

Family Economics and Nutrition Review

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Profiles of Selected Target Audiences: Promoting the Dietary Guidelines for Americans

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To decrease the risk of nutrition-related diseases, Americans need to narrow the gap between scientifically based nutrition guidance and their nutrition-related behaviors. This study examines the usefulness of segmentation and audience-profiling techniques in promoting the Dietary Guidelines, designed to help narrow this gap. Using the 1991-94 survey of the Market Research Corporation of America Information Services (MRCA), we segmented 491 women gatekeepers into tertiles (Better Eaters, Fair Eaters, and Poor Eaters) based on their scores on a modified version of the Healthy Eating Index. We then compared the segments' demographic characteristics; health and diet orientation; values about, and perceived benefits and barriers to, healthful eating; nutrition, food preparation, and shopping habits; and media habits. Results showed that women gatekeepers were interested in improving their diets, and they differed significantly regarding values, benefits, and barriers of eating a healthful diet and nutrition; food preparation practices; and shopping habits. We discussed the implications of these differences in terms of improving the quality of the diet.

The *Dietary Guidelines for Americans* (23), issued by the U.S. Departments of Agriculture (USDA) and Health and Human Services (DHHS), answer this basic question: "What should people eat to stay healthy?" Forming the basis of Federal nutrition policy affecting food, nutrition education, and information programs, the Guidelines stress the significance of dietary balance, variety, and moderation (7). Still, in the United States, four of the leading causes of death—heart disease, cancer, stroke, and diabetes—are linked to nutrition (10). Americans still need to increase total intake of fruits, vegetables, and grain products and to decrease intake of fat and saturated fat. Although some progress has been made based on

progress in meeting Year 2000 Objectives, the startling increase in the portion of Americans who are overweight or obese poses one of the biggest challenges in meeting Healthy People 2000 (24). A summary measure of dietary status—the Healthy Eating Index—has shown that 7 of 10 Americans need to improve their diet (4). Other results have also indicated that although Americans choose a wide variety of foods, they consume less than the recommended servings from the fruit, dairy, meat, grains, and vegetable groups of the Food Guide Pyramid. Americans' consumption of calories from fats and sugars, however, exceeds Pyramid recommendations (11).

Thus evidence has shown that Americans still need to improve their diet; Americans need to narrow the gap between scientifically based nutrition guidance and consumer behavior that may increase the risk of illness from nutrition-related diseases. To better meet the needs of the public, some authors believe the Guidelines need to do two things: (1) continue to advance national dietary guidance that is based upon scientific evidence and (2) promote dietary guidance in ways that will lead to behavior change, improved health, and nutritional well-being (22).

The purpose of this study is to examine the extent to which major differences exist between audience segments on key variables, to profile these audience segments, and to suggest whether these differences warrant distinct nutrition education approaches in attempting to change dietary behaviors. We describe three segments of female gatekeepers and how their characteristics differ on several dimensions: demographic and health status; values about, and benefits and barriers to, healthful eating; nutrition, food preparation, and shopping habits; and media habits. We discuss the implications of these differences in terms of improving the dietary behavior of these segments. We believe that nutrition educators can directly apply this information when they design program interventions. The underlying assumption of social marketing and marketing approaches is that different audience segments require alternate approaches for achieving a desired behavior change. This study examines whether this assumption applies to nutrition education to create dietary behavior change.

Lastly, we examined results in relationship to behavioral models and theories. We examined how the segments might differ with respect to their stage of behavior change and the extent to which audience segments could be described, based on Prochaska and Di Clemente's transtheoretical model of change (18). The stages of this model are precontemplation (not considering whether to make a change), contemplation (thinking about making a change), decision (making definite plans to change), action (initiating change), and maintenance. This model has been used to describe dietary behavior in relationship to weight control and the reduction of dietary fat (6,19).

We looked to social learning theory, which is based on social cognitive theory, to inform recommendations for designing strategies for behavior change (3,17). Social learning theory emphasizes the interaction of cognition, other personal factors (e.g., self-efficacy), and environmental factors on behavior. Several critical personal factors suggested by social learning theory have been assessed in this analysis:

- Perception of the situation
- Anticipated outcomes of behavior
- Knowledge and skills to perform a behavior
- Confidence in performing a behavior

We considered the theory of planned behavior in forming program implications (1). This theory suggests that people will be more likely to take action if it leads to consequences they desire. It also suggests that behavior and behavioral intent are influenced by the degree of control people think they have over circumstances and their ability to perform a behavior.

Background

Research indicates that nutrition promotion of the Guidelines should focus on behavior change; have a strong consumer orientation; segment and target consumers; use multiple, reinforcing, interactive channels; and refine consumer messages continually (22,23). Segmentation, a frequently used approach in commercial-sector marketing, has been used in programs designed to change health behaviors (2) and has been used to create a profile or snapshot that represents the target audience. It, as well, has encouraged creative communication that is tailored to the target audience (6,12,15).

To segment audiences, social marketers analyze potential markets and create subgroups of target populations with similar characteristics regarding the desired behavior. Then they allocate resources among one or more subgroups and vary the methods used to reach each subset (2). Health communicators also use segmentation methods to identify people who are similar in key respects and to tailor the content and delivery of the communication based on people's profiles (16,21). Target-audience profiles have been used in large-scale nutrition education programs, including the 5 A Day media campaign of the National Cancer Institute (13,15) and the Nutrition and Physical Activity program of the Centers for Disease Control (9).

Methods

Database

We analyzed data from the 1991-94 survey of the Market Research Corporation of America Information Services (MRCA). Nationally representative, the MRCA survey consists of information on people's food and beverage consumption and their opinions and attitudes about general interests, health, diet and food preparation, shopping, and media usage. The MRCA data set consists of five surveys and two database systems: Household Information Form, Menu Census Diaries, Psychographic Questionnaire, Diet Information Quiz, and Food and Nutrition Attitude Inventory.

To select participating households, MRCA uses a multistage, stratified-random procedure. In stage 1—the Household Recruiting Pool—a sampling pool of households is generated from generic consumer listings of U.S. households of various demographic types. Households that agree to participate then qualify for the second stage of sampling—the National Consumer Panel. The Panel consists of 5,000 households whose demographic characteristics (household size, homemaker age, household income, census regions, and metro-area size) are matched to the U.S. Census. The third stage—the Menu Census Panel—consists of a subsample of households (n=2,000) from the National Consumer Panel. For the Menu Census Panel, MRCA uses a stratified-random procedure to select 500 households each quarter. Detailed food diaries of food and beverage consumption are collected for 14 consecutive days. Actual serving sizes are not collected. They are imputed based on eating occasions for individual foods by applying standard serving sizes. For this reason, they should be considered

estimates rather than precise measures of food and beverage consumption. The Nutrient Intake database measures macro- and micro-nutrient intake; the Food Guide Pyramid database measures “servings”¹ of the Pyramid Food Groups.

Healthful Eating Measure

The USDA Healthy Eating Index (HEI) measures the overall quality of Americans' diet (4) and uses data from the USDA Continuing Survey of Food Intakes by Individuals (CSFII). The HEI uses 10 components to measure different aspects of a healthful diet:

- Components 1-5 measure the degree to which a person's diet conforms to serving recommendations of the food groups of the USDA Food Guide Pyramid: Grains (bread, cereal, rice, and pasta), vegetables, fruits, milk (milk, yogurt, and cheese), and meat (meat, poultry, fish, dry beans, eggs, and nuts).
- Components 6 and 7 measure consumption of total fat and saturated fat, respectively, as a percentage of total food energy intake.
- Component 8 measures total cholesterol intake.
- Component 9 measures sodium intake.
- Component 10 measures the variety of a person's diet on any given day.

¹MRCA used total frequency of “eatings” as the main measure of the individual food consumed. MRCA estimated serving sizes for each eating occasion for over 330 collapsed food categories based on 1987-88 USDA data on number of grams for each eating occasion for individual food items. MRCA then assigned different serving sizes to 18 age-gender groups: four age groups for children under 12 and seven age groups each for males and females over age 13.

Americans still need to improve their diet; Americans need to narrow the gap between scientifically based nutrition guidance and consumer behavior that may increase the risk of illness from nutrition-related diseases.

Each component of the HEI has a maximum score of 10 and a minimum score of zero; intermediate scores are computed proportionately. The maximum overall score for the 10 components combined is 100. Higher component scores indicate intakes close to recommended ranges or amounts.

The MRCA does not provide information on variety; hence, we used a modified version of the HEI to examine characteristics that distinguish women from the MRCA sample with higher quality diets from those with lower quality diets. All scores on the modified version were adjusted to a 100-point score. Thus the total maximum score was 100. To compute individual HEI scores, we matched the female gatekeeper to the appropriate serving recommendations of the Pyramid Food Groups. We calculated gatekeepers' average percentage of calories from total fat and saturated fat and compared their intakes of cholesterol and sodium with Pyramid recommendations.

Sample

We selected healthy adult women in the United States as the unit of analysis (target audience) because they often are gatekeepers who shape their family's nutrition and health habits.

Our sample consisted of women gatekeepers aged 25 through 55, reporting household income of \$20,000 to \$125,000 and no major health problems. Those excluded reported having high blood pressure, diabetes, heart disease, high levels of serum cholesterol, or followed a diet for diabetes or allergies. We could not use marital status as a screening variable because MRCA does not include information on respondents' marital status. The database also does not include information on vegetarian diets, employment status or profession,

and the relationship of household members. The final sample of 491 gatekeepers was weighted to reflect the U.S. population of interest.

After ranking and dividing the gatekeepers into tertiles (segments) based on their scores on the modified HEI, we developed profiles of the women gatekeepers and used multiple *t* tests to examine differences among the three segments. SUDAAN (Software for the Statistical Analysis of Correlational Data), which accounts for sampling designs that are complex and stratified, was used in the analysis to ensure appropriate estimates of standard errors for hypotheses testing.²

Results

Demographic Characteristics

The women gatekeepers who were *Better Eaters* (having the highest HEI score) are the basis of comparison with other groups of women gatekeepers: *Fair Eaters* and *Poor Eaters*. The women gatekeepers differed in some ways (table 1). Compared with the other groups, the Better Eaters more closely met the recommendations of the USDA Food Guide Pyramid. Based on percentages, overall, the women gatekeepers' average Healthy Eating Index score was 57 percent. With an average score of 74 percent, the Better Eater had the higher HEI score, followed by the Fair Eater, with 62 percent; and Poor Eater, with 52 percent. Healthy Eating Index scores were calculated based on the degree to which a person in the sample's diet

conformed to serving recommendations of the food groups of the USDA Food Guide Pyramid as previously described.

There are small differences in the gatekeepers' average years of education, height, Body Mass Index (BMI), likelihood of having children present in the household, and race. The Better Eater was more likely than the other Eaters to have more years of education. Compared with the Poor Eater, the Better Eater had a lower BMI score, was slightly taller, and more likely to be White or of a race other than Black. Compared with the Fair Eater, the Better Eater was less likely to have children.

The women gatekeepers had some characteristics in common (tables 1 and 2). Their characteristics were considered similar if more than 60 percent of the women in each group exhibited them and if the differences in the characteristics were statistically insignificant ($p > .01$). These three groups were similar demographically based on age, household size, household income, and self-reported weight.

Values, Benefits, and Barriers to Healthful Eating

Similar to the Better Eater, the Fair Eater (F) reported that eating a healthful diet was important to her (table 3). Both said they could avoid future health problems—a perceived long-term benefit—by eating more healthfully. Similarly, the Fair Eater and the Better Eater reported that eating “healthy foods” gave them the energy they needed—a perceived short-term benefit—and agreed that eating “healthy foods” improved their physical appearance.

²“SUDAAN is specifically designed for analysis of cluster-correlated data from studies involving recurrent events, longitudinal data, repeated measures, multivariate outcomes, multistage sample designs, stratified designs, unequally weighted data, and without replacement samples” (20).

Table 1. Education distinguishes all three segments of women gatekeepers: Demographic and health status variables, MRCA 1991-94

Variable	Diet status		
	Better Eaters	Fair Eaters	Poor Eaters
		<i>Mean</i>	
Age (years)	39	38	38
Household size	3.3	3.3	3.3
Household income (thousands)	42.97	41.40	41.93
Education (years)	14.2*	13.7*	13.2*
Weight (kg)	67.39	67.96	71.65
Height (cm)	164.7*	163.9	162.7*
BMI	25.07*	25.54	27.31*
		<i>Percent</i>	
HEI score ¹	74	62	52
Children present	56*	72*	65
White	94.9*	87.5	83.6*
Black	4.1	7.3	9.3
Other	1.0*	5.2	7.1*

¹The Healthy Eating Index scores differ because this factor was used to segment the women gatekeepers.

*Means or percentages within the same row are significantly different ($p < 0.05$).

The Fair Eater differed, however, from the Better Eater in two important ways. (1) She was less likely than the Better Eater to believe she could avoid future health problems by exercising. (2) Both convenience and taste were barriers for the Fair Eater, who was more likely than the Better Eater to say that “healthy foods” had to be convenient for her to use them and to report that a reason for not choosing healthful foods was because they didn’t taste good.

The Poor Eater (P) was less likely than the Better Eater to believe it was important to eat a healthful diet, look and feel physically fit, maintain a proper weight, and to identify with potential benefits of healthful eating. She was less likely to agree that she could avoid future health problems by eating a healthful diet and by exercising; she was less likely to report the perceived short-term benefit that eating “healthy foods” gave her the energy she needed and improved her physical appearance. The Poor Eater also

indicated that she was less likely than her counterpart to say she knew how to eat healthfully. She was, however, more likely than the Better Eater to report that eating healthfully was too complicated and confusing.

Health and Diet Orientation

All of the women gatekeepers believed they were knowledgeable about health and nutrition (table 2). They reported an interest in improving their diets, agreed they had some weight to lose, and tried to do so, at least occasionally. Similarly, they agreed that it was important for them to live long and healthy lives.

Nutrition, Food Preparation, and Shopping Habits

Similar practices among the women gatekeepers extended to how they shopped for food and planned and prepared it (table 2). Among the many similarities, all three groups redeemed the coupons they clipped from magazines and newspapers.

The Poor Eater was less likely than the Better Eater to believe it was important to eat a healthful diet, look and feel physically fit, maintain a proper weight, and to identify with potential benefits of healthful eating.

Table 2. Better Eaters, Fair Eaters, and Poor Eaters have many characteristics¹ in common, MRCA 1991-94

Variable	Commonalities
Health and diet orientation	<ul style="list-style-type: none"> Believe they are knowledgeable about health and nutrition Interested in improving their diets Think they have some weight to lose Try, at least occasionally, to lose weight Believe it is important for them to live a long, healthy life
Physical activity	<ul style="list-style-type: none"> Frequency
Psychographics	<ul style="list-style-type: none"> Like to meet new people Join actively in community groups Desire to be well respected Like the outdoors Enjoy taking the family to a different vacation spot each year
Shopping	<ul style="list-style-type: none"> Make a complete list before going shopping Enjoy browsing through supermarket aisles Do not like the excitement of a busy supermarket Save a lot of money by shopping around for food bargains Stock up on named brand foods that they like during sales Cut coupons out of newspapers and magazines Redeem coupons (almost always) Send away for items offered through advertising Willing to pay for certain food items for special occasions
Food planning and preparation	<ul style="list-style-type: none"> Enjoy cooking and think of themselves as creative cooks Don't like to bother cooking just for themselves (when alone) Enjoy preparing a fancy meal for their families once in awhile Collect recipes from the food sections of the newspapers Exchange recipes with friends and relatives Add something extra (almost always) to prepared foods Serve the same evening meals from one week to the next Try to make use of leftovers but usually throw them out
Family eating habits	<ul style="list-style-type: none"> Have some family members who are concerned about being overweight
Media	<ul style="list-style-type: none"> View television-network evening news, cable news/television Read magazines and newspaper

¹Characteristics were common if more than 60 percent of each group exhibited them and if the differences in the characteristics were statistically insignificant ($p > .01$).

Table 3. Most measured beliefs and practices of Poor and Fair Eaters differ from those of Better Eaters, MRCA 1991-94

Variable	Degree to which Poor (P) and Fair (F) Eaters say the following, compared with Better Eaters		
	As likely	More likely	Less likely
Values, Benefits, and Barriers			
Eating a healthy diet is important to me.	F		P
I can avoid future health problems by eating healthfully.	F		P
I choose healthy foods because they give me the energy I need.	F		P
I choose healthy foods because they improve my physical appearance.	F		
Healthy foods have to be convenient for me to use them.		F	
A reason for not choosing healthy foods is they don't taste good.		F	
Trying to eat healthy is too complicated and confusing.		F, P	
I can avoid future health problems by exercising.			F, P
It is important for me to look and feel physically fit.			P
It is important for me to maintain my proper weight.			P
I know how to eat healthy.			P
Nutrition, Food Preparation, and Shopping Habits			
I worry about the nutritional content of the foods I eat.	F		P
I always see to it that my family takes vitamins.	P		F
I'm much more willing to try a new recipe when someone I know tried it and liked it.		F	
I always or usually pay attention to on-shelf, aisle display.		F	
Most snack foods I like are unhealthy.		P	
I do not discuss various foods and their food values with my family so they understand nutrition better.		P	
I always pay attention to instant coupons.		P, F	
I make every possible effort to see that my family eats really nourishing foods.			F, P
I get upset if the family doesn't eat together.			F, P
I go out of my way to buy non-fat foods.			F, P
Frozen foods are more nutritious than canned foods.			F, P
I serve fish because it has less fat.			F, P
I disagree that red meat is better for your health than fish.			F, P
I do not look for prepared dishes when I shop.			F
I collect recipes from magazines.			P
I disagree that my family is easy to please.			P
Media			
I watch television in general, including entertainment programs, and daytime television.		F, P	
I watch television programs like police/private eye and daytime serials because I really like them.		F	
I watch television serials/soap operas because I like them.		P, F	
I watch prime-time television programs.			P
I read women's general interest magazines.			P

Note: The "F" and "P" for the Fair Eaters and Poor Eaters, respectively, indicate that these women gatekeepers differ significantly from the comparison group: the Better Eaters, at the 0.01 level.

Compared with the Better Eater, the Poor Eater was less likely to worry about the nutritional content of the foods she ate.

The groups differed, however, in a number of important ways related to nutrition, food preparation, and shopping habits (table 3). Similar to the Better Eater, the Fair Eater worried about the nutritional content of the foods she ate. Still, she was less likely than the Better Eater to make an effort to serve her family nourishing foods, get upset if the family didn't eat together, and go out of her way to buy nonfat foods. She was more likely than the Better Eater to pay attention to on-shelf, aisle display ads and instant coupons and to look for prepared foods when shopping.

Compared with the Better Eater, the Poor Eater was less likely to worry about the nutritional content of the foods she ate. Like the Fair Eater, she was also less likely than the Better Eater to make every possible effort to see that her family ate nourishing foods, to get upset if the family didn't eat together, and to go out of her way to buy nonfat foods. The Poor Eater was more likely than the Better Eater to pay attention to instant coupons, to agree that most of the snack foods she liked were unhealthful, and to disagree that she discussed foods with her family so they understood nutrition better.

Media

The three groups watched similar television programs or stations—evening network news, cable news, and cable TV—and they read similar magazines and newspapers (table 2). However, the Fair Eater and Poor Eater were more likely than the Better Eater to watch television in general, including entertainment (non-news) shows and daytime programs (table 3). The Poor Eater also watched less prime-time television than did the Better Eater and was less likely to read women's general interest magazines.

Discussion

Profiles

Demographic differences in audience segments do not explain the overall differences in the three segments' approaches to food consumption. Results of this analysis indicate a small number of demographic differences. Then what might explain these differences?

The Better Eaters are more likely than the Poor Eaters to report that eating a healthful diet is important to them and are concerned about the nutritional content of their diets. They are likely to perceive short- and long-term benefits of eating healthfully, and are taking action to eat healthfully.

Better Eaters are categorized in this analysis as being either in the action or maintenance stages of the transtheoretical model of change, though direct assessment of the stages of change was not measured in this analysis. Better Eaters are considered in one of these two stages of change based on their HEI score, their concerns about nutrition, and their greater tendency to act on their concerns. It is therefore not possible to determine precisely whether they are in the action or maintenance stage, using the algorithm applied by Curry et al. for staging dietary fat reduction (6).

In terms of social learning theory, Better Eaters appear to be able to anticipate the outcomes of their behavior and self-determine their behavior, successfully although not perfectly. They appear to be confident of their ability to carry out healthful eating behaviors based on their being less likely to report that trying to eat more healthfully is complicated and confusing than did women in the other two segments. Better Eaters experience

a rather high degree of control over their circumstances in terms of eating healthfully, based on their responses to all questions, collectively. This characteristic is a key factor in the theory of planned behavior. Still, Better Eaters have room for improving their diets based on their HEI scores.

Fair Eaters, compared with Better Eaters, report a mixture of benefits, barriers, and actions that may account for their lower HEI score. Like the Better Eaters, Fair Eaters are more likely than the Poor Eaters to report that eating a healthful diet is important to them, and are concerned about the nutritional content of their diets. They are as likely as Better Eaters to perceive short- and long-term benefits of eating healthfully, and are taking some action to eat healthfully. However, they are less likely to go out of their way to eat healthfully, such as making an effort to serve their families nourishing foods and buying nonfat foods. They are more likely to respond to in-store promotions such as on-shelf, aisle display ads, and instant coupons. Taste and convenience are especially important to Fair Eaters, and they are more likely than Better Eaters to select prepared foods. In terms of media use, they are more likely to watch television, particularly for entertainment. Lastly, the Fair Eaters are more likely to report that eating healthfully is complicated and confusing, compared with Better Eaters.

In sum: Fair-Eaters are convinced yet not committed to eating healthfully. While they are interested in the positive results associated with eating healthfully and are convinced of its benefits, Fair Eaters are less proactive in making healthful eating choices, and appear to respond passively to stimuli in their environment, be it family, in-store cues, desire for sensory satisfaction, or ease in meal preparation. As a group, they

appear to eat healthfully when it's convenient and could be characterized as "convinced, but not committed" to eating healthfully. Many factors can intervene in their environment to prevent them from eating healthfully.

Fair Eaters could be considered to be in a late stage of contemplation in terms of stages of change, although screening questions for staging were not included in the original MRCA questionnaire. No questions were asked that could help determine whether Fair Eaters had developed a plan of action that would place them in the preparation stage of the transtheoretical model of change. Still, their passivity in relationship to environmental cues indicates that they have not developed a concerted plan of action that they intend to implement in the near future.

In terms of social learning theory, Fair Eaters are aware of the outcomes of behaviors, including expected results and benefits but lack the knowledge and confidence to eat more healthfully based on the fact that, compared with Better Eaters, they are more likely to report that trying to eat healthfully is too complicated and confusing. They also seem to experience a rather low degree of control over their circumstances, an important factor influencing their behavior that is emphasized by the theory of planned behavior.

A number of factors may prevent Poor Eaters from taking actions that could improve their dietary habits, factors that may account for their HEI scores being the lowest among these three groups. They are less likely to report an interest in achieving results related to healthful eating. For example, they are less likely to report that eating more healthfully is important to them, compared with Better Eaters. Poor Eaters are also less likely to be convinced of long-term benefits: they are

less likely than Better Eaters to agree that they can avoid future health problems by eating a healthful diet. Nor are they convinced of short-term benefits such as being less likely to agree that "healthy foods" give them the energy they need. They are also less likely to know how to eat healthfully and are more likely to perceive that eating healthfully is complicated and confusing.

Poor Eaters are less concerned about nutrition for themselves and their families: they are less likely to report that they worry about the nutrient content of the food they eat. They are also less likely to talk with their families about foods in terms of their nutritional value or to report making every possible effort to see that their families eat nourishing food.

Thus Poor Eaters are somewhat interested in improving their diets, but are not convinced of the benefits of doing so. They are also less concerned with achieving the potential results of eating healthfully than are Better Eaters. While they, like other gatekeepers, claim to be knowledgeable about health and nutrition, they admit to not knowing how to eat healthfully. They could be characterized as "interested but unconvinced" that healthful eating is particularly relevant to them.

Poor Eaters could be categorized as being in an early phase of contemplation (transtheoretical model of change) based on their interest in improving their diet. Although Poor Eaters appear to be aware of where they stand when it comes to eating healthfully, they lack three key critical personal factors described by social learning theory: (1) the ability to anticipate outcomes of their behavior, (2) knowledge and skills to act, and (3) confidence to perform this behavior.

Program Implications

Given the large number of characteristics these three segments of women have in common, should the same approach to nutrition education be used for these three groups? Speaking in favor of a common approach are the characteristics the three segments share. However, many of the characteristics the three audience segments have in common may be attributed to the fact that the segments are all primary food preparers. A number of important differences among these three segments of women discussed in this paper suggest that different approaches to nutrition education are needed for each segment.

For the Better Eaters especially, providing tips that are simple, positive, and easy to apply may build on their current interest and actions to improve their diets. A different approach should be used with Fair Eaters. Nutrition education for this group should appeal to their interest in taste and convenience. Communication and education strategies should be used to deliver actionable messages and illustrate easy methods for improving their diet that do not sacrifice taste. Suggestions should be offered that are easy to apply such as adding a grated carrot to prepared tomato sauce as a way to add sweetness, improve its taste, and add important nutrients. It may also be helpful to highlight convenient ways to more healthful eating such as offering ideas that they can do quickly such as a “10-minute-a-day” way to improving their eating habits. Fair Eaters should be targeted with a few carefully selected nutrition messages that are easy to understand and apply, and that are likely to cut through confusion generated by media coverage of nutrition news. Nutrition education for Fair Eaters should use mass media to remind them frequently about eating healthfully. It should also be presented in an entertaining way,

because this audience is used to regular television entertainment.

It will require a highly targeted approach to reach Poor Eaters with nutrition education. An approach is needed that immediately captures their attention and establishes cultural and lifestyle relevance. To help establish relevance of consequences of healthful eating, messages to this audience should come from people they perceive as peers or from someone they admire, such as a celebrity, who can model the desired behavior. For example, the Milk Mustache Campaign has shown celebrities and opinion leaders with their milk mustaches as a way to establish that drinking milk is a highly acceptable and desirable behavior with their target market.

Nutrition education programs and materials that are highly targeted to a specific lifestyle or cultural experience are likely to be welcomed. For example, the National Cancer Institute developed and tested *Down Home Healthy*, a recipe booklet designed for an African-American audience, and found that respondents were highly interested in this book because of its cultural relevance (8). Introducing this recipe booklet was used to explore interest in an approach of encouraging African Americans to use modified versions of traditional recipes to lower fat and increase fiber intake. Responses to the recipe booklet and accompanying brochure were the most active and engaging aspects of focus group sessions. Participants welcomed this approach, if the taste of the food presented in the recipes met their expectations.

Successful nutrition education strategies are recommended that will break abstract nutrition concepts into practical action steps that can easily be mastered and applied to help build knowledge, skills, and self-efficacy for

eating more healthfully. For example, guidance about adding more fiber to the diet should include a brief discussion of the Nutrition Facts panel of the food label. It should include making a specific request to ask people to go to the grocery store and compare the fiber content on the food label of several breakfast cereals they like, and then purchase a cereal that contains 20 percent or more of the Daily Value for fiber per serving. This approach was highly effective in transforming apathy into keen interest in nutrition among working and middle-class women attending focus groups sponsored by the National Cancer Institute (14).

This segment of women gatekeepers, in particular, may be encouraged to begin taking action as they experience more short-term benefits that are meaningful and motivating. To accomplish this, nutrition education and promotion efforts for Poor Eaters should move them from being interested to being convinced that healthful eating is meaningful and relevant to them.

Summary

The most effective ways to reach these women gatekeepers by segment is as follows:

1. **Better Eaters:** Offer new tips that can be added to their current actions for eating healthfully.
2. **Fair Eaters:** Insert frequent environmental cues to eating healthfully that will appeal to their interest in taste and convenience.
3. **Poor Eaters:** Establish relevance by identifying ways to appeal immediately to this audience that are consistent with their lifestyle and cultural context.

These findings are consistent with those of authors reviewing nutrition education for adults (5). In their review of successful nutrition education interventions for adults, the authors suggested nutrition education communication and strategies in programs that

- Are ongoing and multifaceted;
- Use mass media to increase awareness and enhance motivation;
- Tailor strategies based on formative audience research;
- Use motivational messages and educational strategies; and
- Employ a behaviorally focused approach that is based on personal factors, behavioral capabilities, and environmental factors.

The results of this study suggest that nutrition educators can apply the same segmentation methods used by social marketers and health communicators. It can be expected that doing so would allow them to make the most effective use of resources and to increase program efficiency. We suggest that with a greater understanding of applicable target segments, nutrition educators, policymakers, and other information multipliers will be better-positioned to improve the diets of Americans.

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U.S. Teens and the Nutrient Contribution and Differences of Their Selected Meal Patterns

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We examined the nutrient contribution of foods consumed at breakfast, brunch, lunch, dinner, and snacks, as well as the types of foods consumed on those occasions, by adolescents ($n=1,310$) participating in the 1989-91 Continuing Survey of Food Intakes by Individuals. Descriptive statistics were generated, using weights and taking into account sample design effects, to examine the consistency of their meal patterns: Consistent, moderately consistent, and inconsistent. Results showed that for individuals with an inconsistent meal pattern, dinner provided half of the day's energy and total snacks provided over one-fifth, an equivalent of one meal for others. Most nutrients studied (fat, protein, calcium, and iron) followed the same pattern as energy. Age differences were noted: 15- to 18-year-olds were more likely to have inconsistent patterns. The types of foods consumed also differed by meal pattern. Both increasing the consistency in the number of meals consumed, as well as improving food-selection behaviors, may serve as possible interventions to improve the diets of adolescents.

Adolescence is a period of great transitions. Nutrient requirements are increased from childhood because of physical growth, and behaviors acquired during this period persist into adulthood (1,11,17,22). While many subsets of adolescents engage in behaviors that have wide public health attention, some adolescents may also follow pathways of poor food choices and reduced physical activity—both of which can also have deleterious effects on health (10,25). Among the health consequences of following these pathways have been rapid increases in obesity and adult-onset diabetes (13,23,26). Members of this age group are influenced strongly by their peers, the media, and family situation and less by their knowledge of risky behaviors (6,21,22).

Skipping meals is a common practice among adolescents: about 20 percent do not eat breakfast, and about half as many do not eat lunch (3,5,10,18,19). Skipping meals may lead to more snacking; for those who do not view skipping meals as a method of weight loss, snacks often compensate for missed calories and other key nutrients. The literature indicates that, on average, most children and adolescents average four eating occasions a day, with an upper range of 13 occasions among Mexican children who consumed as much as 45 percent of their energy from snacks (4,7,8). Research on the meal patterns of U.S. adolescents showed that most consume at least two meals (plus or minus snacks) on a consistent basis while some follow a highly inconsistent meal pattern: one meal and/or snacks all day (18).

Compared with adolescents with inconsistent meal patterns, those with consistent meal patterns consumed a diet that was adequate in calories and more nutrient dense (with respect to calcium, iron, vitamin E, and fiber) (11). Our study examines in more detail the types of food consumed by adolescents at each eating occasion and the nutrient contributions provided by each eating occasion to adolescents' total daily intakes. This study is unique: we examine snacking behaviors by using a nationally representative sample, and we determine the nutrient contributions of snacks. Previous studies have examined only the nutrient density of meals versus snacks without considering their contribution to the total diet, or previous studies have used very small samples to examine this research question (2,16).

Methods

Survey Design

Food consumption data were provided by the 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII), a survey conducted by the U.S. Department of Agriculture's Agriculture Research Service. A nationally representative sample was collected by using a multistage, stratified sample design of the 48 coterminous States and Washington, DC. Data were collected in four waves during each year: one in each season, between April 1989 and May 1991. In each wave, a different sample of participants was selected. The total number of participants in all age groups sampled was 15,192.

Dietary data were collected for each individual in selected households. Using a 24-hour recall and two 1-day food records, individuals reported 3 consecutive days of intake. The female head of the household reported dietary intake for individuals less than 12 years

old. We were interested in the eating patterns of adolescents, thus our analysis was restricted to 11- to 18-year-olds who reported 3 days of dietary intake (n=1,310). The classification of individuals into meal-pattern categories did not differ between 11- and 12-year-olds, and the differences in nutrient composition of reported intakes of 11- and 12-year-olds were similar in magnitude to the differences between 12- and 13-year-olds. Therefore, 11-year-olds were included in the analysis despite differences in methods of data collection for dietary intake.

Variables

Meal Patterns

Survey data include descriptors of eating occasion (breakfast, lunch, dinner, supper, snack, brunch, and extended consumption) as well as the time of day each food was consumed. To identify meal patterns, we first developed clear and invariable terminology for eating occasions: Breakfast, lunch, brunch, dinner, or snack. Respondents provided the name for each meal. When respondents reported consuming either supper or dinner, the eating occasion was designated as dinner; when the respondent reported consuming both supper and dinner, dinner was designated as lunch and supper designated as dinner. This categorization was based on analysis of the data, which indicated that dinner was consumed primarily as an evening meal (85 to 87 percent between 4 and 8 p.m.). When both supper and dinner were consumed, dinner was the midday meal (56 to 69 percent between 11 a.m. and 3 p.m.) and supper was the evening meal (70 to 81 percent between 4 and 8 p.m.). Eating occasions for 1.3 percent of foods were unknown or identified as extended consumption and therefore not included in our analysis.

Three meal-pattern categories were created based on their ability to provide

meaningful comparison of eating behaviors: Consistent, moderately consistent, and inconsistent. These categories are mutually exclusive and include all possible combinations of eating occasions. Respondents with a consistent meal pattern (n=538) consumed two or three meals (plus or minus snacks) on all 3 days of reported intake. Those with a moderately consistent meal pattern (n=726) consumed two or three meals (plus or minus snacks) on 2 of the 3 days of reported intake. And respondents with an inconsistent meal pattern (n=46) consumed only one meal (plus or minus snacks) or snacks only on all 3 days of reported intake.

Personal, Household, and Demographic Characteristics

Population characteristics available directly from the CSFII were age, gender, race, region of residence, supplement use, school attendance, educational and employment status of the female head of the household, income status, and household size. Our derived variables were consumption of school-based meals and single- versus dual-parent households. Respondents who reported consuming at least one school-based lunch per week were classified as consumers of school lunch. This method was repeated for school breakfast. Classification as a single- or dual-parent household was based on the presence of a male or female head of household or female and male heads of household, respectively.

Nutrient and Food-Grouping System

The nutrient database was provided by USDA Survey Nutrient Data Base, Release #7 and was developed for the 1991 CSFII. For this analysis, we used nutrient information provided as the total average intake or as the average percentage of the Recommended Dietary Allowances (RDA) for all nutrients (12) consumed over 3 days.

The age- and gender-appropriate RDA values were used to calculate the average percentage of the RDA consumed. Grams of food consumed at each eating occasion were calculated by using the University of North Carolina at Chapel Hill food-grouping system. This system disaggregates major USDA food groups into 56 more distinct nutrient-based groups based on the composition of fat and dietary fiber. The University of North Carolina at Chapel Hill's food-grouping system covered all foods that respondents reported eating (14,15).¹

Statistical Methods

We used Student's *t* test and a chi-square test to compare the socio-demographic characteristics among the groups based on their meal patterns. Statistical testing, however, was not performed on the proportion of the nutrients or the grams of food contributed by each meal. To do so would have required many comparisons, resulting in our having to use a very stringent *p* value. Hence our analysis is descriptive. The results provide estimates representative of the U.S. population in the coterminous 48 States. We weighted the statistics for nonresponse and corrected the standard errors for the complex multistage design. We used the STATA survey option that allows for the effects of the complex sample design (20).

Results

Sociodemographic Characteristics

Forty-one percent of the adolescents had consistent meal patterns; only 4 percent had inconsistent meal patterns (table 1). The 15- to 18-year-olds were more likely to have inconsistent meal

¹This information is available upon request.

Table 1. Descriptive characteristics of 15- to 18-year-olds and their households, by meal-pattern category, 1989-91 CSFII

Sociodemographic characteristic	Meal pattern		
	Consistent	Moderately consistent	Inconsistent
Sample	538	726	46
		<i>Percent</i>	
Female	47.0	52.6 ¹	60.9 ^{1,2}
Black	14.1	19.0 ¹	23.9 ^{1,2}
Attends school	93.1	87.2 ¹	75.6 ¹
Single-parent household	27.3	31.4 ¹	34.8 ¹
Female head of household attended college	34.9	31.1 ¹	27.3 ^{1,2}
Female head of household has <12 years of education	26.9	31.1 ¹	31.8 ¹
Region			
Northeast	18.0	17.2	10.9 ^{1,2}
Midwest	30.9	26.5 ¹	28.3
South	31.2	35.4 ¹	34.8
West	19.9	20.9	26.1 ^{1,2}
		<i>Mean (± S.D.)</i>	
Percentage of poverty	329 (264)	326 (249)	330 (209)
Household size	4.7 (1.9)	4.2 (1.4) ³	4.2 (1.5) ^{3,4}

¹Significantly different from the consistent meal pattern, chi-square analysis, *p* < 0.05.

²Significantly different from moderately consistent meal pattern, chi-square analysis, *p* < 0.05.

³Significantly different from consistent meal pattern, weighted *t* test, *p* < 0.05.

⁴Significantly different from moderately consistent meal pattern, weighted *t* test, *p* < 0.05.

patterns. The consistent meal-pattern category had a higher percentage of respondents who were male, white, and who attended school. Adolescents with a consistent meal pattern were less likely to be from a single-parent household and more likely to be from a household in which the female head attended college. Neither the mean percentage of poverty nor years of education of the female head of household differed significantly by meal-pattern category.

Nutrient Profiles Based on Adolescents' Meal Pattern

Adolescents with a consistent or moderately consistent meal pattern consumed 37 to 38 percent of their total energy from dinner. For adoles-

cents in the inconsistent group, 43 percent of their total energy was consumed at dinner. Even more important is the difference in the role of snacks in their diet. Snacks comprised about 23 percent of the total day's energy for those following an inconsistent meal pattern but only 11 to 16 percent for those following the other two meal patterns. In total, the dinner meal and total snacks together provided more than two-thirds of the day's total energy for adolescents with an inconsistent meal pattern.

Differences by age group were noted (figs. 1 and 3). For instance, 11- to 14-year-olds in the inconsistent group obtained 24 percent of energy from lunch while older adolescents in the same group obtained 9 percent of

Figure 1. Distribution of energy obtained, by meal-pattern groups of 11- to 18-year-olds, 1989-91 CSFII

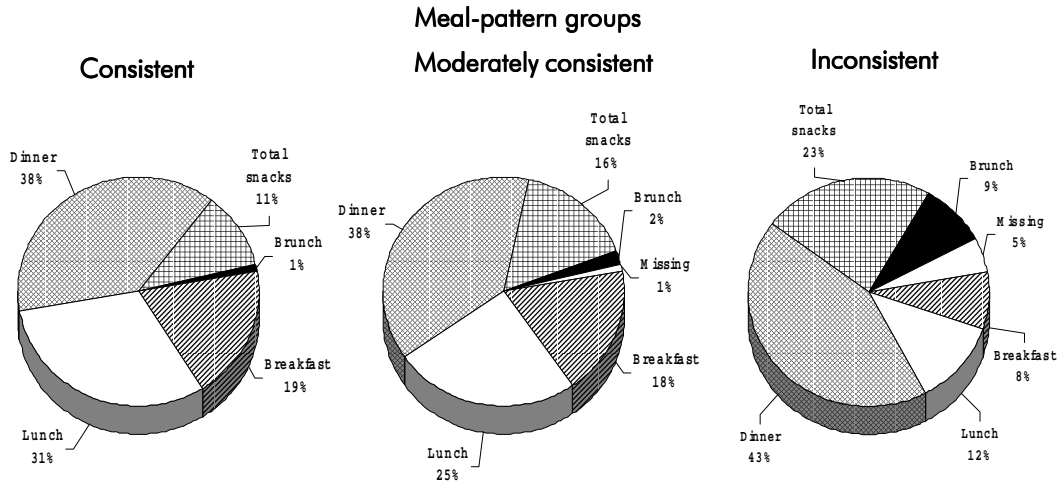


Figure 2. Distribution of energy obtained, by meal-pattern groups of 11- to 14-year-olds, 1989-91 CSFII

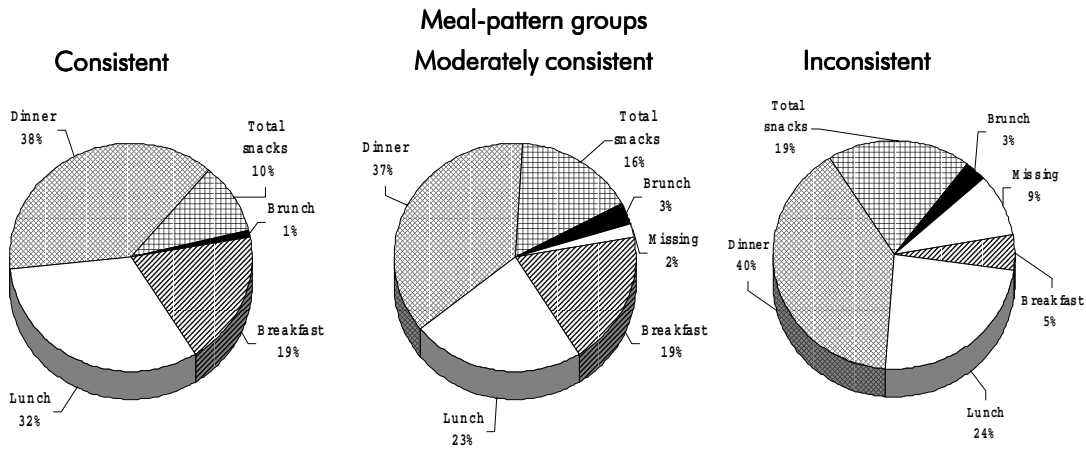
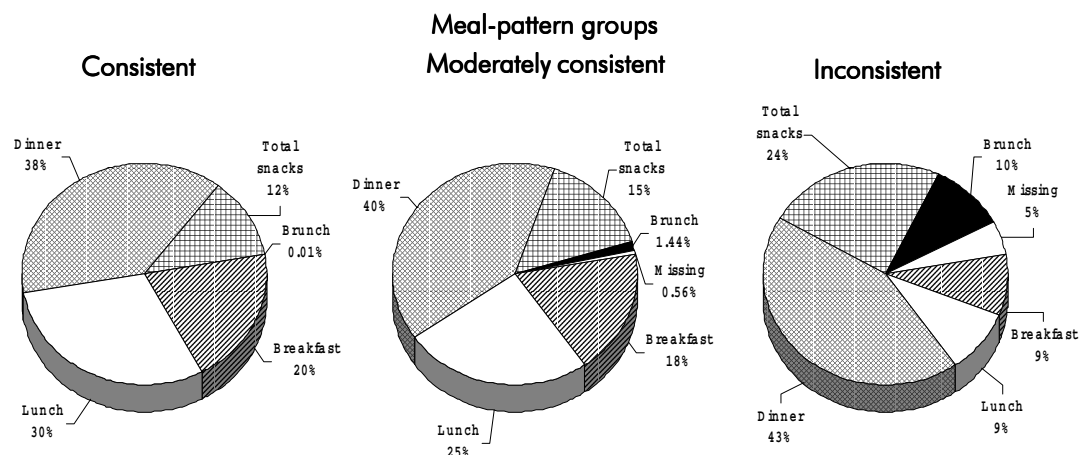


Figure 3. Distribution of energy obtained, by meal-pattern groups of 15- to 18-year-olds, 1989-91 CSFII



energy from lunch. For 11- to 14-year-olds with inconsistent meal patterns, breakfast provided 5 percent of energy, compared with almost twice that amount for the older adolescents. Brunch was more common for older adolescents with inconsistent meal patterns. Among older adolescents (15- to 18-year-olds) following an inconsistent meal pattern, dinner and snacks were far more important than they were for younger adolescents (11- to 14-year-olds).

