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Abstract

The Thrifty Food Plan (TFP), a fundamental part of the U.S. food guidance system and the basis for maximum food stamp allotments, has been revised by USDA's Center for Nutrition Policy and Promotion (CNPP), with assistance from USDA's Food and Nutrition Service (FNS), Economic Research Service (ERS), and Agricultural Research Service (ARS). The TFP provides a representative healthful and minimal cost meal plan that shows how a nutritious diet may be achieved with limited resources. The Plan assumes that all purchased food is consumed at home. The TFP was last revised in 1999. The newly revised (2006) TFP differs from, and improves upon, the previous TFP in a number of ways. The 2006 TFP:

- Is based on the 2005 Dietary Guidelines for Americans as well as the 2005 MyPyramid Food Guidance System.
- Uses the prices low-income people paid for many foods.
- Uses the latest data on food consumption, nutrient content, and food prices: the 2001-2002 National Health and Nutrition Examination Survey and 2001-2002 Food Price Database.
- Offers a more realistic reflection of the time available for food preparation, especially with increased expectations for work in assistance programs. Hence, it allows more prepared foods and requires somewhat fewer preparations from scratch.

Although different from the previous TFP, the revised TFP is similar in one important respect: It is set at the same inflation-adjusted cost as the previous TFP. CNPP determined it was possible, for the 2001-2002 period, to obtain a healthful diet meeting current nutritional standards at a cost equal to the previous TFP's cost.

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Thrifty Food Plan, 2006 Executive Summary

The Thrifty Food Plan (TFP) has been revised to reflect current dietary recommendations, food consumption patterns, food composition data, and food prices while maintaining the cost level of the previous (1999)¹ baskets. This revision was undertaken by the U.S. Department of Agriculture's (USDA) Center for Nutrition Policy and Promotion (CNPP), with assistance from USDA's Food and Nutrition Service (FNS), Economic Research Service (ERS), and Agricultural Research Service (ARS).

CNPP addressed one research question in this TFP revision: *Can new TFP market baskets incorporating current dietary guidance and consumption patterns be developed at the inflation-adjusted cost of the previous TFP?*

The TFP serves as a national standard for a nutritious diet at a minimal cost and is used as the basis for maximum food stamp allotments. The TFP is one of four official USDA food plans (the others being the Low-Cost Plan, the Moderate-Cost Plan, and the Liberal Plan) maintained by CNPP. The TFP market baskets specify the types and quantities of foods that people could purchase to be consumed at home to obtain a nutritious diet at a minimal cost. There are 15 market baskets—one for each of 15 specific age-gender groups.

Thrifty Food Plan Development

Data and Methods

CNPP used two main data sets in revising the TFP market baskets: the Federal Government's 2001-2002 National Health and Nutrition Examination Survey (NHANES) and the 2001-2002 Food Price Database.

NHANES 2001-2002 is a complex, multistage probability sample of the civilian non-institutionalized population of the United States. This survey provides information on people's consumption of foods and nutrients, as well as extensive health-related data and information about Americans' demographic and socioeconomic characteristics. Data on 1-day food intake by individuals in low-income households were used for this revision of the TFP. "Low-income" was defined as before-tax income at or below 130 percent of the U.S. poverty threshold; the gross income cutoff for eligibility in the Food Stamp Program. The final sample for this revision of the TFP consisted of 3,527 individuals ages 1 year old and older from low-income households. NHANES contains sampling weights that make the data representative of the U.S. low-income population. All data were weighted in this study.

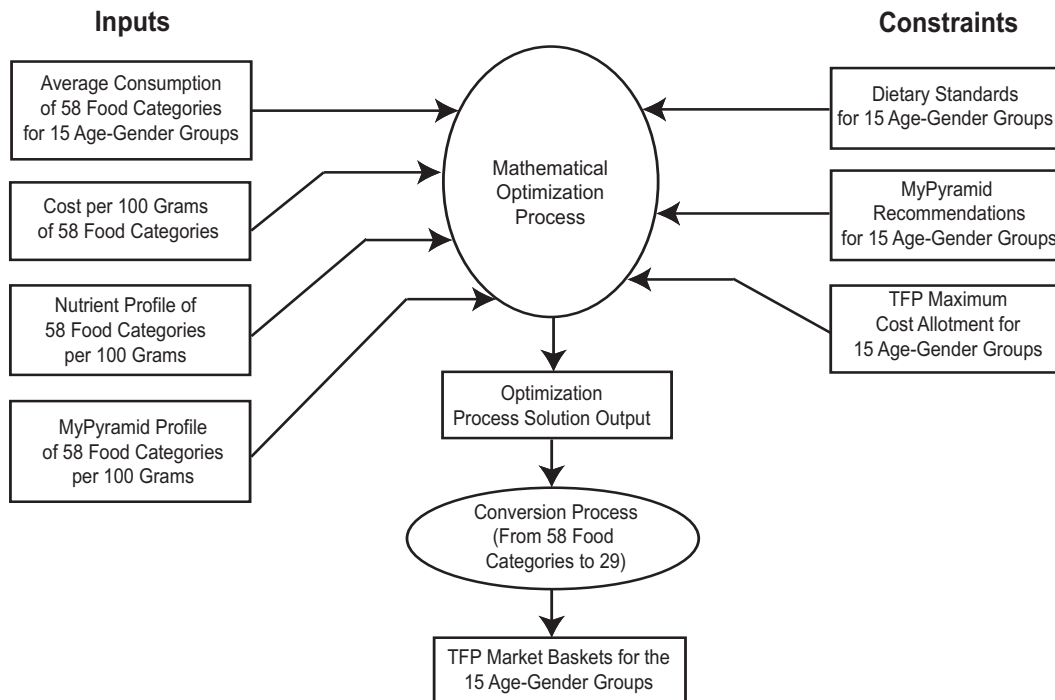
¹ "Previous" TFP refers to the 1999 Thrifty Food Plan. The "newly revised," "revised," or "new" TFP refers to the 2006 Thrifty Food Plan.

In the NHANES 2001-2002, people were asked what foods they consumed in a day—at home and away from home. In total, individuals in low-income households reported consuming about 4,152 different foods. Information on the ingredients, nutrient content, and amount consumed of each of these foods is contained in the NHANES and supporting data sets. For the development of the TFP, the foods reported as consumed were placed into one of 58 food categories. These food categories included “rice and pasta—whole grain”; “potato products—lowfat”; “citrus fruits, melons, and berries”; “milk and milk-based foods—lower fat”; “poultry—low discretionary solid fat, low cost”; and “fats, oils, salad dressings, sauces, and condiments.” Determination of groups was primarily based on the previous TFP food category classification and modified to meet current dietary guidance. In addition, individual foods that had similar nutritive values for certain nutrients were placed in the same food category.

The NHANES does not contain information on food prices or expenditures for foods consumed. This information is needed to price a market basket. CNPP developed a method to estimate the price of foods reported, in NHANES, as having been consumed and created the 2001-2002 Food Price Database by using national average food price data from the ACNielsen Homescan™ Panel. This panel contains the prices paid for food items by 16,821 households, selected and weighted to reflect the U.S. population, in the 48 coterminous States. The food purchases of these households are tracked over a 1-year period. For the previous revision of the TFP, a similar database had to be constructed.

To calculate a TFP market basket for each age-gender group, CNPP used a mathematical optimization model. For each of 15 age-gender groups (children ages 1, 2 to 3, 4 to 5, 6 to 8, and 9 to 11; females ages 12 to 13, 14 to 18, 19 to 50, 51 to 70, and 71 and over; and males ages 12 to 13, 14 to 18, 19 to 50, 51 to 70, and 71 and over), the model minimizes deviations from average consumption patterns for the 58 food categories and suggests new consumption patterns that meet required dietary standards and maintain constant cost levels. Each model consists of four sets of data inputs and is subject to three sets of constraints (fig. ES-1). The data inputs relate to each of the 58 food categories and consist of average consumption (to ensure an acceptable market basket composed of foods that people eat), average food category price, nutrient profile, and MyPyramid food intake recommendation profile. The constraints in the model are dietary standards, including MyPyramid food consumption recommendations, and the TFP cost (for 2001-2002 to correspond to the period of the food consumption data).

Figure ES-1. Thrifty Food Plan Methodology



Dietary Standards

The revised TFP market baskets incorporate updated knowledge of nutritional needs. Forming the nutritional basis of the TFP market baskets are several standards: (1) the 1997-2005 Recommended Dietary Allowances (RDAs), Adequate Intakes (AIs), and Acceptable Macronutrient Distribution Ranges (AMDRs); (2) the 2005 Dietary Guidelines for Americans; and (3) the 2005 MyPyramid food intake recommendations.

The TFP market basket for each age-gender group meets 100 percent or more of the group's RDAs or AIs for vitamin A, vitamin C, vitamin B₆, vitamin B₁₂, thiamin, riboflavin, niacin, calcium, phosphorus, magnesium, iron, folate, zinc, copper, and fiber. The market baskets for each age-gender group also had to be below the Tolerable Upper Intake Level (UL) for nutrients where such a limit was set (vitamin A, vitamin C, vitamin B₆, vitamin E, calcium, phosphorus, iron, folate, zinc, and copper). A UL is the highest amount of a nutrient that can be safely eaten on a continual basis and not cause an adverse effect for most healthy people.

It was not possible for most market baskets to meet the RDA for vitamin E nor the AI for potassium; a solution could not be obtained. Hence, these dietary constraints were relaxed in the models. For vitamin E, the individual market baskets met 63 percent or more of the recommendation and for potassium, 70 percent or more of the recommendation; however, the market baskets are higher than current consumption for both nutrients.

The TFP market baskets for each age-gender group were within the recommended AMDR for linoleic acid, alpha-linolenic acid, protein, carbohydrate, and total fat. For example, the market baskets for adults derive 20 to 35 percent of total calories from total fat; for children ages 4 to 8, 25 to 35 percent of total calories from total fat; and for children ages 1 to 3, 30 to 40 percent of total calories from total fat.

Recommendations for saturated fat and cholesterol, which the revised TFP market baskets also meet, were based on the 2005 Dietary Guidelines for Americans. These Guidelines provide science-based advice to promote health and to reduce the risk for major chronic diseases through diet and physical activity. The Guidelines recommend that all healthy people ages 2 and over consume less than 10 percent of calories per day from saturated fat. For cholesterol, the Guidelines recommend that all healthy people ages 2 and over consume 300 mg or less per day. Although the Guidelines provide recommendations for sodium consumption, it was not possible for 10 of the new TFP market baskets to meet the sodium guideline, so they were instead limited to no more than median sodium consumption. Hence, 10 of the 15 revised TFP market baskets exceeded the recommended sodium level. A similar situation existed with the 1999 TFP market baskets: the sodium recommendation at the time could not be met in the market baskets, so the standard was set to be no more than average sodium consumption for each age-gender group.

This revision of the TFP market baskets also meets food intake recommendations of the MyPyramid Food Guidance System. MyPyramid translates recommendations from the Dietary Guidelines for Americans into the types and amounts of food people can eat to achieve a healthful diet. More important, MyPyramid (1) specifies daily amounts from each of the major food groups (grain, vegetable, fruit, milk, and meat and beans) and oils that population groups need to eat for a healthful diet and (2) sets limitations on the amount of “discretionary calories” allowed within each food intake pattern. Discretionary calories are the balance of calories remaining in a person’s estimated energy allowance after accounting for the number of calories needed to meet recommended nutrient intakes through consumption of foods in lowfat or no-added-sugar forms. They can be used as a basis for determining how much solid fat and added sugars can be allowed in a pattern without exceeding a person’s caloric needs. The solid fats may come from foods that have higher fat content, fats used in preparation, and/or fats added for consumption.

Cost Level

The research question addressed in this TFP revision was the following: *Can new TFP market baskets incorporating current dietary guidance and consumption patterns be developed at the inflation-adjusted cost of the previous TFP?* Accordingly, the cost was constrained by CNPP to equal the inflation-adjusted average cost of the 2001-2002 TFP for each age-gender group. This constant cost was used to ascertain whether, and how, a household could achieve a nutritious diet that deviated as little as possible from existing consumption patterns.

Market Baskets

The model yielded a suggested consumption pattern, consisting of quantities of each of the 58 food categories, for each of the 15 age-gender groups. Each consumption pattern met model constraints for dietary standards and cost levels.

In the design of the TFP, CNPP converted foods and quantities consumed into the appropriate, corresponding form and quantity of purchasable foods. After obtaining quantities of food as consumed in the 58 food categories from the model output, CNPP converted the quantities to the equivalent amount of food ingredients that could be purchased and then collapsed them into a simplified group of 29 food categories. One of the simplifications was that mixed foods were disaggregated into ingredients that were allocated to the respective categories. A 1-week market basket of 29 food categories as purchased was determined for each of the 15 age-gender groups (table ES-1). These individual market baskets may be combined to form a household market basket.

Thrifty Food Plan Comparisons

Compared with reported consumption (in pounds), the TFP basket for a family of four (male and female ages 19 to 50 and two children ages 6 to 8 and 9 to 11) contains more vegetables (137 percent), milk products (125 percent), fruits (115 percent), and grains (16 percent); the same amount of meat and beans; and less other foods, such as fats, oils, and sweets (-83 percent). Having more vegetables, fruits, and milk products and less other foods in the TFP market basket for the family of four, compared with their reported consumption, is not surprising; because, the TFP represents a nutritious diet. The Healthy Eating Index, an indicator of the overall quality of Americans' diet, shows that most people, particularly low-income Americans, need to improve their diet (Basiotis, Carlson, Gerrior, Juan, & Lino, 2002). Compared with the previous TFP market basket (in pounds) for the family of four, the new TFP market basket contains more vegetables (51 percent), milk products (47 percent), and fruits (21 percent) and less grains (-18 percent), meat and beans (-29 percent), and other foods (-45 percent).

Table ES-1. Thrifty Food Plan market baskets, quantities of food purchased for a week, by age-gender group, 2006

Food category	Children				
	1 year	2-3 years	4-5 years	6-8 years	9-11 years
Total pounds	19.24	18.68	21.74	23.59	33.65
	<i>Pounds per week</i>				
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	1.08	.54	1.39	.90	1.70
Whole grain cereals (including hot cereal mixes)	.17	.16	.12	.09	.07
Popcorn and other whole grain snacks	.00	.49	.00	.22	.00
Non-whole grain breads, cereals, rice, pasta, pies, pastries, snacks, and flours	<u>.22</u>	<u>.65</u>	<u>.84</u>	<u>1.19</u>	<u>.76</u>
	1.46	1.84	2.36	2.40	2.54
Vegetables					
All potato products	.52	.85	.65	.29	1.07
Dark-green vegetables	.41	.72	.81	.81	2.38
Orange vegetables	.21	.29	1.00	.52	2.40
Canned and dry beans, lentils, and peas (legumes)	.37	.75	.51	.89	1.20
Other vegetables	<u>3.49</u>	<u>1.47</u>	<u>.67</u>	<u>2.66</u>	<u>2.69</u>
	5.00	4.09	3.64	5.15	9.74
Fruits					
Whole fruits	1.58	1.37	3.59	2.80	3.97
Fruit juices	<u>1.32</u>	<u>2.29</u>	<u>.81</u>	<u>1.82</u>	<u>1.86</u>
	2.90	3.67	4.40	4.62	5.83
Milk products					
Whole milk, yogurt, and cream	7.44	.14	.32	.41	.97
Lower fat and skim milk and lowfat yogurt	.00	7.47	7.71	7.20	10.81
All cheese (including cheese soup and sauce)	.01	.00	.02	.02	.01
Milk drinks and milk desserts	<u>.01</u>	<u>.00</u>	<u>.00</u>	<u>.06</u>	<u>.00</u>
	7.46	7.62	8.05	7.69	11.79
Meat and beans					
Beef, pork, veal, lamb, and game	.23	.11	.35	1.25	.99
Chicken, turkey, and game birds	.03	.02	.38	.33	.49
Fish and fish products	.24	.46	.83	.24	.46
Bacon, sausages, and luncheon meats (including spreads)	.00	.00	.00	.12	.01
Nuts, nut butters, and seeds	.13	.23	.19	.26	.43
Eggs and egg mixtures	<u>.00</u>	<u>.06</u>	<u>.03</u>	<u>.17</u>	<u>.28</u>
	.64	.87	1.78	2.37	2.65
Other foods					
Table fats, oils, and salad dressings	.24	.16	.36	.21	.36
Gravies, sauces, condiments, and spices	.67	.02	.68	.65	.53
Coffee and tea	.00	.00	.00	.00	.00
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.04	.03	.00	.16	.02
Sugars, sweets, and candies	.01	.01	.01	.03	.02
Soups (ready-to-serve and condensed)	.76	.37	.46	.29	.16
Soups (dry)	.00	.00	.00	.01	.00
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	<u>.06</u>	<u>.01</u>	<u>.00</u>	<u>.02</u>	<u>.01</u>
	1.78	.61	1.51	1.36	1.10

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

For children age 1, all milk and yogurt were assigned to the whole milk, yogurt, and cream category, because dietary guidance recommends consumption of primarily whole milk products for these children.

The numbers are rounded; thus, when summed, they may not equal the respective totals.

