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The Intake of Dietary Fats and Cholesterol

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Diet-Health Information and Nutrition: The Intake of Dietary Fats and Cholesterol. By Jayachandran N. Variyam, James Blaylock, and David Smallwood. Food and Consumer Economics Division, Economic Research Service, U.S. Department of Agriculture. Technical Bulletin No. 1855.

Abstract

Diet-health information and nutrient intake data for a sample of U.S. household meal planners are used to estimate the effect of information on the intake of fat, saturated fat, and cholesterol. Results indicate that an awareness of health problems due to excess intake of these nutrients and the self-assessed importance of avoiding too much of these nutrients in one's diet have significant influence on nutrient intake. Results support the allocative efficiency hypothesis that states that higher human capital promotes healthier food choices through better acquisition and use of health information. Personal and household characteristics significantly affecting nutrient intake include income, schooling, age, sex, race, ethnicity, body mass index, vegetarian status, and dieting status. The informational role of exogenous variables is illustrated by computing their direct and indirect effects on intake.

Keywords: Cholesterol intake, fat intake, nutrient demand, nutrition knowledge, health inputs, health production.

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Summary

Understanding how socio-economic characteristics and dietary knowledge affect food consumption is crucial for designing, targeting, and evaluating nutrition education programs and monitoring the Nation's progress toward dietary goals. In this study, we focused on three dietary components that have received widespread publicity for their effect on health: fat, saturated fat, and cholesterol. Specifically, we tested whether the diet-health information level of U.S. household meal planners influences their intake of dietary fats and cholesterol, after controlling for various meal planner characteristics that affect both information and intake.

Our study used data from the U.S. Department of Agriculture's 1989-91 Continuing Survey of Food Intake by Individuals (CSFII) and the companion Diet and Health Knowledge Survey (DHKS). We measured the total fat, saturated fat, and cholesterol intake of the meal planners by averaging the level of these dietary components in each of the foods they reported that they consumed over a 3-day period in the CSFII. We then linked these intakes to the meal planners' knowledge of fat and cholesterol content of foods, attitudes toward avoiding too much fat and cholesterol in the diet, and awareness of diseases linked to fat and cholesterol using their responses to the DHKS.

We found that diet-health information plays a key role in determining fat and cholesterol intake. For two meal planners identical in every respect except their diet-health knowledge, we found that the one with more diet-health knowledge consumed significantly less fat, saturated fat, and cholesterol than the other.

Information about specific links between diet and health, such as the link between excess saturated fat and coronary heart disease, seems to have a larger effect on fat and cholesterol intakes than information related to general notions about healthful diets. This is not surprising given that avoiding health problems has the most immediate and transparent economic benefits to the consumer. Consumers possessing information about specific diet-health links are more likely to change their dietary patterns than consumers without such information or those who have only general notions about the benefits of avoiding excess dietary fat and cholesterol. Our results suggest that nutrition education programs aimed at increasing the awareness of linkages between disease and overconsumption of fat and cholesterol will likely have the highest payoffs in terms of lowering fat and cholesterol consumption.

Household, socio-demographic, health, and diet-related factors influence nutrient intake through two pathways. First, there is a direct effect which is the influence of these factors holding the information variables constant. Second, there is an indirect effect which is the influence of these factors acting through the information variables. The sum of the direct and the indirect effect is the total effect of a factor on intake. Controlling for all other factors, including the diet-health information level, we found the direct effect of both household income and years of schooling on the intake of fat and cholesterol to be positive. For example, a doubling of income increased total fat intake by 5 grams per day and an additional year of schooling increased it by 1.6 grams per day. Income and schooling, however, also raised one's diet-health information. Since a higher diet-health information level translates to lower fat and cholesterol intake, income and schooling acting through information tended to lower fat and cholesterol intake. These indirect

effects canceled out much of the direct effects, rendering the total effect of income and schooling on intake much smaller, although still positive. The net effect of income and schooling, allowing for their effects on information, was to increase fat consumption by 1.8 grams and 0.4 gram per day, respectively. Separating the direct and indirect effects of these factors on nutrient intake provides added insight to understanding what some may call unexpected or perverse behavior.

We found that fat and cholesterol intake was lower for female and older meal planners in general. Additionally, the greater importance that women attach to avoiding too much saturated fat in their diets helps lower their saturated fat intakes. This indirect effect reduces female meal planners' saturated fat intake by 0.5 gram per day compared with male meal planners.

For a given information level, black meal planners had significantly lower intakes of fat and saturated fat than white meal planners, 5 and 3 grams per day less of each. Black meal planners, however, also were less aware of health problems related to these nutrients. This lower information level increased their fat and saturated fat intake and helped to offset much of the direct effect. The pattern was similar for Hispanic meal planners, although their diet-disease awareness level was higher than for blacks. The total effect of Hispanic ethnicity was to lower fat intake by 4.5 grams per day and saturated fat intake by 2 grams per day, compared with other meal planners.

