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An Examination of Consumers' Rankings of the Dietary Recommendations

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The results suggest that when given the opportunity to assign importance rankings to nine dietary recommendations, consumers rank the recommendation for daily intake of fruits and vegetables the highest. Additionally, the ranking for fruit and vegetable intake is uniform for all three racial groups: Caucasians, African-Americans, and other races. However, about 69 percent of the 1,300 consumers agree or strongly agree that there are so many dietary recommendations about healthy ways to eat that it is hard to know what to believe.

The *Dietary Guidelines for Americans*, initially published in 1980 and at five-year intervals since, are designed to provide consumers with science-based recommendations to promote healthier food choices and physical activity. Thus at each five-year interval the dietary recommendations have incorporated any new scientific findings or societal issues regarding diet and health. Most recently, the recommendations have been reflecting scientific evidence linking diet, weight gain, and reduced physical activity to life-threatening diseases such as cardiovascular diseases, type-2 diabetes, hypertension, osteoporosis, and certain types of cancers. As the U.S. overweight and obesity rates have risen over the past two decades, the *Guidelines* now contain specific recommendations for diet, weight status, and physical activity.

At their core, the 2005 *Guidelines* recommend that individuals "consume a variety of nutrient-dense foods and beverages from within and among the basic food groups while choosing foods that limit the intake of saturated and *trans* fats, cholesterol, added sugars, salt, and alcohol" (*Dietary Guidelines* 2005). Expanded recommendations suggest that consumers do the following: (1) use salt or sodium in moderation or that they limit daily intake to about one teaspoon or 2,300 milligrams per day; (2) choose a diet that is low in fat, saturated fat, and cholesterol by reducing total fat intake to between 20 and 35 percent of calories; (3) choose a variety of fruits and vegetables from

all five vegetable subgroups (dark green, orange, legumes, starchy vegetables, and other vegetables); (4) choose fiber-rich fruits, vegetables, and whole grains very often; (5) consume at least two servings of dairy products daily; and (6) maintain a healthy weight by decreasing calories from foods and beverages and by increasing physical activity (*Dietary Guidelines* 2005).

Despite the health benefits embedded in the dietary recommendations and rapid weight gains in a large percentage of the population in the United States and the rest of the world, research continues to indicate that the recommended daily intake levels often fall below the dietary guidelines. This finding has led some researchers to suggest that either consumers do not understand the guidelines or they are having difficulties incorporating them into their fast-paced lifestyles, which often involve eating away from home (Atienza et al 2008; Baker and Wardle 2003; Larson et al. 2008; Marantz, Bird, and Alderman 2008; Shepherd and Towler 1992; Striegel-Moore et al. 2006; Trudeau et al. 1998; Woolf and Nestle 2008). To address these issues, researchers have been using creative intervention strategies such as personal digital assistants (PDAs) to expand nutritional knowledge and track dietary intake. For example, Atienza et al. (2008) used PDAs to track vegetable and whole-grain intake and found that consumers recorded higher intake levels for these food groups when recorded on PDAs than on paper. As use of cellular telephones, text messaging, ipods, and MP3 players grows in the future, these technologies could enhance the delivery and assessment of nutritional information to the public (Atienza et al. 2008).

Baker and Wardle (2003) also observed that in spite of the widely known health benefits from eating fruits and vegetables, the general public has

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limited understanding of what the real benefits are or how much should be eaten. Fruits and vegetables are important components of a healthy diet; however, most Western countries fall below the recommended five servings per day. Widespread dissemination of nutritional information on consumption of fruits and vegetables and disease prevention has had only marginal effects on nutritional awareness. In fact, less than 20 percent of the U.S. population knows the health benefits of consuming fruits and vegetables. Their research further suggests that men are less likely to consume the recommended daily allowances than are to women, and that these gender differences may start as early as childhood (Baker and Wardle 2003). Research also suggests that there are only small correlations between nutritional knowledge about fat intake from meat, meat and dairy products, and fried foods and attitudes toward diet (Shepherd and Towler 1992).

Given these findings and the fact that eating patterns and behavioral modifications vary by socioeconomic, demographic, cultural, and regional factors, our study examines how the *Dietary Guidelines for Americans* are perceived by consumers in Louisiana.

Objectives

This study examines how Caucasians, African-Americans, and other races rank the importance of the following dietary recommendations: low in cholesterol, adequate fiber, plenty of fruits and vegetables, low in fat, low in saturated fat, low in salt or sodium, low in sugars, a variety of foods, and maintaining a healthy weight. This study also assesses beliefs about the overall usefulness of the dietary recommendations.

Data and Procedures

Data were compiled from a 2002 survey of 1,300 primary grocery shoppers and/or meal preparers in Louisiana. Consumers were given a five-point scale ranging from (1) "not at all important" to (5) "extremely important" and asked to rank the importance of the selected recommendations. They also were asked to provide their levels of agreement or disagreement with the following statement: "There are so many recommendations about healthy ways to eat, it is hard to know what to believe."