Table ES-1. Thrifty Food Plan market baskets, quantities of food purchased for a week, by age-gender group, 2006 (cont'd)

Food category	Males				
	12-13 years	14-18 years	19-50 years	51-70 years	71+ years
Total pounds	35.55	38.59	39.86	37.38	34.02
	<i>Pounds per week</i>				
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	1.24	3.46	2.82	2.14	1.59
Whole grain cereals (including hot cereal mixes)	.05	.18	.08	.08	.06
Popcorn and other whole grain snacks	.88	.00	.00	.11	.00
Non-whole grain breads, cereal, rice, pasta, pies, pastries, snacks, and flours	<u>1.27</u>	<u>1.08</u>	<u>1.66</u>	<u>1.65</u>	<u>1.17</u>
	3.43	4.71	4.55	3.97	2.81
Vegetables					
All potato products	1.61	3.13	2.48	2.28	2.11
Dark-green vegetables	.87	1.31	1.24	1.19	1.17
Orange vegetables	.67	.64	.98	.81	.66
Canned and dry beans, lentils, and peas (legumes)	1.83	2.00	1.87	2.16	1.35
Other vegetables	<u>3.28</u>	<u>1.47</u>	<u>2.70</u>	<u>3.18</u>	<u>2.67</u>
	8.25	8.55	9.27	9.62	7.96
Fruits					
Whole fruits	3.70	5.68	6.65	7.71	5.09
Fruit juices	<u>2.29</u>	<u>1.83</u>	<u>1.76</u>	<u>.44</u>	<u>.38</u>
	5.99	7.51	8.41	8.14	5.47
Milk products					
Whole milk, yogurt, and cream	.49	.84	.55	.28	.23
Lower fat and skim milk and lowfat yogurt	12.97	10.97	10.75	11.01	11.41
All cheese (including cheese soup and sauce)	.02	.08	.07	.11	.02
Milk drinks and milk desserts	<u>.00</u>	<u>.00</u>	<u>.00</u>	<u>.05</u>	<u>.00</u>
	13.48	11.89	11.37	11.46	11.65
Meat and beans					
Beef, pork, veal, lamb, and game	.72	.54	.63	.66	.47
Chicken, turkey, and game birds	.82	.77	2.55	.84	3.55
Fish and fish products	.45	.26	.17	.04	.21
Bacon, sausages, and luncheon meats (including spreads)	.02	.08	.02	.01	.01
Nuts, nut butters, and seeds	.46	.41	.26	.34	.35
Eggs and egg mixtures	<u>.42</u>	<u>.34</u>	<u>.36</u>	<u>.29</u>	<u>.06</u>
	2.89	2.39	3.99	2.19	4.64
Other foods					
Table fats, oils, and salad dressings	.33	1.00	.99	.62	.46
Gravies, sauces, condiments, and spices	.39	1.68	.99	.32	.46
Coffee and tea	.00	.00	.01	.03	.02
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.02	.00	.00	.38	.00
Sugars, sweets, and candies	.00	.07	.08	.05	.01
Soups (ready-to-serve and condensed)	.70	.79	.16	.60	.53
Soups (dry)	.00	.00	.02	.00	.00
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	<u>.07</u>	<u>.00</u>	<u>.01</u>	<u>.00</u>	<u>.00</u>
	1.51	3.54	2.26	2.00	1.49

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

The numbers are rounded; thus, when summed, they may not equal the respective totals.

Table ES-1. Thrifty Food Plan market baskets, quantities of food purchased for a week, by age-gender group, 2006 (cont'd)

Food category	Females				
	12-13 years	14-18 years	19-50 years	51-70 years	71+ years
Total pounds	32.18	32.77	33.51	37.13	32.64
	<i>Pounds per week</i>				
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	1.67	2.05	1.25	1.68	1.47
Whole grain cereals (including hot cereal mixes)	.15	.12	.38	.07	.07
Popcorn and other whole grain snacks	.02	.00	.00	.00	.00
Non-whole grain breads, cereal, rice, pasta, pies, pastries, snacks, and flours	<u>1.13</u>	<u>1.47</u>	<u>1.14</u>	<u>1.33</u>	<u>.96</u>
	2.96	3.64	2.77	3.08	2.50
Vegetables					
All potato products	1.00	1.68	2.05	1.75	.58
Dark-green vegetables	1.54	1.12	1.29	2.12	5.97
Orange vegetables	.62	.38	1.19	.53	.56
Canned and dry beans, lentils, and peas (legumes)	1.60	1.31	.93	1.32	1.12
Other vegetables	<u>1.42</u>	<u>2.71</u>	<u>1.94</u>	<u>2.72</u>	<u>2.79</u>
	6.18	7.20	7.40	8.44	11.00
Fruits					
Whole fruits	5.28	5.03	5.16	8.02	3.89
Fruit juices	<u>.25</u>	<u>.47</u>	<u>.46</u>	<u>.38</u>	<u>.39</u>
	5.53	5.49	5.62	8.40	4.29
Milk products					
Whole milk, yogurt, and cream	1.84	.47	.20	.21	.18
Lower fat and skim milk and lowfat yogurt	10.55	11.99	11.31	11.32	10.79
All cheese (including cheese soup and sauce)	.00	.10	.03	.00	.02
Milk drinks and milk desserts	<u>.00</u>	<u>.00</u>	<u>.00</u>	<u>.00</u>	<u>.00</u>
	12.40	12.55	11.53	11.53	10.99
Meat and beans					
Beef, pork, veal, lamb, and game	.27	.83	.65	.66	.70
Chicken, turkey, and game birds	.75	.02	2.67	2.57	1.74
Fish and fish products	.63	.29	.43	.45	.25
Bacon, sausages, and luncheon meats (including spreads)	.02	.01	.00	.01	.00
Nuts, nut butters, and seeds	.29	.42	.47	.42	.43
Eggs and egg mixtures	<u>.37</u>	<u>.06</u>	<u>.06</u>	<u>.13</u>	<u>.03</u>
	2.32	1.63	4.28	4.24	3.14
Other foods					
Table fats, oils, and salad dressings	.54	.42	.55	.48	.24
Gravies, sauces, condiments, and spices	.71	.22	.55	.13	.12
Coffee and tea	.00	.00	.02	.02	.02
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.00	.12	.00	.06	.00
Sugars, sweets, and candies	.05	.01	.04	.03	.03
Soups (ready-to-serve and condensed)	1.48	1.49	.76	.70	.30
Soups (dry)	.00	.00	.00	.00	.00
Frozen or refrigerated entrées (including pizza, fish sticks, frozen meals)	<u>.00</u>	<u>.01</u>	<u>.00</u>	<u>.00</u>	<u>.00</u>
	2.78	2.26	1.91	1.43	.72

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

The numbers are rounded; thus, when summed, they may not equal the respective totals.

Conclusion

The TFP represents a nutritious, minimal-cost diet. This report presents the 2006 revision of the TFP market baskets. The 2006 revision reflects recent changes in dietary guidance and incorporates updated information on food composition, consumption patterns, and food prices at the same inflation-adjusted cost of the previous TFP. CNPP addressed one research question in this TFP revision: *Can new TFP market baskets incorporating current dietary guidance and consumption patterns be developed at the inflation-adjusted cost of the previous TFP?* The answer was yes; however, the new TFP market baskets do not meet the vitamin E and potassium recommendations for some age-gender groups and do not meet the sodium recommendation for most age-gender groups. To do so would have resulted in market baskets very different from typical consumption habits (in the case of vitamin E and potassium) or would require changes in food manufacturing practices (in the case of sodium).

The revised TFP market baskets are now the official TFP baskets. Cost updates of the TFP will be based on the content of these baskets. The list of foods and quantities specified in the market baskets may be used in nutrition and consumer education programs that are designed to help people eat a healthful diet on a minimal-cost budget.

Thrifty Food Plan, 2006

Introduction

The U.S. Department of Agriculture's (USDA) Thrifty Food Plan (TFP) serves as a national standard for a nutritious diet at a minimal cost. It represents a set of market baskets, each applicable to one of 15 age-gender groups. Each market basket contains a selection of foods in quantities that reflect current dietary recommendations, food composition data, food prices, and actual consumption patterns. The TFP is one of four official USDA food plans (the others being the Low-Cost, the Moderate-Cost, and the Liberal Food Plans) and is maintained by USDA's Center for Nutrition Policy and Promotion (CNPP). The TFP is used by the Federal Government to provide food and economic information to consumers purchasing food on a limited budget. It also serves as the basis for maximum food stamp allotments.

This report represents a revision of the TFP market baskets to reflect recent changes in dietary guidance as well as to incorporate updated information on food composition, consumption patterns, and food prices at the same inflation-adjusted cost of the previous TFP.² The research question CNPP addressed in this TFP revision was this: *Can new TFP market baskets incorporating current dietary guidance and consumption patterns be developed at the inflation-adjusted cost of the previous TFP?*

The report provides background information on the 2006 TFP market baskets and describes the data sources, dietary standards, and methods used to revise the TFP market baskets. To illustrate some of the implications of the new TFP market baskets, CNPP compared and contrasted them with both reported consumption patterns and the previous TFP market baskets.

The TFP market baskets are important as a national standard illustrating how a nutritious household diet can be purchased on a limited budget. Past research has found that most low-income families, as well as non-low-income families, do not consume a healthful diet (Basiotis, Carlson, Gerrior, Juan, & Lino, 2002). Therefore, the TFP market baskets are useful as guides in educational programs and as references for policies designed to assist low-income families in efficiently budgeting their food expenditures and improving their diets.

² "Previous" TFP refers to the 1999 Thrifty Food Plan. The "newly revised," "revised," or "new" TFP refers to the 2006 Thrifty Food Plan.

Background of the Thrifty Food Plan

For over 100 years, the USDA has prepared guides for selecting nutritious diets at different cost levels. In 1894, the Department published information on the quantity of foods purchasable at a relatively economical price level that met the nutrient standard for the average American male undertaking moderate physical work. In this original food plan, nutrient needs, food composition, and the price of foods were factored in—the criteria still used in the development of food plans (Cofer, Grossman, & Clark, 1962).

In the 1920s, research had demonstrated the presence of minerals and vitamins in foods and their value to the diet. Basic food plans were developed that were adequate in nutrients, moderate in cost, and satisfying in flavor. These early food plans or diet guides provided consumers with practical and economical advice on healthful eating. In the 1930s, USDA developed four nutritious food plans at different cost levels for families with varying incomes. These plans were (1) the Restricted Food Plan for Emergency Use, (2) the Minimum-Cost Food Plan, (3) the Moderate-Cost Food Plan, and (4) the Liberal-Cost Food Plan. The two lower cost food plans were used in programs for low-income families affected by the Depression and were replaced in the early 1940s by the Low-Cost Food Plan. The early food plans were revised periodically to reflect changes in dietary guidance, consumption behavior, and food prices (Cofer et al., 1962).

In 1961, the Economy Food Plan was developed as a nutritionally adequate diet for short-term or emergency use. This plan, priced at less than the Low-Cost Plan, served as the basis for maximum food stamp allotments, as stipulated in the 1964 Food Stamp Program Act. In 1975, the Economy Food Plan was replaced by the Thrifty Food Plan (TFP), which represented a completely new set of market baskets but at the same minimal cost as the Economy Food Plan. As the new basis for maximum food stamp allotments, the TFP represented a minimal cost diet based on up-to-date dietary recommendations, food composition data, food habits, and food price information. The TFP market baskets were next revised in 1983 with data from USDA's 1977-78 Nationwide Food Consumption Survey and then in 1999 with data from USDA's 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII) and the 1989-91 Food Price Database (which was constructed by merging information from the 1989-91 CSFII on foods consumed with price data from national data sets, including ACNielsen price data).

The 2006 revision of the TFP captures important changes in food composition data, eating patterns, and price information that have occurred since 1989-91. Also, dietary guidance has been updated since the 1999 TFP market baskets were released with the issuance of the Dietary Reference Intakes (DRIs) in 1997-2005, the 2005 Dietary Guidelines for Americans, and the 2005 MyPyramid Food Guidance System. Lastly, relative food prices have changed over time, affecting food choices and consumption patterns.

Data

Two main data sets were used in revising the TFP market baskets: the Federal Government's 2001-2002 National Health and Nutrition Examination Survey (NHANES) and the 2001-2002 Food Price Database.

2001-2002 National Health and Nutrition Examination Survey

NHANES provides information about people's consumption of foods and nutrients, as well as extensive health-related data and information about Americans' demographic and socioeconomic characteristics. NHANES data for 2001-2002, the most recent data available at the time, were used to revise the TFP market baskets. The previous revision of the TFP markets baskets was based on data from the Federal Government's 1989-91 CSFII, which has since been integrated with NHANES.

NHANES 2001-2002 is a complex, multistage probability sample of the civilian non-institutionalized population of the United States. Individuals of all ages were sampled. NHANES 2001-2002 includes expanded samples of low-income people, Mexican Americans, African Americans, adolescents 12 to 19 years old, and adults 60 years old and older.³

For NHANES 2001-2002, individuals' dietary intakes were collected for 1 day. Prior research has indicated that food intake data based on 1-day dietary recall are reliable measures of usual intakes of population groups (Basiotis, Welsh, Cronin, Kelsay, & Mertz, 1987). Data were collected through an in-person interview in a mobile examination center. A 24-hour dietary recall was administered by an interviewer. Typically, for children less than 6 years old, information was provided by a parent (or a proxy); the parent or proxy could also consult with others, such as a day-care provider, regarding what the child ate. For children 6 to 11 years old, intake information was provided by the child with assistance typically from a parent (or proxy). Information about dietary intake for individuals 12 years old and older was self-reported.

This revision of the TFP market baskets is based upon data of individuals ages 1 year old and older in households with income at or below 130 percent of the U.S. poverty threshold, an income level that represents the upper threshold for eligibility in the Food Stamp Program. The final sample for this revision of the TFP consisted of 3,527 individuals ages 1 year old and older from low-income households. Pregnant and lactating women were excluded. The final sample reported consuming about 4,152 different foods. Information about the ingredients, nutrient content, and amount consumed of each of these foods is contained in the NHANES data sets. CNPP used statistical weights to ensure the sample was representative of the U.S. population.

³ For more information on NHANES data, see www.cdc.gov/nchs/data/nhanes/nhanes_01_02/general_data_release_doc.pdf.

2001-2002 Food Price Database

The 2001-2002 Food Price Database was created by CNPP with assistance from USDA's Economic Research Service and USDA's Food and Nutrition Service by merging information about food from NHANES with national data on food prices from the 2001-2002 ACNielsen Homescan™ Panel (2005). This panel contains the prices paid for food items by 16,821 households, selected and weighted to reflect the U.S. population, in the 48 coterminous States. The food purchases of these households are tracked over a 1-year period. Foods purchased at supermarkets, convenience stores, warehouse clubs, mass merchandisers, and drug stores are included.

The two data sources were merged because while NHANES has extensive information about reported food intake, it does not contain information about food prices nor food expenditures. For the previous revision of the TFP, a similar database was constructed.

Creation of the Food Price Database involved the following:

1. Identifying all foods reported in NHANES 2001-2002 as having been consumed at home and away from home.
2. Identifying which foods should be purchased in the ready-to-serve or ready-to-heat form and which foods should be purchased as ingredients for recipes to be prepared at home.
3. Reviewing the recipes for foods prepared at home for practicality (i.e., ingredients that could be easily purchased and not having to make some ingredients, such as bread and pasta, from scratch).
4. Converting all foods to a purchasable form by adjusting for refuse factors and cooking loss or gain.
5. Pricing all foods and ingredients by using data from the 2001-2002 ACNielsen Homescan™ Panel.
6. Calculating the price of the food in the "as-consumed" form.

For many foods, the USDA food codes distinguish the level of convenience the consumer selects. For example, macaroni and cheese has codes that detail whether it is made from scratch, made from a box mix, or purchased as a frozen entrée. For other foods, CNPP reviewed data on foods most frequently consumed by low-income people to determine the form in which foods were most likely purchased. Commercially prepared foods were matched directly to foods in the ACNielsen data to obtain a price. For foods prepared at home, CNPP used data from version 1 of the USDA's Food and Nutrient Database for Dietary Studies (FNDDS) to break the foods down into specific ingredients. Since these recipes were originally created to calculate the nutrient content of foods rather than the price, some recipes had to be modified to match ingredients that people could reasonably purchase in stores. This process generated an additional list of items that could be purchased in the ready-to-eat form.

Other consumed foods have been cooked or prepared (peeled, shelled, etc.) and must be adjusted to retail form before pricing. For such foods, cooking and waste conversion factors that adjust for the loss or gain in weight due to cooking and preparation were applied to all relevant ingredients.⁴ For example, steamed vegetables were converted to raw, unprepared forms, and cooked pasta was converted to its uncooked form. Similarly, cooked eggs were converted to eggs with shells, and peeled bananas were converted to purchasable form with peel. For more information on the development of a Food Price Database, see Bowman (1997).

To determine retail prices that would be used to calculate the costs of foods, CNPP used the 2001-2002 ACNielsen Homescan™ Panel. From the 16,821 total households in the panel, low-income households were selected. This resulted in a sample of 1,429 households for the 2 years. The average price paid by these households for each food item bought was then calculated. All brands and brand sizes of a food reported as having been purchased during the year were used in determining prices and calculated on a per unit basis. If a household purchased a food item more than once, all purchase occasions were used to determine average price per unit. For example, for skim milk, all brands, sizes, and purchase occasions of skim milk bought by households during the year were used in determining the price per gram of skim milk. Foods were priced in dollar amounts per 100 grams.

A food item had to have at least 75 purchases by low-income households to calculate an average price. This minimum sample size, recommended by ACNielsen, ensured statistical reliability of the average price. If this minimum sample size was not met for a food item, purchases by all households (low- and non-low-income) were used to price the food item. Of the 4,152 food items reported as being purchased by low-income households, approximately 63 percent did not meet the minimum criterion of 75 purchase occasions for at least one ingredient used to prepare the food.

The method used in determining food prices for this revision of the TFP has a significant advantage over that of the 1999 TFP. Traditionally, the TFP has reflected food prices paid by low-income households. However, in the 1999 TFP, food prices paid by all households, not just low-income households, were used. This method was used because of data limitations. For the 2006 TFP revision, the food prices paid by low-income households were used for food items when the criterion for sample size was met. Using this criterion, when possible, results in a more accurate portrayal of food prices paid by low-income households.

The calculated average prices were then matched to each food reported, in NHANES 2001-2002, as having been consumed by low-income participants age 1 year old and older.

⁴ USDA *National Nutrient Database for Standard Reference* (Release 18, Nutrient Data Laboratory home page, <http://www.ars.usda.gov/Services/docs.htm?docid=8964>) contains data on the weight of cooked and uncooked foods as well as refuse factors. These data permit computation of cooking conversion factors. Some waste conversion factors that adjust for waste when food is prepared (e.g., due to peeling, coring, slicing, de-boning, dicing, and draining in the case of canned goods) are found in USDA Agriculture Handbook No. 102 *Food Yields: Summarized by Different Stages of Preparation* (USDA, 1975). Food ingredients that are cooked and/or have a waste factor were converted by using either or both conversion factors and then priced.