The indirect effect of the lower diet-disease awareness levels of black and Hispanic meal planners was much more substantial for cholesterol than for fat. The lower diet-disease awareness of blacks compared with others contributed nearly three-fourths (20 milligrams) of their 27-milligram per day higher intake of cholesterol. For Hispanics, the direct effect that lowered their cholesterol intake compared with others was offset by the indirect information effect that increased their cholesterol intake. One implication of these results may be that blacks and Hispanics stand to benefit considerably from better information about diet-health relationships.

A vegetarian diet helped to lower intake of all three nutrients compared with a nonvegetarian diet. Meal planners' dieting status had a significant influence on intake. Both those who reported being on a low-calorie diet and those who reported being on a low-fat diet consumed less fat, saturated fat, and cholesterol than those not on any diet. For those meal planners with an identified health condition, the direct and indirect effects tended to cancel out each other, rendering their fat and saturated fat intake not significantly different from those without a health condition.

Our findings on the differing effects of income, schooling, race, ethnicity, and dieting status through direct and indirect effects may be useful for guiding nutrition education programs. Recommendations for specific dietary changes will have to await a similar analysis of the informational effects on food groups.

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Jayachandran N. Variyam, James Blaylock, and David Smallwood

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, their diets. These activities include developing the popular Food Guide Pyramid, promoting nutrition education, monitoring nutrition, and improving the nutritional content of school lunches and breakfasts. The department's message is clear and simple: Better food choices and diets translate into a healthier America. Most people, unfortunately, find that adopting and sustaining new eating habits is difficult, even with proper nutrition guidance and knowledge.

The Joint Nutrition Monitoring Evaluation Committee, a Federal advisory panel established by USDA and the U.S. Department of Health and Human Services (DHHS) to monitor the nutritional status of the U.S. population, has indicated that today's principal nutrition-related health problems arise from over-consumption of fat, saturated fatty acids, cholesterol, and sodium (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 1986). To help address these problems, the USDA's and DHHS's 1995 *Dietary Guidelines for Americans* make specific quantitative recommendations about the amount of fat Americans should consume. In particular, the dietary guidelines suggest that not more than 30 percent of total calories come from fat and less than 10 percent from saturated fats.

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 salt, and low in fruits, vegetables, and whole grains are linked to 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, cholesterol, or low in dietary fiber.

The cost to individuals and society of poor diets is high and continues to rise. Coronary heart disease (CHD) costs the United States approximately $56 billion annually in medical costs and lost productivity resulting from disability (Frazao, 1995). Costs associated with cancer are even higher, $104 billion. In total, the seven leading diet-related health conditions (CHD, cancer, stroke, diabetes, obesity, hypertension, and osteoporosis) cost America about $250 billion a year.

McGinnis and Foege (1993) estimate that 22-30 percent of all cardiovascular deaths, 20-60 percent of all fatal cancers, and 30 percent of diabetes deaths are the result of diet/physical inactivity. In total, they estimate that 300,000 of the 2.1 million deaths in 1990 (14 percent) could be attributed to poor diets and inadequate physical activity. While better diets will not prevent all occurrences of these diseases, there is the potential for substantial societal savings by reducing the strictly diet-related component of these diseases.

A lot of effort and expense has gone into spreading the message about the health benefits of a balanced diet. While these diet-health campaigns have yielded positive results, the extent of dietary changes has not been large enough to allay the concerns of nutrition educators and public-health professionals. For example, although the average percentage of calories from fat declined from 40 percent in 1977-78 to 33 percent in 1994, only about 29 percent of men and 35 percent of women had diets that met the recommendations for fat in 1994 (Cleveland, Goldman, and Borrud, 1996). In short, while the average figures have shown improvement, there is still a great disparity in the healthfulness of diets across different segments of the population.

A major problem faced by nutrition educators and public-health professionals in their efforts toward achieving further dietary improvements is a lack of specifics on the usage of diet-health information at the individual consumer level. Heightened awareness of diet-health relationships, better attitudes about healthy eating, and better knowledge of the nutrient content of foods (or, in short, more of what we refer to collectively as "diet-health information") presumably lead to healthier food choices. But to what degree does this occur across different segments of the population? Any understanding of factors slowing the adoption of healthful diets requires empirical knowledge of how diet-health information and its effect on dietary choices vary across the population. Policy-wise, such empirical knowledge can be useful for targeting nutrition education programs, food marketing and promotion, and for forecasting food consumption trends.

