

Family Economics and Nutrition Review

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Do Third Graders Eat Healthful Breakfasts?

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Breakfast nutrient consumption patterns of third graders were examined using data from the Child and Adolescent Trial for Cardiovascular Health (CATCH). Twenty-four-hour recalls, assisted with a food record, were collected in 96 public schools in four States. Ninety-four percent of the children reported eating breakfast on the day of the survey: 80 percent ate at home, 13 percent at school, 3 percent at both locations, and 4 percent elsewhere. Breakfast eaters had lower total daily intakes of fat as a percentage of calories (33 vs. 35 percent) but had higher intakes of calories, vitamins, and minerals than did nonbreakfast eaters. Breakfast contributed 18 percent of total daily caloric intakes; 19 to 34 percent of vitamin and minerals; 13 to 14 percent of total fat, saturated fat, and cholesterol; and 17 percent of sodium intakes. Hispanic and African American children had higher fat and saturated fat breakfast intakes than did Caucasian children. Interventions are needed to encourage primary school students to consume healthful breakfasts.

The diets of primary school children are high in food energy, total fat, saturated fat, and sodium (8,18,22,35).

These children are particularly vulnerable to high intakes of saturated fat (18,35), and their intakes of calcium, iron, zinc (1,4), vitamins A, B₆, and C (6) are sometimes low. Compared with earlier generations, today's primary school children are increasingly overweight (9,60). Poor diets and less-than-optimal nutritional status may influence later risks for cardiovascular disease and other chronic degenerative diseases (31,32,33). Attention to the quality of children's diets is, therefore, warranted.

Breakfast contributes substantially to the nutritional quality of children's diets (15,26,28,36,38,40,43,54). Eating breakfast is related positively to children's

cognitive function and school performance (6,23,48,49,50,62), especially for low-income (30) and undernourished children (48). Children's breakfast consumption is also related inversely to two risk factors for cardiovascular disease that persist into adulthood (31): body weight and total blood cholesterol levels (51). Between 5 and 31 percent of school-age children skip breakfast—a particularly common practice among African American girls (27,37,38). Both skipping breakfast and consuming an inadequate breakfast increase the likelihood of dietary inadequacies that are not compensated for by other meals or snacks (17,27,36,54).

The Child and Adolescent Trial for Cardiovascular Health (CATCH) was a multicenter field trial designed to test the effects of school- and family-based interventions designed to reduce risk

factors for cardiovascular disease (47).¹ CATCH provided a unique opportunity to examine the dietary intakes of a large ethnically and geographically diverse group of children (19,61).

This article describes breakfast consumption patterns and nutrient contribution of breakfast meals, measured prior to intervention, when the CATCH sample was in third grade. We compare findings with national goals and results from similar studies. The results may be useful in designing and evaluating health promotion strategies for improving the diets of children.

Methods

Subjects

The total CATCH sample consisted of 5,106 elementary school students from 96 public schools in California, Louisiana, Minnesota, and Texas. Twenty-four schools were in each State: 14 treatment and 10 control. Fifty-nine of these schools (61 percent) had a School Breakfast Program. Before implementing the CATCH intervention, we randomly selected a subsample of 3,486 students from the four States to provide representative 24-hour dietary recalls. Of this subsample, those students who gave their consent and for whom a blood cholesterol level was available were interviewed for baseline measurement (fall 1991) when they were third graders (n=1,920). To evaluate CATCH intervention effects, we also measured students' intakes using a 24-hour dietary recall at follow-up in spring 1994 when they were fifth graders.² The final subsample (n=1,920) was representative

¹The main results of the trial are reported elsewhere (21).

²Results are presented in detail elsewhere (27).

of the entire CATCH sample on factors such as age, race/ethnicity, and other demographic characteristics. The mean age was 8.7 years (range of 7.6 to 11.2 years) for the third graders who participated.

Dietary Assessment

The interview was a 24-hour recall, assisted with a food record, a method that had been validated for use with third graders (20). CATCH staff asked students to record—briefly—all food and beverages consumed “from the time they woke up until the time they went to bed.” The amounts were omitted. The next day, CATCH staff asked each student, during a 24-hour dietary recall interview, to recall everything consumed the previous day. The students' food records were used as a memory prompt. Using three-dimensional food models, two-dimensional shapes, and measuring utensils, children estimated portion sizes. Then they provided the names (breakfast, lunch, snack, and supper), time, and source of each meal (e.g., home, school, restaurants).

CATCH staff collected school breakfast menus and detailed information on recipes, prepared food products, and preparation methods to coincide with the 24-hour dietary recall. Thus, we were able to describe precisely the nutrient intakes from school breakfast meals.³ Information was not collected on the use of vitamin and mineral supplements or salt added at the table, so results reflect only *food* intake.

Trained and certified interviewers used a standard protocol to collect 24-hour recalls from each child. We used the

³Details of the CATCH school meal assessment and quality assurance procedures are published elsewhere (12).

Minnesota Nutrition Data System, version 2.2 (food database 4A and nutrient data 19, 1990) to calculate breakfast and total daily nutrient intakes. This data system is designed to allow users to link the 24-hour recall with relevant nutrient data on school breakfast. We coded foods and beverages that children consumed at breakfast as breakfast items, and for each child, we summed the nutrients for all foods that had a breakfast code. To ensure data quality, we excluded recalls from the analysis if the amount reported could not be verified with documentation about the intake's unusual size (collected at the study site by nutritionists) and if it also exceeded the 99th percentile values for portions commonly eaten by children (45).

Statistical Analysis

Of the 1,920 children in the sample, 46 were excluded for quality assurance reasons and 2 because meal codes were not specified. The sample for nutrient analysis (n=1,872) was representative of the CATCH group by gender (50 percent each), race/ethnicity (69 percent Caucasian, 12 percent African American, 15 percent Hispanic, and 4 percent Other), and site. (Data are not shown.) Among the analysis sample, 1,765 reported eating breakfast either at home, at school, or both places. Seventy-seven additional students reported eating breakfast at “Other” places (e.g., day care, day camp, a friend's house, a store, or in transit) and were not included in the nutrient analyses. Total daily and breakfast intakes for sodium (p<0.04) for students eating breakfast at “Other” places were significantly higher than sodium intakes for students eating breakfast at home or at school. Also, breakfast intakes of students eating breakfast at “Other” places were significantly higher for cholesterol (p<0.007), protein (p<0.02), and vitamin A (p<0.05) and lower for carbohydrate

($p < 0.01$), compared with the intakes of students eating breakfast at home or at school. (Data are not shown.)

To eliminate small cell sizes based on ethnicity and source of breakfast, we excluded 5 students from the analysis. Thus, for the primary analysis of breakfasts eaten at home, at school, or in both locations, 1,683 students were in the sample.

To analyze nutrient intakes at breakfast meals and the percentage of contribution of breakfast to the total daily intake, we used a mixed linear model. We analyzed the dependent variables both in absolute units and relative to the total energy content of breakfast. Site, gender, race/ethnicity, and source of meal were included as fixed independent effects. We assessed interaction terms for gender with race/ethnicity and source of the meal with gender, site, and race/ethnicity. A random effect accounted for between-school variation among sites. Means were adjusted for all factors in the model. Means and standard errors were transformed back to the original units for presentation when log or square root transformations were used to reduce skewness. We used version 6.11 of Statistical Analysis System (SAS) for all computations (29,52).

Results

Breakfast Patterns of Third Graders

Overall, 94 percent of the students reported eating breakfast (table 1). No Asian American students and only 4 percent of Caucasian students reported skipping breakfast, compared with 11 percent of Hispanic and 8 percent of African American students ($p < 0.001$). (Data are not shown.) Two percent of

the third graders in Minnesota skipped breakfast, compared with 5 percent in California, 6 percent in Louisiana, and 10 percent in Texas ($p < 0.001$). Less than one-sixth of the CATCH schools in Minnesota and California provided a School Breakfast Program (14 and 13 percent, respectively), compared with all of the CATCH schools in Louisiana and Texas. (Data are not shown.)

Where Third Graders Ate Breakfast

Most of the students who ate breakfast, did so at home: 84 percent. Only 13 percent ate breakfast at school, and 3 percent ate it both at home and at school. Variations in breakfast consumption patterns among sites were striking. Ninety-eight percent of the students in Minnesota reported eating breakfast, followed by 95 percent of those in California, 94 percent in Louisiana, and 90 percent in Texas. More students in Texas and Louisiana ate breakfast at school (29 and 22 percent, respectively), compared with students in California and Minnesota (2 and 1 percent, respectively).

Differences were not evident in the number of children eating breakfast at home versus at school when only those schools with a School Breakfast Program were examined. (Data are not shown.) Texas and Louisiana (28 percent, each) still had a higher participation rate for school breakfast, compared with California and Minnesota (14 and 4 percent, respectively). (Data are not shown.) That is, simply offering the School Breakfast Program alone did not explain differences among sites. It is difficult to know which factor was associated with this variation, because site and ethnicity are confounded.

Most of the students who ate breakfast, did so at home: 84 percent. Only 13 percent ate breakfast at school, and 3 percent ate it both at home and at school.

Table 1. Breakfast eating and sources of breakfast of the CATCH sample at baseline in the third grade

Characteristic	Reported eating breakfast		Total	Nutrient analysis sample ¹ Source of breakfast					
	N	% ²		N	Home		School		Both
Total	1,765	94	1,683	1,409	84	218	13	56	3
Gender	N	% ⁴	N	N	% ⁵	N	% ⁵	N	% ⁵
Boys	878	94	835	697	83	112	13	26	3
Girls	887	94	848	712	84	106	12	30	4
Race/ethnicity									
Caucasian	1,240	96	1,180	1,082	92	76	6	20	2
African American	207	92	198	115	58	59	30	24	12
American Hispanic	253	89	248	153	62	83	33	12	5
Other	65	97	57	57	100	0	0	0	0
Site (% with School Breakfast Program)									
California (13%)	431	95	423	412	97	7	2	4	1
Louisiana (100%)	416	94	397	275	69	87	22	35	9
Minnesota (14%)	484	98	440	434	99	3	1	3	1
Texas (100%)	434	90	423	288	68	121	29	14	3

¹Native Americans and Asian Americans were combined with “Other” race/ethnicity for nutrient analysis. Eighty-two students were excluded: 77 who ate breakfast in places other than at home or school and 5 students who ate breakfast at school.

²Percentage of total substudy sample (1,872).

³Percentage of nutrient analysis sample.

⁴Percentage of site, gender, or race/ethnicity stratum.

⁵Percentage of site, gender, or race/ethnicity stratum in nutrient analysis sample.

Contribution of Breakfast to Third Graders’ Total Daily Nutrient Intake

Students who ate breakfast consumed, on average, significantly more calories daily than those who did not eat breakfast: 1,952 versus 1,544 calories (table 2). Breakfast eaters also had higher intakes of protein, percentage of energy from carbohydrates, sodium, cholesterol, and most vitamins and minerals. Means for both breakfast eaters and nonbreakfast eaters met at least two-thirds of the Recommended Dietary Allowances (RDA’s) for energy, protein, vitamin A, ascorbic acid, iron, and zinc (34).

Nonbreakfast eaters’ mean intakes fell short of the RDA’s for vitamin A and calcium. Compared with nonbreakfast eaters, breakfast eaters consumed a significantly higher percentage of calories from carbohydrates (54 vs. 52 percent). Total fat intake for both groups exceeded the recommendation of 30 percent of calories from fat (58): 33 percent for breakfast eaters and 35 percent for nonbreakfast eaters. Daily sodium (2,891 mg) and cholesterol (204 mg) intakes among breakfast eaters were higher than those of nonbreakfast eaters (2,259 and 142 mg, respectively). Although cholesterol intakes of breakfast eaters and their

counterparts met recommended guidelines of no more than 300 mg per day (33), sodium intakes of breakfast eaters exceeded the guideline.

Breakfast contributed about 18 percent of the third graders’ mean energy intakes, 17 percent of total protein, 22 percent of carbohydrate, and 13 percent of total fat consumed (table 3). Fourteen percent of total daily amounts of both saturated fat and cholesterol, 17 percent of sodium, and 19 to 34 percent of daily vitamin and mineral intakes came from breakfast. (Data are not shown.) Compared with girls’ breakfasts, those for boys

Table 2. Total daily nutrient intakes of children eating breakfast, compared with those not eating breakfast,¹ CATCH

Variable	Goal	Breakfast eaters N = 1,765	Nonbreakfast eaters N = 107	Breakfast eaters vs. nonbreakfast eaters p ²
Energy (calories)	>1,340 ³	1,952 (17)	1,544 (48)	<0.001
Protein (% calories)	NA ⁴	14.7 (0.1)	15.1 (0.1)	0.30
Carbohydrate (% calories)	NA ⁴	54.0 (0.2)	51.5 (0.8)	0.003
Total fat (% calories)	<30 ³	32.5 (0.2)	34.6 (0.7)	0.002
Saturated fat (% calories)	<10 ³	12.7 (0.11)	13.0 (0.3)	0.28
Sodium (mg)	<2,400 ⁵	2,891 (33)	2,259 (97)	<0.001
Cholesterol (mg)	<300 ⁵	204.4 (3.5)	141.6 (10.1)	<0.001
Protein (g)	>19 ³	71.9 (0.7)	58.0 (2.2)	<0.001
Vitamin A (RE)	>467 ³	908 (15)	455 (39)	<0.001
Ascorbic acid (mg)	>30 ³	89.8 (2.1)	52.0 (5.4)	<0.001
Iron (mg)	>7 ³	13.4 (0.2)	9.1 (0.5)	<0.001
Calcium (mg)	>871 ⁶	1,043 (15)	745 (37)	<0.001
Zinc (mg)	>7 ³	9.59 (0.11)	7.18 (0.28)	<0.001

¹Adjusted mean (standard error): model-adjusted by site, race/ethnicity, and gender.

²Testing hypothesis of equal mean between breakfast eaters and nonbreakfast eaters.

³Goal based on the Dietary Guidelines for Americans (58), National School Lunch Program and School Breakfast Program: School Meals Initiative for Healthy Children (57).

⁴Does not apply.

⁵Values are two-thirds of the 1989 Recommended Dietary Allowances (34) for 7- to 10-year-old children.

⁶Value is two-thirds of the 1998 Dietary Reference Intake (55).

Students who ate breakfast consumed... more calories daily than those who did not eat breakfast:...

supplied 1 to 4 percent more of their daily intakes on 11 of the 12 nutrients analyzed ($p < 0.05$). Boys' and girls' intake of ascorbic acid was not significantly different.

The contribution of breakfast to total daily intakes of fat, saturated fat, and cholesterol differed by site (all $p < 0.001$). (Data are not shown.) Breakfast at all sites provided 20 percent or more of daily intakes of ascorbic acid and iron. Differences in other nutrients were also evident ($p < 0.05$).

Nutrient Content of Third Graders' Breakfast Meals

Table 4 presents mean breakfast intakes of food energy and selected nutrients among third graders overall, by gender, and by race/ethnicity. All interaction terms in table 4, as well as tables 5 and 6, were statistically nonsignificant ($p > 0.10$); thus, results are tabulated for main effects only (e.g., site, gender, race/ethnicity, and source of meal). The tables also provide one-quarter of the RDA goals (34), the Dietary Guidelines' goals (58) recommended by the U.S. Department of Agriculture's (USDA)

Table 3. Percent contributions of breakfast to daily nutrient intakes,¹ CATCH

Variable	Goal ²	Overall N = 1,683	Gender			Site				
			Boys	Girls	P ³	California	Louisiana	Minnesota	Texas	P ³
Energy (calories)	500	18.4 (0.3)	19.0 (0.4)	17.8 (0.4)	0.004	17.3 (0.6)	18.8 (0.6)	17.8 (0.8)	19.7 (0.6)	0.06
Protein (g)		16.5 (0.3)	17.0 (0.4)	16.0 (0.4)	0.03	16.2 (0.7)	17.0 (0.6)	15.6 (0.8)	17.3 (0.6)	0.36
Carbohydrate (g)	NA ⁴	21.6 (0.4)	22.2 (0.5)	21.0 (0.4)	0.02	21.2 (0.8)	20.6 (0.6)	21.9 (1.0)	22.7 (0.7)	0.19
Total fat (g)		12.7 (0.4)	13.3 (0.5)	12.2 (0.4)	0.04	11.2 (0.7)	15.1 (0.7)	10.6 (0.9)	14.4 (0.7)	0.0001
Saturated fat (g)		14.3 (0.4)	14.9 (0.5)	13.7 (0.5)	0.03	13.0 (0.8)	17.1 (0.7)	11.7 (1.0)	15.8 (0.8)	0.0001
Sodium (mg)	<600	16.6 (0.4)	17.4 (0.5)	15.7 (0.4)	0.0007	16.6 (0.8)	16.6 (0.6)	15.7 (0.9)	17.4 (0.7)	0.55
Cholesterol (mg)	<75	14.1 (0.5)	14.9 (0.7)	13.3 (0.6)	0.03	13.3 (1.1)	16.8 (1.0)	10.8 (1.2)	15.8 (1.0)	0.0015
Vitamin A (RE)	175	34.4 (0.8)	36.5 (1.0)	32.3 (0.9)	0.0003	33.9 (1.6)	32.7 (1.2)	35.8 (2.2)	35.0 (1.4)	0.52
Ascorbic acid (mg)	11	23.3 (0.9)	23.4 (1.1)	23.1 (1.1)	0.81	19.5 (1.7)	22.6 (1.5)	24.1 (2.4)	27.2 (1.8)	0.02
Iron (mg)	3	26.9 (0.5)	28.0 (0.7)	25.9 (0.6)	0.005	26.0 (1.1)	23.8 (0.8)	29.3 (1.5)	28.8 (1.0)	0.0004
Calcium (mg)	325	26.4 (0.5)	27.3 (0.7)	25.6 (0.6)	0.01	27.0 (1.1)	27.7 (0.9)	24.3 (1.3)	26.9 (1.0)	0.22
Zinc (mg)	3	19.4 (0.4)	20.2 (0.5)	18.7 (0.5)	0.01	19.4 (0.8)	19.3 (0.6)	20.0 (1.1)	19.1 (0.7)	0.93

¹Adjusted mean (standard error); N=1,683 children.

²Goals based on National School Lunch Program and School Breakfast Program: School Meals Initiative for Healthy Children (57), 1989 Recommended Dietary Allowances (34), and National Academy of Sciences, Diet and Health: Implications for Reducing Chronic Disease Risk (33).

³Testing hypothesis of equal means across gender or site.

⁴NA - not applicable.

School Meal Initiative for Healthy Children (57), and the Diet and Health Report of the National Academy of Sciences (33).

Overall, the adjusted mean energy intake at breakfast was 337 calories, with about 14 percent of energy from protein, 65 percent from carbohydrate, 23 percent from total fat, and 10 percent from saturated fat (table 4). Mean sodium and dietary cholesterol intakes from breakfast were 459 and 32 mg, respectively. The average energy intake at breakfast was significantly lower among girls than boys (317 vs. 358 calories). Similar results were noted for protein intake expressed in grams. Compared with girls, boys consumed significantly more

sodium, dietary cholesterol, vitamin A, iron, calcium, and zinc at breakfast. But gender differences disappeared after adjustment for differences in food energy intakes. (Data are not shown).

Compared with other students, African American and Hispanic students consumed higher percentages of energy in their breakfasts from total fat (23 and 26 percent, respectively) and saturated fat (11 and 12 percent, respectively) (table 4). Compared with other children, Hispanic children consumed less energy from carbohydrates (61 percent vs. 65 to 68 percent). The students' intakes of energy, calcium, and zinc at breakfast did not meet the dietary goals for any of the race/ethnic groups.

The nutrient profiles of breakfasts differed among sites, with Minnesota breakfasts having the most healthful nutrient profiles (table 5). Compared with other breakfasts, those in Minnesota had the lowest percentage of calories from fat (19 percent), saturated fat (8 percent), and dietary cholesterol (21 mg). Also, breakfasts in Minnesota had the highest percentage of calories from carbohydrate (70 percent), vitamin A (363 RE), and iron (4.3 mg). Compared with breakfasts at other sites, those in Texas and Louisiana had more total fat, saturated fat, and dietary cholesterol; exceeded the goal for saturated fat and sodium; but did not contain more food energy. Breakfasts in Louisiana were also lower in vitamin A, ascorbic acid,

Table 4. Energy and selected nutrients for breakfast meals, by gender and race/ethnicity,¹ CATCH

Variable	Goal ²	Overall	Gender			Race/ethnicity					
			Boys	Girls	P ³	Caucasian	African American	Hispanic	Asian	Other	P ³
Energy (calories)	500	337 (7)	358 (9)	317 (8)	<0.001	333 (78)	347 (16)	342 (15)	314 (32)	396 (42)	0.30
Protein (% calories)	NA ⁴	13.6 (0.2)	13.6 (0.2)	13.6 (0.2)	0.84	13.7 (0.2)	13.0 (0.4)	13.7 (0.4)	14.3 (0.9)	10.8 (1.0)	0.013
Carbohydrate (% calories)	NA ⁴	65.0 (0.5)	64.9 (0.6)	65.2 (0.6)	0.68	65.6 (0.6)	65.9 (1.2)	61.3 (1.2)	65.0 (2.9)	68.3 (3.0)	0.014
Total fat (% calories)	<30	23.1 (0.4)	23.4 (0.5)	22.9 (0.5)	0.49	22.5 (0.5)	23.4 (1.1)	26.3 (1.0)	21.8 (2.4)	21.7 (2.5)	0.011
Saturated fat (% calories)	<10	10.4 (0.2)	10.5 (0.3)	10.2 (0.3)	0.30	9.9 (0.2)	10.7 (0.5)	12.2 (0.5)	9.4 (1.2)	9.8 (1.2)	<0.001
Sodium (mg)	<600	459 (12)	491 (14)	428 (13)	<0.001	456 (13)	483 (27)	447 (24)	487 (60)	449 (59)	0.76
Cholesterol (mg)	<75	32.0 (1.7)	34.9 (2.2)	29.1 (2.0)	0.015	29.2 (1.8)	38.7 (4.6)	39.1 (4.4)	33.0 (9.6)	37.3 (10.6)	0.06
Protein (g)	7.0	11.7 (0.2)	12.5 (0.3)	11.0 (0.3)	<0.001	11.7 (0.3)	12.0 (0.6)	11.9 (0.6)	11.6 (1.3)	10.7 (1.3)	0.95
Vitamin A (RE)	175	309 (9)	335 (12)	284 (11)	<0.001	314 (11)	332 (23)	269 (20)	379 (57)	241 (47)	0.067
Ascorbic acid (mg)	11	21.2 (1.2)	21.6 (1.4)	20.8 (1.4)	0.56	20.1 (1.3)	25.8 (3.0)	20.8 (2.6)	24.4 (6.5)	36.0 (8.1)	0.064
Iron (mg)	3	3.8 (0.1)	4.1 (0.1)	3.5 (0.1)	<0.001	3.8 (0.1)	4.3 (0.3)	3.4 (0.2)	3.8 (0.6)	3.1 (0.6)	0.11
Calcium (mg)	325 ⁵	273 (6)	293 (8)	255 (7)	<0.001	278 (7)	272 (15)	266 (14)	248 (32)	205 (30)	0.38
Zinc (mg)	3	1.70 (0.05)	1.85 (0.06)	1.57 (0.05)	<0.001	1.67 (0.05)	1.84 (0.12)	1.70 (0.11)	2.26 (0.35)	1.47 (0.23)	0.13

¹Adjusted mean (standard error); N=1,683 children.