Ingredients in a food item, such as milk in scrambled eggs, were priced separately. All food ingredients were then converted back to the food as it had been consumed, and the food was priced per 100 grams. To illustrate, first, scrambled eggs were separated into ingredients: eggs with the shell, milk, table fat, and salt. These ingredients were then adjusted for loss in weight due to cooking (e.g., the loss of moisture in eggs and milk) and for waste due to food preparation (e.g., the shell of the egg). Using ACNielsen data, CNPP derived national average prices paid by low-income households or paid by all households (if the low-income sample was not sufficient) to price each of the ingredients per 100 grams. The food ingredients were then regrouped into the food that individuals reported consuming—the scrambled eggs—and this food was priced per 100 grams.

For some infrequently purchased food items, such as venison, ACNielsen data did not contain prices. Proxy prices were therefore used. These proxies were determined by using the closest substitute for the food item or food services found on the World Wide Web. In addition, foods that were made with a recipe that included table salt, such as casseroles and sauces, were assumed to be prepared without added salt. This applied to 33 percent of the as-consumed foods. This assumption resulted in a reduced estimate of the sodium content of foods. However, the salt content of ready-to-serve or ready-to-heat foods, such as spaghetti sauce, canned goods, and baked goods, was held at the level given in the FNDDS. Hence, sodium that is naturally occurring or from processed foods remained in the recipes.

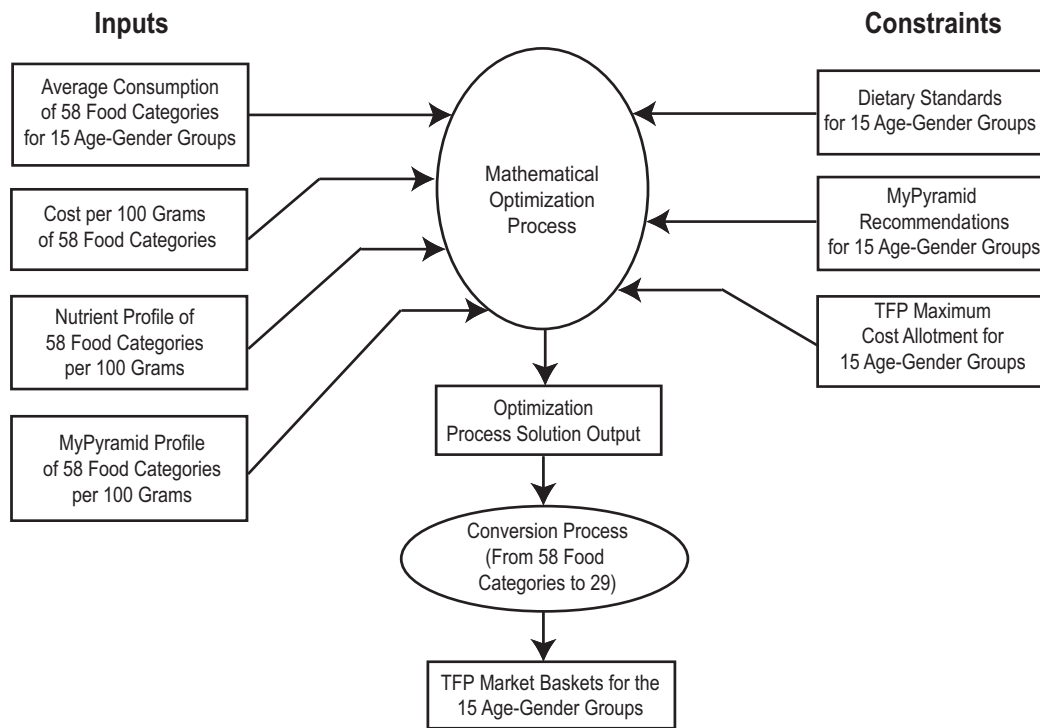
Methods

Development of the TFP includes three major steps. First is the selection of a survey sample to use as the basis for the food plan at a particular cost level. Second is the establishment of dietary standards and a cost limit for the food plan. Third is the use of a computerized mathematical model to help develop the food plan. This model should be designed to identify food market baskets representing the smallest change necessary in actual food consumption patterns to meet the dietary standards and the cost limit desired.

An overview of the methodology used to update the TFP market baskets is depicted in figure 1. A revised market basket was calculated for 15 age-gender groups: Children ages 1, 2 to 3, 4 to 5, 6 to 8, and 9 to 11; females ages 12 to 13, 14 to 18, 19 to 50, 51 to 70, and 71 and over; and males ages 12 to 13, 14 to 18, 19 to 50, 51 to 70, and 71 and over. These age-gender groupings are different from those of the previous TFP. This was done to align more closely the TFP age-gender groups with those of the DRIs, while maintaining the congressional mandate that food stamp allotments be based on a “reference family of four”—a male age 20 to 50, a female age 20 to 50, a child age 9 to 11, and a child age 6 to 8. Individual TFP market baskets calculated for each age-gender group may be combined to calculate a TFP market basket for the household.⁵

⁵ Nineteen-year-old males and females were assigned the respective market baskets of the 20- to 50-year-old age groups because of similarity in nutritional needs.

Figure 1. Thrifty Food Plan Methodology



For TFP modeling purposes, CNPP assigned each of the 4,152 foods into one of 58 food categories. (These foods were reported in NHANES 2001-2002 as having been consumed.) Table 1 presents these 58 food categories and some example foods in each. Foods were assigned to food categories based on a link to the MyPyramid Food Guidance System, similarity of nutrient content, food costs, and use in meals. (See appendix 1 for Food Group Database Documentation.)

To calculate a TFP market basket for each age-gender group, CNPP and ERS estimated a mathematical optimization model. For each age-gender group, the model selected the optimal food plan that met the dietary standards and cost constraints with as little change as possible from reported food consumption. Each model consisted of four sets of data inputs related to each of the 58 food categories, subject to three sets of constraints. The inputs were—by food category—average consumption, average cost per 100 grams, average nutrient profile per 100 grams, and average MyPyramid ounce or cup equivalents profile per 100 grams. These inputs were calculated by using the foods consumed by people in each age-gender group, the Food Price Database created by CNPP, and the MyPyramid cup and ounce equivalents database provided by USDA’s Agricultural Research Service. The constraints were dietary standards, MyPyramid food consumption recommendations, and constant TFP market basket costs (corresponding to the period of food consumption data, 2001-2002).

Table 1. Food categories and examples of foods in each category, Thrifty Food Plan, 2006

Food category	Examples of foods
Grains	
Breads, yeast and quick—whole grain (n = 38)	Whole wheat, multigrain, or pumpernickel breads, rolls, bagels, scones, English muffins, biscuits, tortillas, and pancakes—all with 50% or more of ounce equivalents ¹ from whole grain
Breads, yeast and quick—non-whole grain (n = 271)	White, French, potato, bran, or rye breads and rolls; muffins, English muffins, bagels, waffles, corn tortillas, taco shells, cornbread, and pancakes—all with less than 50% of ounce equivalents from whole grain
Breakfast cereal—whole grain, regular calories ² (n = 74)	Cooked cereals (e.g., oatmeal and bulgur) with sugars, fat, and whole milk or 2% milk added; sweetened ready-to-eat cereals (e.g., frosted wheats and granola)—all with 50% or more of ounce equivalents from whole grain
Breakfast cereal—whole grain, low calories ² (n = 54)	Cooked cereals (e.g., oatmeal, bulgur, and buckwheat groats) without added sugars or fat; nonsweetened ready-to-eat cereals (e.g., shredded wheat and mueslix)—all with 50% or more of ounce equivalents from whole grain
Breakfast cereal—non-whole grain (n = 214)	Cooked cereal (e.g., cream of wheat, grits, and oat bran); sweetened or nonsweetened ready-to-eat cereals (e.g., frosted cornflakes and puffed rice)—all with less than 50% of ounce equivalents from whole grain
Rice and pasta—whole grain (n = 15)	Brown rice, wild rice, whole wheat pasta (e.g., macaroni, spaghetti, and noodles)—all with 50% or more of ounce equivalents from whole grain
Rice and pasta—non-whole grain (n = 48)	Long or short white rice, sweet rice, rice noodles and pasta (e.g., macaroni, spaghetti, and noodles)—all with less than 50% of ounce equivalents from whole grain
Cakes, pies, and other sweet bakery products—whole grain (n = 20)	Oatmeal cookies, granola cookies, whole wheat doughnuts, granola bars, and graham crackers—all with 50% or more of ounce equivalents from whole grain
Cakes, pies, and other sweet bakery products—non-whole grain (n = 425)	Pies, cookies, pastries, doughnuts, shortbread; all cakes (e.g., white, yellow, shortcake, sponge, pound, and angel food); croissants; and sweet rolls—all with less than 50% of ounce equivalents from whole grain
Grain-based snacks—whole grain (n = 30)	Popcorn, salty snacks, crackers, multigrain pretzels, and puffed wheat cakes—all with 50% or more of ounce equivalents from whole grain
Grain-based snacks—non-whole grain (n = 58)	Crackers (e.g., soda, oyster, cheese, and rice); hard or soft pretzels; and salty snacks (e.g., tortilla chips)—all with less than 50% of ounce equivalents from whole grain
Grain mixtures—regular fat (n = 229)	Foods such as tacos, burritos, enchiladas, pizzas, egg rolls, and pasta and rice with meat where grain is major ingredient and containing 6% or more fat by weight
Grain mixtures—lowfat (n = 140)	Foods such as rice and pasta with vegetables and/or beans, noodle or rice soups with vegetables and/or meat, and garden rolls where grain is major ingredient and containing less than 6% fat by weight
Vegetables and fruits	
Potato products—regular fat (n = 34)	French-fried potatoes, potato chips, hash browns, potato puffs, potato patty; and potato salads and mashed potatoes with added fat, eggs, or cheese
Potato products—lowfat (n = 60)	Boiled, baked, scalloped, mashed, and stuffed potatoes; and potato salad, German style
Dark-green vegetables—added fat (n = 34)	All dark-green vegetables such as broccoli, spinach, chard, collard greens, mustard greens, and kale—with or without fat added
Dark-green vegetables—no added fat (n = 21)	
Orange vegetables—added fat (n = 28)	All orange vegetables such as carrots, pumpkin, winter squash, and sweet potatoes—with or without fat added
Orange vegetables—no added fat (n = 28)	
Tomatoes—added fat (n = 32)	Tomato, tomato sauce, tomato puree, tomato paste, tomato soup, and tomato juice—with or without fat added
Tomatoes—no added fat (n = 37)	
Other vegetables—added fat (n = 136)	All other vegetables such as green beans, beets, cabbage, cauliflower, corn, eggplant, green peas, iceberg lettuce, bell pepper, snow peas, turnip, and Brussels sprouts—with or without fat added
Other vegetables—no added fat (n = 163)	
Mixed vegetables—added fat (n = 101)	Foods such as stuffed vegetables, creamed peas and carrots, batter-dipped fried vegetables, and vegetable stir-fry where vegetables are the primary ingredient—with or without fat added
Mixed vegetables—no added fat (n = 43)	

¹The following each counts as 1 ounce-equivalent (1 serving) of grains: 1/2 cup cooked rice, pasta, or cooked cereal; 1 ounce dry pasta or rice; 1 slice of bread; 1 small muffin (1 oz); 1 cup ready-to-eat cereal flakes.

²In this context, “calories” refers to total calories from discretionary solid fat and added sugars in the product. Discretionary solid fat in cereals is the fat that is solid at room temperature and is added to the cereals during processing or at the table.

Note: n refers to number of food codes in the food category.

Table 1. Food categories and examples of foods in each category, Thrifty Food Plan, 2006 (cont'd)

Food category	Examples of foods
Citrus fruits, melons, and berries (n = 62)	Oranges, grapefruits, limes, lemons, and tangelos; melons (e.g., watermelon, cantaloupe, and honeydew); berries (e.g., strawberries, blueberries, cranberries, raspberries, and blackberries)
Citrus fruit, melon, and berry juices (n = 38)	100% fruit juices made from citrus fruits, melons, and berries
Fruits other than citrus fruits, melons, and berries (n = 185)	Fruits such as bananas, apples, cherries, peaches, pears, grapes, plums, papayas, and apricots
Fruit juices other than citrus, melon, and berry (n = 70)	100% fruit juices made from fruits other than citrus fruits, melons, and berries
Milk products	
Milk and milk-based foods—regular fat (n = 56)	All fluid, evaporated, condensed, and dry whole milk; regular yogurt; all fluid creams; cream substitutes; cream cheese; and dips
Milk and milk-based foods—lower fat (n = 38)	All fluid, evaporated, and dry reduced-fat and skim milks; buttermilk; and lowfat or nonfat yogurts
Cheese (n = 98)	Natural, processed, and imitation cheeses; cottage cheese; cheese spreads; cheese dips; and cheese soups
Milk-based drinks and desserts—regular fat (n = 125)	Milk-based drinks (e.g., malted milk, hot chocolate, eggnogs, cocoa, infant formulas, and meal-replacement drinks) with fat equivalent to that of whole milk; dairy desserts (e.g., ice cream, frozen yogurt, ice milk, custard, and puddings) having more than 6% fat by weight
Milk-based drinks and desserts—lower fat (n = 136)	Milk-based drinks made with reduced-fat or skim milk and dairy desserts having 6% or less fat by weight
Meat and beans	
Red meats—regular discretionary solid fat, ³ regular cost ⁴ (n = 59)	Beef (e.g., battered and fried steak, barbecued short ribs, and pot roast), pork (e.g., fresh ham, loin, and spareribs), lamb (e.g., roast), game meats, and jerky—all with more than the median amount of discretionary solid fat
Red meats—regular discretionary solid fat, low cost ⁴ (n = 61)	Pork (e.g., skin, ground, chop, roast, cutlet, and bacon), beef (e.g., brisket, short ribs, neck bones, regular ground beef, and corned beef), lamb (e.g., ground or chop), and organ meats—all with more than the median amount of discretionary solid fat
Red meats—low discretionary solid fat, regular cost (n = 62)	Lean beef (e.g., steak, veal, and oxtail), lean only pork (e.g., roast, steak, fresh ham, and loin), lamb (e.g., ribs and loin chop), and game meats—all with the median amount of discretionary solid fat or less
Red meats—low discretionary solid fat, low cost (n = 74)	Lean pork (e.g., lean spareribs and smoked or cured roast), lean only beef (e.g., brisket), lamb (e.g., shoulder chop), and game meats—all with the median amount of discretionary solid fat or less
Poultry—regular discretionary solid fat, regular cost (n = 50)	Coated and fried poultry (e.g., breast, leg, thigh, and drumstick) purchased without skin—all with more than the median amount of discretionary solid fat
Poultry—regular discretionary solid fat, low cost (n = 42)	Coated and fried dark meat (e.g., wing, thigh, and drumstick) purchased with skin; nuggets; and organ meats of chicken, turkey, and game birds purchased with skin—all with more than the median amount of discretionary solid fat
Poultry—low discretionary solid fat, regular cost (n = 54)	Roasted or broiled poultry (e.g., breast, thigh, and drumstick) purchased without skin—all with the median amount of discretionary solid fat or less
Poultry—low discretionary solid fat, low cost (n = 156)	Smoked or roasted white and dark meat mixture or dark meat (e.g., thigh and drumstick) purchased with skin (but skin not consumed); turkey and game birds purchased with skin (but skin not consumed); and canned chicken soups—all with the median amount of discretionary solid fat or less

³Discretionary solid fat in meats is the fat that is solid at room temperature and is the excess fat from (1) the meat and beans group (including meats, poultry, fish, eggs, nuts, and seeds) beyond amounts that would be consumed if only the lowest fat forms were eaten and (2) solid fats added to these foods in preparation or at the table.

⁴The top 66.66 percent of foods were placed in the regular-cost category; the bottom 33.33 percent of foods, in terms of cost, were placed in the lowest cost category.

Note: n refers to number of food codes in the food category.

Table 1. Food categories and examples of foods in each category, Thrifty Food Plan, 2006 (cont'd)

Food category	Examples of foods
Fish—regular discretionary solid fat, regular cost (n = 60)	Fish, pan-fried or baked with solid fat (e.g., fresh tuna, swordfish, trout, salmon, ocean perch, and porgy) and battered and fried shellfish (e.g., scallops, oyster, shrimp, and crab)—all with more than the median amount of discretionary solid fat
Fish—regular discretionary solid fat, low cost (n = 54)	Fish sticks or other fried and battered fish (e.g., mullet, smelt, haddock, herring, and catfish)—all with more than the median amount of discretionary solid fat
Fish—low discretionary solid fat, regular cost (n = 37)	Broiled, steamed, or smoked fresh fish (e.g., tuna, salmon) and fresh shellfish (e.g., crab and clams)—all with the median amount of discretionary solid fat or less
Fish—low discretionary solid fat, low cost (n = 54)	Canned fish (e.g., tuna, sardines, and herring), canned shellfish (e.g., shrimp), and canned seafood-based soups and chowders—all with the median amount of discretionary solid fat or less
Lunch meats, sausages, and bacon—regular fat (n = 55)	Sausages, salami, frankfurters, bologna, sliced ham, bacon, and pastrami
Lunch meats, sausages, and bacon—lowfat (n = 41)	Sausages, salami, frankfurters, bologna, sliced ham, bacon, and pastrami containing 25% less fat than regular fat form
Eggs and egg mixtures (n = 69)	Fresh, frozen, and dried eggs; egg substitutes; meringues; and egg mixtures
Meat, poultry, and fish mixtures—regular discretionary solid fat (n = 345)	Meat, poultry, and fish with grains or vegetables with more than the median amount of discretionary solid fat
Meat, poultry, and fish mixtures—low discretionary solid fat (n = 355)	Meat, poultry, and fish with grains or vegetables with the median amount of discretionary solid fat or less
Dry beans, peas, lentil dishes, and mixtures (n = 113)	Black, red, pinto, lima, white, mung, and kidney beans and all types of peas—all with or without other foods; soybean products (e.g., miso, tofu, and soybean-based meat substitutes)
Nuts and seeds (n = 74)	Nuts, peanut butter and other nut butters, nut mixtures, carob, and seeds (e.g., sunflower, sesame, and pumpkin)
Other foods	
Fats, oils, salad dressings, sauces, and condiments (n = 188)	Butter, margarine, vegetable oils (e.g., corn, olive, and sunflower), butter blends, salad oils, lard, shortenings, all salad dressings, mayonnaise, pickles, relishes, salsa, soy sauce, catsup, tomato paste, and gravies and sauces
Coffee and tea (n = 81)	Instant, ground, and fluid coffees and teas with or without caffeine and with or without sugar or sweeteners
Fruit drinks, soft drinks, and ades—regular calorie (n = 89)	Fruit drinks, cola- and pepper-type soft drinks, ginger ale, root beer, fruit punches, ades (e.g., lemonades and limeades), and other sodas containing sugar
Fruit drinks, soft drinks, and ades—low calorie (n = 35)	Sugar-free or low-sugar drinks such as cola- and pepper-type soft drinks, ginger ale, root beer, fruit-flavored drinks, fruit punches, ades, and other sodas
Sugars and sweets (n = 215)	All types of sugars, sweeteners, and syrups (e.g., honey, jams, jellies, marmalades, preserves, icings, gelatin desserts, marshmallow, and fudge); all types of candies and chocolates; and chewing gum

Note: n refers to number of food codes in the food category.