Responses to this statement were measured as (1) "strongly disagree," (2) "somewhat disagree," (3) "neutral," (4) "somewhat agree," and (5) "strongly agree." Response categories for the selected recommendations and racial groups are coded as follows: cholesterol (CHOLEST); fiber (FIBER); fruits and vegetables (FRUITVEG); fat (LOWFAT); saturated fat (LOWSAT); salt or sodium (SODIUM); sugars (SUGARS); variety of foods (VARIETY); weight (WEIGHT); Caucasians (WHITE); African-Americans (AFRICAN); other races (OTHER).

Because of the ordinal nature of the response categories, we used the Kruskal-Wallis (K-W) Rank Test statistic to generate mean ranks for the three ethnic groups. The K-W Rank Test statistic can be written as

$$(1) H = \frac{12}{N(N+1)} \left(\frac{R_1^2}{n_1} + \frac{R_2^2}{n_2} + \dots + \frac{R_k^2}{n_k} \right) - 3(N+1),$$

where N is the total number of observations in all samples combined; k is the number of samples; R_1 is the sum of ranks for sample 1; and n_1 is the number of observations in Sample 1 (Triola 2001). For Sample 2, the sum of ranks is R_2 and the number of observations is represented by n_2 . Similar notations apply to the other samples. If the data have ranks R instead of original values x , Triola (2001) suggests that many components are predetermined, and that the sum of all ranks can be expressed as $N(N+1)/2$.

Equation 2 combines the weighted variances of ranks to produce the test statistics:

$$(2) H = \frac{12}{N(N+1)} \sum n_i \left(\bar{R}_i - \bar{R} \right)^2,$$

where $\bar{R}_i = \frac{R_i}{n_i}$ and $\bar{R} = \frac{\sum R_i}{\sum n_i}$ (Triola 2001).

Under the K-W test the null hypothesis for a particular response category is that the rankings are the same across racial groups. The alternative hypothesis is that at least one of the rankings differs across groups. For large samples, the test statistic can be approximated by the chi-square distribution with $k - 1$ degrees of freedom.

Empirical Results and Discussion

Based on the sample, the average age of the respondents was 47 years old; about 24 percent were college graduates; 74 percent were women; the average household size was three persons; 49 percent were married; 69 percent were Caucasians; 27 percent were African-Americans; four percent were other races; and about 70 percent of the respondents had household incomes below \$35,000. Respondents ranked the nine dietary recommendations as follows: FRUITVEG (5.74); WEIGHT (5.66); CHOLEST (4.99); LOWFAT (4.92); VARIETY (4.87); FIBER (4.84); LOWSAT (4.83); SUGARS (4.58); SODIUM (4.58). These mean rankings are statistically significant at the one-percent level of significance ($\chi^2 = 439.541$), and suggest that the three racial groups assign different levels of importance to each of the nine dietary recommendations.

Table 1 shows the importance rankings for Caucasians, African-Americans, and other races; the dietary recommendations are listed in the order in which they are ranked by all respondents. There are statistically significant differences in how the three racial groups rank the dietary recommendations for cholesterol, fat, sugars, and sodium. African-Americans assign higher mean rankings for cholesterol (693.10) and for fat (698.48) than do Caucasians, who assign scores of 634.02 and 634.97 to cholesterol and fat, respectively. Because their rankings exceed those for Caucasians and other races, it appears that African-Americans place higher premiums on the recommendations for intake of cholesterol and fat than do those of other races. Conversely, Caucasians assign higher importance rankings to the recommendations for sugars (666.12) and sodium (665.63) than do African-Americans and other races.

No statistically significant differences are evident among the rankings for recommendations on fruits and vegetables, maintaining a healthy weight, variety of foods, fiber, and saturated fat. Therefore the groups seem to regard these recommendations roughly about the same. All consumers gave the highest mean ranking to the recommendation on intake of fruits and vegetables. When the data are disaggregated across racial groups, the recommendation is statistically insignificant, suggesting that all consumers recognize the importance of having fruits and vegetables in their diets on a daily basis.

Because the dietary guidelines are designed to help Americans make healthier food choices, we also assessed consumers' beliefs about the recommendations. About 69 percent of the respondents strongly or somewhat agree with the statement that there are so many recommendations about healthy ways to eat that it is hard to know what to believe (Table 2). Consumers who strongly agree with the statement are more likely to rank cholesterol, variety of foods, and fiber content highly. Those who strongly disagree with the statement rank fruits and vegetables, maintaining a healthy weight, and saturated fat highest among the recommendations. There are no statistically significant differences in how consumers regard the recommendations for fat, sugars, and sodium. Given these findings, the dietary guidelines need to do a better job of delineating what constitutes a variety of foods, how to restrict cholesterol intake, and how to increase daily intake of fiber.

Conclusion

This study examines consumers' perceptions of nine recommendations from the 2000 *Dietary Guidelines for Americans*. The results suggest that of the nine selected recommendations, consumers rank the recommendation for fruits and vegetables highest in terms of importance. Although the ranking was uniform across the three racial groups, 45 percent of the consumers who believed that it was extremely important to eat fruits and vegetables daily also strongly agreed that there were too many dietary recommendations. This finding is troubling because consumption of fruits and vegetables has been associated with reductions in cardiovascular diseases, diabetes, and various cancers, and less than 20 percent of the U.S. population knows the health benefits of consuming fruits and vegetables (Atienza et al. 2008; Baker and Wardle 2003).

