

Adherence to the Food Guide Pyramid recommendations among Japanese Americans, Native Hawaiians, and whites: Results from the Multiethnic Cohort Study

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ABSTRACT

The Food Guide Pyramid is designed to help Americans make healthful food choices. Whereas national data have been collected to examine adherence to the pyramid recommendations in whites, African-Americans, and Latinos, there are virtually no data available for Japanese Americans or Native Hawaiians. Here we present data on intakes of the Food Guide Pyramid food groups (as servings per day) as well as of the components of the pyramid tip (discretionary fat, added sugar, and alcohol) in these ethnic groups and examine adherence to each of the food group recommendations. Degree of adherence to the fruit group recommendation was similar among the ethnic groups and energy-intake categories, but adherence to the other recommendations was greatest for those consuming more than 2,800 kilocalories per day. However, subjects in this energy-intake group also consumed more than three times as much discretionary fat, added sugar, and alcohol. *J Am Diet Assoc.* 2003;103:1195-1198.

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The Food Guide Pyramid is designed to help Americans make healthful food choices, to ensure nutrient recommendations are met, and to reduce the risk of chronic diseases (1,2). Recommendations for daily servings of grains, vegetables, fruits, dairy products, and meat (including meat alternatives, given as meat ounce equivalents per day) are based on age and energy intake, as well as guidance on the avoidance of discretionary fat, added sugar, and alcohol (pyramid tip) (3).

Diet is associated with risk for cardiovascular disease (CVD) and cancer and has been studied in terms of individual food components such as nutrients, flavonoids, and other phytochemicals (4,5). Although such studies are important in understanding the underlying mechanisms and etiology of diseases, they are of limited use in making practical dietary recommendations to reduce risk factors for chronic diseases because people consume foods and not just individual nutrients. Therefore, studies focusing on usual eating patterns, food groups, and overall diets are more applicable in the development of meaningful public health messages (6,7).

Ethnic groups in the United States have different dietary patterns and distinct rates of chronic diseases. For example, Japanese Americans and other Asian groups have lower mortality rates from CVD and certain cancers than other ethnic groups (8,9). To examine ethnic differences in diet and disease, the Multiethnic Cohort collected comprehensive dietary data primarily from Japanese Americans, Native Hawaiians, and whites in Hawaii, and from African Americans and Latinos in Los Angeles (10). Because no data on pyramid servings' intake have been published for Japanese Americans and Native Hawaiians, we present these data, and for comparison we present data on the white subjects in the Multiethnic Cohort. The degree of adherence to the Food Guide Pyramid recommendations in these three ethnic groups is also evaluated.

METHODS

The Multiethnic Cohort included more than 215,000 individuals, including population samples of Japanese Americans, Native Hawaiians, and whites. Individuals between age 45 and 75 years in 1993 to 1996 completed a mailed self-administered quantitative food

Table 1
Mean age, BMI, energy and Food Guide Pyramid servings^a intake per day for each sex and ethnic group