²Goals based on National School Lunch Program and School Breakfast Program: School Meals Initiative for Healthy Children (57).

³Testing hypothesis of equal means across gender or race/ethnicity.

⁴NA - not applicable.

⁵Value is one-quarter of the 1998 Dietary Reference Intake (55).

and iron, compared with other sites. At all sites, the breakfasts eaten by children did not meet intake goals for energy, calcium, and zinc.

Most breakfast intakes were similar, whether eaten at home or at school (table 6). Children who reported eating breakfasts *both* at home and at school, however, had significantly ($p < 0.05$) higher breakfast intakes of food energy, protein, and of most other nutrients. Breakfast intakes for percentage of food energy from saturated fat and sodium exceeded goals for children eating breakfast both at home and at school. Their breakfast intakes were 705 Kcal, compared with 326 Kcal for those eating

breakfast at home only and 334 Kcal for those eating breakfast at school only ($p < 0.05$). Similarly, total daily energy intakes were 2,397 Kcal for children who consumed breakfasts both at home and at school, compared with 1,928 Kcal for children who ate breakfast at home only and 1,976 Kcal for those who ate breakfast at school only. (Data are not shown.) No differences were apparent in body mass indices by gender or by race/ethnicity for the children who ate breakfast at both places on the same day versus those who ate breakfast once: at home or at school. (Data are not shown.) Most (63 percent) of those eating breakfast at both home and school were from Louisiana.

Mean food energy and most selected nutrient intakes from breakfast were not significant by source of the meal (i.e., whether eaten at home or school or both) (table 6). The exception was iron. Compared with home breakfasts, school breakfasts, on average, contributed significantly lower amounts of iron (2.3 vs. 3.8 mg) and contributed less than the 3-mg dietary goal. This finding persisted across sites, gender, and the three race/ethnic groups ($p > 0.20$ for interaction; data are not shown). Whether consumed at home or at school, both breakfasts exceeded goals for percentage intake from saturated fat (10 and 11 percent, respectively); both were low in energy, calcium, and zinc. In Louisiana and

Table 5. Energy and selected nutrients for breakfast meals by site,¹ CATCH

Variable	Goal ²	Overall	Site				P ³
			California	Louisiana	Minnesota	Texas	
Energy (calories)	500	337 (7)	312 (13)	336 (12)	342 (17)	361 (13)	0.08
Protein (% calories)	NA ⁴	13.6 (0.2)	14.4 (0.3)	13.4 (0.3)	13.3 (0.4)	13.3 (0.3)	0.07
Carbohydrate (% calories)	NA ⁴	65.0 (0.5)	67.0 (1.0)	60.1 (0.8)	69.9 (1.3)	63.2 (0.9)	<0.001
Total fat (% calories)	<30	23.1 (0.4)	21.0 (0.9)	27.5 (0.7)	18.8 (1.1)	25.2 (0.8)	<0.001
Saturated fat (% calories)	<10	10.4 (0.2)	9.6 (0.4)	12.3 (0.4)	8.3 (0.6)	11.2 (0.4)	<0.001
Sodium (mg)	<600	459 (12)	419 (22)	463 (20)	446 (28)	510 (22)	0.04
Cholesterol (mg)	<75	32.0 (1.7)	29.7 (3.3)	40.0 (3.2)	20.6 (3.6)	39.8 (3.4)	<0.001
Protein (g)	7.0	11.7 (0.2)	11.4 (0.5)	11.4 (0.4)	11.5 (0.6)	12.6 (0.5)	0.24
Vitamin A (RE)	175	309 (9)	307 (19)	240 (14)	363 (26)	333 (17)	<0.001
Ascorbic acid (mg)	11	21.2 (1.2)	18.2 (2.2)	17.2 (1.8)	24.0 (3.2)	26.1 (2.4)	0.015
Iron (mg)	3	3.8 (0.1)	3.6 (0.2)	3.0 (0.2)	4.3 (0.3)	4.2 (0.2)	<0.001
Calcium (mg)	325 ⁵	273 (6)	274 (12)	256 (10)	283 (16)	281 (11)	0.32
Zinc (mg)	3	1.70 (0.05)	1.71 (0.09)	1.57 (0.07)	1.86 (0.13)	1.68 (0.08)	0.23

¹Adjusted mean (standard error); N=1,683 children.

²Goals based on National School Lunch Program and School Breakfast Program: School Meals Initiative for Healthy Children (57).

³Testing hypothesis of equal means across site.

⁴NA - not applicable.

⁵Value is one-quarter of the 1998 Dietary Reference Intake (55).

Texas, breakfasts consumed at school were higher ($p < 0.02$) in the mean percentage of energy from total fat and saturated fat and lower ($p < 0.03$) in energy from carbohydrate than were breakfasts consumed at home. The relative contribution of breakfast to total daily intakes did not vary by source of breakfast (e.g., home or school). (Data are not shown.)

Discussion

We found that only 6 percent of the third grade students in the Child and Adolescent Trial for Cardiovascular Health (CATCH) skipped breakfast. This is the same predicted rate for 6- to 10-year-olds included in the USDA's

School Nutrition Dietary Assessment study (SNDA) (15). Other large studies of primary school children, however, reported higher percentages of children who skipped breakfast (14,15,44). In the SNDA study, but not in the CATCH study, the percentage of students who ate breakfast were constant across regions of the country, whether or not the child's school offered a School Breakfast Program. But where children who ate breakfast did differ among sites, more CATCH third graders than SNDA 6- to 18-year-olds consumed breakfast at home (84 vs. 69 percent). Comparisons are difficult, however, because older children skip breakfast more often than younger children do (15). Sixteen percent of CATCH students ate a School Breakfast

Program meal, compared with the 25-percent prediction for 6- to 10-year-olds in the SNDA study. Three-fifths of CATCH schools provided a School Breakfast Program; about two-fifths of schools in the SNDA study did so (61 vs. 45 percent, respectively).

SNDA concluded that the availability of a School Breakfast Program did not influence whether a student ate breakfast. The Bogalusa Heart Study, however, reached the opposite conclusion. In the Bogalusa longitudinal study, prior to widespread availability of the School Breakfast Program, the percentage of children who skipped breakfast was high, ranging from 9 percent in 1973 to 30 percent in 1979. When the School

Table 6. Energy and selected nutrients for breakfast meals, by source of meal,¹ CATCH

Variable	Home N = 1,409	School N = 218	Home and school N = 56	p ² (Home v. school)
Energy (calories)	326 (6)	334 (31)	705 (82)	0.76
Protein (% calories)	13.7 (0.1)	13.4 (0.8)	12.6 (1.1)	0.70
Carbohydrate (% calories)	65.2 (0.4)	64.6 (2.6)	63.0 (3.3)	0.87
Total fat (% calories)	22.9 (0.4)	23.7 (2.2)	26.5 (2.8)	0.74
Saturated fat (% calories)	10.2 (0.2)	11.3 (1.0)	11.7 (1.3)	0.30
Sodium (mg)	448 (10)	427 (51)	838 (90)	0.70
Cholesterol (mg)	31.2 (1.4)	27.3 (8.0)	71.2 (16.3)	0.66
Protein (g)	11.4 (0.2)	11.2 (1.2)	22.4 (2.1)	0.85
Vitamin A (RE)	307 (8)	260 (43)	546 (79)	0.30
Ascorbic acid (mg)	21.4 (1.0)	15.8 (4.8)	37.3 (9.2)	0.31
Iron (mg)	3.8 (0.1)	2.3 (0.4)	9.0 (1.1)	<0.01
Calcium (mg)	264 (5)	276 (30)	518 (53)	0.73
Zinc (mg)	1.65 (0.04)	1.67 (0.23)	3.70 (0.65)	0.89

¹Adjusted mean (standard error); N=1,683 children.

²Testing hypothesis of equal means between breakfast eaters by source of meal.

Breakfast Program became widely available, the percentage of students skipping breakfast declined dramatically (42). In CATCH, the availability of the School Breakfast Program did not affect the percentage of students who skipped breakfast. Compared with students in Minnesota and California (84 and 79 percent, respectively), lower percentages of students in Texas and Louisiana (63 and 70 percent, respectively) ate breakfast at home, and slightly higher percentages skipped breakfast, even after we controlled for the availability of the School Breakfast Program. Although household income data were unavailable for individual CATCH children, we suspect that Texas and Louisiana schools had more children from poor and minority families (as determined by ethnic distribution and number of

children eligible for free or reduced-price school meals at each site).

The contribution of breakfasts eaten at home or at school as a percentage of total daily intakes was similar for most nutrients. However, for the small number of children who consumed breakfast *both* at home and at school, daily food energy intakes were higher, mostly accounted for by the extra food energy at breakfast. Children who ate two breakfasts, however, did not weigh more than other children weighed. Because most of those eating breakfast twice came from sites where more schools were considered low income, it is possible the children were from poor families with limited access to food at other meals and snacks, and the children relied on the School Breakfast Program

to supplement their intakes. Alternatively, the children may have been especially hungry, because they were growing rapidly.

In a related study by our group (11), we found the amount of calories provided by 5 consecutive days of CATCH school breakfast menus at baseline was similar to the data reported here. In the SNDA study, breakfasts consumed at home provided only 18 percent of the RDA for food energy for students overall, and only 10 percent of the students who participated in the School Breakfast Program met or exceeded the target of 25 percent of the RDA for food energy at breakfast (7). Food energy provided in the School Breakfast Program in CATCH conformed to the program's regulations at the time of the baseline study.

Regulations adopted after the CATCH program started require that school breakfasts provide 25 percent of the RDA of 2,025 Kcal per day for children 6- to 11-years-old or about 500 Kcal and an equivalent proportion of other nutrients (57). If schools provide only 25 percent of the RDA, on average, it is unlikely that 25 percent will be consumed, because children rarely eat all of their food. In other analyses, however, we found that CATCH third graders' intakes of both total daily energy and macronutrient intakes were adequate (19). Snacks and other meals consumed throughout the day may have compensated for reduced intakes at breakfast in this study. Because total dietary intakes of students nationwide exceeded the RDA for energy (8), perhaps 25 percent of the RDA is not as critical for food energy consumption at breakfast as it is for vitamins and minerals.

Breakfast eaters also had higher intakes of protein, percentage of energy from carbohydrates, sodium, cholesterol, and most vitamins and minerals.

When the SNDA students' daily dietary intakes were examined, researchers found that students participating in the School Breakfast Program consumed more than the 25-percent target of the dietary goals for fat, saturated fat, and cholesterol that is specified by the National Cholesterol Education program (31). Those eating breakfasts at home consumed less of these nutrients and food energy (7). In contrast, students' breakfast intakes, regardless of whether they were at home, at school, or at both home and school, exceeded the 25-percent target of the RDA's for most nutrients (except zinc). This result underscores the contributions of breakfast to nutritional quality (7,34).

Many aspects of SNDA's data collection and methods of analysis were similar to those used by CATCH. SNDA, however, did not incorporate analysis of actual school recipes and vendor foods into the 24-hour recalls of students who ate school meals: This may have required greater use of generic recipes and food entries (defaults) than were used in CATCH analysis. Using defaults can result in higher nutrient estimates overall and may explain some of the differences in food energy contributions of the School Breakfast Program between the two studies (2).

CATCH third graders consumed breakfasts that were consistent with national nutrition goals for dietary intakes of total fat (no more than 30 percent of energy), saturated fat (10 percent or less of energy), sodium (600 mg or less), and cholesterol (75 mg or less) (31,58). For CATCH third graders, overall, breakfasts contributed only 13 percent of their daily total fat, 14 percent of their saturated fat, and 16 percent of their sodium intakes. Hence, consumption at other meals or snacks must be responsible for

the excessive 24-hour intakes of these nutrients (19). Overall, school breakfast intakes did not meet the goal of less than 10 percent of energy from saturated fat among Hispanics (12 percent of calories) or among children in Louisiana (12 percent) and Texas (11 percent). Variation by sites suggests regional differences in food preparation methods, and types of foods consumed may also influence the nutrients consumed at breakfast (37). To meet fat intake goals for Healthy People 2000 (59), we need intervention efforts that focus on school meals and breakfasts among children in these race/ethnic groups; in different regions; and for lunches, snacks, and dinners.

Mean intakes of protein (g), vitamin A, ascorbic acid, and iron at breakfast contributed at least 30 percent of the RDA's for these nutrients for all gender, regional, and race/ethnic groups among CATCH third graders. The exception was among the small number of girls of "Other" race/ethnicity (34). These findings confirm the importance of school breakfasts in enhancing the quality of children's nutrient intakes (41). Based on the new calcium DRI's (55), intakes of calcium at breakfast were below the 25-percent goal of the RDA's for all groups. Average daily calcium intakes, however, met about 80 percent of the AI (adequate intake).

Among CATCH third graders (and also among participants in other studies such as SNDA), mean zinc intakes at breakfast were less than one-fourth of the RDA. But on a daily basis, the children's intakes reached recommended levels; therefore, there was little cause for concern (8). One way to improve the zinc content of school breakfasts, while meeting the dietary goals for fat intake, is to include fortified, ready-to-eat cereals.

For example, a recent study shows that children who consumed ready-to-eat cereal at any time in a 24-hour period had significantly higher total daily intakes of zinc, compared with those who did not consume ready-to-eat cereals (42).

When we analyzed the 24-hour recalls, we found that iron in the meals of the School Breakfast Program in CATCH schools was about one-third of the RDA (31 to 34 percent) (11). Among third graders eating breakfast at school, iron intake at breakfast was slightly lower (23 percent of the RDA) than the desired percentage of the RDA. Among those eating breakfast at home, iron intake was higher (38 percent of the RDA) than the desired percentage. We attribute this finding to children not eating all their breakfast and sampling variability. The SNDA study, in contrast, found iron intakes at breakfast were adequate (40 to 43 percent of the RDA), regardless of the source of the meal (7).

The study reported here has several limitations. Socioeconomic status could not be assessed for each child, thus relevant adjustments could not be made for factors that could have produced different findings for the subgroups. Use of only a single 24-hour recall on each child is another limitation. Thus, usual intakes could not be assessed. Also, evidence shows that 24-hour recalls systematically underestimate food intakes by 10 to 20 percent; therefore, actual intakes may have been higher than those reported. But no reason exists to suspect that breakfast intakes were underreported differentially (17). Hence, it is likely that among CATCH third graders, mean total calorie intakes may have been higher than the 18 percent of the RDA reported here.

Moreover, our data consist of weekday food intake; it is likely that breakfasts

vary between weekdays and weekends (39). Some children may have reported snacks as part of the breakfast meal, and others may have reported foods eaten at breakfast as snacks. This type of reporting introduces error into the analysis.

Because it was not feasible to collect quantitative data on discretionary salt used by this population, our estimates of total dietary sodium are incomplete. Also, we did not measure intakes from vitamin and mineral supplements.

Conclusion

Our most striking finding confirms the adage that children who eat breakfast tend to have more healthful daily intakes than those who do not eat breakfast. Also, eating breakfast—at home or at school—increased children's daily intakes of several vitamins and minerals and decreased the percentage of calories from fat. Although breakfast is a valuable meal for children, it is less and less likely to be consumed by adults (16). If the availability of breakfast at home decreases because parents are not eating it, the availability of school breakfast becomes more important for enhancing the chances that children will eat healthful breakfasts.

There are, however, economic and other barriers to implementing breakfasts in many schools. Thus, encouraging breakfast consumption—at home or at school—should be a priority in health promotion programs for children. This is particularly important among African American and Hispanic students who skip breakfast more often and in regions of the country where skipping breakfast is more prevalent. It is important among adolescents because breakfast consumption tends to decline during the second decade of life. Skipping breakfast is more prevalent among children from

low-income than higher income families, but low-income children are also more likely to participate in the School Breakfast Program when it is available than are higher income children.

Information on changes in the food supply (13) and in children's eating patterns (1,44) must be considered if health promotion programs about children's meals are to be effective. Therefore, it is important to monitor children's eating behaviors and dietary intakes (3,46,53,56). It is also important that intervention programs and new initiatives for healthy children provide strategies for decreasing fat, saturated fat, and sodium in breakfasts. These programs also need to include recommendations on how to incorporate foods that are energy-dense and rich in vitamins and minerals.

The U.S. Department of Agriculture and others have joined in a campaign on child nutrition and health that has made child nutrition an immediate priority (25). Children must be guided to make healthful decisions. We nutritionists, policymakers, and information multipliers must direct new efforts to better understand children's eating behaviors and psychosocial factors that influence their food-related decisions.

Acknowledgments

This research was supported by funds from the National Heart, Lung, and Blood Institute (HL-398880, HL-39906, HL-39852, HL-399927, HL-39870). We thank Marion Bernstein for her help in preparing the manuscript.

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Comparison of Economic Status of Elderly Households: Nonmetropolitan Versus Metropolitan Residence

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Elderly households in nonmetropolitan areas have lower economic status than do their metropolitan counterparts, as determined by several measures: Income, expenditures, and financial assets. Data from the 1990-94 Consumer Expenditure Survey indicate that nonmetropolitan elderly households have 80 to 83 percent as much income and 79 to 82 percent as much expenditures as metropolitan elderly households. We find that after controlling for age, education, gender, marital status, race, home ownership, and presence of at least one earner in the household, nonmetropolitan and metropolitan differences persist, but as expected, are somewhat smaller. The multivariate models that control for demographic characteristics indicate that nonmetropolitan elderly households have 83 to 88 percent as much income and 81 to 85 percent as much expenditures as metropolitan elderly households. We discuss the public policy implications of these persistent nonmetropolitan and metropolitan differences in economic status.

As the number and percentage of elderly people in the United States continue to increase, there is much concern over the financial well-being and economic status of this growing segment of the population. For 50 years, the elderly population has benefitted from the creation and expansion of public programs and, as a whole, has experienced increases in income and wealth and declines in poverty rates (14). These improvements in economic status, however, conceal high risks of poverty still faced by some subgroups of the elderly population.

Previous research has linked economic well-being of the elderly population to

age, living arrangements, gender, marital status, and race (2,3,7,8,11,13). However, in research examining risks of poverty and low economic status among the elderly, geographic location has received less attention. The limited research that has compared nonmetropolitan and metropolitan elders confirms the relative economic disadvantage of nonmetropolitan elders.¹ For example,

¹The U.S. Bureau of the Census defines a metropolitan area as a county or counties containing a place or urbanized area of 50,000 people or more with a total population of 100,000, including adjacent communities that have a high degree of economic and social integration with the central city. A nonmetropolitan area refers to counties outside a metropolitan area. The metropolitan and nonmetropolitan focus is used in this research because work and residence patterns are likely to be tied more closely to metropolitan and nonmetropolitan residence than to urban/rural residence.

nonmetropolitan elderly households are more likely to be poor and to have lower incomes, compared with their metropolitan counterparts (6,8,10,15). Compared with elders in urban and metropolitan areas, elders living in rural and nonmetropolitan areas are more sparsely located and receive less media attention (5).

Research analyzing differences by geographic location of residence is important because the elderly are over-represented in rural and nonmetropolitan areas. About three times as many elders live in metropolitan areas as in nonmetropolitan areas. Elderly people, however, make up higher percentages of nonmetropolitan populations, compared with metropolitan populations (19).

Income is the most commonly used indicator of economic status. Income captures one resource of elderly households but ignores the use of savings or accumulated financial assets that elders can use to meet current economic needs. For example, income flow generally decreases dramatically when people retire, but retired people often use savings and other assets to purchase goods and services. If these resources are ignored, the economic status of the elderly will be underestimated. Thus, measures of household expenditure or financial assets may be important indicators of economic status, particularly for elderly households.

Measures of economic status should be adjusted for household need to represent more accurately a household's economic status (4). Measures of total household income and total household expenditure ignore differences in need across households of different sizes. If household size is ignored, the relative economic status of larger households will be over-

estimated. Per capita and equivalent measures are frequently used to adjust for household need. Per capita estimates are obtained by dividing household resources by the number of persons living in the household. This measure implies that household need (and therefore cost) increases proportionately as household size increases (1). Equivalent estimates are obtained by dividing household resources by a household equivalence factor, allowing for economies of scale that vary with size of the household and characteristics of household members (12).

Differences in economic status of nonmetropolitan and metropolitan elderly households may be partially explained by nonmetropolitan and metropolitan differences in demographic characteristics that are related to economic status. Research has established that being relatively young, more educated, married, and White are associated positively with the economic status of the elderly population (2,3,7,8,11,13).

Also, nonmetropolitan and metropolitan differences in economic status may be partially explained by differences in "opportunity structures" in nonmetropolitan versus metropolitan areas. "Opportunity structures" refers to potential residential and employment opportunities in a geographic area. It also refers to socioeconomic characteristics of the area that influence the availability and quality of employment and the likelihood different groups of people have for obtaining employment (16). People living in nonmetropolitan areas face different economic and labor market opportunities than do those living in metropolitan areas (17). People in nonmetropolitan areas often have more limited choices; they are less likely than their metropolitan counterparts to

pursue postsecondary education and are more likely to have low-paying, unstable jobs (5). These disadvantages persist through people's years in the labor market and influence the level of resources that are available to them to pay for goods and services during retirement.

