

Role of Demographics, Knowledge, and Attitudes

Fats and Cholesterol

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Among the numerous factors affecting dietary choices, nutrition knowledge and beliefs about foods and health—or “diet-health information”—is the most amenable to change. Presumably, heightened awareness of diet-health relationships, favorable attitudes about healthy eating, and better knowledge of the nutrient content of foods lead to healthier food choices. But, does nutrition information translate into better diets? For the case of dietary fats and cholesterol, the answer is an unqualified yes. Statistical analysis confirms that, holding a variety of consumer characteristics constant, better awareness of fat- and cholesterol-related health problems and better attitudes about avoiding too much fat and cholesterol are associated with significant reductions in the intakes of these nutrients. This result points to the powerful role that nutrition education can play through a strategy of promoting diet-disease awareness.

Introduction

The U.S. Department of Agriculture (USDA) is one of the leading agencies providing information to help consumers improve their food choices and, ultimately, the nutritional quality of their diets. USDA has published the *Dietary Guidelines for Americans* (jointly with the Department of Health and Human Services) and the popular *Food*

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Guide Pyramid, as well as other training materials for foodservice personnel to improve the nutritional content of school lunches and breakfasts.

While many factors—stress levels, genetic predisposition, activity levels, and smoking—influence an individual’s risk of chronic disease, diet is certainly an important factor. Medical evidence suggests that poor diets are often linked to the onset of chronic diseases, contributing to increased morbidity, reduced quality of life, and premature mortality. Diets high in fat, saturated fats, cholesterol, and sodium, and low in fruits, vegetables, and whole grains are linked to increased risk of coronary heart disease, certain types of cancers, stroke, diabetes, overweight, and hypertension. In fact, the top three causes of death in the United States—heart disease, cancer, and stroke—are associated with diets that are too high in calories, total fat, saturated fat, and cholesterol, or too low in fiber-containing foods.

Among the numerous factors affecting dietary choices, nutrition knowledge and beliefs about foods and health—or “diet-health information” in short—is the most amenable to change (Thomas, 1991). Presumably, heightened awareness of diet-health relationships, favorable attitudes about healthy eating, and better knowledge of the nutrient content of foods lead to healthier food choices. Consequently, providing diet-health information has been the major thrust of public sector dietary improvement efforts.

While the role of diet-health information in promoting dietary improvements is clear in theory, little is known about the consumer’s practical use of the information. To what extent does diet-health information influence dietary choices vis-a-vis socioeconomic factors such as age, sex, race, ethnicity, income, and education? Are some population subgroups more disadvantaged than others by a lack of diet-health information? Are some forms of diet-health information more persuasive than others in encouraging people to eat more healthful foods? Answers to these questions are critical for designing nutrition education programs, for food marketing and promotion, and for forecasting food consumption trends.

Economists have long recognized the role of information in consumer health decisions (Grossman, 1972). A persistent positive correlation between education and health suggests that a person with more education is better able to maintain his or her own health than a

person with less education (Grossman and Kaestner, 1997). Education may create a better awareness of the costs and benefits of various health habits, may increase an individual's ability to obtain health information, and may better enable a person to process or act upon that information.

Despite its acknowledged role, diet-health information has not been widely incorporated in economic studies of food and nutrient choice (Behrman and Deolalikar, 1988). In the few studies where the role of information has been recognized, direct measures of information have seldom been used due to the lack of appropriate data. Instead, variables such as education, income, and household structure, which may account for information differences among individuals, have been used as proxies to capture information effects (e.g., Ippolito and Mathios, 1990; Kushi and others, 1988; Putler and Frazao, 1994). A limitation of this approach is that such variables may have a direct effect on food choices beyond their indirect effect on food choices through information.

With the availability of USDA's 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII) and its associated Diet and Health Knowledge Survey (DHKS), it is now possible to examine the links between diet-health information and the intake of various dietary components using direct information measures. This study uses the 1989-91 CSFII-DHKS data and focuses on three dietary components that have received widespread publicity for their adverse health impact: fat, saturated fat, and cholesterol. The chapter examines whether higher levels of diet-health information help individuals reduce their intake of these macronutrients. If yes, are some population subgroups more successful than others in acquiring and using diet-health information? These questions are answered by estimating the relationship between the fat, saturated fat, and cholesterol information levels of the CSFII-DHKS household meal planners and their intake of these nutrients, controlling for an exhaustive set of personal characteristics that affect both information and intake.