	Hawaiian men	Hawaiian women	Japanese-American men	Japanese-American women	White men	White women
N	5,979	7,650	25,893	28,355	21,933	25,303
			<i>mean ± standard deviation</i>			
Age (y)	57±8.7	56±8.7	61±9.2	61±8.9	59±9.1	59±9.0
BMI ^b	28.5±5.1	28.0±6.1	24.7±3.3	23.1±3.8	26.0±4.0	25.2±5.2
Energy (kcal)	2,760±1,311	2,370±1,263	2,255±833	1,808±678	2,283±899	1,805±703
Total Grain	10.4±5.2	8.8±5.0	9.6±3.9	7.7±3.2	7.7±3.6	6.4±3.1
Whole-grain	2.0±1.9	2.1±1.9	1.8±1.6	1.8±1.5	2.3±1.7	2.1±1.6
Non-whole-grain	8.3±4.4	6.6±4.0	7.8±3.5	5.9±2.8	5.4±2.8	4.3±2.3
Total Vegetables	5.5±3.8	5.9±4.4	4.6±2.8	4.7±2.8	4.7±2.8	4.7±2.9
Dark green	0.7±0.7	0.8±0.8	0.7±0.6	0.7±0.7	0.6±0.6	0.6±0.7
Deep yellow	0.5±0.6	0.6±0.7	0.5±0.5	0.6±0.6	0.5±0.5	0.5±0.6
Potato	0.5±0.5	0.4±0.4	0.4±0.3	0.3±0.2	0.6±0.6	0.5±0.4
Starchy	0.7±1.0	0.8±1.2	0.2±0.2	0.2±0.2	0.3±0.3	0.3±0.3
Tomato	0.7±0.5	0.7±0.5	0.5±0.4	0.4±0.3	0.8±0.6	0.7±0.5
Other vegetables	2.4±1.8	2.6±2.0	2.4±1.5	2.5±1.6	2.0±1.4	2.1±1.5
Total Fruit	3.2±3.2	3.9±4.0	2.8±2.5	3.5±2.8	3.1±2.6	3.3±2.7
Citrus, melons, and berries	1.4±1.6	1.6±1.9	1.2±1.3	1.5±1.6	1.3±1.4	1.4±1.4
Other fruit	1.8±2.0	2.3±2.4	1.6±1.5	1.9±1.6	1.8±1.6	1.9±1.7
Total Dairy	1.2±1.0	1.3±1.1	0.8±0.7	0.8±0.7	1.6±1.1	1.5±1.0
Milk	0.8±0.9	0.9±0.9	0.5±0.6	0.6±0.6	0.9±0.8	0.9±0.8
Yogurt	0.04±0.1	0.1±0.2	0.04±0.1	0.1±1.5	0.1±0.2	0.1±0.3
Cheese	0.3±0.3	0.03±0.3	0.2±0.2	0.2±0.2	0.5±0.4	0.5±0.4
Total Meats, Meat Alternatives (oz)	7.3±4.5	6.0±4.1	5.8±3.1	4.4±2.4	5.5±3.0	4.0±2.3
All meat, fish and poultry	6.2±4.1	5.1±3.6	4.8±2.8	3.6±2.1	4.5±2.7	3.3±2.1
Meat	2.4±1.8	1.9±1.5	1.7±1.2	1.2±0.9	1.7±1.3	1.1±0.9
Organ meat	0.04±0.1	0.04±0.2	0.03±0.1	0.02±0.1	0.03±0.1	0.02±0.1
Frankfurter/sausage/lunch meats	0.6±0.6	0.4±0.5	0.4±0.4	0.3±0.3	0.5±0.5	0.3±0.3
Poultry	1.8±1.7	1.6±1.5	1.6±1.3	1.3±1.1	1.5±1.3	1.3±1.1
Fish	1.3±1.3	1.1±1.1	1.0±0.9	0.8±0.7	0.7±0.7	0.5±0.5
Egg	0.5±0.5	0.3±0.3	0.4±0.3	0.2±0.2	0.4±0.4	0.3±0.3
Soy	0.2±0.3	0.2±0.3	0.2±0.3	0.2±0.2	0.1±0.2	0.1±0.1
Nuts	0.3±0.4	0.2±0.4	0.2±0.3	0.2±0.3	0.3±0.3	0.2±0.2
Legumes	0.2±0.3	0.2±0.3	0.2±0.2	0.1±0.2	0.3±0.4	0.3±0.4

^aThe Food Guide Pyramid recommendations are based on daily energy intake: 0-1,600 kcal: 6 servings grain, 3 servings vegetables, 2 servings fruit, 2-3 servings dairy, 5 oz of meat or meat alternatives; 1,601-2,200 kcal: 6 servings grain, 3 servings vegetables, 3 servings fruit, 2-3 servings dairy, 5 oz of meat or meat alternatives; 2,201-2,800 kcal: 9 servings of grain, 4 servings vegetables, 3 servings fruit, 2-3 servings dairy, 6 oz of meat or meat alternatives; more than 2,800 kcal: 11 servings of grain, 5 servings of vegetables, 4 servings fruit, 2-3 servings dairy, 7 oz of meat or meat alternatives.

frequency questionnaire (FFQ). The FFQ was developed specifically for the study population based on 3-day measured food records from approximately 60 men and 60 women, age 45 to 75 years, from each ethnic group. This identified a list of foods for inclusion on the FFQ that contributed more than 85% of the intake of fat, dietary fiber, vitamin A, carotenoids, and vitamin C. Traditional foods of each ethnic group were also included irrespective of their contribution to nutrient intake. A calibration substudy was conducted and showed acceptable correspondence between the questionnaire and multiple 24-hour recalls for the ethnic and gender groups being studied (11).