Most nutrients follow the same pattern as that for energy (table 2). Breakfast provided the same proportion of nutrients for adolescents with consistent and moderately consistent meal patterns; whereas, lunch appeared to have lower proportions of fat, protein, carbohydrates, calcium, fiber, and sodium for adolescents with moderately consistent meal patterns. The proportions of nutrients from brunch were very low (no more than 3.5 percent) for adolescents with the consistent and moderately consistent meal patterns but closer to 10 percent for their counterparts with inconsistent meal patterns. Dinner provided similar proportions of nutrients for all three groups.

For adolescents with inconsistent meal patterns, the proportion of nutrients provided by total snacks was nearly double the nutrients provided to adolescents with consistent meal patterns. The proportion of nutrients coming from snacks for the moderately consistent group falls between those of the other two groups.

Food Consumed Based on Adolescents' Meal Patterns

Interesting differences were noted in the types of foods consumed at each eating occasion across meal-pattern groups. At breakfast, adolescents with a consistent meal pattern, compared with adolescents in the other groups, had

higher per capita consumption of both low- and medium-fat milk, egg items, low-fiber breads, cooked and ready-to-eat cereals, high-fat desserts, and juices (fig. 4). In contrast, adolescents with moderate and inconsistent meal patterns consumed more soft drinks. At lunch, adolescents with consistent meal patterns consumed more milk and higher amounts of total poultry, high-fat desserts, vegetables, fruits, and high-fat grain-based mixed dishes (pizza and macaroni and cheese, etc.), compared with other adolescents (fig. 5). There was no difference in beef/pork consumption between adolescents with consistent and moderately consistent meal patterns, which were, however, higher than that for adolescents with inconsistent meal patterns. The inconsistent and consistent groups had the same quantity of high-fat potato consumption.

For dinner, teens with an inconsistent meal pattern had higher intakes of poultry, green/orange vegetables, high-fat grain-based mixed dishes, high-fat breads, and soft drinks and a lower intake of low- and medium-fat milk, soy and legumes, and fruits, compared with their other adolescent counterparts (fig. 6). In contrast, snacks for the inconsistent group contained more grams per capita of milk items, in particular medium-fat milk items (whole milk and milk shakes) and soft drinks than was the case for the consistent group (fig. 7). All three groups of adolescents had similar intakes of fruits, high-fat desserts, high-fat salty snack items (chips, salty crackers, etc.) and high-fat grain-based mixed dishes.

Patterns within each group revealed that the amount of soft drink consumed per capita at lunch, dinner, and total snacks was higher than the amount of milk consumed (figs. 4-7). High-fat, low-fiber bread is more commonly eaten at breakfast, compared with other bread options available. Low-fiber

In total, the dinner meal and total snacks together provided more than two-thirds of the day's total energy for adolescents with an inconsistent meal pattern.

Table 2. Proportion of nutrients provided by each meal among 11- to 18-year-olds, by meal-pattern consumption¹

Nutrient	Consistent meal pattern		Moderately consistent meal pattern		Inconsistent meal pattern	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Breakfast						
Energy	19.23	9.69	18.24	10.62	7.94	8.51
Fat	16.07	11.76	15.66	11.56	6.31	7.94
Saturated fat	17.92	12.87	17.03	12.20	7.67	8.79
Protein	17.27	9.95	16.15	10.60	9.63	11.86
Carbohydrate	21.95	10.28	20.81	11.93	8.70	9.38
Calcium	28.94	16.53	26.31	16.81	15.81	18.04
Cholesterol	23.35	20.16	21.35	20.82	10.46	17.45
Iron	29.24	17.26	27.47	19.01	19.72	25.64
Folate	39.11	19.16	35.90	22.16	22.66	25.07
Zinc	20.70	13.16	18.63	15.20	10.51	14.33
Fiber	14.68	10.40	16.51	13.05	7.92	12.93
Sodium	16.23	9.54	16.17	10.40	8.86	10.52
Brunch						
Energy	0.47	3.48	2.11	5.80	8.58	13.69
Fat	0.51	3.92	2.44	7.85	9.82	16.16
Saturated fat	0.58	3.93	2.47	7.88	9.07	15.41
Protein	0.45	3.16	2.05	6.84	7.02	11.39
Carbohydrate	0.46	3.60	2.04	5.39	7.97	12.99
Calcium	0.60	3.76	2.26	7.36	8.05	16.38
Cholesterol	0.39	2.88	3.50	12.84	7.97	12.93
Iron	0.36	2.52	2.12	6.87	8.00	12.84
Folate	0.40	2.69	2.41	7.76	9.30	16.49
Zinc	0.43	3.04	1.87	5.76	8.65	15.52
Fiber	0.57	5.12	2.13	6.84	8.14	15.44
Sodium	0.39	2.88	2.11	6.30	9.89	17.09
Lunch						
Energy	31.22	11.64	24.52	12.58	11.94	18.98
Fat	33.29	14.11	26.10	14.56	12.52	20.91
Saturated fat	32.43	14.53	26.33	15.62	11.94	19.99
Protein	30.46	12.04	24.69	14.14	10.32	18.14
Carbohydrate	30.03	12.02	23.48	12.39	12.39	19.05
Calcium	30.46	15.74	24.82	16.11	10.32	19.26
Cholesterol	26.65	14.67	22.49	17.68	10.41	18.49
Iron	26.36	12.03	21.56	13.00	9.54	16.59
Folate	22.88	12.70	19.90	14.38	8.88	18.33
Zinc	27.74	12.99	23.75	14.88	10.42	18.25
Fiber	33.16	15.87	25.26	14.25	12.65	22.14
Sodium	32.26	12.70	25.06	14.12	11.52	20.20

¹The percentage may not total to 100 for each nutrient because of rounding and the small percentage of foods with a missing eating-occasion classification.

(Continued)

Table 2. Proportion of nutrients provided by each meal among 11- to 18-year-olds, by meal-pattern consumption¹ (continued)

Nutrient	Consistent meal pattern		Moderately consistent meal pattern		Inconsistent meal pattern	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Dinner						
Energy	37.72	10.53	38.01	14.60	43.21	26.07
Fat	40.17	13.68	39.79	16.77	46.58	26.58
Saturated fat	38.54	14.52	37.87	17.10	44.04	28.06
Protein	45.23	12.33	45.90	16.52	55.07	25.52
Carbohydrate	33.61	10.92	33.92	14.65	37.49	26.89
Calcium	29.86	14.20	30.84	17.28	42.09	29.05
Cholesterol	43.29	18.86	40.97	20.76	49.50	28.39
Iron	36.81	12.84	37.00	17.46	44.53	30.34
Folate	29.93	13.59	30.53	16.87	38.64	26.11
Zinc	43.80	14.72	43.86	18.95	49.59	28.25
Fiber	41.84	15.89	41.61	18.22	46.14	27.62
Sodium	44.83	12.15	44.52	16.40	52.51	26.52
Total snacks						
Energy	10.92	9.69	15.50	13.74	23.16	19.02
Fat	9.65	10.06	14.40	15.01	21.41	20.34
Saturated fat	10.16	10.94	14.78	15.44	23.38	21.52
Protein	6.38	7.17	9.85	11.30	15.36	15.93
Carbohydrate	13.35	11.53	18.06	15.16	26.91	20.41
Calcium	9.71	11.97	14.24	15.90	19.52	17.71
Cholesterol	6.05	8.59	10.09	13.08	17.83	21.74
Iron	7.06	8.62	10.45	11.87	15.82	17.82
Folate	7.48	9.93	9.79	12.26	18.75	19.36
Zinc	7.09	8.33	10.53	11.81	17.37	17.92
Fiber	9.39	10.96	13.11	13.41	22.09	19.26
Sodium	6.12	6.92	10.74	13.18	14.26	14.47

¹The percentage may not total to 100 for each nutrient because of rounding and the small percentage of foods with a missing eating-occasion classification.

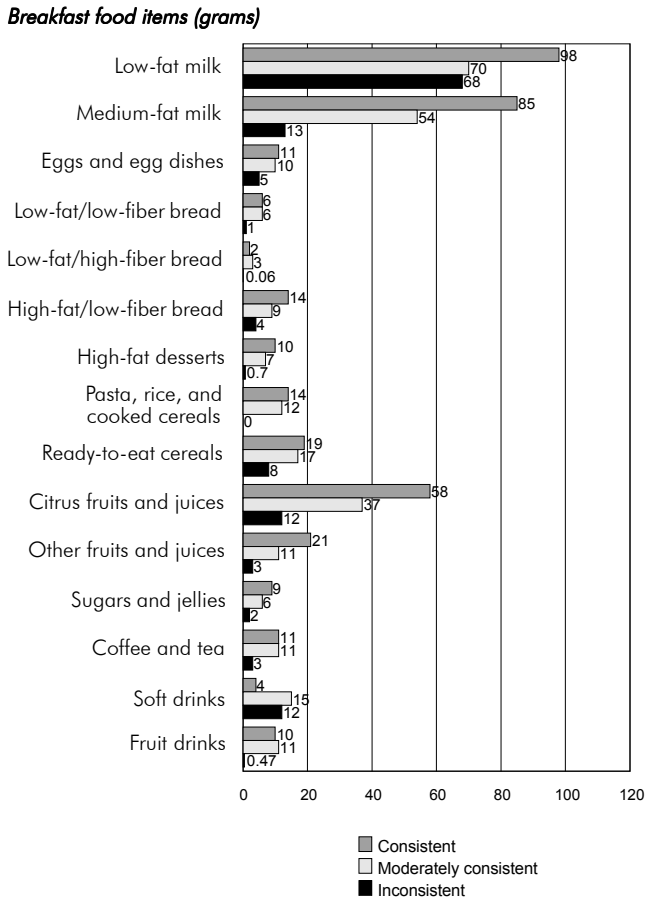
cereal is consumed more than high fiber, and citrus juices are consumed more than noncitrus juices or fruit drinks at breakfast. At lunch, medium fat beef/pork and poultry were eaten more than the low- or high-fat option. The grams per capita for luncheon meats was equally distributed among each fat option. In contrast to breakfast, the low-fat, low-fiber bread option and fruit drinks were eaten in greater amounts at lunch for the consistent and moderately consistent

groups. And for all three groups, there was a higher per capita consumption of the high-fat versus the low-fat of grain-based mixed dishes. The type of bread consumed at the dinner meal was similar to that seen at breakfast. And the higher fat version of grain-based meals was once again consumed more than the low-fat version at dinner for all three groups. Patterns within groups for the different types of foods consumed as snacks were similar.

Discussion

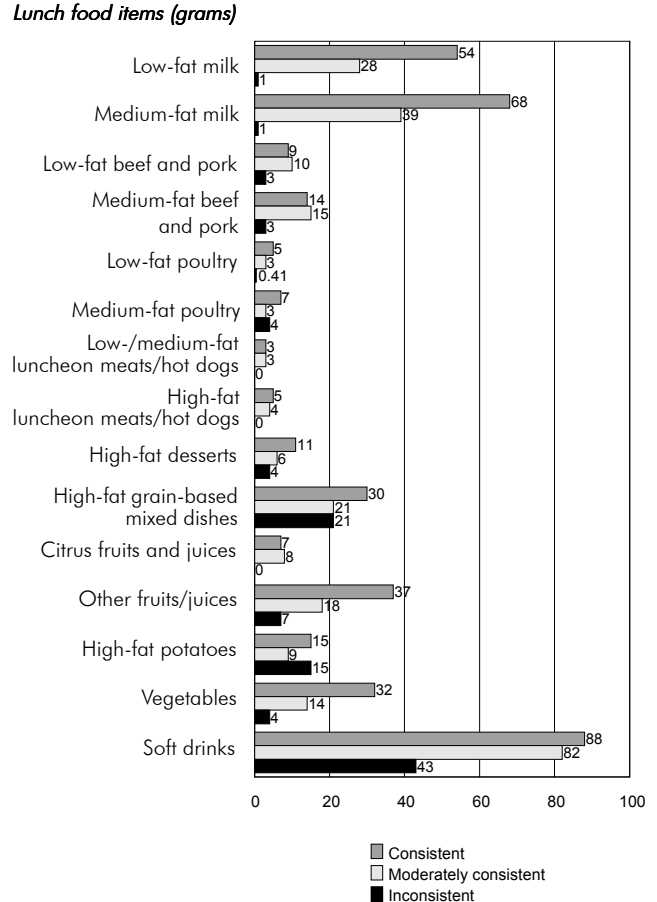
Dietary intake patterns of U.S. adolescents are poor. Skipping meals, excessive snacking, and consumption of excessive high-fat, poor nutritionally dense foods are many of the issues raised in the literature. However, few studies have used nationally representative samples to examine the meal and food patterns of U.S. adolescents. This study highlights the large variation in eating patterns among U.S. adolescents.

Figure 4. Grams consumed at breakfast by adolescents following a consistent, moderately consistent, or inconsistent meal pattern, by selected food groups¹



¹University of North Carolina at Chapel Hill food-grouping system.

Figure 5. Grams consumed at lunch by adolescents following a consistent, moderately consistent, or inconsistent meal pattern, by selected food groups¹



¹University of North Carolina at Chapel Hill food-grouping system.

In particular, we show that teens differ markedly by the proportion of food intake from each meal and the types of foods eaten, based on consistent, moderately consistent, or inconsistent meal patterns.

Regarding snacks, our results differ from the few published studies on this topic. Our study finds that snacks contribute much less to the total diet than reported previously. For most adolescents (97 percent), meals contribute, on average, 20 to 40 percent

of the total day's energy, compared with 10 to 15 percent contributed by snacks. One study has found that about 25 to 33 percent of the total day's energy comes from snacks (16). Other published studies have focused more on the frequency of snacking and the snack foods adolescents like to eat (4,5,8).

Our study shows that for all the adolescents, a higher proportion of the total day's intake of fat is consumed at dinner. Otherwise, meals and snacks

provide similar proportions of the other macronutrients. Our results regarding macronutrients offer a different view of examining macronutrient intake; others who have examined the nutrient density of meals and snacks have found that meals are higher in fat and lower in carbohydrates than are snacks (8).

The nutrient contribution of snacks is more significant for those adolescents following an inconsistent meal pattern, compared with adolescents following

Figure 6. Grams consumed at dinner by adolescents following a consistent, moderately consistent, or inconsistent meal pattern, by selected food groups¹

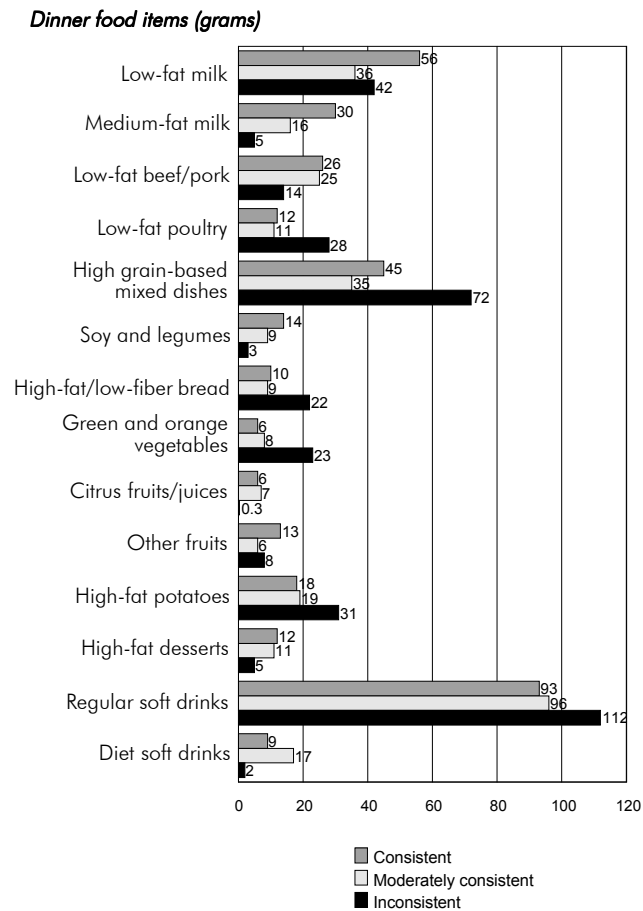
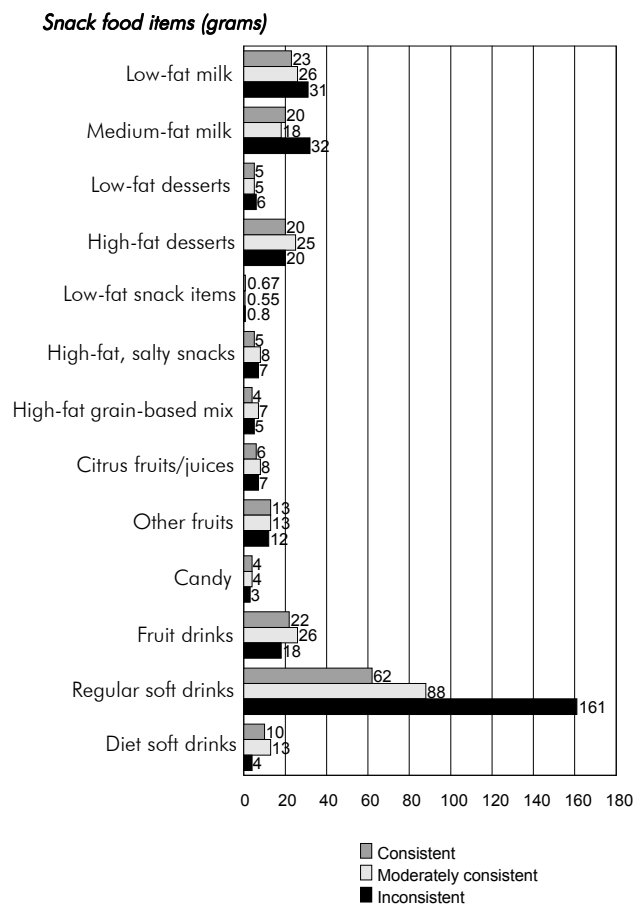


Figure 7. Grams consumed at snack by adolescents following a consistent, moderately consistent, or inconsistent meal pattern, by selected food groups¹



¹University of North Carolina at Chapel Hill food-grouping system.

¹University of North Carolina at Chapel Hill food-grouping system.

other meal patterns. This occurs simply by how this group was defined, those consuming one meal plus or minus snacks on 3 days of intake. The nutrient contribution of snacks for this adolescent group is similar to that reported by Ruxton et al. (16) in a study of 7- to 8-year-olds (n=136), from five schools in Scotland). In our study, snacks for the inconsistent group provided more of most nutrients than did breakfast or lunch with the exception of iron and folate, which were higher at breakfast. By using the 1977 Nationwide Food Consumption Survey (NFCS),

researchers found that for most adolescents, snacks compared with meals contributed significantly more magnesium, calcium, vitamin A, and vitamin C to the diet (2). For the only nutrient on which we overlapped, calcium, this was not found in the 1989-91 USDA survey. Because of the frequency of snacking and the significant proportion of energy and other nutrients that snacks provide adolescents with an inconsistent meal pattern, we believe the nutritional quality of snacks has important implications for the health status of these adolescents.

Another nutritionally important issue is adolescents' high intake of soft drinks and lower intake of milk [also noted in the 1977 NFCS survey (9)]. These consumption patterns apply to adolescents regardless of meal-pattern group. Even though adolescents with a consistent meal pattern consume the most milk, their calcium intakes are lower than recommended. Also, adolescents appear to be consuming more high-fat and low-fiber foods than the more healthful alternatives. Consuming more high-fat and low-fiber foods may have serious health consequences (i.e.,

obesity, osteoporosis, and cardiovascular diseases) if they are consumed in high amounts throughout life. The reasons for the high consumption of these types of foods may be directly related to their source (home vs. away-from-home food sources) as well as the taste preferences of adolescents. A Minnesota survey of 900 adolescents reported a strong preference for high-fat foods that related to taste appeal despite the health consequences associated with consumption of these foods (21).

A limitation of this study is the small sample size for the group with an inconsistent meal pattern. However, there were 27 million adolescents in the United States (24) around the time of this survey. Thus 950,000 U.S. adolescents are represented as following an inconsistent meal pattern for 3 days. In general, adolescents are consuming a large quantity of carbonated beverages and few fruits and vegetables. And for adolescents who follow an inconsistent meal pattern, dinner and snacks provide a disproportionate amount of nutrients. Differences are also noted in food selection: adolescents following an inconsistent meal-pattern group consume more types of fast foods. Both meal-pattern and food-selection behaviors should be used to target future public health messages to adolescents. More research is warranted on the determinants of adolescent eating patterns. Information on the determinants could help guide interventions for changing eating-pattern behaviors noted in this study.

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Associations Between the Milk Mothers Drink and the Milk Consumed by Their School-Aged Children

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The declining milk intakes of U.S. children are of concern because milk is the primary source of calcium in children's diets. The aim of this study was to determine the predictors of milk consumption in U.S. school-aged children (ages 5-17) by using dietary intake data from the USDA 1994-95 Continuing Survey of Food Intakes by Individuals (CSFII). Sociodemographic variables, type of milk consumed (skim, 1%, 2%, whole, or none), and mothers' milk intake (type and amount) were examined as possible predictors. The sample consisted of 1,303 CSFII participants. Sample weights were applied to allow for generalizations to the entire U.S. school-aged population. Children's average milk intake was 300.4 grams per day. For every gram of milk a mother consumed, her child's intake increased by 0.64 grams. Two percent milk was the most commonly consumed milk among the children. For each type of milk consumed by mothers, children were at least 30 times more likely to drink that same type. The strong association between the milk consumed by mothers and the amount and type of milk consumed by U.S. school-aged children should be considered when designing intervention programs aimed at increasing children's milk intake.

Evidence suggests that attainment of peak bone mass by early adulthood may be the most effective protection against osteoporotic fractures later in life (23). Throughout the developmental years, adequate calcium intake is essential to support bone growth (16). Substantial evidence exists linking higher calcium intakes with improved skeletal health in children (2,3,16,21,23,30). Data from the U.S. Department of Agriculture's (USDA) nationwide food consumption surveys reveal that most U.S. school-aged children have calcium intakes that are below recommended levels (4).

Calcium intake is especially problematic for girls, with 59 percent ages 6-11 and 86 percent ages 12-18 not meeting recommendations (4).

Milk and dairy products are the primary source of calcium in children's diets (8). Johnson and colleagues found that in a large sample of school-aged children, on average, only those children who consumed milk at the noon meal met their daily requirement for calcium (15). Rising consumption of soft drinks has been shown to have a negative effect on calcium intake among children and adolescents by

competing with milk as a preferred beverage (9). On the other hand, whole and 2% milk are leading sources of fat and saturated fat in the diets of U.S. children (33). USDA food consumption survey data indicate that for children in all age groups, mean total and saturated fat intakes exceed the recommended levels (4).

Because milk is an important contributor of both calcium and fat in the diets of children, it is important to identify the predictors of children's milk intake (both type and amount). The aim of this study was to identify predictors of U.S. school-aged children's milk intake. Familial aggregation studies show similarities in nutrient intake between parents (especially mothers) and their children (26). Hence, milk consumption patterns of mothers were included, along with sociodemographic variables, in the research model as possible predictors of children's milk intake.

Findings from this study will assist nutrition policymakers, school nutrition personnel, school administrators, nutrition educators, and parents in developing appropriate intervention strategies to address the problem of children's declining milk consumption.

Methods

Sample

The research sample was obtained from the 1994-95 USDA Continuing Survey of Food Intakes by Individuals (CSFII). The CSFII is a continuing component of the USDA Nationwide Food Consumption Survey. The surveys provide data on demographics as well as dietary intake for a nationally representative sample of noninstitutionalized persons residing in the United States. The 1994-95 survey included data on the food and nutrient intakes of 5,598 individuals. The response rate of the

survey was 80 percent for Day 1 dietary intake data and 76 percent for Day 2 (4). These response rates are acceptable by research standards (7).

Trained interviewers used the multiple-pass 24-hour recall method to collect 2 days of dietary intake data from each respondent. The multiple-pass 24-hour recall method has been validated as an accurate measure of children's dietary intake (11). All children ages 5 to 17 years with 2 complete days of dietary intake data (N=1,303) and their mothers were included in this study.

Study Variables

The study investigated predictors of both the amount and type (skim, 1%, 2%, whole, or none) of milk consumed by U.S. school-aged children. The following sociodemographic variables were assessed as possible predictors: Child gender, age, and race; household income; geographic region; urbanization; and mother's age, education, and occupation. Participation in the USDA Food Stamp Program and participation in the USDA national school lunch and school breakfast programs were also included as possible predictors of a child's consumption of milk. Milk is required to be served in the national school lunch and school breakfast programs (5).

Mothers' milk consumption patterns (both type and amount) were included as potential predictors. A mother's nutrient intake has been shown to influence her child's nutrient intake (26). In addition, studies by Pelletier and colleagues indicated that among adult milk drinkers, consumption of lower fat versions of milk (1% and skim) was associated with increased average daily milk consumption (27). If the same is true for children, promotion of 1% and skim milk in this population could have a positive influence on calcium intake.

The dependent variables in the analysis were "Child Milk Amount" and "Child Milk Type." Child Milk Amount was defined as the 2-day mean intake in grams of fluid milk consumed by the sample child. The 7,250 food codes in the CSFII database were searched, and all codes whose primary ingredient was fluid cows' milk were included. Items such as flavored milk, evaporated milk, dry reconstituted milk, eggnog, and milk shakes were included. However, items such as flavored drinks (e.g., Yoo-hoo[®]), canned meal replacements (e.g., Instant Breakfast[®]), and infant formulas were excluded.

Child Milk Type was defined as the type of milk (skim, 1%, 2%, whole, or none) most often consumed by the sample child. The CSFII food codes were searched and all fluid milks were grouped into one of the four categories: Skim, 1%, 2%, or whole. For example: "milk, chocolate, skim milk based" was categorized as skim; "milk, dry, reconstituted, whole" was categorized as whole. The category consumed in the greatest quantity in grams over 2 days by each sample child was considered the Child Milk Type.

Statistical Analysis

The Statistical Export and Tabulation System (SETS) software and the Statistical Analysis System (SAS) were used to format and recode the data for statistical analysis. Statistical significance was set at $p < 0.05$ for all analyses. To compensate for variable probabilities of selection, differential nonresponse rates, and sampling frame considerations, we applied sample weights in both the descriptive and comparative analyses. The Survey Data Analysis System (SUDAAN) was used to weight the sample, compute variances, and run the statistical procedures. Applying sample weights allows the findings to be generalized to the entire U.S. population of school-aged children. Analysis of variance and analysis of

covariance were used to determine both the bivariate and multivariate effect of each independent variable on the dependent variable, Child Milk Amount. Only those independent variables that were significant at the bivariate level were included in the final multivariate model. Chi-square statistics were used to identify independent variables associated bivariate with Child Milk Type. The Multinomial Logistic Model was used for the multivariate analysis of Child Milk Type. As with the Child Milk Amount model, only those independent variables that were significant at the bivariate level were included in the multivariate model.¹

The results of the multinomial model were presented as odds ratios, which describe the change in likelihood of one outcome (e.g., drinking whole milk) versus another outcome (e.g., drinking 2% milk) given a particular characteristic or level of predictor (e.g., being a male compared with being a female) (31). In multinomial logistic models, each outcome (skim, 1%, whole, none) is compared with a reference category, which we determined to be 2% milk—the most common type of milk consumed. Odds ratios greater than 1.0 indicate an increased likelihood of consumption of that type of milk (compared with 2%) for children with that characteristic; whereas an odds ratio of less than 1.0 indicates a lower likelihood of consuming that type of milk (compared with 2%) for children with that characteristic. Both unadjusted and adjusted odds ratios were calculated.

¹The Multinomial Logistic Model is an extension of the logistic regression model. While logistic models can only process dichotomous outcome variables, the multinomial model can include outcomes with two or more categories (25).

Table 1. Amount and type of milk consumed¹ by children ages 5-17 who provided 2 days of dietary intake data, 1994-95 CSFII

Type of milk consumed	Percent	Mean amount (grams)
Skim	11.4	376.6 ²
1%	9.6	407.9
2%	32.0	385.4
Whole	28.4	347.8
None	18.6	0.0

¹Two-day mean intake of milk (grams/day)=300.4+11.9.

²There was no association between type (skim, 1%, 2%, whole) and amount of milk consumed. N=1,303.

This allows for the examination of the influence the independent variables have on the dependent variable (Child Milk Type) both before and after the model is adjusted for all the covariates. Any odds ratio with 95 percent confidence intervals that included 1.0 was not considered statistically significant.

Results

Demographics

The unweighted sample of CSFII respondents consisted of 1,303 participants. The children's average age was 11.6 years; the mothers', 39 years. Most of the sample was white, and was divided relatively equally between boys and girls. The sample was geographically diverse and representative of the U.S. population. Most participants resided in suburban areas, and the average yearly household income was about \$44,000. The mothers' most common classes of occupation included professional/technical and clerical/sales. Twenty-four percent of the children were eligible to receive free or reduced-price lunches, and 14 percent were eligible to receive free or reduced-price breakfasts.

Milk Consumption

The 2-day mean milk intake for children was 300.4 grams per day (table 1). Mothers' mean intake was 109.0 grams per day. Of the types of milk consumed by children (skim, 1%, 2%, whole, and none), 2% milk was most commonly consumed, followed by whole milk. Two percent milk was also the most commonly consumed type by mothers, followed closely by whole milk. No significant associations were found between the type (skim, 1%, 2%, or whole) and amount of milk consumed by children.

Predictors of the Amount of Milk Consumed by Children

Based on the bivariate analysis, the type and amount of milk consumed by mothers, geographic region, and the child's gender were associated with Child Milk Amount. Hence, these variables were entered into the multivariate model. In this model, the type of milk mothers consumed was not significant; however, geographic region, the child's gender, and the amount of milk mothers consumed each had a significant effect on the amount of milk consumed by children. In the multivariate analysis, children from the Midwest had significantly higher milk intakes than children from

Table 2. Amount of milk consumed by children ages 15-17: Analysis of covariance (ANCOVA)¹ of significant relationships, 1994-95 CSFII

Variable	Beta coefficient (±SE Beta)	P-value
Mothers' milk intake (milk type)		
Skim	1.94 ± 35.1	0.96
1%	28.3 ± 28.6	0.33
2%	4.3 ± 32.0	0.89
Whole	29.0 ± 31.7	0.37
None	0.00 ± 0.00	-
Mothers' milk intake (milk amount, grams)	0.64 ± 0.1	<0.001
Region		
Northeast	11.6 ± 26.9	0.66
Midwest	71.8 ± 35.6	0.05
West	49.3 ± 29.7	0.10
South	0.0 ± 0.0	-
Child's gender		
Male	120.0 ± 16.9	<0.001
Female	0.0 ± 0.0	-

¹F value for overall model = 137.07; P-value for model <.001; Intercept = 145.09.

- = No reference category.

N=1,303.

For every 1 gram of milk a mother consumed, her child's intake increased by 0.64 grams.

the South (table 2). Boys in the sample consumed 120 grams more milk per day than girls consumed. Maternal milk intake was significantly and positively associated with the amount of milk children consumed. For every 1 gram of milk a mother consumed, her child's intake increased by 0.64 grams.

Predictors of the Type of Milk Consumed by Children

Of the 12 independent variables, the children's age, gender, and race; geographic region; eligibility for free and reduced-price school lunch and breakfast; mothers' age and level of education; and the amount and type of milk consumed by mothers had a significant bivariate effect on Child Milk Type. Urbanization and participation in the Food Stamp Program were not significant predictors, and were therefore dropped from the multivariate model.

In the multivariate model, older children were more likely to drink skim milk or no milk than were younger children (table 3). Children who paid full price for lunch were more likely to drink skim milk, compared with children who were eligible to receive (and presumably received) free school lunch. Children from the Northeast were more likely than children from the South to drink 1% milk; whereas, children from the South were more likely than children from the Midwest to drink whole milk or no milk. Black children were more likely to drink whole milk or no milk than were White children. Girls were twice as likely to drink no milk, compared with boys.

The type of milk mothers drank was a very strong predictor of the type of milk children drank. Two percent milk was used as the reference category for Child Milk Type, because this was the type most commonly consumed by the

Table 3. Milk consumed by children ages 5-17: Results of unadjusted and adjusted odds ratios,¹ 1994-95 CSFII

	Skim			1%			Whole			None		
	Unadj OR ²	Adj OR	95% CI ³	Unadj OR	Adj OR	95% CI	Unadj OR	Adj OR	95% CI	Unadj OR	Adj OR	95% CI
CHILD												
Age (years)												
13-17	1.8	2.2	1.2, 3.9	0.7	1.2	0.6, 2.6	0.8	1.2	0.7, 2.1	3.8	3.9	2.2, 7.1
9-12	1.3	1.6	0.9, 2.9	0.7	0.9	0.4, 1.7	0.8	1.1	0.7, 1.7	1.0	1.0	0.5, 1.9
5-8	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Race												
Black	0.1	0.4	0.1, 1.2	0.1	0.5	0.2, 1.6	6.4	3.3	1.7, 6.4	3.2	3.0	1.2, 7.6
White	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Other	0.5	1.0	0.3, 3.8	0.7	0.4	0.1, 1.5	2.7	1.7	0.6, 4.6	0.8	1.3	0.4, 4.1
Gender												
Female	1.4	1.5	0.9, 2.7	0.9	1.2	0.7, 2.2	0.9	0.7	0.4, 1.1	2.1	2.1	1.1, 4.0
Male	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
School lunch												
None	1.3	1.0	0.4, 2.8	3.6	2.3	1.2, 4.4	1.2	0.9	0.5, 1.7	1.4	1.0	0.6, 1.9
Free	0.1	0.2	0.1, 0.4	1.1	1.3	0.3, 4.9	2.6	0.8	0.3, 2.6	0.6	0.3	0.1, 1.1
Reduced	0.4	1.2	0.2, 7.4	0.7	0.9	0.2, 4.6	2.0	1.4	0.4, 4.2	0.8	0.8	0.3, 2.4
Full	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
School breakfast												
None	2.7	2.8	0.5, 15.5	1.4	0.7	0.1, 4.2	3.0	3.9	0.8, 18.5	1.9	1.8	0.4, 8.6
Free	0.8	8.6	1.1, 69.8	1.0	1.9	0.2, 21	7.3	3.6	0.6, 23.9	1.8	3.4	0.4, 26.7
Reduced	0.0	0.4	0.1, 3.4	1.3	2.6	0.3, 27	7.9	3.1	0.4, 22.9	2.7	3.0	0.4, 21
Full	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
MOTHER												
Age (years)												
40-60	2.4	0.7	0.1, 3.9	2.1	1.7	0.4, 7.1	0.4	0.9	0.4, 2.2	2.7	1.2	0.4, 3.8
30-39	1.4	0.8	0.1, 4.5	2.3	2.8	0.7, 11	0.7	1.5	0.6, 3.9	1.4	1.0	0.3, 3.0
20-29	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Education												
College graduate	2.1	2.0	0.5, 8.0	3.6	2.5	0.9, 6.8	0.1	0.3	0.1, 0.7	1.2	1.3	0.4, 3.8
Some college	2.0	1.5	0.7, 3.1	2.2	1.6	0.8, 3.3	0.4	0.5	0.3, 0.8	0.8	0.8	0.4, 1.4
High school	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Type of milk consumed												
Skim	37.7	30.0	9.4, 95.8	3.2	3.7	1.1, 12	3.7	4.1	1.2, 14.6	4.5	4.3	1.4, 13
1%	4.3	4.7	0.8, 28.3	67.2	114	31, 416	5.2	8.2	2.6, 25.8	8.1	8.6	3.9, 19
Whole	4.6	5.9	1.5, 23.4	2.8	2.2	0.5, 8.5	50.1	45.8	17.1, 122.8	7.4	5.9	1.8, 19
None	7.2	7.2	2.0, 26.1	3.1	4.2	1.2, 15	10.8	13.0	6.0, 28.1	6.9	3.8	1.6, 9.2
2%	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Amount of milk consumed (grams)												
> 360	1.0	0.9	0.2, 3.2	1.6	1.3	0.3, 6.0	1.0	2.0	0.8, 5.1	0.4	0.7	0.3, 2.0
241-360	1.9	1.4	0.5, 4.3	1.8	2.8	0.6, 12	1.3	1.4	0.4, 4.3	0.2	0.3	0.1, 1.1
121-240	0.6	0.6	0.1, 2.4	0.9	1.0	0.3, 2.8	0.5	0.9	0.4, 2.3	0.3	0.5	0.2, 1.3
0-120	1.0	1.0	0	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
REGION												
Northeast	1.3	1.5	0.7, 3.2	4.5	5.5	1.3, 23	1.1	1.1	0.4, 2.8	0.8	0.9	0.4, 2.1
Midwest	0.6	0.8	0.3, 2.0	0.8	0.9	0.2, 3.3	0.3	0.4	0.2, 0.7	0.3	0.4	0.2, 0.8
West	0.7	1.0	0.4, 2.2	2.0	4.0	1.0, 16	0.7	0.5	0.2, 1.3	0.5	0.7	0.3, 1.7
South	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–

¹Consumption of skim, 1%, whole, or no milk is compared to 2% milk, as 2% is the most commonly consumed milk type among both sample children and mothers. Odds ratios whose confidence limits do not include 1.0 are bolded.

²Odds ratios.

³Confidence intervals.

– = No reference category.

N=1,303.

For each type of milk . . . consumed by mothers, children were at least 30 times more likely to drink the same milk type as their mothers.

sample. For each type of milk (skim, 1%, whole, or none) consumed by mothers, children were at least 30 times more likely to drink the same milk type as their mothers. In addition, the more educated a mother was, the less likely her child was to drink whole milk.

The odds ratios for school breakfast, mother milk amount, and mothers' age were not significant; the 95 percent confidence intervals for these variables included or were very close to 1.0.

Discussion

The findings of this study demonstrated that the amount and type of milk consumed by mothers strongly predicted the amount and type of milk consumed by their school-aged children. This study also demonstrated that differences in children's milk consumption patterns were associated with a number of demographic variables. These included regional differences; differences associated with mothers' level of education; and children's age, gender, and race.

Limitations

The problem of underreporting of food intake is a concern when interpreting dietary intake data (24). When food consumption surveys are used to obtain dietary intake data, both adults and adolescents tend to underreport their food intake (22). However, there is agreement that individuals of all ages are prone to exaggerate those foods they perceive to be healthful and to underreport foods that are commonly considered "sin" foods (i.e., foods high in sugar and fat) (22). Milk is generally perceived as a healthful food and was not among those foods most likely to be underreported in the CSFII (18). Hence underreporting was not likely to be a significant problem in this study.

Factors Influencing the Amount of Milk Consumed by U.S. School-Aged Children

The amount of milk consumed by mothers was associated strongly and positively with the amount of milk consumed by their children. Parents guide and direct children's food choices (17). Wardle and colleagues studied parental influences on children's consumption patterns and found significant mother-child correlations for consumption of dietary fat as well as fruit and vegetable consumption (34). Harper and Sanders observed that children sample unfamiliar food consistently more often when they view their parents partaking of the food (10). Children whose mothers do not drink milk may be less likely to sample milk, perceiving milk as an unfamiliar food.

Parental monitoring may also influence children's milk consumption. Research has shown that parental monitoring can have a marked effect on children's food selection (17). Researchers interviewed over 50 focus groups with children nationwide regarding the factors that influence their consumption of calcium-rich foods. They discovered that a large percentage of children were neither encouraged nor required by their parents to drink milk at home (36).

In our study, other predictors of the amount of milk consumed by U.S. school-aged children included children's gender and region. Compared with the girls, the boys consumed an average of 128 grams per day more milk. This is an important finding, because girls' calcium intakes are also lower than boys' (4). Girls' energy needs are typically lower than boys'. These lower energy needs may be reflected in lower intakes of all foods and beverages, including milk. On the

other hand, it is possible that some girls may be restricting their food intake and eliminating or reducing their milk intake to cut calories and fat. Girls may initiate dieting behaviors as early as age 6. In one Ohio study of school-children Grades 1 through 5, close to twice as many girls as boys reported restricting or altering their food intake (1). Adequate calcium intake is especially important for girls—being female is an independent risk factor for developing osteoporosis (8).

