Special Article

A COMPARISON OF DIETARY TRENDS AMONG RACIAL AND SOCIOECONOMIC GROUPS IN THE UNITED STATES

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ABSTRACT

Background There may be dietary differences among racial and socioeconomic groups in the United States.

Methods Using data from a representative sample of adults, we compared dietary trends among blacks and whites of varying socioeconomic status. We developed comparable measures of diet and of the consumption of macronutrients and food groups for 6061 participants in the 1965 Nationwide Food Consumption Surveys, 16,425 in the 1977–1978 Nationwide Food Consumption Surveys, and 9920 in the 1989–1991 Continuing Survey of Food Intake by Individuals (all conducted by the U.S. Department of Agriculture). The primary outcome was the score (range, 0 to 16) on the Diet Quality Index, a composite of eight food-and-nutrient-based recommendations from the National Academy of Sciences. A score of 4 or less was considered to indicate a relatively more healthful diet, and a value of 10 or more a relatively less healthful diet.

Results Overall dietary quality improved in all groups, from a mean Diet Quality Index score of 7.4 in 1965 to 6.4 in 1989–1991. In 1965, blacks of low socioeconomic status and, to a lesser extent, whites of low socioeconomic status had better diets than whites of high socioeconomic status. By the 1989–1991 survey, the differences among racial and socioeconomic groups had narrowed. In 1965, 9.3 percent of whites of low socioeconomic status, 16.4 percent of blacks of low socioeconomic status, and 4.7 percent of whites of high socioeconomic status had mean scores of 4 or less. In the 1989–1991 survey, the respective percentages were 19.9, 23.5, and 20.0. Fat consumption decreased in all groups. The consumption of fruits and vegetables varied little over time, except for an increase among blacks of medium and high socioeconomic status. The consumption of grains and legumes increased over time among whites of medium and high socioeconomic status and declined among blacks of low socioeconomic status.

Conclusions In 1965, there were large differences among groups in dietary quality, with whites of high socioeconomic status eating the least healthful diet, as measured by the index, and blacks of low socioeconomic status the most healthful. By the 1989–1991 survey, the diets of all groups had improved and were relatively similar. (N Engl J Med 1996;335:716–20.)

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ALTHOUGH research on patterns of obesity and serum cholesterol concentrations suggests possible differences in diet according to race and socioeconomic status, few nationally representative studies in the United States describe dietary differences related to race or income.^{1–4} In general, blacks consume less fat and energy than whites, but more cholesterol.⁵ A cross-sectional analysis found that blacks also consume fewer fruits and vegetables than whites.⁶ Dietary trends over time have not been systematically explored, and the analyses have been limited by the use of aggregate food-group categories that do not reflect important patterns in the intake of fat and fiber. The use of household data, rather than data on individual diets, has also limited previous work.^{7–10}

We used data on individual diets from a representative sample of the United States population to compare dietary trends in racial and socioeconomic groups between 1965 and 1989–1991.

METHODS

Survey Design and Sample

From over 60,000 participants in three U.S. Department of Agriculture (USDA) surveys, we selected the nonpregnant adults (18 years of age or older) who were either white or black and for whom dietary data were available as our final sample. Of these 32,406 subjects, 6061 were respondents to the 1965 Nationwide Food Consumption Surveys, 16,425 to the 1977–1978 Nationwide Food Consumption Surveys, and 9920 to the 1989–1991 Continuing Survey of Food Intake by Individuals. These USDA surveys are administered to stratified probability samples of households of the noninstitutionalized population in the 48 conterminous states. The 1977–1978 and 1989–1991 surveys were both conducted in four waves (winter, spring, summer, and fall), each of which surveyed a different sample.^{11–13} The 1965 survey gathered data on individual diets in a single sample in the spring.¹⁴ These surveys were multistage, stratified samples of the U.S. population in defined geographic areas. For each survey, response rates differed among the surveyed subgroups. Thus, weights, derived from the response rate for each subgroup, could be used to permit inferences applicable to the total noninstitutionalized U.S. population.^{11,12,14}

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Categories of socioeconomic status were based on education and income. Respondents with over 12 completed years of education and an income that was more than 350 percent of poverty level were categorized as having high socioeconomic status; respondents with less than a high-school education and an income less than 185 percent of poverty level were categorized as having low socioeconomic status. Estimates of variance in the study are frequently larger for blacks because of their smaller number in each of the three surveys. Of note is the disproportionately small number of blacks of high socioeconomic status.

