tracker on mean food group intake, it can be seen that the diets of our study participants do not emphasize fruit, vegetable, whole grain, or milk/dairy consumption. In fact, less than: 20% of participants met recommendations for fruit; 30% met recommendations for vegetables (after adjustment); 5% met recommendations for whole grains; and 20% met recommendations for milk regardless of Day (1 or 2) or group breakdown. Lean meat, poultry, fish and nut intake are also uncommonly consumed by participants, as seen on the 24-hour dietary recalls. Therefore, the majority of energy in the diets of these participants must come from added fats, sugars, and meats.

Fruits, vegetables, whole grains, and milk contain many important nutrients. It is important to mention nutrients contained in these foods as the diets of our study participants were shown to be exceptionally low in these groups. Fruits are important sources of potassium, dietary fiber, vitamin C, and folate. Vegetables contain the same important nutrients as fruits, in addition to vitamin A and E. Milk/milk products are important sources of potassium, calcium, vitamin D, and protein, with whole grains foods containing dietary fiber, B vitamins (thiamin, riboflavin, niacin and folate), and minerals (iron, magnesium, and selenium). Unlike whole grains, refined grains do not contain magnesium and selenium, and contain only small amounts of dietary fiber (78). With this said, we would expect the diets of our study participants to be

low in the following nutrients: fiber, vitamin A, vitamin C, folate, potassium, and calcium.

MyPyramid versus the Food Guide Pyramid

At the time in which 24-hour dietary recalls were collected from study participants (fall 2004), food group recommendations were based on the 2000 DGA and the Food Guide Pyramid (FGP). In the FGP, grains were at the base, with fruits and vegetables next, followed by milk and meat, and finally, added fats and sweets at the tip. The FGP recommended the intake of: 6-11 servings of grains, 3-5 servings of vegetables, 2-4 servings of fruit, 2-3 servings of milk, 2-3 servings of meat, and a limited number of servings from fats and sweets each day (95). These ranges were based upon individual energy needs of adults, with the lower values of each group representing the lower spectrum of energy needs. At the time when the older FGP was used, recommendations on whole grain intake were not yet included in the pyramid.

It could be argued that the newer FGP program, the MyPyramid plan, adds a level of complexity to understanding recommendations for food intake as the new plan is much more tailored to the individual (based on age, sex, and level of physical activity). If a lack of understanding of new recommendations was the case among the low educated poor, then we would expect to see higher quality diets among these individuals in the past when recommendations were easier to interpret. However, we find this not to be the case. Regardless of what current recommendations are, the same has been shown true of low-income FSP participating women in the past; and that is, that their diets most commonly fail to meet recommendations for fruit, vegetables, milk, and grain consumption (96).

Results from a previous study based upon the 2000 DGA recommendations were similar to our study (96). Participants were more likely to be inadequate in the milk and fruit groups as differences between actual and recommended intakes were greatest for these groups, followed by

vegetables and grains. Mean intakes of meat/beans exceeded that of the old FGP recommendations on both days, with a large proportion of food servings coming from the fats and sweets group on Day 1 (22 servings) and Day 2 (16 servings). The majority of energy in the diets of those participants was from added fats, sugars, and meats, with the least amount of energy coming from milk, fruit, and vegetables. These findings agree with our results, which show that meat/bean intake and refined grains are the greatest contributors of energy in the diets of our participants, with lesser amounts from milk, fruit/vegetables, and whole grains.

As in our study, participants in that study (n= 30) were women residing in rural areas of SE Louisiana. Approximately 70% of those women participated in the FSP. Although that study had only 21 FSP participants, it showed no differences in food group intakes between groups. This suggests that both participants and low-income non-participants residing in rural SE Louisiana have similarly poor intakes of fruit, vegetables, milk and grains. And, that participation in the FSP appears to have no effect on improving the diets of participants in regards to increasing the intake of nutrient-dense items. This is supported by a USDA study which examined the effects of program participation on the quality of diets (46). Of the meat, fruit, vegetables, grain, dairy, sugars, and fat groups analyzed, only meat, sugars, and total fat intake significantly increased with FSP participation. Fruit, vegetables, grains, and dairy remained stable (and low) among both participants and non-participants.

Store Selection for the Collection of Prices

In order to calculate diet costs for participants on both days, prices needed to be collected from a group of grocery stores similar to those where study participants reported shopping. From questionnaires administered to study participants (when initial 24-hour diet recalls were collected), we were able to determine which grocery stores the majority of participants do their

shopping at. The most commonly reported supermarkets were: Albertsons, Piggly Wiggly, Super Wal-Mart, and Winn Dixie. In addition to these supermarkets, there were many smaller, locally-owned grocery stores that participants frequented, many of which were specific only to the parish where they lived and shopped.

The following constraints to healthy eating have been documented among low-income households: lack of nearby supermarkets, limited selection in nearby stores, lack of transportation to stores of their choice, lack of child care, and limited time to do food shopping (68). Distance has been shown to be significantly correlated with fruit consumption among FSP participants, where those reporting the greatest distance from home to the nearest supermarket had the lowest intakes of fruit (79). Because the majority of our study participants reside within rural areas, we could not ignore the heavy reliance placed on smaller local stores.

Therefore, when choosing grocery stores for price collection, there were two important factors necessary to address. The first was that the overwhelming majority of study participants (84%) resided within only a few parishes. The second was that although study participants reported shopping at large supermarkets, the majority relied more on the smaller, locally owned grocery stores which required less travel time to visit. The following 5 grocery stores were chosen to reflect food prices found in locations where most study participants shop: Albertsons (Baton Rouge- EBR), Piggly Wiggly (Baton Rouge- EBR), Morales (Brusly- WBR), Midway (Donaldsonville- Ascension), and Schexnayder's (Vacherie- St. James). Albertsons and Piggly Wiggly were chosen in low-income areas of EBR parish in order to reflect food costs found at the supermarkets where participants shop. Morales, Midway, and Schexnayder's were chosen in rural areas in order to represent the smaller, locally owned stores that participants frequented.

In a study which examined all 200,000 FSP authorized food retailers in 1995, it was found that approximately 40% of the rural population resided in localities without a supermarket or large grocery store (68). The disadvantage to not having a localized supermarket within the area one resides is both a lack of variety in foods available in the area and higher food costs. One study found that when compared to large supermarkets, the average market basket costs 33% more in small grocery stores and 50% more in convenience stores (68). Because the majority of our study participants were shown to reside within rural areas of SE Louisiana, we chose more small grocery stores than supermarkets. In addition, parishes where these smaller grocery stores were located were near the parishes where the majority of study participants lived.

The question of whether five grocery stores were adequate to represent food costs is questionable; however, it is consistent with the literature. In one study examining the availability and cost of healthier foods for low-income consumers, a total of 12 grocery stores were selected to determine the amount it would cost to purchase the contents of 2 different market-baskets. Because that study looked at prices among both low-income and higher-income communities, grocery store locations were further subdivided, and six stores were chosen within low-income communities to reflect food costs/availability (97). Even fewer than six grocery stores have been used to obtain food costs, as found in a study which explored the effects of resource constraint on diet selection (15). An average of 3 to 4 stores was used within that study (15) when food costs could not be found in the national database. Based on the methods of the diet studies mentioned, 5 grocery stores appears adequate for our study, particularly since grocery stores selected in this study reflect the areas/types of stores where participants shop.

Diet Costs and Energy Intake

Where the average American spends $8.00 or less each day on food and beverages, low-income individuals may spend as little as $3.50 per day (11, 19-20). Several studies support the finding that lower diet costs are associated with lower quality diets (15, 23, 87). In our study, mean daily diet costs of all FSP participants were approximately $4.94 on Day 1 and $4.08 on Day 2. Higher diet costs seen among our study could be a reflection of the higher costs associated with smaller grocery stores (68) or possibly higher costs found in Louisiana. The lowest diet costs were seen among obese participants, with the highest diet costs seen among those who reported consuming FF. Low diet costs among the obese could be explained by underreporting of energy, or possibly by food selection choices among this population.

Diet Costs between the Days

Diet costs were significantly different between the days for obese participants, with mean diet costs found to be higher on Day 1. One explanation could be participation in food cycling practices. As families who participate in food cycling overeat when benefits first arrive, they are later faced with inadequate resources as the majority was used on food during the first half of the month (10-11). The likelihood of food insecurity is higher at end of the month as individuals have to adjust their food intake due to limited funds. However, food insecurity can sometimes be avoided through the selection of a limited number of low-cost foods, high in energy density. With periods of binge eating, as seen when food again becomes plentiful, weight gain is a likely outcome over time. Because food cycling is believed to be a predictor of weight gain independent of the amount and form of FSP benefits, we would expect to see a greater number of obese participants engaging in this behavior (10-11).

Although the predictor of diet costs at the beginning and end of the monthly resource cycle in this study was only a single dietary recall for either day (1 or 2), based on mean diet costs, total weekly expenditure of food intake for the obese would be $31.92/week at the beginning and $24.22/week at the end of the month per person. Mean energy intakes for obese participants also supports the presence of food cycling practices among these participants as total energy was shown to be significantly lower on Day 2.

Differences in diet costs between the days were also observed for the whole sample and for those not consuming FF in our study. Due to the large proportion of obese participants in this study, food cycling practices among the obese likely contributed to the differences in cost observed in the whole sample and those not consuming FF. Approximately 62% of the whole sample and 66% of those not consuming FF were found to be obese.

Differences seen in diet costs between the days in obese participants were not seen among non-obese participants. Food cycling practices were likely present among non-obese participants since 61% these participants were overweight; although probably not to the degree as obese participants. Energy intakes remained the same during both time frames, which suggests that the majority of non-obese participants maintained food intake, with available resources, better than obese participants at the end of the month.

Diet costs were also examined in the study among food security status groups. There were no differences shown for diet costs between the days in either group. As diet quality had not been shown to change much between the days for the same FS participants in the larger study (91), significant differences in diet cost were not expected. However, because many differences in nutrient intakes between the days for FIS participants were seen in the previous study, differences in diet costs were expected for FIS participants (91). Although our findings on diet

cost were approaching significance, we could not conclude that there were any significant differences in either diet costs or energy intake among FIS participants.

For those who consumed FF, no significant differences were seen between the days in mean diet costs. Although mean costs of FF items consumed by participants were shown to be slightly higher on Day 1 ($5.66) than on Day 2 ($5.17), these differences appeared too small to influence overall diet costs between the days.

Our second hypothesis was that study participants will spend more on food items at the beginning than at the end of the month. We reject this hypothesis for FS, FIS, non-obese and FF consumers as diet costs were shown to be the same between the two time frames. We accept this hypothesis for the whole sample, the obese, and those not consuming FF as diet costs were shown to be significantly lower on Day 2.

Diet Costs among Groups

Our third hypothesis was that FF consumers will have higher diet costs than participants not consuming FF. As those who consumed FF in our study were shown to have significantly higher diet costs than those who did not consume FF regardless of Day (1 or 2), we accept this hypothesis. Our fourth hypothesis was that FF consumers will have higher energy intakes than participants not consuming FF. As FF containing diets were shown to contain significantly more energy than diets not containing FF on both days, we accept this hypothesis. Because the majority of participants only consumed FF once on Day 1 (83%) and Day 2 (91%), we posit that FF items are highly energy-dense and costlier than foods consumed at home.

In our study, participants consumed FF an average of 1.8 times per week (data not shown). In a 3-year study of 891 women between the ages of 20 to 45, the frequency of FF restaurant use was shown to be higher among younger women, low income, non-White ethnicity,

greater body weight, lower dietary restraint, fewer low-fat eating behaviors, and greater television watching (98). Because our study population is made up of a sample of low-income participants who are primarily obese black women, that consume poor diets, we expected to see a greater proportion of FF consumption among participants.

Differences in diet costs were not observed between the FS and FIS groups. As diet costs have been shown to predict the quality of diets (15, 17-18), based upon the findings of a recent study on FSF and FIF (28), we expected to see significant differences in diet costs between groups. Dixon et al showed that younger adults (aged 20-59 y) from FSF had higher intakes of calcium, vitamin E, vitamin A and α-carotene, ß-cryptoxanthin and lutein/zeaxanthin than younger adults from FIF (28). Dixon et al also showed that adults of FSF report a higher consumption of milk and milk products, fruits and fruit juices, and vegetables on their one-month frequency than adults of FSF (28). As diets high in nutrient-dense milk, fruits and vegetables have been shown to be associated with higher diet costs (17-18), results of that study (28) indicate that FSF (who consumed more milk, fruit, and vegetables) spend more on their diets. This was not the case in our study, however. Based on the food intake data in our study, there were no differences seen for milk intake, fruit intake, or vegetable intake between FS and FIS groups, nor were there differences seen in energy intake between groups.

There are two explanations of why some of these differences may not have been detected among our FS and FIS population. First, in the study performed by Dixon et al, food group intake between groups was based on a one-month frequency. Differences in food group intake may have been easier to detect between groups using a one-month frequency than by using only two days worth of dietary data. Second, the sample size used in their study (n= 6,475) was much larger than ours and was based on a nationally representative sample, not on low-income families

within a particular segment of the U.S.

Obese participants had the lowest mean diet costs of all groups in our study. Low cost of diets among the obese was reported in an earlier study which found that obese participants purchased a higher proportion of cheap foods than did normal weight subjects due to economic problems and fears or experiences of running out of money to buy food (10). Low diet costs among obese participants in our study suggest that these participants have the most difficulty consuming healthier alternatives as opposed to energy-dense alternatives lower in cost. Although there were no differences in mean food group intakes between weight status groups, differences were found for mean diet costs between the groups (on Day 2), with obese participants spending significantly less on their diet. Under the assumption that a high proportion of obese participants engage in food cycling behaviors, we expected to see significantly lower diet costs on Day 2 among obese participants.

<u>Nutrient Intakes</u>

Protein, Total Fat, Saturated Fat, and Cholesterol

In order to reduce the risk of coronary heart disease, Adult Treatment Panel (ATP) III developed several essential recommendations including: a reduced intake of saturated fats (SFA) of less than 7% of energy, up to 10% of energy from polyunsaturated fats (PUFA), up to 20% of energy from monounsaturated fats (MUFA), the consumption of between 25-35% of energy from total fat, and the consumption of less than 200 mg/day of cholesterol (98). These recommended intakes are part of a list which encompasses the therapeutic lifestyle changes (TLC) diet. ATP III recommendations are more stringent than the DGA recommendations of: consuming less than 10% of energy from SFA, maintaining fat intakes between 20-35% of energy, and consuming less than 300 mg of cholesterol per day (78).

Regardless of group breakdown or Day (1 or 2); mean intakes of total fat and saturated fat exceeded both the ATP III and DGA recommendations with the exception of FS and obese study participants on Day 2 for total fat (99-100). Mean cholesterol intake also exceeded ATP III recommendations on both days and DGA diet recommendations on Day 1 regardless of group breakdown. With the exception of mean cholesterol intake among non-obese participants, cholesterol intakes did not exceed DGA recommendations on Day 2.

Percent intakes from total fat were shown to be ≥ 36% in all groups regardless of Day (1 or 2) with the exception FS and obese groups on Day 2. The significance of this finding relates to the role of dietary fat in regards to obesity. High fat diets are believed to promote obesity by enhancing passive overconsumption of energy and increasing the energy density of the diet. From a review of 28 clinical trials studying the effect of lowering the proportion of energy from fat in the diet, it was shown that a 10% reduction translated to a decrease in body weight of approximately 16 g/day (or 1 lb/month) among study participants (101). An example of a 10% reduction of energy from fat would be a decrease in intake from 89 grams of fat (40% of energy from fat) to 67 grams of fat (30% of energy from fat) for a 2,000 calorie diet, which could be done by substituting low- or non-fat dairy products, fruits, vegetables, and whole grains in place of high fat dairy products, meats, and desserts.

Fat is a major source of fuel energy for the body. Dietary fat can be derived from both animal and plant products and has several important functions in the body, one of which is the role it plays in aiding the absorption of the fat-soluble vitamins A, D, E, and K and carotenoids. Saturated fat comes primarily from animal products such as, meat and dairy, with only a few plant sources (like coconut and palm kernel oil) (100).

In our study, >10% of calories were shown to come from SFA regardless of Day (1 or 2) and group breakdown. A review of the dietary 24-hour recalls from this study indicate that a large proportion of dietary fats consumed by participants are animal fats coming from fatty meats and processed meats, either consumed at home or at FF locations. The American Heart Association (AHA) recommends using PUFA or MUFA oils (and margarines and spreads made from them) in limited amounts in place of fats with a high SFA content, such as butter, lard or hydrogenated shortenings (102). Although MUFA and PUFA intakes were not investigated in this study, results from Burke's study (91) showed that mean % PUFA and MUFA intakes were approximately 50% below ATP III recommendations regardless of group or Day (1 or 2).

The primary goal for the TLC diet is a reduction in the risk of developing coronary heart disease (CHD). Because elevated low-density (LDL) lipoprotein cholesterol is a major cause of CHD, the main objective in reducing CHD is to lower LDL-cholesterol (99). Increased serum cholesterol levels are primarily the result of dietary cholesterol, saturated fat, and *trans* fats intakes (102). In our study, both mean dietary cholesterol and % mean energy from saturated fats exceeded ATP III recommendations regardless of day or group breakdown. And, although *trans* fat intake was not addressed in this study, examination of 24-hour dietary recalls used within the study indicate a high prevalence of foods notably high in *trans* fat content, such as: cookies; crackers; French fries; and other commercial baked goods and fried foods (102). From mean intakes of total fat, saturated fat, and cholesterol our study participants are at risk for the development of CHD, due to eating patterns alone. Compounded with the fact that the majority of our participants are obese (62%) and black (94%), this further increases the risk for CHD and other chronic diseases among study participants (53-54).

Regardless of Day (1 or 2) or group breakdown, mean intakes of protein exceeded DGA recommendations and ATP III recommendations with the exception of mean protein intake in those consuming FF on Day 2 (for ATP III recommendations only) (99-100). The DGA recommendations are based on the RDA for protein, which is 46 grams of "good quality" protein per day for all females ≥ 14 years of age. The ATP III recommendations are based on the percent of energy from protein in the diet. ATP III recommends that approximately 15% of total calories should come from protein.

In our study, the most commonly consumed protein sources were from the meat/beans group. As meat and beans (with rice) were the most commonly consumed items from this group among participants' 24-hour dietary recalls, we conclude that the majority of protein consumed is complete. But, because of the mean intakes of total fat, saturated fat and cholesterol found within this study, we posit that complete protein sources were primarily high-fat processed meats. The 24-hour dietary recalls confirm a high proportion of processed meats (sausage, bacon, sandwich meat) among the diets of study participants.