This study contributes to the research on differences in the economic status of elderly households in nonmetropolitan versus metropolitan areas. It examines the magnitude of differences in economic status by using multiple measures of economic status. Further, multivariate analysis is used to examine whether nonmetropolitan and metropolitan differences in economic status remain when other demographic correlates of economic status are controlled. Thus, the persistence of a nonmetropolitan and metropolitan difference in a multivariate framework would support the theory that residential and employment opportunities in specific geographic areas influence differences in economic status.

Methods

Data and Sample

The data for this research are from the interview component of the 1990-94 Consumer Expenditure Survey (CE) conducted by the U.S. Bureau of the Census for the U.S. Bureau of Labor Statistics (BLS) (20). The CE's data on income, expenditure, and total liquid financial assets were used to construct indicators of economic status for each household. Household is used to refer to a BLS consumer unit. The BLS defines a consumer unit as (1) all members of a particular housing unit who are related by blood, marriage, adoption, or other legal arrangements; (2) two or more people living together who pool their incomes to make joint expenditure

decisions; or (3) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent (20). For this study, only households that were interviewed in four consecutive quarters (excluding the initial bounding interview) between the first quarter of 1990 and the fourth quarter of 1994 were included. Expenditures over the four consecutive quarters were summed to obtain actual annual household expenditure for each household. All dollar values were adjusted to 1994 dollars.

To be included in the analysis, households had to be complete income reporters. Ninety percent of nonmetropolitan elderly households and 89 percent of metropolitan elderly households in the sample were classified by BLS as complete income reporters. A household is classified as a complete income reporter if the respondent provides values for major sources of income, such as wages and salaries, self-employment, and Social Security. Also, to be included, the householder had to be 65 years old or older, and the household could not contain children less than 18 years old. Households with dependent children have different needs and available resources. Thus, they were expected to differ systematically from households without dependent children.

The final sample consisted of 3,334 elderly households: 751 nonmetropolitan and 2,583 metropolitan. About 25 percent of elderly *persons* live in nonmetropolitan areas (19). The unit of analysis for this research is *households* with a householder 65 years old or older. About 23 percent of the elderly *households* in the sample were located in nonmetropolitan areas.

Measures of Economic Status

Multiple measures of economic status were used to compare the economic status of nonmetropolitan and metropolitan elderly households because there is no agreement on the best measure to use. By using several measures, we were able to determine whether the results differed based on the empirical measure used. The measures differed both in the specific economic resource measured (i.e., income, expenditure, and financial assets) and in the method used to adjust for household needs (i.e., per capita and equivalent measures). The specific measures consisted of total, per capita, and equivalent annual household income

and expenditure and the value of household financial assets: the sum of money in savings, checking, and brokerage accounts, U.S. savings bonds, stocks, bonds, mutual funds, and securities. (See box.)

Per capita household income (expenditure) was calculated by dividing total household income (expenditure) by the number of persons living in the household. Equivalent household income (expenditure) was calculated by dividing total household income (expenditure) by the household's equivalence factor implicit in the U.S. poverty thresholds.

Definitions for Each Measure of Economic Status

Ratio: Ratio of mean value for nonmetropolitan households to mean value for metropolitan households.

Total annual household income: Reported household before-tax income excluding the value of food stamps.

Per capita annual household income: Total household income divided by household size.

Equivalent annual household income: Total household income divided by the household equivalence factor.

Total annual household expenditure: Sum of four quarters of reported total household expenditure.

Per capita annual household expenditure: Total household expenditure divided by household size.

Equivalent annual household expenditure: Total household expenditure divided by the household equivalence factor.

Total financial assets (total sample): Sum of money in savings, checking and brokerage accounts, U.S. savings bonds, stocks, bonds, mutual funds, and securities for the total sample of 751 nonmetropolitan and 2,583 metropolitan households.

Total financial assets (subsample): Total financial assets for the subsample of 526 nonmetropolitan and 1,879 metropolitan households with some positive amount of financial assets.

The poverty thresholds are the most widely recognized absolute standard of need in the United States and are commonly used in studies of relative economic status. The 1994 poverty thresholds used in this research are for households with a householder 65 years old or older and containing no related children under age 18. The equivalence factor was calculated by dividing the poverty threshold for a given household size by the poverty threshold for a one-person household. For example, the poverty threshold for a two-person household (\$8,958) was divided by the poverty threshold for a one-person household (\$7,108) to yield an equivalence factor of 1.26 for a two-person household.

According to this scale, an elderly couple needs 26 percent more income than a single elderly person needs to achieve the same level of well-being. This implies large returns-to-scale in consumption. In contrast, budget share-based scales typically have smaller returns-to-scale. The relative economic status of nonmetropolitan and metropolitan elderly households does not change substantively when a budget-share scale is used instead of the implicit scale in the poverty threshold (4).

The assumptions regarding economies of scale underlying the various measures are different: Total household income or expenditure assumes infinite economies of scale, per capita income or expenditure assumes no economies of scale; and equivalent income or expenditure assumes finite economies of scale and thus is between the two extremes.

The value of household financial assets was used as a separate indicator of economic status because these assets are very liquid and are commonly used by

elderly households to purchase goods and services. Home equity represents a less liquid asset than do financial assets, and the appropriate treatment of home equity in the analysis of relative economic status is much more controversial. Home equity is the most important component of wealth for elders. The same is true for other age groups in the United States.

However, elders' ability to use this wealth to purchase other goods and services requires them to sell their house or use market mechanisms such as second mortgages, home equity loans, and reverse mortgages to convert home equity to a more liquid form. In reality, most retired elderly people do not sell their homes or use reverse mortgages to finance their consumption (18). Therefore, in this research, we excluded home equity from the measures of economic status. A dichotomous variable equal to one if the reference person was a homeowner, zero otherwise, was included as an independent variable in the multivariate analysis. This controlled for any correlation between home ownership and income, expenditure, and financial assets.

Excluding home equity has two potentially opposing effects. Most elderly own their homes, but home ownership varies by nonmetropolitan and metropolitan residence. Nonmetropolitan elderly households are more likely than their metropolitan counterparts to own their homes and to do so without a mortgage. (In the sample, 83 percent of nonmetropolitan and 77 percent of metropolitan elders were homeowners. Seventy-three percent of nonmetropolitan and 62 percent of metropolitan elders owned their home without a mortgage.) However, home equity also varies by nonmetropolitan and metropolitan residence. The median value of homes

is higher in metropolitan areas than in nonmetropolitan areas, a reflection, in part, of the higher land values in metropolitan areas (21).

Relative to the economic status of metropolitan elderly households, home ownership rates for nonmetropolitan elderly households would improve their economic status, and lower home values would lower it. Thus, it is difficult to determine the net effect of excluding home equity on our results regarding the relative economic status of nonmetropolitan and metropolitan elderly households. However, it is likely that ignoring home equity as an economic resource is more critical in intergenerational comparisons of economic status than in nonmetropolitan and metropolitan comparisons among elderly households. The influence of home ownership, home equity, and housing choice on the relative economic status of nonmetropolitan and metropolitan elderly households is an important topic for further research.

Empirical Analysis

First, we compared the measures of economic status between nonmetropolitan and metropolitan elderly households. We used two sample t-tests to identify statistically significant differences in the mean value of the measures of economic status between nonmetropolitan and metropolitan elderly households. Then, we calculated nonmetropolitan to metropolitan ratios for each measure of economic status to determine the magnitude of differences between the groups. A ratio of one indicates equivalent economic status at the mean values; a ratio less than one indicates lower economic status of nonmetropolitan elderly households relative to metropolitan elderly households.

Second, differences in economic status of nonmetropolitan and metropolitan elderly households may be partially explained by differences in demographic characteristics that are related to economic status. Hence we summarized demographic characteristics and used appropriate statistical tests to identify characteristics that were significantly different between nonmetropolitan and metropolitan elderly households.

Third, we used multivariate regressions to examine determinants of economic status and to ascertain whether nonmetropolitan and metropolitan differences remained when demographic characteristics were controlled. Regression equations were estimated on the total sample of elderly households, and a dichotomous variable for nonmetropolitan residence was included as an explanatory variable. Separate equations were estimated for each measure of economic status.

Results

Comparisons of Economic Status of Nonmetropolitan and Metropolitan Elderly Households

The eight measures of economic status produced consistent results (table 1). In general, adjusting the measures for household need reduced the magnitude of the nonmetropolitan and metropolitan differences between elderly households, and the differences were larger based on expenditure measures, compared with income measures. However, the magnitude of these differences was never greater than 3 percentage points.

What was the economic status of nonmetropolitan elderly households—compared with their metropolitan counterparts? Results showed that the

mean values of measures of economic status for nonmetropolitan elderly households were lower than those for metropolitan elderly households. This was true for all measures analyzed in this research. Ratios showed that nonmetropolitan elderly households had 80 to 83 percent as much income and spent 79 to 82 percent as much as their metropolitan counterparts. The equivalent and per capita measures of income and expenditure produced nonmetropolitan and metropolitan ratios that were slightly larger (indicating smaller differences) than the ratios based on total income and total expenditure. Differences in ratios for financial assets were more pronounced between the two groups. For the total sample, the value of financial assets for nonmetropolitan elderly households was 72 percent as much as that of their metropolitan counterparts. Among those households with some positive amount of financial assets, the ratio for financial assets increased to 75 percent.

Demographic Characteristics of Nonmetropolitan and Metropolitan Elderly Households

The demographic characteristics of nonmetropolitan and metropolitan elderly households were significantly different (table 2). Compared with metropolitan elderly households, higher percentages of reference persons in nonmetropolitan elderly households were male, White, and married. The percentage of reference persons with at least a high school diploma was higher for metropolitan households, compared with nonmetropolitan households. A higher percentage of nonmetropolitan elders owned their homes and reported that there were no earners in the household. The age of the reference person in nonmetropolitan versus metropolitan households did not differ significantly.

For the total sample, the value of financial assets for nonmetropolitan elderly households was 72 percent as much as that of their metropolitan counterparts.

Table 1. Mean value of measures of economic status of nonmetropolitan and metropolitan elderly households

Measure of economic status	Nonmetropolitan (N=751)	Metropolitan (N=2,583)	Ratio ¹
Total annual household income	18,157 (15,716)	22,715 (19,730)	0.80
Per capita annual household income	11,635 (9,605)	13,970 (10,567)	0.83
Equivalent annual household income	15,282 (12,620)	18,615 (14,690)	0.82
Total annual household expenditure	16,247 (10,619)	20,449 (14,843)	0.79
Per capita annual household expenditure	10,608 (6,434)	12,934 (8,626)	0.82
Equivalent annual household expenditure	13,774 (8,419)	16,956 (11,389)	0.81
Total financial assets (total sample) ²	18,763 (36,174)	26,079 (47,022)	0.72
Total financial assets (subsample) ³	26,788 (40,669)	35,850 (51,860)	0.75

Note: Standard deviations are in parentheses. There are statistically significant nonmetropolitan and metropolitan differences at the mean value of all measures of economic status at the 99-percent confidence level. The two sample t-test was used. The test statistic was constructed as $(X_1 - X_2) / (s_1^2/n_1 + s_2^2/n_2)$ where X_i , s_i^2 , and n_i are the mean, estimate of variance, and number of observations for the i th sample. The test statistic has a t-distribution.

¹Ratio of mean value for nonmetropolitan households to mean value for metropolitan households.

²Sum of money in savings, checking and brokerage accounts, U.S. savings bonds, stocks, bonds, mutual funds, and securities for the total sample of 751 nonmetropolitan and 2,583 metropolitan households.

³Total financial assets for the subsample of 526 nonmetropolitan and 1,879 metropolitan households with some positive amount of financial assets.

Nonmetropolitan and metropolitan differences in gender, race, and marital status would suggest higher economic status for nonmetropolitan households relative to metropolitan households; differences in education and presence of at least one earner in the household would suggest higher economic status for metropolitan households, compared with nonmetropolitan households.

Previous research documents the correlation of age, education, gender, race, and marital status with economic status of

elderly persons (2,3,7,8,11,13). Differences in the composition of elderly households in nonmetropolitan and metropolitan areas suggest that economic status should be higher in nonmetropolitan areas (the exceptions: education and presence of at least one earner in the household). However, across all measures of economic status that we analyzed, economic status is lower among nonmetropolitan elderly households. To separate the contribution of demographic composition and nonmetropolitan residence, we used multivariate analysis to

examine the magnitude of nonmetropolitan and metropolitan differences in economic status, controlling for differences in demographic characteristics.

Determinants of the Economic Status of Elderly Households

We used multivariate regression analysis to determine whether the nonmetropolitan and metropolitan difference in economic status remained—once the independent effects of demographic characteristics were controlled. Multivariate regression results show the effect of each independent variable while simultaneously controlling for the effects of all other independent variables.

Each measure of economic status was used as an independent variable in separate equations. The independent variables included measures of age, education, gender, marital status, and race of the reference person; home ownership; earners; and nonmetropolitan and metropolitan residence. We measured each as follows:

- Age and education—with categorical, dichotomous variables to allow for nonlinear effects on economic status.
- Age of the reference person—with three categorical dichotomous variables: 65 to 74 years of age (the reference category), 75 to 84 years of age, and 85 years and over.
- Educational attainment of the reference person—with five categorical, dichotomous variables: Elementary school or less including no formal schooling (the reference category), at least some high school, high school graduation, at least some college, and college graduation or more.

- Gender of the reference person—with a dichotomous variable equal to one if the reference person was male.
- Marital status—with a dichotomous variable equal to one if the reference person was married. Thus, reference persons who were widowed, divorced, separated, or never married were all coded as zero.
- Race—with a dichotomous variable equal to one if the reference person was White.
- Home ownership—with a dichotomous variable equal to one if the reference person was a homeowner.
- Earners—with a dichotomous variable equal to one if there were no earners in the household.
- Residence—with a dichotomous variable equal to one if the reference person lived in a nonmetropolitan area, zero otherwise.

The effects of the independent variables on economic status are similar across the measures of economic status, with most of the independent variables having statistically significant effects. Table 3 presents statistically significant results.²

²The R² statistic is a commonly used index of how well an estimator fits the sample data. The R² statistic indicates the percentage of the variation in the dependent variable that is explained linearly by the variation in the set of independent variables. The R² statistic adjusted to account for degrees of freedom is called the “adjusted-R².” R² statistics are sensitive to the range of variation of the dependent variable; in general, measures of R² are inversely related to the amount of variation in the dependent variable. The adjusted-R² statistics for the eight regression models estimated in this research vary in a manner consistent with our expectations. The amount of variation in the financial asset variables is large relative to the amount of variation in the income and expenditure measures, resulting in lower measures of R² in the models for financial assets. In general, the R² measure is largest for total income (expenditure), slightly smaller for equivalent income (expenditure), and declines further for per capita income (expenditure).

Table 2. Characteristics of elderly households by nonmetropolitan and metropolitan residence¹

Characteristic ²	Total (N=3,334)	Nonmetropolitan (N=751)	Metropolitan (N=2,583)
	<i>Percent</i>		
Reference person			
Age (in years)			
65 - 74	57	55	58
75 - 84	35	36	34
85 and over	8	9	8
Education***			
Elementary school or less	25	36	22
Some high school	18	18	18
High school graduate	29	25	30
Some college	15	12	16
College graduate or more	13	9	14
Male**	54	58	53
Married***	46	49	45
White***	89	95	88
Household			
Homeowner***	78	83	77
No earners**	70	73	69

¹Data are column percentages.

²The test statistic for the categorical and dichotomous variables was constructed as $\sum(O_i - E_i)^2/E_i$ where O_i and E_i refer to the observed and expected frequency, respectively, for a given cell. The test statistic has a chi-square distribution.

**Characteristics between nonmetropolitan and metropolitan elderly households are significantly different at $p \leq .01$.

***Characteristics between nonmetropolitan and metropolitan elderly households are significantly different at $p \leq .001$.

Across all measures of economic status, households with a reference person who was more highly educated, male, White, and a homeowner had higher economic status, compared with counterparts. All other things equal, metropolitan elderly households, on average, had higher economic status than did nonmetropolitan elderly households.

The effects of age, being married, and having no earners in the household varied with the specific measure of economic

status. Age did not have a statistically significant effect on income measures of economic status for elderly households when the other variables were controlled. However, age was negatively associated with expenditure measures of economic status and positively associated with financial asset measures of economic status.

Being married was positively associated with all but the per capita measures of economic status. This result is reasonable,

Table 3. Multivariate regression: Measures of economic status^{1,2}

	Total annual household income	Per capita annual household income	Equivalent annual household income	Total annual household expenditure	Per capita annual household expenditure	Equivalent annual household expenditure	Total financial assets (total sample)	Total financial assets (subsample)
Intercept	14721.00	10175.00	11961.00	10521.00	7899.97	8820.03	-11729.00	-13794.00
<i>Coefficients</i>								
Age of reference person (omitted: 65-74 years)								
75-84 years				-1257.92	-760.93	-1022.86		5980.51
85+ years						-1263.44	10146.00	16018.00
Education of reference person (omitted: elementary school or less)								
Some high school	2145.07	1132.21	1615.10					
High school graduate	5221.65	3651.99	4606.46	2716.71	2410.33	2688.87	13998.00	16331.00
Some college	8683.65	5514.70	7289.64	6659.47	4584.19	5808.73	17902.00	17871.00
College graduate+	15364.00	10323.00	13256.00	12116.00	8214.30	10517.00	33531.00	36685.00
Male	3282.39	2481.22	2890.71	1819.36	1199.98	1520.04	7953.43	9422.05
Married	8286.53	-2642.17	3341.77	7287.01	-2237.65	3018.43	4289.77	7726.08
White		2359.44	2165.56	3529.52	2967.45	3377.94	11517.00	13605.00
Homeowner	3528.59	1640.94	2607.92	2231.84	780.45	1504.85	9174.80	11602.00
No earners	-10450.00	-3271.27	-6359.07	-6077.04	-1154.47	-3195.37		
Nonmetropolitan	-3711.23	-1659.44	-2577.81	-3762.53	-1848.67	-2737.83		-8241.85
Adjusted R ²	0.3063	0.1643	0.2469	0.3267	0.1569	0.2457	0.1059	0.1082
F value	123.640	55.612	92.049	135.772	52.702	91.463	33.901	25.316
N	3334	3334	3334	3334	3334	3334	3334	2405

¹Statistically significant coefficients only, $p \leq .05$.

²Detailed tables are available from the second author.

because the multivariate analysis revealed the effect of being married, while holding income constant. Because being married was positively correlated with household size, it would be negatively correlated with a per capita measure.

Having no earners in the household was negatively associated with the income and expenditure measures of economic status but did not have a statistically significant effect on financial asset measures of economic status.

The multivariate analysis confirmed this: the nonmetropolitan and metropolitan differences in economic status persisted even after controlling for age, education, gender, marital status, race, home ownership, and presence of at least one earner in the household. Multivariate results showed that nonmetropolitan elderly households had 83 to 88 percent of the income, and spent 81 to 85 percent as much as metropolitan elderly households spent (table 4). Similarly to the bivariate results presented in table 1, the eight

measures of economic status produced consistent results regarding the relative economic status of nonmetropolitan and metropolitan elderly households. In general, adjusting the measures for household need reduced the magnitude of the nonmetropolitan and metropolitan differences, and the differences were larger based on expenditure measures, compared with income measures. However, the magnitude of these differences was never greater than 5 percentage points.

Table 4. Measures of economic status of nonmetropolitan and metropolitan elderly households based on multivariate results

Measure of economic status	Coefficient on nonmetropolitan variable ¹	Sample mean value ²	Ratio ³
Total annual household income	-3,711	21,706 (19,010)	0.83
Per capita annual household income	-1,659	13,444 (10,402)	0.88
Equivalent annual household income	-2,578	17,864 (14,316)	0.86
Total annual household expenditure	-3,763	19,502 (14,112)	0.81
Per capita annual household expenditure	-1,849	12,410 (8,240)	0.85
Equivalent annual household expenditure	-2,738	16,239 (10,872)	0.83
Total financial assets (total sample) ⁴	-6,692	24,431 (44,908)	0.73
Total financial assets (subsample) ⁵	-8,242	33,868 (49,762)	0.76

Note: Standard deviations are in parentheses.

¹Estimated coefficient on the nonmetropolitan dichotomous variable in the regression equation for each measure of economic status.

²Mean value of the measure of economic status for the total sample (N=3,334).

³Ratio of mean value for nonmetropolitan households to the mean value for metropolitan households implied by the multivariate results. The actual ratio was calculated as 1 + (estimated coefficient/sample mean value).

⁴Sum of money in savings, checking and brokerage accounts, U.S. savings bonds, stocks, bonds, mutual funds, and securities for the total sample of 751 nonmetropolitan and 2,583 metropolitan households.

⁵Total financial assets for the subsample of 526 nonmetropolitan and 1,879 metropolitan households with some positive amount of financial assets.

After geographic differences in population composition are controlled, nonmetropolitan elderly households still have lower relative economic status, but the magnitude of the nonmetropolitan and metropolitan differences becomes slightly smaller.

What about the ratios for assets? The nonmetropolitan and metropolitan ratio of total financial assets was 73 percent for the total sample and 76 percent for the subsample when differences in demographic characteristics were controlled. These nonmetropolitan and metropolitan ratios were larger (indicating smaller differences) than the ratios that did not control for differences in demographic characteristics (table 1).

These results suggest that some portion of the nonmetropolitan and metropolitan differences in economic status is due to differences in demographic characteristics of the nonmetropolitan and metropolitan elderly households. However, the result that the measures of economic status of nonmetropolitan elderly households are never greater than 88 percent of the comparable measures for metropolitan elderly households confirms the persistence of relatively lower economic status of nonmetropolitan elderly households.

Summary

Nonmetropolitan elderly households have lower economic status, on average, than metropolitan elderly households have—across measures based on income, expenditure, and financial assets. The magnitude of the nonmetropolitan and metropolitan difference in economic status varies slightly with the specific measure used. The bivariate results indicate that the economic status of nonmetropolitan elderly households is 17 to 21 percent lower than the economic status of metropolitan elderly households, depending on the income or expenditure measure used.