Dietary Data

In each survey, interviewers asked respondents, in the respondents' homes, to recall their diet over a one-day period (a one-day dietary recall). Information was collected on everything the respondents ate inside or outside the home. The 1977–1978 and 1989–1991 surveys also included two self-administered one-day food records. To avoid biasing the results because of different methods of data collection, we used only the information from the interviewer-administered record of dietary intake in each survey.

The 1994 USDA Nutrient Database was used to calculate the nutrient value of the food intake. A linking program was used to assign the same food code to comparable items in each period. Values from the 1994 Nutrient Database were then applied to the three data sets to provide consistent estimates of nutrient composition over time. The use of a nutrient data base developed in the 1990s to assign macronutrient values to food consumed in earlier periods should not artificially create significant differences in measurements of food energy and fat content.^{15,16}

Food Grouping

In order to examine changes in the quantity of foods consumed over time, we developed dietary measures, including measures of macronutrients and of food groups, that could be applied to the data from all three surveys. The food-grouping system disaggregates the major USDA food groups into 56 more distinct nutrient-based groups, according to fat and dietary-fiber composition; these groups included all the foods that respondents reported eating.^{8,10} (A copy of the food-grouping system is available from the authors.)

Diet Quality Index

The primary measure we selected to illustrate the observed trends was the Diet Quality Index, a composite of eight recommendations regarding the consumption of foods and nutrients from the National Academy of Sciences (Table 1).¹⁷ This index reflects the risk gradient associated with diet for major diet-related chronic diseases. Respondents who met a given dietary goal received a score of 0; those whose consumption fell within approximately 30 percent of the goal were given a score of 1; and those whose consumption differed by more than 30 percent from the goal were given a score of 2. The scores for all eight dietary goals were totaled, so that the index ranged from 0 to 16 (the lower the score, the better the diet). Details of the index's rationale, construction, and validity appear elsewhere.^{18,19} For the purposes of our analysis, a Diet Quality Index score of 4 or less was considered to represent a relatively more healthful diet, and a value of 10 or more a relatively less healthful diet; respondents with a Diet Quality Index score of 4 or less by definition met at least four of the eight dietary recommendations.¹⁷

Descriptive statistics on individual dietary components and the overall distribution of dietary outcomes among the respondents to each survey were generated according to race and socioeconomic status.

RESULTS

Overall, dietary quality improved between 1965 and 1989–1991. The mean ($\pm$ SE) Diet Quality In-

dex score changed from 7.4 ± 0.02 to 6.4 ± 0.01 . This improvement was seen in all racial and socioeconomic groups (Table 2). Differences in the mean Diet Quality Index score according to race and socioeconomic status have narrowed. Within the groups of low and medium socioeconomic status, the proportion of blacks with Diet Quality Index scores of 4 or less exceeded that of whites in each period. In 1965 and 1977–1978, the proportion of people with a Diet Quality Index score of 4 or less was lower in the groups of high socioeconomic status than in the groups of lower status. Notably, the upward shift in the percentage of people with a score of 4 or less was greater among whites than blacks for low- and high-socioeconomic-status groups.

By 1989–1991, whites of high socioeconomic status had the largest increase in the percentage of people with Diet Quality Index scores of 4 or less. In 1965, 9.3 percent of whites of low socioeconomic status, 16.4 percent of blacks of low socioeconomic status, and 4.7 percent of whites of high socioeconomic status had mean Diet Quality Index scores of 4 or less; in 1989–1991, the respective percentages were 19.9, 23.5, and 20.0. In 1965, 10.7 percent of whites of low socioeconomic status, 6.1 percent of blacks of low socioeconomic status, and 16.7 percent of whites of high socioeconomic status had mean Diet Quality Index scores of 10 or more. In

TABLE 1. THE DIET QUALITY INDEX.