A recent study analyzed the dietary intakes of individuals living in the LMD in comparison with the overall U.S. population (29). As individuals residing in the LMD region are quite similar to our study participants, findings from their study should be similar to ours. One reason of why our participants and theirs are similar is the high prevalence of food insecurity found among both studies. Rates in the LMD are higher than the national average (21.0% vs. 11.9%), with even higher rates of food insecurity seen among: households with income levels below $15,000, black households, and households with children (43). For our study participants, the majority of which were black women with children, approximately 55% were found to be FIS (data not shown). Another explanation for the similarity between their study population and

ours is that half of the parishes used in our study are located within the LMD region, with approximately 50% of our study participants residing within these 4 parishes (44). Their study concluded that intakes of fat were higher among LMD adults than U.S. adults, while intakes of protein were not (29).

This suggests that low-income participants are consuming their protein sources from higher-fat sources than are U.S. adults in general. This is supported by a USDA study, which analyzed grocery store purchases by income levels (21). This study found that low-income shoppers purchased more meat and poultry when compared with middle (7.6% more) and high-income (6.7% more) shoppers, while doing so at a lower cost (21). The poor were able to purchase more while keeping their costs down by selecting lower quality (high fat), less expensive meats over pricey lean cuts of meat. Lower intakes of fat along with higher protein intakes among U.S. adults are likely because higher-income individuals are more apt to consume other sources of protein (aside from meat and poultry) than are low-income individuals (13-14).

Total Carbohydrates and Fiber

Regardless of Day (1 or 2) or group breakdown, mean intakes of total carbohydrates exceeded DGA recommendations (100). This was not the case for ATP III recommendations as % energy from carbohydrates fell at or below 50% in all groups regardless of Day (1 or 2) (98). The DGA recommendations are based on the RDA for carbohydrates (130g/day for adults and children). This amount is based on the average minimum amount of glucose utilized by the brain (100). ATP III recommendations are based on the percent of energy coming from carbohydrates in the diet and suggest maintaining carbohydrate intake between 50-60% of calories, with carbohydrate intake coming predominantly from foods rich in complex carbohydrates, including grains, especially whole grains, fruits and vegetables (99).

In our study, fruit, vegetable and whole grain intake was shown to be exceptionally low, indicating that the majority of carbohydrate intake among participants was from simple sugars. The problem with consuming a much higher ratio of simple sugar food sources (refined grains) over complex carbohydrate food sources (whole grains, fruit, and vegetables) is that diets with high amounts of simple sugars have been linked to the development of CHD (103) and type 2 diabetes (104) in women. In a 10-y follow-up study of over 75,000 women, it was concluded that diets with a high glycemic load from refined grains increase the risk of developing CHD, independent of known coronary disease risk factors (103). This association was most evident among those with above average body weights (103). Because the overwhelming majority of our study population is overweight or obese (80%), with diets high in simple sugars, based on the results of that study (103), our population is at high risk for the development of CHD.

In our study, mean intakes of fiber were below DGA recommendations and ATP III recommendations regardless of Day (1 or 2) or group breakdown (99-100). The DGA recommendations are based on the adequate intake (AI) for total fiber (25 g/day for women between the ages of 19-50 years and 21 g/day for women ≥ 51 years of age). The AI is based on the intake level observed to protect against the development of CHD (100). ATP III recommendations for fiber, which are 20-30 g/day, are for all age groups (99). Inadequate fiber intakes among participants in our study are the result of low intakes of vegetable, fruit, and whole grains. Diets high in rapidly absorbing carbohydrates (high glycemic index foods) and low in cereal fiber have been shown to be associated with increased risk of developing diabetes in both young and middle-aged women during an 8 y follow-up study (104).

Sodium and Potassium

As expected, mean intakes of potassium were shown to be lower than DGA recommendations for all groups and days. DGA recommendations are based on the AI for potassium (4,700 mg/day) (105). The AI for potassium was chosen to maintain low blood pressure, as well as to minimize adverse effects on blood pressure from salt intake in those who are salt sensitive (105). The median intake of potassium by female adults in the U.S. was 2,200 to 2,400 mg/day, indicating that potassium intake is generally low among women. Intakes of potassium were shown to be even lower among our study participants, with the exception of potassium intake among FF consumers (on Day 1). Mean intake of potassium on Day 1 in FF consumers was higher than the median intake of potassium in US women. However, this was because the sample size was so small for Day 1 (n= 6). Mean intake of potassium was driven by the intake of one participant (~ 4,500 mg).

Regardless of Day (1 or 2) or group breakdown, mean intake of sodium exceeded DGA recommendations (≤ 2,300 mg/day). These findings suggest that the ratio of sodium to potassium is skewed among the majority of our study participants. As sodium rich foods are generally highly processed, potassium-rich foods include a variety of foods such as meat, milk, fruit, and vegetables. In order for potassium to regulate blood pressure effectively, equal amounts of potassium and sodium are recommended within the diet (107). To increase potassium intake while lowering sodium intake, it is important to limit consumption of processed foods, while eating more fruits and vegetables (107).

Salt sensitivity (SS) is a condition which is characterized by an acute blood pressure elevation with increasing salt intake. Individuals most likely to have SS are: those with renal disease, diabetes, obesity, or hypertension; older individuals; and black individuals. After the

age of 55, the prevalence of hypertension becomes greatest among women, particularly for black women between the ages of 65 to 74 (106). As the majority of our participants are obese black women (16% of which are > 55 years of age) we posit that SS is prevalent in a significant portion of our study population

The role of sodium and potassium in hypertension is a particularly important topic for nutrition education among program participants, since hypertension is more commonly seen among low-income communities than higher-income areas (30). In addition to education, greater access to fruits and vegetables must be achievable. Easy access has been shown to be positively associated with fruit intake in a nationally representative sample (n= 963) of participants in the FSP (79). The reverse was true of travel distance in this study; as distance from home to the food store increased, fruit use by households declined (79).

However, there is still the issue of cost. The replacement of fats and sweets in the diet with fruits and vegetables has been shown to be related to significantly higher diet costs (87). As linear programming showed, when imposing greater cost constraints, the proportion of energy contributed by fruits and vegetables, meat, and dairy products decreased (15). Because cost is the most important consideration when choosing foods among the low-income (14-18), fruits and vegetables should be made more affordable for low-income communities. In a study which addressed the global burden of disease attributable to low fruit and vegetable consumption, it was shown that the worldwide mortality currently attributable to inadequate consumption of fruits and vegetables was 2.635 million deaths per year. By increasing individual fruit and vegetable consumption by up to 600 grams/day, we could reduce the burden of ischemic heart disease and stroke by 31% and 19%, respectively (108).

Vitamin A and Vitamin C

Regardless of Day (1 or 2) or group breakdown, mean intake of vitamin A fell below DGA recommendations (109). DGA recommendations are based on the RDA for vitamin A (700 µg activity equivalents (RAE)/day). Important food sources of vitamin A are: liver, whole milk, and eggs; fortified foods such as breakfast cereals; and dark colored fruits and vegetables (110). Vitamin A that comes from animal sources is referred to as preformed vitamin, whereas vitamin A found in colorful fruits and vegetables is known as provitamin A carotenoids (110).

The 2000 NHANES indicated that major dietary contributors of retinol are milk, margarine, eggs, beef liver and fortified breakfast cereals, whereas major contributors of provitamin A carotenoids are carrots, cantaloupes, sweet potatoes, and spinach (110). The 24-hour dietary recalls revealed a low intake of all these foods (with the exception of eggs), although breakfast cereals and milk were the next most commonly seen foods.

Regardless of Day (1 or 2) or group breakdown, mean intakes of vitamin C were shown to fall below DGA recommendations with the exception of FIS and FF consuming study participants on Day 1 (111). Higher mean intakes among FIS and FF consuming participants suggest that participants in these groups had higher intakes of vitamin C when compared with other groups. However, this was not shown to be the case. Because the FF consuming group was so small (n= 6), 2 participants were able to drive the mean intake of the group up, as these participants had intakes of more than twice the RDA. The mean intake of the FIS group was also elevated by several participants who exceeded the RDA. Although 15 (of 35) study participants in the FIS group met recommendations for vitamin C on Day 1, only 5 were responsible for driving the group intake up, as these participants had intakes that were twice the RDA.

DGA recommendations are based on the RDA for vitamin C (75 mg/day for adult women). Although all fruits and vegetables contain some vitamin C, foods which are the best sources are: green peppers, citrus fruits and juices, strawberries, tomatoes, broccoli, turnip greens and other leafy greens, sweet and white potatoes, and cantaloupe (112). The 24-hour dietary recalls revealed that orange juice, lettuce, potatoes, and turnip/mustard greens were the most commonly consumed sources of vitamin C from this list. Other good sources include: papaya, mango, watermelon, Brussels sprouts, cauliflower, cabbage, winter squash, red peppers, raspberries, blueberries, cranberries, and pineapples (112). With the exception of cabbage, intake of these foods was exceptionally low among the diets of our study participants.

Because Vitamin C is a water-soluble vitamin, it cannot be stored; and therefore, must be consumed every day (112). Deficiency of vitamin C can lead to dry and splitting hair; gingivitis and bleeding gums; rough, dry, scaly skin; decreased wound-healing rate, easy bruising; nosebleeds; weakened enamel of the teeth; swollen and painful joints; anemia; decreased ability to ward off infection; and, possibly, weight gain due to slowed metabolic rate and energy expenditure (112). A more severe vitamin C deficiency causes scurvy, which is characterized by symptoms related to connective tissue defects. Although this disease is rare in developed countries, it is still occasionally seen among individuals who consume few fruits and vegetables, engage in peculiar or restricted diets, or abuse alcohol or drugs (111).

The median dietary intake of vitamin C for adults in the U.S. is 102 mg/day indicating that most have adequate intakes. In the U.S., low blood ascorbate concentrations are more prevalent in men that in women and are more prevalent in populations of lower SES (111). Although we are not able to compare our findings with intakes among FSP participating men, we are able to conclude that the majority of our study participants do not meet recommendations for

vitamin C. It is also important to note that findings on nutrient intake in our study are collected from two days worth of dietary recalls only; and that deficiencies have not been confirmed with blood tests.

Folate, Iron, and Calcium

Mean intakes of folate were below the DGA recommendation in all study participants. DGA recommendations are based on the RDA for folate (400 µg/day of dietary folate equivalents [DFEs] for men and women). DFEs are set in order to adjust for the nearly 50% lower bioavailability of food folate compared with that of folic acid, the most oxidized and stable form of folate. Although folic acid occurs rarely in natural food sources, it is the form used in vitamin supplements and in fortified food products (113).

Before cereal grains were fortified with folate in 1998, the reported median intake of folate from food was approximately 250 µg/day (113). The significance of this mandatory fortification is that there were now more food sources of folate available to the general public at low cost. Prior to this process, individuals generally had to rely on food sources such as: spinach, asparagus, broccoli, avocado, peanuts, and romaine lettuce (114). These are foods not widely consumed among our study population (13-15).

Adequate folate is particularly important for women of childbearing age, as inadequate folate intake has been associated with an increased risk of neural tube defects in pregnancy (113-114). Folate is also essential to make red blood cells and to prevent anemia. Because the onset of anemia from a folate deficiency is usually gradual, the body adapts to the changes in oxygen-carrying capacity of the blood. It is not until the anemia is moderate to severe that symptoms of weakness, fatigue, difficulty concentrating, irritability, headache, palpitations, and shortness of breath are seen (113). In addition, folate is also essential for the metabolism of homocysteine

and works to maintain normal levels of this amino acid (114). Normal levels of homocysteine are essential since even mild elevations are a risk factor for occlusive vascular disease. Homocysteine levels are inversely related to the intake and plasma levels of folate and vitamin B-6 as well as vitamin B-12 plasma levels. Therefore, it is important to maintain as adequate an intake of folate and the other B vitamins as possible. In fact, almost two-thirds of the prevalence of high homocysteine has been linked to low vitamin status or intake (115).

The need to maintain adequate intakes of folate appears to be particularly high among our study participants. There are two reasons for this. The first reason is that our study participants are at high risk for cardiovascular disease due to the prevalence of obesity among this group (62% are obese) and poor dietary habits (53-54). As the literature suggests, inadequate intakes of folate and vitamin B-6 increase the risk for vascular disease (115). The second reason is due to the age of our participants. The mean age of study participants was 39 years, suggesting that a large percent of participants are still of childbearing years.

Mean intakes of iron were below DGA recommendations for study participants. DGA recommendations are based on the RDA for iron (18 mg/day in premenopausal women and 8 mg/day for postmenopausal women) (109). Although mean intakes were above 8 mg/d in all groups, the mean age of our sample suggests that a large majority of participants are premenopausal, in which case, recommended intakes were not met.

There are two forms of iron which can be consumed in foods: heme and non-heme iron. Heme iron is derived primarily from meat sources, with beef containing the highest amounts. Non-heme iron is derived primarily from plant and dairy sources, although dairy foods are relatively poor sources of iron. Foods with the highest amounts of non-heme iron include: kidney beans, baked beans, lima beans, spinach, and whole wheat bread (116). Vitamin C aids

in the absorption of non-heme iron; however, mean intakes of vitamin C were shown to be low among our study participants. Therefore, vitamin C likely did not substantially assist absorption of non-heme iron among most participants. Results of food group intake analyses indicate that, of the food sources of iron, meat and beans were likely the most commonly consumed among our participants. The 24-hour dietary recalls indicate that beans were usually consumed with meat (a heme iron source), which also aids the absorption of non-heme iron. So, although mean intakes were low, we posit that the majority of iron consumed in our population was absorbed.

With inadequate intakes of iron anemia can develop. Anemia is more common among women, particularly premenopausal women, than among men, due to menstrual losses and increased needs during pregnancy. The impact of iron-deficiency anemia includes decreased work performance, decreased motor and cognitive development in infants, and adverse pregnancy outcomes (109). Studies have demonstrated that maternal anemia is associated with premature delivery, low birth weight, and increased perinatal infant mortality (109).

Mean intake of calcium fell below DGA recommendations for study participants regardless of Day (1 or 2) or group breakdown (94). DGA recommendations are based on the AI for calcium (1,000 mg/day in women between the ages of 19-50 years and 1,200 mg/day in women $\geq$ 51 years). Men are more likely to not meet calcium recommendation than are women. According to the Continuing Survey of Food Intakes by Individuals (CFSII) (1994-96), 55% of men and 78% of women ages $\geq$ 20 years do not meet calcium recommendations (117).

When evaluating food sources of calcium, calcium content is generally of greater importance than bioavailability, as calcium absorption efficiency is fairly similar in most calcium-containing foods. Dairy foods are generally the major source of calcium in U.S. diets. The breakdown of calcium in the U.S. food supply indicates that the majority comes from milk

products (73%), with less coming from fruits and vegetables (9%), grain products (5%), and other sources (12%) (94). Other foods high in calcium include: tofu, Chinese cabbage, kale, fortified orange juice, and broccoli (117).

Chronic calcium deficiency resulting from inadequate intake or poor intestinal absorption causes reduced bone mass and osteoporosis. In the U.S. each year, approximately 1.5 million fractures are associated with osteoporosis (94). One reason behind inadequate calcium intakes seen among U.S. adults could be the high prevalence of lactose intolerance found among different race/ethnicities. Although the presence of lactose intolerance is highest in Asians (85%), and lowest in whites (10%), blacks still have a high rate of it (50%) (94).

Most individuals who are lactose intolerant avoid dairy foods altogether, although it may not always be necessary to do so as studies have shown that many lactose intolerant individuals can tolerate a small amount of lactose. In our study, mean milk intake was shown to be very low. Aside from whole grains, it had the lowest proportion of participants who met recommendations for either day. Because 94% of our study population was black, we assume that a large proportion of participants are also lactose intolerant. This is only speculation; however, as the actual rate of lactose intolerance among our study population was not determined. Although the prevalence of osteoporosis is lower for black women than for white, Asian, or Hispanic women, it is important to consider that 1 in 10 black postmenopausal women are estimated to have the disease (94). Educating this population on other food sources of calcium (other than dairy) and on the importance of calcium supplementation, when not consuming dairy, is essential in the prevention of osteoporosis and its related complications.

Between the Days

Several studies have shown that nutrient-dense diets are more expensive than nutrient-poor energy dense diets (22-23, 87, 90). Therefore, in our study, we expected to see the greatest differences in nutrient intake among those groups which had significant differences in diet costs between days: the whole sample, obese and those not consuming FF.

For the whole sample, significant differences were seen in nutrient intake between the days for protein and cholesterol. Meat/beans intake was shown to decline between the days for this group as well, while the intake of the other food groups remained equally low between the days. Studies inducing cost constraints on diets have shown that meat is one of the first items to disappear from the diet when funds are inadequate (15). Our 24-hour recalls do reveal a lower intake of meat on Day 2, with a slightly greater proportion of beans.

On the basis of food security status, significant differences were seen in nutrient intake between the days for total fat and saturated fat in FS participants and vitamin A in FIS participants. There were no significant differences in diet cost between the days for FS or FIS participants; therefore, we did not expect a difference in nutrient intakes. Where FS participants consumed less meat/beans on Day 2, this was not the case for FIS participants. Meat/bean intake remained stable and elevated on both days for FIS participants. Declines in total and saturated fat intake among FS participants were probably the result of a lower consumption of meat on Day 2. The lower intake of vitamin A among FIS participants on Day 2 indicates a lower consumption of animal sources, fortified foods, or colorful fruits and vegetables (109). Mean intakes of food groups indicate no differences between the days in grain intake, meat/bean intake, or fruit and vegetable intake. However, when looking at the dietary recalls, fewer eggs were consumed on Day 2, suggesting that egg consumption influenced vitamin A intake for FIS.

On the basis of weight status, significant differences were seen in nutrient intake between the days for protein, total fat, saturated fat, and cholesterol in obese participants and calcium and sodium in non-obese participants, where Day 2 intakes were lower than Day 1. These lower protein, total and saturated fat, and cholesterol intakes on Day 2 among obese participants suggest a lower intake of meat for that day. However, no significant differences were found for meat/bean intake between the days. One reason for this could be that as meat intake declined, bean intake may have increased. The 24-hour dietary recalls suggest that a greater proportion of meat was consumed on Day 1, with less meat and more beans consumed on Day 2. This is further supported by the finding that diet costs were significantly lower on Day 2 than on Day 1 in obese participants suggesting that lower-cost energy dense items may have been chosen more often in order to keep costs down

A lower calcium intake on Day 2 for non-obese participants was confirmed by a lower intake of milk/dairy for that day. A lower sodium intake on Day 2 suggests a lower intake of meat/processed meats for the day. As anticipated, we did find more differences in mean nutrient intake between the days for obese participants than for non-obese participants, as diet costs were shown to be significantly lower on Day 2 for this group (but not for non-obese participants).

Significant differences were noted in nutrient intakes between the days for protein, vitamin A, and cholesterol in those who do not consume FF. These findings are similar to the findings of the whole sample. In contrast to the findings for those not consuming FF, no significant differences were noted between the days for any nutrient in those who consume FF. We conclude that those who consume FF in our sample have equally poor diets on both days.