Model Inputs

Average Consumption of Each of the Food Categories

The TFP has historically reflected the eating habits of the low-income population to ensure acceptable market baskets consisting of foods that people eat. To accomplish this, CNPP determined and entered into each model the average consumption patterns of each of the 15 age-gender groups for the 58 food categories.

Similar to the methods of the previous TFP and consistent with research on household discard of edible food (USDA, 1983a; USDA, 1983b), CNPP also added an allowance of 5 percent to reported intake for each of the 58 food categories in the model to account for food waste. Although dated, this 5 percent factor to account for food waste is the only one available that is applicable to low-income households. (Household discard of edible food could result from plate waste or spoilage.)

Although the revised TFP incorporates average consumption, it does deviate from average consumption to satisfy the dietary standards of the plan. This deviation occurs because average consumption of many foods—especially fruits and vegetables—is far below recommended consumption; whereas, consumption of some other foods or food components—fats, added sugars, and sodium—is above recommendations. Only a small percentage of Americans has a good diet (Basiotis et al., 2002).

Average Price of the Food Categories

Each of the 4,152 foods in the Food Price Database was assigned to one of the 58 food categories. The weighted average price per 100 grams of each of these food categories was then determined based on the average consumption by all people in the age-gender group. For example, the food category “fruits other than citrus fruits, melons, and berries” includes apples, apricots, bananas, and cherries. The average price per 100 grams of this food category was based on the average price of these individual food items weighted by their consumption share. Apples and bananas received a greater weight proportionately because of more frequent consumption.

Nutrient Profile and MyPyramid Equivalents Profile of Each of the Food Categories

The 2001-2002 NHANES contains information about the nutrient content (including food energy, vitamins, minerals, and other food components, such as cholesterol and dietary fiber) of each of the foods that people reported consuming. Using this database, CNPP calculated the weighted average nutrient content of each of the 58 food categories per 100 grams. For example, the “poultry, low-discretionary solid fat and low-cost group” consists of foods such as roasted chicken drumstick without skin, boiled chicken leg, and canned chicken soup. The average nutrient profile of this food category was based on the average consumption of each food item. Weights for the food items were based on the average consumption by all people. The average consumption by all people, compared with the average consumption by each age-gender group, was used because the TFP is for household-wide use.

The MyPyramid equivalents profile of each of the 58 food categories was also an input into the model: The average weighted number of equivalents of grains (whole and non-whole), vegetables (dark green, orange, legumes, starchy, and other vegetables), fruits (whole and 100 percent juice), milk products, and meat and beans (meat, poultry, fish, dry beans, eggs, and nuts). Many food categories yielded equivalents for only one MyPyramid food group; for example, cheese contributed equivalents to the milk products group only. Other food categories contributed equivalents to more than one MyPyramid food group; for example, mixed grains may contain equivalents of grains, vegetables, milk, and meat and beans.

For this TFP revision, excess solid fat and added sugars in foods, above those found in the leanest foods and foods containing no sugars, was considered as part of discretionary calories. The TFP does not include alcoholic beverages.

Model Constraints

Dietary Standards

Before the dietary standards are set for the TFP market baskets for each of the 15 age-gender groups, the appropriate caloric levels these market baskets must meet needs to be determined. These caloric levels could be determined in one of two ways: (1) by using a reference weight and physical activity level that is considered healthful for each age-gender group, along with a reference height (typically set at the median) or (2) by using median weight/height of each age-gender group, along with a set activity level. For this revision of the TFP, CNPP used median weight/height levels of each age-gender group and a low active physical activity level (as defined by the Institute of Medicine, Food and Nutrition Board, 2005). Essentially, for each age-gender group, these three variables were entered into an equation developed by the Institute of Medicine (Institute of Medicine, Food and Nutrition Board, 2005). The yield from the equation was a caloric level reflecting the energy requirement of a person at the median weight and median height and median age (for the group) at a low active physical activity level.⁶

In the previous TFP, caloric levels were set at the 1989 Recommended Energy Allowances, which were based on reference people of median height and weight and having a moderate level of physical activity. However, the methodology used to determine caloric need has changed, the population has gained body weight, and the definition of healthful weight has changed since the previous TFP was constructed.

The dietary standards that the TFP market baskets had to satisfy were drawn from three main sources: (1) the 1997-2005 Dietary Reference Intakes, which include Recommended Dietary Allowances (RDAs), Adequate Intakes (AIs), and Acceptable Macronutrient

⁶The low active category in the Institute of Medicine 2005 classification of activity levels corresponds to the moderate activity level referred to in the 2005 Dietary Guidelines for Americans.

Distribution Ranges (AMDRs); (2) the 2005 Dietary Guidelines for Americans; and (3) the 2005 MyPyramid Food Guidance System. Table 2a-c shows major differences in dietary standards between the old (1999) and revised (2006) plans.

The 1997-2005 RDAs for various age-gender groups are the level of intake of essential nutrients considered adequate to meet the nutrient needs of practically all (97 to 98 percent) healthy Americans in the group (Institute of Medicine, Food and Nutrition Board, 1997, 1998, 2000a, 2000b, 2002, 2004, 2005). The 1997-2005 AIs for various age-gender groups are average daily intake levels, based on observed or experimentally determined approximations or estimates of nutrient intakes by a group of apparently healthy people, that are assumed to be adequate for health (and are used when RDAs cannot be determined) (Institute of Medicine, Food and Nutrition Board, 1997, 1998, 2000a, 2000b, 2002, 2004, 2005). The 1997-2005 AMDRs for various age-gender groups are a range of intakes for a particular energy source that is associated with a reduced risk of chronic disease while providing adequate intakes of essential nutrients (Institute of Medicine, Food and Nutrition Board, 1997, 1998, 2000a, 2000b, 2002, 2004, 2005). The AMDRs are expressed as a percentage of total energy intake.

For the revised TFP, the market baskets for each age-gender group had to meet 100 percent or more of the group's 1997-2005 RDAs or AIs for vitamin A, vitamin C, vitamin B₆, vitamin B₁₂, thiamin, riboflavin, niacin, calcium, phosphorus, magnesium, iron, folate, zinc, copper, and fiber. The market baskets for each age-gender group also had to fall below the Tolerable Upper Intake Level (UL) for nutrients where such a limit was set (vitamin A, vitamin C, vitamin B₆, vitamin E, calcium, phosphorus, iron, folate, zinc, and copper). A UL is the highest amount of a nutrient that can be safely eaten on a continual basis and will not cause an adverse effect for most healthy people.

A solution could not be obtained for most market baskets to meet the RDA for vitamin E nor the AI for potassium. Hence, these dietary constraints were relaxed in the models. For vitamin E, the market baskets for children met 100 percent of their vitamin E RDA; those for teenage males, 95 to 100 percent; those for teenage females, 63 to 85 percent; those for adult males, 70 to 83 percent; and those for adult females, 70 to 78 percent of their vitamin E RDA. For potassium, the market baskets for children met 70 to 90 percent of their potassium AI; those for teenage males, 95 to 100 percent; those for teenage females, 83 to 88 percent; those for adult males, 88 to 98 percent; and those for adult females, 78 to 87 percent of their potassium AI.

Regarding vitamin E, typical intakes as measured in food consumption surveys are far less than what is required by the new RDA standards. Mean usual intakes for adult females are 6.3 mg alpha-tocopherol (AT); for adult males, 8.2 mg AT (Moshfegh, Goldman, & Cleveland, 2005). Meeting the new RDA of 15 mg AT for adults, especially at lower calorie intakes, would have required substantial changes from typical food intake patterns and would also require the regular intake of foods not commonly consumed, such as sunflower and safflower oils. Changing typical food intake patterns was neither realistic nor practical.

Table 2a. Dietary standards of the previous and revised Thrifty Food Plan market baskets

Constraint	Previous TFP market baskets	Revised TFP market baskets
RDAs/AIs/AMDRs¹ for each age-gender group	1989 RDA	1997-2005 RDA/AI/AMDR
Vitamins A, C, E, B ₆ , and B ₁₂ , thiamin, riboflavin, niacin, calcium, phosphorus, magnesium, iron, folate, and zinc	100% RDA	100% RDA or AI and less than UL where applicable for all except vitamin E (95-100% RDA for teenage males, 63-85% for teenage females, 70-83% for adult males, and 70-78% for adult females)
Copper and potassium	Not applicable	100% RDA or AI and less than UL where applicable except for potassium (70-90% AI for children, 95-100% for teenage males, 83-88% for teenage females, 88-98% for adult males, and 78-87% for adult females)
Fiber	No less than 100% of average consumption	100% AI (14 gm /1,000 Kcal)
Linoleic acid	Not applicable	AMDR: 5-10% of total calories
Alpha-linolenic acid	Not applicable	AMDR: 0.6-1.2% of total calories
Protein	100% RDA	AMDR: 5-20% of total calories for children ages 1-3; 10-30% of total calories for children ages 4-18; 10-35% of total calories for adults
Carbohydrate	55% or more of total calories/day	AMDR: 45-65% of total calories
Total fat	30% or less of total calories for adults and children ages 5 and older; at average consumption for children ages 2 to 4; unrestricted for children age 1	AMDR: 30-40% of total calories for children ages 1-3; 25-35% of total calories for children ages 4-18; 20-35% of total calories for adults
Dietary standards	1995	2005
Saturated fat	Less than 10% of total calories for adults and children ages 5 and older; at average consumption for children ages 2 to 4; unrestricted for children age 1	Less than 10% of total calories
Sodium	No more than 100% of average consumption; unrestricted for children age 1	Less than or equal to median consumption or UL, whichever is higher
Cholesterol	300 mg or less/day; unrestricted for children age 1	300 mg or less/day
Pyramid	Food Guide Pyramid	MyPyramid Food Intake Pattern
Grain group	Minimum of 6; maximum of 11 servings/day ²	100% of ounce equivalents in assigned food pattern, based on calorie needs (table 2b)
Whole grain	Not applicable	At least 50% of total grains
Vegetable group	Minimum of 3; maximum of 5 servings/day ²	100% of cups in assigned food pattern, based on calorie needs (table 2b)
Vegetable subgroups	Not applicable	100% of cups in assigned food pattern, for dark-green, orange, legumes, starchy, and other vegetables, based on calorie needs (table 2b)
Fruit group	Minimum of 2; maximum of 4 servings/day ²	100% of cups in assigned food pattern, based on calorie needs (table 2b)
Non-juice fruit	Not applicable	At least 50% of total fruit
Milk group	Minimum of 2; maximum of 3 servings/day ²	2 cups for children ages 1-8; 3 cups for children ages 9 and older and adults
Meat and beans group	Minimum of 2; maximum of 3 (5 to 7 ounces) servings/day ¹	100% of ounce equivalents in assigned food pattern, based on calorie needs (table 2b)
Oils	Not applicable	100% of grams in assigned food pattern, based on calorie needs (table 2b)
Solid fats and added sugars (proxy for discretionary calories)	Not applicable	No more than discretionary calorie allowance in assigned food pattern, based on calorie needs (table 2b)

¹RDAs = Recommended Dietary Allowances, AIs = Adequate Intakes, and AMDRs = Acceptable Macronutrient Distribution Ranges.

²Minimum and maximum servings varied by age-gender group. Maximum servings were specified to ensure that the minimum number of servings from all Food Guide Pyramid food groups was included in the TFP market basket before the maximum number of servings of any one of the food groups was exceeded. Serving sizes for children through 5 years were modified by reducing the serving size by one-third, except for servings of milk products.

Table 2b. MyPyramid food group standards for revised Thrifty Food Plan market baskets, 2006

Calorie level	Daily amount of food from each group											
	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Food group												
Fruits	1 c ¹	1 c	1.5 c	1.5 c	1.5 c	2 c	2 c	2 c	2 c	2.5 c	2.5 c	2.5 c
Vegetables	1 c	1.5 c	1.5 c	2 c	2.5 c	2.5 c	3 c	3 c	3.5 c	3.5 c	4 c	4 c
Grains	3 oz ¹	4 oz	5 oz	5 oz	6 oz	6 oz	7 oz	8 oz	9 oz	10 oz	10 oz	10 oz
Meat and beans	2 oz	3 oz	4 oz	5 oz	5 oz	5.5 oz	6 oz	6.5 oz	6.5 oz	7 oz	7 oz	7 oz
Milk	2 c	2 c	2 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c
Oils	15 g ¹	17 g	17 g	22 g	24 g	27 g	29 g	31 g	34 g	36 g	44 g	51g
Discretionary calorie allowance	165 kc ¹	171 kc	171 kc	132 kc	195 kc	267 kc	290 kc	362 kc	410 kc	426 kc	512 kc	648 kc

¹ c = cups, oz = ounce equivalents, g = grams, kc = kilocalories.

Note: Recommendations for fruit, vegetable, and grain groups include food subgroup (e.g., whole fruit, dark-green vegetable, and whole grain) recommendations (see table 2a).

Table 2c. Food pattern assignment for age-gender group, based on median weight and height NHANES 2001-2002

Age-gender	Assigned calorie level
1 year, M/F	1,000
2-3 years, M/F	1,200
4-5 years, M/F	1,400
6-8 years, M/F	1,600 ¹
9-11 years, M/F	2,000
12-13 years, F	2,200
12-13 years, M	2,400
14-18 years, F	2,200
14-18 years, M	3,000
19-50 years, F	2,200
19-50 years, M	2,800
51-70 years, F	2,200
51-70 years, M	2,600
71+ years, F	1,800
71+ years, M	2,200

M = Male; F = Female.

¹The 6- to 8-year-olds need only 2 cups of milk and 2.5 oz equivalent of whole grains even though they are assigned the 1,600 calorie pattern.

As for potassium, the same problem existed. To meet the potassium AI, substantial changes from typical food intake patterns would be required. Again, CNPP did not consider this a realistic or practical alternative. Hence, CNPP relaxed these dietary constraints and developed TFP market baskets that were as near as possible to the recommendations for vitamin E and potassium without extreme deviations from typical consumption patterns. While not reaching the vitamin E RDA or potassium AI recommendations, vitamin E and potassium levels in the TFP market baskets are higher than average consumption in 2001-2002.

The TFP market baskets for each age-gender group also had to fall within the AMDR for linoleic acid, alpha-linolenic acid, protein, carbohydrate, and total fat. For example, the market baskets for adults derived 20 to 35 percent of total calories from total fat; for children ages 4 to 8, 25 to 35 percent; and for children ages 1 to 3, 30 to 40 percent.

The 2005 Dietary Guidelines for Americans (U.S. Department of Health and Human Services [DHHS], & U.S. Department of Agriculture [USDA], 2005) provide science-based advice to promote health and to reduce risk for major chronic diseases through diet and physical activity. The Guidelines recommend that all healthy people ages 2 and over consume less than 10 percent of calories per day from saturated fat and less than 2,300 mg per day of sodium. For cholesterol, the Guidelines recommend that all healthy people ages 2 and over consume 300 mg or less per day. Although these Guidelines for saturated fat, sodium, and cholesterol apply to healthy people ages 2 and over, CNPP also applied them to 1-year-olds, because this age group was assigned to the 1,000 calorie food pattern and this pattern uses these saturated fat, sodium, and cholesterol guidelines.

With the exception of sodium, these recommendations were met in the revised TFP market baskets. All foods prepared with a recipe were assumed to be done so without added salt; thus, the new TFP market baskets met the sodium guidelines for five age-gender groups (children age 1, children ages 2 to 3, females ages 12 to 13, females ages 51 to 70, and females ages 71 and over). For the other 10 age-gender groups, their TFP market baskets were limited to no more than the groups' median sodium consumption. Sodium levels in the TFP market baskets where the sodium recommendation could not be met ranged from 2,322 mg a day for females ages 14 to 18 to 3,629 mg a day for males ages 14 to 18.

A similar situation existed with the 1999 TFP market baskets: the sodium guideline at the time could not be met in the market baskets, so the standard was set approximately to no more than mean sodium consumption for each age-gender group. Because the median amount of sodium consumed is always less than the mean amount of sodium consumed by each age-gender group, the revised TFP improves upon the 1999 TFP in this respect.

About 75 percent of sodium consumed comes from food-processing methods (DHHS & USDA, 2005). It was thus practically impossible to develop TFP market baskets that met the sodium recommendation. To do so would require substantial changes in food-manufacturing practices or require many foods, including bread and pasta, to be made from scratch. In addition, the sodium content of diets is closely tied to energy intake, making it more difficult to achieve sodium intakes below the recommendation at higher energy intakes. The Dietary Guidelines recognize this reality and therefore recommend selecting more fresh and less processed items, using less sodium-dense foods, and reducing salt in food preparation.

This revision of the TFP market baskets incorporates food intake recommendations of the MyPyramid Food Guidance System. MyPyramid translates recommendations from the Dietary Guidelines for Americans into the types and amounts of food people can eat to achieve a healthful diet. More important, MyPyramid (1) specifies daily amounts from each of the major food groups (grain, vegetable, fruit, milk, and meat and beans) and oils that population groups need to eat for a healthful diet and (2) sets limitations on the amount of discretionary calories allowed within each food intake pattern. Discretionary calories can be used as a basis for determining how much solid fat and added sugars can be allowed in a pattern without exceeding a person's energy needs. The solid fats may come from forms of foods that have higher fat content, fats used in preparation, and/or fats added for consumption.

Based on their age, gender, activity level, height, and weight, people can be assigned to one of the 12 MyPyramid food intake patterns, which range from 1,000 to 3,200 calories. As previously stated, for this TFP revision, assignment to a caloric level and resulting food intake pattern for each age-gender group were based on the group's median weight and height and a low active physical activity level.