RECOMMENDATION*	SCORE†	INTAKE
Reduce total fat intake to 30% or less of total energy	0 1 2	$\leq 30\%$ >30–40% >40%
Reduce saturated-fatty-acid intake to less than 10% of energy	0 1 2	<10% 10–13% >13%
Reduce cholesterol intake to less than 300 mg daily	0 1 2	<300 mg 300–400 mg >400 mg
Eat 5 or more servings daily of vegetables and fruits	0 1 2	≥ 5 servings 3–4 servings 0–2 servings
Increase intake of starches and other complex carbohydrates by eating 6 or more servings daily of breads, cereals, and legumes	0 1 2	≥ 6 servings 4–5 servings 0–3 servings
Maintain protein intake at moderate levels (levels lower than twice the RDA)	0 1 2	<100% RDA 100–150% RDA >150% RDA
Limit total daily intake of sodium to 2400 mg or less	0 1 2	≤ 2400 mg sodium >2400–3400 mg sodium >3400 mg sodium
Maintain adequate calcium intake (approximately the RDA)	0 1 2	$\geq 100\%$ RDA 67–99% RDA <67% RDA

*RDA denotes Recommended Daily Allowance.

†Scores for the eight recommendations are totaled to generate a Diet Quality Index score for a respondent (range, 0 to 16).

TABLE 2. MEAN DIET QUALITY INDEX SCORES AND DISTRIBUTION OF INDIVIDUAL SCORES OF ≤ 4 OR ≥ 10 , ACCORDING TO SOCIOECONOMIC STATUS AND RACE FOR EACH SURVEY.*

RACE AND VARIABLE	SOCIOECONOMIC STATUS								
	LOW			MEDIUM			HIGH		
	1965	1977-1978	1989-1991	1965	1977-1978	1989-1991	1965	1977-1978	1989-1991
Whites									
No. of respondents	2146	3144	3195	2845	8619	3994	381	2716	1415
Mean ($\pm$ SE) score	7.2 $\pm$ 0.03	6.8 $\pm$ 0.03	6.3 $\pm$ 0.03	7.7 $\pm$ 0.03	7.1 $\pm$ 0.02	6.6 $\pm$ 0.02	7.8 $\pm$ 0.08	7.3 $\pm$ 0.03	6.4 $\pm$ 0.05
Score ≤ 4 (% of respondents)	9.3	12.9	19.9	5.6	9.4	17.9	4.7	8.5	20.0
Score ≥ 10 (% of respondents)	10.7	6.7	4.4	15.1	9.5	6.8	16.7	12.4	6.6
Blacks									
No. of respondents	504	1065	948	179	763	328	6†	118	40
Mean ($\pm$ SE) score	6.6 $\pm$ 0.08	6.5 $\pm$ 0.05	6.2 $\pm$ 0.05	7.2 $\pm$ 0.14	6.7 $\pm$ 0.06	6.4 $\pm$ 0.09	—	7.3 $\pm$ 0.17	6.0 $\pm$ 0.28
Score ≤ 4 (% of respondents)	16.4	18.2	23.5	10.0	14.4	22.8	—	6.7	2.7
Score ≥ 10 (% of respondents)	6.1	5.0	4.1	12.2	4.4	5.1	—	14.4	0

*The lower the Diet Quality Index score, the better the diet.

†The sample was too small to present meaningful results.