After geographic differences in population composition are controlled, nonmetropolitan elderly households still have lower relative economic status, but the magnitude of the nonmetropolitan and metropolitan differences becomes slightly smaller. However, the actual magnitude of the difference is still fairly large. Based on the multivariate results, the economic status of nonmetropolitan elderly households is 12 to 19 percent lower than the economic status of metropolitan elderly households, that is, depending on the income or expenditure measure used.

Implications

The explanation for the lower economic status of nonmetropolitan elderly households does not lie completely in variation in population composition. One plausible explanation is that the lower economic status of nonmetropolitan elderly households results from the more limited “opportunity structure” in nonmetropolitan areas. Persons living in nonmetropolitan

areas have poorer employment experiences, resulting from both lower educational attainment and poorer employment opportunities available in nonmetropolitan areas (5). The lower lifetime earnings result in lower economic status in later life.

Economic resources are only one factor contributing to overall well-being or quality of life. Quality of life is influenced by access to goods and services through the marketplace and through nonmarket production (objective factors), as well as by subjective factors: including emotional well-being, life satisfaction, and support networks.

Price levels, which influence access to goods and services through the marketplace, and nonmarket production are likely to differ between nonmetropolitan and metropolitan areas. If prices in nonmetropolitan areas are systematically lower than prices are in metropolitan areas and if nonmarket production is greater in nonmetropolitan areas than in metropolitan areas,⁴ then actual nonmetropolitan and metropolitan differences in levels of well-being will be much smaller than indicated by this research. It is possible that nonmetropolitan elderly households actually enjoy higher levels of well-being than their metropolitan counterparts, when differences in price levels and nonmarket production are considered.

Subjective factors are more difficult to measure than income or expenditure but should be considered for a more comprehensive assessment of the overall well-

⁴Nonmarket production is likely higher in nonmetropolitan areas than in metropolitan areas. Why? Because nonmetropolitan elders are more likely than metropolitan counterparts to have extended family structures and more highly developed community networks for support.

being of the elderly. Previous research documents conflicting evidence regarding the correlation between objective and subjective dimensions of well-being. (For an overview of research on subjective dimensions of well-being, see Lee and Lassey (9)). The notion that metropolitan elderly fare better than nonmetropolitan elderly in objective terms and therefore should also fare better on measures of subjective well-being is not confirmed in empirical research. In a study of rural and urban elderly, the rural elderly scored as well or better than urban elderly scored on measures of subjective well-being (9). Further research should explore the causal processes of subjective well-being and the contribution of subjective factors to overall well-being and quality of life.

The overrepresentation of the elderly in rural and nonmetropolitan areas may suggest that elderly people perceive the quality of life to be higher in nonmetropolitan areas and prefer living in these areas. People in metropolitan areas who prefer nonmetropolitan living may relocate to nonmetropolitan areas later in life. However, less than 10 percent of those aged 65 and over move to a new house. And of those elderly people who move, less than 10 percent leave a metropolitan area and move to a nonmetropolitan area (19).

Overall well-being and quality of life are influenced by both objective and subjective factors. Therefore, low relative economic status associated with nonmetropolitan residence should not be ignored. Because of nonmetropolitan and metropolitan differences in residential and employment opportunities, a blanket approach to improving economic status will not be effective. Different problems and needs demand different solutions.

Most policy aimed at improving economic status focuses on human capital strategies. Public policy designed to increase human capital through increased and better education and employment opportunities should be effective in improving economic status of young people throughout their lives including their later years. Further, improving employment prospects of working-age persons through job training and retraining should effectively raise the economic status of prime-age Americans. However, strategies to improve the economic status of elderly Americans, and specifically elderly Americans living in nonmetropolitan areas, cannot rely on efforts to increase human capital. Strategies to improve the economic status of the elderly today must focus on improving the level of income transfers to persons with low lifetime earnings and interrupted labor force participation. Forward-looking strategies for improving the economic status of future groups of elders need to focus on availability and access to good jobs that help individuals acquire adequate financial resources for retirement.

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How Marketers Reach Young Consumers: Implications for Nutrition Education and Health Promotion Campaigns

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The advertising industry aggressively seeks to understand, anticipate, and influence the perceived needs and desires of young consumers. Because marketers have taken an increasingly disciplined approach to market research, they have gained a wealth of information about children and teenagers. This paper reviews the research methods marketers use to gain information about young consumers to design targeted marketing campaigns. The paper provides an overview of the advertising techniques, styles, and channels marketers use to reach children and teenage youth. It discusses how current market research can be used in a social marketing framework to design more effective nutrition education and health promotion campaigns for young consumers.

Commercialism permeates the lives of children and teenage youth. It is generally defined as the means of communication that creates consumer awareness and induces the desire for products, thus increasing consumer demand and commercial profit (24). The Center for the Study of Commercialism describes commercialism as “ubiquitous product marketing that leads to a pre-occupation with individual consumption to the detriment of society” (16). One top executive of an advertising firm said, “It isn’t enough to just advertise on television...you’ve got to reach kids through the day—in school, as they’re shopping in the mall...or at the movies. You’ve got to become part of the fabric of their lives” (6).

Much research exists that assesses the specific influence of television advertising on children’s food- and nutrition-related decisions and behavior over the past two decades (26). Few studies or reviews, however, have attempted to examine the presence of commercialism in promotional mediums such as school lesson plans, movies, magazines, games, and kid’s clubs.

This paper describes the research methods and type of information gathered by marketers for advertising campaigns targeted to children and teenage youth. The paper also describes the advertising techniques, styles, and channels marketers use to reach young consumers. Then the paper discusses how current knowledge of market research methods, marketing

strategies, and techniques can be used—within a social marketing framework—to design more effective health promotion and nutrition education campaigns that encourage healthful eating habits among children and teenage youth.

How Marketers Reach Children and Teenage Youth

Marketers are extremely interested in children as consumers because children themselves spend billions of dollars annually, influence household purchases, and are future adult consumers (33). A lifetime customer may be worth \$100,000 to a retailer (23). Hence, the advertising industry aggressively pursues efforts to understand and anticipate the needs and desires of young consumers (23). With more sophisticated market research techniques, marketers have gained a wealth of information about children and teenagers. A review of the research methods marketers use provides insight into the type of information they seek: information that allows them to design marketing strategies for young consumers.

To obtain opinions, feedback, and insights from children and teenage youth, market researchers use various research methods. Some are focus groups, written or telephone surveys, individual or group interviews, picture drawing, story-telling, secret ballot, and observational field studies. Manufacturers and retailers will often contract with independent market research firms that have extensive experience working with children and teenagers. These manufacturers and retailers design engaging advertising campaigns to sell products or services to this lucrative market with the goal of increasing their market share. A 1990 market survey, based on the responses of 49 corporations and advertising agencies

that market children's products, revealed that \$16.1 million was spent on children's research. This research was related to product, concept, commercial tests, audience segmentation, programming, packaging, promotions, print advertisements, brand name identification, and pricing (12).

According to the marketing literature, four essential elements help marketers reach children: First, marketers keep their efforts child-focused. Second, they ask children the right questions and select appropriate outcome measures (e.g., product recognition, attention level or in-store behavior, likability rating, verbal recall, and conventional indicators of product preference). Third, marketers keep corporate attention focused on children's needs (using seminars, qualitative interviews, and periodic testing of products and communication strategies). Fourth, marketers complement intuition with theory when designing their research (15).

Market researchers caution against using standard research methods that are used with adults when children are studied. Adult marketers may understand adult consumers intuitively, but they tend to read adult meanings into what children say (15). Using conventional focus groups with children, for instance, can lead to "follow-the-leader" group dynamics. The result: Inadequate data, misleading interpretations, unhappy clients, and dissatisfied customers (30).

Experienced focus group moderators believe that overcoming the effects of peer pressure is a challenge. One way to reduce the influence of peer pressure is to ensure that the children in the group are unacquainted with each other. Moderators suggest keeping focus group members within a 2-year

age span, because younger children may be intimidated by older youth. Moderators also suggest separating boys and girls: girls tend to answer more frequently when genders are mixed (31). It is also recommended that an adult moderator be replaced with a trained youth peer to obtain more reliable information. Another recommendation: collect information in familiar surroundings such as in schools, at summer camps, or at sporting events (30).

Market researchers believe that surveys must be engaging and user-friendly. For example, the 1991 Simmons Kids Study, the first syndicated multimedia survey of children, researched the direct purchase and purchase influence habits of children ages 6 to 14 (see box). It used a "through-the-book" magazine method, a television diary, and a product questionnaire (4). Marketers also use written and visual scales, the latter designed especially for children with limited verbal skills. Smile and star scales are the most common types of visual cues market researchers use. However, market researchers also use card sorts and cartoon figures to determine product appeal, purchase influence and purchase interest, and product appropriateness based on children's age and gender (12).

By having children draw pictures, market researchers have learned a great deal about how children perceive the shopping experience. This technique, like story-telling and secret ballot, is especially useful for children who may not express themselves well verbally (22). Observational field studies are particularly instrumental in helping market researchers study parent-child interactions in stores. Market researchers operate from the premise that the purchasing process

Definitions of Key Marketing Terms

Direct purchase habits: those habits related to the purchase of goods and services that children or teenagers make for themselves.

Purchase influence habits: the array of habits related to a child's or teenager's influence on family purchases. This includes toys and clothes; housing items, televisions, and stereo equipment; and family items, vacations, and food.

Through-the-book magazine method: a research strategy that uses a magazine format to obtain personal information from children regarding product identification and preferences.

Secret ballot: a research method that asks children to make a choice and then write it down or whisper it to the researcher to keep it confidential.

Advertorial: a technique used by marketers to encourage children to read a magazine advertisement. Marketers make the advertisement look like a game, puzzle, advice column, or comic strip.

Product placement: the placement of brand name products in movies to deliver promotional messages to viewers.

tends to be more impulsive than planned. They have found that observational field studies give a more accurate picture of what influences children's consumer behavior than will verbal interviews with children, parents, or both in the marketplace. Market researchers have used observational field studies to determine which factors influence in-store decisions. Their intent was to develop new marketing strategies targeted to families with children of various ages (28).

Advertising Styles, Techniques, and Channels

Successful marketing is based on correctly representing customer lifestyles and making products relevant to their lives. A range of advertising styles, techniques, and channels are used to reach children and youth to foster brand

loyalty and encourage product use. Some approaches are market segmentation; television advertising; sales promotions at schools, stores, and sporting events; multimedia exposure; celebrity endorsement; kid's clubs; product placement; and advertorials. Also, retailers, manufacturers, wholesalers, the media, schools, and corporate donors are creating mutually beneficial partnerships to gain access to, and capture the attention of, young consumers. One of their goals is to develop a market for tomorrow's adult consumers.

Market Segmentation

The basic premise of market segmentation is that different groups of consumers have diverse attitudes, interests, and behaviors. And, by acknowledging these differences, marketers believe they can increase their chances of influencing consumers' behaviors. Segmentation

involves describing the potential market's physical, behavioral, demographic, psychographic, and geographic characteristics (25). Gender, age, socioeconomic status, and ethnicity are four ways that advertisers segment the youth market. Although marketers usually segment young consumers into three age categories (2- to 5-year-olds, 6- to 11-year-olds, and 12- to 17-year-olds), there is agreement on two points—large gaps exist in understanding young consumers' behavior and the existing age categories may be initially helpful but are arbitrary (32).

Marketers often segment age with several other factors, such as gender and socioeconomic status. Only recently have marketers acknowledged the importance of ethnic minority subcultures. Marketers tend to assume that the preferences and consumer habits of various ethnic groups are not significantly different among young children, but these preferences and habits become significant during older childhood and adolescence when ethnic and cultural identities are formed (32). The ability to understand and depict cultural nuances and the use of appropriate language are the two greatest challenges faced by marketers and educators in effectively reaching ethnic minority groups that are distinct and heterogeneous.

Television Advertising

Television has been identified as the medium that provides the widest and most frequent reach for younger children. Children ages 2 to 11 watch an average of 26 hours of television each week (6,26). In a 3-hour setting, a child may watch about 30 minutes of advertising, totaling 20-40 advertisements each hour depending on their length (26) and may be exposed to as many as 22,000-25,000 commercials each year (13). Television commercials use attention-

Although in-school multimedia can be viewed as a useful way to educate children and teenage youth, it has been increasingly criticized as a form of “commercialization of the classroom” when provided by corporations in exchange for advertising promotions and test marketing within educational environments.

getting techniques such as attractive models and familiar songs and jingles; they provide easily stored and recalled images from memory; they motivate children to retain information by highlighting the relevant, desired behavior; and they are highly repetitious (29).

Advertisers are now looking beyond children’s programs to reach the larger audience of children who are watching prime-time television or listening to the radio with their parents because it is an opportunity to reinforce the connection between children’s independent purchases and their influence on family purchases. Marketers who want to focus on children’s personal spending choose media that deliver messages to a large number of children in their desired target group. Marketers who want to take advantage of young people’s power to influence family purchases choose commercials or television programs that reach children or teenage youth together with their parents (32).

Sales Promotion

Sales promotion is a commonly used method for reaching young consumers in places where they are often found. The objectives and strategies marketers use need to be well-defined to capture the attention and interest of the desired target audience. For example, sales promotions occur at rock concerts, beaches, malls, and sports events; in stores; and even at school. They are used to motivate children and teens to make purchases at places they or their parents regularly shop, such as cosmetic counters, convenience stores, supermarkets, and fast-food restaurants. Premiums and sweepstakes prizes are often distributed to appeal to children’s and teens’ tastes and desires (27).

Manufacturers, wholesalers, retailers, the media, and corporate donors frequently engage in cross-selling, the practice of combining promotional efforts to sell a concept, product, or service. Disney, for instance, has launched cross-selling campaigns worth millions of dollars to promote its films and characters in exchange for the sale or placement of other companies’ products into Disney films (7). Disney has marketing agreements with several companies, including Coca-Cola, Proctor and Gamble, Kraft, and McDonald’s.

Nationally, McDonald’s produces and delivers more than 200 different advertisements annually. This fast-food chain spends about \$740 million in advertising, has earned an internationally recognized name that is synonymous with fast-food, and has built a reputation as “the children’s marketer” (17). The company uses a multifaceted sales promotion approach to reach ethnic youth by using radio and cable television to deliver messages to African Americans and Hispanics, and it uses network television to air commercials to the general population. McDonald’s strives to make parents feel good about taking the family to the restaurant chain: both mothers and children surveyed put McDonald’s at the top of their list for likability. McMoms, a program that targets bilingual mothers of children ages 2 to 7, inserts bilingual response cards into its “Happy Meal” boxes. In return, mothers receive Spanish language newsletters and promotions. Sports, youth, and community angles are used in McMoms’ promotional advertising, which also includes scratch card contests, games on the place mats, and toy car give-a-ways (17).

Multimedia Exposure

Using television commercials to reach children and youth is rapidly becoming more expensive and less efficient. Children are increasingly being exposed to different types of mass media, including radio, magazines and newspaper sections written especially for them, and interactive computer technology (21).

Although in-school multimedia can be viewed as a useful way to educate children and teenage youth, it has been increasingly criticized as a form of “commercialization of the classroom” when provided by corporations in exchange for advertising promotions and test marketing within educational environments. Because of chronic funding shortages, school districts have welcomed advertisers to underwrite the cost of educational materials, equipment, and services. Thus, school districts have been viewed as silent partners in advertising to children (7,26).

Celebrity Endorsement

Heroes, heroines, and role models can motivate children and teenage youth to buy products and services. The celebrities most admired by children are entertainers or athletes. McDonald’s and Pepsi, for example, have used Michael Jordon and Michael Jackson, respectively, to endorse food and beverage products targeted to children and teenage youth (27). Celebrity endorsements encourage children to buy products for their status appeal. The status products being marketed are costly, and celebrity commercials are becoming increasingly slick. Today’s children are contending not only with the celebrity appeal in television and magazine advertisements (7,26) but also with peer pressure from friends who see the same commercials. Children must also face the financial realities of wanting products that they do not need and/or their parents cannot afford (7).

Kid’s Clubs

Some corporations (Nickelodeon, Fox, Burger King, and Disney) have created kid’s clubs. A kid’s club establishes an ongoing relationship with its members by providing membership cards and participatory activities that are dependent on spending money. Research has suggested that kid’s clubs promote consumerism, reinforce commercial interests by building brand loyalty, and provide a convenient vehicle to deliver commercial messages and perpetuate ongoing advertising to children. Many of these clubs use their enrollment databases to distribute coupons for club merchandise (7,26).

Product Placement and Advertorials

Advertisers have paid between \$10,000 and \$1 million to display brand name products in movies, with the price increasing if an actor uses a product rather than if the product is only shown. Sometimes, movie studios and producers accept merchandise or promotional support in exchange for placing a product (7,26). For instance, Burger King was depicted in *Teenage Mutant Ninja Turtles* in exchange for promoting the movie before its release. Products can also be placed in prime-time television programs, comic strips, and video games.

The opportunity to reach children and teenage youth with print media has expanded over the past decade. Over 160 magazines are targeted to children, many of which carry hidden advertisements—in editorials, comics, games, and puzzles. The resulting advertorials or hidden advertisements have been described as “subliminal inducements” that can mislead and deceive children (7,26).

Other Advertising Styles and Techniques

Marketers specializing in advertising to children and teenage youth have learned which advertising styles and techniques work well with specific segmented groups and have provided the rationale for why they believe these styles are effective. An executive of one marketing firm offers these 10 tips to make children notice messages:

1. Be aware of age differences in the market;
2. Make sure the product or service has a point of view and a unique selling proposition;
3. Use child-appropriate language to reinforce a feeling of peer-group belonging and bonding;
4. Pay close attention to the location, sets, props, wardrobe, colors, gender, and ages of children and youth depicted in commercials to reinforce the “in” lifestyle;
5. Use music to enhance images and extend the life of a commercial beyond 30 seconds;
6. Make the commercial move because children have high expectations and are capable of absorbing much more information in 30 seconds than adults absorb;
7. Refrain from preaching because children will understand the message if they want to;
8. Use visual humor with younger children and verbal humor with older children;
9. Make the world accessible, and invite the young viewer to join in;
10. Strive for “hall talk” by making a young consumer as excited about a new commercial as the product it endorses (18).

Implications

To sell concepts, products, or services to children and teenage youth, profit-oriented corporations and marketers are conducting extensive market research. They are segmenting youth audiences; designing advertising campaigns that are language-, culture-, and image-sensitive; and tracking young consumers' responses. The food industry and marketers have been viewed by critics as failing to "play fair" and ineffectively monitoring themselves and the media to protect children and teenage youth from overwhelming commercial pressures. These critics say "unfair" marketing indicates a need for government regulation, particularly to protect younger children who may not have the cognitive abilities to discern fact from an advertisement (29).¹

Regulation is one potential approach to address intensive marketing practices. The focus of this paper is, however, to encourage nutrition educators to reflect on current approaches and consider applying what has been learned from market research to create more effective nutrition and health promotion messages. We encourage nutrition educators to use a variety of channels to deliver those messages and to identify common interests with the public and private sectors to deliver consistent messages.

¹The public policy issues and alternatives related to children's advertising via television is beyond the scope of this paper but has been extensively documented. Government regulation of television advertising has been difficult to implement in the United States because of the protection of advertisers' First Amendment rights. Historically, there has been only voluntary regulation of advertising for specific products (e.g., alcohol and cigarettes) or images advertising these products (e.g., Joe Camel) that have been deemed to be socially "evil." For a comprehensive review of these issues, see Armstrong, G.M. and Brucks, M. and also Huston, A.L. et al. (2,14).

It may be strategically necessary to create partnerships with stakeholders who are also concerned about the influence of commercialism on children and teenagers because public health budgets are insufficient to compete with the multimillion dollar campaigns of manufacturers and marketers. The next section examines how market research methods and the knowledge gained from marketing strategies and techniques can be used advantageously to design and deliver more effective health promotion and nutrition education interventions. Effective interventions, in this case, are ones that encourage healthful eating and lifestyle habits among children and teenage youth.

Using Market Research and Advertising Techniques to Design Nutrition Interventions

Many nutrition education programs are based upon health-oriented models that emphasize the underlying cognitive, psychological, and environmental influences on dietary behaviors and lifestyles (11). Consumer-oriented models emphasize information and skills that are instrumental in the marketplace. Market research can provide a wealth of information to nutrition educators about how young consumers view the world and function within it. Consumer behavior research and communications research can provide useful information on children's and parents' attitudes, perceptions, and behavior and provide information on media channels that can best reach targeted groups. These types of research can be viewed as stepping stones to link scientific findings about diet and chronic disease effectively to the desirable food- and nutrition-related perceptions, attitudes, motivations, decisions, and behavior of young consumers.

Public health practitioners have increasingly turned to communication programs as a major strategy to prevent the premature morbidity and mortality associated with chronic diseases in adults. Social marketing is explicitly based on marketing principles. It is one example of a communications program that provides a framework and guidelines that nutrition and health educators can use systematically to address problems related to health promotion and dietary behavior. Social marketing is most often used to accomplish the following objectives: to disseminate new information to individuals, to offset the negative effects of a practice or promotional effort by another organization or group, and to motivate people to move from intention to action (25). This type of campaign directed specifically at children and teenage youth could introduce and disseminate new ideas. It can increase the prevalence of desirable behavior among these target groups.

Social marketing originates from marketing theory with one important difference—the changes in a population's behavior result in the "profits" for individuals and society. For nutritional well-being, the "profits" are to produce healthier children who will become more productive and healthy adults, while simultaneously serving to reduce health care service needs and related costs. Social marketing provides a framework from which behavior-change strategies are formulated and translated into specific and integrated interventions aimed at certain behavior changes. Interventions may include mass media campaigns, interpersonal communications, public policy interventions, school-based interventions, and the use of community-based coalitions to implement a variety of organization-based actions (1,20).