Among Groups

In a cross-sectional study (by Dixon et al) which used data from NHANES III, dietary intakes and serum nutrient levels were examined between adults of FSF and FIF (28). Compared to their food-sufficient counterparts, younger adults (20-59 y) from FIF had lower intakes of calcium and were more likely to have calcium and vitamin E intakes below 50% of the recommended amounts. FIF adults also reported a lower 1-month frequency of milk/milk products, fruits/fruit juices, and vegetables. Older adults from FIF had lower intakes of energy, vitamin B-6, magnesium, iron and zinc. Although their study (28) found significant differences in nutrient intake between groups, ours did not. Our study also did not find any differences in energy intake between FS and FIS groups regardless of Day (1 or 2).

One reason of why differences were not found in our study could be the sample size. Had a larger sample of participants been available, differences in nutrient intake among groups could have become more pronounced. Another difference between that study (28) and ours is that our study participants are all from rural areas of SE Louisiana. Food preferences in this region are different than the U.S. as a whole. Foods specific to this region include grits, turnip greens, okra, ham hocks, crawfish, cracklings, jambalaya, and sweet potato pie (31). In addition, participants among our FS and FIS groups were very similar. Both groups were primarily black females with a high prevalence of obesity. Their study consisted of both men and women of multiple races and ethnicities.

Lower cost diets have been shown to contain the fewest nutrients. Andrieu, Darmon, and Drewnowski followed the diets of 1,474 adult participants (both men and women) for 7 days, and found differences in nutrient and energy intake among diet cost quartiles (90). Diet costs were shown to range from $4.49 in the lowest quartile to $7.41 in the highest quartile. Those

with the lowest diet costs had the highest energy intakes along with the lowest intakes of vitamin C, vitamin D, vitamin E, ß-carotene, folate, and iron (90).

As diets of obese individuals are generally of low-quality and higher energy (16) and in the case of our study, lower costs, we expected to find differences between obese and non-obese participants. However, we found no differences in energy or nutrient intake with the exception of total fat on Day 2. This may be due to underreporting among obese study participants, as no differences in energy intake were seen between obese and non-obese groups on either day. Had underreporting not occurred, energy intakes of obese participants likely would have been higher.

In a cross-sectional study which used data from more than 17,000 adults and children who participated in the 1994-96 and 1998 CSFII, the diets of those who consumed FF were compared with the diets of those who did not (118). Like our study, dietary intake data was collected by 2 non-consecutive 24-hour dietary recalls. However, a greater proportion of adult participants reported FF use in their study (37%) than in ours on Day 1 (9%) and Day 2 (17%). When compared with those who did not eat FF (n= 5,713), adults who consumed FF (n= 3,350) had higher intakes of: total energy; % energy from carbohydrates, protein, fat, and saturated fat; total fat; saturated fat; cholesterol; sodium; and calcium. In contrast, mean intakes were significantly lower among adult FF consumers for fiber, vitamin A, vitamin C, and potassium (118). That study indicates that the presence of FF greatly predicts low-quality diets, as those who consumed FF were shown to have significantly higher intakes of fat, cholesterol, and sodium with significantly lower intakes of important vitamins A and C, fiber, and potassium.

Results from our study on energy intake confirm the finding from the CFSII study (118) on both days; that those who consume FF have significantly higher intakes of energy than those who do not. We also found higher values for % energy from carbohydrates, protein, and total fat

among FF consumers (data not shown). In agreement with their findings (118), we saw significantly higher intakes of total carbohydrates among FF consumers. We also found significantly higher intakes of total fat among FF consumers on Day 2. However, we did not find any differences for intake of saturated fat, cholesterol, sodium, fiber, vitamin A, vitamin C, calcium, or potassium. We expected to see similar trends in our study as was seen in CFSII. Although several of our findings do support what was found in their study, we found fewer differences in nutrient intake between FF consumption groups. The limitation of our study is the sample size. In the CFSII study, much larger samples of FF consumers were used (n= 2,351) (118). Had our study sample been larger, we believe a greater number of differences would have been detected among the two groups.

Nutrient-to-Cost

Between the Days

Whole Sample

As diet costs were significantly lower on Day 2 among for the whole sample, we expected to see significant differences among several nutrients between the days. Significant differences were seen between the days among nutrient-to-cost ratios for carbohydrates, fiber, folate, potassium and iron. It could be argued that the replacement of costlier food sources of carbohydrates, fiber, and folate (whole grains) with cheaper food sources of these nutrients (refined grains) would be a cause of elevated nutrient-to-cost ratios for these nutrients. However, this is not the case since mean intakes of whole grain were well below recommendations on both days. Because cheaper refined grains make up the overwhelming majority of grain consumption among our participants on either day, it is likely that elevated ratios for these nutrients were due to lowering the intake of other food groups or replacing items in groups with cheaper options.

Intake of the meat/bean group declined between the days for the whole sample. This is likely how food costs were kept low on Day 2. However, although nutrient-to-cost ratios for potassium and iron were higher on Day 2, potassium and iron intakes remained the same between days. For potassium and iron intake to be maintained on Day 2 at a lower cost, expensive sources of potassium (fruit and vegetables) and iron (meat) would have been replaced with less expensive sources of potassium (beans) and iron (eggs and beans).

Food Security Status

Significant differences were seen between the days among nutrient-to-cost ratios for carbohydrates and folate only in FIS participants. Since no differences were seen in cost and only very few differences were seen in nutrient intake for the food security status groups, we did not expect to find differences in nutrient-to-cost ratios between the days. The finding that nutrient-to-cost ratios are high for carbohydrates and fiber among FIS participants suggests that lower cost items grains are selected at the end of the month.

Weight Status

Our fifth hypothesis was that obese participants will have lower nutrient-to-cost ratios on Day 2 representing fewer nutrients consumed per dollar spent. Because significant differences were detected between the days for carbohydrates, fiber, calcium, iron, and sodium for obese participants, with higher intakes seen on Day 2 than Day 1, we reject this hypothesis. We had assumed that nutrient-to-cost ratios would be lower on Day 2 because fewer available funds would contribute to a lower intake of nutrients. However, because nutrient intakes were so low on both days, obese participants were able to consume the same amounts of these nutrients, while doing so at a lower cost.

FF Consumption

Once the FF consumers were removed from the whole sample, more differences were detected between the days. Significant differences were now seen between the days for carbohydrates, fiber, folate, potassium, calcium, iron and sodium in those who do not consume FF, with no significant differences noted between the days for FF consumers. From nutrient intake analysis, we see that intakes of these nutrients were the same between days for those not consuming FF. In contrast, diet costs were significantly lower on Day 2 in those not consuming FF. This suggests that nutrient intakes were maintained while choosing lower-cost versions of foods high in each of the nutrients. Intakes of grains, fruit, vegetables, milk, and meat/beans did not change from Day 1 to Day 2 in those not consuming FF, suggesting that substitutions occurred within food groups to keep costs down. Substituting eggs and beans for more expensive meats would maintain iron and potassium intakes, while doing so at a lower cost. The same would be true of substituting more processed meats over fresh meat, although with too much substitution, sodium intakes would be higher for Day 2 which was not the case between days. Similarly, choosing the lowest cost refined grains would maintain carbohydrate, fiber and folate intakes among these participants while doing so at a lower cost.

Among Groups

Food Security Status

No differences were detected among nutrient-to-cost ratios when comparing FS and FIS groups regardless of day. On the basis that diet costs were similar for FS and FIS participants between the days, with no nutrient intake differences noted on either day, we did not expect to see any differences in nutrient-to-cost ratios between food security status groups.

Weight Status

Significant differences were detected among nutrient-to-cost ratios when comparing obese and non-obese participants for: carbohydrates on both days; potassium on Day 1; and fiber, calcium, and iron on Day 2. When comparing nutrient intakes between weight status groups, no significant differences were noted in intakes for these nutrients. However, diet costs were significantly lower for obese participants than non-obese participants on Day 2. The greater number of differences detected for Day 2 between groups suggests the presence of food cycling practices among obese participants, as obese participants were shown to maintain the same amount of these nutrients as non-obese participants, but at a much lower cost.

Fast Food Consumption

Our sixth hypothesis was that FF consumers would have lower nutrient-to-cost ratios than those not consuming FF, representing both lower intakes of vitamins/minerals in FF containing diets and higher costs. Significant differences were detected among nutrient-to-cost ratios when comparing FF consumption groups for fiber, total fat, saturated fat, and vitamin A, on Day 1; protein and carbohydrates on Day 2; and folate, calcium, iron, and sodium on both days. All significant findings for nutrient-to-cost ratios were shown to be lower for those who consume FF regardless of day. Therefore, we accept this hypothesis for all nutrients except protein and carbohydrates on Day 1 and fiber, total fat, saturated fat and vitamin A on Day 2. We had expected nutrient-to-cost ratios to be lower among FF consumers for all nutrients regardless of day. Had our sample of FF consumers been larger, we feel that more differences would have been detected between the two groups.

Conclusions

Our study participants had poor diets. Food groups in which participants were least likely to be adequate in were: whole grains, fruit, vegetables and milk. In contrast, a much higher proportion of participants met recommendations for grains (refined) and meat/beans. This is supported in the literature which suggests that low-income participants consume diets high in energy-dense nutrient poor foods (5, 13-14, 16). Mean intakes of carbohydrates, total fat, saturated fat, protein, cholesterol, and sodium reveal that the majority of participants exceeded recommendations, while failing to meet recommendations for fiber, vitamins A and C, folate, calcium, potassium, and iron. The risk of nutrient deficiencies and disease was high for our study population (53, 74-76, 101, 108). In addition, diet costs were shown to influence food selection among our participants. The majority of participants spent significantly less on food at the end of the month than at the beginning. From the 24-hour dietary recalls, it was clear that substitutions occurred in the meat/beans group, where fresh meat was often replaced with highly processed, lower quality meats or beans/eggs at the end of the month.

Although our study assessed diet quality and cost on the basis of only two 24-hour dietary recalls, it does appear that the greatest proportion of FSP benefits are spent at the beginning of the month when FSP benefits are first received. This provides support for the finding that food cycling practices exist among FSP participants. Distribution of FSP benefits twice a month could help eliminate some of these practices among program participants. In addition, the poor quality of diets among all groups indicates a need for nutrition education among the FSP population. This could be done by incorporating mandatory nutrition classes into the FSP prior to receiving benefits.

Future Directions

Future studies should include larger samples of participants so that the power of the study is increased. Future studies should include more dietary recalls at both points in the month (beginning and end). Although the majority of participants indicated that their recall reflected usual dietary intake, with a greater number of days (e.g. one during the week, and one on a weekend day) could we could be more certain that usual dietary habits are reflected. As our study only examined the diets of primarily obese black FSP participating women, residing in SE Louisiana, future studies should strive to include a nationally representative sample of both men and women participating in the FSP, along with other race/ethnicities, so that the relationship between nutrient intake and cost can be better analyzed among groups and not in just of one particular segment of the U.S. (SE Louisiana). It would also be of great interest to include nationally representative samples of women and men who are not participants of the FSP in order to detect differences in intake and cost between male and female FSP participants and nonparticipants (at differing levels of income).

Finally, it would be of great interest to further explore FF consumption among FSP participants. Diets of FF consumers in our study were shown to be higher in energy and cost than diets not containing FF. Differences in nutrient intake were found between FF consumers and non-consumers; although, with a larger sample, more differences would have been detected. In addition, by adding a sample of non-participants who consume FF, it would be important to note differences in diet quality and food choices between FF consuming participants and non-participants, as the greater majority of our participants chose hamburgers, chicken nuggets, and fries over grilled sandwiches and salads.

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APPENDIX A
HEIGHT AND WEIGHT RECORDING CHART

Name: ______________________ Date: ____________________

Machine settings:

Height (stated): ________________

Age (stated): ________________

Weight & BMI: ________________

Weight & BMI: ________________

Weight & BMI: ________________

Waist Circumference: ________________

Waist Circumference: ________________

Waist Circumference: ________________

Comments:

APPENDIX B
FOOD SECURITY QUESTIONS

SRDC 2003—04 USDA Food Security Module (modified)

[Administer these items in a fairly standard manner. Upon completion of these items, go on to the height, weight, and waist circumference measures, then the 24- hour food recall]

The next questions are about the food eaten in your household in the last 30 days and whether you were able to afford the food you need.

1. “The food that I bought just didn’t last, and I didn’t have money to get more.” Was that often, sometimes, or never true for you in the last 30 days?

2. “We couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for you in the last 30 days?

   (1) Often true (2) Sometimes true (3) Never true

   Probe: What does “balanced meal” mean to you?

3. In the last 30 days, did you ever cut the size of your meals or skip meals because there wasn’t enough money for food?

   (1) Yes _____ (2) No _____

4. In the last 30 days, did you ever eat less than you felt you should because there wasn’t enough money to buy food?

   (1) Yes _____ (2) No _____

5. In the last 30 days, were you ever hungry but didn’t eat because you couldn’t afford enough food?

   (1) Yes _____ (2) No _____

6. In the last 30 days, have you not eaten in order to have enough food for your children?

   (1) Yes _____ (2) No _____

6. Which of these statements best described the food eaten in your household in the last 30 days? (Check only one)

(1) We always have enough to eat and the kinds of food we want
(2) We have enough food to eat but NOT always the KINDS of food we want
(3) SOMETIMES we don’t have ENOUGH to eat

(4) OFTEN we don't have ENOUGH to eat

8. Who does the majority of the grocery shopping in your household? (circle one)

a) Self
b) Spouse/significant other
c) Parent(s)
d) Child(ren)
e) Friends/roommate
f) Other (describe): ____________________

9. Who does the majority of cooking for your household? (circle one)

a) Self
b) Spouse/significant other
c) Parent(s)
d) Child(ren)
e) Friends/roommate
f) Other (describe): ____________________

10. Where do you do the majority of your food shopping?

11. Where else do you shop for food?

12. What amount of food stamps do you receive each month? ____________________

13. How much money do you spend for food above the amount of food stamps that you receive each month? ________________

14. If you need to, how do you stretch your food stamps to reach the end of the month?

____

15. On the average, how much does your household spend per week on food?

$0-25	$26-75	$ 76-125	$126-200	$201-300	$301-500
(1)	(2)	(3)	(4)	(5)	(6)

16. How many persons does this feed per week? (fill in a number in each of the spaces below; fill in zero if applicable)

a. ________________ number of adults
b. ________________ number of teenagers

c. _________________ number of children
d. _________________ number of infants

17. Do you receive WIC? ____ Yes ____ No

18. How would you rate your eating habits? (circle one)

Poor	Fair	Good	Excellent
(1)	(2)	(3)	(4)

19. How would you rate the nutritional quality of your diet? (circle one)

Poor	Fair	Good	Excellent
(1)	(2)	(3)	(4)

20. About how many calories do you think you eat a day? (circle one)

Much Too Low	Somewhat Low	Just About Right	Somewhat High	Much Too High
(1)	(2)	(3)	(4)	(5)

21. How would you rate your knowledge of nutrition? (circle one)

Poor	Fair	Good	Excellent
(1)	(2)	(3)	(4)

22. On average, how often do you eat in fast- food restaurants? (circle one)

Rarely Or Never	Several Times Per Month	Several Times Per Week	Once a Day	Most Meals
(1)	(2)	(3)	(4)	(5)

23. Which fast-food restaurants do you eat in most often?

24. What do you typically order in these fast- food restaurants?

25. On average, how often do you eat in other types of restaurants?

Rarely Or Never	Several Times Per Month	Several Times Per Week	Once a Day	Most Meals
(1)	(2)	(3)	(4)	(5)

26. Which restaurants do you eat in most often?

27. What do you typically order in these restaurants?

29. Use the silhouettes above to answer the following questions about yourself (for each item, fill in the number of the corresponding silhouette).

a. Which figure is closest to your size? __________
b. Which figure is closest to the figure you desire? __________
c. Which figure represents you as a child? __________
d. Which figure represents you as a teenager? __________
e. Which figure is closest to your highest adult body weight? __________
f. Which figure is closest to your lowest adult body weight? __________

30. Do you think you were overweight as a child or teenager? (If yes, proceed with the Perception of Teasing Scale - POTS.)