We compared the usual intake of energy and Food Guide Pyramid servings and adherence to the Food Guide Pyramid recommendations among the

three ethnic groups. Using servings specified in the Food Guide Pyramid, the Pyramid Servings Database file identified the number of servings provided per 100 g for a wide variety of foods reported during the 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII) (12). The Cancer Research Center of Hawaii (CRCH) food composition table was expanded to include Food Guide Pyramid servings of many traditional foods consumed in Hawaii that were not reported in the US national surveys and had to be matched to foods on the Pyramid Servings Database (13). Foods that comprised many food items, such as recipes, were first disaggregated into their components. The daily number of Food Guide Pyramid servings was computed for each individual by summing the servings across the reported food

items (14). A person was defined as adhering to the Food Guide Pyramid if the number of Food Guide Pyramid servings consumed met or exceeded that recommended for their energy intake category.

RESULTS AND DISCUSSION

As shown in Table 1, Native Hawaiian men and women had the greatest daily energy intake and the highest mean body mass index (BMI); Japanese Americans had the lowest BMI. Native Hawaiians consumed the most daily servings for all food groups except dairy products. The grain group showed the most difference in number of servings among the ethnic groups; Japanese American men consumed 2 more servings per day than white men. The sub-food groups provide further data on the types of foods eaten in the main food groups.

Table 2

The percentage of each ethnic group by gender and energy intake, A) *not* consuming the recommended number of Food Guide Pyramid servings and B) intakes from the Pyramid Tip

	Men ^a	Women ^a	0-1,600 kcal	1,600-2,200 kcal	2,201-2,800 kcal	>2,800 kcal
Grain	← % →					
Hawaiian	35	46	76	27	44	35
Japanese-American	27	41	63	13	29	22
White	57	63	85	39	60	46
Vegetables						
Hawaiian	39	31	57	28	34	23
Japanese-American	42	34	56	27	31	27
White	39	35	54	26	30	29
Fruit						
Hawaiian	64	52	56	63	54	50
Japanese-American	63	46	54	57	48	52
White	59	48	53	57	48	54
Dairy^b						
Hawaiian	84	88	100	98	96	83
Japanese-American	97	95	100	99	98	95
White	81	76	98	94	87	74
Meat + Meat Alternatives						
Hawaiian	45	58	91	57	47	23
Japanese-American	56	74	93	62	50	30
White	75	96	93	69	58	40
Discretionary Fat (g/day)						
Hawaiian	75	65	32	51	67	113
Japanese-American	56	45	30	46	61	89
White	65	50	33	52	70	103
Added Sugar (tsp/day)						
Hawaiian	17	15	7	11	15	27
Japanese-American	11	9	6	9	12	18
White	14	11	7	11	15	23
Alcohol (drinks/day)^c						
Hawaiian	1.2	0.3	0.2	0.5	0.6	1.3
Japanese-American	0.9	0.1	0.2	0.4	0.6	1.2
White	1.4	0.6	0.5	0.9	1.2	2.0
Sample sizes (N)						
Hawaiian	5,979	7,650	3,304	3,280	2,604	4,441
Japanese-American	25,893	28,355	18,303	17,248	10,354	8,343
White	21,933	25,303	16,490	14,490	8,718	7,537

^aThe Food Guide Pyramid recommendations are based on daily energy intake (see Table 1 footnote "a" for more details).

^bFor dairy the current recommendation for those older than 50 years is 3 servings, but we have used 2 servings per day as the standard so we could compare our data with the CSFII results.