Social marketers point to the success of this approach because it offers benefits people want, reduces barriers people face, and persuades instead of just informs. The 1995 Gallup Organization Survey, Food, Physical Activity, and Fun: What Kid's Think, revealed a large discrepancy between what children understood and said were healthful eating principles and what they practiced (3). Social marketing proponents believe a successful social marketing campaign for young consumers is not about selling pre-formulated ideas about desirable nutrition habits. They believe it is about creating food and nutrition concepts that conform to a particular target group's expressed desires, values, and tendencies (1,20).

In conducting a comprehensive analysis for a successful campaign that uses social marketing principles, campaign developers seek to identify the basic components of business marketing within a public health context. Four marketing "P's" can be used as a foundation for planning a social marketing program:

- *Product*: this may be defined not only as a service but also as an idea, concept, social cause, or behavior change;
- *Place*: the distribution channels that will be used to get the product or messages to the target audiences;
- *Price*: the social, behavioral, psychological, and geographic costs for the consumer to adopt a behavior; and
- *Promotion*: the communication tools used to increase acceptance and use of a product, tools such as advertising, public relations, and consumer incentives.

Politics is added as a fifth "P" that evaluates the political environment within which a campaign functions. If there is weak internal agency support or external community or government support for a social marketing campaign, the probability is low that the campaign will be successfully implemented (25).

These principles are well-illustrated by the USDA Team Nutrition Campaign. The mission of this campaign is to build skills and motivate children to make healthful food choices by reaching them through multiple channels, in a language they speak, and in ways that are engaging and entertaining. No one message or single delivery strategy will adequately meet the communications objectives of this type of campaign. Thus, the Campaign uses social marketing principles to reach children through the mass media, in schools, and at home to impart knowledge and build skills children need to make healthful food choices (5).

Developers of the USDA Team Nutrition Campaign have identified the *product* or offering (e.g., selecting more fruits, vegetables, and grains and eating less fat to improve health) for two audiences: the primary segmented audiences (e.g., children and teenage youth) and secondary target audiences (e.g., parents, educators, and school food service personnel). The secondary audiences act as influentials for the primary audiences. The *place* (e.g., mass media, schools, and homes) has also been identified (5). The knowledge that marketers and nutrition researchers have gained about children and teenage youth can provide important insights about *price* (e.g., young consumers' perceived benefits and barriers to eating more healthfully) and *promotion* (the communication channels and tools that have the most credibility for these groups) (1,20,25).

It may be strategically necessary to create partnerships with stakeholders who are also concerned about the influence of commercialism on children and teenagers, because public health budgets are insufficient to compete with the multi-million dollar campaigns of manufacturers and marketers.

An organizational-based strategy for addressing the fifth “P,” *politics*, also needs to be devised. The USDA Team Nutrition can be a successful public-private partnership of government agencies, the food and agricultural industries, education, school food service, and health and consumer groups joining together to improve the diet and health of children (5). The partnership will be successful if organizational incentives are created to identify common interests, if organizational obstacles and disincentives are appropriately identified and managed, and if healthy communication is fostered among the array of stakeholders (10,19).

Market research can also provide useful information about the nature and extent of the marketing competition and the additional consumer behavior research that is needed to design an effective and sustainable campaign. The techniques used by market researchers can give nutrition educators new approaches to obtain information from children and teenage youth to tailor and deliver, more effectively, nutrition and health promotion messages that capture their attention and influence their behavior. Manufacturers, retailers, market researchers, and the media may be more amenable to entering collaborative partnerships with nutrition educators when common interests are identified and win-win situations are pursued. This approach is preferable to nutrition educators attempting to compete with commercial advertisers. However, partnerships across sectors present many challenges, including the potential for compromised credibility, implied endorsement of specific products, issues of exclusivity, and inequities of decisionmaking (19).

Addressing Perceived Benefits and Barriers

How can young consumers be motivated to change their eating behavior to approach the recommendations outlined in the Healthy People Objectives 2000 and the Dietary Guidelines? Telling them of the risks to their health or discussing the nutrient value of foods has not been effective (20). Behaviorally focused nutrition education targeted to children uses such strategies as exposure to foods in a positive social context, modeling by peers and adults, and appropriate use of rewards (8).

The message must identify the explicit rewards or incentives and barriers that are perceived by this targeted audience.

- Messages must be simple, strong, repetitive, consistent, and specific about desired behavior (e.g., time of day, location, and qualities of food used as snacks) (20).
- Messages must promote rewards in terms of taste, which is a more significant motivator than are the nutritional benefits of food (9).
- Messages and images must be upbeat to engage and excite children and teenagers.
- Messages must convince children and teenage youth that selecting healthful foods like fruits and vegetables is simple to do.
- Messages must be presented in a catchy and easily remembered format such as “Eat five a day the easy way,” an approach that has been used by the National Cancer Institute’s 5 A Day for Better Health social marketing program.

The information provided by market research can be used to craft nutrition and health promotion messages aimed

at children and teenagers. For instance, this research has revealed that young children identify more with product brands than with food categories, enjoy independent shopping experiences, communicate their needs by pointing to what they want, and are attracted to displays and packaging that provide opportunities for color-learning, shape-naming, story-telling, or animal identification. Older children and teenagers like to “belong” to a group, are strongly influenced by peer pressure, and like to exert independence as they age. Also, their preferences are more readily influenced by ethnicity and culture than is the case for younger children. Both groups like to receive product samples, prizes, and gifts. They respond positively to messages that use familiar vocabulary (27).

Barriers to young consumers’ ability and desire to change their food- and nutrition-related decisions and behavior include nutritious foods not being readily available at home, in school, and in other settings; misperceptions about healthful eating; and aggressive promotion of unhealthful foods through commercial efforts that use a variety of communication channels (3). The research methods used by marketers can provide further information on

- these and other barriers and benefits children and teenage youth believe influence their ability to eat more healthfully;
- what they think will make healthful eating more fun, exciting, entertaining or rewarding; and
- the concepts and vocabulary that are needed when designing and pretesting nutrition and health promotion messages targeting different age groups.

Presentation Context

Marketers recognize the importance of presentation context on young consumers' ability to encode and retrieve knowledge. This is especially relevant when designing advertisements that use the appropriate vocabulary; move quickly; and have the right location, set, props, music, wardrobe, and colors reflecting a desirable lifestyle or product (18).

The influence of television commercials on children's nutrition knowledge suggests that different types of messages produce a "continuum of impacts." Scammon and Christopher (29) found that messages for sugared products tended to reinforce previous pro-sugar consumption messages to which children had been exposed. Exposure to commercials for healthful nonsugared foods did not always lead to increased consumption of healthful foods but appeared to reduce further consumption of sugared foods. This suggests that multiple, complementary methods, besides advertising (e.g., environmental support), are necessary to promote the consistent consumption of healthful foods by children and teenagers.

Separate nutrition messages were the most effective short-format messages in terms of children's verbalized snack selections and nutrition knowledge. Pro-nutrition messages that are aired on television compete with other advertisements for the attention of young viewers, so it is important that nutrition messages are comparable in technical and creative quality, interest, and variety. Public service announcements must be broadcast at times when children are likely to be exposed to them and aired repeatedly to ensure exposure and to reinforce desirable messages (29).

Communication Channels

Marketers can use different levels of intervention to reach various target audiences with messages, programs, and services. The individual-level targets are children and teenage youth, and the network-level targets are peer groups, families, and social networks. Organizational-level targets are restaurants, grocery stores, schools, and school cafeterias; and community-level targets are the media, public opinion, social norms, local legislation, and food producers (25). The message from the advertising industry to us is this: To have a successful social marketing program—one that effectively influences the eating behavior of children and teenagers—we must use multiple and reinforcing communication channels and approaches.

Summary

This paper describes the research methods used by marketers to gain specific information about young consumers—information that is used to design targeted marketing campaigns. Nutrition knowledge is a necessary but insufficient factor that can be used by nutrition educators to influence positively the food- and nutrition-related attitudes, decisions, and behavior of young consumers. Nutrition educators must use the knowledge gained from marketing and communications research to design more effective nutrition education and health promotion campaigns tailored for children and teenage youth (8). This paper discussed the range of research and marketing strategies the private sector uses. We believe that health and nutrition educators can take advantage of this sector's knowledge and expertise and the substantial investments it has made generating this knowledge.

This review indicates that a successful nutrition and health promotion campaign must consider appropriate methods of communication; preferred sources of information; credible sources and role models; and images of self, groups, and society. A social marketing campaign may be a useful component of a larger action plan that fosters partnerships among a variety of stakeholders who are committed to influencing positively the total food and nutrition environment of young consumers. This approach includes working collaboratively with potential allies and stakeholders who are interested in building or strengthening children's and teenagers' ability to become informed consumers in the marketplace.

This collaborative approach has a great advantage for the nutrition community. It has the potential to leverage the substantial resources of the portion of the private sector that has an interest in promoting improved nutrition and health. Collaboration, however, challenges nutrition educators to think and to act creatively, strategically, and nontraditionally to coordinate successfully efforts to improve the health and nutrition needs of our Nation's children and teenagers.

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Changes in Consumers' Knowledge of Food Guide Recommendations, 1990-91 Versus 1994-95

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Food guides are nutrition education tools that are used to translate scientifically based dietary standards, such as the Recommended Dietary Allowances (6) and the *Dietary Guidelines for Americans* (15), into terms that can be more easily understood and acted on by the general public (2). For example, a consumer may wish to consume the recommended amount of calcium. By providing a group of foods that the consumer recognizes as good sources of calcium (e.g., the Milk, Yogurt, and Cheese Group) and recommendations for the appropriate amount of food to consume from that group, food guides offer that consumer a set of guiding principles for selecting a nutritious diet.

The first food guide was developed in 1916. The U.S. Department of Agriculture (USDA), in particular, has been a leader in its development (16) and has continued to publish updated food guides that conform to advances in nutrition knowledge and changes in dietary recommendations. The current USDA Food Guide was developed in the mid-1980's to provide practical advice to Americans on food choices that meet the Dietary Guidelines (3,17) and was featured in several USDA publications (17) and the 1990 and 1995 editions of

the *Dietary Guidelines for Americans* (14,15). It gained further prominence with the publication in 1992 of the Food Guide Pyramid, a graphic representation of the major principles of the Food Guide (17). Details about the development of the Food Guide (3,17) and Pyramid graphic (17) are documented elsewhere.

The Pyramid graphic has appeared on a wide range of nutrition education and food marketing materials and has achieved a high level of consumer recognition in a short period. In the 1994 and 1995 Health and Diet Surveys, consumers were asked if they had heard of the Food Guide Pyramid: awareness rose from 33 percent in 1994 to 43 percent in 1995, a significant difference at the 95-percent confidence level. Also, by 1995, the Food Guide Pyramid was recognized by name by more consumers than either the Dietary Guidelines for Americans or the National Cancer Institute's 5 A Day program (9). Data from the American Dietetic Association's 1995 Nutrition Trends Survey has shown an even higher level of awareness: overall, 58 percent of consumers were aware of the Food Guide Pyramid, and among those, 48 percent said they were "somewhat" or "very familiar" with the Food Guide Pyramid (1).

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Although these results indicate a high level of general awareness of the Food Guide Pyramid, we believe it is also important to assess people's awareness of specific food group recommendations. This knowledge is necessary if people are to follow—successfully—a diet that conforms to Food Guide Pyramid recommendations. The purpose of this paper, therefore, is to assess people's awareness of specific food group recommendations of the Food Guide Pyramid between 1990-91 and 1994-95. USDA's Diet and Health Knowledge Survey (DHKS) is used.

Methods

Data Source

The DHKS collects information on diet-related knowledge, attitudes, and practices of Americans. Begun in 1989 as a telephone follow-up to USDA's 1989-91 Continuing Survey of Food Intakes by Individuals, the DHKS sampled individuals who said they were the main-meal planners for their households. The sampling procedure for the second cycle of the DHKS (1994) was changed to include adults 20 years of age and older, whether or not a meal planner. The household meal planner, however, is still identified, allowing for comparison among knowledge, attitudes, and practices of meal planners in the two periods. In both periods, the DHKS oversampled low-income respondents.

This study used all respondents to the 1994-95 DHKS (n=3,845) to assess knowledge of food guide recommendations at that time. To examine changes in knowledge of food guide recommendations over time, we used the subset

of 1994-95 DHKS respondents who said they were the main-meal planner (n=2,407), and we compared them to the meal planners from the 1990-91 DHKS (n=3,693).² For both the 1989-91 and the 1994-95 DHKS, USDA provides survey weights that adjust for different rates of sample selection and nonresponse to match the sample to known population characteristics. These survey weights have been applied to all results presented here. This allows us to present findings that are more broadly generalizable. Additional details on the methods for each survey are reported elsewhere (11,12,13).

Measures of Knowledge of Food Guide Recommendations

A set of questions assessing knowledge of food guide recommendations was not introduced in the DHKS until 1990. The questions in the 1991 survey were the same as those in the earlier DHKS. In 1994-95, however, there were some changes in the way questions were asked (table). Differences in the wording may influence responses; hence, this limitation of the study must be kept in mind.

At each period, respondents told the interviewers the number of servings they consumed rather than chose a number of servings from a set of choices offered by the interviewer. For each of the five major food groups, a range of recommended servings appears on the Food Guide Pyramid graphic (e.g., 2 to 4 servings of fruit and 3 to 5 servings of vegetables). The recommended number

²Questions on food guide recommendations were not included in the 1989 DHKS.

of servings for a given person varies, depending on caloric and nutrient needs (17). For this study, any answer within a range based on these needs was accepted as correct; we believed it was unreasonable to expect people to know their precise recommendation within the range. Answers below that range were coded as "lower than recommended," and answers above that range were coded as "higher than recommended." For each question, relatively small percentages of respondents did not give an answer; their responses were treated as missing values for that specific question.

Statistical Analysis

To assess knowledge of USDA Food Guide recommendations in 1994-95 (cross-sectional analysis), we estimated the percentage of adults who believed they should consume the recommended number of servings. All adult respondents who provided valid number of servings were included in the analysis. We used weighted estimates to generalize the results to American adults 20 years old and over.

To examine changes in knowledge of food guide recommendations over time (trends analysis), we compared the percentage of meal planners in 1994-95 who believed they should consume the recommended number of servings with the percentage of meal planners in 1990-91 who provided similar responses. We used weighted estimates to generalize the results to meal planners in American households.

Comparison of knowledge of food guide recommendations among main-meal planners, 1990-91 and 1994-95¹

Question 1990-91:

Let's begin by talking about your opinion of the amount of food, such as fruits, vegetables, and meats that people should eat each day for good health. How many servings of [Food Group] should a person eat daily if one serving equals [amount]?

Question 1994:

Let's begin by talking about the number of servings from different food groups that a person should eat each day. How many servings from the [Food Group] would you say a person of your age and sex should eat each day for good health?

Food Group (amount)	Percent of main-meal planners providing response corresponding to Food Guide Pyramid recommendations	
	1990-91	1994-95
Fruit Group ² Fruit....[1 piece of whole fruit] ³	71	74
Vegetable Group ² Vegetables....[a half cup of cooked vegetables)] ³	33	55
Milk, Yogurt & Cheese Group ² Dairy Products....[1 cup of milk or a slice of cheese] ³	60	59
Bread, Cereal, Rice & Pasta Group ² Grain Products....[1 slice of bread or a half cup of cooked cereal, rice, or pasta] ³	2	8
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group ² Meat, Poultry, or Fish....[a piece the size of a medium hamburger] ³	53	60

¹Diet and Health Knowledge Survey.

²Phrasing used in 1994; example serving amount not given in 1994.

³Phrasing used in 1990-91; example serving amounts given are shown in brackets.

Results

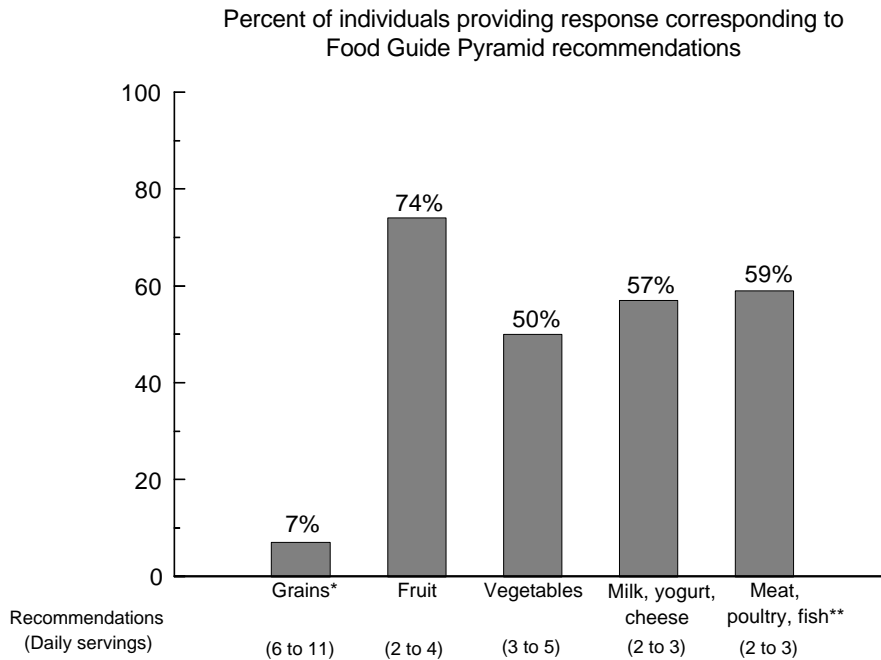
In 1994-95, the percentage of adults who believed they needed to consume a number of servings daily from each of the five major food groups that corresponds to Food Guide Pyramid recommendations varied considerably among food groups (fig. 1). The range went from 74 percent of the consumers who reported the correct recommendation for the Fruit Group to 7 percent for the

Bread, Cereal, Grains, and Pasta Group. One-half to about three-fifths of adults gave an answer that was within the correct range for the Vegetable Group; Milk, Yogurt, and Cheese Group; and Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group.

The table compares knowledge of the recommendations between 1990-91 and 1994-95 for main-meal planners only. This is a period of particular interest—

the USDA released the Food Guide Pyramid graphic in 1992. The 1994-95 estimates in the table differ slightly from those in figure 1: the table includes data from main-meal planners only; figure 1 includes data from all adults. Except for the Milk, Yogurt, and Cheese Group, main-meal planners' knowledge of recommendations for the major food groups appears to have increased between the two periods. The difference for the Vegetable Group

Figure 1. Knowledge of Food Guide Pyramid recommendations among adults, 1994-95¹



Our findings indicate that for four of the five food groups at least 50 percent of adults believe they should consume the number of servings recommended by the Food Guide Pyramid.

¹Diet and Health Knowledge Survey.

*Bread, cereal, grains, and pasta.

**Meat, poultry, fish, dry beans, eggs, and nuts.

is particularly striking—from 33 to 55 percent.

Generally, those who did not know the recommendations gave answers that were below the amounts recommended by the USDA Food Guide. There were two exceptions: For the Milk, Yogurt, and Cheese Group (in 1990-91 and 1994-95), 13 to 15 percent of meal planners believed they should consume more servings than are recommended by the Food Guide (fig. 2). For the Fruit Group, in 1994, 12 percent believed they consumed more than the recommendations (fig. 3).

Discussion and Conclusions

Our findings indicate that for four of the five food groups at least 50 percent of adults believe they should consume the number of servings recommended by the Food Guide Pyramid. The exception is the Bread, Cereal, Grains, and Pasta Group. Previous research indicates that knowledge of serving recommendations is associated with intakes of food groups that more closely match recommendations (7). Thus, increasing people's knowledge of food group serving recommendations is one strategy for improving diet quality.

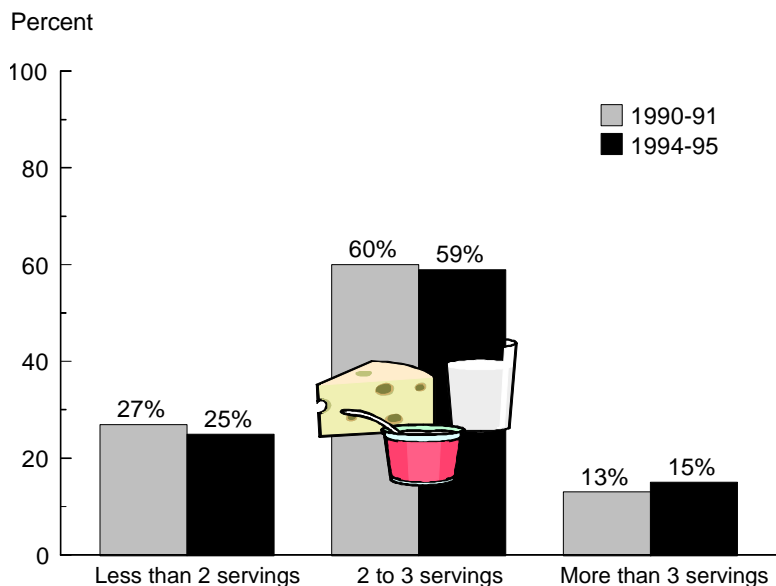
Trend data indicate what knowledge of serving recommendations was acquired between 1990-91 and 1994-95. Unfortunately, only trends in main-meal planners' knowledge could be examined—they were the primary sample in the 1990-91 DHKS. Despite this limitation, we believe the information may still be useful, because meal planners are frequently the focus of nutrition education efforts. Also, the change in the wording of the question may have affected some of the change in results between 1990-91 and 1994-95. Given these limitations, it appears that main-meal planners' knowledge of food group recommendations increased across the period studied, but the increase was not uniform.

Knowledge of vegetable recommendations increased considerably. Not only did knowledge of fruit recommendations increase, but some respondents in 1994-95 also believed they should consume even more servings of fruit than the Food Guide Pyramid recommends. Although knowledge of recommended servings from the Bread, Cereal, Grains, and Pasta Group increased, it still remained at a level far below that of other groups.

The difference in knowledge of recommendations regarding each of the major food groups raises a question. How are consumers getting and using knowledge of Food Guide Pyramid recommendations? Results tell us what consumers believe but do not tell us how they came to hold those beliefs. More research examining how consumers learn specific recommendations would be useful to designers of nutrition intervention programs.