APPENDIX C
STORE LOCATIONS

Albertson’s
9650 Airline Hwy.
Baton Rouge, LA 70815
(East Baton Rouge Parish)

Piggly Wiggly
8180 Plank Road
Baton Rouge, LA 70811
(East Baton Rouge Parish)

Morales Grocery
947 E Main Street
Brusly, LA 70719
(West Baton Rouge Parish)

Midway Grocery
416 Railroad Avenue
Donaldsonville, LA 70346
(Ascension Parish)

Schexnayder’s
13660 Hwy. 643
Vacherie, LA 70090
(St. James Parish)

APPENDIX D
DATA COLLECTION SHEET

Item	Criteria	Price	Price per unit	Comments:
Produce				
Apples	3 lb bag, 2.5 in diameter			
Banana				
Bell pepper, green	individual			
Bell pepper, red	individual			
Bell pepper, yellow	individual			
Broccoli				
Cabbage	head			
Cantaloupe	Individual			
Cauliflower	head			
Carrots, whole	2 lb bag			
Celery	Bag, not hearts			
Collard greens	loose			
Cucumber	individual			
Garlic	loose			
Grapes, red or white seedless				
Lemons	loose			
Lettuce, Romaine	head			
Lettuce, Iceberg	head			
Lettuce, Iceberg	bag			
Mustard greens				
Onions, green	bunch			
Onions, red	individual			
Onions, yellow	individual, medium			
Oranges, navel	loose, baseball sized			
Potatoes, baking	individual			
Potatoes, red	5 lb bag			

Item	Criteria	Price	Price per unit	Comments:
Squash, yellow	individual			
Strawberries	pint			
Tomato, red	loose, specify type			
Turnips				
Watermelon				
Tangerines	individual			
Zucchini	individual			
Canned				
Applesauce, unsweetened	3 lb 2 oz jar			
Fruit cocktail, lite syrup	15 oz can			
Oranges, mandarin	11 oz can, light syrup			
Peaches, lite syrup	1 lb 13 oz can			
Peaches, regular				
Pears, lite syrup	1 lb 13 oz can			
Pineapple chunk, lite syrup	1 lb 4 oz can			
Raisins	15 oz container			
Asparagus	Green giant			
Beets				
Chili	Hormel			
Corn, whole kernel	15.25 oz can			
Corn, cream style	Thrifty maid			
Corn beef				
Green beans, cut	14.5 oz can			
Mushrooms, stems and pieces	4 oz			
Spinach	14 oz can			
Sweet peas	Del Monte			
String beans	Shur fine			
Tomato paste	6 oz can, Hunt's			
Tomato sauce	15 oz can, Hunt's			

Item	Criteria	Price	Price per unit	Comments:
Tomatoes, diced	14.5 oz can			
Tomatoes, Rotel				
Tomatoes, stewed	14.5 oz can			
Turkey gravy				
Yams				
Tuna, chunk-style, in oil	6 oz			
Tuna, chunk-style, in water	6 oz			
Vienna sausage	Libby's			
Beans, baked, canned	28 oz, Bush's			
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			
Beans, garbanzo, canned	15 oz			
Beans, pork and beans				
Beans, red, dry	pack			
Beans, vegetarian, (Navy Beans)	15.5 oz			
Beans, white, dry	Specify # cups yields			
Peas, black-eyed	15.5 oz			
Chicken broth, low sodium				
Chicken noodle soup	Campbell's			
Cream of chicken soup	Campbell's			
Cream of mushroom soup, red. Fat	10.75 oz can			
Hot Tamales	Hormel			
Spaghettios				
Tomato soup	10.75 oz can			
Vegetable soup				

Item	Criteria	Price	Price per unit	Comments:
Frozen				
Orange juice, concentrate	12 oz, cheapest			
Blueberries, bag				
Broccoli, chopped	16 oz			
Corn on the cob	Specify # in package			
Green beans, cut	16 oz			
Mixed vegetables				
Okra, cut	16 oz			
Peas	16 oz			
Spinach, chopped	16 oz			
French fries	2 lb bag, plain			
Frozen hash browns	32 oz bag			
Tator tots	specify # of portions			
Waffles, frozen	Specify # in package			
Chicken nuggets, frozen	Specify # in package			
Chicken patty, breaded	Specify # in package			
Fish, breaded portions, frozen	specify # of portions			
Fish, breaded cod/flounder, frozen	specify # of portions			
Sausage biscuit	Jimmy Dean, specify #			
Sausage patties	Specify # in package			
Scallops				
Shrimp, breaded, frozen	Specify count			
Turkey burgers, frozen	Great value brand, list #			
Biscuits	Grand's, specify #			
Croissant	Pillsbury, specify #			
Garlic bread				
Garlic toast, Texas, frozen	Specify # pieces			

Item	Criteria	Price	Price per unit	Comments:
Cheesecake	Sara Lee, specify #			
Cinnamon roll with icing	Pillsbury, specify yield			
Cookies, chocolate chip	Pillsbury, specify yield			
Cookies, oatmeal	Pillsbury, specify yield			
Cookies, peanut butter	Pillsbury, specify yield			
Pie, Lemon meringue	Cheapest; specify slices			
Frozen yogurt, vanilla				
Ice cream, vanilla	1/2 gallon			
Ice cream sandwich	Specify # in package			
Fudgesicle, ice milk	Specify # in package			
Popsicles, fruit	Specify # in package			
Sherbert, pineapple	Blue bunny			
Hot pocket, ham and cheese	Specify # in package			
Lunchables, small with drink	individual			
Pizza, pepperoni	Tony's, 40", list # slices			
Pizza, pepperoni	Red Baron, list # slices			
Breads, cereals, & other grains				
Bagels, plain, enriched	bread/dairy sect, total #			
Bread crumbs, plain	15 oz			
Bread, dinner roll	12 brown & serve			
Bread, French	1 lb.			
Bread, hamburger buns, enriched	Sesame seeds			
Bread, hotdog bun, wheat	cheapest, specify #			
Bread, poboy	Specify # in package			
Bread, rye	Specify # slices			
Bread, Texas toast	Specify # slices			
Bread, whole-wheat	cheapest, wheat flour			
Bread, white, enriched	Specify # slices			

Item	Criteria	Price	Price per unit	Comments:
English muffins	bread/dairy sect, total #			
Tortillas, whole wheat	package of 10			
Cornmeal				
Crackers, graham	14 oz box			
Crackers, saltine				
Crackers, triscuits	Reduced fat			
Crackers, whole wheat	4 sleeve			
Ritz crackers				
Grits	2 lb bag or equivalent			
Grits, instant, packs	Quacker			
Oatmeal, old fashioned	42 ounce tub			
Oats, rolled				
Pancake, complete mix	Aunt Jemima			
Pancake syrup, lite	24 oz			
Pancake syrup	Blackburn			
Molasses	smallest available			
Poptart, strawberry with frosting	Kellogg's			
Specify serv. size & # serv/box				
Ready to eat cereal	Apple Jacks			
Ready to eat cereal	Captain Crunch			
Ready to eat cereal	Cheerios			
Ready to eat cereal	Toasted oats, 2 lb bag			
Ready to eat cereal	Cinnamon Toast Crunch			
Ready to eat cereal	corn puffs			
Ready to eat cereal	Corn flakes, 18 oz box			
Ready to eat cereal	Fruit loops			
Ready to eat cereal	Honey Bunches of Oats			

Item	Criteria	Price	Price per unit	Comments:
Ready to eat cereal	Honeycomb			
Ready to eat cereal	Lucky Charms			
Ready to eat cereal	Kaboom			
Ready to eat cereal	Product 19/ Special K			
Ready to eat cereal	Raisin bran, 2 lb bag			
Ready to eat cereal	Rice Krispies			
Ready to eat cereal	Shredded Wheat, Post			
Ready to eat cereal	Sugar smacks, Kellogg's			
Ready to eat cereal	Vitamin King			
Cornbread stuffing mix	Stove top			
Macaroni, enriched	16 oz			
Macaroni and cheese	box, Kraft			
Noodles, yolk-free, enriched	12 oz			
Lasagna noodles	Box			
Pasta, fettuccini	12 oz			
Pasta, spaghetti, enriched	16 oz			
Pasta, whole wheat, ziti or penne	12 oz			
Spaghetti sauce	26.5 oz can, Ragu			
Rice, white, enriched	5 lb bag, long grain			
Rice, plain yellow	Zattarain's			
Rice, brown	28 oz.			
Butter-n-herb mashed potatoes	betty Crocker			
Long grain & wild rice stuffing	Stove top			
Rice-A-Roni	chicken flavored			
Ramen noodles	pack			
Lipton chicken flavored rice	box			
Lipton butter n herb noodles	box			

Item	Criteria	Price	Price per unit	Comments:
Tuna noodle casserole entrée	Stouffer's			
Popcorn, stovetop, unpopped	2 lb bag			
Popcorn, microwave, unpopped	6 pk, butter flavor			
Milk and Cheese				
Margarine, tub, 40% lite spread	48 oz			
Margarine, stick	16 oz (4 sticks)			
Eggs, large	1 dozen			
Egg substitute				
Cheese, cheddar, cubes	Package			
Cheese, cheddar	8 oz block			
Cheese, cottage	24 oz container			
Cheese, mozzarella	8 oz block			
Cheese, Neufchatel, light	8 oz block, 1/3 less fat			
Cheese, processed Velveeta-like	2 lb box, spec # serv			
Cheese, shredded, cheddar	bag			
Cheese, slices	Kraft, American			
Milk, whole, gallon	Borden			
Milk, 2%, gallon	Borden			
Milk, 1% low fat, gallon				
Milk, skim, gallon	Borden			
Milk, Lactaid, fat free				
Orange juice	1 gallon jug			
Yogurt, low fat	8 oz			

Item	Criteria	Price	Price per unit	Comments:
Meat and Meat Alternatives				
Bacon, slices	pack			
Bacon, turkey	12 oz			
Beef, chuck roast, boneless	3 lb			
Beef, stew meat	~2 lb., beef chuck			
Beef, ground, 15% fat	closest to 2.5 lb			
Beef ribs				
Beef, round steak	Price per pound			
Chicken, breasts	Price per pound			
Chicken, fryer	whole			
Chicken, leg quarters	10 lb bag (or closest)			
Chicken, thighs	Price per pound			
Crawfish	pack			
Pork, chops	2.5-3.5lb thin cut			
Pork, ground				
Pork, tenderloin	Price per pound			
Pork feet, cured, pickled				
Pickled pig lip				
Sausage, smoked turkey	link, 14 oz			
Sausage	Hillshire farms			
Sausage hotlink	Mr. T's if available			
Turkey, ground, 15% fat	Price per pound			
Turkey, necks	Price per pound			
Turkey, wings	Price per pound			
Bologna, slices	Bryan's			
Ham, deli	1 lb			
Turkey breast	only record price/lb			
Turkey ham	2-3 lb whole, unsliced			
Hot dog	Ball park			

Item	Criteria	Price	Price per unit	Comments:
Hot dog, Chicken/turkey	Lyke's			
Shrimp	Price per pound, count			
Baking				
Baking powder	10 oz			
Baking soda	1 lb box			
Cake mix, yellow				
Cake frosting, cream cheese				
Caramel syrup, topping				
Cornstarch	16 oz box			
Chocolate chips, semi-sweet	12 oz bag			
Chocolate pudding, instant	3 oz box, sugar- free			
Cornbread mix	8.5 oz box (Jiffy)			
Four, enriched, all-purpose	5 lb bag, (Gold metal)			
Flour, pastry, whole-wheat				
Jam, strawberry or grape	32 oz			
Jello, strawberry, sugar-free	3 oz box			
Jello, cherry, sugar-free	3 oz box			
Shortening	Crisco, 42 oz.			
Oil, canola	48 oz			
Oil, vegetable	48 oz, blue plate/Crisco			
Oil, olive				
Pam, cooking spray	6 oz (canola)			
Peanut butter, creamy	40 oz			
Pie crust	individual			
Prunes, pureed				
Sugar, light brown	16 oz box			
Sugar, granulated	5 lb bag			
Sugar, powdered	32 oz box			
Sugar substitute	Equal			
Sugar substitute	Sweet-n-Low			

Item	Criteria	Price	Price per unit	Comments:
Other food items				
Chocolate mix, powdered	30 oz, Ovaltine			
Chocolate mix, hot chocolate	Nestle carnation, packets			
Chocolate syrup	Hershey's			
Coffee, instant	8 oz jar			
Coffee, instant, French vanilla	Maxwell house			
Coffee, ground	Foldger's			
Coffee, creamer, dry	Coffee mate			
Evaporated Milk	20 oz can			
Crystal light				
Fruit cup	Del Monte			
Fruit juice, apple, Lucky leaf	64 oz			
Fruit juice, grape, welch's				
Fruit drink	1 gallon jug			
Kool-aid	pack			
Lemon drink	1 gallon jug			
Ice cream cones	box			
Ketchup	24 oz, Hunt's			
BBQ sauce, regular	Kraft			
Mayonnaise	Blue plate, 32 oz			
Mayonnaise, reduced fat	32 oz			
Mustard, honey				
Mustard, yellow	32 oz (Bama)			
Mustard, Spicy				
Pickle, slices				
Pickle, sweet relish	smallest and cheapest			
Salad dressing, Italian, fat-free	16 oz, wishbone			
Salad dressing, Italian, Regular	16 oz, wishbone			

Item	Criteria	Price	Price per unit	Comments:
Salad dressing, French	16 oz, Kraft			
Salad dressing, Ranch	16 oz, Kraft			
Salad dressing, Ranch, fat-free	16 oz			
Soy sauce, reduced sodium	10 oz (Kikkoman)			
Beverages				
Coca cola	2 liter			
Green tea	Sobe, individual			
Hawaiian punch	gallon if available			
Juicy Juice, kiwi strawberry	specify size			
Lemonade, country time	2 liter			
Lipton tea	2 liter			
Orange soda, Sunkist	2 liter			
Pineapple soda, Fanta	specify size			
Pink lemonade, minute maid	specify size			
PowerAde	32 oz.			
Root beer, Chek	2 liter			
Sierra mist	2 liter			
Sunny Delight	gallon			
Water, bottled, Kentwood	16.9 oz, 6 pack			
Water, gallon				
Snacks				
Cheese crackers	Lance's, specify # packs			
Chips, Cheetos	Specify # servings			
Chips, Corn	Frito, specify # serving			
Chips, Lays	Specify # servings			
Chips, Hot Fries	Specify # servings			
Chocolate chip cookies	Chips ahoy, 6 pack			

Item	Criteria	Price	Price per unit	Comments:
Crunch candy bar with caramel	individual, regular			
Hot tamales candy	box, regular sized			
M & M's	individual, regular			
Mr. Goodbar	individual, regular			
Payday	King size, individual			
Pecan logs (eggs)	Elmer's, & # per pack			
Reese's peanut butter cups	2 pack, regular sized			
Skor chocolate bar	individual, regular			
100 grand candy bar	individual, regular			
Blueberry muffin, prepared	Bakery, specify #			
Banana nut muffins	Bakery, specify #			
Glazed donuts	Bakery, specify #			
Pound cake	Bakery, specify # slices			
Gusher's candy	Specify # packs			
Honey Teddy graham crackers	Specify # packs			
Little Debbie, Banana pie	Specify # per package			
Little Debbie, Honey bun	Specify # per package			
Little debbie, Oatmeal pie	Specify # per package			
Little debbie, Zebra cakes	Specify # per package			
Oreo cookies	Specify # per package			
Peppermint patties	Specify # per package			
Soft peppermints	Specify # per package			
Vanilla wafers	Specify # per package			
Vanilla pudding	6 pack of vanilla cups			
Vanilla cream cookies	Specify # per package			

APPENDIX E
AVERAGE PRICE PER UNIT SHEET

Item	**Albertson's**	**P. Wiggly**	**Morales**	**Midway**	**Schexnayder**	**Average**
	January 10th	January 10th	January 12th	January 13th	January 13th	
Produce (corrected for EP)						
Apples	$1.70/lb	$2.00/lb	.85/lb	n/a	$1.07/lb	$1.40/lb
Banana	.77/lb	.75/lb	.92/lb	n/a	.75/lb	.80/lb
Bell pepper, green	$3.22/lb	$1.62/lb	$1.97/lb	$2.22/lb	$1.97/lb	$2.20/lb
Bell pepper, red	$2.50/lb	n/a	n/a	n/a	n/a	$2.50/lb
Bell pepper, yellow	$3.75/lb	n/a	n/a	n/a	n/a	$3.75/lb
Broccoli, bunch	$2.20/lb	$1.85/lb	$1.83/lb	n/a	$1.95/lb	$1.96/lb
Cabbage	.77/lb	.55/lb	.56/lb	.66/lb	.66/lb	.64/lb
Cantaloupe	$1.91/lb	$1.78/lb	$1.27/lb	n/a	$1.59/lb	$1.64/lb
Cauliflower	$4.78/lb	n/a	$3.18/lb	$3.18/lb	$3.18/lb	$3.58/lb
Carrots, whole	$1.35/lb	.63/lb	.71/lb	.84/lb	.71/lb	.85/lb
Celery	$1.43/lb	$1.07/lb	.95/lb	$1.19/lb	.95/lb	$1.12/lb
Collard greens	$1.34/lb	n/a	n/a	n/a	n/a	$1.34/lb
Cucumber	.59/lb	.47/lb	.47/lb	.53/lb	.47/lb	.51/lb
Garlic	.33/ea	.25/ea	.33/ea	.50/ea	.27/ea	.34/ea
Grapes, red or white	$3.08/lb	$1.33/lb	$1.53/lb	$2.36/lb	$1.53/lb	$1.97/lb
Lemons	.34 ea	.34 ea	.50 ea	.34 ea	.50 ea	.40/ea
Lettuce, Romaine	.77/lb	n/a	.77/lb	$1.01/lb	n/a	.85/lb
Lettuce, Iceberg, head	.98/lb	.78/lb	.78/lb	.46/lb	.98/lb	.80/lb
Lettuce, Iceberg	$1.69 ea	.99 ea	$2.59 ea	$1.19 ea	$1.89 ea	$1.67 ea
Mustard greens, bunch	.99/ea	.89/ea	n/a	n/a	n/a	.94/ea
Onions, green, bunch	$1.10/lb	.53/lb	.71/lb	.60/lb	.59/lb	.71/lb
Onions, red	$1.14/lb	$1.47/lb	$1.13/lb	$1.01/lb	$1.13/lb	$1.18/lb
Onions, yellow	.90/lb	.79/lb	.57/lb	$1.01/lb	.79/lb	.81/lb
Oranges, navel	$3.72/lb	$1.72/lb	n/a	$1.72/lb	n/a	$2.39/lb
Potatoes, baking	.95/lb	.73/lb	.62/lb	.85/lb	.85/lb	.80/lb

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Potatoes, red	.74/lb	.61/lb	.32/lb	.32/lb	.64/lb	.53/lb
Squash, yellow	$1.57/lb	$1.20/lb	.63/lb	$1.73/lb	n/a	$1.28/lb
Strawberries	$4.55/lb	$2.04/lb	n/a	n/a	n/a	$3.29/lb
Tomato, red	$3.31/lb	$1.99/lb	$3.31/lb	$2.22/lb	$2.21/lb	$2.61/lb
Turnips	$1.25/lb	$1.12/lb	$1.63/lb	$2.00/lb	n/a	$1.50/lb
Turnip greens	n/a	n/a	n/a	n/a	n/a	n/a
Watermelon	n/a	n/a	n/a	n/a	n/a	n/a
Tangerines	n/a	$1.50/lb	$1.87/lb	$1.87/lb	$3.30/lb	$2.14/lb
Zucchini	$2.96/lb	$1.46/lb	$1.40/lb	$2.13/lb	n/a	$1.99/lb
Canned						
Applesauce, unsweetened	5.2 cents/oz	6.0 cents/oz	6.0 cents/oz	6.6 cents/oz	5.9 cents/oz	5.9 cents/oz
Fruit cocktail, lite syrup	9.9 cents/oz	11.1 cents/oz	6.6 cents/oz	9.9 cents/oz	9.3 cents/oz	9.4 cents/oz
Oranges, mandarin	8.3 cents/oz	8.0 cents/oz	7.2 cents/oz	11.4 cents/oz	10.5 cents/oz	9.1 cents/oz
Peaches, lite syrup	9.8 cents/oz	11.1 cents/oz	7.7 cents/oz	7.7 cents/oz	7.7 cents/oz	8.8 cents/oz
Peaches, regular	6.9 cents/oz	7.6 cents/oz	7.7 cents/oz	9.8 cents/oz	6.9 cents/oz	7.8 cents/oz
Pears, lite syrup	9.9 cents/oz	n/a	4.0 cents/oz	11.5 cents/oz	9.8 cents/oz	8.8 cents/oz
Pineapple chunk, lite syrup	9.9 cents/oz	7.5 cents/oz	5.0 cents/oz	8.0 cents/oz	5.3 cents/oz	7.1 cents/oz
Raisins	n/a	17.3 cents/oz	15.9 cents/oz	16.3 cents/oz	14.3 cents/oz	15.9 cents/oz
Asparagus	21.9 cents/oz	18.6 cents/oz	17.9 cents/oz	n/a	18.2 cents/oz	19.1 cents/oz
Beets	7.2 cents/oz	4.3 cents/oz	5.3 cents/oz	5.3 cents/oz	6.6 cents/oz	5.7 cents/oz
Chili	13.3 cents/oz	11.9 cents/oz	8.3 cents/oz	12.3 cents/oz	13.9 cents/oz	11.9 cents/oz
Corn, whole kernel	2.9 cents/oz	5.9 cents/oz	3.6 cents/oz	4.9 cents/oz	3.9 cents/oz	4.2 cents/oz
Corn, cream style	3.0 cents/oz	3.9 cents/oz	3.9 cents/oz	4.9 cents/oz	5.2 cents/oz	4.2 cents/oz
Corn beef	11.9 cents/oz	16.7 cents/oz	11.9 cents/oz	n/a	10.6 cents/oz	12.8 cents/oz
Green beans, cut	5.9 cents/oz	2.2 cents/oz	3.4 cents/oz	4.5 cents/oz	4.1 cents/oz	4.0 cents/oz
Mushrooms, stems & pieces	15.4 cents/oz	19.8 cents/oz	15.7 cents/oz	19.8 cents/oz	16.7 cents/oz	17.5 cents/oz
Spinach	7.1 cents/oz	6.6 cents/oz	5.4 cents/oz	5.6 cents/oz	5.6 cents/oz	6.1 cents/oz
Sweet peas	6.5 cents/oz	7.8 cents/oz	7.2 cents/oz	7.5 cents/oz	5.6 cents/oz	6.9 cents/oz