In our study, differences found in children's milk intake by region of residence are also important. Southern girls have the lowest calcium intakes, compared with girls in other regions (12). This study determined that children in the South also have the lowest milk intakes. In addition, they were more likely than children from other regions to drink no milk at all. Increased milk consumption among children in the South could be influential in improving their calcium intakes.

Race did not predict the amount of milk consumed. Lactose maldigestion appears to vary widely among different ethnic and racial groups and in the United States is estimated to be about 15 percent in Whites, 80 percent in African Americans, and 90 percent in Asian Americans (19). However, a dairy-rich diet was found to be well tolerated when fed to African-American adolescent girls for 21 days (29). In this study race did not influence total milk intake. This is consistent with findings that most people with lactose maldigestion are able to tolerate a glass of milk at a meal without developing any significant symptoms (32).

Factors Influencing the Type of Milk Consumed by U.S. School-Aged Children

The results of this study also demonstrated that a variety of factors influenced the type (skim, 2%, 1%, whole, none) of milk consumed by U.S. school-aged children. The type of milk consumed by the mothers was associated strongly with the type of milk consumed by their children. This finding was consistent with results of studies conducted by Fischer and Birch, demonstrating that exposure to a food over time will result in the development of a preference for the food among children (6). Children who have continued exposure to 1% and skim milk in the home and who observe their mothers consuming these types of milk are likely also to drink these types of milk. The type of milk consumed by children can have an effect on total diet quality. Children who drink skim milk come closer to meeting dietary recommendations for fat and saturated fat in their total daily diet (15,28). Individuals in all age groups who consume 1% and skim milk also consume more fruits and vegetables and less red meat (20).

On the other hand, the cross-sectional nature of these data make it difficult to sort out the directionality of the association between the type of milk consumed by mothers and the type consumed by their children. Thus, it is possible that mothers may simply drink the type of milk their children like, and if the children do not like milk, mothers may not buy it just for themselves.

Prior studies have shown that mothers' education level is correlated with their children's nutrient intake (13). In our

study, mothers with the fewest years of education were more likely to have children who drank whole milk or no milk at all, compared with mothers who were more highly educated. Nutrition information may not be reaching less educated mothers. It is also possible that 1% and skim milk are not as accessible to them. Whole milk is sometimes the only choice available in lower income communities (35).

Children from the South (compared with those in other regions) as well as black children (compared with white children) were more likely to drink whole milk or no milk at all. It may be necessary to target the Southern United States for outreach, because children in the South have the highest fat and saturated fat intakes and the lowest calcium intakes of children in all regions in the United States (14).

Several other variables were associated with the type of milk consumed by school-aged children. Older children and girls were more likely to drink skim milk than were younger children and boys, respectively. Findings also showed that children eligible to receive free school lunch were less likely to drink skim milk than were children who paid full price. Beginning in the fall of 1996, schools participating in USDA school nutrition programs were required by law to serve meals that on average meet the dietary guidelines for fat, saturated fat, cholesterol, and sodium (5). Because it is difficult to meet the dietary guidelines when a meal includes whole milk (15), participating schools may now be serving and marketing 1% and skim milk more vigorously. Further research using future USDA surveys is needed to confirm this possibility.

Implications

The findings of our study demonstrate that mothers' milk consumption patterns are potentially strongly associated with the type and amount of milk consumed by U.S. school-aged children. Interventions aimed at increasing children's milk consumption should consider the strong influence of maternal modeling on children's milk intake. Mothers should be encouraged to serve as positive role models for their children by drinking skim or 1% milk regularly. In addition, it becomes apparent that milk promotion campaigns targeting women for prevention of osteoporosis may have a spillover effect of increasing children's milk consumption.

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The Effects of Food Advertising Policy on Televised Nutrient Content Claims and Health Claims

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This study examined changes in nutrient content and health claims made in televised food advertisements before and after the Federal Trade Commission's 1994 food advertising policy, which is predicated on the Nutrition Labeling and Education Act (NLEA). Our sample included 105 and 108 advertisements broadcast during prime-time in 1992 and 1998, respectively. The rate that nutrient content and health claims were used was low in both years. And none of the advertisements contained diet-disease health claims authorized by the Food and Drug Administration. Although current food advertising policy virtually eliminates deceptive advertisements, it may also limit diet-disease health claims in broadcast media. More flexibility in presenting diet-disease health claims in broadcast media advertising could increase the use of such claims and contribute to the goal of NLEA to educate consumers.

The decision to purchase a food is influenced by many factors, one of which is advertising (7,8,36,43). Advertisements traditionally promoted foods and beverages by featuring mainly sensory qualities, convenience, and economic factors (10,44). In recent years some of these advertisements have tried to influence consumer-purchasing decisions by also touting nutritional or health qualities or both (29,32).

Food advertising, like advertising for nearly all products, is regulated by the Federal Trade Commission (FTC). Historically, the FTC permitted nutrient claims (e.g., "high in fiber") in advertising and never formally prohibited diet-disease health claims (i.e., claims that explicitly linked the consumption [or lack of consumption] of a particular nutrient or other substance in a food to

a disease or health-related condition [e.g., "a calcium-rich diet can help prevent osteoporosis"]) (32). However, if diet-disease health claims were made on the label, the Food and Drug Administration (FDA) reclassified the food as a drug and required the manufacturer to adhere to the drug-approval procedures of the FDA (29). For years food advertisers did not make diet-disease health claims about their products, but as the connection between diet and health became increasingly clear, food manufacturers and advertisers grew interested in using this information to sell their products. Consequently, in 1984, the Kellogg Company initiated an advertising campaign that explicitly described the relationship between a high-fiber diet and reduced risk of certain types of cancer. When the FDA failed to prosecute this direct violation of

diet-disease health claims, other food manufacturers launched similar campaigns (18,29). Marketing strategies that included diet-disease health claims did provide consumers with information about nutrition and health. However, in their zeal to gain a competitive edge, advertisers also pushed the limits of what science could support and what consumers would believe (18,25).

To stem questionable marketing practices and restore consumer confidence, the Nutrition Labeling and Education Act (NLEA) was passed in 1990 and became fully effective in 1994 (27). The NLEA overhauled nutrition labels on food packages, expanded the scope of nutrition labeling, explicitly defined nutrient content claims, and regulated diet-disease health claims (25). While the new food-labeling regulations did much to improve the quality of information on food packages, these regulations did not extend to food advertising (41). Fortunately, in its efforts to prevent deceptive or misleading claims, the FTC announced in 1994 that it would apply the standards set forth in the NLEA to evaluate nutrient content and diet-disease health claims made in food advertisements (14). The FTC reported that its goal was to create a food advertising policy that would help ensure that food advertising messages are congruent with data presented and are permitted on food labels (15).

While food and beverage advertisements appear in all types of print, broadcast, and electronic media, television is the preferred advertising medium of food manufacturers—over 75 percent of their 1997 advertising budget was spent on televised advertising (17). The food and alcohol industry accounted for more than one-sixth of the \$73-billion mass media advertising market; only the automobile industry spent more on advertising (17).

Although some studies have examined the nutrient content claims and health claims in food advertising, few have focused on televised advertising. Furthermore, no studies could be located that compared changes in nutrient content claims and health claims over time or examined the effect of the NLEA and FTC food advertising policy on televised food advertisements. Thus the purpose of this study was to examine changes in the nutrient content claims and health claims made in televised food advertisements before and after the enactment of the new food advertising policy of the FTC, a policy which is based on the NLEA, and to determine whether the use of claims varied by type of food product advertised.

Methods

Sample

In the autumn of both 1992 and 1998, 17.5 hours of top-ranked, prime-time¹ were videotaped. This study focused on prime-time and major networks because they traditionally have the largest viewing audience (35). The sample comprised all commercials broadcast during the sampling period. Commercials (i.e., all non-program time) included advertisements, public service announcements, and promotions for television programs. Although all commercials were recorded and analyzed, only data pertaining to food advertisements are presented here. A food advertisement was defined as a paid-commercial announcement that specifically promoted a food, beverage, or dietary supplement intended for human consumption.

¹Prime-time refers to programming broadcast from 8 p.m. to 11 p.m. Monday through Saturday, and 7 p.m. to 11 p.m. on Sunday. Major networks refer to *ABC*, *CBS*, *NBC*, *Fox*, and *WB*; note *WB* became a network in 1998.

Instrument

The food advertisements were content and textually analyzed by using the study instrument that was adapted from those reported elsewhere (5,19,28,38,40,50). Content analysis permits systematic, objective evaluation of visual and linguistic elements (6,24). Textual analysis allows researchers to investigate how linguistic elements are used, their significance, and their contribution to understanding a topical area (4,38).

Content analysis began by eliminating all nonfood commercials. All food advertisements were then classified into 11 food categories based largely on the USDA Food Guide Pyramid (47): Breads and cereals, vegetables, fruits, protein-rich foods (i.e., eggs, meat, poultry, fish, shellfish, nuts, and seeds), dairy products, high-sugar foods (e.g., syrup, candy, and soft drinks), high-fat foods (e.g., butter, oils, and salad dressing), alcohol-containing beverages (i.e., wine), calorie-free beverages, dietary supplements, and miscellaneous items (i.e., seasonings).

Restaurant advertisements frequently highlighted a variety of food items that together comprised a meal. Thus to evaluate the nutritional value of the foods advertised, we assigned all items in an advertised meal to the appropriate food categories. In addition, combination foods (e.g., fast-food sandwiches and soups) were broken down into their component parts and appropriately assigned to two or more of the food categories. Foods in the first five categories listed previously were further classified by nutrient density: low, moderate, and high. Methods described in detail elsewhere were used to classify density (51). In brief, foods low in nutrient density tended to be ones that are highest in fat in each of the first five categories (e.g., pastries, French fries, coconut, luncheon meats, and whole milk). Foods moderate in

nutrient density were less nutrient dense than were foods high in nutrient density (e.g., breads made with enriched flour instead of whole grains, candied sweet potatoes instead of plain vegetables, fruits canned in syrup rather than fresh or canned in unsweetened juice, fat-trimmed beef instead of skinless poultry white meat, or lowfat instead of nonfat milk). Foods high in nutrient density provided the greatest level of nutrients per kilocalorie.

The subsequent step, requiring textual analysis, involved identifying and coding nutrient content claims as either (a) *Contains Specific Nutrient* or (b) *Minimizes (or eliminates) Specific Nutrient*. Nutrient content claims, defined in the FDA and USDA's food-labeling regulations, include 11 core terms that can be used to describe the nutrient content of foods: good source, more, high, free, low, lean, extra lean, reduced, less, light, and fewer (42). An advertisement that indicated a food contained a nutrient was classified as a *Contains-Specific-Nutrient* content claim. For example, the advertisement may have included the terms *good source of vitamin C, more fiber, high in calcium*, or used a similar inclusionary adjective followed by a nutrient name. An advertisement indicating a lack of or minimal nutrients or calories was coded as a *Minimizes-Specific-Nutrient* content claim. This type of advertisement may have included the terms *sugar free, low fat, lean meat, reduced saturated fat, less cholesterol, fewer calories*, or used a similar exclusionary adjective followed by a nutrient name.

The last step, also requiring textual analysis, involved identifying and classifying health claims as general wellness claims, for example, "healthy"

and "good for you"² or specific health claims: for example, describing the relationship of a food or nutrient to health or disease. Specific health claims were further grouped according to the 10 diet-disease health claims authorized by the FDA, as of September 1998 (26):

- calcium and osteoporosis
- sodium and hypertension
- dietary fat and cancer
- dietary saturated fat and cholesterol and risk of coronary heart disease
- fiber-containing grain products, fruits, and vegetables and cancer
- fruits, vegetables, and grain products that contain fiber, particularly soluble fiber, and risk of coronary heart disease
- fruits and vegetables and cancer
- folate and neural tube defects
- dietary sugar alcohols and dental caries
- dietary soluble fiber (such as that found in whole oats and psyllium seed husks) and coronary heart disease

Data Analysis

Data from each food advertisement were recorded, and all foods and claims were categorized independently by one researcher. All coding was checked for inter-observer reliability by independent double coding of the food advertisements by a second researcher. All discrepancies were resolved to reach unanimous agreement. For every 3 hours of recorded programming, the researchers alternated coding the advertisements in 1992 and 1998. This procedure helps to avoid a systematic bias that might have been caused by

²FDA food-labeling regulations categorize "healthy" claims as a nutrient content claim. However, because specific nutrients were not termed "healthy," claims were categorized in this study as general health claims.

The nutrient-density advertising trends indicate a deteriorating "prime-time diet" that promotes dietary patterns implicated in the etiology of obesity, heart disease, and certain cancers.

chronological trends. The test-retest method was used to establish intra-coder reliability (21). That is, each researcher coded commercials that were shown in 1 hour of televised programming that was representative of the study sample. This coding was done twice, with a 14-day interval separating the coding periods. The intra-coder coefficients indicated a high index of consistency: 0.92 and 0.93.

The frequency that food categories were advertised was tabulated over the two sampling periods. A chi-square statistic was used to determine whether significant differences existed in the food categories advertised as well as in the nutrient density of foods advertised (1,16) and to determine whether significant differences in nutrient and health claims occurred between 1992 and 1998 (16).

Results

Changes in Food Advertisement

During the sampling period for 1992, there were 535 commercials, of which 105 were food advertisements; during 1998, there were 700 commercials, of which 108 were food advertisements. Only findings related to food advertisement are reported here. Except for calorie-free beverages and dietary supplements, the frequency with which each food category was advertised was similar in 1992 and 1998 (table 1).

In 1992 and 1998, breads and cereals were the most frequently advertised foods, followed by vegetables, protein-rich foods, and high-sugar foods. These four food categories were the most frequently advertised—mostly because of the substantial number of advertisements for fast-food restaurant meals (i.e., meat-containing sandwiches, French fries, and regular soft drinks). For either year, fruits and dairy products were rarely advertised.

Table 1. Televised food advertisements during prime-time viewing, 1992 and 1998

Food category	Year			
	1992		1998	
Number of advertisements	169		209	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Breads and cereals*	60	36	62	30
High nutrient density	5	3	0	0
Moderate nutrient density	47	28	50	24
Low nutrient density	8	5	12	6
Vegetables*	33	20	28	13
High nutrient density	16	9	3	1
Moderate nutrient density	0	0	0	0
Low nutrient density	17	10	25	12
Fruit	1	<1	4	2
High nutrient density	1	<1	4	2
Moderate nutrient density	0	0	0	0
Low nutrient density	0	0	0	0
Protein-rich foods	33	20	42	20
High nutrient density	0	0	0	0
Moderate nutrient density	26	15	34	16
Low nutrient density	7	4	8	4
Dairy products	9	5	14	7
High nutrient density	0	0	0	0
Moderate nutrient density	0	0	0	0
Low nutrient density	9	5	14	7
Fats, sweets, and alcohol	30	18	38	18
High-sugar foods	23	14	32	15
High-fat foods	6	4	2	1
Alcohol-containing beverages	1	<1	4	2
Kcalorie-free beverage	0	0	12	6
Dietary supplements	0	0	7	3
Miscellaneous¹	3	2	2	1

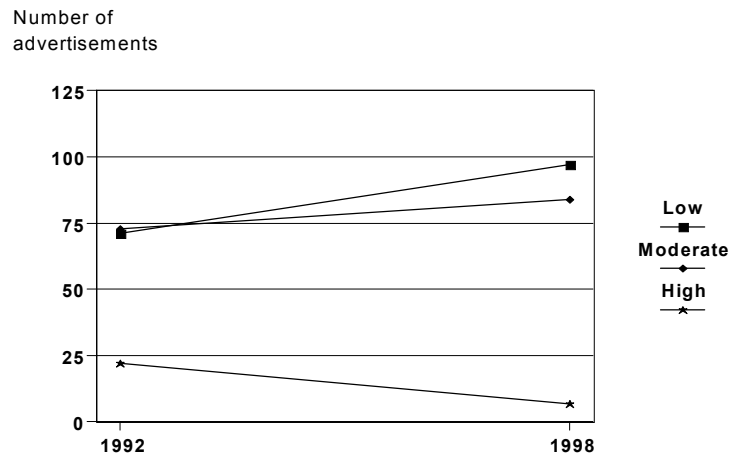
¹Miscellaneous includes foodstuffs of minimal nutritional value not included in other categories, such as seasonings.

*Food advertisements are significantly different between 1992 and 1998, based on 3-way Chi-square tests. For vegetables, Chi-square = 10.081 and the p-value = 0.0065; for breads and cereals, Chi-square = 5.8616 and the p-value = 0.0534.

Significant differences existed in the nutrient density of two food categories advertised between 1992 and 1998—vegetables, followed by breads and cereals. For vegetables, the primary difference was the shift from nearly equal numbers of 1992 advertisements for vegetables low and high in nutrient density to 1998 advertisements almost exclusively featuring vegetables low in nutrient density. For breads and cereals, advertisements shifted from featuring similar numbers of breads and cereals that were low and high in nutrient density in 1992 to featuring no breads and cereals that were high in nutrient density in 1998.

An overall examination of the nutrient density of the foods advertised reveals that in 1992, advertisements for foods whose nutrient density is low (coupled with high-sugar foods, high-fat foods, and alcohol-containing foods) almost equaled the number of foods whose nutrient density is moderate (71 and 73 advertisements, respectively) and was more than three times larger (22 advertisements) than advertisements for foods whose nutrient density is high. By 1998 the number of advertisements for foods low in nutrient density, high in sugar, high in fat, and containing alcohol exceeded foods moderate in nutrient density (97 vs. 84) and were advertised nearly 14 times more frequently than foods high in nutrient density (7 advertisements). Statistical analysis shows a significant difference³ between 1992 and 1998 advertisements, with the most important difference being the decrease in advertisements for foods high in nutrient density. The increase in advertising of foods low in nutrient density was made at the expense of advertising for their counterparts high in nutrient density. The nutrient-density

Figure 1. Prime-time televised advertisements of foods, by nutrient density, 1992 and 1998



advertising trends indicate a deteriorating “prime-time diet” that promotes dietary patterns implicated in the etiology of obesity, heart disease, and certain cancers (fig. 1) (34,52).

Nutrient Content Claims and Health Claims

Overall, the use of nutrient content claims was low in both sampled years (table 2). Significantly more *Minimizes-Specific-Nutrient* content claims than *Contains-Specific-Nutrient* content claims were made in 1992. No significant differences existed between the types of nutrient content claims made in 1998.

A comparison of the types of nutrient content claims made between 1992 and 1998 indicates that a significant difference existed.⁴ Most important was the increase in 1998 for *Contains-Specific-Nutrient* content claims. The change in this type of claim, constituting 72 percent of the chi-square value, was the result of a rise in the number of advertisements for fruits and dietary

supplements that included nutrient content claims. Advertisements for fruits that included nutrient content claims rose from 1 to 4 in the sample years. The increase in these types of televised advertisements for dietary supplements went from zero to 7. In addition to the foods that were promoted with a *Contains-Specific-Nutrient* content claim, an additional 11 advertisements (data not shown) in each sampled year promoted foods by highlighting the presence of specific ingredients—all but one of which were foods traditionally thought of as “nutritious” (i.e., fruit, grain, vegetable, cheese). The only nonfood ingredient was kavakava, an herbal tea additive.

In 1992, 11 percent of the televised food advertisements had *Minimizes-Specific-Nutrient* content claims; by 1998, 16 percent of the televised food advertisements used this type of claim. However, this increase was not significant. The main contributor to the increased prevalence of *Minimizes-Specific-Nutrient* content claims was advertisements of calorie-free beverages, specifically those for PepsiOne®. PepsiOne® was heavily advertised because it uses the newly approved

³Chi-square = 10.71, p-value = 0.0047.

⁴Chi-square = 6.038, p-value = 0.0488.

Table 2. Percentage of televised food advertisements¹ containing nutrient or health claims, 1992 and 1998

Food category	Nutrient claims and year				Health claims and year	
	Contains specific nutrient 1992	Contains specific nutrient 1998	Minimizes specific nutrient 1992	Minimizes specific nutrient 1998	All health claims 1992	All health claims 1998
Total	3*	11	11*	16	25	25
Breads and cereals	3	2	3	3	14	8
Vegetables	0	0	0	0	2	1
Fruit	0	3	0	0	0	3
Protein-rich foods	0	0	0	2	0	3
Dairy products	0	0	2	1	0	1
High-sugar foods	0	0	3	2	6	1
High-fat foods	0	0	1	0	1	0
Alcohol-containing beverages	0	0	0	0	0	0
Kcalorie-free beverages	0	0	0	6	0	1
Dietary supplements	0	0	0	2	0	7
Miscellaneous	0	0	2	0	2	0

¹N=105 in 1992; N=108 in 1998.

Note: Claim categories are not additive because a food advertisement could include more than one claim category.

*Nutrient claims are significantly different; p-value=0.0287.

sweetener Splenda® (12), which is promoted as tasting more like sugar than other artificial sweeteners. Also in 1998, one advertisement (data not shown), in addition to those promoted using a *Minimizes-Specific-Nutrient* content claim, billed a beverage as being caffeine-free.

Most of the televised advertisements that included health claims used claims related to general wellness: 72 percent in 1992 and 68 percent in 1998 (data not shown). Only 7 health claims in 1992 and 8 health claims in 1998 were specific. In 1992 most (n=4) of the specific health claims were made in advertisements for chewing gum that included statements like “helps fight cavities.” A cereal advertisement

(shown two times) stated that “beta-carotene is important for health,” but it gave no additional information. An advertisement for cooking oil indicated that the product could make traditional meals more healthful because it was low in saturated fat; no mention was made of this product being 100 percent fat. In 1998 most specific health claims were for advertisements of dietary supplements. One televised advertisement for a dietary supplement indicated that the supplement was a “healthy way to lose weight” and included a disclaimer that the weight-loss images shown were not typical. Another advertisement for a dietary supplement stated that the supplement built muscle mass; it did not include any other qualifying information. Yet another

advertisement (shown three times) implied that a supplement could replace the minerals lost during pregnancy and could keep a woman’s bones strong into old age. Neither the supplement’s name nor its nutrient content was stated, and osteoporosis was not specifically mentioned. One chewing gum was advertised as being able to decrease plaque. Only two conventional food items made specific health claims. An herbal tea was promoted as being able to decrease stress, but it included a disclaimer that advertising statements had not been evaluated by the FDA. A calcium-fortified orange juice was advertised as helping to build strong bones, with no mention of osteoporosis.

In both 1992 and 1998 none of the advertisements classified as having specific health claims complied with the FDA's criteria for diet-disease health claims and were, in reality, structure/function claims. Structure/function claims link a food or the effect of a food substance to the structure or function of the body and do not relate food or food substances to disease or health conditions (23). For example, the previously mentioned advertisement for orange juice described the effect of calcium on the structure of bones.

Discussion

When interpreting the findings of this study, readers must consider that, as is the case with any observational study, assessing the effect of policy change is difficult because other factors, including those that are societal, political, and scientific, shift during the time a policy is adopted (32). In addition, the sample for this study was limited to food advertisements shown during 17.5 hours of prime-time network programming over 2 years. Nonetheless, the observations made in this study do reflect the content of food advertisements shown to a nationwide audience during the most heavily watched time frame for an amount of time nearly equal to the entire prime-time period of 1 week in 2 years (35).

In 1987 Lord et al. concluded that food advertisements in magazines had not "jumped on the bandwagon" by using health and nutrition claims (29). The limited number of televised food advertisements that included either nutrient content claims or health claims before or after the implementation of the NLEA and the FTC Food Advertising Policy suggests that the conclusion reached by Lord et al. (29) is still valid and applicable to televised advertising.

The continuing low usage of health and nutrition claims seems surprising because researchers have found that consumers rate foods as being more nutritious when the foods are in advertisements that include more nutrition information (3,39,49). It remains unclear, however, how perceived nutritional value affects purchasing behavior. The lack of clearly defined regulations for using nutrient content claims and health claims may have discouraged advertisers from using such claims in 1992 (32). Although growth in nutrient content claims exceeded that of health claims, advertisers did not embrace either type of claim in the televised advertisements sampled in 1998, when the regulations were specified and an advertising policy had been in place for several years.

Why food advertisements sampled in this study seldom included nutrient content claims or health claims remains a question. The rate with which nutrient content claims were used in 1998 may have exceeded that of diet-disease health claims because diet-disease health claims tend to be temporarily associated with regulatory activity. That is, advertising campaigns that focus on a diet-disease health claim often occur immediately after a diet-disease health claim rule is finalized (20). This temporal association, in conjunction with the relatively short life of most advertising campaigns, may mean that the inclusion of diet-disease health claims in advertisements is likely to come in bursts.⁵ While the diet-disease relationships in approved FDA health claims are continually important from the perspective of nutrition education, they often are not so from the perspective of televised

⁵There were no new diet-disease health claim proposals or rules in 1998 until after the data for this study were collected.

Advertisers have significant potential, while promoting their products, for increasing consumer awareness of diet-health relationships and improving dietary choices consumers make.

advertisements. This may be the case because of the outlook that “old news is no news,” or perhaps because food advertisements centered on diet-disease health claims influence sales less heavily than advertisements focusing on hedonic qualities. However, because research conducted by food manufacturers to assess the effect of advertising campaigns is proprietary, it is rarely available to those outside the company (8).

Another reason why the frequency of nutrient content claims in 1998 exceeded that of diet-disease health claims may be the result of regulations for nutrient content claims being more straightforward and capable of being made succinctly (e.g., No Calories! Zero Fat!). In contrast, diet-disease health-claim regulations for food labels are more complex and require considerable disclosure of information. For example, calcium- and osteoporosis-claim requirements state that

food or supplement must be “high” in calcium; must not contain more phosphorus than calcium. Diet-disease health claims must cite other risk factors; state the need for regular exercise and a healthful diet; explain that adequate calcium early in life helps reduce fracture risk later by increasing as much as genetically possible a person’s peak bone mass; and indicate that those at greatest risk of developing osteoporosis later in life are White and Asian teenage and young adult women, who are in their bone-forming years. Claims for products with more than 400 mg of calcium per day must state that a daily intake of over 2,000 mg offers no added known benefits to bone health. (13, p. 24)

Although the FTC does not explicitly state that the same level of information disclosure is required in advertisements, its policy makes it clear that the commission will “be especially vigilant in examining whether qualified claims are presented in a manner that ensures that consumers understand both the extent of the support for the claim and the existence of any significant contrary view within the scientific community” (14, p. 10).

The requirements of diet-disease health claims may negate the likelihood that they can be used in 15-, 30-, or even 60-second televised advertisements. These requirements likely contributed to the lack of specific information about diet-disease relationships conveyed by food manufacturers even though a number of advertised foods (e.g., fruit juice, milk, wild rice, and bran cereal) and newly formulated foods introduced in both sampled years (12) met the restrictions set by the FDA for one or more diet-disease health claims.

A goal of the NLEA was to educate consumers about how they can use nutrition information on food labels to maintain health (11). Diet-disease health claims in advertising are an ideal mechanism for helping to achieve this goal and reaching consumers who are unaware of nutrition and health information. Plus, diet-disease health claims in advertisements in broadcast media are more likely to reach certain population groups, like adolescents, than diet-disease health claims on food labels (23). Because television is the primary source of health and nutrition information for many Americans (2,17), it may be worthwhile to consider how the FTC food advertising policy (14) could be adapted to better fit the constraints of broadcast media.

The revised standards for advertising prescription drugs on television and radio have resulted in more savvy, demanding consumers (45) who are readily discussing medical conditions or illnesses with a physician (46). Proposed by the FDA in 1997, these standards were designed to make advertisements more understandable to consumers and to work with time and space constraints unique to broadcast media (37,48). Thus the standards for advertising prescription drugs on television may provide a suitable model for televised food advertisements. That is, an advertisement for a food meeting the published requirements for a diet-disease health claim could be permitted to name the nutrient or ingredient in the advertised food and its link to a disease or health condition, along with adapting a method for consumers to obtain full product labeling and more complete information about the claim. More flexibility in shortening and simplifying diet-disease health claims in advertising could increase advertisers’ “interest in creating compelling messages that will have an impact on consumer behavior” (23, p. 96). In addition, researchers have suggested that diet-disease health claims in advertising would be most effective if provided in “plain English” (33).

A food advertising policy that fits the constraints of broadcast media should benefit consumers because it could enhance opportunities, and thus the competitive pressure on food manufacturers, to promote the nutritional qualities of foods (32). An example: even though the link between reduced cancer risk and high-fiber diets became stronger throughout the 1970’s and early 1980’s, the introduction of new high-fiber cereals during that period did not increase. After diet-disease

health claims in advertising began in late 1984, however, the number of households purchasing high-fiber cereals climbed (22). Food manufacturers responded by developing new high-fiber cereals. Concomitantly, consumers' knowledge of the link between fiber and cancer increased profoundly. "Even before 1984, firms were permitted to disclose fiber content on cereal labels. Consequently, the dramatic effects on producer and consumer behavior are clearly linked to the use of the diet-disease health claim rather than the ability to disclose fiber content. In other words, it is important to permit firms to explain the reasons why consumers should care about fiber" (32, p. 192).

Currently, the advertising policy for diet-disease health claims may not be an incentive to introduce new foods. Since the implementation of the FTC's current food advertising policy, the introduction of new products with healthful attributes dropped precipitously. In 1998, compared with 1992, the introduction of new products that were reduced/low calorie declined 60 percent; reduced/low fat, 6 percent; reduced/low salt, 87 percent; low/no cholesterol, 82 percent; added/high fiber, 71 percent; and reduced/low sugar, 76 percent. The only category that increased between these years was added/high-calcium products, with a 10-percent rise (12).

Advertisers have significant potential, while promoting their products, for increasing consumer awareness of diet-health relationships and improving dietary choices consumers make (32). Perhaps, if diet-disease health claims can be made more easily in the broadcast media, advertisers would use them more often, and they could spread vital diet and health information to a larger percentage of the population. Factors other than the release of FDA

health claim rules and current advertising policy, however, may influence advertisers' decisions regarding the use of claims. Thus future investigations should include discussions with advertisers to identify those factors.

Conclusion

Television reaches almost every U.S. home and is a valuable means of disseminating health promotion images and messages that can help individuals and communities improve the quality of their lives. "The media should be encouraged to play a greater role in advocating for health, thus raising the public profile of health and ensuring that health becomes an important topic of public debate" (52). Food advertisements are one method for disseminating information on diet-health relationships and improving consumers' dietary choices, although it is frequently argued that "advertising is always a dubious means of education, since it involves the testimony of interested parties" (9). Nonetheless, in the United States, diet is linked directly to four of the top seven leading causes of disease and death (51), and advertisements are designed to influence consumer-purchasing behavior (and in the case of food advertisements, eating behavior as well). Also, food advertisers have a budget that eclipses even the best-funded nutrition education campaigns. For example, food manufacturers spent \$7 billion on advertising in 1997, compared with \$333.3 million spent by the USDA on nutrition education (17).

The current food advertising policy eliminates potentially deceptive advertisements, but it may also limit the inclusion of accurate diet-disease health claims in broadcast media. Thus it makes sense for regulatory agencies to examine food advertising policies

and consider how the NLEA can be preserved so that advertisements for only truly nutritious foods can make diet-disease health claims, yet ensure that the inclusion of such claims in broadcast advertising is feasible. Two actions advertisers can take regarding health claims continue to be important from a public health perspective: (1) Advertisers can emphasize to consumers the value of nutrition-related product attributes (30,31). (2) Advertisers can also emphasize the diet-disease relationships elucidated in FDA-approved health claims. Both actions point to the need for health professionals to work with food advertisers to encourage them to use diet-disease health claims whenever possible. Such steps will help to begin harnessing the power of the media to enhance the public's perception of the importance of healthful eating and reinforce the messages taught by nutrition professionals.

While the NLEA and FTC advertising policy does much to protect the public from misleading or deceptive advertising, neither the FDA nor FTC has sufficient staffing or funds to monitor the media sufficiently. Hence nutrition professionals need to continue developing consumer education programs that help individuals assess the validity of advertising claims and help them learn how to use advertising information to their advantage. Moreover, nutrition professionals may be able to capture consumers' attention more readily by using nutrient content claims and diet-disease health claims embedded in food advertisements as a springboard for more in-depth health promotion instruction.

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The Thrifty Food Plan, 1999: Revisions of the Market Baskets

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Policy and Promotion—
compiled by Mark Lino, PhD

The Thrifty Food Plan (TFP), a fundamental part of the U.S. food guidance system, is revised. The TFP provides a representative healthful and minimal-cost meal plan to demonstrate how a nutritious diet may be achieved by consumers using a limited budget or food stamp benefits. This revision incorporates recent developments in nutritional standards and dietary guidance as well as updated underlying information about food consumption and nutrient content. It is the first revision to incorporate serving recommendations of the Food Guide Pyramid. Results show it is possible for Americans to obtain a healthful diet that meets current nutritional standards at a constant real cost equal to the previous Thrifty Food Plan.

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 1 of 12 age-gender groups. Each market basket contains a selection of foods in quantities that reflect current dietary recommendations, actual consumption patterns, food composition data, and food prices. 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) and is maintained by the USDA Center for Nutrition Policy and Promotion (CNPP). The TFP is used by the Federal Government to provide food and economic information to consumers preparing food on a limited budget. It also serves as the basis for food stamp allotments.

CNPP recently revised 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. This article provides background information on the updated TFP market baskets and describes the data sources, dietary standards, and methods used to revise the TFP market baskets.¹ The TFP market baskets were last revised in 1983 with data from USDA's 1977-78 Nationwide Food Consumption Survey (9).

Data

Two main data sources were used in revising the TFP market baskets: the USDA 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII) and the Food Price Database. The Food Price Database was created by CNPP, with assistance from the USDA Economic Research Service, by merging food items from the CSFII with national data on food prices.

¹For a more detailed description of the revisions to the TFP market baskets, see *The Thrifty Food Plan 1999, Administrative Report (8)*.

1989-91 Continuing Survey of Food Intakes by Individuals

The CSFII provides detailed information on people's reported intake of food at home and away from home, as well as extensive demographic and socioeconomic information. The CSFII is nationally representative of individuals living in households in the 48 coterminous States. Lower income households are oversampled to increase the precision level in analyses of this group. Sampling weights to make the sample representative of the U.S. population were used in this study.

For the 1989-91 CSFII, dietary intakes of individuals were collected over 3 nonconsecutive days. Day-1 data were collected by using in-person interviews and a 24-hour dietary recall.² This study used the Day-1 food intake data of individuals ages 1 and older in households with income at or below 130 percent of the U.S. poverty threshold. For children under age 12, the parent or main meal planner furnished the information, often with the child's help.

Individuals with household income at or below 130 percent of the poverty threshold were included in this study because this income level represents the upper threshold for determining eligibility to participate in the Food Stamp Program. The final sample consisted of about 7,800 individuals ages 1 and older from low-income households. These individuals reported consuming about 4,800 different foods.

²For the other 2 days, food diaries were kept by participating individuals; however, response rates were lower than the first day's, and subsequent days were not used for this analysis. One-day data have been indicated in prior research to be reliable measures of usual intakes of groups of people (2).

Information on the ingredients, nutrient content, and amount consumed of each of these foods is recorded in the CSFII data sets.

Food Price Database

The Food Price Database was constructed specifically for this study by merging information from the CSFII on foods consumed with price data from national data sets. This was required because while the CSFII has extensive information on reported food intake, it does not contain information on either food prices or food expenditures. The earlier Nationwide Food Consumption Surveys used in the development of previous food plans did include information on household food expenditures from which food costs were derived. For this study, creation of the Food Price Database involved

- (1) identifying all foods that were reported in the CSFII as having been consumed at home and away from home and, by using recipes, disaggregating them into their specific ingredients,
- (2) adjusting ingredient quantities for cooking and waste factors, when appropriate, to convert foods to a purchasable form,³
- (3) pricing the purchasable ingredients by using national retail price databases, and
- (4) converting the priced retail ingredients back to the consumed form of the food, with a price now attached.

³USDA Agriculture Handbook No. 8 (series) *Composition of Foods (6)* contains data on the weight of cooked and uncooked foods. These data permit computation of cooking conversion factors. Waste conversion factors that adjust for waste when food is prepared (e.g., due to peeling, coring, slicing, and dicing) are found in USDA Agriculture Handbook No. 102 *Food Yields. Summarized by Different Stages of Preparation (7)*. Food ingredients that are cooked and/or have a waste factor were converted, by using either or both conversion factors, and then priced.

To determine retail prices to calculate the costs of foods, CNPP used four sources of data: (1) the A.C. Nielsen Scantrack system, which was used to price most food ingredients, (2) Department of Labor price data for miscellaneous foods (Bureau of Labor Statistics), (3) USDA price data for fresh produce and meat (Agricultural Marketing Service), and (4) Department of Commerce price data for fish (National Marine Fisheries Service). The average price of all brands (including national, store, and generic) of a food ingredient was used to price that food ingredient. For example, the average price of all brands of whole milk was used to price whole milk, and the average price of all types of corn flakes was used to price corn flakes. Food ingredients were priced in dollar amounts per 100 grams; the CSFII Survey Code Book and Survey Recipe File, together with label information on supermarket products, were used to convert fluid ounces to gram weights.

All food ingredients were then converted back to the food consumed, and the food was priced per 100 grams. To illustrate, scrambled eggs were first separated into ingredients: egg without shell, milk, table fat, and salt. These ingredients were then adjusted for any loss in weight due to cooking (e.g., the loss of moisture in eggs and milk) and waste due to food preparation (e.g., the shell of the egg). National average prices were used to price each of the ingredients per 100 grams. The food ingredients were then regrouped into the food reported consumed—the scrambled eggs—and this food was priced per 100 grams.

Methods

Figure 1 shows an overview of the methods used to update the TFP market baskets. A revised market basket was calculated for the 12 age-gender groups. Nutritional needs, similarity of RDA age categories, and comparability to previous age-gender categories in the food plan were key factors in the selection of the age-gender groups. Individual TFP market baskets calculated for each age-gender group may be combined to calculate a TFP household market basket.

For TFP-modeling purposes, CNPP assigned each of the 4,800 foods reported in the CSFII into 1 of 44 food categories (table 1). Foods were assigned to food categories based on similarity of nutrient content, food costs, use in meals, and their link to the food groups of the USDA Food Guide Pyramid.

To calculate a TFP market basket for each age-gender group, CNPP estimated a mathematical optimization model for each group. The model selected the optimal food plan for each age-gender group that met the dietary standards and cost constraints with as little change as possible from actual reported food consumption. Each model consisted of four sets of data inputs related to each of the 44 food categories, subject to three constraints. The inputs were average consumption within a food category, average cost per 100 grams of a food category, average nutrient profile of a food category, and average servings profile of food category based on the Food Guide Pyramid. The constraints were dietary standards, serving specifications of the Food Guide Pyramid, and constant costs of TFP market basket (corresponding to the period when the food consumption data were collected).

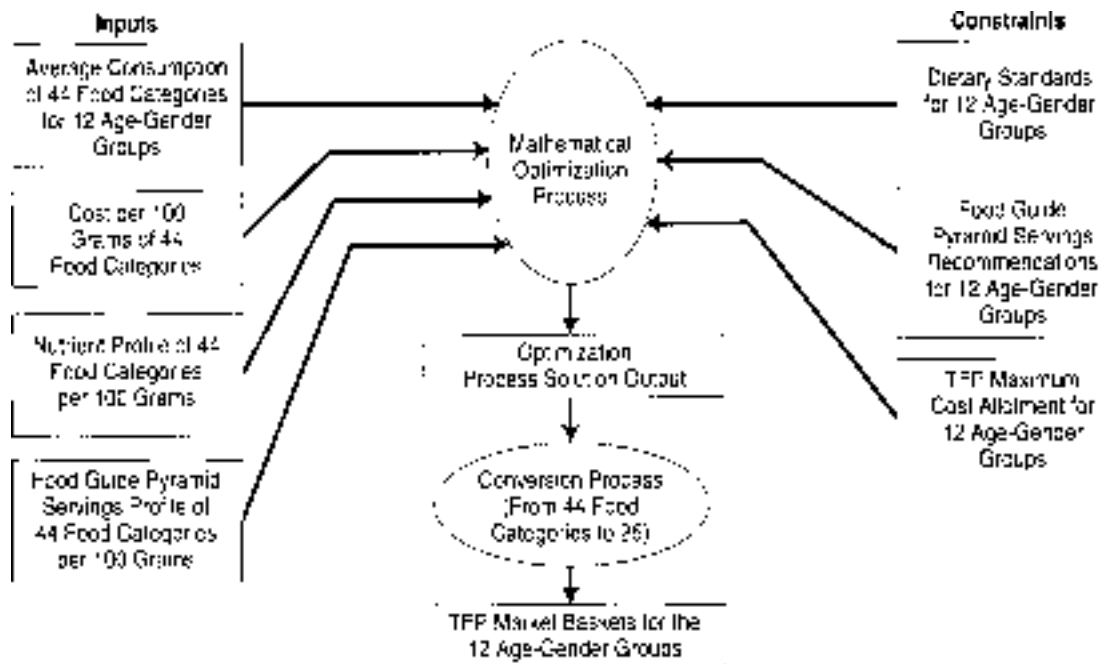
Model Inputs

Average consumption of each of the 44 food categories

The TFP has historically reflected the consumption patterns and eating habits of the low-income population to ensure acceptable market baskets composed of foods that people actually eat. To accomplish this, CNPP determined and entered into each model the average consumption patterns of each of the 12 age-gender groups for the 44 food categories.

For each age-gender group, to guarantee that consumption patterns provided the 1989 Recommended Energy Allowance (REA), CNPP adjusted quantities of each of the food categories proportionately by an average of 10 percent to meet the specific REA of the age-gender group. The exact percentage was derived by comparing the REA of each age-gender group with

Figure 1. Thrifty Food Plan Methodology



The TFP market basket for each age-gender group meets 100 percent or more of the group's RDAs for 15 essential nutrients.

its reported average energy intake. This correction adjusts for underreporting of consumption by individuals in the survey and ensures that the overall quantity of food in each market basket is consistent with the energy recommendations of the Food and Nutrition Board (4).

Similar to the previous TFP and consistent with research on household discard of edible food (9,10), CNPP also added an allowance of 5 percent to reported intake for each of the 44 food categories in the model to account for food waste. Household discard of edible food could result from preparation, plate waste, or spoilage.