We can measure meal planners' intakes of fat, saturated fat, and cholesterol from the 1989-91 CSFII data by summing the level of these nutrients in each of the foods reported as consumed over 3 consecutive days. Meal planners (sample = 3,845), on average, consumed 63 grams of total fat and 22 grams of saturated fat, accounting for 35 percent and 12 percent of their total energy intake (table 1). (The

Table 1—Dietary fat and cholesterol intake by socioeconomic group, 1989-91

Group	Fat		Saturated fat		Cholesterol
	<i>Grams</i>	<i>% calories</i>	<i>Grams</i>	<i>% calories</i>	<i>Mg</i>
All	63.0	34.6	22.0	12.0	238.2
Age:					
Under 30	67.6	34.3	24.5	12.4	256.1
30-49	66.4	35.4	23.3	12.4	251.1
50-69	58.9	34.2	20.0	11.6	220.5
70 and over	53.8	33.3	18.6	11.4	207.6
Sex:					
Male	82.3	35.0	29.3	12.4	330.4
Female	58.3	34.5	20.3	12.0	215.7
Race:					
White	63.5	34.7	22.3	12.1	233.5
Black	60.5	34.3	20.7	11.7	275.0
Other	58.5	33.1	20.2	11.5	236.3
Ethnicity:					
Hispanic	56.6	33.7	19.7	11.8	239.3
Non-Hispanic	63.4	34.6	22.2	12.1	238.2
Yearly per capita income:					
\$3,800 or less	61.8	35.2	21.9	12.4	258.1
\$3,801-\$5,400	58.1	34.6	20.2	12.0	221.6
\$5,401-\$10,200	59.7	34.5	20.9	12.1	224.9
Over \$10,200	65.3	34.6	22.8	12.0	243.0
Education:					
Less than high school	58.7	34.6	20.3	12.0	242.3
Completed high school	62.5	35.4	22.0	12.4	236.8
More than high school	65.2	34.0	22.7	11.8	237.6
Vegetarian:					
Yes	59.6	32.6	20.7	11.4	218.9
No	63.1	34.7	22.1	12.1	238.8
Smoker:					
Yes	64.7	35.4	23.0	12.6	252.3
No	62.4	34.3	21.7	11.9	233.6
Participation in WIC or FSP:¹					
Yes	62.5	35.7	22.3	12.8	266.4
No	63.0	34.5	22.0	12.0	235.9

¹ Women, Infants, and Children (WIC) program; Food Stamp Program (FSP).

Source: USDA/ERS.

Dietary Guidelines recommend that no more than 30 percent of energy come from fat, and that less than 10 percent come from saturated fat.) The average cholesterol intake, at 238 milligrams, is below the 300 milligrams recommended by many health authorities.

Factors helping to explain variations in dietary intakes as well as variations in diet-health information levels fall into three broad categories: household, individual, and dietary characteristics. Household characteristics include income, food program participation, household size, and location of residence. Sex, race, education, and age are individual characteristics. Dietary or health-related characteristics include smoking and vegetarianism. Statistical methods allow us isolate the impact of nutrition knowledge and awareness of diet-disease relationships from individual characteristics on the intake of foods or nutrients.

Table 1 also lists the average intakes for our sample of meal planners by selected household, individual, and dietary categories. The differences in intake of fat and saturated fat among categories within a characteristic are large when measured in absolute amounts (grams), but much smaller when measured in terms of percentage of calories. For example, meal planners under 30 years of age consume, on average, 68 grams of fat compared with 54 grams for meal planners 70 and over. However, the share of calories from fat intake is much closer (34 and 33 percent).

Measuring Diet-Health Information

The DHKS data provide measures of a meal planner's (1) attitudes about avoiding too much fat and cholesterol, and (2) awareness of health problems linked to excess fat and cholesterol. We refer to these measures as diet-health information.

Three survey questions asked how important it is to the respondent to avoid too much fat, saturated fat, and cholesterol. The responses were categorized into "very important" or "not very important"; those reporting "very important" were considered to have better attitudes about following a healthy diet (table 2). More people reported that avoiding too much cholesterol was very important (49 percent) than avoiding too much fat (44 percent) or saturated fat (45 percent). In all cases, the share of those reporting "very important" increases

Table 2—Attitudes about fats and cholesterol, 1989-91*How important is it to you personally to avoid too much:*