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
String beans	6.1 cents/oz	6.1 cents/oz	4.1 cents/oz	4.5 cents/oz	4.2 cents/oz	5.0 cents/oz
Tomato paste	14.8 cents/oz	10.8 cents/oz	9.7 cents/oz	10.8 cents/oz	9.5 cents/oz	11.1 cents/oz
Tomato sauce	6.6 cents/oz	5.9 cents/oz	4.7 cents/oz	5.7 cents/oz	5.0 cents/oz	5.6 cents/oz
Tomatoes, diced	3.8 cents/oz	5.4 cents/oz	5.2 cents/oz	5.9 cents/oz	5.7 cents/oz	5.2 cents/oz
Tomatoes, rotel	6.7 cents/oz	10.9 cents/oz	9.9 cents/oz	11.5 cents/oz	10.5 cents/oz	9.9 cents/oz
Tomatoes, stewed	9.6 cents/oz	5.4 cents/oz	5.4 cents/oz	5.9 cents/oz	5.7 cents/oz	6.4 cents/oz
Turkey gravy	n/a	n/a	11.3 cents/oz	11.9 cents/oz	11.9 cents/oz	11.7 cents/oz
Yams	10.6 cents/oz	6.6 cents/oz	5.8 cents/oz	3.4 cents/oz	6.2 cents/oz	6.5 cents/oz
Tuna, chunk-style, in oil	13.2 cents/oz	15.8 cents/oz	11.5 cents/oz	12.3 cents/oz	11.9 cents/oz	12.9 cents/oz
Tuna, chunk-style, in water	11.1 cents/oz	14.7 cents/oz	11.5 cents/oz	12.3 cents/oz	11.9 cents/oz	12.3 cents/oz
Vienna sausage	15.8 cents/oz	14.9 cents/oz	12.6 cents/oz	15 cents/oz	9.5 cents/oz	13.6 cents/oz
Beans, baked, canned	7.1 cents/oz	7.1 cents/oz	6.4 cents/oz	6.8 cents/oz	6.8 cents/oz	6.8 cents/oz
Beans, black, canned	4.6 cents/oz	n/a	6.4 cents/oz	n/a	n/a	5.5 cents/oz
Beans, kidney, canned	3.3 cents/oz	5.3 cents/oz	4.3 cents/oz	5.0 cents/oz	4.9 cents/oz	4.6 cents/oz
Beans, lima, dry	9.4 cents/oz	9.3 cents/oz	6.8 cents/oz	7.2 cents/oz	7.8 cents/oz	8.1 cents/oz
Beans, northern, canned	5.0 cents/oz	2.7 cents/oz	6.4 cents/oz	n/a	6.6 cents/oz	5.2 cents/oz
Beans, garbanzo, canned	5.6 cents/oz	n/a	n/a	n/a	n/a	5.6 cents/oz
Beans, pork and beans	3.1 cents/oz	6.1 cents/oz	3.8 cents/oz	4.7 cents/oz	4.6 cents/oz	4.5 cents/oz
Beans, red, dry	5.9 cents/oz	6.2 cents/oz	6.2 cents/oz	4.3 cents/oz	5.9 cents/oz	5.7 cents/oz
Beans, vegetarian	4.9 cents/oz	4.7 cents/oz	6.4 cents/oz	6.1 cents/oz	6.1 cents/oz	5.6 cents/oz
Beans, white, dry	6.8 cents/oz	6.2 cents/oz	5.3 cents/oz	4.7 cents/oz	5.9 cents/oz	5.8 cents/oz
Peas, black-eyed	4.6 cents/oz	5 cents/oz	2.1 cents/oz	5.0 cents/oz	4.9 cents/oz	4.3 cents/oz
Chicken broth, low sodium	5.2 cents/oz	11.6 cents/oz	n/a	n/a	7.2 cents/oz	8.0 cents/oz
Chicken noodle soup	17.6 cents/oz	12.5 cents/oz	12.9 cents/oz	6.4 cents/oz	10.7 cents/oz	12.0 cents/oz
Cream of chicken soup	14.8 cents/oz	11.6 cents/oz	12.1 cents/oz	9.8 cents/oz	11.7 cents/oz	12.0 cents/oz
Cream mush. soup, red. fat	8.5 cents/oz	11.6 cents/oz	12.1 cents/oz	11.7 cents/oz	11.7 cents/oz	11.1 cents/oz
Hot Tamales	11.9 cents/oz	10.6 cents/oz	9.3 cents/oz	9.9 cents/oz	9.8 cents/oz	10.3 cents/oz
Spaghettios	7.9 cents/oz	10.8 cents/oz	6.7 cents/oz	7.1 cents/oz	6.7 cents/oz	7.8 cents/oz
Tomato Soup	5.1 cents/oz	11.6 cents/oz	6.4 cents/oz	6.4 cents/oz	6.4 cents/oz	7.2 cents/oz

<u>Item</u>	**Albertson's**	**P. Wiggly**	**Morales**	**Midway**	**Schexnayder**	**Average**
Vegetable soup	18.0 cents/oz	8.5 cents/oz	11.1 cents/oz	14.2 cents/oz	10.7 cents/oz	12.5 cents/oz
Frozen						
Orange juice, concentrate	9.9 cents/oz	15.8 cents/oz	12.1 cents/oz	11.6 cents/oz	11.6 cents/oz	12.2 cents/oz
Blueberries, bag	21.7 cents/oz	n/a	n/a	n/a	25.3 cents/oz	23.5 cents/oz
Broccoli, chopped	10.4 cents/oz	10.4 cents/oz	9.9 cents/oz	10.9 cents/oz	9.7 cents/oz	10.3 cents/oz
Corn on the cob	57.3 c/ear	67.3 cents/ear	28.6 cents/ear	28.6 cents/ear	28.1 cents/ear	42.0 cents/ear
Green beans, cut	6.3 cents/oz	12.4 cents/oz	9.3 cents/oz	8.1 cents/oz	8.1 cents/oz	8.8 cents/oz
Mixed vegetables	8.1 cents/oz	13.7 cents/oz	11.8 cents/oz	8.1 cents/oz	9.9 cents/oz	10.3 cents/oz
Okra, cut	9.4 cents/oz	10.4 cents/oz	9.3 cents/oz	10.3 cents/oz	9.9 cents/oz	9.9 cents/oz
Peas	12.5 cents/oz	12.4 cents/oz	7.4 cents/oz	8.1 cents/oz	10.6 cents/oz	10.2 cents/oz
Spinach, chopped	14.3 cents/oz	10.6 cents/oz	10.6 cents/oz	10.9 cents/oz	10.6 cents/oz	11.4 cents/oz
French fries	7.8 cents/oz	9.3 cents/oz	8.7 cents/oz	7.5 cents/oz	9.6 cents/oz	8.6 cents/oz
Frozen hash browns	11.7 cents/oz	9.3 cents/oz	8.7 cents/oz	9.8 cents/oz	7.3 cents/oz	9.4 cents/oz
Tator tots	7.8 cents/oz	9.3 cents/oz	8.7 cents/oz	15.6 cents/oz	9.6 cents/oz	10.2 cents/oz
Waffles, frozen	12.5 cents/ea	29.9 cents/ea	21.9 cents/ea	24.9 cents/ea	23.5 cents/ea	22.5 cents/ea
Chicken nuggets, frozen	10.0 cents/ea	23.3 cents/ea	27.4 cents/ea	13.5 cents/ea	13.1 cents/ea	17.5 cents/ea
Chicken patty, breaded	80.0 cents/ea	n/a	54.7 cents/ea	81.2 cents/ea	52.2 cents/ea	67.0 cents/ea
Fish, breaded portions, frozen	38.0 cents/ea	48.6 cents/ea	n/a	79.8 cents/ea	57.9 cents/ea	56.1 cents/ea
Sausage biscuit	62.0 cents/ea	31.3 cents/ea	54.7 cents/ea	37.5 cents/ea	44.8 cents/ea	46.1 cents/ea
Sausage patties	42.0 cents/ea	15.6 cents/ea	33.2 cents/ea	35.8 cents/ea	33.8 cents/ea	32.1 cents/ea
Shrimp, breaded, frozen	41.6 cents/oz	n/a	37.4 cents/oz	n/a	n/a	39.5 cents/oz
Turkey burgers, frozen	28.1 cents/oz	n/a	11.2 cents/oz	n/a	n/a	19.7 cents/oz
Biscuits	27.8 cents/ea	23.5 cents/ea	12.4 cents/ea	12.4 cents/ea	12.3 cents/ea	17.7 cents/ea
Croissant	41.5 cents/ea	33.6 cents/ea	32.4 cents/ea	25.6 cents/ea	31.1 cents/ea	32.8 cents/ea
Garlic bread	20.0 cents/oz	22.9 cents/oz	24.9 cents/oz	13.7 cents/oz	12.8 cents/oz	18.9 cents/oz
Garlic toast, Texas, frozen	37.4 cents/ea	33.6 cents/ea	24.9/ea	27.4 cents/ea	25.6 cents/ea	29.8 cents/ea

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Cheesecake	24.3 cents/oz	24.9 cents/oz	21.4 cents/oz	n/a	n/a	23.5 cents/oz
Cinnamon roll with icing	31.3 cents/ea	20.8 cents/ea	31.1 cents/ea	32.4 cents/ea	31.1 cents/ea	29.3 cents/ea
Cookies, chocolate chip	18.3 cents/ea	20.5 cents/ea	11.0 cents/ea	19.2 cents/ea	18.3 cents/ea	17.5 cents/ea
Cookies, oatmeal	18.3 cents/ea	20.5 cents/ea	11.0 cents/ea	19.2 cents/ea	18.3 cents/ea	17.5 cents/ea
Cookies, peanut butter	18.3 cents/ea	20.5 cents/ea	11.0 cents/ea	19.2 cents/ea	18.3 cents/ea	17.5 cents/ea
Pie, Lemon meringue	17.6 cents/oz	17.6 cents/oz	18.8 cents/oz	n/a	20.1 cents/oz	18.5 cents/oz
Frozen yogurt, vanilla	34.3 cents/1/2 c	34.3 cents/1/2 c	33.7 cents/1/2 c	n/a	n/a	34.1 cents/half c
Ice cream, vanilla	12.5 cents/half c	15.6 cents/half c	17.4 cents/1/2 c	15.6 cents/ 1/2 c	15.3 cents/half c	15.3 cents/half c
Ice cream sandwich	39.9 cents/ea	35.8 cents/ea	20.8 cents/ea	31.6 cents/ea	30.7 cents/ea	31.8 cents/ea
Fudgesicles, ice milk	20.8 cents/ea	24.9 cents/ea	20.8 cents/ea	36.5 cents/ea	24.1 cents/ea	25.4 cents/ea
Popsicles, fruit	19.1 cents/ea	12.5 cents/ea	19.9 cents/ea	9.9 cents/ea	11.2 cents/ea	14.5 cents/ea
Sherbert, pineapple	31.1 cents/half c	32.4/half c	31.1/half c	31.1 cents/1/2 c	31.1 cents/1/2 c	31.4 cents/half c
	In dollars	**In dollars**	**In dollars**	**In dollars**	**In dollars**	**In dollars**
Hot pocket, ham & cheese	$1.00 ea	$1.49 ea	$1.49 ea	$1.47/ea	$1.42/ea	$1.37/ea
Lunchables, small w/ drink	$2.29 ea	n/a	$2.59 ea	$0.99/ea	$2.69/ea	$2.14/ea
Pizza, pepperoni, Tony's	$2.69 ea	$2.99 ea	$2.50 ea	n/a	n/a	$2.73/ea
Pizza, Red Baron	$7.99 ea	$6.49 ea	$4.99 ea	n/a	n/a	$6.49/ea
Breads, cereals, and other						
Bagels, plain, enriched	48.2 cents/ea	n/a	28.2 cents/ea	27.5 cents/ea	n/a	34.6 cents/ea
Bread crumbs, plain	16.9 cents/oz	8.8 cents/oz	7.9 cents/oz	10.6 cents/oz	13.7 cents/oz	11.6 cents/oz
Bread, dinner roll	18.3 cents/ea	10.8 cents/ea	16.6 cents/ea	22.1 cents/ea	n/a	16.9 cents/ea
Bread, French	36.1 cents/oz	n/a	8.1 cents/oz	9.9 cents/oz	11.2 cents/oz	16.3 cents/oz
Bread, hamburger buns	29.9 cents/ea	28.6 cents/ea	27.4 cents/ea	27.4 cents/ea	26.1 cents/ea	27.2 cents/ea
Bread, hotdog bun, wheat	38.2 cents/ea	n/a	24.9 cents/ea	26.1 cents/ea	19.9 cents/ea	27.3 cents/ea
Bread, poboy	36.5 cents/ea	n/a	32.2 cents/ea	41.5 cents/ea	38.0 cents/ea	37.1 cents/ea

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Bread, rye	19.9 cents/ea	n/a	n/a	n/a	n/a	19.9 cents/ea
Bread, Texas toast	n/a	n/a	11.1 cents/ea	n/a	11.7 cents/ea	11.4 cents/ea
Bread, whole-wheat	6.8 cents/ea	9.0 cents/ea	10.4 cents/ea	10.9 cents/ea	9.3 cents/ea	9.3 cents/ea
Bread, white, enriched	4.1 cents/ea	4.1 cents/ea	4.1 cents/ea	4.5 cents/ea	3.7 cents/ea	4.1 cents/ea
English muffins	41.7 cents/ea	n/a	18.2 cents/ea	18.2 cents/ea	n/a	26.0 cents/ea
Tortillas, whole wheat	32.9 cents/ea	n/a	n/a	19.9 cents/ea	n/a	26.4 cents/ea
Cornmeal	8.7 cents/oz	n/a	9.9 cents/oz	4.3 cents/oz	3.8 cents/oz	6.7 cents/oz
Crackers, graham	24.9 cents/oz	24.9 cents/oz	25.6 cents/oz	19.1 cents/oz	19.1 cents/oz	22.7 cents/oz
Crackers, saltine	12.5 cents/oz	n/a	10.6 cents/oz	10.6 cents/oz	7.9 cents/oz	10.4 cents/oz
Crackers, triscuits	38.7 cents/oz	n/a	36.3 cents/oz	n/a	n/a	37.5 cents/oz
Crackers, whole wheat	9.4 cents/oz	23.3 cents/oz	23.1 cents/oz	n/a	23.8 cents/oz	19.9 cents/oz
Ritz crackers	n/a	2.5 cents/ea	3.7 cents/ea	3.1 cents/ea	2.6 cents/ea	3.0 cents/ea
Grits	6.2 cents/oz	6.2 cents/oz	4.4 cents/oz	4.7 cents/oz	4.4 cents/oz	5.2 cents/oz
Grits, instant, packs	20.8 cents/pack	15.7 cents/pack	19.1 c/pack	20.4 cents/pack	20. cents/pack	19.2 cents/pack
Oatmeal, old fashioned	8.3 cents/oz	10.0 cents/oz	13.3 cents/oz	13.6 cents/oz	10.0 cents/oz	11.0 cents/oz
Oatmeal, instant, packs	33.3 cents/pack	38.9 cents/pack	31.6 cents/pack	37.9 cents/pack	37.9 cents/pack	35.9 cents/pack
Pancake, complete mix	7.2 cents/oz	2.3 cents/oz	7.1 cents/oz	7.3 cents/oz	6.3 cents/oz	6.0 cents/oz
Pancake syrup, lite	5.4 cents/oz	5.2 cents/oz	6.6 cents/oz	6.6 cents/oz	6.6 cents/oz	6.1 cents/oz
Pancake syrup	16.6 cents/oz	16.2 cents/oz	9.1 cents/oz	15.0 cents/oz	9.6 cents/oz	13.3 cents/oz
Molasses	23.3 cents/oz	24.5 cents/oz	20.8 cents/oz	21.3 cents/oz	21.0 cents/oz	22.2 cents/oz
Poptart, strawberry	20.8 cents/ea	28.6 cents/ea	18.7 cents/ea	29.4/ cents/ea	28.1 cents/ea	25.1 cents/ea
Apple Jacks	28.6 cents/oz	18.0 cents/oz	34.5 cents/oz	35.4 cents/oz	25.1 cents/oz	28.3 cents/oz
Captain Crunch	28.4 cents/oz	17.8 cents/oz	n/a	n/a	25.6 cents/oz	23.9 cents/oz
Cheerios	13.3 cents/oz	19.9 cents/oz	13.3 cents/oz	37.9 cents/oz	37.9 cents/oz	24.5 cents/oz
Toasted Oats	19.0 cents/oz	17.9 cents/oz	19.0 cents/oz	n/a	13.9 cents/oz	17.4 cents/oz
Cinnamon Toast Crunch	14.3 cents/oz	21.3 cents/oz	27.8 cents/oz	27.8 cents/oz	24.9 cents/oz	23.2 cents/oz
Corn Puffs	22.9 cents/oz	18.2 cents/oz	27.9 cents/oz	33.9 cents/oz	23.2 cents/oz	25.2 cents/oz