The role of public education efforts in disseminating specific information should be considered. Recommendations for some food groups have been publicized

Figure 2. Beliefs concerning intake of milk, yogurt, and cheese group among main-meal planners, 1990-91 and 1994-95¹



Number of servings main-meal planners believe they should consume daily²

¹Diet and Health Knowledge Survey.

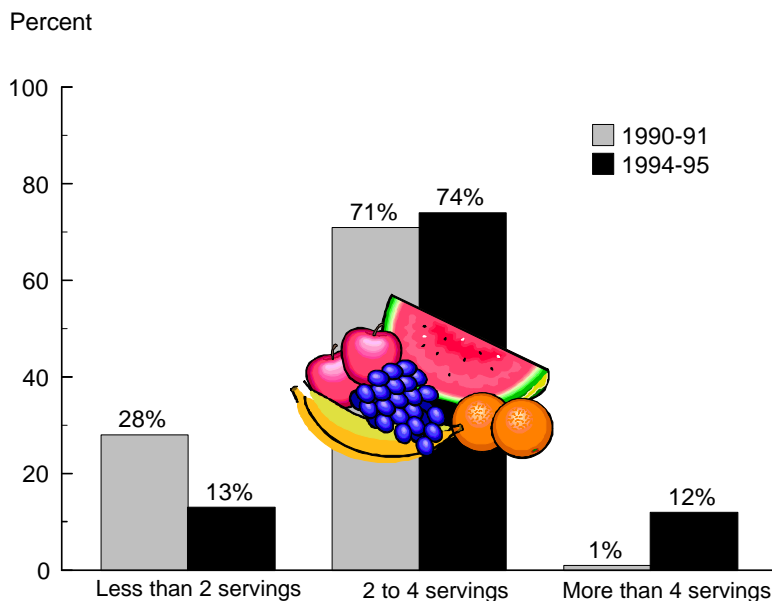
²One percent of main-meal planners responded "don't know."

widely. For example, recommendations for fruit and vegetable consumption have been highly publicized as a part of the 5 A Day Campaign (5). This may be a factor in what seems to be an increasing belief that fruit and vegetables should be consumed in larger amounts. Fruit and vegetables have been identified as being among the most underconsumed food groups by Americans (8). Hence, increasing consumers' knowledge of fruit and vegetable recommendations can be highly beneficial in improving the diets of Americans.

It is unfortunate that knowledge of recommended consumption of grains, another food group reported to be widely underconsumed (8), continues to be at such low levels. One reason may be the

lack of a broad-based promotion program, such as 5 A Day. Another problem may be consumers' confusion about the meaning of the recommendation. Shaw et al. (10) have noted that for most food groups, the food guide serving amount is similar to the size of a portion typically consumed by most people. (For example, the Food Guide Pyramid serving is 1/2 cup of cooked vegetables or 1 cup of raw leafy greens. This corresponds well to the size of a typical portion.) For grains, however, the typical portion is about twice that of a Food Guide Pyramid serving. (For example, a typical portion is 1 cup of rice or pasta or 1 whole hamburger bun.) Thus, one reason consumers may have difficulty learning or accepting this recommendation may be confusion

Figure 3. Beliefs concerning fruit intake among main-meal planners, 1990-91 and 1994-95¹



Results tell us what consumers believe but do not tell us how they came to hold those beliefs.

Number of servings main-meal planners believe they should consume daily²

¹Diet and Health Knowledge Survey.

²One percent of main-meal planners responded "don't know."

about serving amounts. Further examination of the 1994-95 DHKS indicates that 43 percent of consumers believe they should eat 3 to 5 servings of grains daily. (Data are not shown.) If their portions are twice that of the food guide serving, consumers' intake would match the recommendations of 6 to 11 servings.

Confusion over serving amount may be part of the problem; however, 1994-95 DHKS data also indicate that almost 50 percent of consumers believe they need fewer than 3 servings of grains daily. (Data are not shown.) It appears that many consumers are not convinced of a health need for grains; perhaps they do not have a clear understanding of the

health value of grains. Perhaps they hold conflicting beliefs. For example, according to a recent survey by the Wheat Food Council and American Bakers Association (18), 40 percent of consumers think bread is fattening, and 35 percent think starches should be avoided. Given the 1995 Dietary Guidelines Advisory Committee's urging that Americans learn to make grains the center of their plate (4), researchers need to continue investigating why people do not recognize the role of grains in the diet. Other nutrition professionals need to promote strategies that increase consumers' knowledge of the recommended servings of the Food Guide Pyramid—especially those for the Bread, Cereal, Grains, and Pasta Group.

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Each of the following is a reprinted *Nutrition Insights*, a publication of the Center for Nutrition Policy and Promotion.

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Insight 3

Dietary Guidance on Sodium: Should We Take It With A Grain of Salt?

Should Americans Cut Back on Salt?

Recently, a major television network aired a report criticizing Federal Government recommendations to eat less salt. Many of the experts interviewed in this report stated that there is no need for most Americans to cut back on sodium and sodium chloride—known commonly as salt. Unfortunately, this program incorrectly portrayed the current scientific evidence on the association between salt consumption and blood pressure. What are the facts concerning salt and high blood pressure?

Nutrition Insights

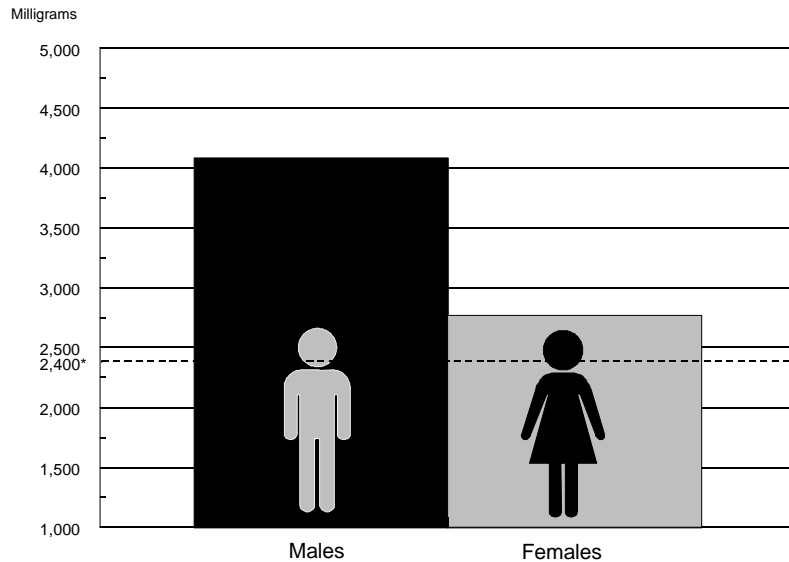
1. How much sodium do Americans consume and how much should they consume?

Although sodium plays an essential role in regulation of body fluids and blood pressure, most Americans consume more sodium and salt than their bodies need. Leading health authorities, including the National Academy of Sciences, the National High Blood Pressure Education Program, and the American Heart Association, recommend that Americans limit sodium intake to no more than 2,400 milligrams a day. The 4th edition of the *Dietary Guidelines for Americans* (1995)

urges consumers to “Choose a diet moderate in salt and sodium” and refers to the Daily Value of 2,400 milligrams of sodium found on the Nutrition Facts Label. This recommendation is made to avoid excessive sodium intake rather than to impose sodium restriction on the general population. It should be noted that the Federal Government’s dietary recommendations are based on the recommendations of an independent advisory panel made up of widely recognized nutrition experts from throughout the country.

Most adult Americans are eating much more than the recommended limit, even when salt added at the table or in preparation is not counted (fig. 1). Additionally, about two-thirds of Americans report they add salt to their food at the table. Approximately 75 percent of dietary sodium consumed is added to food during processing, with only about 20 percent coming from salt added in cooking or at the table. (The rest comes from sources such as water treatment and medications.) Although much of the sodium in the American diet comes from products found in the grain group and from the meat, poultry, fish, dry beans, eggs, and nuts group (fig. 2), components of mixed dishes found in these groups, such as spaghetti with meat sauce and pizza, account for most of this sodium contribution.

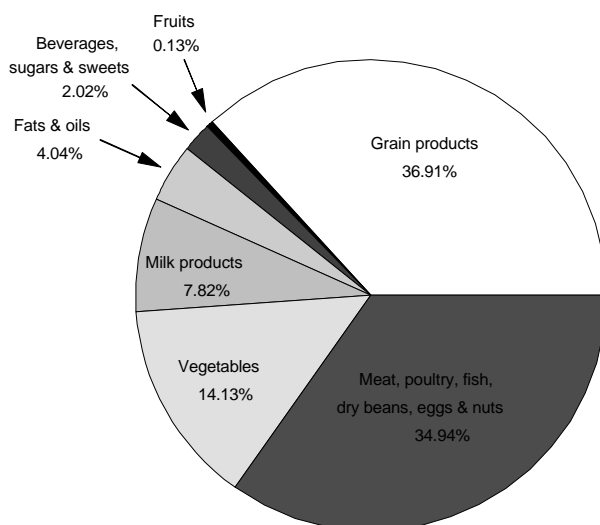
Figure 1. Average dietary sodium intake, by sex, adults 19 years and over



* Recommended maximum level.

Source: USDA, *Continuing Survey of Food Intakes by Individuals, 1994, 1-Day Data.*

Figure 2. Food group contributions to sodium intake, percent of total



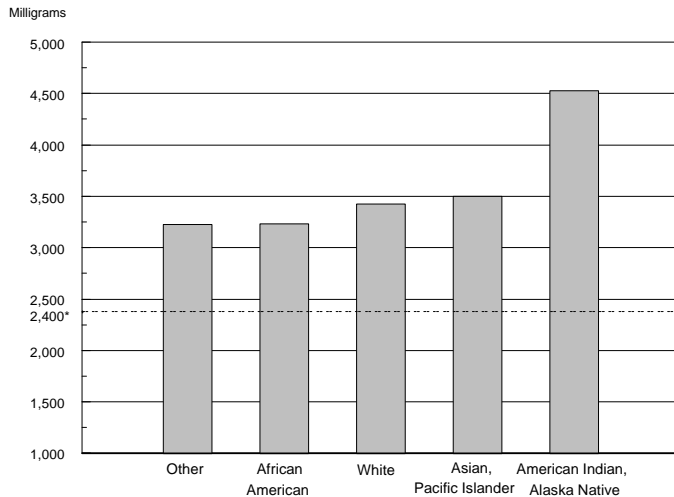
Source: USDA, *Continuing Survey of Food Intakes by Individuals, 1994, 1-Day Data.*

2. What is the relationship between dietary salt and sodium intake and high blood pressure?

Over 30 years of scientific evidence shows that a diet containing more than 6 grams of salt per day (2,400 milligrams of sodium—the amount in a little more than a teaspoon of salt) is associated with elevated blood pressure. Increased blood pressure can lead to hypertension, heart disease, stroke, and kidney disease. It is important to note that elevated blood pressure can harm the body before symptoms occur. In the United States, hypertension affects nearly 1 in 4 Americans. Because it is not technically or economically feasible to determine who might develop high blood pressure from eating too much salt, and because consuming less salt or sodium is not harmful, it is understandable why the Federal Government recommends that healthy, normal individuals moderate their salt and sodium intake. Clinical trials have shown that reducing sodium intake decreases blood pressure in people with and without high blood pressure and therefore decreases the risk of developing hypertension and heart disease.

Despite the overwhelming evidence on the relationship between sodium intake and high blood pressure, some scientists have questioned the significance of this relationship. For example, Midgley et al., in an article appearing in the *Journal of the American Medical Association* (275:1560-1597, 1996) reported that dietary sodium restriction for older hypertensive individuals might be considered, but the evidence in people with normal blood pressure does not support current recommendations for universal dietary sodium reduction. However, the actual data in this paper show the expected lower blood pressure in people without hypertension who reduced salt intake. Several experts have criticized the methodology of this study and arrived

Figure 3. Average dietary sodium intake, by race, adults 19 years and over



* Recommended maximum level.

Source: USDA, *Continuing Survey of Food Intakes by Individuals, 1994, 1-Day Data*.

at different conclusions when analyzing similar data.

Likewise, Alderman et al. reported in the journal *Hypertension* (25:1144-1152, 1995) that people treated for high blood pressure who had particularly low sodium intakes experienced more heart attacks than apparently similar people who had higher sodium intakes. However, this was a limited study in a number of ways, including the fact that the study subjects were people being treated for high blood pressure and should not be projected to the general population. The authors concluded that additional research is needed to confirm their findings.

A recent meta-analysis of 32 clinical trials testing the effects of reducing sodium intake on blood pressure, published by Cutler et al. in the *American Journal of Clinical Nutrition* (65(suppl): 643S-651S, 1997) concludes that (1) there is no evidence that moderate sodium

reduction presents any safety hazards, and (2) the blood pressure reduction that would result from a substantial lowering of dietary sodium in the U.S. population could reduce cardiovascular morbidity and mortality.

3. Are there specific groups of Americans for whom sodium intake is particularly important?

High blood pressure is more prevalent and more severe in African Americans than in the general population. Consequently, they suffer more cardiovascular and renal disease than other ethnic groups suffer. Dietary salt reduction has been found to be effective in the treatment and prevention of hypertension in African Americans. Dietary sodium intake in the African American population is somewhat lower than in the White population but still higher than the recommended level (fig. 3).

4. How can I moderate my sodium intake?

The *Dietary Guidelines for Americans* offer the following tips to help consumers cut back on salt:

- **Read the Nutrition Facts Label on food packages to determine the amount of sodium in foods and choose lower sodium varieties. Many processed foods such as frozen dinners, packaged mixes, and canned soups contain a considerable amount of sodium.**
- **Request less salt in meals when eating out.**
- **Use herbs and spices, rather than salt, to enhance the flavor of foods. For example, try curry powder or onion powder to spice up rice dishes.**

Insight 8

Could There Be Hunger in America?

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The economic expansion that began in March 1991 has been widely touted as the longest peacetime expansion of the last 50 years. By implication, all Americans should be enjoying rising household incomes and expanded economic opportunities. Unemployment is at its lowest rate in more than two decades. Earned income tax credits are available for the working poor, and food assistance is available to all citizens living in low-income households. Could there still be hunger in a land where economic times are so good and there is help for the needy?¹

Hunger Count

According to a national survey taken in 1995, a year marked by good economic news, hunger existed among persons in 4.2 million households, that is 4.1 percent of all U.S. households. These households had one or more persons that reported experiencing reduced food intake because of a lack of financial resources. Nearly 20 percent of households (817,000 of the 4.2 million) had one or more members who experienced severe hunger. In some of these households, children experienced reduced food intake (332,000) or, where

no children were present, adults experienced a prolonged lack of food, including going without food for a whole day.

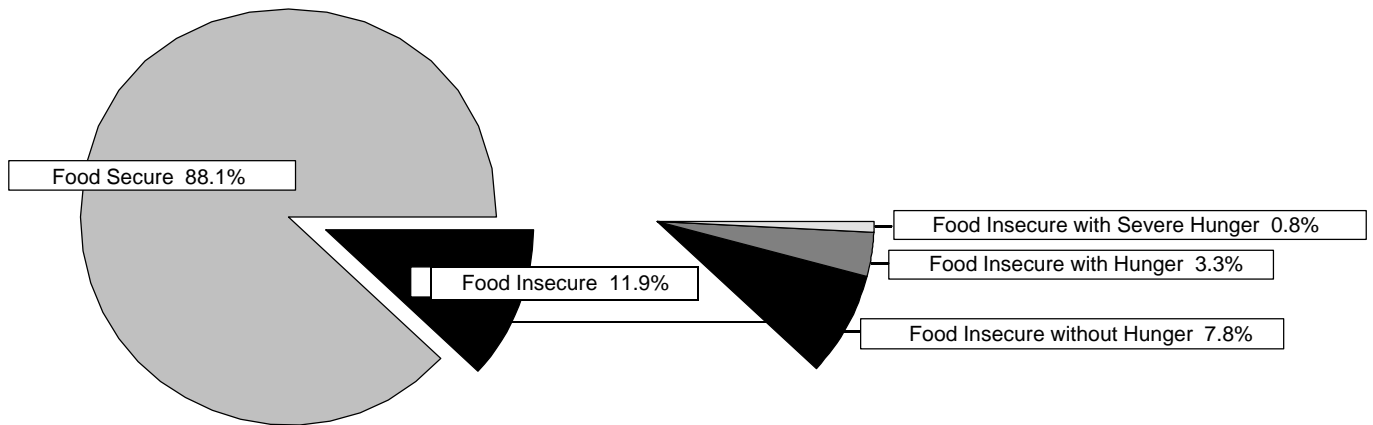
A larger group of households, including households experiencing hunger and those at-risk of hunger, was classified as food insecure. This larger group totaled 11.9 million households, about 12 percent of all U.S. households. Those who were food insecure but not hungry, which accounted for 7.8 percent of all households, were concerned about the adequacy, quality, and variety of their household's food, but did not report sustained reductions in food intake (see figure).

Not all households are equally likely to be hungry. A slightly larger proportion of households with children were classified as experiencing hunger. Black and Hispanic households with children were about twice as likely to be classified as experiencing hunger as their White counterparts. Female-headed households were four times more likely to experience hunger than husband-wife households. The lower a household's income, the higher the chance of experiencing hunger (see table).

The count of hungry people was obtained through a scientific survey conducted by the U.S. Bureau of the Census and sponsored by the USDA's Food and Nutrition Service (FNS). FNS administers the Nation's food assistance programs, with annual expenditures of almost \$40 billion.

¹Hunger is the uneasy or painful sensation caused by a lack of food. It can result from the recurrent and involuntary lack of access to food. Severe hunger exists in households when children go hungry or adults experience prolonged or acute hunger. Hunger is a potential although not necessary consequence of food insecurity. Food insecurity is used to describe inadequate access to enough food at all times for a healthy, active life. It can be a warning sign for hunger. Malnutrition and related diseases are not addressed in these definitions.

Prevalence of Food Security and Hunger in U.S. Households, 1995



Source: Hamilton et al., 1997, *Household Food Security in the United States*, Food and Consumer Service, Alexandria, VA.

The agency's interest in measuring hunger arises from its legal mandate to serve those who meet the requirements for assistance programs. These include the Food Stamp Program, the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), and the National School Lunch Program.

Food Assistance and Hunger

About half the households that reported experiencing hunger received food assistance in the month before the interview. This included households participating in the Food Stamp Program and those receiving WIC benefits. The relationship between hunger and food assistance is complex. Although the benefits reduce hunger, they may not eliminate it completely. For example, Food Stamp Program participants are expected to use one-third of their net income to supplement the food purchasing power of their food

stamps. If those supplemental funds were reallocated to pay utility bills or other necessities, the money could not be used for food. This shortfall could result in a lack of food and lead to hunger. Some gaps exist in Federal program coverage because all communities do not sponsor the range of Federal food assistance programs available to them. For instance, the Summer Food Service Program that provides meals to low-income children during school vacations is only available in a limited number of places.

Information Source

The results are based on a sample of 44,730 households that completed the survey interview. The results represent the entire population except the homeless or institutionalized who were not included in the survey. The survey questions refer to the household's situation over the past 30 days and the past 12 months. Only

the results for the 12-month period are reported here.²

The survey questions determine which households are experiencing hunger by asking about household behaviors that indicate inadequate access to food and an insufficient amount of food available in the household. These conditions are restricted to those related to economic circumstances and do not include hunger that results solely from illness, abuse, or voluntary dieting. Household respondents are asked about lack of food to prepare meals, cutting or skipping meals, and not eating for a whole day. Separate questions were asked about children's behavior that indicate inadequate access to food.

²At USDA, research is ongoing on hunger and food security thus methods are subject to change from knowledge gathered through the research process. All data are from the Current Population Survey, Food Security Supplement, April 1995.

Prevalence of Household Food Security Status by Selected Characteristics of Households, 1995

Characteristic	Total	Food secure	Food insecure, hunger not evident	Food insecure, hunger evident
	<i>Numbers in thousands</i>	<i>Percent</i>		
All households	100,210	88.1	7.8	4.1
With children under 18 years				
All households	38,113	82.5	12.3	5.3
White	30,438	84.6	11.1	4.3
Black	5,841	71.8	18.1	10.1
Hispanic ¹	4,475	69.6	21.6	8.8
Other	1,833	81.1	12.6	5.3
Married-couple families	26,841	88.5	8.8	2.8
Female head, no spouse	8,941	64.7	22.9	12.3
Male head, no spouse	2,332	81.4	12.0	6.6
All households by annual income				
Below \$10,000	14,977	67.7	19.6	12.7
\$10,000 to \$19,999	16,717	80.2	13.2	6.6
\$20,000 to \$29,999	15,625	89.0	7.7	3.3
\$30,000 to \$39,999	12,149	93.8	4.6	1.6
\$40,000 to \$49,999	8,539	95.8	3.0	1.2
\$50,000 and above	22,370	98.7	0.9	0.4

¹ Persons of Hispanic ethnicity can be of any race.

Source: Hamilton et al., 1997, *Household Food Security in the United States*, Food and Consumer Service, Alexandria, VA.

Conclusion

In 1995, hunger existed in 4.2 million households, or 4.1 percent of all households. In these households, one or more persons had an inadequate amount of food because of financial circumstances, affecting up to 11.2 million persons. In 817,000 of the 4.2 million households, hunger was severe, and 692,000 children lived in these households.

For more information, contact the CNPP Office of Public Information and Governmental Affairs at (202) 418-2312.

Women's Labor Force Participation

A significant social and economic trend, that began shortly after World War II, is the increase in the percentage of women in the labor force. Between 1975 and 1990, the labor force participation rate for women grew but did so at a gradually slowing pace. The rate changed very little from 1990 to 1993, but it resumed its upward trend in 1994. And it was mothers who accounted for most of this rise. This study presents data collected each March by the Current Population Survey (CPS). A nationwide survey of about 50,000 households, the CPS is conducted each month for the Bureau of Labor Statistics by the Bureau of the Census. The survey collects information on the demographic characteristics and employment status of the population.

Although women's labor force participation rate rose from 46 percent in 1975 to 59 percent in 1996, its pace was unsteady. Between 1975 and 1980, the rate increased an average of 1 percent each year. Between 1980 and 1985, the average yearly gain fell to 0.7 percentage point. The gain was slower between 1985 and 1990, averaging 0.5 percentage point each year. The rate stayed the same between 1990 and 1993 but started rising again in 1994.