Average price of each of the 44 food categories

Each of the 4,800 foods reported as being consumed, according to the Food Price Database, was assigned to 1 of 44 food categories. The weighted average price per 100 grams of each of these food categories was then determined based on total average consumption. For example, the food category of "noncitrus fruits and juices" 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. Total average consumption, compared with average consumption by each age-gender group, was used to calculate food-item weights, because food prices do not vary by age-gender group.

Profiles of each of the 44 food categories: Nutrients and servings of the Food Guide Pyramid

The 1989-91 CSFII Nutrient Database contains information on the nutrient content (including food energy, vitamins, minerals, and other dietary 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 44 food categories per 100 grams. For example, the poultry and fish lean, low-cost group consists of foods such as baked chicken, broiled turkey breast, and tuna. The average nutrient profile of this food category was calculated based on the food items in the category and the average consumption of each item. Weights for the food item were again based on total average consumption (by all people). The total average consumption, compared with average consumption by each age-gender group, was used because the TFP is for use by the household.

Serving profiles, based on the Food Guide Pyramid, of each of the 44 food categories were also an input into the model. The average weighted number of servings of grains, vegetables, fruits, milk products, and meat/meat alternates contained in each of the 44 food categories was considered. Many food categories yielded servings for only one Pyramid food group; for example, cheese contributed servings to the milk products group only. Other food categories contributed servings to more than one Pyramid food group; mixed grains may contain servings of grains, vegetables, and meat/meat alternates.

Model Constraints

Dietary standards

The revised TFP market baskets incorporate updated knowledge of nutritional needs. The 1989 Recommended Dietary Allowances (RDA), the 1995 *Dietary Guidelines for Americans* (11), the National Research Council's *Diet and Health Report* (5), and the serving recommendations of the USDA Food Guide Pyramid form the nutritional basis of the TFP market baskets. The TFP market basket for

Table 1. Food categories and foods in each category, Thrifty Food Plan, 1999

Food category	Examples of foods
Grains	
Breads, yeast and quick—high fiber	Whole wheat, rye, oatmeal, bran, and pumpernickel rolls and breads; corn tortillas and taco shells; and muffins, bagels, waffles, and pancakes made from whole-grain flours or containing bran
Breads, yeast and quick—regular fiber	White rolls and breads; muffins, bagels, waffles, pancakes, and scones not made from whole-grain flours or containing bran; and biscuits, cornbread, and croissants
Breakfast cereal—high fiber	Oatmeal, barley, bulgur, oat bran cereals, and ready-to-eat cereals having 3.7% or more fiber (e.g., shredded wheat)
Breakfast cereal—regular fiber	Corn meal or grits, cream of wheat, and ready-to-eat cereals having less than 3.7% fiber (e.g., corn flakes)
Rice and pasta	All types of rice, spaghetti, noodles, and macaroni
Cakes, pies, and other sweet bakery products	Cakes, cookies, pies, pastries, doughnuts, sweet rolls, croissants with sweet filling, sweet crackers including graham crackers, and breakfast or granola bars
Grain-based snacks	Crackers, popcorn, pretzels, and salty snacks
Grain mixtures—regular fat	Tacos, burritos, enchiladas, pasta and rice with meat, pizzas, and egg rolls having 6% or more fat content
Grain mixtures—lowfat	Rice and pasta with vegetables and/or beans, noodle or rice soups with vegetables and/or meat having less than 6% fat content
Vegetables and fruits	
Potato products—high fat	Potato chips, French-fried potatoes, hash browns, potato puffs, potato patty; and potato salads and mashed potatoes with added fat, eggs, and cheese
Potato products—regular fat	Boiled, baked, scalloped, mashed, and stuffed potatoes; and potato salad, German style
Green-yellow vegetables—added fat Green-yellow vegetables—no added fat	All dark-green and deep-yellow vegetables such as broccoli, chard, collard greens, kale, spinach, carrots, pumpkin, squash, and sweet potato—with or without added fat; and juices from these vegetables
Other vegetables—added fat Other vegetables—no added fat	All other vegetables such as beans, beets, cabbage, cauliflower, corn, cassava, eggplant, green peas, lettuce, bell pepper, snow peas, tomatoes, turnip, and Brussels sprouts that are not dark-green or deep-yellow vegetables—with or without added fat; and juices from these vegetables
Mixed vegetables—added fat Mixed vegetables—no added fat	Mixed vegetables containing corn, lima beans, and peas; vegetable salads; stuffed vegetables; and other mixed vegetable dishes—with or without added fat. Mixed vegetables with added fat include creamed peas and carrots, batter-dipped fried vegetables, cole slaw with dressing, and vegetables in combination with other foods such as cheese and nuts
Citrus fruits, melons, berries, and juices	Limes, lemons, grapefruits, oranges, and tangelos; melons such as cantaloupe, honeydew, and watermelons; berries such as blackberries, blueberries, cranberries, raspberries, and strawberries; and juices from these fruits
Other noncitrus fruits and juices	All other noncitrus fruits such as apples, apricots, bananas, cherries, grapes, papayas, peaches, pears, and plums; and their juices
Milk products	
Milk and milk-based foods—regular fat	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	All fluid, evaporated, and dry reduced-fat and skim milks; buttermilk; and lowfat or nonfat yogurts
Cheese	Natural, processed, and imitation cheeses, cottage cheese, cheese spreads, cheese dips, and cheese soups

(Continued)

Table 1. Food categories and foods in each category, Thrifty Food Plan, 1999 (continued)

Food category	Examples of foods
Milk-based drinks and desserts—regular fat	Milk-based drinks such as malted milk; hot chocolate; eggnogs, cocoa, infant formulas, and meal-replacement drinks with a fat equivalent to that of whole milk; and dairy desserts such as ice cream, frozen yogurt, ice milk, custard, puddings, and tofu frozen desserts having more than 6% fat
Milk-based drinks and desserts—lower fat	Milk-based drinks made with reduced-fat or skim milk and dairy desserts having 6% or less fat
Meat/meat alternates	
Red meats—high fat, regular cost Red meats—high fat, low cost	Beef, pork, veal, game meats, and organ meats with 10% or more fat
Red meats—lean, regular cost Red meats—lean, low cost	Beef, pork, veal, and game meats with less than 10% fat
Poultry and fish—high fat, regular cost Poultry and fish—high fat, low cost	Chicken, turkey, duck, Cornish hen, game birds, and organ meats, and all fish and shellfish with 10% or more fat
Poultry and fish—lean, regular cost Poultry and fish—lean, low cost	Chicken, turkey, duck, Cornish hen, and game birds, and all fish and shellfish, with less than 10% fat
Lunch meats, sausages, and bacon—regular fat	Sausages, salami, frankfurter, bologna, sliced ham, bacon, and pastrami
Lunch meats, sausages, and bacon—lowfat	Sausages, salami, frankfurter, bologna, sliced ham, bacon, and pastrami having less than 25% fat compared with the regular fat category
Egg and egg mixtures	Fresh, frozen, and dried eggs; egg substitutes; meringues; and egg mixtures
Meat, poultry, and fish mixtures—regular fat	Beef, veal, pork, lamb, chicken, turkey, and fish with grain or vegetables with 8% or more fat
Meat, poultry, and fish mixture—low fat	Beef, veal, pork, lamb, chicken, turkey, and fish with grain or vegetables with less than 8% fat
Dry beans, peas, lentil dishes, and mixtures	Black, red, pinto, lima, white, mung, and kidney beans; all types of peas with or without other foods; soybean products such as miso, tofu, and soybean-based meat substitutes
Nuts and seeds	Nuts, peanut butter and other nut butters, nut mixtures, carob, and seeds such as sesame and pumpkin
Other foods	
Fats, oil, salad dressings, sauces, and condiments	Butter; margarine; vegetable oils such as corn oil, olive oil, and sunflower oil; 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	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; cola- and pepper-type soft drinks; ginger ale; root beer; and fruit punches, ades, lemonades, limeades, and other sodas containing sugar
Fruit drinks, soft drinks, and ades—low calorie	Sugar-free or low-sugar drinks such as cola- and pepper-type soft drinks, ginger ale, root beer, fruit-flavored drinks, fruit punches, ades, lemonades, and other sodas
Sugars and sweets	All types of sugars, sweeteners, and syrups such as honey, jams, jellies, marmalades, preserves, icings, gelatin desserts, marshmallow, fudge, all types of candies and chocolates, and chewing gum

Note: For more complete definitions of regular fat and lowfat, regular cost and low cost, and other terms for a particular food category, see Appendix 3 of the administrative report (8).

each age-gender group meets 100 percent or more of the group's RDAs for 15 essential nutrients—protein, vitamin A, vitamin E, vitamin C, thiamin, riboflavin, niacin, vitamin B₆, folate, vitamin B₁₂, calcium, phosphorus, magnesium, iron, and zinc. The RDA levels for each of these 15 nutrients represent an amount sufficient to meet the needs of all healthy people in the group.

Recommendations for fat and saturated fat consumption for the revised TFP market baskets are based on the *1995 Dietary Guidelines for Americans (11)*, which recommended that adults and children ages 5 and older consume no more than 30 percent of total food energy (calories) per day from total fat and less than 10 percent of calories per day from saturated fat. For children ages 2 to 5, the Dietary Guidelines recommended reducing intake of total and saturated fat gradually to no more than 30 percent (total fat) and less than 10 percent (saturated fat) of total calories per day by the time the child is about 5 years old. Recommendations for cholesterol and carbohydrate were based on the National Research Council's *Diet and Health Report (5)*, which recommends that people ages 2 and over limit their daily intake of cholesterol to 300 milligrams or less and that all people consume 55 percent or more of calories per day from carbohydrate.

This revision of the TFP market baskets is the first one to incorporate serving recommendations of the Food Guide Pyramid. The Pyramid specifies the number of servings of the five major food groups (grains, vegetables, fruits, milk products, and meat/meat alternates) that people of different age-gender groups need to eat to have a healthful diet. For this TFP revision, the market basket for each age-gender

group had to meet the recommended servings of each of the five major food groups.

The *Dietary Guidelines for Americans (11)* do not recommend a quantitative standard for dietary fiber or caloric sweeteners/added sugars. Because of the lack of precise numeric guidelines, CNPP constrained the revised TFP market basket for each age-gender group to provide no less than average consumption of dietary fiber and no more than average consumption of sweeteners/added sugars. The actual TFP market basket for each age-gender group, however, contains more fiber and less sweeteners/sugars than average consumption because of the influence of other dietary standards. Regarding sodium, the *Diet and Health Report (5)* recommends that people ages 2 and over limit their daily intake to 2,400 milligrams or less. This is difficult to achieve in practice because so many grain products contain sodium, and grains are a recommended part of a healthful diet. The sodium standard in the model, therefore, was fixed at no more than average consumption for each age-gender group. For children age 1, no restriction was set on sodium, in accordance with the *Diet and Health Report (5)*.

A food item or ingredient that makes up at least one-fourth of a Food Guide Pyramid serving was counted in calculating Pyramid servings. A food item or ingredient that was less than one-fourth of a Food Guide Pyramid serving was not counted, therefore creating an underestimate of Pyramid food group consumption. Because of this limitation of the data, CNPP adjusted the Pyramid serving recommendations downward by 10 percent to compensate for food components in a food item (e.g., raisins in raisin bread) that were not counted toward a serving of a particular food group.

Cost and other constraints

A primary constraint satisfied by the new TFP market baskets was that they should cost no more than the previous TFP baskets in real terms. Accordingly, because 1989-91 consumption data underlie this revision of the TFP market baskets, CNPP constrained the cost of each age-gender group's revised TFP market basket to equal the average real cost of its previous TFP market basket for the 1989-91 period.

In addition, efforts were made to consider ease of food preparation and convenience in the development of these TFP market baskets. Foods such as breads, ready-to-eat cereals, canned soups, processed vegetables, chicken parts, frozen orange juice, boxed mashed potatoes, and macaroni and cheese are included in the new TFP market baskets. This is an improvement over the previous TFP that required many dishes to be made from scratch, using individual ingredients and requiring more preparation than what is required when packaged mixes are used.

The TFP market basket for each age-gender group also was constrained to fall within a range of average consumption for each of the 44 food categories. This was done for technical reasons and to ensure that no food category was eliminated from any market basket. The lower bounds were set slightly above zero for most food categories. The upper bounds were set at six times consumption for most food categories, to keep any particular food category from increasing to an unreasonable level. The lower- and upper-bound amounts of the various food categories were based on consultation with nutrition researchers and examination of how consumption of each food category was distributed.

The new TFP market baskets consist of the quantities of the 25 food categories that, in turn, fall into one of the food groups of the Food Guide Pyramid

Mathematical Model

Since 1975 a computerized programming model with a quadratic mathematical function has been used to develop the TFP. The model selects for each age-gender group the optimal food plan that meets dietary standards and cost constraints, with as little change as possible from actual food consumption. The model for the revised TFP was adapted, from the one used in the 1983 TFP, to accommodate the 44 food categories, additional dietary constraints, and serving specifications of the Food Guide Pyramid. Also, the mathematical model was upgraded to reduce the limitations of the previous model. CNPP used shares of the food group of the total food budget as the weights in the model for this revised TFP. Weighting in this manner is desirable because budget shares reflect consumer preferences; thus, the food categories are weighted according to these preferences. Another improvement in the model is the use of logarithms of quantities rather than actual quantities. Hence the model is more resistant to decreases than to increases in consumption of any food category, a more realistic portrayal of consumer behavior.

Thrifty Food Plan Market Baskets

The optimization model yielded 12 TFP market baskets, one for each age-gender group. Each basket contained designated quantities of each of 44 food categories. Initially in “as consumed” form, the 44 food categories were then simplified into 25 food categories in an “as purchased” form. The consolidation of categories, wherein similar foods were grouped, expedited the development of menus and recipes. (See the companion article in this issue, pp. 65-75.) For example,

CNPP combined high-fiber and regular-fiber categories of breakfast cereals into one category of breakfast cereals, high-fat and regular-fat potato products to form one category of potato products, and lean and high-fat red meat into one category of red meats. The dietary standards were still maintained when the 44 food categories were collapsed into 25 food categories.

The new TFP market baskets consist of the quantities of the 25 food categories that, in turn, fall into one of the food groups of the Food Guide Pyramid (grains, vegetables, fruits, milk products, meat/meat alternates, and other foods). Table 2 lists the quantities of the 25 food categories (including coffee and tea) (in pounds per week) in the TFP market baskets for each of the 12 age-gender groups. The following subsections discuss the revised TFP market baskets in terms of general food groups and food categories.⁴ Revised market baskets are also compared with average reported consumption and the previous market baskets.

Thrifty Food Plan Market Baskets by Food Group

The following bullets highlight key findings of the total pounds of food per week overall and by food group (in percentage form) in the TFP market baskets for the various age-gender groups (table 3):

- *Grains*, accounting for 8 to 14 percent of the revised TFP market baskets for the various age-gender groups, represented a larger share for males ages 15 to 50 than for the other age-gender groups.

⁴Components of the TFP market baskets are discussed in terms of weight; therefore, fluids such as milk and soft drinks are weighted more prominently than dry foods, and juice concentrates are weighted less prominently than reconstituted forms.

Table 2. Quantities of food for a week,¹ 1999 Thrifty Food Plan market baskets, by age-gender group

Food category	Children (years)				
	1	2	3-5	6-8	9-11
Total pounds	18.22	17.88	20.02	24.66	27.63
	<i>Pounds per week</i>				
Grains					
Breads, yeast and quick	.14	.18	.51	1.42	1.33
Breakfast cereals, cooked and ready to eat	.76	.90	.52	.08	.32
Rice and pasta	.50	.22	1.31	1.28	1.30
Flours	.05	.07	.15	.33	.45
Grain-based snacks and cookies	.02	.04	.09	.04	.08
	1.47	1.41	2.58	3.15	3.48
Vegetables					
Potato products	1.58	1.55	.98	2.06	3.10
Dark-green and deep-yellow vegetables	.21	.15	.22	.97	.49
Other vegetables	.90	.83	1.09	1.56	1.35
	2.69	2.53	2.29	4.59	4.94
Fruits					
Citrus fruits, melons, berries, and juices	.70	.95	.84	2.51	3.04
Noncitrus fruits and juices	1.47	1.33	1.56	1.55	1.50
	2.17	2.28	2.40	4.06	4.54
Milk products					
Whole milk, yogurt, and cream	7.51 ²	6.46	3.72	1.71	2.63
Lower fat and skim milk and lowfat yogurt	-	-	2.71	5.59	4.06
Cheese	.07	.06	.16	.09	.14
Milk drinks and milk desserts	.09	.29	.35	.14	.40
	7.67	6.81	6.94	7.53	7.23
Meat/meat alternates					
Beef, pork, veal, lamb, and game	.45	.50	.80	1.19	.95
Chicken, turkey, and game birds	.72	.76	.62	1.15	1.29
Fish and fish products	.15	.25	.08	.52	1.14
Bacon, sausages, and luncheon meats	.06	.10	.20	.11	.18
Eggs and egg mixtures	1.21	.85	.45	.62	.46
Dry beans, lentils, peas, and nuts	.29	.63	.99	.95	.42
	2.88	3.09	3.14	3.77	4.44
Other foods					
Table fats, oils, and salad dressings	.15	.13	.21	.26	.34
Gravies, sauces, condiments, spices, and salt	.06	.07	.12	.18	.18
Fruit drinks, soft drinks, and ades	.84	1.24	1.97	.70	2.23
Sugars, sweets, and candies	.29	.32	.37	.42	.25
	1.34	1.76	2.67	1.56	3.00

¹Food as purchased includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; dry beans and legumes; and meat with bones. Coffee and tea are included in the food plan but are not shown because of the small quantities. However, their cost is included in the estimated cost of the food plan.

²For children ages 1 and 2 years, the model yielded quantities of whole milk, yogurt, and cream, and lower fat and skim milk and lowfat yogurt. Dietary guidance, however, is that children at these ages primarily consume whole-milk products, so quantities of lower fat and skim milk and lowfat yogurt for these children were allocated to the whole milk, yogurt, and cream category.

(Continued)

Table 2. Quantities of food for a week,¹ 1999 Thrifty Food Plan market baskets, by age-gender group (continued)

Food category	Females	Males		Females	Males	Females	Males
	12-19	12-14	15-19	20-50	20-50	51+	51+
Total pounds	31.90	32.42	34.70	30.45	33.30	26.48	30.63
Grains							
Breads, yeast and quick	1.32	1.20	1.02	1.52	1.36	.97	1.14
Breakfast cereals, cooked and ready to eat	.33	.42	.05	.18	.09	.42	.36
Rice and pasta	1.28	1.95	3.41	1.31	2.86	1.24	1.45
Flours	.47	.50	.34	.44	.35	.30	.41
Grain-based snacks and cookies	.06	.05	.03	.09	.05	.09	.04
	3.46	4.12	4.85	3.54	4.71	3.02	3.40
Vegetables							
Potato products	2.74	3.76	2.95	2.85	3.95	1.33	2.02
Dark-green and deep-yellow vegetables	.56	.17	.47	.45	.37	.65	.62
Other vegetables	1.81	1.89	2.59	2.01	2.28	2.76	2.92
	5.11	5.82	6.01	5.31	6.60	4.74	5.56
Fruits							
Citrus fruits, melons, berries, and juices	3.27	3.96	5.42	4.08	3.67	3.03	6.47
Noncitrus fruits and juices	.99	1.43	.99	1.08	2.75	1.87	1.34
	4.26	5.39	6.41	5.16	6.42	4.90	7.80
Milk products							
Whole milk, yogurt, and cream	1.84	2.68	2.05	1.80	2.47	1.39	1.75
Lower fat and skim milk and lowfat yogurt	8.59	7.66	8.75	4.87	4.24	5.14	5.28
Cheese	.12	.09	.11	.17	.20	.10	.09
Milk drinks and milk desserts	.19	.20	.07	.20	.14	.17	.10
	10.74	10.63	10.98	7.04	7.05	6.80	7.22
Meat/meat alternates							
Beef, pork, veal, lamb, and game	1.14	1.53	1.14	1.58	1.42	1.54	1.73
Chicken, turkey, and game birds	2.59	1.78	.56	1.64	1.72	1.39	.80
Fish and fish products	.45	.36	1.18	.47	.58	.40	.25
Bacon, sausages, and luncheon meats	.12	.12	.26	.16	.23	.14	.25
Eggs and egg mixtures	.38	.35	.32	.45	.38	.46	.57
Dry beans, lentils, peas, and nuts	4.99	4.76	5.01	4.70	5.77	4.35	4.92
Other foods							
Table fats, oils, and salad dressings	.28	.37	.46	.35	.48	.31	.37
Gravies, sauces, condiments, spices, and salt	.17	.16	.22	.19	.26	.18	.22
Fruit drinks, soft drinks, and ades	2.70	1.06	.69	3.88	1.87	1.96	.98
Sugars, sweets, and candies	.19	.11	.07	.27	.14	.22	.15
	3.34	1.70	1.44	4.70	2.75	2.67	1.72

¹Food as purchased includes uncooked grain products; raw, canned, and frozen vegetables; fruit juice concentrates; dry beans and legumes; and meat with bones. Coffee and tea are included in the food plan but are not shown because of the small quantities. However, their cost is included in the estimated cost of the food plan.

- *Vegetables* account for 11 to 19 percent of the revised TFP market baskets for children and adolescents ages 1 to 19, and 17 to 21 percent for females and males ages 20 and older.
- *Fruits* make up 12 to 18 percent of the revised TFP market baskets for children and adolescents ages 1 to 19, 17 to 19 percent for females ages 20 and older, and 19 to 25 percent for males ages 20 and older. The fruits group constitutes the largest single share of pounds in the TFP basket for males ages 51 and older. Generally, the vegetables and fruits groups combined make up a larger share of the TFP market baskets for adults than they do of the market baskets for children.
- *Milk products* account for the largest share of food by weight in the revised TFP market baskets for children and most adults: 21 to 42 percent. For children and adolescents ages 1 to 19, the milk products group accounts for 26 to 42 percent of total pounds of their TFP market baskets, with pre-schoolers having the largest share of milk products. The share of milk products declines for children after age 1 until ages 9 to 11; it then increases after this age. Milk products account for 24 to 26 percent of the TFP market baskets for females ages 20 and older and 21 to 24 percent for males ages 20 and older.
- *Meat/meat alternates* account for 14 to 17 percent of the revised TFP market baskets for the various age-gender groups.
- *Other foods* (fats, oils, and sweets), accounting for 4 to 15 percent of the TFP market baskets for the various groups, make up a particularly large share of the revised TFP market

basket for females ages 20 to 50. For these women, foods such as fruit drinks, soft drinks, and ades provide inexpensive sources of calories, after all other dietary standards are met.

Thrifty Food Plan Market Baskets by Food Categories

Grains

Breakfast cereals account for over half of the grains in the revised TFP market baskets for children ages 1 and 2 (table 2). Rice and pasta and breads (yeast and quick) are the main grain products in the TFP market baskets for older children and adolescents. Rice and pasta account for a particularly large share of grain products (70 percent) for males ages 15 to 19. For adults ages 20 and older, rice and pasta as well as breads (yeast and quick) continue to be the main grain products in their TFP market baskets, with rice and pasta accounting for a larger share for adult males, compared with the share for adult females. Foods in the grains group are especially nutrient dense because of fortification.

Vegetables

Two food categories—potato products and other vegetables (cabbage, corn, etc.)—account for most of the vegetables portion of the revised TFP market baskets for children ages 1 to 19. For many children and adolescents, potato products make up over half the vegetables portion of their TFP baskets. Potatoes are relatively inexpensive sources of copper, potassium, vitamin B₆, vitamin C, and dietary fiber. Dark-green and deep-yellow vegetables, relatively expensive sources of nutrients, make up a smaller portion of children's and adolescents' TFP market baskets. The vegetables portion of the TFP market basket for adults is similar to the vegetable portion for children and adolescents—high in potato products and other vegetables.

Compared with other vegetables, potato products account for a larger share of the vegetables component of the TFP baskets for adults ages 20 to 50. For adults ages 51 and older, the reverse holds.

Fruits

Noncitrus fruits and juices account for over half—58 to 68 percent—of the fruits portion of the revised TFP market baskets for children ages 1 to 5. Citrus fruits, melons, berries, and juices account for most of the fruits component of the TFP market baskets for all other age-gender groups. For males ages 15 to 19, citrus fruits, melons, berries, and juices account for up to 85 percent of the fruits component of their TFP market basket. For females ages 20 to 50, citrus fruits, melons, berries, and juices make up to 79 percent of the fruits component of their TFP market basket. These fruits then decline to 62 percent for females ages 51 and older. A reverse trend is true for adult males: citrus fruits, melons, berries, and juices compose 57 percent of the fruits component of the TFP market basket for males ages 20 to 50 but increase to 83 percent for males ages 51 and older. The large share of citrus fruits, melons, berries, and juices in most of the market baskets ensures an adequate daily source of vitamin C, folate, and potassium.

Milk Products

The category of lower fat and skim milk and lowfat yogurt accounts for over half the milk products portion of the revised TFP market baskets for most children and adolescents. The exception is the market basket for children ages 1 to 5, where the whole milk, yogurt, and cream category exceeds the lower fat and skim milk and lowfat yogurt category as a share of the milk products component of their TFP baskets. For children ages 1 and 2, the model yielded quantities of lower fat and skim milk and lowfat

Table 3. Percentage distribution of food groups in the Thrifty Food Plan market baskets, by age-gender group, 1999

	Children (ages)				
	1 yr	2 yrs	3-5 yrs	6-8 yrs	9-11 yrs
Total pounds per week	18.22	17.88	20.02	24.66	27.63
	<i>Percent total pounds per week</i>				
Grains	8	8	13	13	13
Vegetables	15	14	11	19	18
Fruits	12	13	12	16	16
Milk products	42	38	35	31	26
Meat/meat alternates	16	17	16	15	16
Other foods ¹	7	10	13	6	11

	Females (ages)			Males (ages)			
	12-19 yrs	20-50 yrs	51+ yrs	12-14 yrs	15-19 yrs	20-50 yrs	51+ yrs
Total pounds per week	31.90	30.45	26.48	32.42	34.70	33.30	30.63
	<i>Percent total pounds per week</i>						
Grains	11	12	11	13	14	14	11
Vegetables	16	17	18	18	17	21	18
Fruits	13	17	19	17	18	19	25
Milk products	34	24	26	32	33	21	24
Meat/meat alternates	16	15	16	15	14	17	16
Other foods ¹	10	15	10	5	4	8	6

¹Fats, oils, and sweets.

yogurt. Dietary guidance, however, is that children at these ages need to consume whole-milk products (1), so quantities of lower fat and skim milk and lowfat yogurt for these children were allocated to the whole-milk, yogurt, and cream category. For females ages 12 to 19, lower fat and skim milk and lowfat yogurt makes up 80 percent of the milk products portion of their TFP basket. For adults, lower fat and skim milk and lowfat yogurt makes up over half of the milk products component of their TFP market baskets, with a larger share for older adults than for adults ages 20 to 50.

Cheese contributes very little (1 to 3 percent) to the milk products component of the TFP market baskets for all age-gender groups. Milk products

constitute a large share of the overall TFP market baskets for all age-gender groups, because these products provide high-quality protein and are good sources of vitamin A, vitamin D, vitamin B₁₂, riboflavin, calcium, phosphorus, magnesium, potassium, and zinc.

Meat and Meat Alternates

No food category dominates the meat/meat alternates portion of the revised TFP market baskets for any age-gender group. Eggs and egg mixtures and poultry (chicken, turkey, and game birds) are the main foods in the meat/meat alternates component of the TFP market baskets for children ages 1 to 2. Red meat (beef, pork, veal, lamb, and game) and another category—legumes (dry beans, lentils, and peas) and nuts—are the main foods in the meat/

meat alternates component of the TFP baskets for children ages 3 to 8. Poultry and fish and fish products are the main foods in the meat/meat alternates component of the TFP basket for children ages 9 to 11.

Poultry makes up 52 percent of the meat/meat alternates component of the TFP market basket for females ages 12 to 19, compared with 37 percent for males ages 12 to 14 and 11 percent for males ages 15 to 19. Red meat accounts for about one-third of the meat/meat alternates component of the TFP basket for males ages 12 to 14, and legumes and nuts account for about one-third of this component for males ages 15 to 19. Red meat and poultry make up most of the meat/meat alternates component of the TFP market baskets for females ages 20 and older. These two food

Table 4. Average Thrifty Food Plan market basket versus average consumption and average previous market basket¹

	Average Thrifty Food Plan market basket	Average consumption		Average previous Thrifty Food Plan market basket	
	Pounds	Pounds	Difference in average basket vs. average consumption	Pounds	Difference in revised vs. previous basket
Grains	3.43	2.52	+36%	3.83	-10%
Vegetables	5.73	4.15	+38%	5.75	0%
Fruits	5.00	2.06	+143%	2.63	+90%
Milk products	7.58	5.86	+29%	6.37	+19%
Meat/meat alternates	3.80	4.15	-8%	3.41	+11%
Other foods (fats, oils, and sweets)	2.89	6.77	-58%	1.60*	-
Total	28.43	25.51		23.59	

¹Figures are a weighted average for all age-gender groups in terms of pounds of food per week.

*Do not contain added fats, oils, and sugars; these items are included in the food groups to which they apply.

-Does not apply.

categories and legumes and nuts are the main foods in the meat/meat alternates component of the TFP baskets for males ages 20 and over. Meat, poultry, and fish supply protein, B-vitamins, iron, and zinc. In general, the greater presence of these foods in the TFP market baskets for females and children reflects the higher RDA for iron for females and children, compared with that for males.

Other Foods

Fruit drinks, soft drinks, and ades make up most of the other foods component—which is relatively small to begin with—of the revised TFP market baskets for many of the age-gender groups. Two exceptions are the market baskets for children ages 6 to 8 and males ages 15 to 19: fruit drinks, soft drinks, and ades account for less than half of the other foods component of their TFP market baskets. For children ages 6 to 8, sugars, sweets, and candies make up 27 percent (about 0.4 pounds per week) of the other foods component, and for males ages 15 to 19, table fats, oils, and salad dressings

account for 32 percent (about 0.5 pounds per week) of the other foods component of their TFP market basket. Sugars, sweets, and candies account for 5 to 9 percent of the other foods component of the TFP market baskets for adults.

A Comparison of the New Thrifty Food Plan Market Baskets With Average Consumption and Previous Market Baskets

To understand how actual reported diets would need to change to meet the nutritional standards of the new TFP, we can compare the average TFP market basket with average consumption. Results could also be shown for each age-gender group, but for simplicity, CNPP computed an average revised TFP market basket based on all age-gender groups and compared it with a market basket based on actual average consumption. CNPP derived these average baskets by weighting each age-gender group by its population size and calculating a weighted mean.

Compared with average reported consumption (in pounds), the average new TFP market basket contains more fruits (+143 percent), vegetables (+38 percent), grains (+36 percent), and milk products (+29 percent) but less other foods (fats, oils, and sweets) (-8 percent) and meat/meat alternates (-8 percent) (table 4). Having more fruits and vegetables and less of the other food groups in the average TFP market basket, compared with average consumption, is not surprising: the TFP market basket represents a nutritious diet. The Healthy Eating Index, an indicator of the quality of the average American's diet, shows that most people's diet, particularly low-income Americans, needs improvement (3).

We can also compare the new and the old TFP average baskets to understand how dietary guidance has changed over time. Doing so, we find that compared with the previous average TFP market basket (in pounds), the new TFP market basket contains more fruits (+90 percent), milk products (+19 percent), and meat/meat alternates (+11 percent), about the same amount

of vegetables, and less grains (-10 percent). These percentage changes from the previous average TFP market basket are likely to be underestimates of fruits, milk products, and meat/meat alternates and an overestimate of grains because the food groups of the previous TFP basket contained added fats, oil, and sugars. The revised TFP basket has added fats, oils, and sweets in a separate category. Hence a true comparison of the other foods category cannot be made between the two TFP baskets. It is also important to consider that larger quantities of most food groups in the revised TFP, compared with the previous one, partly reflects changes in dietary recommendations since the TFP was last updated.

Sensitivity Analysis

Sensitivity analysis permits assessment of how sensitive model results are to changes in the constraints imposed on the solution. To understand how sensitive the results are to changes in market basket costs, we use sensitivity analysis to change systematically the cost limit within the range of the original cost while holding all other inputs and constraints constant. CNPP conducted sensitivity analysis of the revised TFP market baskets for each of the 12 age-gender groups to understand whether a model solution of the TFP market baskets could still be obtained if costs were lowered and what its food group composition would be, given the same inputs (average consumption, cost of food, and nutrient profile/Pyramid servings of food categories) and other constraints (dietary standards and serving recommendations of the Pyramid). With this sensitivity analysis, CNPP made incremental downward and upward changes in the cost constraint of the TFP.

Using this approach, CNPP found that the model produced market-basket solutions between 96 and 125 percent

of the cost of the TFP for the market baskets. At a cost level below 96 percent of the TFP allotment, a market basket that met the dietary standards could not be constructed for at least one of the age-gender groups. In the 96- to 125-percent cost range, dietary standards and serving recommendations of the Food Guide Pyramid can be met. However, the mix and desirability of foods from the various food groups differ. For the TFP market baskets at the bottom end of the cost range, more rice and pasta and less breakfast cereals enter the solution from the grains group, more potatoes and less green and yellow vegetables from the vegetables group, and more citrus fruits and less other fruits from the fruits group. In addition, more dry beans, lentils, peas, and nuts and less fish and poultry are included from the meat/meat alternates group, and more lower fat and skim milk and lowfat yogurt and less milk drinks and milk desserts enter the model solution from the milk products group.

Providing more money (relaxing the cost constraint) naturally makes it easier to find market-basket solutions. Sensitivity analysis of the TFP was capped at 125 percent so that its cost would not exceed the cost of the Low-Cost Food Plan, the next highest cost USDA food plan.

Cost Update of the Thrifty Food Plan

CNPP will use the current method to update the cost of the revised TFP market baskets each month for each of the 12 age-gender groups. This method was approved by an expert interagency panel of economists and uses the monthly Consumer Price Indexes (CPIs) for specific food categories to update prices for the food categories of the TFP market basket. Each of the 25 food categories of the TFP has a corresponding CPI or a set

of corresponding CPIs that are applied to update the appropriate TFP-food-category cost for the market basket of each age-gender group. For TFP food categories with more than one corresponding CPI, CNPP uses a weighted average of the appropriate CPIs. 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 cost of the TFP market basket for each age-gender group.

Conclusions

The TFP represents a minimal cost, nutritious diet. The revised TFP market baskets successfully incorporate recent dietary guidance and nutrient recommendations while maintaining constant real-cost levels. The market baskets serve as a valuable framework for providing advice to low-income households regarding economical, nutritious food selection. This is especially important because the average low-income family of four currently spends about 23 percent more on food than the cost of their TFP market basket and, even so, their diets do not meet nutritional standards. This latest revision of the TFP market baskets is an important step in helping households to eat more healthfully.

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Sample Menus and Recipes Based on the 1999 Thrifty Food Plan

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Policy and Promotion—
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Samples of three weekly menus and recipes based on the 1999 Thrifty Food Plan (TFP) are now available. The TFP serves as a national standard for a nutritious diet and is used to set food stamp allotments. These menus were developed under contract with The Pennsylvania State University and, after being tested, were found to be acceptable by households receiving food stamps. The menus illustrate one way that families who want to economize on food can eat nutritious meals that meet nutritional standards at a constant real cost equal to the previous TFP.

Samples of three weekly menus and recipes, described here, illustrate one way families who want to economize on food can eat nutritious meals that meet current dietary recommendations.¹ These menus are based on the 1999 Thrifty Food Plan (TFP).

The TFP serves as a national standard for a nutritious diet at a minimal cost and is used as the basis for food stamp allotments. The TFP was recently revised to incorporate current dietary standards, including the 1989 Recommended Dietary Allowances (RDA), the *1995 Dietary Guidelines for Americans*, and serving recommendations of the Food Guide Pyramid (2,3). The plan is now based on data from the 1989-91 Continuing Survey of Food Intakes by Individuals and national average food prices.

¹Previous CNPP publications regarding the 1999 Thrifty Food Plan present samples of two weekly menus and recipes. Since these publications were issued, another week of menus and recipes has been developed and is presented here for the first time.

The revised TFP provides food market baskets for 12 age-gender groups. Each TFP market basket identifies the type and quantity of foods that people in specific age-gender groups could consume at home to have a healthful diet that meets dietary standards. For a description of the development of the TFP market baskets, the reader should see the *Thrifty Food Plan, 1999 Administrative Report (5)*.

To help implement the TFP, The Center for Nutrition Policy and Promotion (CNPP) in 1996 contracted with The Pennsylvania State University (PSU) to have the market basket of food items for a family of four converted into menus and recipes that may be used by food stamp recipients or other households with a limited food budget. This article describes how the revised TFP market baskets were translated into sample meal plans, a process including the development of menus and recipes, as well as the evaluation of these menus and recipes by food stamp households.

Menu and Recipe Development

Meal plans for Week I, Week II, and Week III were designed to meet stipulated weekly costs of foods, use foods and quantities from the market basket, and meet dietary standards. When possible, PSU incorporated convenience in the meal plans: for example, using canned broth or bouillon instead of preparing soup from stock, using a commercial pudding mix rather than preparing pudding from basic ingredients, choosing canned beans instead of dry beans, using some deli meats for sandwiches instead of baking a roast or ham, and using store-bought bread rather than using baked bread for sandwiches and toast. However, these menus still require that many food products (e.g., biscuits and oatmeal cookies) be prepared from basic ingredients rather than purchased as boxed mixes or ready-to-eat foods, because specific quantities of basic ingredients, such as flour and milk, must be used in the weekly menus.

The same dietary standards used in the development of the TFP market baskets were used to develop each sample weekly menu. These standards were the 1989 Recommended Dietary Allowances (RDAs), the *1995 Dietary Guidelines for Americans*, the serving recommendations of the Food Guide Pyramid, and the National Research Council recommendations for cholesterol and carbohydrate. CNPP defined target RDAs and servings of the Food Guide Pyramid for four-person households by totaling the needs of individual household members.

To allow some flexibility in planning weekly menus, CNPP established ranges for meeting target food quantities of the market basket, the mandatory total weekly cost limit, and specific dietary standards. Food

quantities of the 25 food categories used in each weekly menu had to be within a 5-percent deviation of the amounts specified in the weekly market basket, except for any one or two food categories, which could deviate up to 10 percent. Costs needed to be between \$91 to \$93 for each weekly menu (the approximate cost of the TFP market basket for a family of four in 1996). As long as the specified dietary standards for the households were met, CNPP permitted the quantity limits for the fats; sugars; gravies, sauces, and condiments; and seasonings groups to deviate from the quantities in the market basket so that the weekly calorie level could be met.

Combining some of the 25 food categories in the market basket was allowed to keep the number of food categories manageable in planning the menus. For example, the milk drinks and milk desserts category and the milk and yogurt category (whole, lower fat, and skim) were combined. The nutritive content of the menus was not affected by combining these groups, because the foods had similar nutritive values.

The energy (calories) content of each weekly menu could exceed the specified target for the four-person household by 5 percent but could not drop below the recommended amount. Daily calories had to be within 5 percent of the recommendation; the percentage of calories from fat, within 27 to 30 percent for a week; and the percentage of calories from fat on a given day, within 27 to 33 percent for each weekly menu. The percentage of total calories from saturated fat had to be within 9 to 10 percent of the recommendation for a week, and the percentage of calories from saturated fat on a given day had to be within 8 to 12 percent of the recommendation for each weekly menu.

PSU used the Food Intake Analysis System (FIAS) (8) to analyze the nutritive values of the daily and weekly menus and recipes.² Quantitative dietary standards appropriate for the total diet were applied to the weekly menu but not to individual recipes, foods, or meals. However, recipes were developed based on principles of the Dietary Guidelines whenever possible (e.g., lower fat, saturated fat, and cholesterol; moderate amounts of sodium and sugars; and plenty of whole grains, fruits, and vegetables). Servings of the Food Guide Pyramid for the daily and weekly menus were determined by using the CNPP 1996 Food Guide Pyramid Servings Data Base (1).

Recipe Testing

Testing in the PSU Food Laboratory consisted of standardizing recipes and replicating them at least twice. New recipes or uncommon recipes, such as chick pea dip, were evaluated by PSU taste panelists. Recipes for commonly used foods, such as cooked noodles, were not rated for acceptability. Each laboratory-tested recipe included the number and size of servings, a list of ingredients and quantities, step-by-step preparation procedures, and preparation and cooking times.

Ingredients that were needed to prepare and test the recipes in the food laboratory were purchased at supermarkets local to PSU. To obtain the prices used in estimating costs for the menus and recipes, PSU purchased food items for quantities as close as possible to amounts specified on the shopping list. Food items chosen at the store were those with the lowest unit price,

²FIAS is a computerized nutrient-analysis system developed by the University of Texas, Houston Health Science Center in collaboration with the USDA Agricultural Research Service (8).

regardless of brand name. The recipes were followed exactly to reduce any variation in methods and product from one replication to another.

Taste panelists (six for each panel) used a sensory evaluation form³ to evaluate recipes immediately after preparation in the laboratory. Taste panelists rated the overall appearance, smell, first taste, texture, taste after several minutes, and overall eating quality of the recipes being tested. Scores given each recipe over two replications were averaged to obtain the mean score for the recipe. Recipes were defined as acceptable if they had an overall mean score of 7 or higher on a 9-point hedonic scale, where 9 represented the most positive score (“like extremely”). Recipes that received an acceptable evaluation score were then tested and evaluated by households receiving food stamps.

Evaluation of Menus and Recipes by Households Receiving Food Stamps

Twelve four-person households receiving food stamps evaluated the weekly menus and recipes; four households evaluated the menus for each week. These households, residing in Pennsylvania, were selected by PSU with assistance from the local food stamp office. The sample consisted of married couples ages 20 to 50, with two children, ages 6 to 11; and single parents ages 20 to 50, with three children, ages 6 to 11. The households reflected ethnic and racial diversity within the limits of a small sample. In addition, all households had to have access to a working telephone and refrigerator.