TABLE 3. INTAKE OF DIETARY COMPONENTS ACCORDING TO SOCIOECONOMIC STATUS AND RACE FOR EACH SURVEY.*

RACE AND COMPONENT	SOCIOECONOMIC STATUS								
	LOW			MEDIUM			HIGH		
	1965	1977-1978	1989-1991	1965	1977-1978	1989-1991	1965	1977-1978	1989-1991
Whites									
No. of respondents	2146	3144	3195	2845	8619	3994	381	2716	1415
Energy from fat (%)	38.8 $\pm$ 0.2	37.4 $\pm$ 0.1	34.1 $\pm$ 0.1	39.5 $\pm$ 0.2	38.1 $\pm$ 0.1	34.8 $\pm$ 0.1	39.1 $\pm$ 0.4	38.2 $\pm$ 0.1	34.2 $\pm$ 0.2
Energy from saturated fat (%)	14.2 $\pm$ 0.1	13.4 $\pm$ 0.1	11.9 $\pm$ 0.1	14.7 $\pm$ 0.1	13.7 $\pm$ 0.04	12.2 $\pm$ 0.1	14.4 $\pm$ 0.2	13.8 $\pm$ 0.1	11.6 $\pm$ 0.1
Cholesterol (mg)	426 $\pm$ 6	334 $\pm$ 4	272 $\pm$ 4	462 $\pm$ 6	347 $\pm$ 3	276 $\pm$ 4	452 $\pm$ 14	362 $\pm$ 5	261 $\pm$ 5
Fruits and vegetables (no. of servings)	4.3 $\pm$ 0.04	4.5 $\pm$ 0.03	4.3 $\pm$ 0.03	4.5 $\pm$ 0.03	4.6 $\pm$ 0.02	4.5 $\pm$ 0.03	4.7 $\pm$ 0.09	4.9 $\pm$ 0.03	4.8 $\pm$ 0.06
Grains and legumes (no. of servings)	4.6 $\pm$ 0.06	4.3 $\pm$ 0.04	4.5 $\pm$ 0.04	4.1 $\pm$ 0.05	4.2 $\pm$ 0.02	4.7 $\pm$ 0.04	3.7 $\pm$ 0.11	3.9 $\pm$ 0.04	4.7 $\pm$ 0.06
Protein (% of RDA)	147 $\pm$ 2	130 $\pm$ 1	125 $\pm$ 1	166 $\pm$ 2	145 $\pm$ 0.7	139 $\pm$ 1	170 $\pm$ 4	149 $\pm$ 1	138 $\pm$ 2
Sodium (mg)	3519 $\pm$ 42	3015 $\pm$ 28	3137 $\pm$ 30	3673 $\pm$ 37	3249 $\pm$ 18	3467 $\pm$ 30	3601 $\pm$ 94	3298 $\pm$ 30	3399 $\pm$ 46
Calcium (% of RDA)	82 $\pm$ 1	74 $\pm$ 1	80 $\pm$ 1	86 $\pm$ 1	80 $\pm$ 1	88 $\pm$ 1	86 $\pm$ 3	88 $\pm$ 1	93 $\pm$ 2
Blacks									
No. of respondents	504	1065	948	179	763	328	6†	118	40
Energy from fat (%)	37.2 $\pm$ 0.4	36.7 $\pm$ 0	34.9 $\pm$ 0.3	38.9 $\pm$ 0.7	37.3 $\pm$ 0.3	34.7 $\pm$ 0.5	—	39.5 $\pm$ 0.8	32.6 $\pm$ 1.2
Energy from saturated fat (%)	12.8 $\pm$ 0.2	12.5 $\pm$ 0.1	11.7 $\pm$ 0.1	13.9 $\pm$ 0.3	12.7 $\pm$ 0.1	12.1 $\pm$ 0.2	—	13.8 $\pm$ 0.3	10.1 $\pm$ 0.4
Cholesterol (mg)	441 $\pm$ 12	392 $\pm$ 8	305 $\pm$ 8	502 $\pm$ 25	399 $\pm$ 10	311 $\pm$ 15	—	379 $\pm$ 23	281 $\pm$ 37
Fruits and vegetables (no. of servings)	4.2 $\pm$ 0.12	4.5 $\pm$ 0.08	4.1 $\pm$ 0.07	4.5 $\pm$ 0.16	4.7 $\pm$ 0.08	5.4 $\pm$ 0.16	—	3.9 $\pm$ 0.11	5.0 $\pm$ 0.33
Grains and legumes (no. of servings)	5.5 $\pm$ 0.14	4.7 $\pm$ 0.08	4.5 $\pm$ 0.07	4.5 $\pm$ 0.29	4.6 $\pm$ 0.09	4.5 $\pm$ 0.14	—	4.0 $\pm$ 0.20	3.8 $\pm$ 0.45
Protein (% of RDA)	153 $\pm$ 4	142 $\pm$ 2	132 $\pm$ 2	179 $\pm$ 7	144 $\pm$ 2	142 $\pm$ 4	—	145 $\pm$ 6	132 $\pm$ 10
Sodium (mg)	3643 $\pm$ 84	3136 $\pm$ 52	3086 $\pm$ 60	3630 $\pm$ 152	3110 $\pm$ 55	3470 $\pm$ 111	—	2981 $\pm$ 172	3095 $\pm$ 274
Calcium (% of RDA)	73 $\pm$ 2	62 $\pm$ 1	60 $\pm$ 1	73 $\pm$ 3	63 $\pm$ 2	77 $\pm$ 3	—	66 $\pm$ 5	76 $\pm$ 9