The TFP market basket for each age-gender group had to meet the food group intake requirements for the five major food groups and for oils. In addition, food subgroup requirements were also included: At least 50 percent of the total amount from the grain group had to be whole grains, at least 50 percent of the amount from the fruit group had to be non-juice fruit, and all vegetable subgroups had to be incorporated at levels that were specified in MyPyramid. Also, the amounts of solid fats and added sugars had to total to no more than the discretionary calorie allowance for the assigned food intake pattern.

Cost and Other Constraints

A primary constraint satisfied by the revised TFP market baskets was that they should cost no more than the previous TFP market baskets, adjusted for inflation. That is, the cost level of the TFP should remain constant. Accordingly, because 2001-2002 consumption data underlie the 2006 revision of the TFP market baskets, for each age-gender group, CNPP limited the cost of each group's revised TFP market basket to equal the average real cost of its previous TFP market basket for the 2001-2002 period. This constant real-cost constraint was used to examine whether and how a person could achieve a nutritious diet based on current dietary standards.

In addition, efforts were made to consider ease of food preparation and convenience in the development of the TFP market baskets. Foods such as boxed macaroni and cheese, frozen vegetables, ready-to-serve breads and cereals, canned soups, chicken parts, canned dry beans, and boxed mashed potatoes are included in the TFP market baskets.

The TFP market basket for each age-gender group also was constrained to fall within a range of average consumption for each of the 58 food categories based on NHANES 2001-2002. This was done to maintain a palatable diet. The lower bound was set slightly above zero for most food categories. The upper bounds varied by food category, depending on average consumption. Generally, the upper bounds were three to 10 times average consumption. Although this may seem high, average consumption was near zero for some food categories (e.g., whole grains). Thus, a tenfold increase did not result in an unreasonable level of intake. For the meat and beans food group, each of the subgroups (beef, pork, veal, lamb, and game; chicken, turkey, and game birds, etc.) was constrained within a narrower range of average consumption to ensure that no one subgroup dominated the pattern.

Mathematical Model

For the past 30 years, a computerized quadratic mathematical optimization programming model has been used in the development of the TFP (appendix 2). For each age-gender group, the model selects the optimal food plan that meets the dietary standards and cost constraints, with as little change as possible from food consumption. The model for this revision of the TFP was based on the model of the 1999 TFP. This model accommodates all 58 food categories, dietary constraints, and serving specifications of MyPyramid. The model also uses food budget shares of each of the food groups within a food category as the basis for weighting; this is desirable because food budget shares reflect consumer preferences, so the shares weight food categories to reflect consumer preferences. However, this model, like all models, remains an approximation of people's consumption behavior. The important point is that the mathematical model for the 2006 TFP provides people with illustrative market baskets that can be developed into daily food plans that provide nutritionally adequate, healthful meals at the most economical cost.

Thrifty Food Plan Consumption Patterns

The mathematical optimization model produced 15 TFP-suggested consumption patterns, one for each age-gender group. Each pattern contained quantities of each of the 58 food categories in as-consumed form. The 58 TFP food categories in as-consumed form were then regrouped into (1) USDA MyPyramid amounts consumed per day and (2) 29 food categories in as-purchased form. The next two sections discuss each of these regroupings of TFP consumption patterns.

TFP Consumption Patterns: MyPyramid Amounts

The TFP-suggested consumption patterns in as-consumed form meet the daily food intake recommendations of the MyPyramid Food Guidance System (table 3). As specified in MyPyramid, the TFP-suggested consumption patterns for each age-gender group contain, at a minimum, the suggested daily intake recommendations for grains (3 to 10 ounces depending on age-gender group), vegetables (1 to 4 cups), fruits (1 to 2.5 cups), milk products (2 to 3 cups), and meat and beans (2 to 7 ounces). In most cases, the TFP-suggested consumption patterns for each age-gender group slightly exceed the suggested MyPyramid intake recommendations. This occurred, in part, because the suggested consumption patterns assume a waste factor of 5 percent. Intake recommendations for the

Table 3. Thrifty Food Plan consumption patterns in USDA MyPyramid amounts of food per day, by age-gender group, 2006

Food category	Children				
	1 year	2-3 years	4-5 years	6-8 years	9-11 years
Total energy (kcal)	1,055	1,254	1,463	1,672	2,090
Grains (oz equivalents)	3.15	4.20	5.25	5.67	6.41
Whole grains	1.82	2.10	2.62	2.63	3.15
Vegetables (cups)	2.27	1.57	1.85	2.10	3.66
Dark-green vegetables	.15	.23	.22	.30	.83
Orange vegetables	.09	.15	.41	.22	.96
Starchy vegetables	.23	.37	.37	.38	.45
Other vegetables	1.73	.68	.67	.83	.97
Legumes	.07	.15	.17	.37	.45
Fruits (cups)	1.05	1.13	1.57	1.57	2.10
Whole fruits	.57	.53	1.37	1.10	1.62
Milk products (cups)	2.10	2.10	2.10	2.10	3.25
Meat and beans (oz equivalents)	2.10	3.15	4.20	5.25	5.78
Red meat	.33	.13	.86	1.73	1.55
Poultry	.29	.29	.38	.44	.51
Fish	.31	.84	1.59	.35	.47
Mixed meats (primary ingredient is meat)	.02	.03	.01	.09	.02
Lunch meat	.01	.01	.03	.58	.01
Nuts and seeds	.55	.96	.82	1.34	1.95
Legumes	.48	.69	.38	.27	.60
Other main ingredient (primary ingredient is not meat)	.11	.20	.14	.46	.67
Oils (grams)	15.75	18.39	17.85	23.10	33.28
Discretionary Calorie Allowance (kcal)	173.25	199.55	179.55	228.60	280.35

Note: For the consumption patterns, a waste factor of 5 percent was assumed.

food subgroups also are met by the revised TFP-suggested consumption patterns for each age-gender group. The recommendations for these food subgroups stipulate at least half of grain consumption be from whole grains, half of fruit consumption be from whole fruit, and certain types of vegetables (dark green, orange, starchy, other vegetables, and legumes) be consumed at set levels (which are met here).

For most age-gender groups, the fruit intake requirement that at least half of consumption be in the form of whole fruit is greatly exceeded in the suggested consumption patterns,

likely due to the fact that whole fruits are a good source of fiber while fruit juices have very little fiber. Also, for some age-gender groups (children ages 9 to 11 and females ages 51 and over), the recommendation for dark-green vegetable intake is exceeded in the suggested consumption patterns. MyPyramid also specifies amounts from oils as well as the maximum amount of discretionary calories each age-gender group needs to have for a healthful diet, that is, calories from solid fat and added sugars. Each TFP-suggested consumption pattern satisfies the MyPyramid recommendation for oils; the patterns also do not exceed each age-gender group's limit for discretionary calories.

Table 3. Thrifty Food Plan consumption patterns in USDA MyPyramid amounts of food per day, by age-gender group, 2006 (cont'd)

Food category	Males				
	12-13 years	14-18 years	19-50 years	51-70 years	71+ years
Total energy (kcal)	2,507	3,134	2,925	2,744	2,322
Grains (oz equivalents)	8.40	10.50	10.50	9.45	7.35
Whole grains	4.20	6.05	5.25	4.72	3.68
Vegetables (cups)	3.15	4.20	3.68	3.68	3.15
Dark-green vegetables	.45	.45	.45	.45	.45
Orange vegetables	.30	.37	.38	.38	.30
Starchy vegetables	.90	1.35	1.06	1.05	.90
Other vegetables	1.05	1.50	1.28	1.28	1.05
Legumes	.45	.53	.52	.53	.45
Fruits (cups)	2.10	2.62	2.62	2.10	2.10
Whole fruits	1.50	2.15	2.15	1.98	1.98
Milk products (cups)	3.63	3.15	3.15	3.15	3.15
Meat and beans (oz equivalents)	6.83	7.35	7.35	6.83	6.30
Red meat	.99	.94	.99	.99	.99
Poultry	.62	.80	2.62	.87	2.71
Fish	.71	.35	.35	.50	.47
Mixed meats (primary ingredient is meat)	.01	.00	.00	.07	.01
Lunch meat	.02	.00	.00	.05	.01
Nuts and seeds	1.93	1.73	1.06	1.46	1.46
Legumes	1.57	2.77	1.55	2.29	.37
Other main ingredient (primary ingredient is not meat)	.97	.75	.78	.59	.27
Oils (grams)	32.88	46.20	37.80	35.70	30.45
Discretionary Calorie Allowance (kcal)	380.10	532.95	411.16	430.50	304.50

Note: For the consumption patterns, a waste factor of 5 percent was assumed.

The amount of meat and beans in the TFP-suggested consumption patterns varies by age-gender group. For children (below age 11), no particular type of food from the meat and beans group dominates the suggested consumption patterns. For teenage boys and girls, primary sources from this group are poultry, nuts and seeds, and legumes. For adult males, the primary sources are poultry, nuts and seeds, and legumes; whereas, for adult females, the primary sources are poultry, nuts and seeds, and red meat.

TFP Consumption Patterns: Market Baskets or As-Purchased Form

The consolidation of categories, whereby similar foods were grouped and converted into market baskets or as-purchased (versus as-consumed) form, illustrates how households can purchase foods in the marketplace in order to obtain the suggested consumption patterns in the TFP. The consolidation also provides better information for nutrition education needs. For example, CNPP combined “potato products, regular fat” and “potato products, lowfat” into one potato product category and “citrus fruit, melon, and berry juices” and “fruit juices other than citrus, melon, and berry” into

Table 3. Thrifty Food Plan consumption patterns in USDA MyPyramid amounts of food per day, by age-gender group, 2006 (cont'd)

Food category	Females				
	12-13 years	14-18 years	19-50 years	51-70 years	71+ years
Total energy (kcal)	2,299	2,298	2,298	2,322	1,899
Grains (oz equivalents)	7.35	8.05	7.35	7.35	6.30
Whole grains	3.67	3.68	3.68	3.68	3.15
Vegetables (cups)	3.41	3.15	3.37	3.99	4.26
Dark-green vegetables	.71	.45	.45	.96	2.09
Orange vegetables	.30	.30	.52	.30	.30
Starchy vegetables	.90	.90	.90	.90	.45
Other vegetables	1.05	1.05	1.05	1.38	.98
Legumes	.45	.45	.45	.45	.45
Fruits (cups)	2.10	2.10	2.10	2.10	1.57
Whole fruits	2.03	1.98	1.98	1.98	1.45
Milk products (cups)	3.40	3.44	3.15	3.15	3.15
Meat and beans (oz equivalents)	6.30	6.30	6.30	6.30	5.25
Red meat	.49	.99	.99	.98	.99
Poultry	2.43	2.86	2.46	2.32	1.57
Fish	1.00	.30	.56	.48	.47
Mixed meats (primary ingredient is meat)	.00	.03	.00	.01	.01
Lunch meat	.00	.01	.00	.01	.01
Nuts and seeds	1.29	1.77	1.97	1.90	1.81
Legumes	.41	.02	.00	.29	.09
Other main ingredient (primary ingredient is not meat)	.67	.33	.30	.32	.30
Oils (grams)	30.45	30.45	30.45	30.45	25.20
Discretionary Calorie Allowance (kcal)	304.50	304.50	304.50	304.50	219.75

Note: For the consumption patterns, a waste factor of 5 percent was assumed.

one fruit juice category. The dietary standards were still maintained when the 58 food categories were collapsed into 29 food categories. Table 4 lists the 29 food categories of the TFP market baskets in as-purchased form and lists examples of foods the categories contain. The expenditure shares of these 29 food categories for the 15 age-gender groups are listed in appendix 3.

The revised TFP market baskets consisting of the quantities in as-purchased form of the 29 food categories (in pounds per week) for each of the 15 age-gender groups are listed in table 5. Because the benefit allotment for the Food Stamp Program is based on a reference family (male and female ages 20 to 50 and two children ages 6 to 8 and 9 to 11)

and to streamline the discussion, the following subsections address the revised TFP market baskets for this reference family.⁷ This discussion is done in terms of general food groups and subgroups. Also, a comparison is made between the revised market baskets and reported consumption as well as the 1999 market baskets for the reference family.⁸

⁷ Although 19-year-olds are officially not included in the reference family, they are included in the discussion because they share market baskets with the 20- to 50-year-olds.

⁸ Components of the TFP market baskets are discussed in terms of weight; therefore, fluids such as milk and soft drinks are weighted more prominently than are dry foods, and juice concentrates are weighted less prominently than are reconstituted forms.

Table 4. Food categories and examples of foods in the market baskets, Thrifty Food Plan, 2006

Food category	Examples of foods
Grains	
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	Breads, rolls, muffins, biscuits, bagels, waffles, tortillas, pancakes, rice, pasta, and doughnuts—all made from whole grain; and buckwheat flour
Whole grain cereals (including hot cereal mixes)	Whole grain sweetened or nonsweetened ready-to-eat cereals (e.g., frosted and shredded wheat), whole grain cooked breakfast cereals (e.g., oatmeal, buckwheat groats, and bulgur), and whole grain babyfood cereal
Popcorn and other whole grain snacks	Popcorn; and whole grain crackers, cookies, salty snacks, pretzels, breakfast bars, and granola bars
Non-whole grain breads, cereals, rice, pasta, pies, pastries, snacks, and flours	Breads, bagels, biscuits, rolls, tortillas, muffins, and pancakes; cooked or ready-to-eat non-whole grain cereals; white rice and pasta; cakes and cake mixes, pies, cookies, and doughnuts; corn-based snacks, chips, pretzels, and crackers—all made from non-whole grain; and refined flour
Vegetables	
All potato products	Potatoes, instant mashed potatoes, potato puffs, French-fried potatoes, and potato chips
Dark-green vegetables	Spinach, broccoli, kale, chard, collards, endive, and mustard greens
Orange vegetables	Carrots, sweet potatoes, winter squash, pumpkin, and yams
Canned and dry beans, lentils, and peas (legumes)	Black, lima, mung, pinto, red, white, navy, pink, and kidney beans; cowpeas; chickpeas; lentils; soybeans; soy flour; and soybean-based meat substitutes
Other vegetables	Tomatoes and tomato products, sweet corn, onions, green peas, green beans, beets, Brussels sprouts, cabbage, cauliflower, celery, cucumber, eggplant, lettuce, mushrooms, okra, peppers, radishes, squash, and mixed vegetables
Fruits	
Whole fruits	Oranges, bananas, apples, grapes, watermelon, grapefruit, pears, peaches, cherries, strawberries, plums, apricots, cranberries, blueberries, and dried fruits
Fruit juices	All fresh, canned, and frozen fruit juices and nectars
Milk products	
Whole milk, yogurt, and cream	All fluid, evaporated, condensed, and dry whole milk; regular yogurt; all fluid creams; sour creams; cream cheeses; and cream soups
Lower fat and skim milk and lowfat yogurt	All fluid, evaporated, and dry reduced-fat and skim milks; lowfat and nonfat yogurt; and fluid and dry buttermilk
All cheese (including cheese soup and sauce)	Natural, processed, and imitation cheeses; cottage cheese; cheese spreads; cheese dips; and cheese soups
Milk drinks and milk desserts	Milk-based drinks (e.g., malted milk, milk shakes, and eggnogs); chocolate or cocoa-based drinks; infant formulas; nondairy dessert toppings; and milk-based desserts (e.g., ice cream, frozen yogurt, fudgesicles, sherberts, puddings, and custards)

Table 4. Food category and examples of foods in the market baskets, Thrifty Food Plan, 2006 (cont'd)

Food category	Examples of foods
Meat and beans	
Beef, pork, veal, lamb, and game	Beef, pork, veal, lamb, game meats, organ meats, meat-based soups, meat-based baby foods, cured meat products, and processed meat products
Chicken, turkey, and game birds	Chicken, turkey, duck, game birds, organ meats, chicken- or turkey-based soups, chicken- or turkey-based rolls, and canned chicken
Fish and fish products	Finfish, shellfish, fish chowders, and reconstructed seafoods
Bacon, sausages, and luncheon meats (including spreads)	Bacon, sausages, salami, frankfurters, bologna, pastrami, corned beef, turkey ham, and luncheon meats
Nuts, nut butters, and seeds	Peanuts, almonds, walnuts, cashews, brazilnuts, and pine nuts; pumpkin, sunflower, and sesame seeds; and peanut butter and other nut butters made from these nuts and seeds
Eggs and egg mixtures	Fresh, frozen, and dried eggs; egg substitutes; meringues; and egg mixtures
Other foods	
Table fats, oils, and salad dressings	Butter, margarine, vegetable oils (e.g., corn, olive, palm, peanut, sunflower, safflower, and soybean), shortenings, butter blends, lard, salad oils, all types of salad dressings, and mayonnaise
Gravies, sauces, condiments, and spices	Gravies, soy sauce, barbecue sauce, duck sauce, white sauce, and other sauces; pickles, relishes, mustard, and olives; baking soda, vinegar, and baker's yeast; and all spices
Coffee and tea	Instant, ground, and fluid coffees and teas with or without caffeine and with or without sugars or sweeteners
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	All carbonated soft drinks; fruit-flavored punches, cocktails, and drinks; breakfast drinks or rice beverages; energy drinks; and ades (e.g., lemonade and limeade)
Sugars, sweets, and candies	All types of sugars, sweeteners, and syrups (e.g., honey, jams, jellies, marmalades, preserves, icings, gelatin desserts, marshmallow, and fudge); all types of candies and chocolates; and chewing gum
Soups (ready-to-serve and condensed)	All canned ready-to-serve or condensed soups (e.g., chicken noodle or cream of mushroom)
Soups (dry)	Instant and dry soup mixes and meat-flavored bouillons (e.g., chicken bouillon)
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	Frozen meals, pizza, fish sticks, entrées, and babyfood dinner meals and junior foods

Table 5. Thrifty Food Plan market baskets, quantities of food purchased for a week, by age-gender group, 2006