Of the 12 households, 7 were Caucasian; 4, African American; and 1, Latino. Eight households lived in urban areas, and 4 lived in rural areas. Eight households contained two adults; four contained single parents.

Researchers interviewed each household by telephone, providing background information about the project; eliciting participant expectations; and confirming eligibility, availability, and willingness to participate in the study. Researchers also identified the person who was primarily responsible for food shopping and preparation, location of the preferred grocery store, and availability of cooking equipment needed to complete the testing of menus and recipes. Food preparers were told they would be accompanied to stores by researchers to shop for the foods required to prepare a week of menus and that the researchers would purchase the foods at no cost to the families.

A preliminary in-home interview by PSU researchers with the participating households was used to review the project and to present the evaluation instruments, sample of weekly menus, food lists, and recipes to be evaluated. The three weekly menus and food lists are shown on pages 70-75. The evaluation instruments and recipes (for Week I and Week II) are published in the *Thrifty Food Plan, 1999 Administrative Report (5)*. The food preparer of each household was asked to shop for and prepare meals and snacks, consume them with the family, and evaluate their acceptability. Each participating household received a “start-up kit” consisting of a 9- by 13-inch baking dish, an 8-inch square baking dish, a 3-quart saucepan, and measuring cups and spoons.

Evaluations began with the PSU researcher accompanying the food preparer to shop for food. During the

The food preparer of each household was asked to shop for and prepare meals and snacks, consume them with the family, and evaluate their acceptability.

³The sensory evaluation form is published in the *Thrifty Food Plan, 1999 Administrative Report (5)*.

Results of the study indicate that minimal-cost, nutritious meal plans based on the revised TFP market basket were feasible and acceptable to sample households that received food stamps.

week, PSU researchers gathered data from household members by conducting three personal interviews in the home and one telephone interview every other day to obtain reactions on the previous day's menus and recipes. After 1 week, PSU conducted a final interview to obtain household members' comments on the overall acceptability of the sample menus and recipes.

Household members used the same 9-point hedonic scale for rating the quality of recipes that was used for evaluating the products in the food laboratory. For households, a mean score of 5 or higher was considered acceptable, because the homes of participants provided a more informal environment than did the food laboratory.

Overall, households gave acceptable ratings to the menus and recipes for all 3 weeks, with three of the four food preparers rating Week I and Week II meal plans as "good." All four food preparers rated Week III as "good." Average ratings were slightly lower in Week I because one recipe (Saucy Beef Spaghetti) was rated unfavorably. It was subsequently replaced with Saucy Beef Pasta. The household's mean sensory evaluation ratings for Week I and Week II recipes are published in the *Thrifty Food Plan, 1999 Administrative Report (5)*. Remarks by the households showed that some of the households were not accustomed to using recipes. Overall, the households found the food preparation techniques used to prepare food items in the menus acceptable. At least 3 of the 12 households required additional guidance to prepare the meal plans, such as measuring ingredients and following appropriate cooking techniques, because they lacked basic cooking skills needed to prepare food items from the recipes.

A limitation of the study was the small sample of households recruited from one State to evaluate the weekly menus. PSU researchers indicated that participant recruitment and data collection were challenging. They also indicated that newly enacted welfare reform legislation, relocation of some families, and lack of basic food preparation and cooking skills of some households made collection of the data labor-intensive.

Conclusions

Results of the study indicate that minimal-cost, nutritious meal plans based on the revised TFP market basket were feasible and acceptable to sample households that received food stamps. The list of foods and quantities specified in the market basket ensures that the menus can be applied broadly to a national population. Because the foods and meal plans were designed to meet dietary standards, the meal plans show one way of eating a healthful diet on a minimal-cost budget.

Two weeks of meal plans (including weekly menus, individual recipes, and food-shopping lists) are published in the following USDA publications: *Preparing Nutritious Meals at Minimal Cost (6)*, the *Thrifty Food Plan, 1999 Administrative Report (5)*, and *Recipes and Tips for Healthy, Thrifty Meals (7)*.

Our data indicate that assisting households to enhance their skills in basic food preparation and meal management will improve the chances of low-income and other families to benefit from these meal plans. These skills, as well as efficient and economical food-shopping techniques, should be enhanced through nutrition and consumer education efforts.

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3. U.S. Department of Agriculture and U.S. Department of Health and Human Services. 1995. *Nutrition and Your Health: Dietary Guidelines for Americans* (4th ed.). Home and Garden Bulletin No. 232.
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5. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. 1999. *Thrifty Food Plan, 1999 Administrative Report*. CNPP-7.
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7. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. 2000. *Recipes and Tips for Healthy, Thrifty Meals*. CNPP-11.
8. University of Texas, Houston Health Science Center School of Public Health and U.S. Department of Agriculture, Agricultural Research Service. 1996. *Food Intake Analysis System*. Version 3.2. Houston, TX.

Week I. Menus for a Family of Four

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
B R E A K F A S T	Orange juice (3 c) Ready-to-eat cereal (3 c flakes) Toasted English muffin (4) 1% lowfat milk (2 c)	Orange juice (3 c) Banana (4) Bagel (4) Margarine (4 tsp) 1% lowfat milk (2 c)	Orange juice (3 c) **Cooked rice cereal Bagel (4) Margarine (4 tsp)	Orange juice (3 c) Scrambled eggs (4) Hashbrown potatoes (2 c) 1% lowfat milk (2 c)	Orange juice (3 c) Ready-to-eat cereal (3 c flakes) English muffin (4) Margarine (4 tsp) 1% lowfat milk (2 c)	Orange juice (3 c) *Baked French toast Cinnamon sugar topping (4 tsp) 1% lowfat milk (2 c)	Orange juice (3 c) *Baked potato cakes White toast (4 slices) 1% lowfat milk (2 c)
L U N C H	*Turkey patties Ham burger bun (4) Orange juice (3 c) Cole slaw (2 c) 1% lowfat milk (2 c)	*Crispy chicken **Potato salad **Orange gelatin salad Peaches, canned (1 c) **Rice pudding	**Turkey chili Macaroni (2 c) *Peach-apple crisp 1% lowfat milk (2 c) Orange juice (3 c)	Turkey ham (11 oz, 2 tbsp salad dressing) sandwiches (4) **Baked beans Banana, slices (2 c) **Oatmeal cookies Orange juice (3 c) 1% lowfat milk (2 c)	**Potato soup Snack crackers, low salt (5 each) *Tuna pasta salad Orange slices (2 c) **Oatmeal cookies 1% lowfat milk (2 c)	**Potato soup Snack crackers, low salt (5 each) Apple or orange slices (2 apples, 2 oranges) (2 c) **Rice pudding 1% lowfat milk (2 c)	Baked fish (12 oz, 4 tbsp salad dressing) sandwiches (4) *Crispy potatoes **Macaroni salad Melon (1-1/3 c) Orange juice (3 c) 1% lowfat milk (2 c)
D I N N E R	**Beef-noodle casserole Lima beans (2 c) Banana or orange salad (2 bananas, 2 oranges) (2 c) 1% lowfat milk (2 c)	*Turkey stir fry Steamed rice (3 c) White bread (4 slices) *Peach-apple crisp 1% lowfat milk (2 c)	**Baked cod w/cheese *Scalloped potatoes Spinach (1-1/3 c) Margarine (4 tsp) Chocolate pudding (2 c)	*Beef pot roast Noodles (4 c) Peas and carrots (1 c) Orange slices (2 c) Biscuits (8) Margarine (4 tsp) **Rice pudding 1% lowfat milk (2 c)	Beef pot roast (12 oz) Noodles (4 c) Green beans (1-1/3 c) Leaf lettuce (1-1/3 c) Salad dressing (4 tbsp) **Rice pudding 1% lowfat milk (2 c)	*Saucy beef pasta White bread (4) Canned pears (2 c) Orange juice (3 c) 1% lowfat milk (2 c)	*Turkey-cabbagescasserole (8 c) Orange slices (2 c) White bread (2 slices) **Chickpea dip 1% lowfat milk (2 c)
S N A C K	White bread (4 slices) **Chickpea dip Lemonade (4 c)	Orange juice (3 c)	*Crispy potatoes	Lemonade (4 c)	Biscuits (8) Margarine (4 tsp) Lemonade (4 c)	Lemonade (4 c)	

*Recipes were tested and sensory-evaluated in the food laboratory and by household.

**Recipes were tested and sensory-evaluated in the food laboratory.

Note: Daily menus are designed in no specific sequence. Amounts of foods that a family is expected to use are shown in parentheses for most foods. Amounts of allowed margarine and milk can be combined or divided differently at meals. Recipes are provided elsewhere for foods shown with asterisks (4). Serving sizes are shown on the recipes.

Week II. Menus for a Family of Four

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
B R E A K F A S T	Orange juice (3 c) Hash brown potatoes (2c) Biscuits(8) Margarine (4tsp) Jelly (8 tbsp)	Orange juice (3 c) Ready-to-eat-cereal (3 c toasted oats) White toast (4 slices) Margarine (8 tsp) 1% lowfat milk (2 c)	Orange juice (3 c) Bananas (1/2 c) Ready-to-eat-cereal (3 c toasted oats) White toast (4 slices) Jelly (8 tbsp) 1% lowfat milk (2 c)	Orange juice (3 c) **Cooked rice cereal White toast (4 slices) Margarine (4tsp) 1% lowfat milk (2 c)	Orange juice (3 c) Ready-to-eat cereal (3 c toasted oats) White toast (4 slices) Margarine (4tsp) 1% lowfat milk (2 c)	Orange juice (3 c) Scrambled eggs (2 c) Turkey ham (11 oz) Bagels (4) 1% lowfat milk (2 c)	Orange juice (3 c) Melon (1-1/3 c) Pancakes(12) Pancake syrup (8 tbsp) 1% lowfat milk (2 c)
L U N C H	**Chicken and vegetables **Scalloped potatoes Grapes (12 oz) Whole wheat bread (4 slices) Margarine (4tsp) *Peach cake 1% lowfat milk (2 c)	*Pizza meat loaf Noodles (4c) Margarine (8 tsp) Orange slices (2 c) 1% lowfat milk (2 c)	*Tuna macaroni salad White bread (4 slices) Margarine (4tsp) Apple slices (2 c) 1% lowfat milk (2 c) Cocoa drink mix (2 oz)	Ham burger (12 oz) sandwiches (4) *Ranch beans **Orange gelatin salad Banana slices (1/2 c) 1% lowfat milk (2 c)	*Baked chicken nuggets **Shoestring potatoes Macaroni (5 c) Margarine (4tsp) **Orange gelatin salad 1% lowfat milk (2 c)	*Chicken noodle soup Biscuits (8) Canned peaches (2 c) Orange juice (3 c) 1% lowfat milk (2 c) Cocoa drink mix (2 oz)	Meatball (12 meatballs) sandwiches (4) Grapes (12 oz) **Sugar cookies 1% lowfat milk (2 c) Orange juice (3 c)
D I N N E R	*Southwestern salad Steamed rice (6 c) Apple orange salad (2 apples, 2 oranges) (2 c) Margarine (4tsp) 1% lowfat milk (2 c)	*Spanish baked fish Steamed rice (6 c) Peas (1-1/3 c) Whole wheat bread (4 slices) Margarine (8 tsp) *Peach cake 1% lowfat milk (2 c)	*Stir-fried pork and vegetables with rice Dinner rolls (4) Margarine (4tsp) Mandarin oranges (2c) 1% lowfat milk (2 c)	Baked chicken (10 oz) Mash potatoes (6c) Green beans (1-1/2 c) White bread (4 slices) Margarine (5-1/3tbsp) Orange slices (2 c) 1% lowfat milk (2 c)	**Baked spicy fish Noodles (4c) Peas and carrots (10 oz) White bread (4 slices) Margarine (8tsp) *Chocolate rice pudding 1% lowfat milk (2 c)	*Baked meatballs Spaghetti and sauce (5 c) Leaf lettuce (2 c) Salad dressing (4 tbsp) French bread (4 slices) 1% lowfat milk (2 c)	*Cheese-stuffed potatoes Macaroni (5 c) Peas (1-1/3 c) Margarine (8tsp) Orange slices (2 c) 1% lowfat milk (2 c)
S N A C K	Popcorn (6 c)	**Shoestring potatoes Fruit drink (4 c)	Popcorn (6c) Orange juice (3 c)	*Chocolate rice pudding	Baked French fries (11 oz) Fruit drink (4 c)	Ice milk fudgesicle (4)	Popcorn (6c) Fruit drink (4 c)
<p>*Recipes were tested and sensory-evaluated in the food laboratory and by households. **Recipes were tested and sensory-evaluated in the food laboratory. Note: Daily menus are designed in no specific sequence. Amounts of foods that a family is expected to use are shown in parentheses for most foods. Amounts of allowed margarine and milk can be combined or divided differently at meals. Recipes are provided elsewhere for foods shown with asterisks(*). Serving sizes are shown on the recipes.</p>							

Week III. Menus for a Family of Four

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
B R E A K F A S T	Orange juice (3 c) Hash brown potatoes (2 c) Biscuits (8) Margarine (4 tsp) Jelly (8 tsp)	Orange juice (3 c) Ready-to-eat cereal (4 c crispy rice) Bagel (4) Margarine (8 tsp) 1% lowfat milk (3 c)	Orange juice (3 c) **Cooked rice cereal White toast (4 slices) Margarine (8 tsp) 1% lowfat milk (2 c)	Orange juice (3 c) Scrambled eggs (4) Turkey bacon (8 slices) Bagel (4) Margarine (4 tsp)	Orange juice (3 c) Ready-to-eat cereal (4 c crispy rice) English muffin (4) Margarine (8 tsp) 1% lowfat milk (3 c)	Orange juice (3 c) Ready-to-eat cereal (4 c crispy rice) *Muffins Margarine (8 tsp) 1% lowfat milk (3 c)	Orange juice (3 c) *Rice pancakes Applesauce (2 c) Melon (1-1/3 c) 1% lowfat milk (2 c)
L U N C H	*Skillet chicken w/potatoes Cooked peas (1-1/3 c) Sliced peaches (1-1/3 c) Whole wheat bread (4 slices) Margarine (4 tsp) 1% lowfat milk (2 c)	*Black bean chili **Meatloaf Noodles (8 c) Margarine (8 tsp) Orange slices (2 c) 1% lowfat milk (2 c) w/coconut powder (2 oz)	*Tuna/cheese sandwich Leaf lettuce (2 c) Bananas (1-1/4 c) Apples (2 c) 1% lowfat milk (2 c)	Baked ham (12 oz) *Baked diced potatoes **Orange gelatin salad 1% lowfat milk (2 c)	**Cajun chicken **Shoestring potatoes Macaroni (5 c) Orange juice (3 c) Margarine (8 tsp) 1% lowfat milk (2 c)	**Herbed-baked fish Whipped potatoes (6 c) Carrots (1-1/3 c) Orange juice (5 c) 1% lowfat milk (2 c) w/coconut powder (2 oz)	Baked meat balls (12) Buns (4) Stove-top baked beans (4 c) **Sugar cookies Orange juice (3 c) 1% lowfat milk (2 c)
D I N E R	Cheeseburger (4) Rice (6 c) Apple-orange salad (2 apples, 2 oranges) 1% lowfat milk (2 c)	*Chicken, noodles, green beans Rice (6 c) White bread (4 slices) Margarine (16 tsp) Orange juice (3 c) 1% lowfat milk (2 c)	Baked chicken (1 lb) *Macaroni/vegetables Orange slices (2 c) White bread (4 slices) Margarine (8 tsp) 1% lowfat milk (2 c)	*Beef chuck wagon stew Rice (8 c) White soft rolls (4) Margarine (4 tsp) 1% lowfat milk (2 c) Oranges, mandarin (1-1/3 c)	**Mustard-glazed fish *Broccoli and spaghetti White bread (4 slices) Margarine (8 tsp) Apple/banana slices (2 c) 1% lowfat milk (2 c)	*Stuffed peppers Leaf lettuce (2 c) Orange salad dressing (8 tsp) French bread (4 slices) Margarine (8 tsp) 1% lowfat milk (2 c)	**Egg cheese casserole Orange slices (2 c) Banana slices (2 c) 1% lowfat milk (2 c)
S N A C K	Popcorn (6 c) Lemonade (4 c)	Popcorn (6 c)	*Chocolate cake	Popcorn (6 c) Orange juice (3 c)	Baked French fries (11 oz) Lemonade (4 c)	Ice milk fudgesicle (4)	**Shoestring potatoes Lemonade (4 c)

*Recipes were tested and sensory-evaluated in the food laboratory and by households.

**Recipes were tested and sensory-evaluated in the food laboratory.

Note: Daily menus are designed in no specific sequence. Amounts of foods that a family is expected to use are shown in parentheses for most foods. **Amounts of allowed margarine and milk can be combined or divided differently at meals.**

Food List

Week I: Food for a Family of Four¹

Fruits and Vegetables

Fresh²:

Apples	(6 small) 1 lb 8 oz
Bananas	(11 medium) 2 lb 12 oz
Melon	1 lb
Oranges	(26 small) 5 lb 7 oz
Cabbage	4 oz
Carrots	1 lb 4 oz
Celery	3 oz
Green pepper	3 oz
Lettuce, leaf	4 oz
Onions	2 lb 8 oz
Potatoes	11 lb 14 oz
Zucchini	7 oz

Canned:

Applesauce	2 oz
Peaches	1 lb 10 oz
Pears	13 oz
Green beans	12 oz
Spinach	10 oz
Tomato paste	6 oz
Tomato sauce	1 lb 1 oz
Tomato soup	10.5 oz

Frozen:

Orange juice, concentrate	8 12-oz cans
Green beans	5 oz
Peas	5 oz

Breads, Cereals, and Other Grain Products

Bagels, plain, enriched	(8) 1 lb
Bread crumbs	2 oz
Bread, white, enriched	2.2 lb
English muffins	8
French bread, enriched	8 oz
Hamburger buns, enriched	8
Crackers, snack, low salt	4 oz
Oatmeal, quick, rolled oats	3 oz
Ready-to-eat cereal (flakes)	6 oz
Barley, pearl	4 oz
Flour, enriched	1 lb 8 oz
Macaroni, enriched	1 lb 11 oz
Noodles, yolk-free, enriched	2 lb 3 oz
Rice, enriched	2 lb 5 oz

Milk and Cheese

Evaporated milk	16 fl oz
Milk, 1% lowfat	10 qt
Milk, whole	3 qt
Cheddar cheese	8 oz

Meat and Meat Alternates

Beef chuck roast	2.5 lb
Beef, ground, lean	2.4 lb
Chicken, fryer	1.5 lb
Fish	
Breaded portions, frozen	1 lb
Cod, frozen	1 lb
Tuna fish, chunk-style, water-pack	12 oz
Turkey breast	2 lb 4 oz
Turkey, ground	2 lb
Turkey ham (deli)	11 oz
Beans, kidney, canned	1 lb 11 oz
Beans, lima, dry	6 oz
Beans, northern, canned	9 oz
Beans, garbanzo (chickpeas), canned	10 oz
Eggs, large	16

Fats and Oils

Margarine, stick	7 oz
Shortening	2 oz
Salad dressing, mayonnaise-type	1 lb
Vegetable oil	9 fl oz

Sugars and Sweets

Sugar, brown	2 oz
Sugar, granulated	1 lb
Chocolate pudding, instant	3 oz
Lemonade (ready-to-drink)	1 gal

Other Food Items³

Baking powder
Baking soda
Beef bouillon cubes
Black pepper, red pepper
Catsup
Chicken bouillon cubes
Chili powder
Cinnamon
Cornstarch
Cumin
Dry mustard
Gelatin, unflavored
Lemon juice, bottled
Onion powder
Oregano
Paprika
Parsley flakes
Salt
Soy sauce
Sweet pickle relish
Vanilla
Vinegar

¹Provides food for a family of four. Amounts of food shown are for foods **actually used** during the week.

²Substitute other fruits or vegetables in season that contain similar nutrients if they are better buys.

³Small amounts used in preparing recipes and other foods in the Week I menus; purchase as needed.

Food List

Week II: Food for a Family of Four¹

Fruits and Vegetables

Fresh²:

Apples	(5 small) 1 lb 4 oz
Bananas	(11 medium) 2 lb 12 oz
Grapes	1 lb 8 oz
Melon	1 lb
Oranges	(22 small) 4 lb 12 oz
Carrots	1 lb
Celery	5 oz
Green pepper	4 oz
Lettuce, leaf	9 oz
Onions	1 lb 4 oz
Potatoes	10 lb 8 oz
Tomatoes	6 oz

Canned:

Oranges, mandarin	13 oz
Peaches, canned, light-syrup	1 lb 10 oz
Mushrooms, canned	4 oz
Spaghetti sauce	26 oz
Tomato sauce	8 oz

Frozen:

Orange juice, concentrate	7 12-oz cans
Broccoli	6 oz
French fries	11 oz
Green beans	1 lb 7 oz
Peas	15 oz

Breads, Cereals, and Other Grain Products

Bagels, plain, enriched	(4) 8 oz
Bread crumbs	3 oz
Bread, French	4 oz
Bread, white, enriched	2 lb
Bread, whole-wheat	1 lb
Hamburger buns, enriched	8
Rolls, dinner, enriched	4
Ready-to-eat cereal	
Corn flakes	1 oz
Toasted oats	10 oz
Flour, enriched	1 lb 7 oz
Macaroni, enriched	1 lb 5 oz
Noodles, yolk-free, enriched	1 lb 2 oz
Popcorn, microwave, unpopped	3 oz
Rice, enriched	3 lb 2 oz
Spaghetti, enriched	11 oz

Milk and Cheese

Evaporated milk	4 oz
Milk, 1% lowfat	9 qt
Milk, whole	4 qt
Cheese, cheddar	2 oz
Cheese, cottage	7 oz
Cheese, mozzarella	1 oz

Meat and Meat Alternates

Beef, ground, lean	3 lb 15 oz
Chicken, fryer	1 lb 13 oz
Chicken, thighs	2 lb 12 oz
Fish (flounder, cod), frozen	2 lb
Tuna fish, chunk-style, water-pack	12 oz
Pork, ground	1 lb 7 oz
Turkey, ground	1 lb
Turkey ham	11 oz
Beans, garbanzo (chickpeas), canned	15 oz
Beans, kidney, canned	15 oz
Beans, vegetarian, canned	1 lb 9 oz
Eggs, large	17

Fats and Oils

Margarine, stick	15 oz
Shortening	4 oz
Salad dressing, mayonnaise-type	6 fl oz
Vegetable oil	9 fl oz

Sugars and Sweets

Sugar, brown	1 oz
Sugar, powdered	3 oz
Sugar, granulated	9 oz
Jelly	8 oz
Molasses	1 fl oz
Pancake syrup	2 oz
Chocolate chips, semi-sweet	2 oz
Fruit drink	1 gal
Fudgesicles, ice milk	4

Other Food Items³

Baking powder
Baking soda
Black pepper
Catsup
Chicken broth, reduced sodium
Chili powder
Cinnamon
Chocolate drink mix, powdered
Cumin
Dried onion
Garlic powder
Gelatin, unflavored
Italian herb seasoning
Lemon juice, bottled
Oregano
Paprika
Salt
Soy sauce, reduced sodium
Vanilla

¹Provides food for a family of four. Amounts of food shown are for foods **actually used** during the week.

²Substitute other fruits or vegetables in season that contain similar nutrients if they are better buys.

³Small amounts used in preparing recipes and other food items in the Week II menus; purchase as needed.

Food List

Week III: Food for a Family of Four¹

Fruits and Vegetables

Fresh²:

Apples	(9 small) 2 lb
Bananas	(11 medium) 2 lb 12 oz
Oranges	(21 small) 4 lb 8 oz
Melon	1 lb
Carrots	11 oz
Lettuce leaf	8 oz
Celery	3 oz
Green pepper	1 lb 9 oz
Potatoes	11 lb 3 oz
Onions	15 oz

Canned:

Applesauce	1 lb 1 oz
Peaches, light syrup	11 oz
Oranges, mandarin	13 oz
Mushrooms	4 oz
Tomato paste	2 oz
Tomato soup (low sodium)	2 10.5 oz cans
Tomatoes	15 oz

Frozen:

Orange juice, concentrate	7 12-oz cans
Broccoli	7 oz
Carrots	12 oz
French fries	11 oz
Green beans	15 oz
Peas	15 oz

Breads, Cereals, and Other Grain Products

Bagels, plain, enriched	(8) 1 lb
Bread crumbs	2 oz
Bread, French	4 oz
Bread, white, enriched	1 lb 12 oz
Bread, whole-wheat	4 oz
English muffins	4
Flour, enriched	1 lb 7 oz
Ready-to-eat cereal	
Crispy rice	11 oz
Macaroni, enriched	10 oz
Noodles, yolk-free, enriched	1 lb 5 oz
Popcorn, microwave, unpopped	4 oz
Rice, enriched	3 lb 4 oz
Rolls, canned, enriched	4 oz
Spaghetti, enriched	8 oz

Milk and Cheese

Milk, 1% lowfat	11 qt
Milk, whole	2 1/4 qt
Cheese, cheddar	6 oz
Cheese, mozzarella	3 oz
Cheese, parmesan	1/2 oz

Meat and Meat Alternates

Beef, ground, lean	3 lb 5 oz
Beef, round	1 lb 5 oz
Chicken, drumsticks	1 lb 6 oz
Chicken, fryer	1 lb 8 oz
Chicken, thighs	3 lb
Fish (cod, pollock) frozen	2 lb
Ham, baked	14 oz
Tuna fish, canned, chunk-style, waterpack	12 oz
Beans, black, canned	11 oz
Beans, garbanzo (chickpeas), canned	10 oz
Beans, vegetarian	2 lb
Eggs, large	17

Fats and Oils

Margarine, stick	1 lb 2 oz
Turkey bacon	11 oz
Vegetable oil	13 fl oz

Sugars and Sweets

Sugar, powdered	3 oz
Sugar, granulated	1 lb
Lemonade (ready-to-drink)	3 qt

Other Food Items³

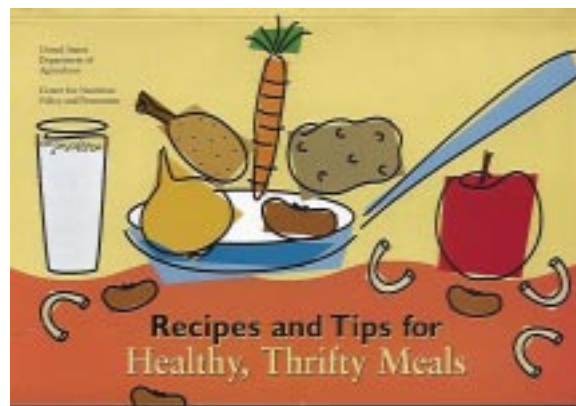
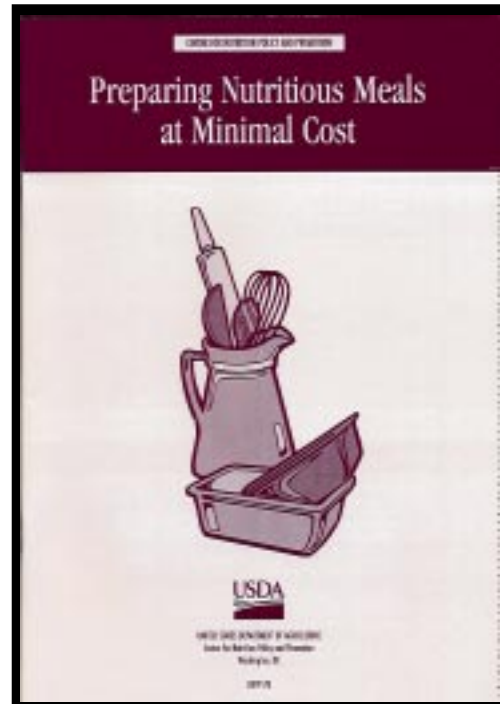
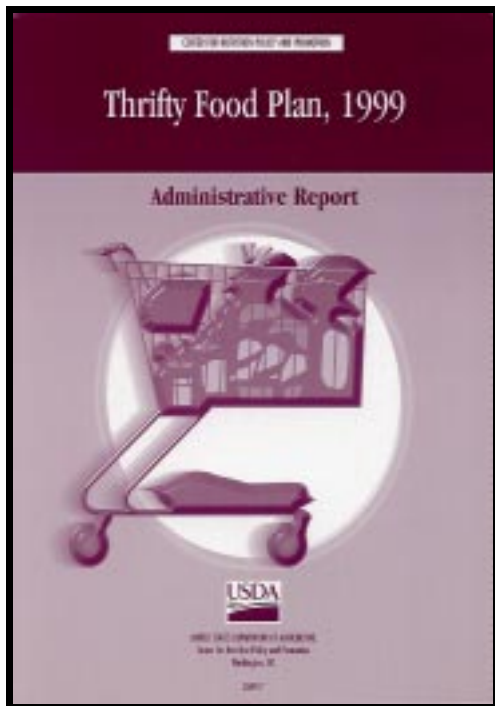
Baking powder
Baking soda
Black pepper
Catsup
Chicken broth, reduced sodium
Chili powder
Cinnamon
Chocolate drink mix, powdered
Cocoa
Dried onion
Garlic powder
Gelatin
Jelly
Mustard, prepared
Oregano
Paprika
Parsley, dried
Salad dressing, mayonnaise-type
Salt
Shortening
Soy sauce, low sodium
Sugar, dark, corn
Thyme, dried
Vanilla
Vinegar, white

¹Provides food for a family of four. Amounts of food shown are for foods **actually used** during the week.

²Substitute other fruits or vegetables in season that contain similar nutrients if they are better buys.

³Small amounts used in preparing recipes and other food items in the Week III menus; purchase as needed.

Thrifty Food Plan, 1999: Publications



USDA's Food Guide: Updating the Research Base to Reflect Changes in Food Consumption Patterns

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and Promotion

The Food Guide Pyramid was based on a food guide developed in the early 1980's by the U.S. Department of Agriculture (USDA). This food guide was developed to meet specific nutritional goals and was based on food consumption patterns of Americans (1,3) and food composition data. While the original food guide used the 1980 Recommended Dietary Allowances (RDA) to set nutritional goals for food energy, protein, vitamins, and minerals, the 1980 edition of the *Dietary Guidelines for Americans* was used to provide nutritional goals for fat and added sugars. The 1989 RDA and the 1985 and 1990 editions of the *Dietary Guidelines for Americans* were used in subsequent research that described the food guide (4).

In developing the food guide, the USDA used food intakes from the Nationwide Food Consumption Survey (NFCS 1977-78, Spring 1977) for all individuals to identify patterns of actual intake within food groups and subgroups (3). These food-group and subgroup "composites" are important parts of the research base supporting the food guide. For each food group or subgroup, USDA developed a composite that reflected, on a percentage basis, Americans' use of individual foods within that group. For example, in 1977 the deep-yellow vegetable composite was 79.5 percent carrots, 10.6 percent sweet potatoes, and 10.0 percent winter squash. Composites were developed for each of the following food groups or

subgroups: Meat, poultry, fish; dark-green leafy vegetable; deep-yellow vegetable; starchy vegetable; legume; other vegetable; fruit; whole grains; and enriched grains. These composites were used to provide documentation that the recommended food-selection patterns, in terms of numbers of servings for each food group and subgroup, would meet nutritional goals.

Nutrient profiles for each composite were calculated by using the forms of the food items that were lowest in fat and added sugars. This reflected the philosophical goals that the food guide be realistic and allow maximum flexibility for users to select specific sources of fats and sugars within their diet.

The objective of the research described here was to determine whether the diet pattern of the Food Guide Pyramid continues to meet nutritional goals. Effects of changes in Americans' food selections between 1977 and 1991 on the nutrient profiles of food group composites were assessed.

Procedures for Updating the Composites

The NFCS 1977-78 composites for each food group and subgroup were updated by using data from the Continuing Survey of Food Intakes by Individuals (CSFII) 1989-91. Foods

reported in the CSFII 1989-91 as consumed by 11,488 individuals 2 years old and older were used, and sample weights were applied to provide estimates that were representative of the population. USDA's Center for Nutrition Policy and Promotion developed a Food Guide Servings Data Base that was used to convert grams of foods reported as consumed in the CSFII 1989-91 into numbers of food guide servings.

Composites for each Pyramid food group (e.g., meat, poultry, fish) or subgroup (e.g., dark-green leafy vegetable) were developed based on consumption of food items (e.g., cooked broccoli) as reported in the CSFII 1989-91. For example, all food codes that were consumed and that contained cooked broccoli were grouped together in a "cooked broccoli item group." A composite was then constructed of these item groups and weighted by the number of servings of each that were reported by all individuals. One food code was selected to represent each food-item group in each of the composites, and nutrient values of these food codes were used to calculate the nutrient profile of a composite serving.

The original composites, developed by using NFCS 1977-78 data, were then compared with the updated composites. Both the percentages of each food-item group in the composites and the nutrient profiles of the composites were compared. Nutrient data from 1991 were used for the calculation of both the original and updated composites' nutrient profiles. The nutrient values per serving of each food group or subgroup for the original composites (4) and the updated composites (2) have been published.

To determine whether the food guide patterns based on updated composites

continued to meet nutritional goals, the Food Guide Pyramid diet pattern for 1,600 calories was calculated and nutrient totals were then compared with the current nutritional goals for the food guide, including the 1989 RDA. Results were also compared with the 1,600-calorie pattern based on the 1977-78 composites to examine trends over time.

Results

Changes occurred between 1977 and 1991 in the percentages of specific food items consumed within the food groups and subgroups, thus altering the nutrient profiles of several composites. The amounts of zinc, vitamin B₁₂, and iron in the meat, poultry, fish composite decreased due to the smaller amounts of beef and liver consumed in 1991 (44 percent) compared with 1977 (52 percent) (fig. 1). The amount of zinc dropped from 1.27 to 1.10 mg per ounce; vitamin B₁₂, from 1.4 to 0.6 mcg per ounce; and iron, from 0.62 to 0.54 mg per ounce.

As a nutrient in the dark-green leafy vegetable composite, vitamin A dropped from 363 to 238 RE per serving primarily due to less spinach being consumed in 1991 (fig. 2). In 1977 spinach was about 29 percent of the dark-green leafy vegetable composite, compared with about 14 percent in 1991. Cooked spinach is a much richer source (819 RE per 100 g) of vitamin A than cooked broccoli (139 RE). The increase in the amount of broccoli consumed, from 32 to about 58 percent between 1977 and 1991, resulted in a sharp increase in vitamin C: from 24 to 43 mg per serving of the dark-green leafy vegetable composite. A decrease in the amount of folate per serving (76 to 56 mcg) was also attributable to the decreased consumption of spinach—the most concentrated

source of folate among the food items in this composite.

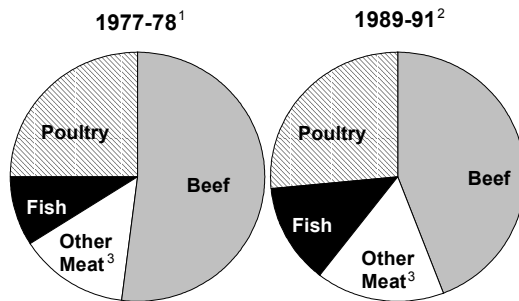
Between 1977 and 1991 the percentage of foods in the legume composite changed dramatically (fig. 3). While white beans decreased from about 53 to 27 percent of the composite, pinto beans increased from about 22 to about 32 percent. The changes in the amounts of the various components of the legume composite resulted, however, in only slight changes in the nutrient profile of this composite. For example, dietary fiber per serving increased slightly, from 5.3 to 5.7 g.

Dietary fiber in the fruit composite dropped to 1.2 g per serving (from 1.6 g) due to the slight increase (5 percent) in consumption of "other juice" (noncitrus juice) between 1977 and 1991. The other nutrients in a serving of the fruit composite varied only slightly between the original and updated composites. Vitamin C, for example, changed by only 2 mg per serving: from 32 to 30.

The dietary fiber content of the composite for whole grains rose from 1.8 to 2.0 g per serving, mainly from the increased consumption of "other whole grains": primarily corn tortillas and popcorn. From 1977 to 1991 "other whole grains" changed from about 14 to about 21 percent of the whole grains composite. Corn tortillas and popcorn also contributed to an increased amount of magnesium in the composite in 1991, a rise from 20.6 to 23.0 mg per serving.

The 1991 composites' nutrient profiles were used to calculate the 1,600-calorie Food Guide Pyramid diet pattern. The pattern met nutritional goals for food energy, protein, vitamins, most minerals, dietary fiber, sodium, fat, and added sugars. As in 1977-78, iron, zinc, and copper were between 70 and 88 percent of the 1989 RDA for

Figure 1. Comparison of meat, poultry, fish group composites

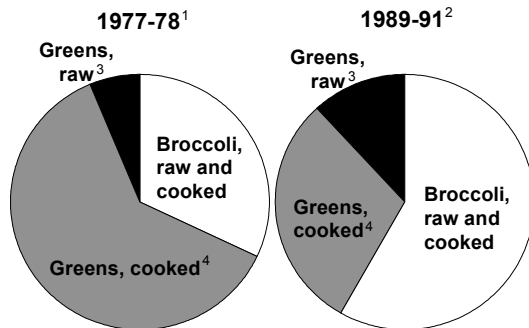


¹Nationwide Food Consumption Survey

²Continuing Survey of Foods Intakes by Individuals, 3-day, weighted data for all individuals 2 years old and older.

³Includes pork and lamb.

Figure 2. Comparison of dark-green leafy vegetable subgroup composites



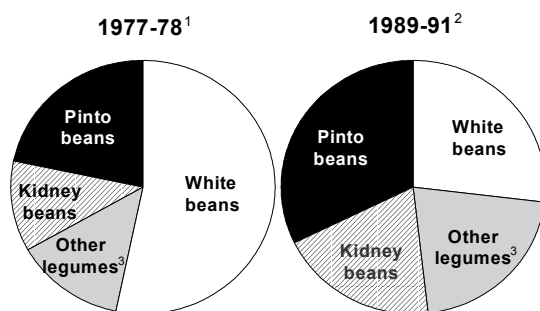
¹Nationwide Food Consumption Survey

²Continuing Survey of Foods Intakes by Individuals, 3-day, weighted data for all individuals 2 years old and older.

³Includes romaine, spinach, endive, etc.

⁴Includes spinach, kale, collards, etc.

Figure 3. Comparison of legume subgroup composites



¹Nationwide Food Consumption Survey

²Continuing Survey of Foods Intakes by Individuals, 3-day, weighted data for all individuals 2 years old and older.

³Includes lentils, chickpeas, split peas, etc.

women. From the 1977 to the 1991 composites, little change occurred in the overall nutrient adequacy of the diet pattern. Nonfortified ready-to-eat and cooked breakfast cereals were used in both the 1977-78 and 1989-91 composites for whole grains and enriched grains. Composite nutrient profiles thus do not over-count the nutrients from fortified breakfast cereals for people who do not eat them. This was consistent with the philosophical goals for the food guide. Actual intakes of nutrients commonly used in fortified cereals may be higher than the levels reflected in analysis of the Food Guide Pyramid diet pattern.

Conclusions

USDA's Food Guide Pyramid depicts patterns of food selection that provide adequate amounts of food energy, protein, vitamins, minerals, and dietary fiber for good health and that are moderate in sodium, added sugars, and fat. Regardless of changes in individual food group composites over time, Pyramid dietary patterns continue to meet most nutrient objectives. Women's consumption of important food sources of iron, copper, and zinc, which fell below the RDA, should be encouraged. Continued monitoring with new data on food consumption is recommended. Procedures for updating composites based on current consumption data have been automated and thus permit continued research related to food guidance.

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USDA's Expenditures on Children by Families Project: Uses and Changes Over Time

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For 40 years, the U.S. Department of Agriculture (USDA) has provided annual estimates of family expenditures on children. These expenditure estimates have important policy applications. This research brief reviews these applications and compares the most recent child-rearing expense estimates with those first produced in 1960. A description of the methods used to derive the expense estimates is reported elsewhere (2).

Some people wonder why the USDA, and not another Federal department such as the Department of Health and Human Services, produces the child-rearing expense estimates. Improving the economic well-being of American families has long been a goal of USDA, and the Expenditures on Children by Families report is one example of the Department's commitment to this purpose. Other examples include the USDA Thrifty Food Plan, which is used to determine food stamp allotments, and the USDA Food Guide Pyramid, which is used to help people make nutritious food choices.

Uses of Expenditures on Children Report

The Expenditures on Children by Families report has three primary uses. The significance of these uses has changed over time, in line with the changing structure of American families.

Child Support

One of the primary uses of the expense estimates is in determining child support. When the expense estimates were first produced in 1960, only 9 percent of families with children under age 18 were headed by a single parent (fig. 1), and many of these parents were widows. In 1998, 27 percent of families with children under age 18 were headed by a single parent, many becoming single-parent families as the result of divorce (5). These figures represent families at a given point in time. The percentage of children residing in a single-parent household at some point in their childhood is greater because many single parents remarry. In 1998, 52 percent of children lived with their original two parents; the remaining 48 percent of children lived with either a single parent, a parent and stepparent, or in some other arrangement (7).

Because so many children make their primary residence with only one of their biological parents, child support (legally mandated payments from a noncustodial parent to a custodial parent) has become important. It has become even more important in recent years because many single-parent families are in poverty, and payment of child support is seen as one way to reduce poverty among these families.

The Family Support Act of 1988 required States to implement numeric child support guidelines that are to be followed unless their application would

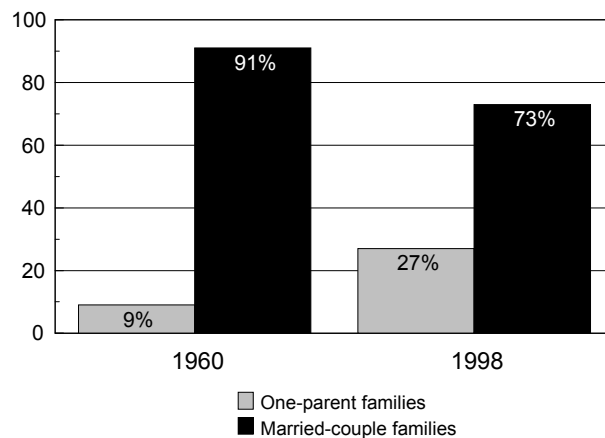
be unjust or inappropriate. In addition, States are required to review their guidelines every 4 years: (1) to ensure that application of the guidelines results in appropriate award amounts for child support and (2) to consider economic data on the cost of raising children in this review by the States. As a result of this act, USDA's Expenditures on Children by Families report has influenced the economic well-being of millions of children in the United States. A 1998 study titled "Interstate Comparisons of Child Support Orders Using State Guidelines" found that the USDA child-rearing expense estimates are usually consulted by States when calculating typical expenditures on children for State child support guidelines (3).