*The results were weighted to permit inferences applicable to the total noninstitutionalized U.S. population. Plus-minus values are means $\pm$ SE.

†The sample was too small to present meaningful results.

1989–1991, the respective percentages were 4.4, 4.1, and 6.6.

Examination of the components of the Diet Quality Index reveals that by 1989–1991 the proportion of energy derived from fat dropped from nearly 40 percent in some groups to less than 35 percent for both races in all socioeconomic groups (Table 3). Blacks reported a marginally lower percentage of energy derived from saturated fat than whites in all periods, and by 1989–1991 the mean among blacks of high socioeconomic status approached the Diet Quality Index's target of 10 percent. The consumption of dietary cholesterol declined in all groups over time. The consumption of fruits and vegetables varied little over time, except that blacks of medium and high socioeconomic status increased their mean number of servings of these foods by one, to approach or meet the recommended five servings a day. In 1965, the consumption of grains and legumes was near the recommended level of six or more servings daily among blacks of low socioeconomic status. However, the mean number of servings in this group declined over time, from 5.5 in

1965 to 4.5 in 1989–1991. The consumption of grains and legumes, however, increased over time among whites of medium and high socioeconomic status, from, for example, 3.7 servings a day for whites of high socioeconomic status in 1965 to 4.7 in 1989–1991. Excessive consumption of protein and sodium declined over time; declines in the intake of protein were greatest among blacks of medium socioeconomic status and whites of high socioeconomic status, and declines in sodium consumption were greatest among blacks of low socioeconomic status. The differences in calcium intake related to race widened over time, with whites consuming more than blacks and groups of higher socioeconomic status consuming more than those of lower socioeconomic status.

To illustrate changes in consumption between 1965 and 1989–1991, the changes in the mean intake of foods from selected food groups by whites and blacks of low socioeconomic status and whites of high socioeconomic status are shown in Table 4. Blacks of high socioeconomic status are excluded because of the small sample in 1965. In 1989–1991,