In Table 2 we present data on degree of nonadherence to the Food Guide Pyramid recommendations by gender (based on energy intake) and by energy intake category. A greater percentage of women than men adhered to the recommendations for fruits and vegetables.

For subjects who consumed less than 1,600 kcal, at least half (53%–100%) across all ethnic groups did not meet the recommended number of servings; dairy servings were the least likely to be met, and this pattern was seen in all energy intake categories.

The percentage that did not meet the recommendations for fruit was similar between the ethnic groups and energy intake categories (50%–65%). For vegetables, the degree of adherence to the recommendations was similar among

the ethnic groups in each energy intake category but varied substantially among energy intake categories. For example, more than 50% of all ethnic groups did not meet the number of total servings recommended in the lowest energy intake category (<1,600 kcal/day), but these figures decreased to half of that (26%–28%) for all ethnic groups in the 1,600 to 2,200 kcal category because the recommended number of vegetable servings remained constant.

The group of subjects consuming more than 2,800 kcal/day had a much smaller percentage not meeting the recommendations compared with those who consumed less than 1,600 kcal/day. However, subjects in the highest energy intake group also consumed more than three times as much

discretionary fat, added sugar, and alcohol as those consuming less than 1,600 kcal. This illustrates the importance of examining all components of the diet, as is done by the Dietary Guidelines in its promotion of the Food Guide Pyramid as a tool to ensure nutritional adequacy and avoidance of excessive macronutrient intakes.

There is no information available on Food Guide Pyramid serving intake for Japanese Americans or Native Hawaiians from any national survey or other study for comparison. However, we compared our data for white adults to those who participated in CFSII 1994–1996 (12). The number of daily servings from CSFII for non-Hispanic white males are given, followed by those from Multiethnic Cohort white males in parentheses: grains 7.9 (7.7); vegetables

4.2 (4.7); fruit 1.5 (3.1); dairy 2.4 (1.6); meat (including meat alternatives, in meat ounce equivalents) 6.2 (4.0). The greatest differences between the two surveys are fruit, dairy, and meat, perhaps because the men surveyed in CSFII were much younger (20 years and older) than in our sample (45 years and older). Residents in Hawaii and California may also have a diet that is lower in meat and dairy and higher in fruit than those in national surveys.

A further explanation for differing intake estimates could be the difference in the survey methods. Data collected in the Multiethnic Cohort used a FFQ, whereas CSFII used 24-hour recalls. Underreporting is a well-known problem with virtually all diet assessment methods (15-17). However, the FFQ used in the Multiethnic Cohort seems to capture total intake relatively well (10,11). Mean energy intakes from the Multiethnic Cohort were several hundred kilocalories more for both men and women than those in national surveys. Thus, although underreporting may have inflated the percentage not meeting the recommendations, this effect should be less for the Multiethnic Cohort FFQ.

The Multiethnic Cohort deliberately sought a representative population sample. Although there necessarily was some selection bias due to the voluntary nature of participation in the study, we demonstrated that several characteristics of the sample were comparable to data from the US census for Hawaii and California (10).

The Food Guide Pyramid was based on recommendations for nutrient intakes that were released more than a decade ago and that recently have changed substantially (18-21). When the Food Guide Pyramid was developed, there were less data available for ethnic minority groups than today. While food guides have been developed for specific cultural groups (22), none of these guides was developed using the USDA's protocol to ensure nutrient adequacy (23). The Food Guide Pyramid is currently under review, and if it is to continue to meet the objectives of improving the diets of the US population (24-26), data on many ethnic groups must be considered, both in terms of inadequate intake and excess intake.

APPLICATIONS

Results from this study have the following practical implications for nutrition professionals:

■ When giving dietary advice, consider ethnic variations in the diet and tailor advice to the food habits of each group.

■ Dairy product consumption is low in all ethnic groups, and therefore calcium intake is of concern. If dairy products are not being consumed, other sources of calcium, such as fish (with soft bones) or supplements need to be encouraged, particularly in Asians who may be lactose intolerant (27).

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