The results also suggest that the levels of importance consumers place on other recommendations vary across racial groups. For example, African-Americans assign greater importance to choosing a diet low in cholesterol and fat than do Caucasians and other races, while Caucasians rank choosing a diet low in sugars and sodium higher than do African-Americans and other races. Importance rankings for maintaining a healthy weight, fiber, variety of foods, and saturated fats are invariant

Table 1. Importance Rankings of Dietary Recommendations by Racial Groups.

	Race	Mean ranks	χ^2	P-value
FRUITVEG	WHITE	645.80	2.062	0.357
	AFRICAN	670.32		
	OTHER	611.72		
WEIGHT	WHITE	644.38	4.527	0.104
	AFRICAN	678.41		
	OTHER	588.46		
CHOLEST	WHITE	634.02	6.884**	0.032
	AFRICAN	693.10		
	OTHER	661.68		
LOWFAT	WHITE	634.97	8.378**	0.015
	AFRICAN	698.48		
	OTHER	618.23		
VARIETY	WHITE	660.35	2.711	0.258
	AFRICAN	623.23		
	OTHER	653.61		
FIBER	WHITE	653.51	1.706	0.426
	AFRICAN	652.83		
	OTHER	593.02		
LOWSAT	WHITE	648.07	1.332	0.847
	AFRICAN	659.39		
	OTHER	637.92		
SUGARS	WHITE	666.12	5.862*	0.053
	AFRICAN	617.96		
	OTHER	596.92		
SODIUM	WHITE	665.63	5.721*	0.057
	AFRICAN	620.54		
	OTHER	590.16		

* and ** imply statistical significance at the ten-percent and five-percent levels of probability, respectively.

to ethnicity. One criticism often levied against the *Dietary Guidelines for Americans* is that they contain so many recommendations and that consumers have a difficult time knowing what to believe. Our results suggest that many consumers strongly agree with that assessment for the recommendations pertaining to cholesterol, variety of foods, and fiber, but strongly disagree with regards to fruits and vegetables, maintaining a healthy weight, and saturated fats.

For more than 25 years the *Dietary Guidelines for Americans* have been used to disseminate nutritional information to consumers, yet U.S. rates of overweight and obesity continue to climb. This has led some researchers to suggest that consumers either do not understand the recommendations or they are having problems incorporating them into their diets. Thus other strategies should be explored to facilitate greater compliance with the recommendations. Research indicates some success in improving dietary intake and behavior when computer-based technologies are used to record intakes. Given the explosion in mobile technologies such as cellular telephones, text messaging, ipods, and MP3 players, researchers may be able to use these tools in the future to expand nutritional knowledge and compliance with the dietary recommendations.

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Table 2. Overall Beliefs about the Dietary Recommendations.

	Responses	Mean ranks	χ^2	P-value
FRUITVEG	Strongly disagree	693.12	11.1645**	0.025
	Somewhat disagree	616.00		
	Neutral	673.13		
	Somewhat agree	608.70		
	Strongly agree	665.10		
WEIGHT	Strongly disagree	699.70	15.960***	0.003
	Somewhat disagree	609.16		
	Neutral	583.88		
	Somewhat agree	611.41		
	Strongly agree	674.60		
CHOLEST	Strongly disagree	643.48	8.067*	0.089
	Somewhat disagree	604.15		
	Neutral	598.41		
	Somewhat agree	632.29		
	Strongly agree	676.80		
LOWFAT	Strongly disagree	692.15	5.758	0.218
	Somewhat disagree	627.40		
	Neutral	598.47		
	Somewhat agree	629.05		
	Strongly agree	655.12		
VARIETY	Strongly disagree	642.88	10.466**	0.034
	Somewhat disagree	635.48		
	Neutral	631.34		
	Somewhat agree	606.89		
	Strongly agree	681.94		

*, **, and *** imply statistical significance at the ten-, five-, and one-percent levels of probability, respectively.

Table 2. Overall Beliefs about the Dietary Recommendations (Continued).

	Responses	Mean ranks	χ^2	P-value
FIBER	Strongly disagree	657.55		
	Somewhat disagree	635.64		
	Neutral	556.65		
	Somewhat agree	608.52		
	Strongly agree	685.33	15.328***	0.004
LOWSAT	Strongly disagree	679.58		
	Somewhat disagree	610.87		
	Neutral	603.78		
	Somewhat agree	614.98		
	Strongly agree	675.36	10.718**	0.030
SUGARS	Strongly disagree	663.87		
	Somewhat disagree	618.56		
	Neutral	595.48		
	Somewhat agree	638.13		
	Strongly agree	660.84	3.804	0.433
SODIUM	Strongly disagree	646.84		
	Somewhat disagree	634.86		
	Neutral	601.77		
	Somewhat agree	631.91		
	Strongly agree	665.00	3.218	0.522

*, **, and *** imply statistical significance at the ten-, five-, and one-percent levels of probability, respectively.