	Fat	Saturated fat	Cholesterol
	<i>Percent responding "Very Important"</i>		
All	44.1	44.8	49.3
Age:			
Under 30	36.4	35.2	41.2
30-49	39.1	40.7	42.1
50-69	52.7	53.7	64.4
70 and over	53.7	53.1	54.4
Sex:			
Male	33.7	36.0	41.7
Female	46.7	47.0	51.2
Race:			
White	43.3	44.8	49.1
Black	47.4	46.2	54.4
Other	53.2	42.1	38.6
Ethnicity:			
Hispanic	42.9	48.5	45.1
Non-Hispanic	44.2	44.6	49.6
Yearly per capita income:			
\$3,800 or less	44.9	41.8	47.0
\$3,801-\$5,400	49.3	44.2	48.6
\$5,401-\$10,200	44.2	48.2	51.8
Over \$10,200	43.2	44.0	48.8
Education:			
Less than high school	45.7	46.4	50.7
Completed high school	43.7	45.4	51.6
More than high school	43.8	43.7	47.0
Vegetarian:			
Yes	50.4	57.1	59.2
No	43.9	44.5	49.0
Smoker:			
Yes	40.3	40.9	45.6
No	45.4	46.1	50.6
WIC or FSP:¹			
Yes	45.8	43.4	47.0
No	44.0	44.9	49.5

¹ Women, Infants, and Children (WIC) program; Food Stamp Program (FSP).

Source: USDA/ERS.

sharply for people age 50 or older. Higher percentages of women, nonsmokers, and vegetarians also reported it was very important to avoid too much fat, saturated fat, and cholesterol compared with men, smokers, and nonvegetarians. Differences in attitudes are much smaller among income and education groups.

Awareness of diet-disease relationship is measured by questions asking meal planners if they have heard about health problems related to how much fat, saturated fat, or cholesterol a person eats, and, if so, what those health problems are. Only respondents who listed cancer or heart disease were considered to be “aware” in this analysis (table 3). Again, more were aware of health problems related to cholesterol (72 percent) than to fat (67 percent) and saturated fat (57 percent). Unlike the previous pattern, awareness increases with income and education.

To better understand variations in diet-health information and intakes, statistical models were used to isolate the influence of one household, individual, or dietary/health characteristic (such as income, race, and vegetarianism) from another.

Diet-Health Information: Who Has It, Who Doesn't

Results of statistical analyses confirm that the characteristics of a person with better attitudes toward more healthful foods are not the same as those of a person with better awareness of diet-disease relationships.¹ The person most likely to be armed with better attitudes is a woman, older, and vegetarian. For example, holding all other characteristics constant, women are 8.7 percent more likely than men to think it is very important to avoid too much fat, 7.4 percent more likely to think it is very important to avoid too much saturated fat, and 5.4 percent more likely to think it is very important to avoid too much cholesterol. Likewise, holding all other characteristics constant, an additional year of age is associated with about 0.2 percent greater likelihood of thinking it is very important to avoid too much saturated fat in the diet. This is likely to stem from the differing dietary needs and concerns of the elderly.

¹ For brevity, we are not reproducing these statistical results here. The full set of results can be found in Variyam, Blaylock, and Smallwood (1997).

Table 3—Diet-disease awareness, 1989-91*Have you heard about any problems related to:*

	Fat	Saturated fat	Cholesterol
	<i>Percent responding "Yes" and identifying correct health problem</i>		
All	66.5	57.4	72.4
Age:			
Under 30	55.7	49.1	72.7
30-49	70.9	61.9	74.8
50-69	70.1	61.0	73.9
70 and over	57.6	45.7	60.9
Sex:			
Male	62.5	57.6	69.3
Female	67.5	57.4	73.1
Race:			
White	68.1	60.2	74.7
Black	55.0	36.3	56.9
Other	63.9	58.6	66.0
Ethnicity:			
Hispanic	51.8	40.5	49.8
Non-Hispanic	67.4	58.5	73.8
Yearly per capita income:			
\$3,800 or less	49.4	40.2	57.3
\$3,801-\$5,400	53.2	44.5	61.8
\$5,401-\$10,200	63.4	52.8	68.6
Over \$10,200	72.6	64.3	78.1
Education:			
Less than high school	51.7	40.2	56.2
Completed high school	62.2	54.2	71.6
More than high school	75.8	67.1	79.6
Vegetarian:			
Yes	76.2	60.2	78.8
No	66.2	57.4	72.2
Smoker:			
Yes	63.9	49.8	73.1
No	67.3	60.0	70.1
WIC or FSP:¹			
Yes	44.1	40.1	53.1
No	68.3	58.9	74.0

¹ Women, Infants, and Children (WIC) program; Food Stamp Program (FSP).

Source: USDA/ERS.

While gender, age, and vegetarian status have significant influence on attitudes, these variables have no effect on an individual's diet-disease awareness, at least for fat and saturated fat. Older people tend to be less aware of cholesterol-health links than younger people. Diet-disease awareness is much influenced by a person's level of education, household income, race, and ethnicity. These results suggest that those aware of diet-disease relationships are not necessarily those with better dietary attitudes and vice versa.