Item	**Albertson's**	**P. Wiggly**	**Morales**	**Midway**	**Schexnayder**	**Average**
Corn flakes	23.3 cents/oz	21.6 cents/oz	22.2 cents/oz	26.3 cents/oz	19.7 cents/oz	22.6 cents/oz
Fruit Loops	32.3 cents/oz	33.5 cents/oz	27.9 cents/oz	31.7 cents/oz	24.6 cents/oz	30.0 cents/oz
Honey Bunches of Oats	13.7 cents/oz	24.9 cents/oz	24.9 cents/oz	n/a	24.3 cents/oz	21.9 cents/oz
Honeycomb	27.5 cents/oz	n/a	26.8 cents/oz	n/a	26.8 cents/oz	27.0 cents/oz
Lucky Charms	32.8 cents/oz	21.3 cents/oz	35.5 cents/oz	32.5 cents/oz	32.4 cents/oz	30.9 cents/oz
Kaboom	n/a	28.8 cents/oz	28.9 cents/oz	n/a	n/a	28.8 cents/oz
Product 19/Special K	39.6 cents/oz	35.8 cents/oz	34.1 cents/oz	34.9 cents/oz	36.9 cents/oz	36.3 cents/oz
Raisin Bran	15.0 cents/oz	18.4 cents/oz	19.5 cents/oz	23.3 cents/oz	15.6 cents/oz	18.4 cents/oz
Rice Krispies	25.0 cents/oz	36.9 cents/oz	31.0 cents/oz	24.9 cents/oz	34.0 cents/oz	30.4 cents/oz
Shredded Wheat	22.2 cents/oz	23.1 cents/oz	26.6 cents/oz	31.5 cents/oz	n/a	25.8 cents/oz
Sugar Smacks	25.9 cents/oz	23.5 cents/oz	28.6 cents/oz	28.2 cents/oz	23.8 cents/oz	26.0 cents/oz
Vitamin King	n/a	29.1 cents/oz	27.4 cents/oz	n/a	24.1 cents/oz	26.9 cents/oz
Cornbread stuffing mix	n/a	16.7 cents/oz	26.5 cents/oz	30.8 cents/oz	24.8 cents/oz	24.7 cents/oz
Macaroni, enriched	5.6 cents/oz	7.8 cents/oz	6.8 cents/oz	7.2 cents/oz	6.6 cents/oz	6.8 cents/oz
Macaroni and cheese	19.2 cents/oz	15.0 cents/oz	17.0 cents/oz	15.9 cents/oz	15.0 cents/oz	16.4 cents/oz
Noodles, yolk-free, enriched	14.1 cents/oz	16.1 cents/oz	15.8 cents/oz	14.1 cents/oz	14.1 cents/oz	14.8 cents/oz
Lasagna noodles	9.3 cents/oz	9.3 cents/oz	7.8 cents/oz	7.8 cents/oz	11.2 cents/oz	9.1 cents/oz
Pasta, fettuccini	5.0 cents/oz	6.1 cents/oz	9.1 cents/oz	n/a	8.7 cents/oz	7.2 cents/oz
Pasta, spaghetti, enriched	6.3 cents/oz	8.7 cents/oz	6.8 cents/oz	7.2 cents/oz	6.6 cents/oz	7.1 cents/oz
Pasta, whole wheat, penne	12.8 cents/oz	n/a	11.8 cents/oz	n/a	n/a	12.3 cents/oz
Spaghetti sauce	5.8 cents/oz	8.9 cents/oz	7.6 cents/oz	8.0 cents/oz	8.3 cents/oz	7.7 cents/oz
Rice, white, enriched	2.4 cents/oz	4.4 cents/oz	2.6 cents/oz	2.5 cents/oz	2.9 cents/oz	3.0 cents/oz
Rice, plain yellow	22.7 cents/oz	12.4 cents/oz	12.4 cents/oz	n/a	14.1 cents/oz	15.4 cents/oz
Rice, brown	4.3 cents/oz	7.8 cents/oz	4.6 cents/oz	4.5 cents/oz	4.5 cents/oz	5.1 cents/oz
Butter-n-herb mash. potatoes	33.1 cents/oz	28.4 cents/oz	25.6 cents/oz	17.8 cents/oz	n/a	26.2 cents/oz
Long grain & wild rice mix	41.7 cents/oz	n/a	20.3 cents/oz	34.8 cents/oz	n/a	32.3 cents/oz
Rice-A-Roni	n/a	17.4 cents/oz	18.3 cents/oz	20.1 cents/oz	11.9 cents/oz	16.9 cents/oz

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Ramen noodles	10.0 cents	20.0 cents	14.3 cents	19.0 cents	17.0 cents	16.1 cents
Lipton chicken rice	n/a	75.0 cents/c	95.0 cents/c	69.5 cents/c	58.5 cents/c	74.5 cents/c
Lipton butter n herb noodles	n/a	75.0 cents/c	60.0 cents/c	69.5 cents/c	58.5 cents/c	65.7 cents/c
Tuna noodle casserole	n/a	50.0 cents/c	47.8 cents/c	n/a	45.8 cents/c	47.9 cents/c
Popcorn, stovetop, unpopped	4.3 cents/oz	4.0 cents/oz	n/a	4.3 cents/oz	4.3 cents/oz	4.2 cents/oz
Popcorn, microwave	6.0 c/serv	26.6 c/serv	n/a	22.9 c/serv	14.1 c/serv	17.4 c/serv
Milk and Cheese						
Margarine, tub, 40% light	5.8 cents/oz	6.2 cents/oz	6.2 cents/oz	6.6 cents/oz	6.2 cents/oz	6.2 cents/oz
Margarine, stick	9.3 cents/oz	8.7 cents/oz	7.4 cents/oz	8.1 cents/oz	7.8 cents/oz	8.3 cents/oz
Eggs, large	10.4 cents/egg	10.7 cents/egg	11.6 cents/egg	11.2 cents/egg	10.4 cents/egg	10.9 cents/egg
Egg substitute	37.4 cents/egg	79.0 cents/egg	44.8 cents/egg	40.6 cents/egg	43.1 cents/egg	49.0 cents/egg
Cheese, cheddar, cubes	n/a	n/a	n/a	n/a	n/a	n/a
Cheese, cheddar	37.4 cents/oz	27.4 cents/oz	26.1 cents/oz	26.9 cents/oz	25.6 cents/oz	28.7 cents/oz
Cheese, cottage	9.1 cents/oz	12.0 cents/oz	12.5 cents/oz	n/a	12.5 cents/oz	11.5 cents/oz
Cheese, mozzarella	28.6 cents/oz	31.1 cents/oz	29.9 cents/oz	n/a	28.6 cents/oz	29.5 cents/oz
Cheese, Neufchatel, lite	22.4 cents/oz	24.9 cents/oz	26.1 cents/oz	n/a	25.6 cents/oz	24.8 cents/oz
Cheese, processed, Velveeta	15.6 cents/oz	12.5 cents/oz	21.5 cents/oz	20.2 cents/oz	22.2 cents/oz	18.4 cents/oz
Cheese, shredded, cheddar	24.9 cents/4th c	27.8 cents/4th c	24.9 /4th c	16.5 cents/4th c	24.1 cents/4th c	23.6 cents/4th c
Cheese, slices	18.1 cents/ea	11.8 cents/ea	12.4 cents/ea	21.6 cents/ea	12.4 cents/ea	15.3 cents/ea

Item	**Albertson's**	**P. Wiggly**	**Morales**	**Midway**	**Schexnayder**	**Average**
Milk, whole, gallon	3.8 cents/oz	3.1 cents/oz	3.6 cents/oz	3.6 cents/oz	3.0 cents/oz	3.4 cents/oz
Milk, 2%, gallon	3.8 cents/oz	3.1 cents/oz	3.6 cents/oz	3.6 cents/oz	3.0 cents/oz	3.4 cents/oz
Milk, 1% low fat, gallon	2.7 cents/oz	2.6 cents/oz	2.5 cents/oz	3.2 cents/oz	3.0 cents/oz	2.8 cents/oz
Milk, skim, gallon	3.8 cents/oz	3.1 cents/oz	3.6 cents/oz	3.6 cents/oz	3.0 cents/oz	3.4 cents/oz
Milk, Lactaid, fat free	5.9 cents/oz	5.9 cents/oz	6.2 cents/oz	n/a	6.2 cents/oz	6.0 cents/oz
Orange juice	3.1 cents/oz	3.0 cents/oz	2.5 cents/oz	2.8 cents/oz	2.4 cents/oz	2.8 cents/oz
Yogurt, low fat	5.0 cents/oz	9.9 cents/oz	8.3 cents/oz	12.5 cents/oz	8.2 cents/oz	8.8 cents/oz
Meat & Alternatives (EP)						
Bacon, slices	18.8 cents/oz	16.7 cents/oz	13.7 cents/oz	19.1 cents/oz	20.4 cents/oz	17.7 cents/oz
Bacon, turkey	20.8 cents/oz	24.9 cents/oz	24.1 cents/oz	n/a	24.6 cents/oz	n/a
Beef, chuck roast, boneless	$4.28/lb	$4.28/lb	$3.27/lb	$3.85/lb	$3.56/lb	$3.85/lb
Beef, stew meat	$5.95/lb	$5.20/lb	$4.01/lb	$5.05/lb	$5.20/lb	$5.08/lb
Beef, ground, 15% fat	$4.99/lb	$3.49/lb	$3.49/lb	$3.74/lb	$3.36/lb	$3.81/lb
Beef ribs	$11.96/lb	$3.96/lb	$11.96/lb	$4.76/lb	$9.96/lb	$8.52/lb
Beef, round steak	$7.14/lb	$4.28/lb	$4.13/lb	$5.99/lb	$5.42/lb	$5.39/lb
Chicken, breasts	$2.58/lb	$2.26/lb	$3.78/lb	$3.63/lb	$3.78/lb	$3.21/lb
Chicken, fryer	$3.11/lb	$1.95/lb	$2.95/lb	$2.72/lb	$2.78/lb	$2.70/lb
Chicken, leg quarters	$2.04/lb	$2.02/lb	$1.00/lb	.88/lb	$1.22/lb	$1.43/lb
Chicken, thighs	$3.00/lb	$1.18/lb	$2.18/lb	$1.18/lb	$2.78/lb	$2.06/lb
Crawfish	49.9 cents/oz	49.9 cents/oz	45.8 cents/oz	49.9 cents/oz	49.1 cents/oz	48.9 cents/oz
Pork, chops	$2.44/lb	$3.39/lb	$6.81/lb	$4.37/lb	$5.34/lb	$4.47/lb
Pork, ground	n/a	$1.86/lb	n/a	n/a	$2.61/lb	$2.23/lb
Pork, tenderloin	$5.40/lb	$4.05/lb	n/a	$9.23/lb	$11.08/lb	$7.44/lb
Pork feet, cured, pickled	n/a	43.7/oz	n/a	22.5/oz	14.3/oz	26.8/oz
Pickled pig lip	n/a	n/a	n/a	$2.75/can	n/a	$2.75/can
Sausage, smoked turkey	51.5 cents/oz	n/a	n/a	45.4 cents/oz	39.8 cents/oz	45.6 cents/oz
Sausage	57.7 cents/oz	39.8 cents/oz	45.4 cents/oz	41.1 cents/oz	30.4 cents/oz	42.9 cents/oz
Sausage hotlink	57.1 cents/oz	53.0 cents/oz	46.4 cents/oz	47.7 cents/oz	n/a	51.0 cents/oz

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Turkey, ground, 15% fat	$1.42/lb	n/a	n/a	n/a	$2.11/lb	$1.76/lb
Turkey, necks	n/a		n/a	n/a		
Turkey, wings	$5.29/lb	$2.47/lb	$3.10/lb	$3.72/lb	$3.10/lb	$3.54/lb
Bologna, slices	14.2 cents/slice	21.1 cents/slice	26.3 /slice	11.2 cents/slice	24.9 cents/slice	19.5 cents/slice
Ham, deli	$3.99/lb	$3.50/lb	$1.99/lb	$3.99/lb	$1.99/lb	$3.09/lb
Turkey breast	n/a	$0.88/lb	$3.69/lb	$2.99/lb	$4.99/lb	$3.14/lb
Turkey ham	$3.16/lb	$3.16/lb	$4.12/lb	$4.44/lb	$6.19/lb	$4.21/lb
Hot dog	43.6 cents/ea	25.0 cents/ea	37.4 cents/ea	10.9 cents/ea	36.9 cents/ea	30.8 cents/ea
Hot dog, Chicken/turkey	17.9 cents/ea	25.0 cents/ea	12.9 cents/ea	24.5 cents/ea	n/a	20.1 cents/ea
Shrimp, 1 lb pack	$5.99/lb	$9.99/lb	$3.59/lb	$3.00/lb	$4.35/lb	$5.38/lb
Baking						
Baking powder	20.0 cents/oz	16.7 cents/oz	16.9 cents/oz	16.9 cents/oz	14.9 cents/oz	17.1 cents/oz
Baking soda	6.2 cents/oz	4.3 cents/oz	4.9 cents/oz	3.7 cents/oz	3.4 cents/oz	4.5 cents/oz
Cake mix, yellow	10.4 cents/slice	10.8 cents/slice	11.9 cents/slice	8.2 cents/slice	9.5 cents/slice	10.2 cents/slice
Cake frosting, cream cheese	7.7 cents/T	13.7 cents/T	9.9 cents/T	6.7 cents/T	5.6 cents/T	8.7 cents/T
Caramel syrup, topping	14.3 cents/T	15.6 cents/T	n/a	13.1 cents/T	n/a	14.3 cents/T
Cornstarch	11.2 cents/oz	8.1 cents/oz	10.5 cents/oz	6.6 cents/oz	5.9 cents/oz	8.5 cents/oz
Chocolate chips, semi-sweet	10.4 cents/oz	23.3 cents/oz	14.1 cents/oz	17.4 cents/oz	17.4 cents/oz	16.5 cents/oz
Chocolate pudding, instant	27.9 cents/oz	26.8 cents/oz	37.5 cents/oz	31.7 cents/oz	33.0 cents/oz	31.4 cents/oz
Cornbread mix	4.1 cents/oz	5.2 cents/oz	6.4 cents/oz	3.9 cents/oz	n/a	4.9 cents/oz
Four, enriched, all-purpose	2.9 cents/oz	2.5 cents/oz	2.7 cents/oz	2.6 cents/oz	2.6 cents/oz	2.7 cents/oz
Flour, pastry, whole-wheat	3.4 cents/oz	n/a	3.4 cents/oz	n/a	n/a	3.4 cents/oz
Jam, strawberry or grape	7.2 cents/oz	6.8 cents/oz	8.1 cents/oz	8.3 cents/oz	5.1 cents/oz	7.1 cents/oz
Jello, strawberry, s/free	20.0 c/cup	37.5 c/cup	39.5 c/cup	37.5 c/cup	34.5 c/cup	33.8 c/cup

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Jello, cherry, sugar-free	20.0 c/cup	37.5 c/cup	39.5 c/cup	37.5 c/cup	34.5 c/cup	33.8 c/cup
Shortening	n/a	5.8 cents/oz	8.0 cents/oz	8.1 cents/oz	n/a	7.3cents/oz
Oil, canola	6.2 cents/oz	6.6 cents/oz	6.2 cents/oz	6.5 cents/oz	5.8 cents/oz	6.3 cents/oz
Oil, vegetable	6.6 cents/oz	6.6 cents/oz	5.4 cents/oz	5.2 cents/oz	6.6 cents/oz	6.1 cents/oz
Oil, olive	23.5 cents/oz	22.9 cents/oz	29.7 cents/oz	32.9 cents/oz	45.2 cents/oz	30.8 cents/oz
Pam, cooking spray	66.5 cents/oz	73.8 cents/oz	56.5 cents/oz	58.2 cents/oz	52.2 cents/oz	61.2 cents/oz
Peanut butter, creamy	10.0 cents/oz	10.4 cents/oz	13.2 cents/oz	10.5 cents/oz	10.5 cents/oz	10.9 cents/oz
Pie crust	n/a	$1.25/ea	$0.99/ea	$1.49 ea	$1.07/ea	$1.20/ea
Prunes, pureed	25.0 cents/oz	n/a	n/a	17.4 cents/oz	n/a	21.2 cents/oz
Sugar, light brown	4.7 cents/oz	6.8 cents/oz	6.2 cents/oz	5.9 cents/oz	5.9 cents/oz	5.9 cents/oz
Sugar, granulated	2.8 cents/oz	4.0 cents/oz	3.1 cents/oz	3.1 cents/oz	3.2 cents/oz	3.2 cents/oz
Sugar, powdered	4.7 cents/oz	6.2 cents/oz	5.3 cents/oz	5.0 cents/oz	5.9 cents/oz	5.4 cents/oz
Sugar substitute	5.0 cents/pack	5.2 cents/pack	4.1 cents/pack	4.2 cents/pack	3.9 cents/pack	4.5 cents/pack
Sugar substitute	3.0 cents/pack	2.6 cents/pack	2.6 cents/pack	3.0 cents/pack	1.9 cents/pack	2.6 cents/pack
Other food items						
Chocolate mix, powdered	27.5 cents/c	7.8 cents/c	29.3 cents/c	29.1 cents/c	28.9 cents/ c	24.5 cents/c
Chocolate mix, hot chocolate	23.3 cents/c	8.2 cents/c	34.9 cents/c	20.9 cents/c	26.1 cents/ c	22.7 cents/c
Chocolate syrup	8.3 cents/oz	9.5 cents/oz	9.1 cents/oz	9.1 cents/oz	9.1 cents/oz	9.0 cents/oz
Coffee, instant	3.7 cents/ 6 oz	3.8 cents/ 6 oz	4.1 cents/ 6oz	3.6 cents/ 6oz	3.6 cents/ 6oz	3.8 cents/ 6oz
Coffee, instant, French vanilla	21.4 cents/ 6 oz	22.2 cents/ 6 oz	22.2 / 6oz	n/a	22.2 cents/ 6oz	22.0 cents/ 6oz
Coffee, ground	9.0 cents/six oz	4.7 cents/six oz	3.7/six oz	4.6 cents/six oz	4.6 cents/six oz	5.3 cents/six oz
Coffee, creamer, dry	1.7cents/t	1.0 cents/t	2.0 cents/t	2.1 cents/t	2.1 cents/t	1.8 cents/t
Evaporated milk	9.6 cents/oz	6.6 cents/oz	5.7 cents/oz	7.9 cents/oz	4.2 cents/oz	6.8 cents/oz
Tea bags	2.5 cents/bag	1.9 cents/bag	3.0 cents/bag	2.5 cents/bag	2.7 cents/bag	2.5 cents/bag