Food category	Children				
	1 year	2-3 years	4-5 years	6-8 years	9-11 years
Total pounds	19.24	18.68	21.74	23.59	33.65
	<i>Pounds per week</i>				
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	1.08	.54	1.39	.90	1.70
Whole grain cereals (including hot cereal mixes)	.17	.16	.12	.09	.07
Popcorn and other whole grain snacks	.00	.49	.00	.22	.00
Non-whole grain breads, cereals, rice, pasta, pies, pastries, snacks, and flours	<u>.22</u>	<u>.65</u>	<u>.84</u>	<u>1.19</u>	<u>.76</u>
	1.46	1.84	2.36	2.40	2.54
Vegetables					
All potato products	.52	.85	.65	.29	1.07
Dark-green vegetables	.41	.72	.81	.81	2.38
Orange vegetables	.21	.29	1.00	.52	2.40
Canned and dry beans, lentils, and peas (legumes)	.37	.75	.51	.89	1.20
Other vegetables	<u>3.49</u>	<u>1.47</u>	<u>.67</u>	<u>2.66</u>	<u>2.69</u>
	5.00	4.09	3.64	5.15	9.74
Fruits					
Whole fruits	1.58	1.37	3.59	2.80	3.97
Fruit juices	<u>1.32</u>	<u>2.29</u>	<u>.81</u>	<u>1.82</u>	<u>1.86</u>
	2.90	3.67	4.40	4.62	5.83
Milk products					
Whole milk, yogurt, and cream	7.44	.14	.32	.41	.97
Lower fat and skim milk and lowfat yogurt	.00	7.47	7.71	7.20	10.81
All cheese (including cheese soup and sauce)	.01	.00	.02	.02	.01
Milk drinks and milk desserts	<u>.01</u>	<u>.00</u>	<u>.00</u>	<u>.06</u>	<u>.00</u>
	7.46	7.62	8.05	7.69	11.79
Meat and beans					
Beef, pork, veal, lamb, and game	.23	.11	.35	1.25	.99
Chicken, turkey, and game birds	.03	.02	.38	.33	.49
Fish and fish products	.24	.46	.83	.24	.46
Bacon, sausages, and luncheon meats (including spreads)	.00	.00	.00	.12	.01
Nuts, nut butters, and seeds	.13	.23	.19	.26	.43
Eggs and egg mixtures	<u>.00</u>	<u>.06</u>	<u>.03</u>	<u>.17</u>	<u>.28</u>
	.64	.87	1.78	2.37	2.65
Other foods					
Table fats, oils, and salad dressings	.24	.16	.36	.21	.36
Gravies, sauces, condiments, and spices	.67	.02	.68	.65	.53
Coffee and tea	.00	.00	.00	.00	.00
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.04	.03	.00	.16	.02
Sugars, sweets, and candies	.01	.01	.01	.03	.02
Soups (ready-to-serve and condensed)	.76	.37	.46	.29	.16
Soups (dry)	.00	.00	.00	.01	.00
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	<u>.06</u>	<u>.01</u>	<u>.00</u>	<u>.02</u>	<u>.01</u>
	1.78	.61	1.51	1.36	1.10

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

For children age 1, all milk and yogurt were assigned to the whole milk, yogurt, and cream category, because dietary guidance recommends consumption of primarily whole milk products for these children.

The numbers are rounded; thus, when summed, they may not equal the respective totals.

Table 5. Thrifty Food Plan market baskets, quantities of food purchased for a week, by age-gender group, 2006 (cont'd)

Food category	Males				
	12-13 years	14-18 years	19-50 years	51-70 years	71+ years
Total pounds	35.55	38.59	39.86	37.38	34.02
	<i>Pounds per week</i>				
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	1.24	3.46	2.82	2.14	1.59
Whole grain cereals (including hot cereal mixes)	.05	.18	.08	.08	.06
Popcorn and other whole grain snacks	.88	.00	.00	.11	.00
Non-whole grain breads, cereal, rice, pasta, pies, pastries, snacks, and flours	<u>1.27</u>	<u>1.08</u>	<u>1.66</u>	<u>1.65</u>	<u>1.17</u>
	3.43	4.71	4.55	3.97	2.81
Vegetables					
All potato products	1.61	3.13	2.48	2.28	2.11
Dark-green vegetables	.87	1.31	1.24	1.19	1.17
Orange vegetables	.67	.64	.98	.81	.66
Canned and dry beans, lentils, and peas (legumes)	1.83	2.00	1.87	2.16	1.35
Other vegetables	<u>3.28</u>	<u>1.47</u>	<u>2.70</u>	<u>3.18</u>	<u>2.67</u>
	8.25	8.55	9.27	9.62	7.96
Fruits					
Whole fruits	3.70	5.68	6.65	7.71	5.09
Fruit juices	<u>2.29</u>	<u>1.83</u>	<u>1.76</u>	<u>.44</u>	<u>.38</u>
	5.99	7.51	8.41	8.14	5.47
Milk products					
Whole milk, yogurt, and cream	.49	.84	.55	.28	.23
Lower fat and skim milk and lowfat yogurt	12.97	10.97	10.75	11.01	11.41
All cheese (including cheese soup and sauce)	.02	.08	.07	.11	.02
Milk drinks and milk desserts	<u>.00</u>	<u>.00</u>	<u>.00</u>	<u>.05</u>	<u>.00</u>
	13.48	11.89	11.37	11.46	11.65
Meat and beans					
Beef, pork, veal, lamb, and game	.72	.54	.63	.66	.47
Chicken, turkey, and game birds	.82	.77	2.55	.84	3.55
Fish and fish products	.45	.26	.17	.04	.21
Bacon, sausages, and luncheon meats (including spreads)	.02	.08	.02	.01	.01
Nuts, nut butters, and seeds	.46	.41	.26	.34	.35
Eggs and egg mixtures	<u>.42</u>	<u>.34</u>	<u>.36</u>	<u>.29</u>	<u>.06</u>
	2.89	2.39	3.99	2.19	4.64
Other foods					
Table fats, oils, and salad dressings	.33	1.00	.99	.62	.46
Gravies, sauces, condiments, and spices	.39	1.68	.99	.32	.46
Coffee and tea	.00	.00	.01	.03	.02
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.02	.00	.00	.38	.00
Sugars, sweets, and candies	.00	.07	.08	.05	.01
Soups (ready-to-serve and condensed)	.70	.79	.16	.60	.53
Soups (dry)	.00	.00	.02	.00	.00
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	<u>.07</u>	<u>.00</u>	<u>.01</u>	<u>.00</u>	<u>.00</u>
	1.51	3.54	2.26	2.00	1.49

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

The numbers are rounded; thus, when summed, they may not equal the respective totals.

Table 5. Thrifty Food Plan market baskets, quantities of food purchased for a week, by age-gender group, 2006 (cont'd)

Food category	Females				
	12-13 years	14-18 years	19-50 years	51-70 years	71+ years
Total pounds	32.18	32.77	33.51	37.13	32.64
	<i>Pounds per week</i>				
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	1.67	2.05	1.25	1.68	1.47
Whole grain cereals (including hot cereal mixes)	.15	.12	.38	.07	.07
Popcorn and other whole grain snacks	.02	.00	.00	.00	.00
Non-whole grain breads, cereal, rice, pasta, pies, pastries, snacks, and flours	<u>1.13</u>	<u>1.47</u>	<u>1.14</u>	<u>1.33</u>	<u>.96</u>
	2.96	3.64	2.77	3.08	2.50
Vegetables					
All potato products	1.00	1.68	2.05	1.75	.58
Dark-green vegetables	1.54	1.12	1.29	2.12	5.97
Orange vegetables	.62	.38	1.19	.53	.56
Canned and dry beans, lentils, and peas (legumes)	1.60	1.31	.93	1.32	1.12
Other vegetables	<u>1.42</u>	<u>2.71</u>	<u>1.94</u>	<u>2.72</u>	<u>2.79</u>
	6.18	7.20	7.40	8.44	11.00
Fruits					
Whole fruits	5.28	5.03	5.16	8.02	3.89
Fruit juices	<u>.25</u>	<u>.47</u>	<u>.46</u>	<u>.38</u>	<u>.39</u>
	5.53	5.49	5.62	8.40	4.29
Milk products					
Whole milk, yogurt, and cream	1.84	.47	.20	.21	.18
Lower fat and skim milk and lowfat yogurt	10.55	11.99	11.31	11.32	10.79
All cheese (including cheese soup and sauce)	.00	.10	.03	.00	.02
Milk drinks and milk desserts	<u>.00</u>	<u>.00</u>	<u>.00</u>	<u>.00</u>	<u>.00</u>
	12.40	12.55	11.53	11.53	10.99
Meat and beans					
Beef, pork, veal, lamb, and game	.27	.83	.65	.66	.70
Chicken, turkey, and game birds	.75	.02	2.67	2.57	1.74
Fish and fish products	.63	.29	.43	.45	.25
Bacon, sausages, and luncheon meats (including spreads)	.02	.01	.00	.01	.00
Nuts, nut butters, and seeds	.29	.42	.47	.42	.43
Eggs and egg mixtures	<u>.37</u>	<u>.06</u>	<u>.06</u>	<u>.13</u>	<u>.03</u>
	2.32	1.63	4.28	4.24	3.14
Other foods					
Table fats, oils, and salad dressings	.54	.42	.55	.48	.24
Gravies, sauces, condiments, and spices	.71	.22	.55	.13	.12
Coffee and tea	.00	.00	.02	.02	.02
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.00	.12	.00	.06	.00
Sugars, sweets, and candies	.05	.01	.04	.03	.03
Soups (ready-to-serve and condensed)	1.48	1.49	.76	.70	.30
Soups (dry)	.00	.00	.00	.00	.00
Frozen or refrigerated entrées (including pizza, fish sticks, frozen meals)	<u>.00</u>	<u>.01</u>	<u>.00</u>	<u>.00</u>	<u>.00</u>
	2.78	2.26	1.91	1.43	.72

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

The numbers are rounded; thus, when summed, they may not equal the respective totals.

Food Groups

Grains account for 8 to 11 percent of the revised TFP market baskets in terms of pounds per week for the family of four (table 6). Grains make up a larger share (and larger actual amount) for males ages 19 to 50 than for the other three age-gender groups.

Vegetables account for 22 to 29 percent of the revised TFP market baskets for the family of four. This food category makes up a larger share for children ages 9 to 11 and a smaller share for children ages 6 to 8.

Fruits account for 17 to 21 percent of the revised TFP market baskets for the family of four. Fruits comprise a larger share for males ages 19 to 50 and children ages 6 to 8; although, in actual pounds, the basket for children ages 6 to 8 contains the lowest amount of fruits.

Milk products account for the largest share of food by weight in the revised TFP market baskets for the family of four: 29 to 35 percent. As previously stated, fluids such as milk are weighted more prominently in the market baskets, compared with foods with lower water content.

Meat and beans account for 8 to 13 percent of the revised TFP market baskets for the family of four. Meat and beans accounted for a larger share for females ages 19 to 50 and a smaller share for children ages 9 to 11.

Other foods (e.g., fats, oils, sweets, soups, and frozen entrées) account for 3 to 6 percent of the revised TFP market baskets for the family of four. For these foods, comprising such a small share of the baskets is not surprising because many are less nutrient dense or relatively expensive or both.

Table 6. Percentage distribution of food groups in the Thrifty Food Plan market baskets for reference family, 2006

	Children		Males	Females
	6-8 years	9-11 years	19-50 years	19-50 years
Total pounds per week	23.59	33.65	39.86	33.51
	<i>Percent total pounds per week</i>			
Grains	10	8	11	8
Vegetables	22	29	23	22
Fruits	20	17	21	17
Milk products	33	35	29	34
Meat and beans	10	8	10	13
Other foods ¹	6	3	6	6

¹Fats, oils, sweets, for example.

Note: The numbers are rounded; thus, when summed, they may not equal 100 percent.

Grains

Given the dietary constraint that at least half of the recommended grains in the TFP market baskets had to be in the form of whole grains, 51 to 70 percent of the grains in the baskets for the family of four are whole grain bread, rice, and pasta; whole grain cereal; and popcorn and other whole grain snacks (table 7).

Table 7. Percentage distribution of grain categories in the Thrifty Food Plan market baskets for reference family, 2006

	Children		Males	Females
	6-8 years	9-11 years	19-50 years	19-50 years
Total pounds of food per week	23.59	33.65	39.86	33.51
Total pounds of grains per week	2.40	2.54	4.55	2.77
	<i>Percent grain pounds per week</i>			
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	38	67	62	45
Whole grain cereals (including hot cereal mixes)	4	3	2	14
Popcorn and other whole grain snacks	9	0	0	0
Non-whole grain breads, cereals, rice, pasta, pies, pastries, snacks, and flours	49	30	36	41

Note: The numbers are rounded; thus, when summed, they may not equal 100 percent.

Vegetables

A variety of vegetables make up the vegetable group in the TFP market baskets, in line with the MyPyramid dietary constraint that a set amount of vegetables from the dark-green, orange, starchy, other vegetable, and legumes subgroups had to be contained in the baskets (table 8). Potato products account for 6 to 28 percent of the vegetable portion of the TFP baskets for the family of four, with the basket for males ages 19 to 50 having the largest actual amount. Potatoes are relatively inexpensive sources of copper, potassium, vitamin B₆, vitamin C, and dietary fiber. Dark-green and orange vegetables compose 24 to 49 percent of the vegetable portion of the baskets, with the basket for children ages 9 to 11 having the largest share as well as actual amount. Other vegetables (corn, cabbage, etc.) compose about half of the vegetable portion of the basket for children ages 6 to 8.

Table 8. Percentage distribution of vegetable categories in the Thrifty Food Plan market baskets for reference family, 2006

	Children		Males	Females
	6-8 years	9-11 years	19-50 years	19-50 years
Total pounds of food per week	23.59	33.65	39.86	33.51
Total pounds of vegetables per week	5.15	9.74	9.27	7.40
	<i>Percent vegetable pounds per week</i>			
All potato products	6	11	27	28
Dark-green vegetables	16	24	13	17
Orange vegetables	10	25	11	16
Canned and dry beans, lentils, and peas (legumes)	17	12	20	13
Other vegetables	52	28	29	26

Note: The numbers are rounded; thus, when summed, they may not equal 100 percent.

Fruits

Whole fruits account for over half (61 to 92 percent) of the fruit portion of the TFP market baskets for the family of four (table 9). This percentage distribution occurs because one of the dietary constraints of the baskets was that at least half of the recommended fruit be in the form of whole fruit, in compliance with MyPyramid recommendations. Whole fruit made up a larger share of the fruit portion of the baskets for females ages 19 to 50, compared with other age-gender groups of the reference family, most likely because this age-gender group prefers whole fruit over juice and whole fruit provides more fiber.

Table 9. Percentage distribution of fruit categories in the Thrifty Food Plan market baskets for reference family, 2006

	Children		Males	Females
	6-8 years	9-11 years	19-50 years	19-50 years
Total pounds of food per week	23.59	33.65	39.86	33.51
Total pounds of fruits per week	4.62	5.83	8.41	5.62
	<i>Percent fruit pounds per week</i>			
Whole fruits	61	68	79	92
Fruit juices	39	32	21	8

Note: The numbers are rounded; thus, when summed, they may not equal 100 percent.

Milk Products

The lower fat and skim milk and lowfat yogurt food category accounts for most (92 to 98 percent) of the milk portion of the TFP market baskets for the family of four (table 10). This is expected because these forms of milk products are lower in total and saturated fat. Milk products constitute a large share of TFP baskets for the four age-gender groups because these products are good sources of vitamin A, vitamin B₁₂, riboflavin, calcium, phosphorus, magnesium, potassium, and zinc, and because they are mostly sold in fluid form.

Table 10. Percentage distribution of milk product categories in the Thrifty Food Plan market baskets for reference family, 2006

	Children		Males	Females
	6-8 years	9-11 years	19-50 years	19-50 years
Total pounds of food per week	23.59	33.65	39.86	33.51
Total pounds of milk products per week	7.69	11.79	11.37	11.53
	<i>Percent milk product pounds per week</i>			
Whole milk, yogurt, and cream	5	8	5	2
Lower fat and skim milk and lowfat yogurt	94	92	95	98
All cheese (including cheese soup and sauce)	0	0	1	0
Milk drinks and milk desserts	1	0	0	0

Note: The numbers are rounded; thus, when summed, they may not equal 100 percent.

Meat and Beans

Beef, pork, veal, lamb, and game account for 53 percent of the meat and beans portion of the TFP market baskets for children ages 6 to 8 and 37 percent for children ages 9 to 11 (table 11). Chicken, turkey, and game birds account for over half (62 to 64 percent) of the meat and beans portion of the TFP market baskets for males and females ages 19 to 50. The remaining portions of the meat and beans group are dispersed among the various meat and beans subgroups for the four age-gender groups. This is likely due to the additional constraints placed on the meat and beans group, as opposed to other food groups, that model solutions had to fall within a narrower range of average consumption to ensure a more palatable diet. It should also be noted that this food category being in as-purchased form has a high refuse factor, especially for the chicken, turkey, and game birds subgroup. While the actual amounts of chicken, turkey, and game birds appear high in the baskets, much is in the form of refuse such as bones that are not consumed.

Table 11. Percentage distribution of meat and beans categories in the Thrifty Food Plan market baskets for reference family, 2006

	<u>Children</u>		<u>Males</u>	<u>Females</u>
	<u>6-8 years</u>	<u>9-11 years</u>	<u>19-50 years</u>	<u>19-50 years</u>
Total pounds of food per week	23.59	33.65	39.86	33.51
Total pounds of meat and beans per week	2.37	2.65	3.99	4.28
	<i>Percent meat and beans pounds per week</i>			
Beef, pork, veal, lamb, and game	53	37	16	15
Chicken, turkey, and game birds	14	19	64	62
Fish and fish products	10	17	4	10
Bacon, sausages, and luncheon meats (including spreads)	5	0	1	0
Nuts, nut butters, and seeds	11	16	7	11
Eggs and egg mixtures	7	10	9	1

Note: The numbers are rounded; thus, when summed, they may not equal 100 percent.

Other Foods

Gravies, sauces, condiments, and spices as well as table fats, oils, and salad dressings make up much of the other foods component (which is small to begin with) of the revised TFP market baskets for the family of four (table 12). For females ages 19 to 50, soups (ready-to-serve and condensed) make up 40 percent of the other foods component of their TFP basket. The other components of this food category—coffee and tea; soft drinks, sodas, fruit drinks, and ades; sugars, sweets, and candies; dry soups; and frozen or refrigerated entrées—compose a very minimal share of the TFP market baskets because these foods tend to have a low nutrient density.