As income increases, so does the probability that a person has heard about health problems related to fat, saturated fat, and cholesterol. For a \$1,000 rise in income, the probability rises by 0.34 percent for fat, 0.29 percent for saturated fat, and 0.25 percent for cholesterol. The effects of education are larger. For an additional year of schooling, the probability that a person has heard about health problems rises by 2.3 percent for fat, 3 percent for saturated fat, and 2.3 percent for cholesterol.

Blacks are less likely than whites to be aware of diet-disease relationships. The same holds true for Hispanics versus non-Hispanics. While 68 percent of white meal planners had heard about health problems related to fat, only 55 percent of black meal planners had (table 3). The gap is wider for awareness of health problems related to cholesterol: 57 percent of blacks versus 75 percent of whites. Only 50 percent of Hispanics were aware of health problems related to cholesterol, compared with 74 percent of non-Hispanics.

The above differences between racial and ethnic groups persist even after taking socioeconomic characteristics into account. Multivariate statistical analyses showed that, between two meal planners similar in all respects except race, the black meal planner is about 13.8 percent less likely to have heard about health problems related to cholesterol than the white meal planner. Similarly, a Hispanic meal planner is 18 percent less likely to have heard of health problems related to cholesterol than a non-Hispanic meal planner. These findings probably relate to cultural differences in the use of print and electronic media sources for information.

Meal planners from households that participate in the Women, Infants, and Children program (WIC) or the Food Stamp Program (FSP) appear to have lower diet-disease awareness levels than households that do not participate (table 3). For example, only 44 percent

of meal planners from WIC/FSP households were aware of fat-disease relationship, compared with 68 percent of meal planners from other households. However, statistical analysis showed that this difference disappears when other characteristics are held constant.

Better Awareness Equals Lower Dietary Fats and Cholesterol

Statistical analysis confirms that, holding a variety of consumer characteristics constant, better awareness of fat- and cholesterol-related health problems and better attitudes about avoiding too much fat and cholesterol are associated with significant reductions in the intakes of these nutrients. Between the two diet-health information variables, diet-disease awareness has the larger impact on consumption of dietary fats and cholesterol. This may be because avoiding health problems has the most immediate and transparent economic benefit to the consumer. This suggests that nutrition education programs aimed at increasing public awareness of fat- and cholesterol-health links will likely have large payoffs in terms of lowering dietary fat and cholesterol intake levels.

While the benefits of diet-health information apply to all population subgroups in the study, differences become clear when we consider the direct and indirect channels through which various consumer characteristics affect fat and cholesterol intake. For example, income has a positive direct effect on fat intake because richer people may consider grain and cereal products to be inferior to meat products. At the same time, income also has a negative indirect effect on fat intake because richer people have more resources to obtain greater nutrition information, which in turn affects intake.

For income and education, the direct and indirect effects on intakes are mixed (table 4). Both income and schooling have positive direct effects on intakes. This implies that, holding other characteristics and the diet-health information level constant, those with higher income or education tend to consume diets richer in fats and cholesterol than do those with lesser income or education. At the same time, those with higher income or education tend to have substantially greater diet-disease awareness, which translates into substantially lower intakes of total fat, saturated fat, and cholesterol. For example, the direct effect of income on total fat intake—5.3 additional grams

Table 4—Predicted change in fat, saturated fat, and cholesterol intake, by soci

Variable	Total fat (effect)				Saturated fat (effect)			
	Direct	Indirect		Total	Direct	Indirect		Total
		Attitude Awareness				Attitude Awareness		
	Grams				Grams			
Income ¹	5.316*	0.126	-3.667*	1.775*	1.630*	-0.042	-0.968*	0.621*
Education ²	1.554*	-0.032	-1.091*	0.431*	0.566*	-0.038*	-0.430*	0.097
Age ³	-0.199*	-0.016	-0.020	-0.235*	-0.088*	-0.013*	0.003	-0.097*
Female	-15.380*	-1.189*	-1.697	-18.265*	-5.760*	-0.522*	-0.415	-6.697*
Black	-4.923*	0.214	2.927*	-1.782	-3.306*	0.028	1.971*	-1.307*
Hispanic	-6.499*	0.507	1.538	-4.455*	-3.082*	0.111	0.906*	-2.065*
Vegetarian	-4.585	-1.723*	-0.113	-6.420*	-1.935*	-0.447	-0.196	-2.578*
Smoker	-1.521	0.221	-0.420	-1.720*	-0.572	-0.701	0.318	-0.324
WIC or FSP ⁴	1.570	-0.598	1.912	2.883*	1.315*	-0.041	-0.067	1.208*

Note: An asterisk indicates that the corresponding coefficient estimate was statistically significant at least

¹ Figures are for a doubling of income.