Presence and Age of Children

Women with children accounted for most of the increase in women's labor force participation. The rate for mothers whose youngest child was 6 to 17 years old rose from 55 percent in 1975 to 77 percent in 1996, a 22-point gain. The rate for mothers whose children were under age 6 rose from 39 to 62 percent,

a 23-point gain. However, the participation rate for women with no children under age 18 rose by only 8 points: 45 to 53 percent. Most of these women are under age 25 or are 55 years or over—two age groups with relatively low participation rates that have not fluctuated much in recent years. For all of these groups, most of the gains occurred in the late 1970's and early 1980's.

The labor force participation rate for mothers of children under 1 year of age has grown in recent years, from 50 percent in 1990 to 55 percent in 1996. Full-time homemaking was considered the norm in earlier generations. Now, labor force participation is an integral part of many women's lives. Most of today's mothers of infants established their career before giving birth to their newest child.

Age of Women Workers

Labor force participation of women differs by age. Data are presented for 16- to 24-year-olds, 25- to 44-year-olds, and 45- to 54-year-olds. Older women are excluded because there has been little change in the participation rate for women aged 55 and older.

The participation rate for women 16 to 24 years old peaked at 62 percent between 1975 and 1987, declined to 59 percent by 1993, and has exhibited no clear direction since then. The decline can be attributed to two factors: the sensitivity of labor force participation of teenagers to the business cycle and a growing trend among women in this age group to stay in school. The 1990-91 recession was responsible for a period of slow employment growth—this had a negative effect on teen participation rates. The percentage of females who were enrolled in school rose from 61 percent in 1990

to 67 percent in 1996 for teens and 23 to 29 percent for 20- to 24-year-olds. Young people enrolled in school are less likely to be in the labor force than are young people who are not in school. Women aged 16 to 24 who were in school had a labor force participation rate of 50 percent in 1996, compared with 72 percent for those not enrolled in school.

The labor force participation rate for women aged 25 to 44 grew rapidly between 1975 and 1985—from 55 percent to 71 percent—and slowed after that, reaching 76 percent in 1996. The increase was led by mothers of children under age 18. The rate for these mothers climbed from 49 percent in 1975 to 65 percent in 1985 and reached 71 percent by 1996. Although more of the women in this age group with no children under

age 18 were in the labor force, compared with mothers, their participation rate gains were smaller, moving from 77 percent in 1975 to 85 percent in 1985. It remained unchanged thereafter. The gap between the participation rate of mothers and that of women with no children under age 18 narrowed sharply, from a 29-percentage point difference in 1975 to a 13-point difference by 1996.

Growth in the participation rate for women aged 45 to 54 followed a different trend. Their rate grew from 55 percent in 1975 to 66 percent in 1985. However, their participation rate continued to grow, reaching 75 percent by 1996. About one-fourth of these women had children under age 18, and their participation rate increased rapidly: from 49 percent in 1975 to 60 percent in 1985. It rose to 76 percent by 1996. For those with no

children under age 18, the growth in labor force participation rate was slower: rising from 59 to 68 percent over the 1975-85 period and to 75 percent by 1996. The gap in the participation rate between the mothers and the women with no children under age 18 narrowed from an 11-percentage point difference in 1975 to a rate that was nearly identical in 1996.

The overall trend in the labor force participation rate of women points toward continuing growth, particularly for women with children. The gains have been slower and more sporadic, however, than they were two decades ago.

Source: Hayghe, H.V., 1997, Developments in women's labor force participation, *Monthly Labor Review* 120(9):41-46.

USDA's Healthy Eating Index and Nutrition Information

Nearly two-thirds of the annual deaths in the United States are traceable to diseases associated with dietary excesses—for example, coronary heart disease, some cancers, stroke, and noninsulin-dependent diabetes mellitus. Estimates show that illnesses and premature deaths resulting from diet-related diseases and conditions cost Americans about \$250 billion a year.

Greater knowledge of the nutrient content of foods and greater awareness of diet-health relationships will lead presumably to more healthful food choices. Improving diet quality through better information has been the goal of recent national campaigns such as USDA's Food Guide Pyramid, Dietary Guidelines for Americans, and the 5 A Day campaign. However, a large gap remains between actual and healthful diets.

In their efforts to achieve further dietary improvements, nutrition educators and public-health professionals face a lack of specifics concerning individuals' use of diet-health information. To understand factors slowing the adoption of healthful diets, these information multipliers need empirical knowledge of how diet-health information and its effect on dietary choices vary across the population. This knowledge can be used to target nutrition education programs, promote and market foods, and forecast food consumption trends.

This report estimates the effect of nutrition information on overall diet quality, as measured by the Healthy Eating Index

(HEI). Researchers controlled for an extensive set of personal and household characteristics that influence both nutrition information and the HEI, simultaneously using several model specifications and estimation methods. The report provides the first look at the influence of socioeconomic characteristics, nutrition knowledge, and awareness of diet-disease relationships on dietary patterns.

Data

The report uses data from USDA's 1989-90 Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS). The CSFII gathers data on what, when, where, and how much Americans eat. Each participant provides 3 consecutive days of dietary data. Social, economic, and demographic characteristics of the survey participants were also collected in the 1989-90 survey; 4,406 households provided information. Each food item eaten was recorded using a coding system containing about 6,700 food codes.

The DHKS obtains information about an individual's knowledge of and attitudes toward diet, health, and food safety issues. The respondent for a household is usually its main-meal planner. In 1989-90, 86.4 percent of the CSFII-participating households completed the DHKS. This study was limited to the main-meal planners of the sample households who responded to both the CSFII and the DHKS. The final sample consisted of 2,442 respondents.

USDA's Center for Nutrition Policy and Promotion developed the HEI—a summary measure—to assess overall diet quality in America. The instrument combines information on the amount and variety of food in the diet and compliance with specific recommendations of the Dietary Guidelines. A score on the Index represents the sum of 10 dif-

ferent dietary components, each with a range of 0 to 10. The Index's 10 dietary components and what they measure are as follows:

- Components 1-5: the extent to which a person's diet conforms to the Food Guide Pyramid serving recommendations for the grain, vegetable, fruit, milk, and meat groups.
- Component 6: total fat consumption as a percentage of total food energy intake.
- Component 7: saturated fat consumption as a percentage of total food energy intake.
- Component 8: total cholesterol intake.
- Component 9: total sodium intake.
- Component 10: the amount of variety in a person's diet over 3 days.

USDA developed a grading scale to rate overall diet quality, as measured by the HEI. The HEI rates scores over 80 as signifying a "good" diet, scores between 51 and 80 as signifying a diet that "needs improvement," and scores less than 51 as signifying a "poor" diet. The table reports results of tabulating the HEI scores and the nutrition information variables against key socioeconomic groups (discussed later). Higher scores were associated with higher levels of income and education. Scores were also higher for females and for nonsmokers.

Nutrition Information Measures

Researchers developed measures of meal planners' nutrition information by using responses to two sets of questions in the DHKS. The first measure was called the "nutrient content knowledge" of meal planners. Respondents were

Nutrition information and the Healthy Eating Index across selected sociodemographic groups

	Nutrient content knowledge (NCK)	Diet-health awareness (DHA)	Healthy Eating Index (HEI)
HEI			
Less than 51	14.41	4.71	44.99
51-80	15.45	5.33	64.79
Greater than 80	16.55	6.04	88.09
Age			
Less than 30	15.09	4.84	59.28
31-49	15.67	5.64	61.51
50-69	15.68	5.44	67.17
Over 69	14.74	4.84	69.33
Gender			
Male	14.75	4.95	60.59
Female	15.56	5.39	64.79
Race			
White	15.74	5.49	64.78
Black	13.76	4.41	59.66
Other	14.12	4.47	63.56
Ethnic origin			
Non-Hispanic	15.55	5.37	64.04
Hispanic	13.56	4.60	64.11
Income per capita			
Less than \$3,801	14.28	4.72	59.52
\$3,801-\$5,400	14.69	4.74	63.47
\$5,401-\$10,200	15.30	5.18	64.52
\$10,201 or above	16.57	6.06	66.83
Education			
Less than high school	14.10	4.53	62.57
High school	15.56	5.20	62.97
More than high school	16.56	6.21	66.67
Vegetarian			
Vegetarian	15.61	5.18	67.21
Nonvegetarian	15.41	5.32	63.95
Smoking			
Smoker	15.04	4.93	58.63
Nonsmoker	15.55	5.45	65.98

Source: Variyam, J.N., Blaylock, J., Smallwood, D., and Basiotis, P.P., 1998, *USDA's Healthy Eating Index and Nutrition Information*, U.S. Department of Agriculture, Technical Bulletin No. 1866.

given a series of binary-choice questions about sources and occurrences of various nutrients in common food items. The minimum score was 0, and the maximum was 21. Respondents correctly answered an average of 15.4 questions.

The second measure was called the “diet-health awareness” variable; it measured the meal planners’ awareness of diet-health problems. The eight questions took this general form: Have you heard about any health problems that might be related to how much of a particular nutrient (fat, fiber, salt, calcium, etc.) a person eats? The diet-health awareness measure was calculated by totaling the positive responses for the eight questions. The minimum score was 0, and the maximum was 8. The average score was 5.33.

Explanatory Variables

Three categories of explanatory variables were hypothesized to affect nutrition information and/or the HEI: Household characteristics, personal characteristics, and survey-related controls. The effect of income was uncertain—although higher income may provide more access to dietary information. Thus, higher income indirectly increases diet quality and intake of meats. Also convenience foods may rise as income increases, producing a negative direct effect on diet quality.

Household size, presence of children, household head status, and employment status of the meal planner were likely to influence both nutrition information and diet quality. Education was expected to have a positive indirect effect on diet quality. Women were expected to have more nutritional information than were men. Because smokers may value health less than do nonsmokers, researchers expected smoking to have a negative direct effect on diet quality. Researchers

also expected vegetarians to have higher HEI scores, compared with their counterparts and expected body mass index (BMI) to have a negative direct effect on HEI scores.

Researchers use four indicators to assess the meal planners' use of various sources of information: Whether the respondent watched television 5 or more hours daily (excessive watching); whether the respondent received dieting advice from a physician or dietitian; whether, when shopping, the respondent always compared nutrients in foods; and whether, when shopping, the respondent sometimes compared nutrients in foods. Excessive television watching was likely to hinder information gathering; whereas, both receiving dietary advice and comparing nutrients while shopping were expected to be correlated positively with nutrition information level.

Findings

A linear ordinary least squares (OLS) model, which did not include information variables, profiled a meal planner with a high HEI score as an older, White, non-smoking, highly educated female, with high household income, low BMI, unemployed or employed part-time, and residing in the Northeast. Other OLS models included nutrition information—either nutrient content knowledge or diet-health awareness—as an explanatory variable. A higher information level was related to better diet quality, as measured by the HEI. Holding other explanatory variables constant, researchers found a 1-percent rise in the score for nutrient content knowledge resulted in a 0.155-percent increase in the HEI, and a 1-percent rise in the diet-health awareness score resulted in a 0.049-percent increase in the HEI. Other models indicated that much of the effect of the sociodemographic variables on the HEI occurred because of nutrition information. The role of

education and income in determining diet quality, as measured by the HEI, appears to be totally information-related.

The estimated effects of gender, race, and ethnicity provided additional evidence about the informational effects of sociodemographic variables on the HEI. By holding all sociodemographic and household characteristics constant, researchers found that the HEI scores of a male meal planner and a female meal planner, both possessing the same level of nutrient content knowledge, did not differ significantly. When nutritional information was held constant, the HEI for Black meal planners was about three points higher than that for White meal planners. Meal planners of other races had HEI scores four points higher than did White meal planners; Hispanic meal planners' HEI scores were eight points higher than those of non-Hispanic meal planners.

However, when nutrition information was allowed to vary, Black and other non-White meal planners had significantly lower nutrient content knowledge than did White meal planners. Likewise Hispanic meal planners had lower HEI scores, compared with non-Hispanic meal planners. Non-White and Hispanic meal planners' relative lack of nutrition information reduced their ability to choose a better quality diet.

When informational effects are controlled, diet quality tends to improve with respondents' age. A latent variable (LV) model showed that 1 year added about one-fifth of a point to the HEI. Also, an additional BMI unit reduced the HEI by a similar amount, and smokers' HEI scores were about 3.5 points lower than nonsmokers' scores.

The HEI and information were unaffected by the presence of children, household size, or gender of the household head. Being a vegetarian produced insignificant effects. Watching more than 5 hours of television a day had a significant negative effect on nutrition information; whereas, the effects of receiving dietary advice from a physician or dietitian and the use of nutrition labels were all positively related to nutrition information. Income and education levels, race, ethnicity, and age also explained variations in HEI scores.

Conclusions

This report makes a strong case that information and knowledge are the keys to improving the American diet. Level of nutrition information has an important influence on the HEI. Researchers found that nutrition information has a significant role in determining diet quality, even after controlling for individual differences in a number of personal and household characteristics, including income, education, age, gender, race, ethnicity, smoking behavior, and body mass index.

Higher education promotes more healthful food choices through better attainment and use of health information. Findings suggest a continued role for nutrition education efforts to close the gap between actual and healthful diets. Main-meal planners who are Black, of "other" race, or Hispanic will benefit from additional nutrition information. These groups should be targeted for nutrition education and promotion efforts, and this should result in a significant improvement of their overall diet quality.

Source: Variyam, J.N., Blaylock, J., Smallwood, D., and Basiotis, P.P. 1998. *USDA's Healthy Eating Index and Nutrition Information*. U.S. Department of Agriculture, Economic Research Service. Technical Bulletin No. 1866.

Eating Breakfast: Effects of the School Breakfast Program

Authorized by the Child Nutrition Act of 1966, the School Breakfast Program started as a pilot program to provide funding for breakfast in poor areas and areas where children had to travel a great distance to school. The intent was to provide a nutritious breakfast to children who might otherwise not receive one. In 1975 the School Breakfast Program became permanent, with the objective of having the program “available in all schools where it is needed to provide adequate nutrition for children in attendance.” To expand the availability of the program, the Child Nutrition Act of 1989 required that the Secretary of Agriculture provide funds to States to support the costs of starting school breakfast programs in low-income areas.

All public and private elementary and secondary schools in the United States are eligible to participate in the School Breakfast Program, and to participate, schools must make breakfast available to all students. Breakfasts in the program are required to provide about one-fourth of the Recommended Dietary Allowance (RDA) for important nutrients over a period of time. To the extent that the School Breakfast Program increases the percentage of children who eat breakfast, the program can be expected to improve children’s diet and school performance.

Studies of the influence of the School Breakfast Program on the likelihood of eating breakfast, however, do not provide strong evidence that children

attending schools with the School Breakfast Program are more likely than other children to eat breakfast. Older studies of the first National Evaluation of School Nutrition Programs (NESNP-1) had mixed results. Data from the 1992 School Nutrition Dietary Assessment study (SNDA-1) suggest that the availability of the School Breakfast Program does not affect whether a student eats breakfast: the percentage of students eating breakfast was the same in schools that participated in the School Breakfast Program as in schools that did not, even after demographic and socioeconomic characteristics were controlled.

Defining Adequate Breakfast

An important issue to consider in examining school breakfast is the definition of breakfast. In the SNDA-1, breakfast was defined as the consumption of at least 50 calories between the time of waking and 45 minutes after the start of school. Recently, what constitutes an adequate or substantive breakfast has been debated; questions have been raised about the 50-calorie cutoff and whether eating breakfast ought to encompass a higher calorie cutoff or be based on foods or food groups.

This report presents findings from a re-analysis of the SNDA-1, which used alternate definitions of breakfast. The re-analysis of SNDA-1 data on the likelihood of eating breakfast includes two main components:

- Review of the literature on breakfast consumption patterns to identify alternate definitions of eating breakfast and, based on this review, recommend alternate definitions.
- Re-analysis of SNDA-1 data using the alternate definitions of breakfast.

Literature on breakfast consumption encompasses a broad range of definitions. Studies examining breakfast consumption fall into two primary groups: (1) those focusing on whether breakfast is eaten and (2) those examining the effects that eating breakfast has on various performance measures. In general, studies that examine whether breakfast is eaten use self-reports of breakfast consumption or whether any food or beverage was consumed after waking in the morning to define breakfast. Studies examining breakfast consumption typically do not use a definition that reflects any minimal calorie content or attempt to define an adequate breakfast. In contrast, studies that focus on the effects that eating breakfast has on cognitive tests and performance measures typically use some minimal calorie content to define breakfast.

Students Eating Breakfast

As the definition of eating breakfast becomes more robust and includes more foods or more calories, the percentage of students who eat breakfast declines (table 1). To illustrate, 88 percent of students consumed some food or beverage, but only 45 percent of students ate a breakfast that included food from at least two of the main food groups and had breakfast intake of food energy greater than 15 percent of the RDA. (The main food groups were milk and milk products, meat and meat alternates, grain products, fruits and fruit juices, and vegetable and vegetable juices.) About 1 of 10 students had a breakfast that was equal to or exceeded what School Breakfast Program meals are designed to offer: food from at least three of the four School Breakfast Program food groups and breakfast intake of food energy greater than 25 percent of the RDA. (The food groups

Table 1. Percentage of students eating breakfast: Alternate definitions

Alternate definition	Percentage eating breakfast		
	Total sample	Elementary school students	Middle and high school students
Any food item consumed	88	93	84
Breakfast intake of food energy >50 Kcal	87	92	83
Breakfast intake of food energy >100 Kcal	84	90	79
Breakfast intake of food energy >150 Kcal	78	83	74
Breakfast intake of food energy >200 Kcal	72	77	68
Breakfast intake of food energy >10 percent of the RDA	69	76	62
Breakfast intake of food energy >15 percent of the RDA	50	54	45
Consuming food from at least two of the main food groups ¹	71	81	62
Consuming food from at least two of the main food groups and breakfast intake >10 percent of the RDA	61	71	53
Consuming food from at least two of the main food groups and breakfast intake >15 percent of the RDA	45	51	40
Consuming food from at least three of the four SBP food groups and breakfast intake >20 percent of the RDA ²	17	20	14
Consuming food from at least three of the four SBP food groups and breakfast intake >25 percent of the RDA ²	11	12	9
Sample size (unweighted)	3,381	1,611	1,770

¹The main food groups are (1) milk and milk products, (2) meat and meat alternates, (3) grain products, (4) fruits and fruit juices, and (5) vegetable and vegetable juices.

²The School Breakfast Program (SBP) food groups are (1) milk and milk products, (2) meat and meat alternates, (e) grain products, and (4) fruits and vegetables or full-strength fruit or vegetable juices.

Source: School Nutrition Dietary Assessment (SNDA-1) data, weighted.

of the School Breakfast Program are milk and milk products, meat and meat alternates, grain products, and fruits and vegetables or full-strength fruit or vegetable juices.) The likelihood of eating any breakfast, regardless of how it is defined, declines with age: 93 percent elementary school students versus 84 percent of middle and high school students.

Case 1 defines breakfast as any food or beverage consumed. Controlling for student and family characteristics, researchers found the difference in the predicted percentage of students eating breakfast with and without a School Breakfast Program being available is small and statistically insignificant for the total sample as well as for students from low-income households (table 2). These results are consistent with earlier

studies that found no effect of the School Breakfast Program on the likelihood of children eating any food or food containing a minimal number of calories.

However, when breakfast is defined as intake of food energy greater than 10 percent of the RDA (Case 2) and still controlling for student and family characteristics, the likelihood of eating breakfast is significantly higher for

Table 2. Predicted percentage of students eating breakfast

Sample	School Breakfast Program	
	Available	Not available
<i>Case 1: Any food or beverage consumed.</i>		
<i>Case 2: Breakfast intake of food energy >10 percent of RDA.</i>		
<i>Case 3: Consumed food from two food groups and breakfast intake of food energy >10 percent of RDA.</i>		
Total sample		
Case 1	88.0	88.8
Case 2	70.6	68.3
Case 3	62.9	60.3
Low-income sample		
Case 1	87.5	86.2
Case 2	73.5**	63.4
Case 3	67.4**	54.8
Elementary school students		
Case 1	94.1	93.1
Case 2	78.6	75.1
Case 3	72.3	69.6
Low-income elementary students		
Case 1	93.4	90.3
Case 2	81.7**	65.9
Case 3	76.8**	62.3

** p<0.01.

Source: School Nutrition Dietary Assessment (SNDA-1) data.

low-income students attending schools with a School Breakfast Program than for comparable students attending schools without it (74 vs. 63 percent). Similarly, when breakfast is defined as consumption of food from two or more food groups and intake of food energy greater than 10 percent of the RDA (Case 3), the predicted percentage of students eating breakfast is significantly higher for low-income students attending schools with a School Breakfast Program

than for comparable students attending schools without it (67 vs. 55 percent).

The estimated effects of the availability of the School Breakfast Program on the likelihood of eating breakfast are largest for low-income elementary students. Two of the more robust definitions of breakfast are (1) consuming food from at least three of the four food groups of the School Breakfast Program and intake greater than 20 percent of the

RDA and (2) consuming food from at least three of the four food groups of the School Breakfast Program and intake greater than 25 percent of the RDA. The predicted percentages of low-income elementary students eating breakfast are significantly higher for students attending schools with a School Breakfast Program than for students attending schools without it. For both of the more robust breakfast definitions, low-income elementary students attending schools with a School Breakfast Program are 23 percent more likely to consume breakfast than similar students attending schools without the School Breakfast Program.

Expansion of the School Breakfast Program is a policy issue currently being debated. The findings from re-analysis of the 1992 School Nutrition Dietary Assessment study suggest that expanding the program to low-income students would be associated with their increased likelihood of consuming a breakfast that included at least 10 percent of the RDA for food energy. In 1992 about two-thirds of low-income students attended schools with the School Breakfast Program, suggesting that a significant percentage of low-income students would be affected by an expansion of the School Breakfast Program.

Source: Devaney, B. and Stuart, E. 1998. *Eating Breakfast: Effects of the School Breakfast Program*. U.S. Department of Agriculture, Food and Nutrition Service. Contract No. 53-3198-7-006.