Foster Care

In 1982 about 262,000 children were in foster care. (Figures for earlier years are not available.) By 1998 about 520,000 children were in foster care (6). A child is placed in foster care when a court determines that his or her family cannot provide a minimally safe environment. This determination often follows an investigation by a State or county child protective services worker. Most children in foster care live in the home of a relative or nonrelative who is compensated monetarily to help cover the cost of the children living with them.

The USDA child-rearing expense estimates are often used by States in setting the levels of foster care rates. A 1989 study by the American Public Welfare Association found that nearly half the States used the USDA child-rearing expense report to calculate foster care rates (1).

Figure 1. Families, by presence of own children under age 18, 1960 versus 1998



Educational and Other Uses

One of the original intents of the child-rearing expense estimates was to "provide budgetary guidance to individual families" who had children or were planning to have children (4). A recent cover story by *U.S. News & World Report* used the USDA child-rearing expenses to inform people of the cost of children (8). Many financial advisors and personal finance textbooks use the estimates as a guide to how families may allocate their expenditures. In addition to providing budgetary guidance, the USDA child-rearing expenses are used in many high schools to educate teenagers on how much raising children really costs. One intent of providing this information is to encourage teenagers to wait until they are adults and more financially secure before having children.

There are many other uses of the USDA child-rearing expenses. Courts use the estimates to appraise damages

arising from personal injury or wrongful death cases. For example, if a person with children is hurt on a job such that he or she cannot work, the court uses the expense figures as a guide to determine how much the person is to be compensated in order to support the family. Courts also use the estimates to determine damages in malpractice cases, especially for women who give birth after undergoing surgical procedures to prevent pregnancy. These women are compensated based on the cost of the child they did not expect to have.

Estimating Child-Rearing Expenses: Similarities and Differences Over Time

Since the first report in 1960 on family expenditures on children, there have been similarities and differences in the method used by USDA researchers in estimating child-rearing expenses. Comparisons over time highlight both the similarities and differences.

Similarities

- USDA's child-rearing expense estimates always have been based on data from the Consumer Expenditure Survey (CE). The 1960 estimates were based on the 1960 CE, and the latest estimates are based on the 1990-92 CE, updated to 2000 dollars with the Consumer Price Index. The CE is the only Federal survey of household expenditures collected nationwide. It collects information on sociodemographic characteristics, income, and expenditures of a nationally representative sample of households.
- The child-rearing expense estimates always have covered total expenses on a child as well as expenses by major budgetary component: Housing, food, transportation, clothing, health care, education/child care, and other miscellaneous expenses (personal care items, recreation expenses, etc.).
- Expenses on children always have been estimated by age of child, household income level, number of children in the family, and geographic area. These factors are key determinants of how much a family spends on a child. Results have shown that in both 1960 and 2000 (1) families spend more on older children than younger children; (2) the higher a family's income, the more is spent on a child; (3) the more children in a family, the less is spent on each individual child because of economies of scale and income being spread over more children; and (4) families in the West have the highest expenses on a child, primarily because of high housing costs in this region.

- With the exception of food, the expense estimates for the various budgetary components have represented what is actually spent on a child as opposed to a scientific standard of what should be spent to ensure some standard or adequate level of living. This is because for most budgetary components, such as housing and education, a commonly accepted standard for what is adequate does not exist. Attempts to define a standard have been very controversial.

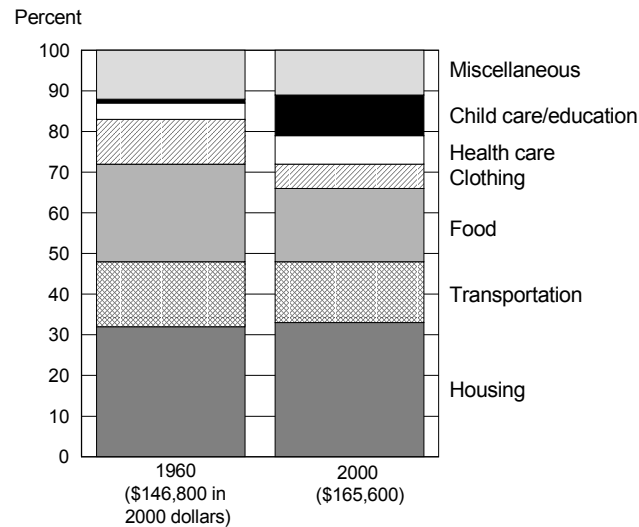
Differences

- When the child-rearing expense estimates were first produced in 1960, the figures were only applicable to husband-wife families. Since then, an increasing number of children are living in single-parent families. Hence, in 1990, USDA began to produce child-rearing expenses for single-parent families, as well as for husband-wife families.
- During the 1960's and 1970's child-rearing expense estimates were made for farm families in different regions of the country (Northeast, South, Midwest—also called North Central—, and West). Since then the number of families residing on farms has declined to the point where there has not been a sufficient sample size to produce estimates for farm families in the regions. Also, the current CE does not identify region for rural families. Because of these factors, USDA does not currently produce estimates of child-rearing expenses in farm families but rather produces estimates of child-rearing expenses in rural families throughout the United States. Rural areas are defined as places of fewer than 2,500 people outside a Metropolitan Statistical Area.

Expenses on children always have been estimated by age of child, household income level, number of children in the family, and geographic area.

- In 1960 there was no separate budgetary component for child care because many women were not in the labor force. Child care expenses were small and were included in the housing component because such expenses typically consisted of babysitting expenses in the home. Since 1989, child care/education has been a separate budgetary component; for preschoolers, child care accounts for almost all the expenditures in this category. For older children, education accounts for almost all the expenditures in this category. According to the most recent USDA child-rearing expense estimates, child care is one of the largest expenditures families make on preschoolers.

Figure 2. Expenditures on children up to age 18, by middle-income husband-wife families, 1960 versus 2000



- From 1960 to 2000 expense estimates for most budgetary components have represented what is actually spent on a child rather than representing some scientific standard of what should be spent. The exception was for food-at-home expenses. From 1960 to 1988, food-at-home expenses on a child represented a standard level and were based on the USDA Food Plans, which reflect the cost of a nutritious market basket of foods at different cost levels. Actual food-away-from-home expenses, however, were included in the food estimates during this time. After 1988 actual food-at-home expenditures on a child were used in the estimates, as opposed to the Food Plans, in order to make the expenses consistent across categories—that is, actual expenses rather than a standard.

Changes in Expenditures on Children: 1960 versus 2000

How have family expenditures on children changed from 1960 to 2000? A precise comparison is not possible because the household income groups do not exactly correspond over time. However, an approximate comparison may be made for a child in a two-child family by using the 1960 “moderate” income group and the 2000 “middle” income group.

In 1960 a moderate income family spent about \$146,800 (in 2000 dollars) to raise a child to age 18 (fig. 2). A similar family in 2000 spent about \$165,600 for this purpose—a 13-percent increase. As a percentage of total child-rearing costs, housing increased slightly (from 32 to 33 percent), whereas health care and child care/education increased considerably over this time. Health care rose from 4 to 7 percent of total child-rearing costs in tandem with the

significant increase in the costs of medical care over this time. Child care/education increased from 1 to 10 percent. As previously stated, in 1960, this category did not include child care because such expenses were minor. Hence, one of the major changes in child-rearing expenses since 1960 has been the addition of child care as more and more women entered the labor force.

Child-rearing expenses on food declined both as a percentage of total child-rearing costs (24 to 18 percent) and in real dollars from 1960 to 2000. However, it should be reiterated that in 1960, the food-at-home expenses on a child were not what people actually spent, but a determined standard. Hence, the figures for the 2 years do not represent the same concept. Child-rearing expenses on clothing also declined as a percentage of total child-rearing costs (from 11 to 6 percent) and in real dollars over this time. This is surprising because many people view present expenses on clothing for a child as being at an all-time high. The

clothing expenses do not include those expenditures made by nonhousehold members, such as grandparents. Total clothing expenses on a child would, therefore, be greater than reported here. It is unknown whether expenditures on clothing for a child by these non-household members would result in higher total clothing expenses in real terms in 2000 versus 1960. Transportation and miscellaneous expenses on a child declined slightly as a percentage of child-rearing costs from 1960 to 2000 (16 to 15 percent and 12 to 11 percent, respectively); however, in real dollars, transportation and miscellaneous expenses increased.

There were changes in child-rearing expenses by region from 1960 to 2000. In 1960 moderate or middle-income families in the urban West had the highest expenditures on a child, followed by families in the urban South and urban Northeast (fig. 3). Families in the urban Midwest had the lowest expenditures on a child. In 2000 families in the urban West still had the highest expenditures on a child, followed by families in the urban Northeast, urban South, and urban Midwest. Increases in housing costs were a primary reason families in the urban Northeast moved from having the third highest expenses on a child in 1960 to having the second highest expenses in 2000.

Figure 3. Expenditures on children, by middle-income husband-wife families, by region, 1960 versus 2000

	1960	2000
\$\$\$\$	Urban West	Urban West
\$\$\$	Urban South	Urban Northeast
\$\$	Urban Northeast	Urban South
\$	Urban Midwest	Urban Midwest

As in 2000, child-rearing expenses in 1960 included neither the cost of a college education nor the indirect costs of children. These indirect costs stem from the time involved in child rearing and include the reduction in current earnings and future career opportunities for one or both parents because of less time in the labor force. Both college-related and indirect costs of children are likely greater in real terms in 2000 than in 1960. More children are attending college now than were attending in 1960, and college costs have generally outpaced inflation in recent years. Also, there are more career opportunities for women, therefore making the indirect costs of child rearing higher.

Future Plans

USDA plans to continue providing annual estimates of family expenditures on children. Given the changing structure of American families, these estimates should continue to be important in the areas of child support and foster care. A new database, most likely the 1998-2000 CE when it is available, will be used to calculate future estimates because expenditure patterns change over time. New expenditure items will be added or subtracted from the child-rearing expense estimates as family expenditures change. As families change, and as new goods and services are introduced in the market, expenditures on children will change. USDA will monitor these developments.

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Current Knowledge of the Health Effects of Sugar Intake

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Twenty years ago, the common perception was that sugar intake was associated with several chronic diseases: Diabetes, coronary heart disease, obesity, and hyperactivity in children. Sugar was also thought to be the sole cause of dental caries. Recent advances in scientific knowledge, however, have shed some light on the role of sugar in chronic diseases and dental caries. The evidence indicates that sugar is not in itself associated with the aforementioned chronic diseases and is not the sole offender in the development of dental caries. This research brief discusses current scientific knowledge of the health effects of sugar.

Physiology

Despite having been labeled as “empty calories,” sugars are truly important compounds from the perspective of the human organism. Humans have retained the ability to synthesize all forms of carbohydrates the body needs from simple sugars. This is not the case with the other dietary macronutrients, fats, and proteins. Following ingestion, all digestible complex dietary carbohydrates are broken down in the gut to simple sugars before they are absorbed into the body. Because simple sugars are all identical chemically, the absorption process cannot distinguish simple sugars resulting from the breakdown of complex dietary carbohydrates from corresponding simple sugars occurring naturally in the foods

themselves or from corresponding simple sugars added to foods during processing. Within the body, most dietary sugars are converted to glucose, a major fuel used by all cells and the primary fuel required by brain tissue for normal function. Low levels of glucose in the blood will impair the brain and cause permanent mental impairment or worse—coma or death. The body can store a limited amount of glucose as glycogen, which it can draw upon for less than a day. After this, other sources such as proteins, from the breakdown of body tissues, must be used to synthesize glucose for the cells (15).

Diabetes

The relationship between dietary carbohydrates and insulin resistance (a risk factor for diabetes mellitus, ischemic heart disease, and hypertension) is not clear based on available research (7). In two studies based on a large, prospective study of U.S. women, sucrose and carbohydrate intake were not associated with an increased risk of diabetes (6,27). However, based on the same population, associations were found between a diet with high glycemic load² (26) and high intake of refined grains (21) and the risk of diabetes. The general consensus, based on epidemiological studies, is that sugar intake alone is not

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²Glycemic load is a function of the effect of a carbohydrate meal on glucose levels in the blood (3).

associated with the development of diabetes mellitus. Sugars fed at levels equivalent to those consumed by the U.S. population do not produce adverse glycemic effects in non-diabetics (23). The effects of sugar intake on glucose tolerance, insulin levels, and plasma lipids are confounded by other dietary components. The American Diabetes Association has also acknowledged, in its nutrition recommendations for people with diabetes, that there is no evidence that refined sugars such as sucrose behave any differently from other types of simple carbohydrates (1).

Heart Disease

The Sugars Task Force of the U.S. Food and Drug Administration (29) presented a comprehensive review of epidemiological, clinical, and animal studies dealing with the relationship between sugar intake and heart disease or risk factors for heart disease (14). The report concluded that at current levels of consumption, sugar is not an adverse risk factor in heart disease. The same conclusion was made by the National Research Council in its report on chronic disease risk (23). There is no conclusive evidence that dietary sugar is an independent risk factor for coronary artery disease in the general population. However, hypertriglyceridemia³ and central fat distribution,⁴ consequences of abnormal glucose tolerance and diabetes mellitus, are independent risk factors for coronary heart disease (8). A 1996 randomized

³Elevated blood levels of triglycerides: a form of fatty acid found in animal and vegetable fats.

⁴A type of body fat distribution with a high ratio of waist or abdominal circumference to hip or gluteal circumference that is epidemiologically associated with heart disease and diabetes.

study of 32 hypertriglyceridemic patients provided evidence that an “extrinsic sugar-free” diet significantly lowers abnormally elevated plasma triglyceride levels (28). Evidence also suggests that insulin resistance and compensatory hyperinsulinemia⁵ have major roles in the regulation of blood pressure in subjects predisposed to hypertension due to hereditary or environmental factors, possibly mediated by activity of the sympathetic nervous system. But there are multiple metabolic abnormalities associated with hyperinsulinemia in hypertensive patients that increase the risk of coronary heart disease (24).

Obesity

Despite popular belief that sugar causes obesity, a number of studies show an inverse relationship between reported sugar consumption and degree of overweight (10,11,20,25). An increase in the percentage of calories from sugar is, by definition, associated with a decreased consumption of calories from fat. Obesity is basically a consequence of higher energy intake than energy expenditure, where excess calories are stored as fat (5). The type of calories consumed is the subject of much study in obesity research. For instance, extra calories consumed as sugar cause an appropriate compensatory increase in carbohydrate oxidation (metabolism of carbohydrates for energy), whereas extra calories consumed as fat do not (17). Simply stated, obesity results from energy intake in excess of energy requirements. Many factors contribute to obesity, but evidence does not single out dietary sugar as a cause (25).

⁵An increase in pancreatic secretion of insulin to compensate for cellular resistance to insulin.

Hyperactivity

Many people still believe that sugar intake in children causes hyperactivity. A meta-analysis, however, of 16 different reports from 23 separate studies with 560 subjects showed virtually no effect of sugar intake on the hyperactivity in children (30). In a review of the literature, Krummel et al. (19) reported that in 12 double-blind, placebo-controlled studies, no association was found between sugar intake and hyperactive behavior. Thus, despite numerous anecdotal perceptions to the contrary, systematic, controlled studies show that sugars do not cause hyperactivity.

Dental Caries

Dental caries is a chronic disease that has many causes. Sugar is involved in tooth decay, but it is one of many factors, including oral bacteria, saliva, tooth enamel, food substrate, and host susceptibility. All fermentable carbohydrates are potentially cariogenic. Other dietary factors such as the retention of food in the mouth affect cariogenic potential. Even starches, which may not taste sweet, are chains of glucose and are broken down to glucose in the mouth. Good oral hygiene, good genes, fluoridation of water, and restricting snacks between meals can prevent tooth decay, no matter how high the sugar consumption (13,18,25).

Nutrient Displacement

Research on the effects of sugar intake and nutrient displacement in the diet of children is inconclusive. In a review of the literature, Ruxton et al. (25) found that higher intake of sugar did not negatively affect micronutrient intake. Gibney et al. (10) found, in an analysis

of the 1987-88 USDA Nationwide Food Consumption Survey, that high consumption of sugars was not associated with a poorer quality diet. In a study of 143 children ages 11 and 12 years, a 7-day weighed and recorded food inventory revealed that as the proportion of energy from sugars increased, there was no decline in dietary fiber or micronutrient intake, with the exception of niacin, which exceeded recommended levels (22). However, Linseisen et al. (20) and Gibson (12) did demonstrate intake of many micronutrients below recommended levels in persons in Germany and the United Kingdom who consumed high (energy-adjusted) amounts of sugar. In addition, high consumption of non-diet soft drinks, a significant source of added-sugar intake in children, is associated with lower consumption of milk and fruit juice and lower intake of riboflavin, vitamin A, calcium, phosphorus, and the ratio of calcium to phosphorus, which may be considered markers for milk consumption (16).

In an analysis of the Continuing Survey of Food Intakes by Individuals (1994-96), Bowman found that compared with Americans over 2 years of age with lower added sugar consumption as a percentage of total energy, individuals consuming greater than 18 percent of their total energy from added sugars did not meet the Recommended Daily Allowance (RDA) for many micronutrients (4). Farris et al. reported that as total sugar intake increased, a significant linear decrease occurred in mean intake of protein, fat, saturated fat, starch, cholesterol, sodium, vitamins B₆ and E, thiamin, niacin, iron, and zinc. Also, as total sugar intake increased, a significant linear increase occurred in mean intake of carbohydrate, fructose, lactose, sucrose, vitamin D, and calcium (9).

But, the nutritional quality of the diet of children with higher sugar intake appeared to be adequate regarding vitamin and mineral intakes and were closer to meeting current recommendations for dietary fat. Nevertheless, a relationship between the consumption of sugars and nutrient displacement has not been observed consistently nor has there been consistency among the specific nutrients displaced when a relationship has been found. Thus, this issue remains unsettled and requires additional data from primary research.

Conclusion

Recent evidence shows that aside from dental caries, the intake of added sugars is not directly related to diabetes, heart disease, obesity, and hyperactivity, as was previously thought. This conclusion was also reached in a 1997 review of the literature on the health effects of sugar intake (2). Because high intake of sugars along with other factors can affect oral health and can displace important foods and nutrients in the diets of children when consumed as soft drinks, it seems prudent to limit excessive intake. But the focus on sugar as an independent risk factor for chronic disease and hyperactivity should be de-emphasized.

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Insight 11
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The following are reprinted *Nutrition Insights*, a publication of the Center for Nutrition Policy and Promotion.

Food Portions and Servings: How Do They Differ?

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Consumers appear to be confused about serving sizes—what they mean and how to use them. Complicating the problem are large portions of food that are becoming the norm in many eating establishments, which differ from the servings in the Food Guide Pyramid (FGP) and on the Nutrition Facts Label on food packaging. For example, a large deli bagel might weigh 6 ounces (about 6 FGP servings of bread) while the 1/2 medium bagel listed on the Food Guide Pyramid weighs 1 ounce (about 1 serving of bread). With so much variation in portions of foods, it's easy for consumers to become confused about what serving sizes mean and how to use them.

What's a Food Guide Pyramid Serving?

The Food Guide Pyramid serving is a unit of measure used to describe the total daily amount of foods recommended from each of the food groups. Criteria for selecting the serving sizes are identified in the box. Larger portions count as more than one serving; smaller portions count as partial servings. The Pyramid shows a range of servings for each of the five major food groups. The number of servings an individual requires depends on how many calories he or she needs. For example, the Pyramid suggests 6 to 11 servings of grain products each day. An individual consuming 1,600 calories would need 6 servings of grains, while an individual consuming

2,800 calories would need 11 servings of grains. Additional information on what counts as one food guide serving unit and the suggested number of servings for various calorie levels is reported in *The Food Guide Pyramid (1)*.

What's a Food Label Serving?

A food label serving is a specific amount of food that contains the quantity of nutrients listed on the Nutrition Facts Label. The 1990 Nutrition Labeling and Education Act (NLEA) specified reference serving amounts for almost 200 product categories to be used on labels. To make food label servings consumer-friendly, the serving sizes are expressed in household measures, such as cups, ounces, or pieces, as well as grams, and generally reflect the amount an individual might reasonably consume at each eating occasion.

Food Label vs. Food Guide Pyramid Serving Sizes—How Do They Differ?

For many food items, the serving size in the Food Guide Pyramid and on the food label are the same (e.g., 1/2 cup canned fruit or vegetables). However, some serving sizes differ because the Pyramid and the food label serve different purposes. The Pyramid describes serving units for each food group (e.g., 1/2 cup chopped or cooked

Serving Sizes in the Food Guide Pyramid Are Based on Four Criteria (2,3):

1. Amount of foods from a food group typically reported in surveys as consumed on one eating occasion;
2. Amount of foods that provide a comparable amount of key nutrients from that food group, for example, the amount of cheese that provides the same amount of calcium as 1 cup fluid milk;
3. Amount of foods recognized by most consumers (e.g., household measures) or that can be easily multiplied or divided to describe a quantity of food actually consumed (portion);
4. Amount traditionally used in previous food guides to describe servings.

vegetables and 1 cup raw leafy vegetables) so that they will be easy to remember and help consumers select a healthful diet. The food label serving unit is specific for each product category and designed to help consumers compare nutrient information on a number of food products within a category. The food label serving units cover mixed dishes (e.g., frozen entrees) as well as simple items (e.g., canned fruits). Pyramid serving units are primarily for simple food items, such as fruits, vegetables, and plain grain products.

Additionally, the Pyramid serving size specifies the amount of a food that provides a designated amount of key nutrients from that food group: for example, 3/4 cup fruit juice and 1 cup milk. Some food label product categories such as “beverages” specify the same serving size (1 cup), regardless of the food group in which the beverage (fruit juice, milk, or soda) belongs.

In both cases—the Food Guide Pyramid and the food label—the “serving size” is a unit of measure and may not be the portion of food an individual actually eats at one occasion.

What’s a Portion?

A “portion” can be thought of as the amount of a specific food an individual eats for dinner, snack, or other eating occasion. Portions, of course, can be bigger or smaller than the servings listed in the Food Guide Pyramid or on a food label. Many factors affect food portions, such as the individual’s age, gender, activity level, and appetite and where and when the food is obtained and eaten.

How Do Food Guide Pyramid Serving Sizes Compare With Portions Typically Reported?

Recently, the Center for Nutrition Policy and Promotion (CNPP) reviewed data on quantities of some foods commonly eaten in the United States that individuals reported consuming at each eating occasion in the USDA 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII) (4). The table presents typical amounts of selected foods, expressed in food guide serving units, that were consumed by three age groups of adult men and women. Results are similar to

data on typical portion sizes obtained from a study using the USDA 1977-78 Nationwide Food Consumption Survey (5). Consistent with their greater calorie need, men’s portion sizes (number of food guide servings at each eating occasion) are larger than those for women; for both genders, portion sizes decrease with age, especially for foods such as meats and grain products.

What Is the Challenge for the Grain Products?

As in the earlier study (5), individuals’ typical portion sizes for grain products in the 1989-91 CSFII equaled 1-1/2 to 2 food guide serving units; for example, 2 slices of bread or a cup of cooked pasta. However, the Food Guide Pyramid retains the grain serving size units of 1 slice of bread or 1/2 cup of cooked pasta used in previous food guides, in part because the serving units are familiar and easy to use. This may have caused some confusion among consumers who are unaware of the specified serving unit—they may either perceive 6 to 11 servings of grain products suggested by the Pyramid to be far more than can be eaten or may alternatively interpret this as permission to consume more than they should of these foods, often with added fats and sugars. However, changing the *servicing unit* to the more typically reported 2 slices of bread or 1 cup of cooked pasta would *reduce* the *number* of servings suggested by the Pyramid to 3 to 5 and might give an appearance of a conflict with the Dietary Guideline to include plenty of grain products in the diet.

How Can Educators Help?

Educators can help consumers better understand the concepts of servings and portions by:

Amounts of selected foods reported at each eating occasion,¹ 50th percentile, by age and gender

Food	FGP ² serving size	20-39 years		40-59 years		60+ years	
		Men	Women	Men	Women	Men	Women
----- Number of FGP servings sizes -----							
Apples, raw	1 medium	1.0	1.0	1.0	1.0	0.9	0.9
Orange juice	3/4 cup	1.3	1.3	1.3	1.1	1.1	1.0
String beans, cooked	1/2 cup	1.5	1.0	1.0	1.0	1.4	1.0
Broccoli, cooked	1/2 cup	1.3	1.0	1.6	1.3	0.8	1.1
Fluid milk	1 cup	1.0	0.9	1.0	0.7	0.8	0.7
Cheese ³	1-1/2 oz	0.7	0.6	0.7	0.7	0.7	0.7
White bread	1 slice	2.0	1.8	1.9	1.7	1.8	1.5
Rice, cooked	1/2 cup	1.7	1.5	1.6	1.3	1.4	1.2
Ready-to-eat cereals	1 oz	2.1	1.5	1.8	1.3	1.7	1.2
Pasta, cooked	1/2 cup	2.2	1.5	2.0	1.5	1.7	1.5
Muffins	1 oz (approx.)	2.3	1.9	2.1	1.8	2.0	2.0
----- Number of 1-ounce meat equivalents ⁴ -----							
Beef steak, cooked	1 oz	5.7	4.9	5.3	4.3	4.9	3.8
Ham, cured cooked	1 oz	1.9	1.5	2.0	1.6	2.0	1.9
Eggs, fried	1 large	1.8	1.4	1.8	1.0	1.6	0.9
Dry beans, cooked	1/2 cup	1.9	1.0	1.5	1.0	1.3	1.0

¹Data calculated from CSFII 1989-91, NFS Report No. 91-3.

²FGP (Food Guide Pyramid).

³Includes all cheeses, other than cream or cottage, regardless of fat content.

⁴Serving sizes of meats and meat alternates are listed in 1-ounce equivalents because serving amounts vary by type of food (steak, roast, ground meat, beans, eggs, or peanut butter). The Food Guide Pyramid suggests 2 to 3 servings of meat or meat alternates for a total of 5 to 7 ounces each day.

- Explaining that Food Guide Pyramid servings are units of measure that are easy to use and understand. They are not prescribed portions to eat at a meal or snack.
- Explaining that the number of servings suggested in the Food Guide Pyramid are related to the caloric needs of the individual—the higher the caloric needs, the higher the suggested number of servings.
- Providing tips on how to visually estimate serving sizes.
- Explaining why Food Guide Pyramid servings and food label servings differ.

- Explaining how serving sizes differ from portion sizes.
- Showing individuals how to evaluate their diets to determine whether changes are needed to achieve a healthful diet. One way to evaluate an individual's diet is to total the number of Food Guide Pyramid servings eaten daily and compare them—based on caloric need—with the number of servings suggested by the Food Guide Pyramid.

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Insight 14
July 1999

A Focus on Nutrition for the Elderly: It's Time to Take a Closer Look

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Longevity trends, combined with the swelling wave of aging “baby boomers,” are contributing to an explosive growth in the U.S. elderly population, ages 65 and over, which has grown 11-fold during the 20th century (1). By 2050 about 19 million Americans (24 percent of elderly Americans) will be ages 85 and over (1). Older people may not know that their nutrient requirements can change from their younger years. The process of aging can introduce other factors—chronic disease, physical disabilities, poor economic status, social isolation, prescription medications, and altered mental status—that may cause poor eating habits that do not meet an older person’s current nutrient needs. The elderly face the challenge of choosing a nutrient-dense diet, one that provides an adequate intake of nutrients at a time when their activity levels and energy needs decline. Assessing the diet quality of the elderly is critical to addressing issues relevant to their health and nutritional status.

This *Nutrition Insight* summarizes the overall diet quality of three age groups of independent, free-living elderly Americans—the young-old, 65-74 years; the old, 75-84 years; and the oldest-old, 85+ years—by using the Healthy Eating Index (HEI) (2). Data from USDA’s Continuing Survey of Food Intakes by Individuals (CSFII) 1994-96, a nationally representative survey containing information on

people’s consumption of foods and nutrients, were used in the analysis. Scores for the elderly groups are compared with the overall HEI for “pre-elderly” adults ages 45-64.

About the Healthy Eating Index

The HEI is a summary measure of people’s overall diet quality. It is an excellent tool both for assessing the quality of Americans’ diets and for understanding better the influence of food choices on Americans’ health. The HEI is expressed as one score on a scale of 1-100 but is composed of the sum of 10 components. Each component score can range between 0 and 10. Components 1-5 measure the degree to which a person’s diet conforms to the serving recommendations from the USDA Food Guide Pyramid’s five major food groups: Grains, vegetables, fruits, milk, and meat. A high score for these components is reached by maximizing consumption of recommended amounts. Components 6-9 measure compliance of total fat and saturated fat intake according to the *Dietary Guidelines for Americans* and of cholesterol and sodium from the *Daily Values* listed on the Nutrition Facts Label. A high score is reached by consuming at or below recommended amounts. The last component evaluates variety in the diet. A person consuming 8 or more different foods each day will score 10 points. A summary HEI score

above 80 implies a “good” diet; a score between 51-80 implies a diet that “needs improvement”; and a score less than 51 implies a “poor” diet.

Overall HEI Snapshot

The CSFII 1994-96 data show the average HEI score for elderly persons 65+ years old is 67.2 of a possible score of 100. The average HEI score for the pre-elderly group ages 45-64 is 63.4. Both fall midway in the “needs improvement” range.

Among the three elderly groups, as age increases, those with an overall diet quality of “good” remain consistent at around 20-21 percent (fig. 1). Most movement in diet quality occurs between the “needs improvement” and “poor” ratings. The data indicate that with an increase in age, there is a slight but gradual increase in the percentage of elderly with a “poor” diet (12 to 15 percent). In comparison, fewer individuals in the pre-elderly group (ages 45-64) achieve a “good” diet, and more of them have a diet rated as “needs improvement” or “poor.” However, the elderly people’s mean HEI scores decrease as income levels decrease, indicating a greater risk for a poor diet quality among lower socioeconomic groups.

Looking Closer at the Components

A closer look at the HEI component scores reveals more pronounced differences between age groups (fig. 2). Among the three elderly age groups, the median scores for each of five components—total fat, saturated fat, cholesterol, sodium, and variety—are 8.0 or better. Despite good scores, the pre-elderly group’s component scores were not as high as the elderly groups’ scores in three of those same five

Figure 1. Overall diet quality, older age groups

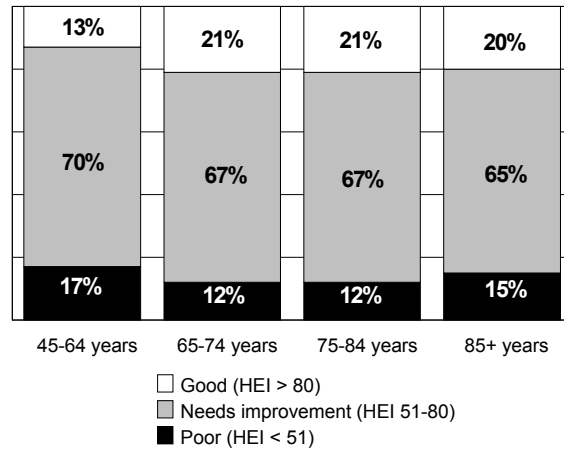


Figure 2. Median HEI component scores

components. A high score for total fat, saturated fat, cholesterol, and sodium is reached by consuming at or below recommended amounts; thus interpretation of these high scores may be deceiving. A review of CSFII food energy intake data showed that an elderly person’s caloric intake declines by as much as 500 calories between ages 65 and 85. Therefore, although the score is high, without further study,

it is not possible to know whether educational messages have reached this population, whether reduced food intake is keeping the intake of these components low, or whether the elderly are receiving well-balanced nutrition assistance.

The fruits and milk components had the lowest HEI scores for all age groups. Median fruit scores for the three elderly

age groups ranged from 4.6 to 4.9. A slight decrease is noted with advancing age. Median fruit scores for the pre-elderly age group hovered around 3.1, much lower than even the lowest fruit score of the three elderly age groups. Milk component median scores “saw-sawed” tightly with advancing age.

In terms of age group, the HEI component scores of the younger, pre-elderly group lagged behind those of the elderly age groups in 3 of the 10 food components (fruit, total fat, and sodium), but they either met or exceeded the elders’ scores in 6 other components (grains, vegetables, milk, meat, saturated fat, and variety). All ages studied have a median score of 10.0 for cholesterol.

As Aging Advances

A noticeable, but not extreme, decline in the overall diet quality of Americans ages 65 and over is indicated in figure 1. This trend, however, is more clearly observed by looking at their median HEI component scores in figure 2. Only milk, total fat, and sodium scores deviated from this trend. Milk and total fat component scores vacillated from 4.3 to 5.0 and from 7.4 to 8.4, respectively, among all age groups studied. Sodium component scores showed a reverse trend—the older the group, the higher the component score. Until age 85, the groups’ median variety score was constant at 10.0. After age 85, the group’s score dropped dramatically to 8.0.

Conclusions

The overall diet quality of the elderly seems to be better than their pre-elderly counterparts, but it still falls into the “needs improvement” category. The data indicate that the elderly are

consuming enough different foods (i.e., variety). However, research efforts and nutrition education strategies should target the quantity and nutrient density of foods the elderly consume, because both quantity and nutrient density are integral to meeting the recommended intake levels of the five major food groups. Inadequate intake of the milk and fruits components, in particular, needs addressing. In addition to eating patterns and income status, poor HEI scores also may be affected by other influential risk factors, such as physical limitations, depression, and non-participation in nutrition programs. Such factors should be considered when conducting research and developing nutrition communications that lead to successful aging.

The United Nations International Year of the Older Person is being celebrated during 1999. Its theme “Healthy Aging, Healthy Living—Start Now!” is indicative that it is time to focus more of our nutrition research, nutrition policy development, and nutrition promotion efforts on the elderly now and into the next millennium.

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Insight 19
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Beliefs and Attitudes of Americans Toward Their Diet

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The American diet needs improvement—so indicates the USDA's Healthy Eating Index (HEI), which reported an average score of 63.6 of a possible 100 for the 1994-96 period. But are Americans interested in improving their diet? And how is that interest related to their dietary status? This *Nutrition Insight* examines the beliefs and attitudes of Americans toward their diet.

Data from a 1991-94 survey conducted by Market Research Corporation of America (MRCA) were used. Nationally representative, the survey consists of information on people's food and beverage consumption over 14 days and their opinions and attitudes about general interests, health, diet, food preparation, shopping, and media usage. The sample consisted of 1,851 adults (18 years old and over). The results were weighted to represent the population of interest.

A Modified Healthy Eating Index Used to Measure Diet Quality

A modified version of the HEI was used to assess the overall quality of the American diet. This modified version uses 9 of the original 10 components. Components 1-5 measure the degree to which a person's diet conforms to serving recommendations of the Food Guide Pyramid food groups: Grains (bread, cereal, rice, and pasta), vegetables, fruit, milk products (milk,

yogurt, and cheese), and meat and meat alternates (meat, poultry, fish, dry beans, eggs, and nuts). As a percentage of total intake of food energy, component 6 measures consumption of total fat; component 7, saturated fat. Component 8 measures total cholesterol intake; component 9, sodium intake. The score for each component ranges from zero to 10. Intermediate scores are computed proportionately. The MRCA data set does not provide enough information to calculate variety of a person's diet on any given day (component 10 of the original HEI), so variety is not reported. All HEI scores on the modified version were adjusted to a 100-point scale. Thus the total maximum score was 100. Scores greater than 80 imply a good diet; between 80 and 51, a diet that needs improvement; and less than 51, a poor diet. Higher component scores indicate intakes that are closer to recommendations.

About 2 of 10 People Want to Improve Their Diet

Twenty-three percent of the people surveyed were interested in improving their diet, compared with 37 percent who were not interested and 40 percent who believed their diet needed no improvement (table 1). Whereas 20 percent of those who were interested in improving their diet were non-White, 7 percent of those not interested and 8 percent of those who said their diet did not need improvement were

Table 1. Americans' interest in improving their diet, by selected characteristics and nutrition-related beliefs, 1991-94

	Interest in improving the diet		
	Yes	No ¹	Needs no improvement
Sample	409	590	852
Percent	23	37	40
	<i>Percent</i>		
Race			
White	80	93	92
Non-White	20	7	8
Gender			
Male	37	62	53
Female	63	38	47
Percent of Poverty			
130 and under	36	24	22
131 and over	64	76	78
Beliefs			
Diet is unhealthful.	58	32	5
Too much emphasis is placed on nutrition.	37	69	48
Eating healthfully is too complicated.	70	69	40
Most snacks consumed are unhealthful.	77	68	49

¹Not interested in improving the diet or believes changing the diet will do no good.

non-White. Sixty-three percent of those interested in improving their diet were female. Thirty-eight and 47 percent, respectively, of the others who were either not interested or who believed their diet did not need improvement were female. Over one-third (36 percent) of those interested in improving their diet had a household income at or below 130 percent of the poverty threshold. Less than one-fourth, each, of the others had an income within this range: 22 percent (no need to improve) and 24 percent (not interested).

Eating Healthfully—Many Believe—Is Too Complicated

People interested in improving their diet were more likely than others to believe their diet was unhealthful: 58 versus 32 percent (not interested) and 5 percent (no need to improve). About 7 of 10 Americans not interested in improving their diet believed that too much emphasis was placed on nutrition, compared with 37 percent of those interested in improving their diet and 48 percent of those who said their diet

needed no improvement. Seven of 10 Americans interested in improving their diet, as well as 7 of 10 not interested in improving their diet, believed eating healthfully was too complicated. Only 4 of 10 who said their diet needed no improvement believed eating healthfully was too complicated.

Snacks were perceived as unhealthful by a majority of people. Over three-fourths of those interested in improving their diet and over three-fifths of those not interested in doing so thought their snacks were unhealthful. Also half (49 percent) of those who believed there was no need to improve their diet also believed they consumed unhealthful snacks.

Americans Need to Improve Their Diet

Regardless of the desire to improve their diet, people need to eat healthfully to prevent the occurrence of chronic, nutrition-related diseases: In 4 of the 10 leading causes of death for this country, poor diet and lack of physical activities are significant contributing factors. For the Americans studied, mean scores on the modified HEI indicated the diet needed improvement (table 2). Scores ranged from 54.2 to 59.2. Those interested in improving their diet had about the same score (54.4) as those not interested in improving their diet (54.2).

Among the components related to the Pyramid food groups, Americans' scores were lowest for fruits. Among the moderation components, the scores for cholesterol were best. Over a 14-day period, Americans interested in improving their diet, compared with those who believed their diet needed no improvement, had lower daily mean scores for grains (5.21 vs. 5.84), fruits (2.62 vs. 3.82), and vegetables (5.16

Table 2. Americans' interest in improving their diet, by scores on the modified Healthy Eating Index, 1991-94

	Interest in improving the diet		
	Yes	No ¹	Needs no improvement
	<i>Mean</i>		
Total HEI Score	54.4 ^a	54.2 ^a	59.2 ^b
Grains	5.21 ^a	5.25 ^a	5.84 ^b
Fruit	2.62 ^a	2.26 ^a	3.82 ^b
Dairy	4.59 ^a	5.24 ^b	5.38 ^c
Meat	7.58 ^a	7.56 ^a	7.54 ^a
Vegetable	5.16 ^a	5.00 ^a	5.84 ^b
Total fat	4.77 ^a	5.05 ^a	5.91 ^b
Saturated fat	3.55 ^a	3.43 ^a	4.39 ^b
Cholesterol	8.11 ^a	8.28 ^a	7.93 ^a
Sodium	7.38 ^a	6.72 ^b	6.65 ^{cb}

¹Not interested in improving the diet or believes changing the diet will do no good.

Note: Groups in the same row with different superscripts have significantly different mean scores on the modified version of the HEI, at $p < .0125$.

vs. 5.84). A similar pattern existed for total fat and saturated fat. Dairy and sodium scores differed among all groups, with those who wanted to improve their diet having the lowest dairy scores (4.59) and the highest sodium score (7.38). Meat scores were similar for all groups.

Conclusion

Results show that people know their diet is poor. Some believe their diet needs no improvement; and yes, their diet is better than that of their counterparts. However, although people's attitude about improving their diet differed, they have one thing in common—their diet needs improvement. Helping Americans improve their diet will mean targeting their interest to do so and addressing some of their other diet-related beliefs, attitudes, and practices (e.g., belief that eating healthfully is too complicated

and the practice of eating what many believe are unhealthful snacks). When nutrition-related beliefs and practices lead to healthful dietary practices, the likelihood of reducing the incidence of chronic, nutrition-related disease becomes more promising, and all Americans benefit.

Note: For more details on the Healthy Eating Index and how it is computed, the reader is referred to Bowman, S.A., Lino, M., Gerrior, S.A., and Basiotis, P.P. 1998. *The Healthy Eating Index: 1994-96*. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. CNPP-5. Available at: <http://www.usda.gov/cnpp>.

Consumer Price Index Research Series Using Current Methods

The Bureau of Labor Statistics (BLS) has made numerous improvements to the Consumer Price Index (CPI)¹ over the past quarter-century to make the series more accurate. However, historical price index series are not adjusted to reflect these improvements. This article presents an estimate of the CPI-U² from 1978 to 1998 that incorporates most of the improvements made over that time span into the entire series. The new measure is called the *CPI research series using current methods* (CPI-U-RS).

The CPI-U-RS was constructed by adjusting the component indexes of the national CPI-U at the level of the item, such as new vehicles. Then the component indexes were aggregated by using the official CPI-U base-period expenditure weights to form the all-items CPI-U-RS. Component indexes were adjusted directly; individual prices were not used to recompute those indexes. The CPI-U-RS provides an annual inflation series that adjusts only for specified changes in BLS methodology. The measure should help answer the question of the degree to which the measured rate of inflation has been affected by improvements made by BLS.