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Crystal light	6.3 cents/ c	12.5 cents/ c	9.3 cents/ c	11.0 cents/ c	11.8 cents/c	10.2 cents/c
Fruit juice, apple, Lucky leaf	1.6 cents/oz	4.0 cents/oz	3.2 cents/oz	3.7 cents/oz	2.9 cents/oz	3.1 cents/oz
Fruit juice, grape, welch's	4.7 cents/oz	7.2 cents/oz	6.7 cents/oz	6.5 cents/oz	6.5 cents/oz	6.3 cents/oz
Fruit drink	1.6 cents/oz	1.9 cents/oz	1.0 cents/oz	1.0 cents/oz	1.0 cents/oz	1.3 cents/oz
Kool-aid	26.3 cents/pack	25.0 cents/pack	25.0 /pack	29.0 cents/pack	27.0 cents/pack	26.5 cents/pack
Lemon drink	1.6 cents/oz	1.9 cents/oz	1.0 cents/oz	1.0 cents/oz	1.0 cents/oz	1.3 cents/oz
Ice cream cones	n/a	13.9 cents/ea	9.9 cents/ea	7.4 cents/ea	9.9 cents/ea	10.3 cents/ea
BBQ sauce, regular	9.9 cents/oz	9.3 cents/oz	8.8 cents/oz	8.8 cents/oz	8.7 cents/oz	9.1 cents/oz
Ketchup	4.2 cents/oz	5.2 cents/oz	4.1 cents/oz	7.0 cents/oz	4.1 cents/oz	4.9 cents/oz
Mayonnaise	6.5 cents/oz	7.5 cents/oz	4.6 cents/oz	5.9 cents/oz	5.9 cents/oz	6.1 cents/oz
Mayonnaise, reduced fat	7.8 cents/oz	12.5 cents/oz	9.3 cents/oz	9.8 cents/oz	9.8 cents/oz	9.8 cents/oz
Mustard, honey	24.9 cents/oz	24.9 cents/oz	24.1 cents/oz	25.4 cents/oz	n/a	24.8 cents/oz
Mustard, yellow	8.3 cents/oz	4.0 cents/oz	3.7 cents/oz	3.3 cents/oz	3.3 cents/oz	4.5 cents/oz
Mustard, Spicy	9.9 cents/oz	9.9 cents/oz	n/a	13.3 cents/oz	10.4 cents/oz	10.9 cents/oz
Pickle, slices	12.5 cents/oz	9.1 cents/oz	9.3 cents/oz	10.0 cents/oz	12.4 cents/oz	10.7 cents/oz
Pickle, sweet relish	15.0 cents/oz	21.1 cents/oz	16.1 cents/oz	13.9 cents/oz	19.4 cents/oz	17.1 cents/oz
Salad dressing, Italian, fat-free	18.8 cents/oz	18.7 cents/oz	9.4 cents/oz	n/a	16.2 cents/oz	15.8 cents/oz
Salad dressing, Italian, Reg.	18.8 cents/oz	18.7 cents/oz	9.4 cents/oz	9.4 cents/oz	9.4 cents/oz	13.1 cents/oz
Salad dressing, French	15.6 cents/oz	20.6 cents/oz	18.7 cents/oz	n/a	19.1 cents/oz	18.5 cents/oz
Salad dressing, Ranch	15.6 cents/oz	20.6 cents/oz	18.7 cents/oz	19.1 cents/oz	19.1 cents/oz	18.6 cents/oz
Salad dressing, Ranch, fat-free	15.6 cents/oz	n/a	9.9 cents/oz	n/a	15.8 cents/oz	13.8 cents/oz
Soy sauce, reduced sodium	27.4 cents/oz	n/a	18.9 cents/oz	n/a	24.1 cents/oz	23.5 cents/oz

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Beverages						
Coca cola	1.5 cents/oz	1.5 cents/oz	1.9 cents/oz	2.2 cents/oz	1.5 cents/oz	1.7 cents/oz
Green tea	n/a	n/a	n/a	n/a	n/a	n/a
Hawaiian punch	1.9 cents/oz	2.7 cents/oz	n/a	2.5 cents/oz	3.1 cents/oz	2.6 cents/oz
Juicy Juice, kiwi strawberry	4.9 cents/oz	5.6 cents/oz	5.2 cents/oz	n/a	5.2 cents/oz	5.2 cents/oz
Lemonade, country time	2.2 cents/oz	1.8 cents/oz	2.0 cents/oz	1.4 cents/oz	1.5 cents/oz	1.8 cents/oz
Lipton tea	1.5 cents/oz	1.5 cents/oz	2.8 cents/oz	3.0 cents/oz	2.0 cents/oz	2.2 cents/oz
Orange soda, Sunkist	2.0 cents/oz	n/a	2.0 cents/oz	2.0 cents/oz	1.5 cents/oz	1.9 cents/oz
Pineapple soda, Fanta	n/a	1.5 cents/oz	1.9 cents/oz	n/a	n/a	1.7 cents/oz
Pink lemonade, minute maid	2.8 cents/oz	1.8 cents/oz	1.9 cents/oz	n/a	2.5 cents/oz	2.2 cents/oz
PowerAde	4.7 cents/oz	3.9 cents/oz	4.6 cents/oz	4.9 cents/oz	3.4 cents/oz	4.3 cents/oz
Root beer, Chek	1.1 cents/oz	n/a	1.5 cents/oz	1.6 cents/oz	1.5 cents/oz	1.4 cents/oz
Sierra mist	2.1 cents/oz	n/a	2.0 cents/oz	2.2 cents/oz	1.5 cents/oz	1.9 cents/oz
Sunny Delight	2.2 cents/oz	n/a	2.6 cents/oz	1.4 cents/oz	2.6 cents/oz	2.2 cents/oz
Water, bottled, Kentwood	2.5 cents/oz	n/a	2.0 cents/oz	n/a	n/a	2.2 cents/oz
Water, gallon	1.0 cents/oz	0.9 cents/oz	1.0 cents/oz	0.6 cents/oz	0.6 cents/oz	0.8 cents/oz
Snacks						
Cheese crackers	27.4 cents/pack	n/a	31.1/pack	n/a	29.9 cents/pack	29.5 cents/pack
Chips, Cheetos	26.2 cents/oz	15.7 cents/oz	24.8 cents/oz	16.5 cents/oz	24.8 cents/oz	21.6 cents/oz
Chips, Corn	23.3 cents/oz	16.7 cents/oz	24.9 cents/oz	n/a	24.9 cents/oz	22.5 cents/oz
Chips, Lays	21.7 cents/oz	10.3 cents/oz	23.8 cents/oz	n/a	21.8 cents/oz	19.4 cents/oz
Chips, Hot Fries	n/a	n/a	28.3 cents/oz	28.3 cents/oz	28.3 cents/oz	28.3 cents/oz
Chocolate chip cookies	6.4 cents/ea	8.3 cents/ea	8.3 cents/ea	8.5 cents/ea	8.5 cents/ea	8.0 cents/ea
Crunch (caramel)candy bar	59.0 cents/ea	64.5 cents/ea	n/a	65.0 cents/ea	59.0 cents/ea	61.9 cents/ea
Hot tamales candy	69.0 cents/ea	64.5 cents/ea	n/a	65.0 cents/ea	n/a	66.2 cents/ea
M & M's	59.0 cents/ea	64.5 cents/ea	65.0 cents/ea	65.0 cents/ea	59.0 cents/ea	62.5 cents/ea

Item	Albertson's	P. Wiggly	Morales	Midway	Schexnayder	Average
Mr. Goodbar	59.0 cents/ea	64.5 cents/ea	65.0 cents/ea	65.0 cents/ea	n/a	63.4 cents/ea
Payday, king-sized	99.0 cents/ea	n/a	$1.09/ea	n/a	n/a	$1.04/ea
Pecan logs (eggs)	99.0 cents/ea	n/a	59.0 cents/ea	65.0 cents/ea	n/a	74.3 cents/ea
Reese's peanut butter cups	59.0 cents/ea	64.5 cents/ea	65.0 cents/ea	65.0 cents/ea	59.0 cents/ea	62.5 cents/ea
Skor chocolate bar	59.0 cents/ea	n/a	65.0 cents/ea	65.0 cents/ea	59.0 cents/ea	62.0 cents/ea
Snickers	59.0 cents/ea	50.0 cents/ea	65.0 cents/ea	65.0 cents/ea	59.0 cents/ea	59.6 cents/ea
100 grand candy bar	59.0 cents/ea	33.0 cents/ea	n/a	65.0 cents/ea	n/a	52.3 cents/ea
Blueberry muffin, prepared	n/a	$1.29/ea	n/a	n/a	n/a	$1.29/ea
Banana nut muffins	n/a	$1.29/ea	n/a	n/a	n/a	$1.29/ea
Glazed donuts	n/a	n/a	n/a	24.9 cents/ea	28.2 cents/ea	26.5 cents/ea
Pound cake	n/a	n/a	n/a	n/a	87.4 cents/sli	87.4 cents/sl
Gusher's candy	49.8 cents/ea	n/a	n/a	50.8 cents/ea	n/a	50.3 cents/ea
Honey Teddy graham crackers	29.2 cents/pack	n/a	46.6 /pack	n/a	n/a	37.9 cents/pack
Little debbie, Banana pie	19.8 cents/ea	14.9 cents/ea	19.9 cents/ea	14.9 cents/ea	14.9 cents/ea	16.9 cents/ea
Little debbie, Honey bun	21.5 cents/ea	35.0 cents/ea	18.2 cents/ea	21.5 cents/ea	21.5 cents/ea	23.5 cents/ea
Little debbie, Oatmeal pie	9.9 cents/ea	9.9 cents/ea	9.1 cents/ea	9.9 cents/ea	9.9 cents/ea	9.7 cents/ea
Little debbie, Zebra cakes	12.9 cents/ea	12.9 cents/ea	10.9 cents/ea	12.9 cents/ea	12.9 cents/ea	12.5 cents/ea
Oreo cookies	5.6 cents/ea	8.9 cents/ea	8.9 cents/ea	9.5 cents/ea	8.9 cents/ea	8.4 cents/ea
Peppermint patties	9.7 cents/ea	14.8 cents/ea	13.7 cents/ea	13.3 cents/ea	n/a	12.9 cents/ea
Soft peppermints	3.0 cents/ea	n/a	n/a	5.7 cents/ea	n/a	4.3 cents/ea
Vanilla wafers	2.4 cents/ea	2.1 cents/ea	1.0 cents/ea	1.7 cents/ea	1.1 cents/ea	1.7 cents/ea
Vanilla pudding	44.7 cents/ea	41.7 cents/ea	42.2 cents/ea	n/a	35.2 cents/ea	40.9 cents/ea
Vanilla cream cookies	4.4 cents/ea	3.2 cents/ea	4.2 cents/ea	2.5 cents/ea	2.2 cents/ea	3.3 cents/ea

APPENDIX F
RECIPE INFORMATION

Recipe	Price for Total Recipe	Number of Servings	Serving Size	Price Per Serving
Baked Beans	$4.65	14	½ cup	0.33
Basic Chili	$7.01	4	1 cup	$1.75
BBQ Sauce	$5.86	64	2 T	0.09
Beef and Vegetable Soup	$6.97	8	1 cup	0.87
Blueberry Muffins	$4.88	12	1 muffin	0.41
Bread Pudding	$2.52	6	1 slice	0.42
Broccoli salad	$4.62	6	1 cup	0.77
Chicken Salad	$4.22	10	½ cup	0.42
Cornbread dressing	$5.93	10	½ cup	0.59
Cornbread muffins	$1.17	6	1 muffin	0.20
Crawfish Bisque	$18.26	12	3 pieces	$1.52
Crawfish Etouffe	$8.54	4	1 cup	$2.13
Crawfish Fettuccine	$32.57	16	1 cup	$2.04
Crawfish Recipe	$12.75	6	1 cup	$2.13
Crawfish Stew	$36.31	18	1 cup	$2.02
Cream Cheese Cookies	$4.46	12	1 cookie	0.37
Dirty Rice	$2.03	4	½ cup	0.51
Gravy	$1.60	8	¼ cup	0.20
Hamburger Recipe	$5.68	8	4 oz. patty	0.71
Hamburger Helper Recipe	$6.67	5	1 cup	1.33
Jambalaya	$18.52	8	1 cup	$2.32
Kool Aid	$1.85	16	1 cup	0.12
Lasagna	$19.38	16	1 slice	$1.21
Lemon Meringue	$2.67	8	1 slice	0.33
Mac and Cheese	$6.22	9	2/3 cup	0.69
Mac & Cheese (Baked)	$39.13	100	2/3 cup	0.39
Meatloaf	$4.47	8	1 slice	0.56
Meat sauce	$10.61	16	½ cup	0.66
Pancakes	0.48	1	1 pancake	0.48
Peanut Butter Candy	$4.38	25	1 piece	0.18

Pound cake	$4.05	20	1 slice	0.20
Potato Salad	$4.07	10	½ cup	0.41
Raw Sugar cake	$4.22	16	1 slice	0.26
Red Beans (no meat)	$4.08	8	½ cup	0.51
Red Beans (with pork feet)	$8.46	8	½ cup	$1.06
Spaghetti and Meat Sauce	$7.30	6	¾ cup	$1.22
Spaghetti and Meat sauce 2	$90.95	100	¾ cup	0.91
Stuffed Bell Pepper	$13.99	6	1 pepper	$2.33
Sweet Potato Pie	$3.55	8	1 slice	0.44
Tuna Noodle Casserole	$4.01	4	1 cup	$1.00
Tuna Recipe	$1.45	7	2 ounces	0.21

BEEF AND VEGETABLE SOUP

Ingredients	Amounts
Beef stew meat, simmered	8 ounces
Carrots, canned	15 ounces
Green peas, canned, drained	15 ounces
Potatoes, boiled with skin, (flesh only)	4 whole
Tomato sauce, canned	15 ounces
Onions, chopped	½ whole
Bell or sweet pepper	1 whole
Spaghetti, cooked, al dente	¼ pound
Table salt	½ teaspoon
Black pepper	½ teaspoon

BROCCOLI AND TOMATO SALAD

Ingredients	Amounts
Broccoli florets	4 cups
Cherry tomatoes, halved	1 (1 pint basket)
Dijon mustard	2 teaspoons
Rice vinegar	3 tablespoons
Olive oil	1 tablespoon
Dried oregano	2 teaspoons

Instructions

Steam broccoli until just crisp-tender, about 3 minutes. Transfer to large bowl and cool. Add tomatoes. Place mustard in small bowl. Gradually whisk in vinegar, then oil. Mix in oregano. Add to salad and toss to coat. Season with salt and pepper. Cover and chill. Recipe found at: http://www.epicurious.com

CHICKEN SALAD

Ingredients	Amounts
Chicken, meat only, roasted	1 pound
Hard boiled egg	2 whole
Real mayonnaise	4 ½ tablespoons
Yellow mustard	1 ½ tablespoon
Onion, chopped	1 whole
Bell or sweet pepper	½ whole
Celery stalk	2 pieces
Black pepper	¼ teaspoon
Table salt	1 ½ tablespoon

POTATO SALAD

Ingredients	Amounts
Real mayonnaise	2 tablespoons
Yellow mustard	2 tablespoons
Creole seasoning	1 ½ teaspoon
Hard boiled egg	4 eggs
Sweet pickle relish	5 ounces
Potatoes, flesh and skin, large	5 pounds

BAKED BEANS

Ingredients	Amounts
Baked beans with pork, canned	29 ounces
Ground beef, broiled	½ pound
Barbeque sauce (from recipe)	8 ounces

BARBEQUE SAUCE

Ingredients	Amounts
Barbeque sauce	56 fluid ounces
Granulated sugar	1 ½ cups
Butter	8 tablespoons
Onion powder	¼ teaspoon
Garlic powder	¼ teaspoon
Lemon pepper	¼ teaspoon

CORNBREAD DRESSING

Ingredients	Amounts
Yellow onions, chopped	2 cups
Celery, chopped	2 cups
Butter	½ cup
Toasted bread, crumbled	4 cups
Cornbread, crumbled	4 cups
Table salt	1 tablespoon
Black pepper	2 teaspoons
Dried sage	1 tablespoon
Poultry seasoning	2 teaspoons
Turkey broth	3 ½ cups
Egg, large	4 eggs
Recipe found at: http://www.recipezaar.com	

CORNBREAD MUFFINS

Ingredients	Amounts
Jiffy cornbread mix	8 ½ ounces
Cream style corn	(1) 8 ¼ ounce can
Table salt	½ teaspoon
Granulated sugar	¼ cup
Whole milk	¼ cup
Large eggs	2 eggs
Melted butter	2 tablespoons

Instructions

Preheat the over to 350˚. Mix everything together. Pour into a rectangular battered dish or muffin cups. Bake for 30 to 40 minutes. Recipe found at: http://www.anomaly.org

GRAVY

Ingredients	Amounts
White flour, unbleached	2 tablespoons
Crisco	½ cup
Tap water	16 fluid ounces
Green bell or sweet pepper	1 whole
Yellow onion, chopped	1 whole
Scallions, green or spring onions	1 item
Garlic clove	1 clove

DIRTY RICE

Ingredients	Amounts
Cooked or canned red beans, rinsed	1 cup
Brown rice	1 cup
Tap water	1 cup
Low sodium chicken broth	2 cups
Yellow onion, diced	½ whole
Celery stalk, diced	1 stalk
Garlic cloves, minced	2 cloves
Paprika	2 teaspoons
Cayenne pepper	¼ to ½ teaspoon

HAMBURGER HELPER
CHEESEBURGER MACARONI

Ingredients	Amounts
Hamburger helper	1 box
Milk	1 ½ cups
Ground beef, lean	1 pound

MACARONI AND CHEESE

Ingredients	Amounts
Spaghetti, cooked, al dente	18 ounces
Whole milk	15 fluid ounces
Margarine, unsalted	12 tablespoons
Kraft singles cheese	23 slices

MACARONI AND CHEESE
(BAKED)

Ingredients	Amounts
Uncooked elbow macaroni	6 pounds
Margarine	1 cup
Flour	2 cups
Dry mustard	3 tablespoons
Table salt	1 1/3 tablespoons
Skim milk, heated	2 gallons
Processed cheddar cheese, shredded	6 pounds

Instructions

For 100 servings: cook macaroni in 6 gallons boiling water until tender; about 12 minutes. Drain. Place in 4 baking pans (12” x 20”), about 2-3/4 quart or 4 pounds per pan. Melt margarine; stir in flour, mustard, and salt. Gradually stir in milk. Cook, stirring constantly, until thickened. Add cheese; stir until cheese melts. Pour sauce over cooked macaroni, about 2-1/2 quarts or 5 pounds 10 ounces per pan. Bake at 350 degrees F for 35-40 minutes until lightly browned. Serving size: 2/3 cup.