TABLE 4. DIETARY INTAKE FROM FOOD GROUPS IN THE 1989–1991 SURVEY AND PERCENTAGE CHANGE FROM THE 1965 SURVEY.*

FOOD GROUP	LOW SOCIOECONOMIC STATUS				HIGH SOCIOECONOMIC STATUS	
	WHITES		BLACKS		WHITES	
	g	% change	g	% change	g	% change
Low-fat milk	120.3	+607	44.8	+92	163.4	+256
High-fat milk	0.3	–92	1.3	–66	0.17	–99
Low-fat cheese	3.9	–38	0.77	–61	4.1	–65
High-fat cheese	8.3	+130	5.2	+271	12.2	+72
Butter and margarine	5.8	–55	4.4	–56	6.1	–50
Egg items	22.4	–45	32.4	–24	16.8	–52
Low-fat red meat	44.7	–13	42.3	–6	41.4	–47
Low-fat poultry	24.4	+77	19.5	–26	36.3	+157
Low-fat lunch meats	4.9	+965	4.5	+350	5.0	+1512
Low-fat fish	9.0	+52	5.1	+8	21.4	+21
High-fat red meat	7.2	–71	4.2	–89	3.2	–89
Bacon	2.3	–63	4.5	–54	1.4	–76
Low-fiber, low-fat bread	27.3	–52	32.2	–42	12.3	–69
High-fiber, low-fat bread	18.1	+135	10.0	+212	28.6	+135
Pasta, rice, cooked cereals	56.8	+66	94.3	+8	52.9	+224
High-fat grain-based mixes	38.4	+331	26.7	+187	60.7	+483
High-fiber ready-to-eat cereals	6.0	+150	2.7	+1476	12.7	+225
Citrus fruits	45.1	+18	49.9	+53	82.1	–18
Other fruits	51.8	–4	29.5	–24	71.5	–25
Dark-green and orange vegetables	17.5	+21	26.5	+3	24.6	+44
Other vegetables	64.2	–9	32.2	–26	89.3	–21
Soups	47.5	+53	31.6	+259	38.7	+21
Soy products and legumes	29.3	0	22.8	–24	19.5	+156

*Data are from the 1965 Nationwide Food Consumption Survey and the 1989–1991 Continuing Survey of Food Intake by Individuals. The food groups shown have been selected from those we derived for this study. Amounts are given in grams per capita per day. Blacks of high socioeconomic status are not listed because of the small number of such respondents in the 1965 survey.

whites of high socioeconomic status consumed low-fat foods more frequently than the other surveyed groups, reduced their intake of some high-fat foods, and increased their intake of high-fiber foods and nutrient-rich vegetables. Whites of low socioeconomic status increased their intake of low-fat foods over time, but the reductions in their intake of high-fat foods were smaller than those of whites of high socioeconomic status. Whites of low socioeconomic status also had smaller increases in their consumption of high-fiber foods and nutrient-rich dark-green and orange vegetables than whites of high socioeconomic status.

In 1989–1991 as compared with 1965, blacks of low socioeconomic status consumed low-fat foods more frequently and reduced their intake of some high-fat foods such as high-fat milk, red meat, and bacon, but they had a greater increase in the consumption of high-fat cheese than the other groups. However, the number of grams of high-fat cheese consumed per capita by blacks of low socioeconomic status was still less than in the other groups. Blacks of low socioeconomic status also markedly increased their consumption of ready-to-eat high-fiber cereals and citrus fruits. They also decreased their consumption of vegetables other than dark-green and orange vegetables.

DISCUSSION

In general, the dietary patterns we examined with the Diet Quality Index suggest two main trends. First, the differences among racial and socioeconomic groups have narrowed over time. The overall improvement in mean Diet Quality Index scores over time reflects changing consumption patterns and increasing acceptance of dietary recommendations. The fat-related components of the index (consumption of cholesterol and of total and saturated fat) and protein intake follow this pattern; however, the mean number of servings of fruits and vegetables and the consumption of grains either have remained constant or have decreased in some groups, such as whites and blacks of low socioeconomic status. Changes related to food groups are more complex to interpret but generally show that whites of high socioeconomic status reduced their consumption of items in high-fat food groups and conformed to other dietary guidelines to a greater extent than did either whites or blacks of medium and low socioeconomic status.

Second, improvements in diet were more likely to occur in the groups of high socioeconomic status. With so few high-income blacks surveyed in 1965, we cannot describe trends in this group as clearly as we can in other groups, but our results suggest that this subgroup is more similar to whites of high so-

cioeconomic status than to blacks of low socioeconomic status. In summary, although in 1965 there were large differences in dietary quality, with whites of high socioeconomic status eating the worst diets, as measured by the Dietary Quality Index, and blacks of low socioeconomic status the best, by 1989–1991, the diets of all groups were relatively similar.

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