¹The Consumer Price Index (CPI) is the most widely used measure of inflation in the United States. Annual cost-of-living adjustments for Social Security recipients and Federal and military retirees; the annual change in Federal income tax brackets, along with personal exemption and standard deduction amounts; and the calculation of key economic indicators are based on the CPI.

²Consumer Price Index for All Urban Consumers.

Methodological Improvements

The CPI-U-RS differs from the CPI-U in that the CPI-U-RS is adjusted to incorporate estimates of what the measured rate of inflation would have been had improvements to the CPI-U been made earlier. Eleven improvements were made to the CPI since 1978 for which estimates of historical effects were included in the CPI-U-RS.

1. *Use of rental equivalence to measure changes in homeowner costs.*

(Implemented in 1983.) The homeownership component of the CPI-U was changed from the cost of the purchase of a home to the value of rental services. For the CPI-U-RS, rental equivalence was imputed for the period 1978-82 by changes in the CPI residential rent index.

2. *Quality adjustment of used-car prices.* (Implemented in 1987.) Prices of used cars were adjusted for differences in quality after changeovers to new models, similar to adjustment in new-car prices to reflect changes in quality first undertaken in 1967. The used-car index of the CPI-U-RS was adjusted downward for the years 1978-86 by estimating the general distribution of model years within the used-car sample in each of those years and then estimating the effect of quality adjustments applied to new cars of the same model years.

3. *Quality adjustment of sampled housing units to reflect aging.* (Implemented in 1988.) The CPI-U-RS incorporates an estimate of the effect of the aging housing stock by adjusting the residential rent and owners' equivalent rent indexes upward by about 0.3 percent per year from 1978 to 1987.

4. *Quality adjustment of apparel prices.* (Implemented in 1991.) Regression models were used to adjust apparel

prices for changes in quality when new clothing lines are introduced. Using a BLS study that estimated the effect of changes in quality over the last 6 months of 1991, the Bureau adjusted all of the CPI-U-RS apparel commodity indexes from 1978 to 1990 upward by about 0.4 percent per year.

5. *Treating shifts between brand-name and generic drugs as price changes.* (Implemented in 1995.) A new procedure was introduced that allows a generic drug to be priced when the corresponding brand-name drug loses its patent protection. This change is estimated to have reduced the prescription drug index between 1993 and 1997 by an average 0.4 percent per year. The CPI-U-RS prescription drug index was adjusted downward from 1978 to 1994 based on the number of generic drugs entering the market each year (relative to the number for the 1993-97 period).

6. *Changes in shelter formulas in 1995.* (Implemented in 1995.) The composite estimator approach that used a weighted average of 1- and 6-month changes in rent was replaced by a 6-month chain estimator. This methodological improvement affected both the residential rent and owners' equivalent rent indexes. Also, the formula for calculating the owners' equivalent rent index was modified to eliminate an upward-drift tendency. The CPI-U-RS was adjusted for these two improvements in the shelter component between 1991 and 1995 by substituting an experimental Laspeyres consumer price index called the CPI-U-XL for the CPI-U. The effect was to adjust the residential rent index by an average of 0.1 percent per year during this period. The CPI-U-RS applied this adjustment for the years 1978-90. The average downward adjustment of the owners' equivalent rent index from 1991 to 1995 was 0.6 percent per year and applied for the years 1987-90. From 1978 to 1986, the owners'

equivalent rent index was subject only to the downward bias resulting from the use of composite estimation; therefore, the index was adjusted upward by about 0.1 percent per year for the CPI-U-RS.

7. *Quality adjustment of personal-computer prices.* (Implemented in 1998.) Estimates based on an analysis of 1998 data indicate that this improvement effectively lowered the personal-computer index by about 6.5 percent per year. The CPI-U-RS uses this figure to adjust the personal-computer component downward from 1987 to 1997.

8. *Elimination of automobile finance charges.* (Implemented in 1998.) Automobile finance charges were dropped because they did not reflect a cost of current consumption. The CPI-U-RS eliminates the automobile finance charges index from 1978 to 1997.

9. *Quality adjustment of television prices.* (Implemented in 1999.) BLS research indicates that the television index would have been about 0.1 percent lower each year with the quality adjustments applied from August 1993 to August 1997. The CPI-U-RS estimates the effect of this improvement on the index from 1977 to 1998 by adjusting the index down by 0.1 percent per year.

10. *Eliminating functional form bias and accounting for consumer substitution within CPI item categories.* (Implemented in 1995, 1996, and 1999.) The CPI-U-RS uses estimates derived from the experimental CPI using geometric means (CPI-U-XG) to account for both functional form bias and consumer substitution within item categories. Eliminated in 1995 and 1996 was the upward bias in measured price changes that occurs during the period immediately following the

introduction of new item samples into the CPI. New "seasoning" procedures were used instead. Since January 1999, a geometric-mean formula has been used to address consumer substitution within item categories

11. *Treating mandated pollution measures as price increases.* (Implemented in 1999.) From 1967 to 1998, federally mandated improvements in emissions were treated as improvements in quality. In 1999, they began to be treated as price increases instead. The CPI-U-RS is adjusted upward by removing the environmental quality adjustments made to the motor vehicle and gasoline indexes from 1978 to 1998.

12. *Improvements made to the CPI from 1978 to 1998 and not incorporated into the CPI-U-RS.* If the effect of the improvement on the rate of growth of the index could not be estimated or was believed to be negligible, BLS did not make adjustments to the CPI-U-RS. Examples of such improvements were

- C updating expenditure weights and area samples in the CPI revisions of 1978, 1987, and 1998.
- C improving the treatment of airline discount fares in 1991.
- C improving the methods for pricing hospital services in 1997.
- C changing the treatment of utility rebates in 1999.

13. *Limitations of the CPI-U-RS.* Most adjustments to the CPI-U-RS were based on BLS research that estimated the effect of methodological changes to the CPI over a relatively short period. For example, apparel indexes for the CPI-U-RS from 1978 to 1990 are adjusted based on studies of the effect of the improvement during the last 6 months of 1991. Whereas there is confidence about the *direction* of the adjustment, the *size* of the adjustment is subject to question.

CPI for all urban consumers (CPI-U) and CPI research series using current methods (CPI-U-RS), all items and major groups, percent changes, December to December, 1978-98

Year	Index	All items	Food and beverages	Housing	Apparel	Transportation	Medical care	Entertainment	Other goods and services	Recreation	Education and communication
1978	CPI-U	9.0	11.6	10.0	3.1	7.7	8.8	5.7	6.4	-	-
	CPI-U-RS	7.8	11.0	7.4	2.1	7.5	8.8	5.2	6.2	-	-
1979	CPI-U	13.3	10.0	15.2	5.5	18.3	10.1	6.9	7.8	-	-
	CPI-U-RS	10.7	9.5	9.5	4.5	18.5	9.7	6.3	7.5	-	-
1980	CPI-U	12.5	10.1	13.7	6.8	14.6	9.9	9.7	10.1	-	-
	CPI-U-RS	10.7	9.5	9.9	5.8	15.6	10.0	9.0	9.9	-	-
1981	CPI-U	8.9	4.3	10.2	3.5	10.9	12.5	7.2	9.9	-	-
	CPI-U-RS	8.3	3.8	9.8	2.7	10.5	12.2	6.6	9.6	-	-
1982	CPI-U	3.8	3.2	3.6	1.6	1.8	11.0	5.6	12.1	-	-
	CPI-U-RS	5.0	2.7	6.7	.8	2.0	10.8	5.1	11.9	-	-
1983	CPI-U	3.8	2.7	3.5	2.9	3.9	6.4	4.0	7.9	-	-
	CPI-U-RS	3.7	2.1	3.6	1.9	4.2	6.2	3.2	7.7	-	-
1984	CPI-U	3.9	3.8	4.3	2.0	3.1	6.1	4.2	6.0	-	-
	CPI-U-RS	3.7	3.2	4.4	1.0	2.7	5.9	3.7	5.9	-	-
1985	CPI-U	3.8	2.8	4.3	2.8	2.6	6.8	3.1	6.3	-	-
	CPI-U-RS	3.7	2.3	4.4	1.9	2.8	6.5	2.6	6.0	-	-
1986	CPI-U	1.1	3.7	1.7	.9	-5.9	7.7	3.4	5.5	-	-
	CPI-U-RS	1.0	3.3	2.0	.1	-6.2	7.5	2.7	5.3	-	-
1987	CPI-U	4.4	3.5	3.7	4.8	6.1	5.8	4.0	6.1	-	-
	CPI-U-RS	4.0	3.0	3.4	3.8	5.9	5.5	3.4	5.9	-	-
1988	CPI-U	4.4	5.1	4.0	4.7	3.0	6.9	4.6	7.0	-	-
	CPI-U-RS	3.9	4.5	3.6	3.6	2.5	6.6	3.9	6.7	-	-
1989	CPI-U	4.6	5.5	3.9	1.0	4.0	8.5	5.1	8.2	-	-
	CPI-U-RS	4.2	5.0	3.5	-.1	3.7	8.2	4.5	7.9	-	-
1990	CPI-U	6.1	5.3	4.5	5.1	10.4	9.6	4.3	7.6	-	-
	CPI-U-RS	5.8	4.6	4.0	4.1	10.6	9.3	3.6	7.4	-	-
1991	CPI-U	3.1	2.5	3.4	3.4	-1.5	7.9	3.9	8.0	-	-
	CPI-U-RS	2.5	2.0	2.6	2.1	-1.5	7.7	3.4	7.8	-	-
1992	CPI-U	2.9	1.6	2.6	1.4	3.0	6.6	2.8	6.5	-	-
	CPI-U-RS	2.6	1.2	2.1	-.1	3.2	6.5	2.3	6.3	-	-
1993	CPI-U	2.7	2.7	2.7	.9	2.4	5.4	2.8	2.7	-	-
	CPI-U-RS	2.3	2.1	2.4	-.7	2.4	5.1	2.4	2.3	-	-
1994	CPI-U	2.7	2.7	2.2	-1.6	3.8	4.9	2.3	4.2	-	-
	CPI-U-RS	2.4	2.1	1.9	-2.4	4.4	4.8	1.4	3.9	-	-
1995	CPI-U	2.5	2.1	3.0	.1	1.5	3.9	3.3	4.3	-	-
	CPI-U-RS	2.3	1.9	2.8	-1.3	1.3	3.7	2.7	4.2	-	-
1996	CPI-U	3.3	4.2	2.9	-.2	4.4	3.0	2.9	3.6	-	-
	CPI-U-RS	3.1	3.8	2.8	-1.0	4.7	2.9	2.0	3.5	-	-
1997	CPI-U	1.7	1.6	2.4	1.0	-1.4	2.8	1.4	5.2	-	-
	CPI-U-RS	1.5	1.5	2.2	.0	-1.5	2.7	.8	5.1	-	-
1998	CPI-U	1.6	2.3	2.3	-.7	-1.7	3.4	-	8.8	1.2	.7
	CPI-U-RS	1.4	1.9	2.3	-2.4	-1.7	3.2	-	8.2	.7	3.0
Dec. 1977 to Dec. 1998	CPI-U	163.9	142.5	172.5	62.0	136.5	316.3	134.3 ¹	301.8	...	...
	CPI-U-RS	141.2	119.6	143.2	29.1	137.7	299.9	107.9 ¹	282.5	...	...
Average annual difference, Dec. 1977- Dec. 1998		.45	.49	.57	1.10	-.03	.20	.62	.25	...	...

¹Entertainment was dropped as a major group in December 1997; number represents percent change from December 1977 through December 1997. Note: Dash indicates not a major group that year. From 1978 to 1998, there were seven major groups in the CPI. In 1998, entertainment was dropped as a major group, and two major groups were added: recreation, and education and communication.

Results

Over the 21-year period of the study (December 1977 to December 1998), the CPI-U-RS increased 141.2 percent, compared with 163.9 percent for the CPI-U (see table). These figures represent an average annual increase of 4.28 percent for the CPI-U-RS and 4.73 percent for the CPI-U. From 1978 to 1982, the CPI-U-RS increased about 1 percent more slowly, on average, than the CPI-U—primarily because of the use of rental equivalence in the CPI-U-RS. The difference between the two measures was only 0.1 percent per year between 1983—when rental equivalence was introduced into the CPI-U—and 1986. Since 1986, the difference has typically remained around 0.3 to 0.4 percent per year.

Food and beverages. The difference between the CPI-U and the CPI-U-RS was consistently between 0.5 and 0.6 percent per year between 1978 and 1994. After 1994, when the food-at-home components of the CPI-U were improved to eliminate the functional-form bias, the average difference between the two measures fell to 0.2 percent per year.

Housing. The difference between the CPI-U and CPI-U-RS varied significantly by period. From 1977 to 1982, the difference—1.9 percent per year—is explained by the inclusion of an estimate for rental equivalence in the CPI-U-RS (only included in the CPI-U from 1983 forward). From 1983 to 1986, the difference, -0.15 percent per year, is caused by the elimination of composite estimation and the quality adjustment of shelter units to reflect aging in the CPI-U-RS. Since 1987, the difference in housing measures was consistently positive, averaging between 0.3 and 0.4 percent per year.

Apparel. From 1978 to 1990, the annual difference between the CPI-U and CPI-U-RS apparel indexes was consistently around 1.0 percent. After 1991, the average annual difference between the two indexes was 1.4 percent. This substantial gap reflects the large downward adjustment to the CPI-U-RS caused by using the geometric-mean formula.

Transportation. The annual average difference between the CPI-U and CPI-U-RS transportation components between 1978 and 1998 was near zero because various changes roughly offset each other. Downward adjustments to the CPI-U-RS resulted from incorporating the effects of changes in quality of used cars; upward adjustments occurred because automobile finance charges were deleted, and mandated pollution controls were no longer considered a change in quality.

Medical care. The average annual difference between the CPI-U and CPI-U-RS for the medical care component was 0.2 percent per year. This relatively small difference occurs because although medical care commodities were subjected to the geometric-mean formula, most medical services were not.

Entertainment. The annual difference between the CPI-U and CPI-U-RS for entertainment averaged 0.6 percent from 1978 to 1997, reflecting the downward adjustment made to the CPI-U-RS from the estimate of the likely effect of the geometric-mean formula.

Other goods and services. The annual average difference between the CPI-U and CPI-U-RS for the other goods and services component between 1978 and 1998 was 0.25 percent, also reflecting the downward adjustment made to the CPI-U-RS from the estimate of the

effect of the geometric-mean formula. Because the CPI-U does not incorporate methodological changes retroactively, BLS developed the CPI-U-RS for researchers who are interested in using current and consistent methods of estimating consumer inflation over the 1978-98 period. The CPI-U-RS includes an estimate of most improvements made over time to the CPI.

The CPI-U-RS is subject to revision. When an improvement is made to the CPI and an effect of that change can be estimated, the CPI-U-RS will be revised so that earlier years incorporate that improvement. In addition, if a better method of adjusting the CPI-U-RS for past improvements is found, the CPI-U-RS will be revised to reflect the new technique.

Source: Stewart, K.J. and Reed, S.B., 1999, Consumer price index research series using current methods, 1978-98, *Monthly Labor Review* 122(6):29-38.

Changes in the Health Services Industry

The Industry: Not What It Use to Be

Unlike many service industries, the health services industry experienced a slowdown in employment and wage growth in recent years, even as it continues to be a major source of new jobs in the United States. The Nation's health care system underwent a major transition in the way health care was financed, where care was provided, and how care was delivered. Strategic bargaining by large insurers and the managed care industry helped to bring increases in health prices in line with overall inflation.

The primary health service industries are offices of medical doctors and other health practitioners, nursing and personal care, hospitals, and home health care. Federal reimbursement policies for home health care and nursing homes were revised during the late 1990's, and many individuals shifted from fee-for-service to managed care insurance plans. Most of the increase in health care jobs over the 1987-97 period came from hospitals and from offices and clinics of medical doctors.

Growth, Reimbursements, and Cost Containments

In terms of *rate of growth* during the 1987-97 period, home health care surpassed all other components of the health services industry. Medicare expenditures for home health services grew at an average annual rate of 28.6 percent between 1990 and 1996, but

Table 1. Annual percentage rate of increase in average hourly earnings, total services, and selected services industries, selected years, 1987-98

Industry	Percent growth			1998 annual average (dollars per hour)
	1987-92	1992-97	1998	
Services	4.4	3.1	4.6	\$12.84
Health services	5.5	3.1	3.5	13.72
Offices of medical doctors	5.8	3.8	3.6	14.28
Offices of other health practitioners	6.7	4.6	5.1	13.13
Nursing and personal care	5.6	3.5	4.5	9.76
Hospitals	5.8	2.9	2.9	15.46
Home health services	8.2	2.6	1.3	11.50
Business services	2.7	3.5	6.1	12.55
Personnel supply	2.7	2.8	5.3	10.33
Computer and data processing	5.2	4.9	5.3	21.16
Engineering and management services ¹	4.3	3.3	4.2	17.86
Amusement and recreation ¹	2.3	2.7	5.6	9.67

¹Data series began in 1988; therefore, the average shown is a 4-year average in the 1987-92 period.

Note: Data are for nonsupervisory workers.

Source: Engel, C., 1999, *Health services industry: Still a job machine?* *Monthly Labor Review* 122(3):3-14.

this was projected to have slowed to 0.2 percent annually between 1996 and 1998. Regarding cost controls, false claims in the medicare program were aggressively targeted in 1997 by the Health Care Financing Administration. The greatest rate of fraud was found in nursing homes and home health care services.

Prior to July 1998, reimbursements varied widely for medicare patients with the same diagnosis and were not adjusted for the clinical conditions of the patient. After July of that year, the prospective payment system in the nursing home industry was established; medicare reimbursements had to reflect the average cost to treat patients by diagnosis. At first, a facility-specific rate and a Federal rate could be blended. By 2002, all nursing facilities will receive a single Federal rate to charge by diagnosis of the patient.

Hospitals have operated under the prospective payment system since

1983; reimbursements were based on diagnostic groupings of illnesses and, as a result, operating costs were reduced—in part, through greater control of labor costs. Further efforts by the Federal Government to control rising costs in medicare continued with the implementation in 1992 of a physician fee schedule.

Cost-containment efforts affected employment and wage growth in the medical services industry. In 1998, the rate of growth in average hourly earnings for nonsupervisory workers in health services was only half of its 1987-92 pace. Still, the average of hourly earnings was greater than the average for all workers in the services industry in 1998 (\$13.72 vs. \$12.84) (table 1). Also, the number of paid hours throughout the health care industry increased. Over the decade, home health services, compared with other services in this industry, increased the average workweek the most. The growth in worker hours in the health

services industry is particularly significant when compared with almost no growth in the average workweek for all services industries (table 2).

The Quest for Efficiency

Types of Health Plans

The higher increases in hourly earnings between 1987 and 1992 occurred at a time when health care was predominantly fee-for-service. The slower wage growth between 1992 and 1998 corresponds with the shift to managed care.

In a fee-for-service arrangement, the insured may choose the health care provider and service, and fees are submitted to the insurer when care is delivered. Any licensed provider may be used, including very specialized physicians. Thus, providers are subject to fewer cost controls than under other types of arrangements.

Preferred provider organizations (PPO's) represent groups of providers who have negotiated discounts with insurers. These plans offer participants a higher rate of reimbursement for choosing from a designated list of participating physicians. Though considered a form of managed care, PPO's are similar to fee-for-service plans in that services are reimbursed following treatment (subject to a deductible), and there is an out-of-pocket expense limit. A primary care physician is not required nor are referrals for appointments with specialists.

Health maintenance organizations (HMO's) have the dual role of health provider and insurer. HMO's have a prepaid fee that covers most medical procedures. In addition, the insured pay a small copayment. HMO's require the insured to be screened by a primary physician for most treatments, while

Table 2. Annual average growth in hours, 1988-98

Industry	Hours	
	1988 annual average	1988-98 change
Services	32.4	0.3
Health services	31.6	1.5
Offices of medical doctors	31.6	1.3
Offices of other health practitioners	29.6	0.6
Nursing and personal care	31.6	1.0
Hospitals	34.0	1.0
Home health services	26.5	3.5

Note: Data are for all nonsupervisory workers, both full- and part-time employees, and include all hours for which workers are paid (hours of work and paid leave hours).

Source: Engel, C., 1999, *Health services industry: Still a job machine?* *Monthly Labor Review* 122(3):3-14.

also providing more complete coverage for preventive care and routine physicals. As a result, HMO's often provide less expensive health insurance to the insured. According to a survey of the American Medical Association, the percentage of physicians having contracts with one or more managed-care companies grew from 88.1 percent in 1996 to 92.3 percent in 1997.

Medical Care Costs

Inflation of medical care, as measured by the Consumer Price Index (CPI), far exceeded the rate of inflation of other goods and services over the 1989-95 period. In 1996-97, price growth of medical care slowed, approaching the rate of growth of other goods and services. Consumers' health care costs are split between insurance premiums and out-of-pocket costs, which include drugs, medical supplies, and services. Despite average annual increases in insurance premiums amounting to 6.1 percent between 1990 and 1996, the average annual increase in the total health care bill was only 3.0 percent during the same period. Declining price growth resulted from shifting care from inpatient facilities to outpatient settings, consolidating acute care facilities within the industry, and conducting more studies on processes in hospitals.

Hospital Restructuring

Jobs of hospital personnel were reorganized to reduce idle time and the number of staff-member contacts per patient. Nurses became "resource coordinators," and staff were trained in several skills. In a survey of registered nurses, practical nurses, physical therapists, and occupational therapists, more than half reported they did not have enough time to spend with patients; 38 percent said their facility was understaffed. However, one-third reported staffing levels as either excellent or good. The most frequently mentioned contributor to a lower quality of care was the closing of urban hospitals and clinics; the second, expansion of managed care.

Length of Hospital Stay

Government and private insurance policies have lowered reimbursements to hospitals for inpatient services and increased reimbursements for home health and outpatient services. Hence, costly hospital stays have been shortened. Reductions in average length of stay have occurred for all age groups except those under age 15. Between 1985 and 1996, the average length of stay for those 85 years and older declined by 2.6 days, compared with 2.2 days for those aged 65 and older and 1.7 days for those aged 45-64. As

lengths of stay decreased, cost growth was greater than average in the post-acute settings of skilled nursing facilities, home health services, and hospice care.

Effect of Demographic Changes

As the elderly population continues to grow, demand for medical and personal services will increase. Although Medicare provides only about half of the personal health care expenditures of the elderly, public funds contribute a larger share of personal health care costs as the population ages. The portion of health care costs that the Federal Government paid increased from 24 percent in 1970 to 34 percent in 1996 (table 3). More persons are living longer while they are eligible for Medicare, contributing to larger Federal expenditures. Also, new and improved treatments have increased demand from this group. In 1970, 20 percent of hospital discharges and 33 percent of the days of care in hospitals were for persons aged 65 and older; in 1994, these percentages had grown to 37 and 47 percent, respectively.

To contain cost growth, Medicare is turning to managed-care arrangements. Because managed care was limited to the HMO option prior to 1998, participation among Medicare enrollees was only at 12 percent. The Balanced Budget Act of 1997 contained provisions that expand Medicare's managed-care options. Managed care is more prevalent for the elderly in Medicaid than it is in Medicare, covering 40 percent of those enrolled in 1996 and 48 percent in 1997.

Effect on Health Care Occupations

Managed care has placed more control in the hands of generalists who typically are general practitioners, physician assistants, and nurse practitioners. Most often, generalists treat

Table 3. Percent distribution of personal health care payment sources, selected years

Source of payment	1970	1980	1990	1996
Total (billions of dollars)	73.2	247.3	699.5	1035.1
Total (in percent)	100	100	100	100
Private funds	62.2	57.6	59.3	53.3
Private health insurance	3.7	4.8	5.8	5.9
Public funds	37.8	42.4	40.7	46.7
Federal	24.3	29.1	28.0	33.9
State and local	13.5	13.3	12.7	12.8

Note: Data exclude administrative, research, construction, and other spending that is not directed towards patient care.

Source: Department of Health and Human Services, Health Care Financing Administration, Office of the Actuary and Office of National Health Statistics.

patients or refer them to specialists. According to a study of medical journal recruitment ads, the ratio of advertisements for specialist positions to generalist positions dropped from a peak of 4 to 1 in 1990 to 1.8 to 1 in 1995. Between 1984 and 1995, only family medicine practitioners exhibited continuous growth, because care plans required the use of generalists. This is reflected by the choices of new medical residents—more than half of whom in 1998 began residencies in generalist programs.

Where gaps exist, physician assistants provide health services otherwise provided by physicians, such as conducting complete physicals, providing treatment, and counseling patients. In 44 States, they are permitted to write prescriptions. Over the last 10 years, the number of graduates who became physician assistants has more than doubled to about 4,000 per year. Because the median annual income of physician assistants is only about half that of doctors, health care costs are reduced while the quality of care provided for authorized procedures is maintained—according to a study by the Congressional Office of Technology Assessment.

Between 1983 and 1994, the ratio of registered nurses per hospital bed increased by more than 50 percent. During this period, the workload of nurses increased because they cared for patients with more acute illnesses and whose average length of stay became shorter. However, a declining rate of growth in hospital employment led some nurses to seek jobs in other sectors that paid 10 to 20 percent less than those working in hospitals in 1994. The rate of employment growth between 1988 and 1994 for registered nurses was 26 percent in nursing homes, compared with 16 percent in hospitals. According to the Current Population Survey estimates of weekly earnings, registered nurses' earnings continued to decline through 1997 when adjusted for inflation. Coupled with the other occupational changes, a slowing of growth in hospitals and increased bargaining power of insurance companies, the health services industry has experienced a slowdown in wage growth.

Source: Engel, C., 1999, Health services industry: Still a job machine? *Monthly Labor Review* 122(3):3-14.

Extended Measures of Well-Being: Meeting Basic Needs

Although personal or household income is generally regarded as the single best measure of the degree to which people are “well off,” other factors can also contribute to people’s well-being. Between October 1995 and January 1996, the Census Bureau included questions on basic needs, food sufficiency, and income adequacy in a supplement to the Survey of Income and Program Participation (SIPP).¹ This report presents the findings for these extended measures of well-being.

Basic needs included in this study were the ability to pay for utility bills, mortgage or rent, the doctor or dentist as needed, enough food, and other essential expenses. In 1995 about 1 person in 5 lived in a household that had at least one difficulty meeting basic needs. Eleven percent lived in households where more than one of these difficulties took place (table 1).

Having low income greatly increased the likelihood of having difficulty meeting basic needs. Among those who were in the lowest income quintile, 37.8 percent lived in households with at least one difficulty meeting basic needs. In 1995 more than a quarter of children (age 17 or younger) lived in a

Table 1. Percent with at least one difficulty meeting basic needs in household, by detailed characteristics, 1995

Characteristics	Percent who experienced at least one difficulty ¹	Percent who experienced more than one difficulty ¹
Total	20.2	11.0
Income quintile measures ²		
Lowest	37.8	22.9
Second	24.5	14.0
Third	18.4	9.1
Fourth	11.3	4.4
Fifth	6.5	2.7
Age (years)		
0 to 9	28.5	16.1
10 to 17	27.8	16.3
18 to 29	22.3	12.6
30 to 39	21.1	11.5
40 to 49	17.9	9.4
50 to 59	14.8	7.5
60 to 69	10.1	4.0
70 and over	8.4	2.6
Race and Hispanic origin ³		
White, not Hispanic	17.0	9.0
Black, not Hispanic	32.3	18.1
Hispanic	32.1	18.5
Region		
Northeast	20.2	10.4
Midwest	17.8	8.7
South	20.4	11.4
West	22.7	13.2
Gender		
Male	19.5	10.7
Female	20.9	11.2
Gender of householder		
Male	16.3	8.4
Female	28.5	16.2

¹The SIPP is a longitudinal survey of people who are at least 15 years old, conducted at 4-month intervals. Although the main focus of the SIPP is information on labor force participation, jobs, income, and participation in Federal assistance programs, information is also collected in topical modules on a rotating basis. Data shown in this report are from the Basic Needs topical module.

household in which someone reported at least one difficulty meeting basic needs. Less than 10 percent of those 70 years old and older were in this situation.

Besides income and age, a number of other characteristics were associated

with difficulty in meeting basic needs. These included race and ethnicity. Blacks were more likely than Whites, and Hispanics (who can be of any race) were more likely than non-Hispanic Whites, to experience difficulty meeting basic needs. Also, barriers to productive labor force participation

Table 1. Percent with at least one difficulty meeting basic needs in household, by detailed characteristics, 1995 (continued)

Characteristics	Percent who experienced at least one difficulty ¹	Percent who experienced more than one difficulty ¹
Educational attainment		
Less than high school diploma	26.3	14.6
High school graduate	18.7	9.9
Some college or associate degree	15.6	8.1
Bachelor's degree or more	8.4	3.3
Health insurance coverage		
Not insured	35.8	22.7
Insured	15.7	7.5
Tenure		
Renter occupied	33.0	19.8
Owner occupied	13.8	6.5
Residential mobility		
Moved recently	27.2	16.0
Non-mover	17.7	9.1
Employment status⁴		
Unemployed	38.4	25.0
Not in labor force	17.6	9.1
Employed	16.0	8.1
Work disability⁴		
Work disability	29.1	16.9
Not disabled	15.3	7.7
Marital status⁴		
Not married	21.8	12.2
Married	14.0	6.6

¹At least one difficulty meeting basic needs includes those who didn't meet essential expenses, didn't pay utility bills, didn't pay rent or mortgage, needed to see the dentist but didn't go, needed to see the doctor but didn't go, had phone service cut off, had utilities shut off, were evicted, or didn't get enough to eat. More than one difficulty refers to experiencing two or more types.

²Income quintiles group people according to household income, ranging from the lowest fifth of the population to the highest.

³Data for White and Black excluded Hispanics. Hispanics may be of any race.

⁴These items are tabulated for adults (age 18 and over) only. All other items cover the entire population.

Source: Bauman, K.J., 1999, *Extended measures of well-being: Meeting basic needs*, Current Population Reports, P70-67, U.S. Census Bureau.

(unemployment, work disabilities, low levels of education), lack of health insurance, and an unmarried marital status were characteristics commonly associated with difficulty meeting basic needs.

Those who rented rather than owned their homes were more likely to experience at least one difficulty meeting basic needs: renters tend to have lower incomes, fewer assets and other resources to draw on, and less stability. Also, people living in households with a female householder were significantly more likely to experience difficulty meeting basic needs than people in households with a male householder.

People who were without health insurance for at least 1 of the 4 months prior to the interview were more than twice as likely to live in a household with any difficulty meeting basic needs as those who had continuous coverage. This finding suggests that people who lack health insurance may do so because of other pressing needs. About 15 percent of those without health insurance lived in households where needed medical care was not obtained.

The SIPP included questions concerning the kind and amount of food in a household, the length of time food was in short supply, and the amount of money it would have taken to balance the food budget. About 5 percent of respondents lived in a household in which members sometimes did not get enough to eat (table 2). A larger share (18.8 percent) lived in households that either did not get enough to eat or did not get the kind of foods they wanted to eat.

Among those in households that did not get enough food to eat in the last 30 days, the average time they reported being short of food was over a week.

Table 2. Food sufficiency, days without food and food budget shortfall, by income quintile, age, race, Hispanic origin, and gender, 1995

Characteristic	Not enough or not the kind of food wanted (percent)	Not enough food		
		Percent	Average number of days without food in last 30 days	Average budget shortfall in last 30 days (dollars)
Total	18.8	4.8	9	95
Income quintile measures ¹				
Lowest	35.1	11.2	9	86
Second	24.8	6.6	9	110
Third	15.1	3.2	9	98
Fourth	9.8	1.5	6	115
Fifth	6.4	0.8	6	42
Age (years)				
0 to 17	25.1	7.3	8	100
18 to 29	20.6	5.6	9	91
30 to 59	16.7	4.1	9	96
60 and over	11.5	1.9	11	67
Race and Hispanic origin ²				
White, not Hispanic	14.6	3.2	10	107
Black, not Hispanic	30.4	9.3	7	59
Hispanic	35.0	11.7	7	104
Gender				
Male	18.3	4.7	8	96
Female	19.2	5.0	9	94
Gender of householder				
Male	15.9	3.3	8	93
Female	24.8	8.0	9	96
Health insurance coverage				
Not insured	32.8	9.7	9	106
Insured	14.7	3.4	9	93

¹Income quintiles group people according to household income, ranging from the lowest fifth of the population to the highest.

²Data for White and Black exclude Hispanics. Hispanics may be of any race.

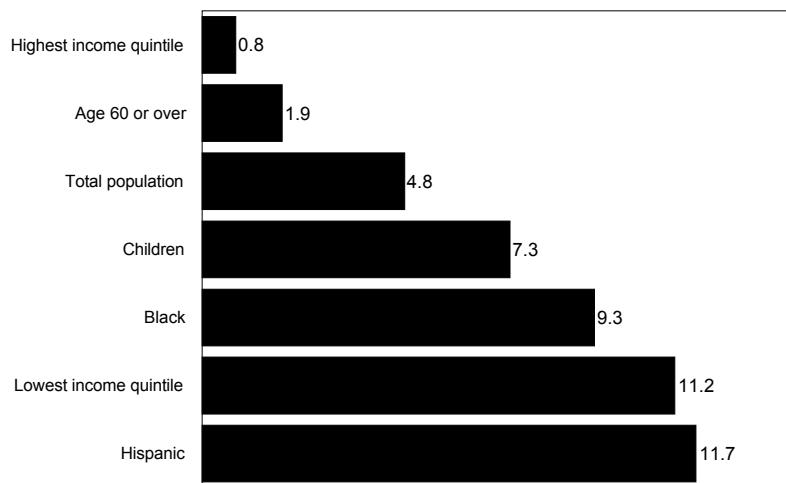
Source: Bauman, K.J., 1999, *Extended measures of well-being: Meeting basic needs, Current Population Reports P70-67, U.S. Census Bureau.*

On average, it would have taken about \$100 for these households to balance their food budget. Getting enough food was strongly associated with income, age, race and Hispanic origin, gender of householder, and health insurance coverage. Among children, 7.3 percent lived in households where people did not have enough to eat (fig. 1). Among those 60 years and older, only 1.9 percent reported not having enough food in the household.

The SIPP asked households that had difficulty meeting basic needs whether they received any help, and if so, where it came from. Of those with difficulties, 17.2 percent received help from others—usually family, friends, and community organizations. Government agencies provided help to 4.9 percent. Compared with those living with male householders, people living with female householders were more likely to have received help when they experienced difficulty meeting basic needs. Renters, those who have moved recently, and unmarried people were more likely to receive help than owners, those who haven't moved recently, and married people.

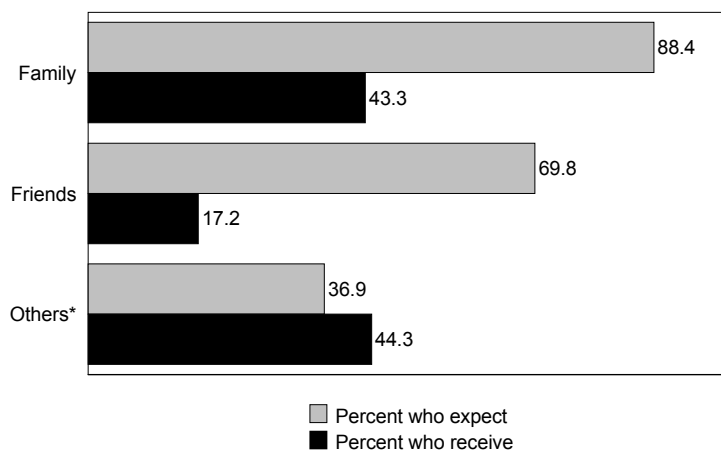
All respondents were asked about sources of help that would be available if it were needed. Over three quarters (77.3 percent) lived in households reporting that help would be available if it were needed. Compared with their counterparts, those less likely to have help available had less than a high school education, were unemployed, and had work disabilities. Over two-thirds (68.4 percent) lived in a household where family would supply any help needed; about half (54.0 percent) lived where help was available from friends; 28.5 percent of the households would obtain help from community agencies.

Figure 1. Percent with not enough food in household in 1995, by selected characteristics



Source: Bauman, K.J., 1999, *Extended measures of well-being: Meeting basic needs, Current Population Reports P70-67, U.S. Census Bureau.*

Figure 2. Sources of help people expect they would get if they needed it compared with sources of help people actually do get when they have difficulty meeting basic needs



*"Others" refers to "Other people in the community besides family and friends, such as a social agency or a church."

Note: Calculation of percentages excludes those who did not expect help.

Source: Bauman, K.J., 1999, *Extended measures of well-being: Meeting basic needs, Current Population Reports P70-67, U.S. Census Bureau.*

People in low-income households were more likely than people in high-income households to receive help from others when they experienced difficulties meeting basic needs. But when asked about help available in a hypothetical situation, low-income people were less likely than high-income people to be in households where help was available. Those with low incomes might have been reluctant to ask for help or might have used up the generosity of those willing to help, especially if those available to help had similarly low incomes.

Among those in households that expected to get help, 88.4 percent expected to receive help from family; 69.8 percent expected to get help from friends (fig. 2). Of those in households that had difficulties meeting basic needs, much smaller percentages actually received help from family (43.3 percent) or friends (17.2 percent). In contrast, other agencies in the community were a larger part of actual help received than they were of help expected: 44.3 versus 36.9 percent.

Traditional measures of income, wealth, and poverty provide basic information about the well-being of the population. Extended measures such as those examined in this report can provide insight into aspects of well-being not captured fully by traditional measures.

Source: Bauman, K.J., 1999, *Extended measures of well-being: Meeting basic needs, Current Population Reports P70-67, U.S. Census Bureau.*

Measuring Time at Work

Interest in the length of the workweek has increased along with the number of dual earner families. The “time famine” faced by working parents has generated much research and public discussion. Research related to the amount of time workers devote to their jobs has, thus far, usually been based on data from time diaries or the standard self-reported measure of working time.

The Current Population Survey (CPS), conducted in March of each year, asks respondents to indicate the number of hours they worked last week *and* how many hours they typically worked per week *last year*. Individuals’ own estimates of their time spent on the job form the basis of this data series on working time. Based on data from the CPS, researchers have concluded that the proportion of Americans who work more than 50 hours per week has increased since 1970.

Proponents of the time-diary method are skeptical of individuals’ self-reports and suggest a number of reasons for miscalculations: respondents have to calculate their workweek in a few seconds; respondents may provide normatively desirable answers rather than precise information; there are ambiguities in what constitutes work (commuting time, lunch breaks, work brought home). When a group of respondents was asked to fill out time diaries as well as the standard self-reported question regarding time on the job, those who reported working 50 or more hours per week tended to exaggerate their working time—at least compared with time-diary measures. In contrast, those who reported working few hours underreported their working time.

Previous research compared individual self-reports with information from company records and found a moderately strong correlation ($r = 0.614$) with self-reports of time spent at work *last week*. A higher association ($r = 0.719$) was found with self-reports of annual hours. Also, no evidence was found that workers exaggerate their working time.

Although time diaries provide more detailed data on time use than do standard self-reported questions, an even more detailed approach to time use is the Experience Sampling Method. For this method, respondents are required to wear digital wrist-watches that beep randomly for them to record their activity several times over a 1-week period. Advocates of this method maintain it avoids the recall problems of time diaries by providing more precise information about time use.

A simple measure of working time that could serve as a check on the accuracy of self-reports and, if necessary, as a substitute for them, would be of value to researchers. One possibility is to ask respondents the time they typically leave for work and the time they typically return home from work. Workers usually have good reason to remember these times. They may have an appointed time to arrive at work; they may listen to the radio or television while preparing to leave for work and thus be aware of the time; or they may commute by public transportation and need to be aware of bus or train schedules. Thus, it may be easier for respondents to specify their departure and return times than it is to estimate the amount of time they spend on the job. These departure and return times could then be used to calculate time away from home. Time away from home is not the same as time at work; nevertheless it is an important yardstick of workers’ job obligations because it indicates what time is left for child care

and other household responsibilities. By allowing for commuting time, lunchtime, and other breaks, research may be able to determine a measure of time at work.

Even if there were no overall tendencies for self-reports to exaggerate working time, it is possible that some groups of workers tend to overstate their workweeks, and others tend to understate their working time. Such discrepancies could result from social-psychological factors, job and demographic factors, and the reference period.

Social-Psychological Factors

Those who feel rushed on their jobs, who work with great intensity, or who believe they confront difficult deadlines frequently might inflate their reported working hours, compared with individuals who do not perceive their jobs as being so stressful. Workers who feel torn between the competing demands of home and work may also exaggerate their reports of working time.

Nature of the Job

Individuals with nonstandard or irregular schedules might make greater errors than do their counterparts with regular schedules. Those with the flexibility to set their own schedules may be more likely to err and to exaggerate the time they spend at work. In contrast, those who are unionized and have specific overtime provisions in their contracts might be less likely to exaggerate their working hours because they have precise measures of their workweek.

Demographic Attributes

Misreports might vary with age, educational level, race and ethnicity, and marital status. Predictions about the direction of these differences, however, are not obvious. For example, workers with small children might

tend to exaggerate their working time because they feel torn between job and family demands.

Reference Period

A change in the reference period provides a simple alternative to the standard question on the workweek. The standard question asks respondents to indicate the number of hours they worked last week. By asking the respondents how many hours they typically worked per week *last year*, researchers may find that the longer reference period might reduce respondents' tendencies to report very long workweeks.

The 1992 National Survey of the Changing Workforce (Workforce Survey)

This study gathered data on a wide range of work experiences, including the connections between work and family life. The analysis was based on responses from 3,059 employed individuals. The Workforce Survey asked respondents when they typically left for and returned from work and asked a supplemental set of departure and return times for respondents with split shifts. Also, respondents were asked about the duration of their commute to work as well as how many days per week they worked. A measure of time on the job can be computed that includes lunch and breaks but excludes commuting time (and work at home when applicable). This indicator is referred to as the "calculated workweek" in contrast to the self-reported workweek. Because the standard self-reported question was also included in the Workforce Survey, comparisons can be made between the two measures for the same respondents.