RED BEANS RECIPE
(NO MEAT)

Ingredients	Amounts
Table salt	2 Tablespoons
Black pepper	1 Tablespoon
Yellow Onion	½ whole
Green bell or sweet pepper	½ whole
Garlic clove	1 teaspoon
Red kidney beans, boiled	1 pound

RED BEANS RECIPE
(WITH PORK FEET)

Ingredients	Amounts
Corn oil	2 tablespoons
Onions, chopped	2 whole
Green bell or sweet pepper	2 whole
Celery stalk	2 pieces
Garlic clove	10 cloves
Pork feet, pickled	1 pound
Red kidney beans, boiled	2 pounds

BASIC CHILI

Ingredients	Amounts
Ground beef, lean	1 pound
Yellow onion, diced	1 whole
Diced tomatoes, drained	1 can
Beans (chili, kidney, red, black, or pinto)	3 cans
Tap water	1 can
Brown sugar	2 tablespoons
Chili seasoning	To taste

Instructions

Put the hamburger and onion in a frying pan or Dutch oven over medium to medium-high heat, stirring occasionally, until onions are soft and the hamburger is brown. Rinse hamburger-onion with hot water in a colander, especially if not using lean beef. Add to crock-pot with other ingredients on low or add to Dutch oven with other ingredients, heat on medium to boil, and then simmer for several hours. Add 1-2 teaspoons of chili seasoning at first, sample after 1 hour, and add more seasoning if needed. Don't forget to stir. Recipe found at: http://www.cdkitchen.com

CRAWFISH BISQUE

Ingredients	Amounts
Crawfish, cooked, moist heat	36 ounces
Parsley chopped	1 cup
Garlic clove	4 cloves
Scallions	1 cup
White bread	2 slices
Egg, raw	1 egg

CRAWFISH ETOUFFE

Ingredients	Amounts
Crawfish, cooked, moist heat	16 ounces
All purpose wheat flour	1 tablespoon
Butter	4 tablespoons
Green bell or sweet pepper	1 whole
Yellow onion, chopped	1 whole
Cayenne pepper	¼ teaspoon
Tap water	8 ounces
Table salt	¼ teaspoon
Black pepper	1 teaspoon

CRAWFISH FETTUCINE

Ingredients	Amounts
Butter	1 ½ cups
Yellow onions, chopped	3 medium
Bell peppers, chopped fine	2 medium
Flour	¼ cup
Parsley	4 tablespoons
Half and half cream	1 pint
Velveeta cheese	1 pound
Jalapeno relish	2 teaspoons
Garlic cloves, minced	2 cloves
Crawfish, cooked	3 pounds
Fettuccine, cooked	1 pound
Parmesan cheese	To taste
Salt and pepper	To taste

Instructions

Melt butter in large saucepan. Add onion and bell pepper. Cook covered until tender. Add flour. Cover and cook approximately 15 minutes, stirring frequently. Add cream, cheese, relish, garlic, salt and pepper. Cover and cook on low heat for 30 minutes, stirring

occasionally. Add crawfish and cooked and drained fettuccine. Mix well and pour into (2) 3 quart casserole dishes. Sprinkle with parmesan cheese. Bake at 350 degrees for 15 to 20 minutes until heated. Serves 16. Recipe found at: http://www.cooks.com

CRAWFISH RECIPE

Ingredients	Amounts
Crawfish, cooked, moist heat	24 ounces
Crisco pure vegetable oil	1 ½ tablespoons
All purpose white wheat flour	2 tablespoons
Red or cayenne pepper	¼ teaspoon
Bell or sweet pepper	1 whole
Yellow onion, chopped	1 whole

CRAWFISH STEW

Ingredients	Amounts
Vegetable oil	1 teaspoon
Green onions	½ cup
Yellow onion, chopped	1 whole
Garlic powder	2 teaspoons
Celery stalk	3 pieces
Bell or sweet pepper	1 whole
Red chili pepper	¼ teaspoon
Creole seasoning	1 tablespoon
Crawfish, cooked, moist heat	72 ounces

HAMBURGER RECIPE

Ingredients	Amounts
Ground beef, regular, broiled	1 pound
Ground turkey, cooked	1 pound
Worcestershire sauce	1 tablespoon
Dried herbs	1 tablespoon

JAMBALAYA

Ingredients	Amounts
Chicken pieces (drumsticks, thighs, and breast halves with skin and bones)	5 ½ pounds
Vegetable oil	4 tablespoons
Andouille or other pork sausage	1 ½ pounds
Yellow onions, chopped	3 medium
Celery ribs, chopped	2 ribs
Green bell pepper, chopped	1 whole
Garlic cloves, finely chopped	4 large cloves
Chicken stock or broth	2 cups
Tap water	1 ½ cups
Whole tomatoes, drained and chopped	(1) 14 to 16 ounce can
Cayenne pepper (optional)	¼ teaspoon
Long-grain white rice, dry	2 ½ cups
Scallion greens, thinly sliced	1 cup

Instructions

Pat chicken dry and season with salt. Heat 2 tablespoons oil in 10 to 12 inch heavy skillet over moderately high heat until hot but not smoking, then brown chicken in batches, without crowding, turning once (6 to 8 minutes total). Add remaining 2 tablespoons of oil as needed between batches. Transfer to a bowl as browned. Reduce heat to moderate and brown sausage in 4 batches in fat remaining in skillet, turning (3 to 4 minutes). Transfer to a paper-towel-lined bowl as browned. Pour off all but about 1 tablespoon of fat from skillet and then cook onions, celery, and bell pepper in skillet over moderate heat, stirring occasionally, until onions are golden brown and softened (about 8 minutes). Add garlic and cook, stirring, 1 minute. Add 1 cup of stock and cook, stirring (1 minute). Transfer mixture to a wide 8-quart heavy pot and add chicken, water, tomatoes, cayenne (if using), and remaining cup of stock. Simmer, partially covered, until chicken is tender (about 30 minutes). Preheat oven to 350˚. Transfer chicken with tongs to a clean bowl and measure cooking liquid with vegetables, adding additional water as necessary to measure 7 cups. (If over 7 cups, boil to reduce). Stir rice into cooking liquid (in pot). Arrange chicken over rice (do not stir), then bring to a boil over high heat, uncovered, without stirring. Bake, covered, in middle of oven until rice is tender and most of the liquid is absorbed (about 30 minutes). Remove from heat and let jambalaya stand, covered, 10 minutes. Gently stir in scallion greens, sausage and salt to taste. Makes 6 to 8 servings.
Recipe found at: http://www.epicurious.com

LASAGNA

Ingredients	Amounts
Spaghetti sauce with mushrooms	48 fluid ounces
Ground beef, lean, broiled	2 ½ pounds
Scallions, green or spring onions	5 items
Yellow onions, chopped	1 whole
Lasagna, enriched, dry	1 pound
American cheese, processed	2 pounds

MEATLOAF RECIPE

Ingredients	Amounts
Egg, raw	1
Plain bread crumbs	½ cup
Yellow onion, chopped	½ cup
Green bell or sweet pepper	½ whole
Ground beef	1 pound

MEATSAUCE RECIPE

Ingredients	Amounts
Ragu traditional pasta sauce	28 fluid ounces
Ground beef, lean, broiled	2 pounds
Pork sausage, link, cooked	2 ounces

SPAGHETTI AND MEATSAUCE

Ingredients	Amounts
Ground beef, regular, broiled	1 pound
Tomato sauce	28 ounces
Tomato paste	12 ounces
Spaghetti, cooked, al dente	6 ounces

SPAGHETTI AND MEATSAUCE 2

Ingredients	Amounts
Ground beef	17 pounds + 4 ounces
Yellow onions, chopped	6 pounds
Garlic powder	3 tablespoons
Black pepper	1 tablespoon

Chopped tomatoes, canned	8 pounds + 8 ounces
Tomato paste, canned	3 pounds + 8 ounces
Tap water	3 quarts
Basil	¼ cup + 3 tablespoons
Oregano	¼ cup + 3 tablespoons
Marjoram	¼ cup + 3 tablespoons
Flaked thyme	1 tablespoon
Table salt	2 tablespoons
Spaghetti, broken into thirds	6 pounds + 2 ounces

Instructions

Brown ground beef. Drain. Add onions and garlic powder. Cook for 5 minutes.
Add pepper, canned tomatoes, tomato paste, water and seasonings. Simmer about 1 hour.
Heat 6 gallons of water to rolling boil. Add salt. Slowly add spaghetti. Stir constantly, until water boils again. Cook 10-12 minutes or until tender; stirring occasionally.
Do not overcook. Drain well. Stir into meat sauce. Pour into serving pans. Portion ¾ c per serving. Recipe adapted from: Nutritionist Pro.

STUFFED BELL PEPPER

Ingredients	Amounts
Red bell pepper	6 large
Olive oil	2 tablespoons
Chopped onions	2 cups
Chopped fresh parsley	6 tablespoons
Garlic cloves, chopped	3 cloves
Cooked white rice, cooled	2/3 cup
Table salt	1 ¼ teaspoons
Black pepper	1 teaspoon
Allspice, ground	¼ teaspoon
Tomato sauce, canned	2 ½ cups
Ground beef, lean	1 ¼ pounds
Large egg	1 egg

Recipe found at: http://www.epicurious.com

TUNA NOODLE CASSEROLE

Ingredients	Amounts
Campbell's cream of mushroom soup	1 can (10.75 ounces)
Milk	½ cup
Chopped pimiento (optional)	2 tablespoons
Cooked peas	1 cup
Tuna, canned, drained, flaked	2 cans
Medium egg noodles, cooked	2 cups
Dry bread crumbs	2 tablespoons
Margarine, melted	1 tablespoon

Ingredients

Mix soup, milk, pimiento, peas, tuna and noodles in 1 ½ quart casserole dish. Bake at 400 F for 20 minutes, or until hot. Stir. Mix bread crumbs with margarine and sprinkle on top. Then, bake 5 more minutes. Serves 4. Recipe found at: http://www.backofthebox.com

TUNA RECIPE

Ingredients	Amounts
Tuna fish, canned, in oil	6 ½ ounces
Hard boiled egg	3 eggs
Real mayonnaise	3 tablespoons
Hamburger pickle relish	2 tablespoons

BLUEBERRY MUFFINS

Ingredients	Amounts
Granulated sugar	¼ cup
Pureed prunes	1/3 cup
Egg substitute	1/3 cup
Skim milk	1 cup + 2 tablespoons
Vanilla extract	1 ½ teaspoons
Whole wheat pastry flour	2 ¼ cups
Rolled oats	1 cup + 2 tablespoons
Baking powder	1 ½ tablespoons
Baking soda	1/3 teaspoon
Blueberries, fresh or frozen	2 cups

Instructions

Preheat over to 375˚ degrees. Mix the wet ingredients and sugar together. Mix the dry ingredients together and add them with the blueberries to the wet ingredients. Mix just enough to incorporate. Do not over mix. The mixture will be thick. Spray a nonstick muffin pan lightly with vegetable cooking spray (or line with paper baking cups and omit the spray). Scoop the muffin batter into the tins. (A 2 oz. ice cream scoop works well for this). Bake for 25-35 minutes at 375˚ degrees or until a tooth pick inserted into the middle comes out clean. Cool in pans for 10 minutes and then remove from the pans. Cool completely and store in the refrigerator or freeze in plastic zipper bags.

BREAD PUDDING

Ingredients	Amounts
Soft bread crumbs	3 cups
Milk scalded with butter	2 cups (milk); ¼ cup (butter)
Granulated sugar	1/3 cup
Eggs, slightly beaten	2 eggs
Table salt	¼ teaspoon
Ground cinnamon	1 teaspoon
Seedless raisins	½ cup

Instructions

Preheat oven to 350˚ degrees. Place bread crumbs in a 1-1/2 quart dish. Blend in the remaining ingredients. Place baking dish in a pan of hot water 1 inch deep. Bake 40 to 45 minutes, or until a silver knife inserted 1 inch from the edge comes out clean. Serve warm with cream. Recipe found at: http://www.cdkitchen.com

BROWNIES WITH CREAM CHEESE SWIRL
(As a substitute for raw sugar cake with nuts and cream cheese)

Ingredients	Amounts
Cream cheese, room temperature	3 ounces
Unsalted butter, room temperature	2 tablespoons
Granulated sugar	¼ cup
Large egg	1
All purpose flour	1 tablespoon
Vanilla extract	½ teaspoon
Baking chocolate, chopped	6 ounces
Unsalted butter, room temperature	3 tablespoons
Granulated sugar	½ cup
Large eggs	2
All purpose flour	½ cup
Baking powder	½ teaspoon

Table salt	¼ teaspoon
Vanilla extract	2 teaspoons
Almond extract	¼ teaspoon
Semisweet chocolate chips	1 cup
Chopped walnuts	¼ cup

Instructions

To make swirl: Preheat the over to 350˚ F. Lightly butter 8-inch square nonstick baking pan. Using electric mixer beat cream cheese and butter in medium bowl until light and fluffy. Gradually add sugar and beat until well blended. Beat in egg. Mix in flour and vanilla. Set mixture aside.

To make brownies: Stir baking chocolate and butter in heavy small saucepan over low heat until smooth. Cool slightly. Using electric mixer, beat sugar and eggs in large bowl until slightly thickened, about 2 minutes. Mix in flour, baking powder and salt. Mix in chocolate mixture and extracts. Stir in chocolate chips and walnuts. Spread half of chocolate batter (about 1 ¼ cups) in prepared pan.

Using rubber spatula spread cream cheese mixture over chocolate batter. Spoon remaining chocolate batter over top of cream cheese mixture. Using tip of knife, gently swirl through batter, forming a marble design. Bake brownies until tester inserted into center comes out with a few moist crumbs attached (about 30 minutes). Cool brownies on a rack and cut into squares. Recipe found at: http://www.epicurious.com

CREAM CHEESE COOKIES

Ingredients	Amounts
Refrigerated chocolate chip cookie dough	1 tube (18 ounces)
Cream cheese, softened	4 ounces
Butter, softened	2 tablespoons
Vanilla extract	½ teaspoon
Confectioners' sugar	1 ¼ cups

Instructions

Cut cookie dough in half (save one portion for another use). With floured hands, press about 1 tablespoon of dough onto the bottom and up the sides of 12 ungreased miniature muffin cups. Bake at 350˚ for 8-10 minutes or until lightly browned. Using the end of a wooden spoon handle, reshape the puffed cookie cups. Cool for 5 minutes before removing from pan to a wire rack to cool completely. In a small mixing bowl, beat the cream cheese, butter, and vanilla until blended. Gradually beat in confectioners' sugar. Spoon into cookie cups. Store in the refrigerator. Yield= 12 cookies. Recipe found at: http://recipes.tasteofhome.com

KOOLAID RECIPE

Ingredients	Amounts
Tap water	1 gallon
Kool aid packs	2
Granulated sugar	2 ½ pounds

LEMON MERINGUE PIE

Ingredients	Amounts
Granulated sugar	1 cup
Cornstarch	5 tablespoons
Table salt	¼ teaspoon
Tap water	1 cup
Milk	½ cup
Egg yolk	4 large
Unsalted butter	1 tablespoon
Fresh lemon juice	½ cup
Freshly grated lemon zest	2 teaspoons
Egg whites	4 large
Cream of tartar	¼ teaspoon
Granulated sugar	½ cup
Pie shell	(1) 9 to 10” shell

Instructions

Preheat oven to 350˚. To make filling: in a heavy saucepan whisk together sugar, cornstarch, and salt and gradually whisk in water and milk, whisking until cornstarch is dissolved. In a bowl, whisk together egg yolks. Cool milk mixture over moderate heat, whisking, until it comes to a boil. Gradually whisk about 1 cup milk mixture into yolks and whisk yolk mixture into milk mixture. Simmer mixture, whisking, for about 3 minutes. Remove pan from heat and whisk in butter, lemon juice, and zest until butter is melted. Cover surface of filling with plastic wrap. To make meringue: in another bowl with an electric mixer beat egg whites with cream of tartar and a pinch of salt until they hold soft peaks. Beat in sugar in a slow stream, beating until meringue just holds stiff peaks. Pour filling into shell and spread meringue on top, covering filling completely, sealing it to pastry. Draw meringue up into peaks and bake pie in middle of oven until meringue is golden (about 15 minutes). Recipe adapted from: http://www.epicurious.com

PANCAKES

Ingredients	Amounts
All purpose white wheat flour	1 ½ cups
Baking soda	1 teaspoon
Table salt	¼ teaspoon
White granulated sugar	¼ teaspoon
Egg, raw	1 egg
Whole milk	4 ½ fluid ounces

PEANUT BUTTER CANDY RECIPE

Ingredients	Amounts
Whole pet milk	¼ can
Condensed milk	1 can
Granulated sugar	1 ½ cup
Bluebonnet margarine	1 stick
Peanut butter	1 ½ cup
Vanilla extract	1 teaspoon
Margarine for pan	1 teaspoon

POUND CAKE

Ingredients	Amounts
Self-rising cake flour	2 1/3 cups
Unsalted butter	2 sticks (1 cup)
Cream cheese, softened	8 ounces
Granulated sugar	2 cups
Vanilla extract	2 teaspoons
Eggs, large	6 eggs

Instructions

Preheat oven to 350˚ F. Butter and flour a 10-inch (3-quart) bunt pan, knocking out excess. Sift flour. Beat together butter and cream cheese in a large bowl with an electric mixer until light and fluffy. Add sugar, flour, and vanilla and beat on low speed until just combined (mixture will appear dry and crumbly). Add eggs, 1 at a time, beating well after each addition (mixture will form a batter as eggs are added). Pour batter into pan, smoothing top. Bake in middle of oven until golden and a tester comes out clean (about 50 minutes). Cool cake in pan on a rack for 15 minutes, then invert onto a rack and cool completely. Recipe found at: http://www.epicurious.com

SWEET POTATO PIE

Ingredients	Amounts
Sweet potato, medium	2 (about 1 ¼ pounds)
Unsalted butter	¼ cup (1/2 a stick)
Granulated sugar	¾ cup
Whole milk	¾ cup
Large eggs	3 eggs
Vanilla extract	1 teaspoon
Grated cinnamon	½ teaspoon
Grated nutmeg	¼ teaspoon
Table salt	¼ teaspoon
Dark rum	1 tablespoon
All purpose flour	1 tablespoon
9-inch pie shell, unbaked	1 shell

Instructions

Preheat over to 350˚. Prick the sweet potatoes with a fork and roast them onto a shallow baking pan in the middle of the oven until very tender (about 1 ¼ hours). Cool to room temperature. Raise the oven temperature to 400˚, and place a shallow baking pan on the bottom rack. Scoop the flesh from potatoes into a bowl and discard the skins. Mash the sweet potatoes with a fork until smooth. Melt the butter in a small saucepan and stir in the sugar. Whisk in the remaining ingredients (the filling will be quite liquid). Pour the filling into the pie shell. Carefully transfer the pie to the heated shallow baking pan on the bottom rack of the oven and bake until the filling is just set, about 40 minutes. Transfer the pie to a rack to cool. Recipe found at: http://www.epicurious.com

VITA

Shanna Kaye Lundy was born on December 28, 1982, to parents Ed and Alana Lundy. She graduated in May of 2000 from False River Academy in New Roads, Louisiana, and then went on to attend Louisiana State University. She graduated with honors with a Bachelor of Science degree in dietetics in the Fall of 2004. In the spring of 2005, Shanna began a graduate program in nutrition at Louisiana State University. Over the past two years, she has worked as a graduate assistant for Dr. Heli Roy at Pennington Biomedical Research Center. She plans to graduate in the fall of 2006 with a Master of Science degree in Human Nutrition and Food. She will continue working at Pennington until the start of her internship program in June or August. Once she completes an internship program, she will take the Registered Dietitian exam so that she can become a Registered Dietitian.