Table 12. Percentage distribution of other food categories in the Thrifty Food Plan market baskets for reference family, 2006

	Children		Males	Females
	6-8 years	9-11 years	19-50 years	19-50 years
Total pounds of food per week	23.59	33.65	39.86	33.51
Total pounds of other foods per week	1.36	1.10	2.26	1.91
	<i>Percent other food pounds per week</i>			
Table fats, oils, and salad dressings	16	33	44	29
Gravies, sauces, condiments, and spices	48	48	44	29
Coffee and tea	0	0	0	1
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	11	2	0	0
Sugars, sweets, and candies	2	2	4	2
Soups (ready-to-serve and condensed)	21	14	7	40
Soups (dry)	1	0	1	0
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	1	1	1	0

Note: The numbers are rounded; thus, when summed, they may not equal 100 percent.

Comparing the New Thrifty Food Plan Market Baskets With Average Consumption and the Previous Market Baskets

To understand how reported diets would need to change to meet the dietary standards of the new (2006) TFP, we can compare the TFP market basket for the reference family of four (the four individual baskets summed) with reported average consumption for this reference family as reported in NHANES 2001-2002 (table 13). Compared with reported consumption (in pounds), the TFP basket for the family of four contains more vegetables (137 percent), milk products (125 percent), fruits (115 percent), and grains (16 percent); the same amount of meat and beans; and less other foods, such as fats, oils, and sweets (-83 percent). Having more vegetables, fruit, and milk products and less other foods in the TFP market basket for the reference family, compared with their reported consumption, is not surprising; because, the TFP represents a nutritious diet. The Healthy Eating Index, an indicator of the overall quality of Americans' diet, shows that most people, particularly low-income Americans, need to improve their diet (Basiotis et al., 2002). It is interesting to note that the TFP market basket for the family of four contains more pounds of food than the family reports eating. By eating more nutritious foods, a family can actually consume more foods in terms of total pounds.

Compared with the previous or 1999 TFP market basket (in pounds) for the family of four, the new TFP basket for the family of four contains more vegetables (51 percent), milk products (47 percent), and fruits (21 percent), and less grains (-18 percent), meat and beans (-29 percent), and other foods (-45 percent) (table 13). The differences between the previous and new TFP market baskets for the family of four reflect changes in dietary guidance over time. The 2005 Dietary Guidelines for Americans encourage increased intakes of fruit, vegetables, and fat-free or lowfat milk and milk products. The new USDA food guidance system, MyPyramid, recommends more of these food groups than was the case with the 1992 Food Guide Pyramid, in part because of changes in the recommendations by the Food and Nutrition Board of the Institute of Medicine (Institute of Medicine, Food and Nutrition Board, 1997, 1998, 2000a, 2000b, 2002, 2004, 2005). The increased amounts of these food groups inevitably resulted in decreases of the other food groups, especially in the "other" food group because foods in this group are less nutrient dense. Differences also partly reflect changes in relative food prices since the TFP was last updated.

Table 13. Thrifty Food Plan market basket versus reported consumption and previous Thrifty basket for reference family¹

	Thrifty Food Plan market basket	Reported consumption	Difference in basket vs. consumption	Previous Thrifty Food Plan market basket	Difference in new vs. previous basket
	<i>Pounds</i>	<i>Pounds</i>		<i>Pounds</i>	
Total	130.61	106.06		117.44	
Total grains	12.26	10.58	16%	15.02	-18%
Total vegetables	31.56	13.31	137%	20.85	51%
Total fruit	24.48	11.40	115%	20.17	21%
Total milk products	42.39	18.81	125%	28.85	47%
Total meat and beans	13.29	13.31	0%	18.68	-29%
Total other (fats, oils, sweets, etc.)	6.63	38.65	-83%	12.01	-45%

¹Reference family consists of male and female adults ages 19-50 and two children ages 6-8 and 9-11.

Cost Update of the Thrifty Food Plan

The method used to produce the costs of the previous TFP market baskets will also be used to update the monthly costs of the revised market baskets for each of the 15 age-gender groups. This method, originally approved by an expert panel of economists, uses the monthly Consumer Price Indexes (CPIs) for specific food categories to update prices for the food categories of the TFP market baskets. Each of the 29 food categories of the TFP has a corresponding CPI or set of corresponding CPIs that are applied to update the appropriate cost of the TFP food categories for the market basket for each age-gender group. For TFP food categories with more than one corresponding CPI, CNPP uses a weighted average of the appropriate CPIs. The following illustrates the overall concept of matching food categories to CPIs: The CPI for breakfast cereal is used to update the cost of the TFP category “whole grain cereals”; the CPI for potatoes is used to update the TFP category “all potato products”; the CPI for cheese and related products is used to update the TFP category “all cheese”; the CPI for poultry is used to update the TFP category “chicken, turkey, and game birds.” This example illustrates the use of two CPIs for the TFP category “lower fat and skim milk and lowfat yogurt.” CNPP uses a weighted average of the CPI for fresh milk other than whole and the CPI for other dairy and related products. The weights are based on expenditure patterns. After the CPIs are applied to each food category, the costs of the food categories are summed to determine the total TFP market basket cost for each age-gender group.

Conclusion

The TFP represents a nutritious, minimal-cost diet. This report presents the 2006 revision of the TFP market baskets. The 2006 revision reflects recent changes in dietary guidance and incorporates updated information on food composition, consumption patterns, and food prices at the same inflation-adjusted cost of the previous TFP. For the 2006 revision, CNPP addressed one research question: *Can new TFP market baskets incorporating current dietary guidance and consumption patterns be developed at the inflation-adjusted cost of the previous TFP?* The answer was in the affirmative. The new TFP market baskets, however, do not meet the vitamin E and potassium recommendations for some age-gender groups and do not meet the sodium recommendation for many age-gender groups. To do so would have resulted in market baskets very different from typical consumption habits (in the case of vitamin E and potassium) or would require changes in food manufacturing practices (in the case of sodium).

The TFP is the basis for the maximum food stamp allotment. This study shows it is possible to eat a nutritious diet at the maximum allotment. Although most food stamp recipients do not receive the maximum allotment, because it gradually declines with increases in income, they are expected to supplement their food stamps with income in order to spend the necessary amount to have a nutritious diet.

The new (2006) TFP market baskets are now the official TFP baskets. Cost updates of the TFP will be based on the content of these baskets. Also, the list of foods and quantities specified in the market baskets may be used in nutrition and consumer education programs designed to help people eat a healthful diet on a minimal-cost budget.

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Appendix 1

Food Group Database Documentation

Food categories developed for the 2006 Thrifty Food Plan (TFP) are based mainly on the classification of the 1999 TFP food categories used in the 1989-91 CSFII, with modifications suitable to meet the recommendations from the 1997-2005 Dietary Reference Intakes, the 2005 Dietary Guidelines for Americans, food intake patterns of MyPyramid, and for TFP models. In addition, criteria used in the development of the 1999 food plan and the MyPyramid food groups were considered in categorizing foods. Within major food categories, individual foods were placed in the same food category when they had similar nutritive values for certain nutrients, such as the content of total fat and discretionary solid fat or calories from the sum of discretionary solid fat and added sugars. The cost of the foods was also used in grouping meat products.

Except for alcoholic beverages, foods reported consumed by all individuals 1 year old and older in the 2001-2002 National Health and Nutrition Examination Survey (NHANES) are grouped into 58 categories in the food category database, totaling 4,152 individual foods. Foods included in each category and criteria used to assign a food to a particular food category are described below.

Grains

Breads, yeast and quick—whole grain; Breads, yeast and quick—non-whole grain:

This category consists of breads, rolls, muffins, bagels, tortillas, taco shells, pancakes, waffles, biscuits, and cornbread. Breads or bread products with 50 percent or more of ounce equivalents from whole grain were placed in the whole grain category for the purposes of food group classification; all remaining breads and bread products were placed in the non-whole grain category.

Breakfast cereal—whole grain, regular calories; Breakfast cereals—whole grain, low calories: Breakfast cereals containing 50 percent or more ounce equivalents from whole grain per 100 grams (e.g., oatmeal, oats, bulgur, buckwheat, and certain ready-to-eat cereals) were placed in the whole grain category. This breakfast cereal group is subdivided into regular and low calorie based on the amount of discretionary solid fat and added sugars (SFAS). Cereals with 15 percent or more of calories from SFAS were placed in the regular calories SFAS group, and cereals with less than 15 percent of calories from SFAS were placed in the low calories SFAS group. The 15 percent cutoff is primarily based on the sugar content of sugar-coated cereals.

Breakfast cereal—non-whole grain: Breakfast cereals with less than 50 percent of ounce equivalents from whole grain (e.g., cream of wheat, grits, oat bran, wheat germ, corn flakes, and Rice Krispies®) were placed in the non-whole grain category.

Rice and pasta—whole grain; Rice and pasta—non-whole grain: This category consists of all types of rice and pasta products, such as macaroni, noodles, and spaghetti. Products with 50 percent or more of ounce equivalents from whole grain were placed in the whole grain category. Products with less than 50 percent of ounce equivalents from whole grain were placed in the non-whole grain category.

Cakes, pies, and other sweet bakery products—whole grain; Cakes, pies, and other sweet bakery products—non-whole grain: This category consists of cakes, cookies, pies, pastries, doughnuts, sweet rolls, croissants, graham crackers, breakfast and meal replacement bars, and other sweet products. Products with 50 percent or more of ounce equivalents from whole grain were placed in the whole grain category. Products with less than 50 percent of ounce equivalents from whole grain were placed in the non-whole grain category.

Grain-based snacks—whole grain; Grain-based snacks—non-whole grain: This category consists of crackers, popcorn, pretzels, and corn- or wheat-based salty snacks. Products with 50 percent or more of ounce equivalents from whole grain were placed in the whole grain category. Products with less than 50 percent of ounce equivalents from whole grain were placed in the non-whole grain category.

Grain mixtures—regular fat; Grain mixtures—lowfat: This category consists of tacos, enchiladas, chimichangas, pizzas, pasta with meat and/or vegetables, egg rolls, lasagna, and rice with meat and/or vegetables. Generally, mixtures were placed in the regular or lowfat category based on food descriptors. However, in some cases, a food code was reviewed and the mixture was placed in a particular category based on the fat content of its recipe components. Six percent was selected as the cutoff value for regular versus lowfat by looking at the fat content of fried or high fat grain mixtures such as tacos, nachos, burritos, pizza, and pasta with cheese. Pizza without cheese contains 6.25 percent fat; rice dishes with beans, macaroni salads, meatless lasagna, and lo-mein with meat contain 4.5 to 6 percent fat. Because pizza is considered a higher fat food, and those foods with a fat content of 4.5 to 6 percent are considered lower fat foods, mixtures with a fat content less than 6 percent by weight were placed in the lowfat category and mixtures with a fat content of 6 percent or more by weight were placed in the regular fat category.

Vegetables and Fruits

Potato products—regular fat; Potato products—lowfat: This category consists of fresh and processed white potatoes, French fries, hash browns, home fries, potato chips, and potato sticks. The regular fat category consists of cooked, boiled, baked, scalloped, mashed, and stuffed potatoes; and potato salad, German style. The high fat category consists of potato chips; French fried potatoes; hash browns; potato puffs; potato patties; potato pancakes; potato puddings and salads; and mashed potatoes with added fat, egg, and/or cheese.

Dark-green vegetables—added fat; Dark-green vegetables—no added fat: This category consists of vegetables such as broccoli, chard, collard greens, mustard greens, kale, and spinach; juices from these vegetables are also included. The Food and Nutrient Database for Dietary Studies (FNDDS) was used to determine whether fat was added to the vegetable during cooking. If fat was added, the vegetable was placed in the added-fat category; if no fat was added, the vegetable was placed in the no-added-fat category.

Orange vegetables—added fat; Orange vegetables—no added fat: This category consists of vegetables such as carrots, pumpkin, winter squash, and sweet potatoes; juices from these vegetables are also included. The FNDDS was used to determine whether fat was added to the vegetable during cooking. If fat was added, the vegetable was placed in the added-fat category; if no fat was added, the vegetable was placed in the no-added-fat category.

Tomatoes—added fat; Tomatoes—no added fat: This category consists of all fresh and canned tomato products, such as raw tomatoes, canned tomato sauce, tomato puree, tomato paste, tomato soup, and tomato juice. The FNDDS was used to determine whether fat was added to the tomatoes during cooking. If fat was added, the tomato food items were placed in the added-fat category; if no fat was added, the tomato food items were placed in the no-added-fat category.

Other vegetables—added fat; Other vegetables—no added fat: This category consists of vegetables such as beans, beets, cabbage, cauliflower, corn, cassava, eggplant, green peas, lettuce, bell peppers, snow peas, turnips, and Brussels sprouts; juices from these vegetables are also included. The FNDDS was used to determine whether fat was added to the vegetable during cooking. If fat was added, the vegetable was placed in the added-fat category; if no fat was added, the vegetable was placed in the no-added-fat category.

Mixed vegetables—added fat; Mixed vegetables—no added fat: This category consists of mixed vegetable groups and/or vegetables in combination with other foods. Creamed peas and carrots; carrots in tomato sauce; cucumber salad with creamy dressing; mixed vegetables containing corn, lima beans, and peas; batter-dipped fried vegetables; and vegetable casseroles with cheese are examples of foods in this category. The FNDDS was used to determine whether fat was added to the vegetable during cooking. If fat was added, the vegetable was placed in the added-fat category; if no fat was added, the vegetable was placed in the no-added-fat category.

Citrus fruits, melons, and berries; Citrus fruit, melon, and berry juices: This category consists of fresh, canned, frozen, and dried citrus fruits (e.g., limes, lemons, grapefruits, oranges, tangelos, and tangerines); fresh, canned, frozen, and dried melons (e.g., cantaloupe, honeydew, and watermelon); and fresh, canned, frozen, and dried berries (e.g., blackberries, blueberries, cranberries, raspberries, and strawberries). Fruit juices from these fruits are included in the citrus fruit, melon and berry juices category.

Fruits other than citrus fruits, melons, and berries; Fruit juices other than citrus, melon, and berry: This category consists of fresh, canned, frozen, and dried fruits other than citrus fruits, melons, and berries, such as apples, apricots, bananas, cherries, grapes, papayas, peaches, pears, and plums. Fruit juices made from these fruits are included in the juices category.

Milk Products

Milk and milk-based foods—regular fat: This category consists of all fluid, evaporated, condensed, and dry whole milk (fat content 3 percent or higher by weight) as well as regular yogurt, coffee creams, cream substitutes, whipping creams, sour creams and dips, and neufchatel/cream cheese and dips. For dry milk, the fat content was equivalent to whole milk after reconstitution.

Milk and milk-based foods—lower fat: This category consists of all fluid, evaporated, and dry reduced-fat milk (fat content 2 percent by weight), light milk (fat content 0.5 to 1 percent by weight), and skim (fat-free) milk as well as lowfat or nonfat yogurt (fat content less than 1.55 percent by weight). For dry milk, the fat content was equivalent to reduced-fat, light, or skim milk after reconstitution.

Cheese: This category consists of natural, processed, and imitation cheeses; cottage cheese; cheese spreads; cheese dips; and cheese soups. These foods were not subclassified into a regular and a lowfat category, because the average amount of lowfat cheese reported as having been consumed was too low to be separated out and to be used in the mathematical model.

Milk-based drinks and desserts—regular fat; Milk-based drinks and desserts—lower fat: This category consists of milk-based drinks, such as flavored milk, malted milk, eggnogs, cocoa, hot chocolate, infant formulas, meal replacement drinks, soy-based drinks, and milk-based dry mixes; dairy desserts made with ice milk, ice cream, and frozen yogurt; and sherbet, puddings, and custard. Milk-based drinks with a fat content equivalent to that of whole milk (fat content 3 percent or higher by weight) and dairy desserts having more than 6 percent fat content by weight were placed in the regular fat category. Milk-based drinks with a fat content equivalent to that of reduced-fat or skim milk (fat content less than 3 percent by weight) and dairy desserts having 6 percent or less fat content by weight were placed in the lower fat category. For dry milk-based drinks, the fat level of whole milk powder was used as the basis for placing the dry mixes into the regular or lower fat category. Whole milk powder has a fat content of 26.7 percent; thus, milk-based dry drink mixes having less fat than 26.7 percent were placed in the lower fat category.

Meat and Beans

Red meats—regular discretionary solid fat, regular cost; Red meats—regular discretionary solid fat, low cost: This category consists of beef, pork, veal, and lamb; game meats; and organ meats, such as liver and kidney. Red meats with discretionary solid fat content of more than the median amount (5.9 grams per 100 grams of cooked form) were placed in the regular discretionary solid fat category. Discretionary solid fat in red meat is the excess fat from the lean meat fat composite standard, which includes natural fat as well as cooking fats. To determine regular cost versus low cost, CNPP arranged each food in the regular discretionary solid fat red meat category in descending order in terms of its average cost per 100 grams of edible forms. The top 66.66 percent of foods were placed in the regular-cost category, and the bottom 33.34 percent of foods, in terms of cost, were placed in the low-cost category.

Red meats—low discretionary solid fat, regular cost; Red meats—low discretionary solid fat, low cost: This category consists of beef, pork, veal, lamb, and game meats. Red meats with a discretionary solid fat content of equal to or less than the median amount (5.9 grams per 100 grams of cooked form) were considered low discretionary solid fat. Discretionary solid fat in red meat is the excess fat from the lean meat fat composite standard, which includes natural fat as well as cooking fats. To determine regular cost versus low cost, CNPP arranged each food in the low discretionary solid fat red meat category in descending order in terms of its average cost per 100 grams of edible forms. The top 66.66 percent of foods were placed in the regular-cost category, and the bottom 33.34 percent of foods, in terms of cost, were placed in the low-cost category.

Poultry—regular discretionary solid fat, regular cost; Poultry—regular discretionary solid fat, low cost: This category consists of cooked and processed chicken, turkey, duck, Cornish game hen, game birds, and organ meats (e.g., liver and giblets). Poultry products with a discretionary solid fat content of more than the median amount (3.3 grams per 100 grams of cooked form) are included in the regular discretionary solid fat group. Discretionary solid fat in poultry is the excess fat from the lean meat fat composite standard, which includes natural fat as well as cooking fats. To determine regular cost versus low cost, CNPP arranged each food in the regular discretionary solid fat poultry category in descending order in terms of its average cost per 100 grams of edible forms. The top 66.66 percent of foods were placed in the regular-cost category, and the bottom 33.34 percent of foods, in terms of cost, were placed in the low-cost category.