Table 1. Distribution of average hours, by self-reported workweek versus calculated workweek methods, 1992

Average hours per week range	Self-reported method	
	Self-reported hours (mean)	Calculated hours (mean)
Total (mean)	42.2	44.8
0-19 hours	13.8	18.0
20-29 hours	23.1	24.9
30-39 hours	34.3	38.4
40-49 hours	41.9	45.3
50-59 hours	51.7	52.6
60 hours or more	64.8	62.2
	Calculated method	
	Calculated hours (mean)	Self-reported hours (mean)
0-19 hours	14.1	20.6
20-29 hours	25.1	27.0
30-39 hours	35.9	37.0
40-49 hours	44.6	42.1
50-59 hours	53.4	49.0
60 hours or more	69.8	58.5

Source: Jacobs, J.A., 1998, *Measuring time at work: Are self-reports accurate?* Monthly Labor Review 121(12):42-53.

This analysis focuses only on the time spent in respondents' main job. Twenty-two variables that were potentially associated with discrepancies between reported and calculated workweeks were grouped into three sets of predictor variables.

- **Social-psychological measures** were examined to determine whether respondents who felt especially busy or rushed would exaggerate their hours on the job relative to other respondents. These social-psychological measures were job satisfaction, thought of quitting job in last 3 months, enough time to get job done, difficult deadlines, working at a high fraction of one's capacity, supervisor support, family spillover to job, success in balancing work and personal life, satisfaction with current life, and being nervous and stressed in the last 3 months.

- **Job attributes** were examined to determine whether some types of jobs produced systematic bias in estimates of the workweek. These job attributes were flexible hours, shift type, union membership, self-employment status, dual-job status, years with employer, and job tenure.

- **Demographic variables** were examined to see how they affected responses. These demographic variables were age, marital status, presence of children in the household, race and ethnicity, and education.

This analysis examined data from the March 1997 CPS to compare self-reported time measures for different reference periods. Nonfarm wage and salary workers were selected for this comparison. They were 18-64 years old, worked at least 1 week during 1996, and were employed during the survey week in March 1997.

Table 2. Trends in hours usually worked last week, for male and female nonfarm wage and salary workers, 1970-90

Category	Mean hours, all jobs (standard deviation)	Percent working less than 30 hours per week	Percent working 50 or more than per week
Men, 1997 (n=24,889)			
Hours worked last week	42.66	9.26	25.40
Standard deviation	(12.46)	...	...
Hours usually worked last year	42.60	5.78	22.97
Standard deviation	(10.06)	...	...
Women, 1997 (n=23,968)			
Hours worked last week	36.90	19.78	10.93
Standard deviation	(11.93)	...	...
Hours usually worked last year	37.30	16.00	9.23
Standard deviation	(10.30)	...	...

Source: Jacobs, J.A., 1998, *Measuring time at work: Are self-reports accurate?* *Monthly Labor Review* 121(12):42-53.

Results

The mean workweek was slightly longer with the calculated measure than with the self-reported indicator (table 1). This difference reflects the fact that the calculated measure includes lunch and other breaks that are excluded (in principle) from self-reports. Those who reported working 60 or more hours per week (on average) report working 2.6 hours per week more than the calculated hours. For the rest of the sample, the calculated workweek is longer than the self-reported workweek. However, the lower panel in the table indicates that when arranged by length of the calculated workweek, those with calculated workweeks of 40 hours or more understate the time they spend at work, but those with calculated workweeks of less than 40 hours tend to exaggerate their workweeks.

Regression analyses were undertaken to determine whether the discrepancies between the two measures of working

time were related to independent variables. There was little evidence that social-psychological measures—individuals' orientations to their life or their job—lead them to exaggerate their working time. However, some evidence showed that job tenure reduces reported work time for men, but this may be offset by the fact that years with one's employer tend to increase reported working time. Women who held multiple jobs exaggerated their hours on their primary jobs; men did not. Individuals with less than a college education tend to underreport their workweeks. However, more educated workers might be more likely to bring their work home, an aspect of work that is missed by the calculated workweeks examined in this study.

Table 2 compares self-reported workweeks based on data from the March 1997 CPS for two reference periods (last week vs. last year). The mean length of the workweek is similar for these two time periods. The

proportion of respondents who report working more than 50 hours per week is lower when the reference period is last year, compared with last week. Also, the proportion who reported working less than 30 hours per week is also lower for last year than last week.

Conclusion

Independent measures of working time largely corroborate the self-reported measures relied on by the standard surveys, such as the census and CPS. A workweek calculated from departure-and-return-time, minus commuting time, is slightly longer than the self-reported workweek and correlates with self-reports quite strongly.

Few predictor variables account for the gaps between self-reported and calculated working time. To the extent that self-reported measures are in error, the errors appear to be random.

Data on "hours usually worked last year" tend to have less dispersion than data on "hours worked last week." The reference period thus seems to influence the extent of reporting at the extremes. Researchers interested in studying the behavior of workers at the extremes of the distribution can produce more conservative estimates by relying on data with an annual reference period.

The standard self-reported measure of working time is a reasonably reliable indicator of time use. A time diary and other measures of time use are helpful as a supplement—not as a substitute—for standard measures of the workweek.

Source: Jacobs, J.A., 1998, *Measuring time at work: Are self-reports accurate?* *Monthly Labor Review* 121(12):42-53.

Research and Evaluation Activities in USDA

From the Economic Research Service

Food Assistance and Nutrition Research Small Grants Program

Executive Summaries of 1998 Research Grants

Since their origins in the 1930's, food assistance programs—Food Stamps, the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), the school meals program, and others—have been a major component of public assistance to the poor. Food assistance, as well as nutrition assistance, has become increasingly important to the social safety net as a result of welfare reform. To stimulate new research on these programs and to broaden the participation of social science scholars in food and nutrition assistance research, the USDA Economic Research Service (ERS) partnered with five academic institutions and research institutes in 1998 to establish the Small Grants Program for Food and Nutrition Assistance Research. ERS and the partner institutions competitively award small grants for 1-year research projects. One of the five partner-institutions is the American Indian Studies Program (AISP) at the University of Arizona (web address: <http://w3.arizona.edu/~aisp/projects.html>). AISP operates the only PhD program in Native American Studies in the United States and maintains close relationships to the land grant tribal colleges. AISP works with scholars at tribal colleges and elsewhere to support research addressing the unique position and problems of Native Americans with respect to food assistance. The

following abstracts summarize the findings of the first set of small grants awarded by AISP, in the fall of 1998. For a listing of all projects funded and research findings to date, see www.ers.usda.gov.

The Variety, Affordability, and Availability of Healthful Foods at Convenience Stores and Trading Posts on the Navajo Reservation

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Dine College, Shiprock, New Mexico and
Shirley L. Pareo-Tubbeh
University of New Mexico*

A basic assumption of health and nutrition education programs is that foods being promoted will be available. On the Navajo reservation, where the nearest source for groceries may be a trading post or convenience store, this assumption may not be valid. To test this assumption, Dine Tribal College staff and students, in partnership with the University of New Mexico, developed and administered a 69-item food inventory at rural trading posts and convenience stores across the three States encompassing the Navajo reservation. The food inventory included only “healthful foods” such as fruits, vegetables, low-fat dairy products, and lean meat. Interviewers asked store managers open-ended questions about their primary customers and foods most commonly sold. The sample included a total of 48 stores, with one large grocery store for comparison. Individual foods were collapsed into broad food categories.

The authors used analysis of variance to determine differences in food categories by State, type, and distance

of store from a major grocery store. Seventy-five percent of store owners reported that local people were their primary customers, and 53 percent reported that “junk food” is the food most commonly sold, followed by 19 percent reporting staples. All but five stores had at least one type of fresh fruit or vegetable available; the mean number of these items available was 9. Only four stores had 1-percent milk, and six stores had skim milk available. Ninety percent of the stores accepted WIC stamps, and these stores had whole-grain cereals, fruit juices, and low-fat string cheese available. There were no differences in food availability by type of store or distance from a major grocery store. However, the number of fresh fruits and vegetables and total variety differed significantly across States. Their results show that the number of healthful foods available throughout the reservation is limited, and that store owners would make more of such foods available if they were demanded.

The Impact of Welfare Reform on Food Assistance Programs on American Indian Reservations: The Northern Cheyenne Case Study

*Judith Davis and Rita Hiwalker
Dull Knife Memorial College,
Lame Deer, Montana
and*

*Carol Ward, Erin Feinauer, and
Martha Johnson
Brigham Young University*

The goal of this research project was to identify and evaluate the effects of recent welfare reforms, particularly reforms related to food assistance programs, in the Northern Cheyenne Nation. The report documents the recent experiences of food assistance

programs and their clients and clarifies how recent welfare reforms affect food assistance and other service needs of Northern Cheyenne residents. Davis et al. present historical, demographic, and cultural information about the Northern Cheyenne Nation that is useful for understanding current conditions as well as the significance of food assistance programs. They report on the nature of the current programs, the views of the program directors, and client experiences with the food programs. They provide analysis of their findings and a discussion of policy implications.

The authors' analyses reveal effects of changes in the food assistance program on Northern Cheyenne cultural and social life, as well as on the range of formal and informal services and resources—the local safety net—to which economically vulnerable Cheyenne have access. Cultural effects can be seen in the struggle of tribal members to uphold one of their central values: like many other American Indian groups, the Northern Cheyenne place a high priority on sharing resources with both family and non-family to ensure survival. Prevalence of the value placed on sharing and caring for others is evident in the low to nonexistent level of homelessness on this reservation. It is also evident in the everyday actions of individuals who share food with those in need, regardless of how much or how little they have. However, as the numbers needing food assistance increase, the ability of families and the community to care for them is strained.

The authors also show that despite the significance of food assistance programs for increasing well-being, there are important obstacles for individuals attempting to access food assistance. Poor families living in remote reservation areas must make and get to appointments with program

personnel to receive the benefits for which they qualify. Lack of transportation or of gas money for others to drive them, and a lack of telephones are the most frequently cited problems. The considerable paperwork required of food stamp and other program recipients and the complexity of the system are often difficult to navigate for many individuals who are trying to establish and maintain eligibility for benefits. This is particularly the case for those who lack high school diplomas or whose first language is Cheyenne. Other common complaints include the lack of jobs, workplaces on or near the reservation where clients may complete required work hours, and inadequate childcare. The frequency of such problems indicates, despite their best efforts, the declining ability of local programs to serve their clients' needs adequately. A service gap leads to clients' discouragement and loss of confidence when they fall through the safety net.

Interviews with program directors and clients show that both groups understand the problems and gaps in services. However, constrained by regulations and limited resources, programs are often unable to make the changes needed to solve these problems. Such constraints leave many clients feeling frustrated and perceiving that programs are insensitive to their needs.

Because the Cheyenne are relatively representative of tribal populations in the Plains and elsewhere, this study presents useful insights about the effect of welfare reform on food assistance programs and other elements of the social safety net operating in many reservation communities. Findings of the study indicate the importance of examining the intricacies of clients' experiences with food assistance programs, the complexity of food programs, and the relationship of food

programs to the whole range of formal and informal resources on which the Northern Cheyenne rely.

Federal Food Programs, Traditional Foods and the Gros Ventre and Assiniboine Nations of the Fort Belknap Indian Reservation

*Rachel C. Grant, Misty Arcand, Caroline Plumage, and Max G. White Jr.
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Eating habits and food preparation among the Gros Ventre and Assiniboine peoples have changed dramatically since the establishment of the Fort Belknap Indian Reservation and the introduction of Federal food distribution programs on the reservation. This project documented such changes from the perspective of tribal elders, community members, and associated service providers. Data were collected from both men and women over the age of 50 through a survey designed by Fort Belknap College's (FBC) principal investigator, a consultant, and three student researchers who were graduates of FBC. The survey was administered in and around Fort Belknap Indian Reservation communities during the summer of 1999. Survey results identify various relationships between past and present Federal food distribution programs and the Gros Ventre and Assiniboine people's traditional practices of hunting, gathering, preparing, and preserving food.

Assessment of Food Concerns, Nutrition Knowledge, and Food Security of Oglala Lakota College Students on the Pine Ridge Reservation

*Leslie Rae Henry, Rhonda Bear-Little Boy, and Brian Dodge
Oglala Lakota College, Kyle, South Dakota*

For this project, researchers adapted a survey developed by the South Dakota State University Department of Nutrition and Food Science to assess food concerns, nutrition knowledge, and food insecurity on the Pine Ridge Reservation. They interviewed students at five Oglala Lakota College (OLC) sites on the reservation. The interviews, conducted in 1999, included general demographic background questions, multipart interest/needs questions, questions related to current food understanding, and questions related to food adequacy.

Overall, the survey results show OLC students are five times more likely to be food insecure than the national average of 3.5 percent reported by the Economic Research Service for the 1996-98 period. The college needs to do further research to see whether this level of food insecurity affects academic performance. Students from the Wounded Knee College Center were eight times more likely to be food insecure than the national average. At the Pine Ridge College Center, 30 percent of the students stated that they consumed the same thing for several days in a row because they have only a few different kinds of food on hand and don't have money to buy more. This result was surprising because the Pine Ridge College Center houses the largest supermarket on the reservation and is located within 2 miles of two other grocery stores.

"Feeding self and family" was the primary concern of OLC students, with employment and housing being tied for second place for needs/interests. Employment was the greatest financial need, with "feeding self and family" second. Parents were the number one source of information for feeding students and family; second was a dietitian or nutritionist. Less than 10 percent of OLC students used USDA extension programs for information.

Parents were ranked the highest (70 percent) in terms of trustworthiness of the information provided.

Thirty-three percent of OLC students surveyed could not pick out which package of chicken was the best buy. Over 12 percent of OLC students surveyed did not understand why hot foods should be kept hot and cold foods cold. Over 86 percent did not know how many daily servings of bread, cereal, rice, and pasta are recommended for adults, teens, and children. Sixteen percent stated incorrectly that physical activity did not count unless you worked up a sweat. Also, 12.4 percent did not know that some form of physical activity is needed at least four times per week for overall good health.

The authors suggest that the new extension education program in holistic human health at OLC could coordinate educational activities to improve OLC students' knowledge of nutrition and health issues identified in the survey, with assistance from other land grant universities.

Dietary Choices and Weight Control Practices Among Cheyenne River Lakota Households

*John Phillips and John Finn
Si Tanka College, Eagle Butte,
South Dakota*

This study describes the prevailing dietary choices and weight control practices among Cheyenne River Lakota households. The use of food assistance programs and food sources on the reservation is also examined. A standardized questionnaire and in-person interviews were used to survey a random sample of Cheyenne River Lakota households during the summer of 1999. Follow-up interviews on a random subsample of households helped to verify the questionnaire and

sought further information on preferences for weight control programs.

A total of 216 households participated in the survey. High-fat foods consumed most frequently included butter/margarine (35 percent >5 times per week), potato and corn chips (29 percent >5 times per week), cheese (27 percent >5 times per week), and hot dogs, bologna, and luncheon meats (26 percent >5 times per week). Few reported consuming fruits (11 percent >5 times per week) or vegetables (18 percent >5 times per week) on a daily basis. Sweetened beverages were consumed frequently, including regular pop (43 percent >5 times per week) and Kool-Aid® or punch (39 percent >5 times per week).

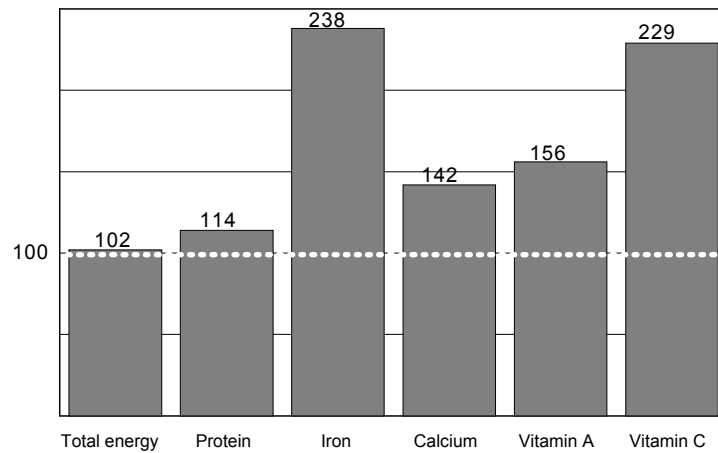
Most respondents engaged in mild exercise for at least 30 minutes 3 times per week or more (78 percent). Weight loss or maintenance techniques used frequently included increasing activity levels (59 percent), eating more fruits and vegetables (76 percent), eating less fatty foods (65 percent), eating less sweets (74 percent), and reducing the amount of total food consumed (70 percent). Most individuals (64 percent) were favorable to joining a program that promotes healthy diet and exercise. Major barriers to exercise included lack of time (54 percent) and medical reasons or disabilities (42 percent). Barriers to eating healthy foods included higher costs (50 percent) and unpopularity with the family (40 percent). The authors conclude that nutrition and weight control programs are needed to address these reported barriers and provide incentives for increased participation.

Federal Studies: Review of the Nutritional Status of WIC Participants

This review of the nutrient intake of participants in the Special Supplemental Nutrition Program for Women, Infants, and Children—the WIC Program—compares the nutritional content of reported food intake to current nutritional standards and assesses the potential contribution of WIC supplemental nutrition packages to the quality of participants’ diets. Results of the review indicate that whereas infants and children appear to achieve good nutrient intake—with the exception of low zinc intake in children—women’s diets need improvement. Pregnant women report lower than recommended energy intake, and they need to improve their intake of calcium, iron, folic acid, zinc, vitamin B₆, and magnesium. Breast-feeding women participating in WIC need to improve intake of vitamin C and iron, as well as vitamin B₆, magnesium, and zinc. Non-breast-feeding postpartum women report low energy intake as well as low intake of nutrients targeted by WIC. Recommendations for the WIC Program include package modifications (in some cases) and nutrition education.

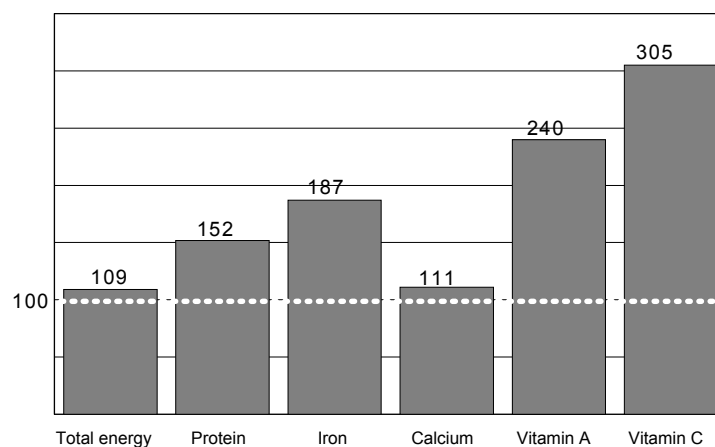
The diets of infants 2 to 3 months old who participate in the WIC Program meet recommended nutrient intakes for energy and for nutrients targeted by WIC.

Total nutrient intake as percentage of RDA



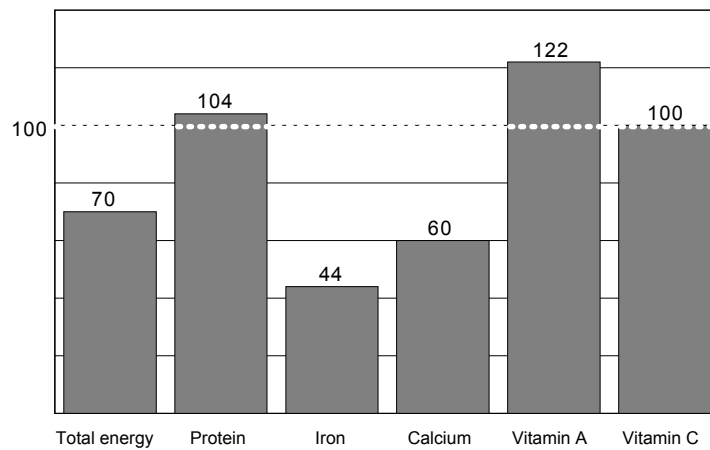
The diets of infants 4 to 11 months old who participate in the WIC Program meet recommended nutrient intakes for energy and for nutrients targeted by WIC.

Total nutrient intake as percentage of RDA



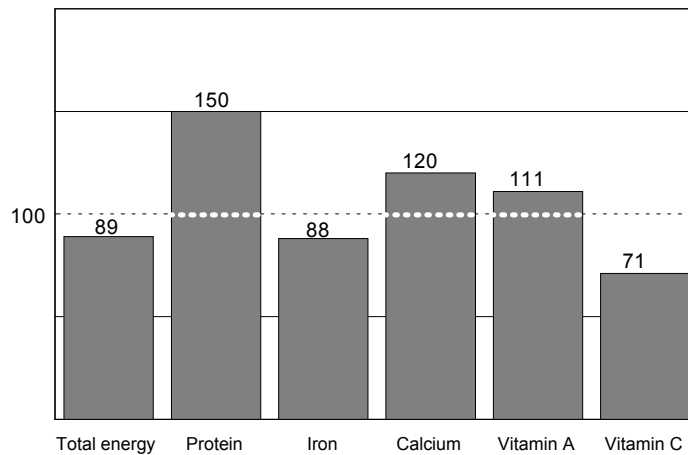
The diets of pregnant women who participate in the WIC Program are nutrient-deficient.

Total nutrient intake as percentage of RDA



The diets of breast-feeding, postpartum women who participate in the WIC Program are also nutrient-deficient.

Total nutrient intake as percentage of RDA



Source: Review of the Nutritional Status of WIC Participants. 1999. By Carol Kramer-LeBlanc, Anne Mardis, Shirley Gerrior, and Nancy Gaston. Center for Nutrition Policy and Promotion, U.S. Department of Agriculture. CNPP-8A.

Journal Abstracts

The following abstracts are reprinted verbatim as they appear in the cited source.

Brown, A.C., Brody, G.H., and Stoneman, Z. 2000. Rural black women and depression: A contextual analysis. *Journal of Marriage and the Family* 62(1):187-198.

We use ecological systems theory to guide our investigation of depression among a sample of 102 married Black mothers residing in the rural South. Using self-report data collected via computerized interviews during home visits, we conduct multivariate regression analyses, exploring the association between depression and (a) spousal support and conflict, (b) cocaregiver support and conflict, (c) child conduct difficulties, and (d) socioeconomic risk. We hypothesize that each of these variables [is] associated with mothers' depression scores and that the extent to which these familial variables and depression are associated will vary across socioeconomic contexts. Socioeconomic risk, child conduct difficulties, and conflict with a cocaregiver were associated with women's depression in the full model. The moderational hypotheses were upheld for the variables of spousal support and child conduct difficulty. Spousal support and depression have a strong negative association under conditions of high socioeconomic risk and a nonsignificant relationship when socioeconomic risk is low. The association between child conduct difficulty and depression was exacerbated under high socioeconomic risk.

Chambers IV, E., Godwin, S.L., and Vecchio, F.A. 2000. Cognitive strategies for reporting portion sizes using dietary recall procedures. *Journal of the American Dietetic Association* 100(8):891-897.

Do portion-size aids improve dietary recall? After assigning 76 adults, aged 18 to 65 years, to 4 groups based on portion-size estimation aids—2-dimensional (2-D) paper aids presented in stacks, 2-D aids cut out and presented on rings, household aids, and a combination of 2-D and 3-dimensional (3-D) aids—the authors of this study conducted interviews of 1 to 1½ hours in which they asked participants to recall the portion sizes of foods they had reported as eaten. Visualization and comparison with other aids were used most frequently by participants for recall. There was a demonstrated preference among participants for aids—regardless of whether they were 2-D or 3-D—that were similar in size and shape to actual liquids or amorphous foods, and rulers for solid foods. The authors recommend supplying respondents participating in dietary recall with visual aids to facilitate the recall process.

Fast, J.E., Williamson, D.L., and Keating, N.C. 1999. The hidden costs of informal elder care. *Journal of Family and Economic Issues* 20(3):301-327.

Demographic, socio-economic, and political trends throughout the developed world have contrived to make elder care an issue of utmost policy importance. They also have led to sharp reductions in health and social program expenditures. Policymakers are looking to communities to help meet growing care needs because community care is believed to be better and cheaper than institutional care. However, these beliefs become untenable when costs beyond public sector costs are considered. In fact,

informal care carries a number of hidden costs that seldom are considered in health and social policy discussions. This article introduces a taxonomy of the costs of informal elder care, which can be categorized as out-of-pocket expenditures, foregone employment opportunities, unpaid labor, and emotional, physical and social well-being costs. Then, an illustration is provided regarding how the taxonomy can be applied to understanding the incidence, magnitude, and distribution of these costs among stakeholder groups. This taxonomy can help inform ongoing debate about health and social policy reform.

Lee, S-K., Sobal, J., and Frongillo Jr., E.A. 1999. Acculturation, food consumption, and diet-related factors among Korean Americans. *Journal of Nutrition Education* 31:321-330.

This study examined how Korean Americans with different levels of acculturation varied in food consumption, and which diet-related factors were important to acculturation and food consumption. Pretested questionnaires were mailed to a national sample, and 55% of the deliverable sample responded, producing 356 usable questionnaires. Sociocultural acculturation was measured with a two-culture matrix model and Gordon's theoretical work and showed four dimensions: American structural, American cultural, Korean structural, and Korean cultural. Food frequency questionnaire responses were divided into American, common, and Korean food consumption. American food consumption increased with higher American structural adaptation and loss of Korean culture. In the relationship of

acculturation to frequency of American food consumption, preparing meals themselves, concern about health, and willingness to try other ethnic foods were important. Meal preparation and purchasing power were related to the number of regularly consumed American foods. Korean food consumption decreased with higher familiarity with American culture and less retention of Korean society. Women with someone to prepare meals were most likely to eat more Korean foods. Korean food availability was related significantly only to the number of regularly consumed Korean foods. Future work can benefit by acknowledging acculturation as a multidimensional process and applying several dietary assessment approaches.

Mackenbach, J.P., Kunst, A.E., Groenhouf, F., Borgan, J-K., Costa, G., Faggiano, F., Jozan, P., Leinsalu, M., Martikainen, P., Rychtarikova, J., and Valkonen, T. 1999. Socio-economic inequalities in mortality among women and among men: An international study. *American Journal of Public Health* 89(1):1800-1806.

Objectives. This study compared differences in total and cause-specific mortality by educational level among women with those among men in 7 countries: the United States, Finland, Norway, Italy, the Czech Republic, Hungary, and Estonia.

Methods. National data were obtained for the period ca. 1980 to ca. 1990. Age-adjusted rate ratios comparing a broad lower-educational group with a broad upper-educational group were calculated with Poisson regression analysis.

Results. Total mortality rate ratios among women ranged from 1.09 in the Czech Republic to 1.31 in the United States and Estonia. Higher mortality rates among lower-educated women

were found for most causes of death, but not for neoplasms. Relative inequalities in total mortality tended to be smaller among women than among men. In the United States and Western Europe, but not in Central and Eastern Europe, this sex difference was largely due to differences between women and men in cause-of-death pattern. For specific causes of death, inequalities are usually larger among men.

Conclusions. Further study of the interaction between socioeconomic factors, sex, and mortality may provide important clues to the explanation of inequalities in health.

Molarius, A., Seidell, J.C., Sans, S., Tuomilehto, J., and Kuulasmaa, K. 2000. Educational level, relative body weight, and changes in their association over 10 years: An international perspective from the WHO MONICA Project. *American Journal of Public Health* 90(8):1260-1268.

Objectives. This study assessed the consistency and magnitude of the association between educational level and relative body weight in populations with widely different prevalences of overweight and investigated possible changes in the association over 10 years.

Methods. Differences in age-adjusted mean body mass index (BMI) between the highest and the lowest tertiles of years of schooling were calculated for 26 populations in the initial and final surveys of the World Health Organization (WHO) MONICA (Monitoring Trends and Determinants in Cardiovascular Disease) Project. The data are derived from random population samples, including more than 42,000 men and women aged 35 to 64 years in the initial survey (1979-1989) and almost 35,000 in the final survey (1989-1996).

Results. For women, almost all populations showed a statistically significant inverse association between educational level and BMI; the difference between the highest and the lowest educational tertiles ranged from -3.3 to 0.4 kg/m². For men, the difference ranged from -1.5 to 2.2 kg/m². In about two thirds of the populations, the differences in BMI between the educational levels increased over the 10-year period.

Conclusion. Lower education was associated with higher BMI in about half of the male and in almost all of the female populations, and the differences in relative body weight between educational levels increased over the study period. Thus, socioeconomic inequality in health consequences of obesity may increase in many countries.

Thompson, B., Demark-Wahnefried, W., Taylor, G., McClelland, J.W., Stables, G., Havas, S., Feng, Z., Topor, M., Heimendinger, J., Reynolds, K.D., and Cohen, N. 1999. Baseline fruit and vegetable intake among adults in seven 5 A Day study centers located in diverse geographic areas. *Journal of the American Dietetic Association* 99:1241-1248.

Because diet is receiving more attention as a possible factor in some types of cancer, this study was designed to examine whether adults in diverse regions were meeting the minimum recommendation of at least 5 servings of fruits and vegetables per day and to determine if there were any geographic differences in fruit and vegetable intake. The researchers analyzed data from a 7-item food frequency questionnaire and found a mean intake of 3.6 servings of fruits and vegetables per day. The geographic differences in fruit and vegetable consumption suggest that dietetics practitioners need to be aware of region of the country when designing nutrition interventions.

Official USDA Food Plans: Cost of Food at Home at Four Levels, U.S. Average, May 2001¹

AGE-GENDER GROUPS	WEEKLY COST				MONTHLY COST			
	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan
INDIVIDUALS²								
CHILD:								
1 year	\$16.20	\$20.00	\$23.50	\$28.60	\$70.20	\$86.70	\$101.80	\$123.90
2 years	1610	20.00	23.50	28.60	6980	86.70	101.80	123.90
3-5 years	17.60	21.90	27.20	32.60	7630	94.90	117.90	141.30
6-8 years	21.80	29.20	36.40	42.40	9450	126.50	157.70	183.70
9-11 years	25.80	33.10	42.30	49.10	111.80	143.40	183.30	212.80
MALE:								
12-14 years	26.60	37.40	46.40	54.60	115.30	162.10	201.10	236.60
15-19 years	27.40	38.50	48.10	55.50	118.70	166.80	208.40	240.50
20-50 years	29.40	38.40	47.80	58.00	127.40	166.40	207.10	251.30
51 years and over	26.70	36.50	45.00	54.00	115.70	158.20	195.00	234.00
FEMALE:								
12-19 years	26.70	32.20	39.20	47.40	115.70	139.50	169.90	205.40
20-50 years	26.70	33.50	40.80	52.50	115.70	145.20	176.80	227.50
51 years and over	26.30	32.70	40.60	48.50	114.00	141.70	175.90	210.20
FAMILIES:								
FAMILY of 2³:								
20-50 years	61.70	79.10	97.50	121.60	267.40	342.80	422.30	526.70
51 years and over	58.30	76.10	94.20	112.80	252.70	329.90	408.00	488.60
FAMILY OF 4:								
Cou ple, 20-50 years and children—								
2 and 3-5 years	89.80	113.80	139.30	171.70	389.20	493.20	603.60	744.00
6-8 and 9-11 years	103.70	134.20	167.30	202.00	449.40	581.50	724.90	875.30

¹ Basis is that all meals and snacks are purchased at stores and prepared at home. For specific foods and quantities of foods in the Low-Cost, Moderate-Cost, and Liberal Plans, see *Family Economics Review*, No. 2 (1983); for specific foods and quantities of foods in the Thrifty Food Plan, see *Thrifty Food Plan, 1999, Executive Summary*, CNPP-7A. The Thrifty Food Plan is based on 1989-91 data, and the other three food plans are based on 1977-78 data updated to current dollars using the Consumer Price Index for specific food items.

² The costs given are for individuals in 4-person families. For individuals in other size families, the following adjustments are suggested: 1-person—add 20 per cent; 2-person—add 10 per cent; 3-person—add 5 per cent; 5- or 6-person—subtract 5 per cent; 7- (or more) per son—subtract 10 per cent.

³ Ten per cent added for family size adjustment.

Official USDA Alaska and Hawaii Thrifty Food Plans: Cost of Food at Home (2nd half 2000)¹

AGE-GENDER GROUPS	ALASKA		HAWAII	
	Weekly Cost	Monthly Cost	Weekly Cost	Monthly Cost
INDIVIDUALS²				
Child, 6-8 years	\$26.30	\$114.00	\$31.70	\$137.40
Child, 9-11 years	31.10	134.80	38.10	165.10
Male, 20-50 years	34.40	149.10	42.10	182.40
Female, 20-50 years	31.50	136.50	38.30	166.00
FAMILY OF 2³				
20-50 years	72.50	314.20	88.40	383.20
FAMILY OF 4				
Couple, 20-50 years and children, 6-8 and 9-11 years	123.30	534.40	150.20	650.90

¹ Basis is that all meals and snacks are purchased at stores and prepared at home. For specific foods and quantities of foods in the Thrifty Food Plan, see *Family Economics Review*, No. 1 (1984). The food plans are based on 1977-78 National Food Consumption Survey data adjusted for Alaska and Hawaii and updated to current dollars using the Consumer Price Index for specific food items for the Anchorage, Alaska, and Honolulu, Hawaii, areas.

² The costs given are for individuals in 4-person families. For individuals in other size families, the following adjustments are suggested: 1-person—add 20 per cent; 2-person—add 10 per cent; 3-person—add 5 per cent; 5- or 6-person—subtract 5 per cent; 7- (or more) per son—subtract 10 per cent.

³ Ten per cent added for family size adjustment.

Consumer Prices

Average per cent change for major budgetary components

GROUP	Annual average per cent change from December of previous year to December:			Per cent change 12 months ending with May 2001
	1990	1995	2000	
All Items	6.1	2.5	3.4	3.6
Food	5.3	2.1	2.8	3.1
Food at home	5.8	2.0	3.0	3.2
Food away from home	4.5	2.2	2.4	2.9
Housing	4.5	3.0	4.3	4.6
Apparel	5.1	0.1	-1.9	-1.8
Transportation	10.4	1.5	4.3	4.0
Medical care	9.6	3.9	4.2	4.6
Recreation	NA	2.8	1.4	1.8
Education and communication	NA	4.0	1.2	2.2
Other goods and services	7.6	4.3	4.5	3.7

Price per pound for selected food items

Food	Price per pound unless otherwise noted (as of December in each year)			May 2001
	1990	1995	2000	
Flour, white, all purpose	\$.24	\$.24	\$.28	\$.31
Rice, white, long grain, uncooked	.49	.55	.50	.49
Spaghetti and macaroni	.85	.88	.88	.91
Bread, white	.70	.84	.99	1.00
Beef, ground, uncooked	1.63	1.40	1.63	1.74
Pork chops, center cut, bone-in	3.32	3.29	3.46	3.50
Chicken, fresh, whole	.86	.94	1.08	1.10
Tuna, light, chunk	2.11	2.00	1.92	1.89
Eggs, Grade A, large, per dozen	1.00	1.16	.96	.88
Milk, fresh, lowfat, per gallon	NA	2.31	2.66	2.56
Butter, salted, grade AA, stick	1.92	1.73	2.80	3.26
Apples, red delicious	.77	.83	.82	.85
Bananas	.43	.45	.49	.51
Oranges, navel	.56	.64	.62	.79
Potatoes, white	.32	.38	.35	.36
Lettuce, iceberg	.58	.61	.85	.87
Tomatoes, field grown	.86	1.51	1.57	1.24
Broccoli	NA	.76	1.52	1.00
Carrots, short trimmed and topped	.43	.53	.52	.52
Onions, dry yellow	NA	.41	NA	NA
Orange juice, frozen concentrate per 16 oz.	2.02	1.57	1.88	1.89
Sugar, white, 33-80 oz. pkg.	.40	.39	.40	.42
Margarine, stick	.87	.79	NA	NA
Peanut butter, creamy	2.09	1.78	1.96	1.94
Coffee, 100% ground roast	2.94	3.75	3.21	3.10

NA = Data not available.

Selected items from CPI Detailed Reports, Bureau of Labor Statistics, various issues. Price changes are for all urban consumers. Food prices are U.S. city average.

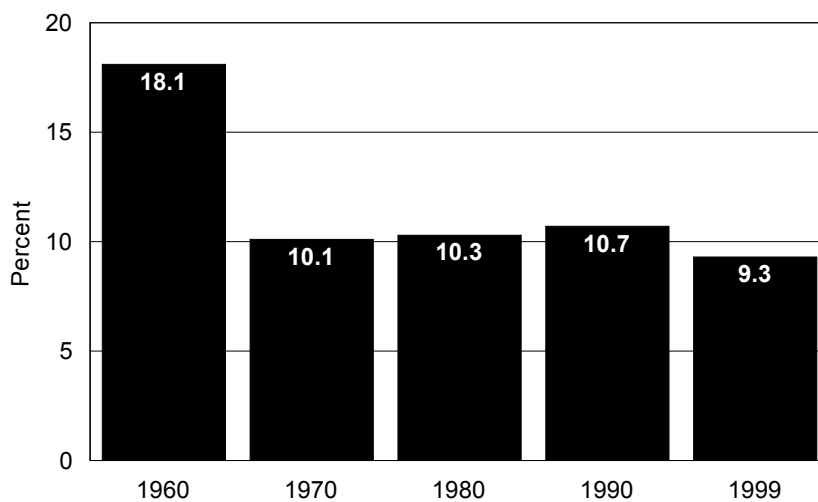
U.S. Poverty Thresholds and Related Statistics

Poverty Thresholds in 2000, by size of family and number of related children under 18 years

Size of family unit	Related children under 18 years								
	None	One	Two	Three	Four	Five	Six	Seven	Eight or more
One person (unrelated individual)									
Under 65 years	\$8,959								
65 years and over	8,259								
Two people									
Householder under 65 years	11,531	\$11,869							
Householder 65 years and over	10,409	11,824							
Three people	13,470	13,861	\$13,874						
Four people	17,761	18,052	17,463	\$17,524					
Five people	21,419	21,731	21,065	20,550	\$20,236				
Six people	24,636	24,734	24,224	23,736	23,009	\$22,579			
Seven people	28,347	28,524	27,914	27,489	26,696	25,772	\$24,758		
Eight people	31,704	31,984	31,408	30,904	30,188	29,279	28,334	\$28,093	
Nine people or more	38,138	38,322	37,813	37,385	36,682	35,716	34,841	34,625	\$33,291

Source: U.S. Census Bureau.

Poverty Rate for Families Over Time



Source: U.S. Census Bureau.



Check the CNPP website (www.cnpp.usda.gov) for the following information and publications:

- Nutrient Content of the U.S. Food Supply Report, 1909-1997
 - Expenditures on Children by Families, 2000 Annual Report
 - Dietary Guidelines for Americans, 2000, 5th Edition
 - Interactive Healthy Eating Index
 - Recipes and Tips for Healthy, Thrifty Meals
 - Nutrition Insights
 - Food Guide Pyramid
 - Food Guide Pyramid for Children
 - Family Economics and Nutrition Review
 - Interactive Nutrient Content of the U.S. Food Supply
 - Official USDA Food Plans
 - Proceedings and Video Archives of Symposia including Childhood Obesity, Popular Weight-Loss Diets, The Role of Diet and Genes, and More
-

Guidelines for Submissions to *Family Economics and Nutrition Review*

Family Economics and Nutrition Review (FENR) is a peer-reviewed journal published by the Center for Nutrition Policy and Promotion, United States Department of Agriculture.

FENR will consider for publication articles concerning economic and nutritional issues related to the health and well-being of families. We are especially interested in studies about U.S. population groups at risk—from either an economic or nutritional perspective. Research may be based on primary or secondary data as long as it is national or regional in scope or of national policy interest.

Your submission should contain:

- ◆ an affiliation page that lists the author's(s') full name, academic degree(s), employer, and title.
- ◆ a short abstract of about 15 lines that summarizes the major findings. Abstracts are required for research articles, not for research briefs.
- ◆ text of 12-20 double-spaced pages for research articles or 5-10 double-spaced pages for research briefs. Articles over 20 pages in length will be considered by FENR editorial staff only in exceptional circumstances. Page limits include references but exclude author's (s') affiliation page, abstract page, tables, and graphs.
- ◆ no more than a total of five tables and graphs for research articles and two for research briefs to illustrate major findings. Do not include tables or graphs that are not referenced in the text. Tables larger than 1 full page will not be considered.
- ◆ acknowledgment of the source of funding for the research, if other than the employer.

Subject matter should be based on research findings of interest to a wide family economics and nutrition audience, including Federal, State, and local government officials, nutrition and economic educators, and social scientists.

The writing style must be more journalistic than that used in purely academic journals. Use of descriptive statistics, rather than multivariate analyses, is preferred. We encourage authors to use the active voice, to keep jargon and acronyms to a minimum, and to explain any technical terms that are unavoidable. To be considered for publication, all manuscripts must follow the guidelines of the *Publication Manual of the American Psychological Association*, 5th edition.

Format:

FENR articles follow the general format of (1) abstract, (2) introduction/background, (3) methods, (4) results and discussion, (5) conclusions, (6) acknowledgments, and (7) references. These headings may be combined or renamed where appropriate. An abstract is necessary only for research articles. Refer to previously published articles for variations in headings and general formatting.

Tables, graphs, and maps should include titles in bold and sources at the bottom (if not original). Tables should be arranged to fit vertically (portrait style) on the page and should be done in a word processing program (Word, WordPerfect) by using tabs rather than a table function.

References in the text should be internal parenthetical citations that include the author's name and date of publication. Refer to the *Publication Manual of the American Psychological Association*, 5th edition, for examples.

The font size of the text should be no smaller than 11 points; for tables, 10 points.

Review:

Research articles and briefs will be peer-reviewed by a minimum of 2 reviewers with significant knowledge of the field. Articles and briefs also will be reviewed and edited by the FENR editorial staff.

Please submit 4 copies of your manuscript to the editor:
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