^{2 3} Figures are for an additional year of education and age, respectively.

⁴ Women, Infants, and Children (WIC) program; Food Stamp Program (FSP).

Source: Variyam, Blaylock, and Smallwood (1997).

per day—is lowered by 3.7 grams due to the indirect effect of income through diet-disease awareness. Similarly, the direct effect of education on saturated fat intake—0.6 gram—is lowered by 0.4 gram due to the indirect effect of education through diet-disease awareness. For cholesterol, the negative indirect effect of schooling on diet-disease awareness is large enough to make the total effect negative, nearly 1 milligram lower.

Intakes of all three nutrients decrease with age. Holding diet-health information and other socioeconomic variables constant, an additional year of age decreases intakes by 0.2 gram of fat, 0.1 gram of saturated fat, and 0.8 milligram of cholesterol. The indirect effects of age through diet-health information on all three nutrients are modest.

Women's intakes are lower than men's. All else held constant, the direct effects reduce women's intake of fat, saturated fat, and cholesterol by 15 grams, 6 grams, and 85 milligrams compared with men's intake of these nutrients—probably because women tend to eat less than men. Female meal planners, however, also benefit from the greater importance they attach to avoiding too much fat and saturated fat. This indirect effect reduces their fat and saturated fat intake by an additional gram and half-gram compared with male meal planners. For cholesterol, the indirect effects are small relative to the direct effect.

For a given information level, black meal planners have significantly lower intakes of fat and saturated fat than white meal planners. Black meal planners, however, also have lower awareness of health problems related to these nutrients. This lower awareness level increases their fat and saturated fat intake and reduces the total effect. The pattern is similar for Hispanic meal planners, although their diet-disease awareness level is higher than that of blacks. The total effect of Hispanic ethnicity is to lower fat intake by 4 grams and saturated fat intake by 2 grams compared with non-Hispanic meal planners. The indirect effect of the lower diet-disease awareness levels of black and Hispanic meal planners is much more substantial for cholesterol than for fats. The lower diet-disease awareness of blacks compared with whites contributes nearly three-fourths (20 mg) of their higher intake (27 mg) of cholesterol. For Hispanics, the direct effect that lowers their cholesterol intake compared with other ethnic groups is offset by the indirect awareness effect that increases their cholesterol intake, netting 9 mg higher cholesterol intake (not statistically significant). The clear implication of these results is that blacks and

Hispanics stand to benefit considerably from better information about diet-health relationships.

Vegetarians have substantially lower intake of all three nutrients than nonvegetarians. The direct effect rather than indirect effect is predominant, indicating that a vegetarian diet in itself—rather than higher information levels—contributes to lower intakes. The only statistically significant effect of smoking is on total fat intake. Once the effect of other sociodemographic characteristics and nutrition information are taken into account, smokers tend to have about 2 grams of lower total fat intake than nonsmokers.

Meal planners whose households participate in the Food Stamp or WIC programs have significantly higher intakes of all three nutrients. Since information effects are insignificant—particularly for saturated fat and cholesterol—much of the effect is direct, through dietary differences unrelated to information. This suggests that nutrition education programs targeted at program participants need to examine participants' diets before focusing on their diet-health knowledge.

Implications for Nutrition Education

Information is the fuel that will drive the engine of dietary change. Nutrition information demonstrably lowers intake of dietary fats and cholesterol. This result, combined with a similar result for dietary fiber (Variyam, Blaylock, and Smallwood, 1996), points to the powerful role that nutrition education can play through diet-disease awareness.

An effective nutrition information message that can be relayed to consumers is that there are well documented links between some diseases and high intakes of dietary fats and cholesterol. People aware of these links tend to consume less fats and cholesterol than those less informed. A positive attitude toward avoiding too much fat and cholesterol also helps decrease consumption of fat and cholesterol.

Like any campaign to change people's consumption—be it of soft drinks, cars, or dietary fats—the likelihood of success increases dramatically if the proper message is conveyed to the proper audience. In the case of fats and cholesterol, the message might be more effective if geared toward individuals and groups that tend to have low levels of diet-disease awareness or blasé attitudes toward avoiding

too much fat and cholesterol. Groups with these characteristics include less educated individuals, lower-income people, the young, men, blacks, and Hispanics.

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