Poultry—low discretionary solid fat, regular cost; Poultry—low discretionary solid fat, low cost: This category consists of cooked and processed chicken, turkey, duck, Cornish game hen, game birds, and organ meats (e.g., liver and giblets) with a discretionary solid fat content equal to or less than the median amount (3.3 grams per 100 grams of cooked form). Discretionary solid fat in poultry is the excess fat from the lean meat fat composite standard, which includes natural fat as well as cooking fats. To determine regular cost versus low cost, CNPP arranged each food in the low discretionary solid fat poultry

category in descending order in terms of its average cost per 100 grams of edible forms. The top 66.66 percent of foods were placed in the regular-cost category, and the bottom 33.34 percent of foods, in terms of cost, were placed in the low-cost category.

Fish—regular discretionary solid fat, regular cost; Fish—regular discretionary solid fat, low cost: This category consists of raw, cooked, and processed fish and shellfish with more than the median amount (2.8 grams per 100 grams edible form) of discretionary solid fat. Discretionary solid fat in fish is the excess fat from the lean meat fat composite standard, which only includes cooking fats. To determine regular cost versus low cost, CNPP arranged each food in the regular discretionary solid fat fish category in descending order in terms of its average cost per 100 grams of edible form. The top 66.66 percent of foods were placed in the regular-cost category, and the bottom 33.34 percent of foods, in terms of cost, were placed in the low-cost category.

Fish—low discretionary solid fat, regular cost; Fish—low discretionary solid fat, low cost: This category consists of raw, cooked, and processed fish and shellfish, with equal to or less than the median amount (2.8 grams per 100 grams edible form) of discretionary solid fat. Discretionary solid fat in fish is the excess fat from the lean meat fat composite standard, which only includes cooking fats. To determine regular cost versus low cost, CNPP arranged each food in the low discretionary solid fat fish category in descending order in terms of its average cost per 100 grams of edible form. The top 66.66 percent of foods were placed in the regular-cost category, and the bottom 33.34 percent of foods, in terms of cost, were placed in the low-cost category.

Lunch meats, sausages, and bacon—regular fat; Lunch meats, sausages, and bacon—lowfat: This category consists of sausage, bacon, and luncheon meat-type foods, such as frankfurters. Foods with the descriptor “lowfat” or which contain 25 percent less fat by weight than their original form were placed in the lowfat category. The 25-percent cutoff value is based on the Food and Drug Administration definition of regular- versus reduced-fat meat. For some foods, fat comparisons were not possible, so a cutoff of a fat content of 20 percent or more by weight was used to classify foods into regular and lowfat products.

Eggs and egg mixtures: This category consists of eggs, egg substitutes, eggs with vegetables and/or meat, egg drop soup, and meringues. Foods in this category are not subdivided based on fat content because egg-based products have similar fat contents.

Meat, poultry, and fish mixtures—regular discretionary solid fat; Meat, poultry, and fish mixtures—low discretionary solid fat: This category consists of beef, veal, pork, lamb, chicken, turkey, and fish with vegetables and/or grain mixture products. Mixtures were placed in the regular discretionary solid fat category based on having more than the median amount (2.7 grams per 100 grams of edible form); mixtures with equal to or less than the median amount of discretionary solid fat per 100 grams of edible forms were placed in the low discretionary solid fat group. Discretionary solid fat in meat, poultry, and fish mixtures is the excess fat from the lean meat fat composite standard, which includes natural fat as well as cooking fats.

Dry beans, peas, lentil dishes, and mixtures: This category consists of black, white, lima, pinto, red, mung, and kidney beans; lentils; and different types of peas cooked alone or with other foods. Soybean products (e.g., miso, tofu, and soy meal) and soybean-based meat substitutes (e.g., textured protein products and soyburger) were also placed in this food category.

Nuts and seeds: This category consists of all ground and tree nuts, such as almonds, cashews, peanuts, coconut, and walnuts; seeds, such as sunflower, pumpkin, and sesame; and nut butters, such as peanut butter.

Other Foods

Fats, oils, salad dressings, sauces, and condiments: This category consists of table fats, such as butter, margarine, vegetable oil, and butter blends; fat-free butter replacements; cooking fats, such as lard, shortening, corn oil, olive oil, peanut oil, rapeseed oil, safflower oil, soybean oil, and sunflower oil; salad dressings; and condiments, sauces, gravies, and seasonings.

Coffee and tea: This category consists of instant, ground, and fluid coffees and teas with or without caffeine and with or without sugar or sweeteners.

Fruit drinks, soft drinks, and ades—regular calorie: Fruit drinks, soft drinks, and ades—low calorie: This category consists of fruit juice drinks, cola- and pepper-type soft drinks, root beer, ginger ale, cream soda, and lemonade. All drinks that are sugar-free or are described in the food descriptors as low calorie are included in the low calorie category. Drinks containing sugar are included in the regular calorie category.

Sugars and sweets: This category consists of all types of sugars, sweeteners, and syrups such as honey, jams, jellies, marmalades, preserves, icings, gelatin desserts, marshmallow, and fudge; all types of candies and chocolates; and chewing gum.

Appendix 2

Description of Thrifty Food Plan Optimization Model

The Thrifty Food Plan (TFP) model is a mathematical programming model that solves for a food plan that meets the nutritional requirements of a healthful diet for groups of individuals distinguished by age and gender. The food plan is in terms of average daily consumption for a set of food groups, with each food group consisting of a share of more detailed food items. The share is based on the consumption of foods within each food group by the age-gender group.

Nutritional requirements are imposed as upper and lower bounds on the sum total of nutrients consumed and on meeting the MyPyramid guidelines, given data on the nutrient contents of the foods consumed in the groups by all individuals. The budget constraint for each age-gender group is calculated from the cost of the previous TFP update, inflated to 2001-2002 by the Consumer Price Indexes for food. Prices for each food group are based on consumption of foods within the group by each age-gender group.

Finally, consumption constraints are placed on all food groups to prevent the solution from containing an unreasonable amount of food from a single group. These constraints also force a more varied diet than the model would otherwise contain. Lower bounds on all food groups are also required to prevent taking the log of 0. The objective function is designed to minimize the change in consumption of the food groups from average consumption by age-gender group that is required to meet the nutritional and cost constraints. Average consumption of each food group by each age-gender group is taken from National Health and Nutrition Examination Survey 2001-2002.

The TFP model is a constrained nonlinear optimization, with linear constraints and a nonlinear objective function. The model is programmed in General Algebraic Modeling System and solved sequentially with both the Minos and Conopt solvers.¹

¹ For more information on these and other solvers, see www.gams.com.

Thrifty Food Plan Optimization Model

Minimize the objective function:*

$$\sum_f (\text{FBS})_f (\ln (\text{FP})_f - \ln (\text{Current})_f)^2$$

Subject to:

$$\sum_f (\text{FP})_f (p)_f \leq \text{Set Cost Limit}$$

$$\sum_f (\text{Quantity of nutrient group in } \text{FP}_f) \geq 1997\text{-}2005 \text{ RDA/AI/AMDR}$$

$$\leq \text{upper limit if applicable}$$

$$\sum_f (\text{Amount of total fat in } \text{FP}_f) > \text{lower limit set by AMDR for age group}$$

$$\leq \text{upper limit set by AMDR for age group}$$

$$\sum_f (\text{Amount of saturated fat in } \text{FP}_f) < 10\% \text{ of total kilocalories}$$

$$\sum_f (\text{Amount of linoleic acid in } \text{FP}_f) \geq 5\% \text{ of total calories}$$

$$\leq 10\% \text{ of total calories}$$

$$\sum_f (\text{Amount of } \alpha\text{-linolenic acid in } \text{FP}_f) \geq 0.6\% \text{ of total calories}$$

$$\leq 1.2\% \text{ of total calories}$$

$$\sum_f (\text{Amount of carbohydrates in } \text{FP}_f) \geq 45\% \text{ of total calories}$$

$$\leq 65\% \text{ of total calories}$$

$$\sum_f (\text{mg of cholesterol in } \text{FP}_f) \leq 300 \text{ mg}$$

$$\sum_f (\text{grams of fiber in } \text{FP}_f) \geq 14 \text{ g/1,000 calories}$$

$$\sum_f (\text{mg of sodium in } \text{FP}_f) \leq \text{median consumption of sodium for age-gender group or upper limit, whichever is higher}$$

$$\sum_f (\text{Calories in } \text{FP}_f) = \text{IOM equation for median height and weight } \pm 5 \text{ percent}$$

$$\sum_f (\text{Number of MyPyramid group servings in } \text{FP}_f) \geq \text{Recommended for calorie pattern}$$

$$(\text{FP})_f > 0$$

$$(\text{FP})_f \leq (\text{Upper Limit}) (\text{Current})_f$$

Where:

$$\text{FBS}_f = \text{Food Budget Share} = \frac{p_f (\text{Current})_f}{\sum_f p_f (\text{Current})_f}$$

f = food group (58 food groups)

p_f = price of food group f

FP_f = amount of food for 1 day in food group f at Food Plan level in grams

Current_f = amount of food for 1 day in food group f at Current Consumption level in grams

Nutrient group = protein, thiamin, riboflavin, niacin, folate, calcium, copper, phosphorus, potassium, magnesium, iron, zinc, vitamins A, E, C, B₆, B₁₂

Upper Limit = multiplier set on a case-by-case basis to allow the model to both meet the MyPyramid requirements and prevent an unreasonable amount of any one food group

RDA = Recommended Dietary Allowances

AI = Adequate Intakes

AMDR = Acceptable Macronutrient Distribution Ranges

*The objective function states that the food plan basket should be as close to current consumption as possible. The food budget share (FBS) weight gives higher priority to food groups on which consumers spend more of their budgets. The food plan objective function is constructed to minimize the distance between optimal food consumption and current consumption while simultaneously meeting the 14 group constraints listed under "Subject to."

Appendix 3

Table A-3. Expenditure shares for food categories in Thrifty Food Plan, by age-gender group, 2006

Food category	Children				
	1 year	2-3 years	4-5 years	6-8 years	9-11 years
<i>Percent of Thrifty Food Plan Cost</i>					
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	6.54	3.42	8.19	4.73	6.64
Whole grain cereals (including hot cereal mixes)	3.03	3.07	2.07	1.43	.74
Popcorn and other whole grain snacks	.00	8.15	.00	2.77	.00
Non-whole grain breads, cereals, rice, pasta, pies, pastries, snacks, and flours	2.83	9.52	4.52	10.41	7.16
Vegetables					
All potato products	1.30	1.89	1.45	0.56	2.04
Dark-green vegetables	3.19	4.84	5.75	6.46	13.34
Orange vegetables	1.24	1.48	4.60	1.76	7.26
Canned and dry beans, lentils, and peas (legumes)	2.49	3.93	2.46	5.08	3.23
Other vegetables	19.99	7.10	3.21	10.02	9.94
Fruits					
Whole fruits	8.24	7.00	15.94	11.02	13.31
Fruit juices	9.60	10.58	2.86	6.06	4.08
Milk products					
Whole milk, yogurt, and cream	15.95	.32	.70	.69	1.29
Lower fat and skim milk and lowfat yogurt	.00	16.70	15.17	11.48	13.20
All cheese (including cheese soup and sauce)	.25	.08	.30	.28	.09
Milk drinks and milk desserts	.13	.00	.00	.31	.00
Meat and beans					
Beef, pork, veal, lamb, and game	2.53	1.06	5.30	11.05	5.55
Chicken, turkey, and game birds	.24	.12	1.88	2.14	1.67
Fish and fish products	3.20	11.31	15.62	2.63	2.65
Bacon, sausages, and luncheon meats (including spreads)	.01	.00	.04	1.39	.06
Nuts, nut butters, and seeds	1.41	2.56	2.03	2.87	3.13
Eggs and egg mixtures	.01	.26	.10	.58	.72
Other foods					
Table fats, oils, and salad dressings	1.61	.96	2.57	1.16	1.30
Gravies, sauces, condiments, and spices	2.95	.06	2.85	2.74	1.46
Coffee and tea	.00	.00	.00	.01	.00
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.12	.10	.00	.29	.03
Sugars, sweets, and candies	.06	.01	.03	.18	.08
Soups (ready-to-serve and condensed)	12.40	5.35	2.37	1.71	.87
Soups (dry)	.01	.01	.00	.05	.00
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	.68	.11	.00	.15	.13

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

For children age 1, all milk and yogurt were assigned to the whole milk, yogurt, and cream category, because dietary guidance recommends consumption of primarily whole milk products for these children.

The numbers are rounded; thus, when summed, they may not equal 100 percent.

Table A-3. Expenditure shares for food categories in Thrifty Food Plan, by age-gender group, 2006

Food category	Males				
	12-13 years	14-18 years	19-50 years	51-70 years	71+ years
<i>Percent of Thrifty Food Plan Cost</i>					
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	4.76	12.35	10.16	8.93	7.42
Whole grain cereals (including hot cereal mixes)	.39	1.80	.68	1.09	.80
Popcorn and other whole grain snacks	8.36	.00	.00	.96	.00
Non-whole grain breads, cereals, rice, pasta, pies, pastries, snacks, and flours	9.14	2.37	3.60	6.78	7.67
Vegetables					
All potato products	3.08	7.10	4.38	5.49	3.55
Dark-green vegetables	3.85	5.40	4.73	4.80	4.90
Orange vegetables	1.99	1.71	2.83	2.46	2.07
Canned and dry beans, lentils, and peas (legumes)	4.29	4.79	6.62	6.89	8.45
Other vegetables	9.05	5.38	8.52	9.92	9.44
Fruits					
Whole fruits	10.83	15.90	16.72	16.16	15.70
Fruit juices	5.46	3.55	3.04	1.17	.93
Milk products					
Whole milk, yogurt, and cream	.64	1.20	.67	.42	.29
Lower fat and skim milk and lowfat yogurt	14.38	12.23	12.67	14.52	14.12
All cheese (including cheese soup and sauce)	.21	.83	.74	1.35	.24
Milk drinks and milk desserts	.00	.00	.00	.39	.00
Meat and beans					
Beef, pork, veal, lamb, and game	4.57	3.58	4.09	4.48	2.62
Chicken, turkey, and game birds	2.29	2.64	7.42	2.90	10.05
Fish and fish products	4.34	1.89	1.36	.61	2.68
Bacon, sausages, and luncheon meats (including spreads)	.13	.57	.22	.12	.05
Nuts, nut butters, and seeds	3.33	2.64	2.61	2.63	3.08
Eggs and egg mixtures	1.07	.85	.83	.82	.14
Other foods					
Table fats, oils, and salad dressings	1.66	3.60	3.50	2.04	1.39
Gravies, sauces, condiments, and spices	1.27	7.41	3.18	.99	1.28
Coffee and tea	.00	.00	.20	.35	.35
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.03	.00	.00	.41	.00
Sugars, sweets, and candies	.01	.13	.44	.18	.07
Soups (ready-to-serve and condensed)	4.26	2.11	.60	3.08	2.71
Soups (dry)	.00	.00	.17	.04	.00
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	.62	.00	.05	.02	.00

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

The numbers are rounded; thus, when summed, they may not equal 100 percent.

Table A-3. Expenditure shares for food categories in Thrifty Food Plan, by age-gender group, 2006

Food category	Females				
	12-13 years	14-18 years	19-50 years	51-70 years	71+ years
<i>Percent of Thrifty Food Plan Cost</i>					
Grains					
Whole grain breads, rice, pasta, and pastries (including whole grain flours)	12.96	9.31	5.07	7.78	6.24
Whole grain cereals (including hot cereal mixes)	1.67	1.37	3.36	.73	.62
Popcorn and other whole grain snacks	.21	.00	.00	.00	.00
Non-whole grain breads, cereals, rice, pasta, pies, pastries, snacks, and flours	8.43	11.73	8.13	6.61	7.22
Vegetables					
All potato products	1.93	3.43	2.77	5.77	.82
Dark-green vegetables	6.81	5.54	6.62	11.27	26.22
Orange vegetables	1.71	1.32	3.35	1.81	1.80
Canned and dry beans, lentils, and peas (legumes)	7.18	5.23	2.95	4.72	2.99
Other vegetables	4.53	11.40	6.18	6.55	9.25
Fruits					
Whole fruits	15.42	15.98	16.82	17.40	11.46
Fruit juices	.61	1.10	1.10	.79	1.53
Milk products					
Whole milk, yogurt, and cream	2.20	.64	.35	.38	.50
Lower fat and skim milk and lowfat yogurt	12.13	15.16	15.68	13.77	14.50
All cheese (including cheese soup and sauce)	.02	1.19	.41	.00	.27
Milk drinks and milk desserts	.00	.00	.00	.00	.00
Meat and beans					
Beef, pork, veal, lamb, and game	1.83	4.22	3.76	3.88	4.03
Chicken, turkey, and game birds	4.12	.10	8.64	7.68	5.11
Fish and fish products	5.26	1.65	3.14	3.02	1.64
Bacon, sausages, and luncheon meats (including spreads)	.12	.16	.02	.06	.00
Nuts, nut butters, and seeds	2.01	3.52	5.11	3.08	3.23
Eggs and egg mixtures	.93	.16	.16	.34	.07
Other foods					
Table fats, oils, and salad dressings	2.23	1.23	1.79	1.13	.65
Gravies, sauces, condiments, and spices	1.83	.90	1.80	.47	.21
Coffee and tea	.00	.01	.44	.40	.38
Soft drinks, sodas, fruit drinks, and ades (including rice beverages)	.00	.14	.00	.07	.00
Sugars, sweets, and candies	.31	.04	.07	.05	.04
Soups (ready-to-serve and condensed)	5.51	4.42	2.26	2.23	1.22
Soups (dry)	.00	.01	.02	.00	.00
Frozen or refrigerated entrées (including pizza, fish sticks, and frozen meals)	.00	.03	.00	.00	.00

Notes: Food in as-purchased form, which includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; and meat with bones.

The numbers are rounded; thus, when summed, they may not equal 100 percent.