Research and Evaluation Activities in USDA

From the Cooperative State Research, Education, and Extension Service (CSREES)

The Cooperative State Research, Education, and Extension Service reports on 12 research and evaluation activities that will be of interest to family economists and nutritionists.

Welfare Reform Research

A multi-State research project, "Rural Low-Income Families: Tracing Their Well-Being and Functioning in the Context of Welfare Reform," was launched October 1, 1998, with funding by the State Agricultural Experiment Station. The key objectives of the research are to the following:

- Track over time the individual and family circumstances, functioning, and well-being of rural low-income families with children, in the context of welfare reform.
- Track over time the changing welfare policy environment as well as the community factors that enhance family support for rural low-income families with children.
- Identify and analyze the interactions among welfare policy, community infrastructure, and individual and family circumstances, functioning, and well-being that affect the ability of rural low-income families with children to function in a changed environment of policies and programs.

Focus on Family Economics

A Family Economics Research Coordinating Committee (NCR-52), funded by CSREES and State Agricultural Experiment Stations, has set research priorities for the 21st century—welfare reform, retirement income security, community sustainability, and financial literacy for youth. This committee was the foundation for the research project on welfare reform described previously. In November 1998, committee members met key representatives of research think tanks, government agencies, and nonprofit organizations to launch and nurture partnerships to frame relevant research questions; conduct research; and draw implications for education, outreach, and policy.

Understanding Family Businesses

"Family Businesses: Interaction in Work and Family Spheres," a multi-State research project, has been extended through September 1999 for funding by the State Agricultural Experiment Station. The research project has four objectives:

- To study the relationships among business and family activities, work environments, and family functioning in families with family businesses.
- To identify and measure the divergence and complementarity of family and business management behavior in families that own and manage businesses.
- To compare the relationships between the family and the business in family businesses in three major

subpopulations: home-based, women-owned, and minority-owned businesses with family businesses that are not home-based nor women- or minority-owned.

- To develop research-based information that will assist families and professionals who help families assess the feasibility of establishing and continuing a family business.

Financial Literacy for Youth

Now in its seventh year, CSREES-USDA operates under a Memorandum of Understanding with the National Endowment for Financial Education (NEFE), Denver, to revise, deliver, and evaluate the High School Financial Planning Program. More than a million U.S. youth have completed the seven-part curriculum, which emphasizes concepts such as managing credit, saving to achieve financial goals, and owning and protecting assets. CSREES and NEFE, in partnership with educators in the Cooperative Extension System nationwide, train classroom teachers and youth-serving professionals to deliver the program. A program evaluation study, funded by NEFE and conducted during the 1997-98 school year, established the influence of students' financial management behaviors on tracking expenses, comparison shopping, savings and investments, use of a spending plan (budget), use of credit and debt, auto insurance, and self-efficacy in financial decisionmaking. Preliminary analysis of the data documents significant, positive changes in participants' personal financial knowledge, behavior, and confidence. The program evaluation report was available in October 1998.

Individual Savings Behaviors

“Money 2000” is a nationwide campaign of the Cooperative Extension System and its Federal partner CSREES. The campaign encourages individuals and families to increase savings and reduce debt. Enrollees set financial goals, participate in extension education to learn money management skills, and report progress. State extension services are at various stages of implementing “Money 2000.” A July 1998 report, compiled by Rutgers University, totaled responses from 13 States with 6,538 Money 2000 participants. Four States reported data on the effect of the campaign: the amounts for savings and debt reduction were \$1,568,404 and \$1,366,909, respectively. As Y2K nears, we expect these numbers will grow significantly.

Health Maintenance Aspects of Dietary Recommendations Designed to Modify Lipid Metabolism

The Dietary Guidelines urge Americans to consume diets lower in total fat, saturated fat, and cholesterol and higher in complex carbohydrates, a way to reduce the incidence of chronic diseases, particularly cardiovascular diseases and certain cancers. The overall goal of the 5-year project, NC-167, was to examine the effects of diets that are modified to achieve the goals of the Dietary Guidelines of reducing total fat and saturated fatty acid intakes, of limiting cholesterol intakes, and of increasing polyunsaturated fatty acid and dietary fiber intakes. Examples of published findings are described:

- A butter diet produced a small but significant rise in cholesterol. Margarine containing trans fatty acids did not change serum cholesterol; whereas, soft margarine containing no trans fatty acids reduced serum cholesterol. These results

confirm the role that diets high in saturated fats have in increasing serum cholesterol. Further, they suggest that trans unsaturated fatty acids are not equivalent to the natural (cis) form of fatty acids in their ability to lower serum cholesterol.

- Bone growth and change were influenced by the type of fat in the diet, indicating that the type of dietary fat is important in development.
- Compounds in soy (isoflavones) inhibited the development of the early stage of liver cancer.
- Fibers of different viscosities reduce plasma cholesterol in a predictable manner in several animal models and humans, indicating that degree of viscosity of food fibers is important in lowering cholesterol.

Nutrition and Health Research

Two multi-State research projects were renewed for funding for another 5 years by State Agricultural Experiment Stations on October 1, 1997. The overall goal of the project “Role of n-3/n-6 Polyunsaturated Fatty Acids in Health Maintenance” (NC-167) is to determine the quantitative importance of n-3 polyunsaturated fatty acids (PUFA) and the ration of n-3/n-6 PUFA on various nutritional and functional markers associated with optimal health and disease prevention. The specific objective is to evaluate the efficacy of these dietary modifications to reduce the risk of cardiovascular disease and cancer and to promote bone development and perinatal health. The objectives of the project “Nutrient Bioavailability” (W-143) are to determine factors affecting bioavailability of selected nutrients that maximize health and disease prevention and to construct models of metabolism to predict optimal vitamin and mineral intakes.

Food Demand and Consumption Behavior

Scientists from 23 land-grant universities recently completed work on “Food Demand and Consumption Behavior,” a 5-year research project (S-216). An important area of work has been the development and evaluation of widely used databases, such as the creation of a new database from Consumer Expenditure Surveys, to fill a void in price information; the establishment of historical records of supermarket scanner data and advertising databases as alternative information sources; and the development of data sets for studying the away-from-home food market. This project has also led to several breakthroughs in the development and formulation of theoretical and applied models that provide more accurate assessments of changing patterns of food demand and consumer behavior. The findings have significant implications for the agribusiness community, agricultural policies, and assessments of the health and dietary status of the population. Specifically, efforts identified important determinants of changes in food habits and nutritional adequacy, addressed consumers’ concerns about food safety and quality, and studied issues related to food program costs. Use <http://agecon.lib.umn.edu/s216.html> to get more details.

Dietary Fat and Fiber: Knowledge, Perceived Risk, and Dietary Practices

This project (W-182) examined the public’s attitudes, knowledge, and behaviors related to the Dietary Guidelines about fat and fiber. Almost 3,200 surveys were returned from adults in 10 States and the District of Columbia. The public was more likely to link fat rather than fiber or fruits and vegetables to chronic diseases, particularly heart disease. Respondents were also more likely to practice dietary behaviors that

reduced fat than practice behaviors that increased fiber: such as eating more fruits and vegetables. Those who rated "health" as the primary influence on their dietary choices were eating more healthful diets relative to both fat and fiber than those who rated other influences as most important. The general public was also compared to registered dietitians and those with diagnosed chronic diseases. Both of these subgroups, particularly the registered dietitians, had substantially more healthful diets than did the public.

Competitive Grants Program on Improving Human Nutrition for Optimal Health

The Nutrition, Food Quality, and Health area of the National Research Initiative Competitive Research Grants Program supports research that contributes to our understanding of appropriate dietary practices throughout the life cycle and factors that affect these requirements, such as gender, race, and ethnicity. In addition, new insights are needed about factors that affect consumers' attitudes and behavior toward food. We need to improve understanding of the role of foods and their components (e.g., phytochemicals) in promoting health. Data from these studies will be used for updating dietary recommendations, formulating national nutrition policy, and encouraging new developments by the food industry. The following areas of research are emphasized:

- Nutritional requirements including metabolism and utilization for all age groups
- Bioavailability of dietary components
- The interrelationships among dietary components

- Mechanisms underlying the relationship between diet and optimal health, for example, influence of dietary components on the immune, cardiovascular, and central nervous systems
- Cellular and molecular mechanisms influencing nutritional status, such as those mechanisms responsible for the influence of dietary components on gene expression
- Identification of obstacles to consumers' adoption of healthful food habits, with particular emphasis on factors affecting consumer attitudes and behavior
- Development of recommendations for interventions to improve nutritional status

More information can be found at <http://www.reeusda.gov/crgam/nri/programs/progdesc/nutrdiv.htm>.

EFNEP Evaluation/Reporting System

The Evaluation/Reporting System was redesigned to enhance its usefulness in measuring the influence of other nutrition education programs. It has been in use since 1993 and originally was designed to measure the effects of the Expanded Food and Nutrition Education Program (EFNEP). EFNEP Evaluation/Reporting System, version-4 (ERS4), is a Windows-based program that captures demographic data on clients, staff, and volunteers; measures interagency cooperation; and measures clients' behavior changes related to dietary intakes (nutrient and food groups), food resource management, nutrition practices, and food safety. A new module measures perinatal influences, the start and duration of breastfeeding, and infant-feeding practices.

A Master Question Database allows for the selection of up to 15 additional questions for each client subgroup, and it includes measures of money management, parenting, and physical activity, as well as more detailed assessment of the core behaviors measured in the base system. The integrated system provides detailed reports at the local, State, and Federal levels. Copies were distributed in April 1998 throughout the Land-Grant University System and to other government agencies and organizations. A webpage (www.reeusda.gov/ers4/home.htm) provides background information, frequently asked questions, software updates, and announcements.

Nutrition Education Cost-Benefit Study

Researchers at Virginia Polytechnic Institute and State University have been working on the development of a cost-benefit analysis of nutrition education programs, with a focus on EFNEP in Virginia. Data from the EFNEP Evaluation/Reporting System were used to calculate the number of participants who improved their dietary intakes to levels associated with reduced risk of chronic diseases. Once completed, the study protocol will be distributed for use as a model in other States and/or programs to measure program affects.

Federal Statistics: USDA Food and Nutrition Programs

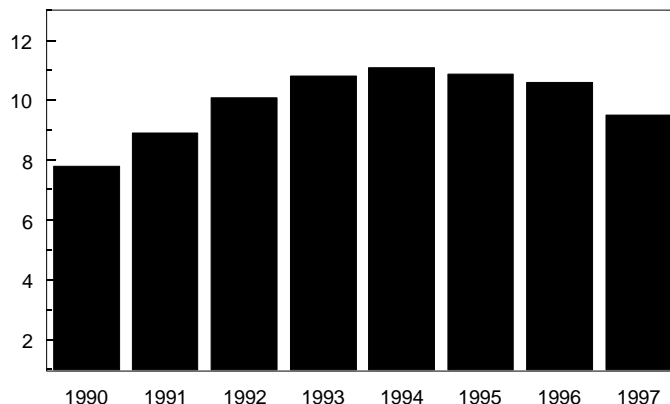
USDA Food and Nutrition Programs Provide Nutrition Safety Net

The U.S. Department of Agriculture administers the Nation's major domestic food assistance programs. These programs provide a nutrition safety net to people in need. The goals of these food assistance programs are to provide needy people with access to a more nutritious diet, to improve the eating habits of children, and to help farmers by providing an outlet to distribute foods purchased under commodity price-support and surplus-removal programs. Three of the major food assistance programs are the Food Stamp Program, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the National School Lunch and Breakfast Programs.

Participation in Food Stamp Program Declines in Recent Years:

The Food Stamp Program is the largest U.S. food assistance program, with outlays of \$19.6 billion in 1997. Most participants receive monthly allotments of coupons that are redeemable for food at authorized retail food stores. A growing number of participants receive an Electronic Benefits Transfer (EBT) card, which operates like a bank card. From 1990 to 1994, the number of households receiving food stamps increased. Thereafter the number declined.

Number of households receiving food stamps (in millions), 1990-97

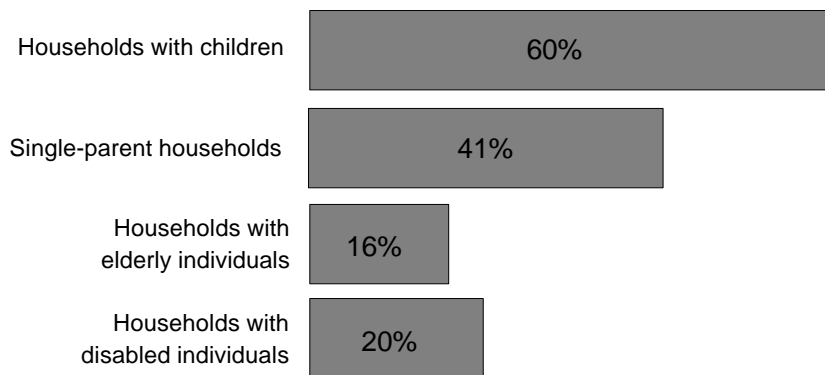


Source: U.S. Department of Agriculture, Food and Nutrition Service, 1998, unpublished tables.

Most Food Stamp Households Have Children:

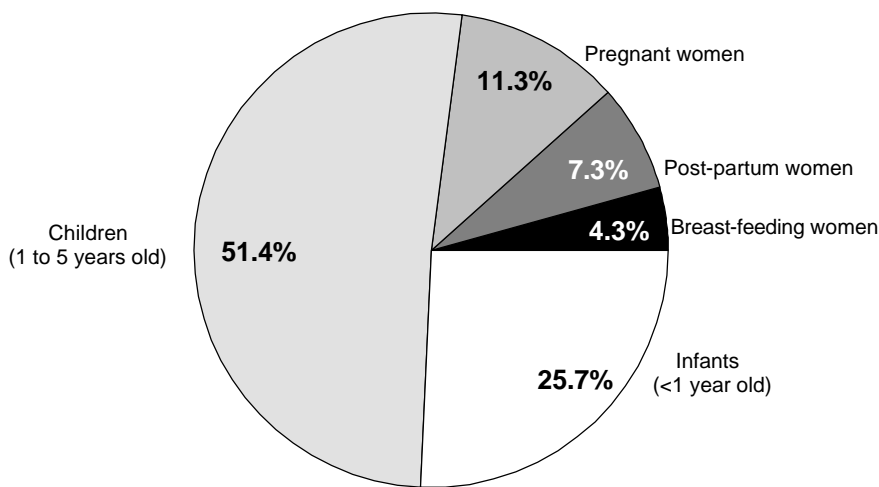
The Food Stamp Program is designed to address the basic nutritional needs of all eligible low-income households or individuals. Eligibility and benefits are based on household size, household assets, and income (gross and net). A large percentage of households receiving food stamps are composed of single parents and their children. Sizable percentages of food stamp households also contain elderly individuals (adults age 60 and over) as well as disabled individuals (adults less than age 65 who receive Supplemental Security Income and those age 18 to 61 who receive Social Security, veterans benefits, or other governmental benefits as a result of disability).

Composition and selected characteristics of households receiving food stamps, 1996



Source: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis and Evaluation, 1998, Characteristics of Food Stamp Households, Fiscal Year 1996.

People enrolled in the WIC Program, 1996

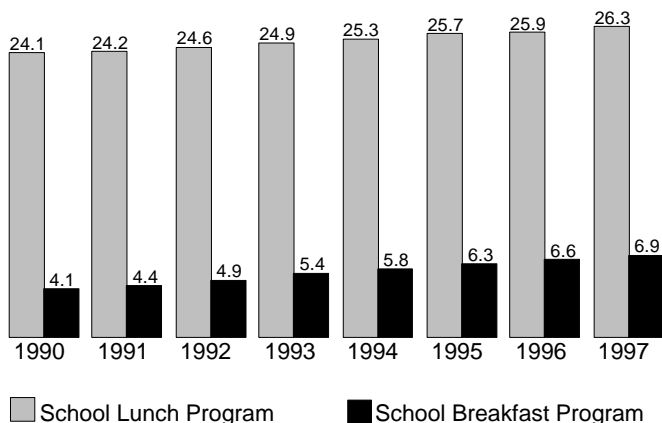


Source: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis and Evaluation, 1998, *Study of WIC Participant and Program Characteristics 1996, Final Report*.

Young Children Are Primary Recipients of WIC Benefits:

The WIC Program provides supplemental foods, nutrition education, and access to health care services to needy women, infants, and children. Participants receive vouchers that can be redeemed at retail food stores for specific foods (milk, juice, cereal, for example) that are rich sources of the nutrients frequently lacking in the diet of low-income mothers and children. In 1996, a little more than half of WIC participants were children (1 to 5 years old). Infants accounted for about one-quarter of participants; pregnant, post-partum, or breast-feeding women accounted for the remainder. Unlike the Food Stamp Program, the WIC Program must operate within annual funding levels established by Congress. Not all eligible participants are guaranteed benefits.

Number of children participating in National School Lunch and Breakfast Programs (in millions), 1990-97



Source: U.S. Department of Agriculture, Food and Nutrition Service, 1998, unpublished tables.

Participation in School Breakfast Program Is Increasing:

Most school children eat a lunch provided through the National School Lunch Program. More than half of these children receive the meal free or at a reduced price. A growing number of children are participating in the National School Breakfast Program. In 1997, about 6.9 million children participated in the School Breakfast Program, up from 4.1 million children in 1990. Low-income children may qualify to receive school breakfast free or at a reduced price. Both programs provide cash reimbursements and commodity foods for meals served in nonprofit food services in elementary and secondary schools and in residential child care institutions.

Official USDA Food Plans: Cost of Food at Home at Four Levels, U.S. Average, December 1998¹

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:								
1-2 years	\$15.30	\$18.90	\$22.20	\$26.90	\$66.30	\$81.90	\$96.20	\$116.60
3-5 years	16.60	20.60	25.50	30.60	71.90	89.30	110.50	132.60
6-8 years	20.50	27.50	34.10	39.70	88.80	119.20	147.80	172.00
9-11 years	24.40	31.10	39.70	46.00	105.70	134.80	172.00	199.30
MALE:								
12-14 years	25.20	35.10	43.50	51.10	109.20	152.10	188.50	221.40
15-19 years	25.90	36.10	45.00	51.90	112.20	156.40	195.00	224.90
20-50 years	27.90	35.90	44.70	54.20	120.90	155.60	193.70	234.80
51 years and over	25.10	34.20	42.10	50.50	108.80	148.20	182.40	218.80
FEMALE:								
12-19 years	25.10	30.30	36.70	44.30	108.80	131.30	159.00	192.00
20-50 years	25.20	31.40	38.20	49.00	109.20	136.10	165.50	212.30
51 years and over	24.70	30.50	37.90	45.40	107.00	132.20	164.20	196.70
FAMILIES:								
FAMILY of 2³:								
20-50 years	58.40	74.00	91.20	113.50	253.10	320.90	395.10	491.80
51 years and over	54.80	71.20	88.00	105.50	237.40	308.40	381.30	457.10
FAMILY OF 4:								
Couple, 20-50 years and children—								
1-2 and 3-5 years	85.00	106.80	130.60	160.70	368.30	462.90	565.90	696.30
6-8 and 9-11 years	98.00	125.90	156.70	188.90	424.60	545.70	679.00	818.40

¹Basis 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 *Family Economics Review*, No. 1 (1984). The food plans are based on 1977-78 Nationwide Food Consumption Survey data updated to current dollars using the Consumer Price Index for specific food items.

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

³Ten percent added for family size adjustment.

Consumer Prices

Consumer Price Index of all urban consumers [1982-84=100], selected years

GROUP	Annual average percent change from previous year			Percent change 12 months ending with December 1998
	1990	1995	1997	
All Items	5.4	2.8	2.3	1.6
Food	5.8	2.8	2.6	2.3
Food at home	6.5	3.3	2.5	2.1
Food away from home	4.7	2.3	2.8	2.5
Housing	4.5	2.6	2.6	2.3
Apparel and upkeep	4.6	-1.0	.9	-0.7
Transportation	5.6	3.6	.9	-1.7
Medical care	9.0	4.5	2.8	3.4
Entertainment	4.7	2.5	2.1	NA
Recreation	NA	1.9	2.3	1.2
Education and communication	NA	3.8	3.3	0.7
Other goods and services	4.7	4.2	4.4	8.8

Food	Price per pound unless otherwise noted (as of December in each year)			December 1998
	1990	1995	1997	
Flour, white, all purpose	\$.24	\$.24	\$.28	\$.28
Rice, white, long grain, uncooked	.49	.55	.58	.54
Spaghetti and macaroni	.85	.88	.88	.88
Bread, white	.70	.84	.88	.87
Beef, ground, uncooked	1.63	1.40	1.39	1.39
Pork chops, center cut, bone-in	3.32	3.29	3.39	3.03
Chicken, fresh, whole	.86	.94	1.00	1.06
Tuna, light, chunk	2.11	2.00	2.03	2.22
Eggs, Grade A, large, per dozen	1.00	1.16	1.17	1.09
Milk, fresh, lowfat, per gallon	NA	2.31	2.41	2.76
Butter, salted, grade AA, stick	1.92	1.73	2.46	3.18
Apples, red delicious	.77	.83	.90	.85
Bananas	.43	.45	.46	.51
Oranges, navel	.56	.64	.58	.61
Potatoes, white	.32	.38	.37	.38
Lettuce, iceberg	.58	.61	.70	.64
Tomatoes, field grown	.86	1.51	1.62	1.80
Broccoli	NA	.76	.93	.97
Carrots, short trimmed and topped	.43	.53	.50	.54
Onions, dry yellow	NA	.41	.46	NA
Orange juice, frozen concentrate per 16 oz.	2.02	1.57	1.67	1.68
Sugar, white, 33-80 oz. pkg.	.40	.39	.41	.41
Margarine, stick	.87	.79	.80	NA
Peanut butter, creamy	2.09	1.78	1.73	1.79
Coffee, 100% ground roast	2.94	3.51	4.16	3.45

NA = Data not available for publication.

Selected items from CPI Detailed Reports, Bureau of Labor Statistics, various issues. Consumer Price Index data are considered a better measure over time than actual price data. All data rounded to the nearest cent.

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Family Economics and Nutrition Review
gratefully acknowledges the reviewers of manuscripts for 1998 issues.

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