Economists have long recognized the role of information in the production of health and the choice of health inputs (Arrow, 1963; Grossman, 1972). Individuals vary in their access to information, cost of acquiring information, and efficiency in using the acquired information. Therefore, their responses to new information, as reflected in their consumption decisions, will also vary. Thus, the flow of new information can alter consumption decisions and ultimately change the distribution of welfare. The recent increase in scientific evidence linking diet and health provides a good example of information flow with potential to improve consumer welfare.

The question in this context is, therefore, whether and how the new diet-health information has affected the food and nutrient choices of individuals? Although economists have addressed nutrient intake issues (Behrman and Deolalikar, 1988), most studies have assumed a fixed or given level of diet-health information. Even in studies where the role of new information has been recognized, direct measures of information have been seldom used.[1] Instead, variables such as education, income, and household structure that account for information differences have been used as proxies to capture information effects (for example, Ippolito and Mathios, 1990). The problem with this approach is that such variables have a direct effect on health input choice, besides their indirect effect on health input choice through information. These direct and indirect effects cannot be separated without explicitly modeling the information differences using information measures.

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[1]Some time series studies have modeled variations in food demand due to changing diet-health information using direct information measures (Brown and Schrader, 1990; Chern, Loehman, and Yen, 1995).

There have been two recent exceptions to this gap between theory and empirical knowledge of the effect of consumer health information. Kenkel (1990) modeled the role of health information in the demand for physician services using a direct measure of information. The study showed that poorly informed consumers tend to underestimate the productivity of medical care in treating illness. Kenkel (1991) examined the role of schooling in the choice of healthier habits through improved health knowledge. Using direct measures of health knowledge, he found that with more knowledge people reduced smoking and alcohol use, and increased exercise.

With the availability of U.S. Department of Agriculture's 1989-91 Continuing Survey on Food Intakes by Individual (CSFII) and Diet and Health Knowledge Survey (DHKS) data, it is now possible to extend this empirical research to examine the links between diet-health information and the intake of various dietary components with well-established health effects. The CSFII gathers dietary intake data for members of a sample of U.S. households. The companion DHKS collects data on the household meal planner's knowledge, attitudes, and awareness of diet, nutrition, and health links.

This report uses the 1989-91 CSFII-DHKS data and focuses on three dietary components that have received widespread publicity for their health effect: fat, saturated fat, and cholesterol. Does better acquisition and use of diet-health information help individuals reduce their intake of these macronutrients? If yes, are some population sub-groups more successful than others in acquiring and using diet-health information? We answer these questions 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.

Diet-Health Information, Nutrients, and Health Production

The theory of household production developed by Becker (1965) and the characteristics model of consumer demand developed by Lancaster (1971) have provided the conceptual framework for much of the economic analyses of health inputs and outcomes (Behrman and Deolalikar, 1988; Panis and Lillard, 1994; Pitt and Rosenzweig, 1985). In this framework, households combine various inputs to produce "commodities," including the health of family members, so as to maximize a joint utility function. Some inputs (food and medical care) derive their value by supplying characteristics (nutrients and medical services) necessary for the production of some commodities (health). Subject to the constraints of technology and resources, household utility maximization generates individual and household demand functions for the inputs and characteristics.

Assume that a representative household with M members has a joint utility function:

$$\max_{\boldsymbol{F},\underline{z}} U = U(\boldsymbol{F},\underline{z},\underline{h}), \quad U^{\prime}>0,\ U^{\prime\prime}<0, \tag{1}$$

where **F** is a matrix of foods consumed, and $\underline{z}$ and $\underline{h}$ are vectors of nonfoods and health status for each family member. Health and food intakes enter directly into the utility function because good health is valued in itself and because foods are consumed for reasons other than their nutritional value such as taste.

Given household income and market prices, preference equation 1 is maximized, subject to three sets of constraints. First, the health of each family member is constrained by the health production technology:

$$h_m = h(\underline{c}_m, \underline{g}_m | \underline{x}_m, u_m), \; m = 1,...,M, \tag{2}$$

where $\underline{c}_m$ is a vector of nutrients consumed, and $\underline{g}_m$ is a vector of nonfood health inputs such as exercise and medical services. The efficiency of producing health from $\underline{c}_m$ and $\underline{g}_m$ is conditional on $\underline{x}_m$, a vector of personal and household characteristics, and u_m, an exogenous health endowment beyond the individual's or household's control.

Second, expenditures are constrained to equal household income:

$$\underline{i}'(\boldsymbol{F}\underline{p}_F + \underline{z}p_z) = I, \tag{3}$$

where p denotes prices, I is household income, and $\underline{i}$ is a unit vector. Third, nutrient inputs into the health production function are constrained by the production technology:

$$\underline{c}_m = \boldsymbol{Q}\underline{f}_m, \tag{4}$$

where **Q** is a matrix of fixed weights representing the nutrient level in each food and f is the vector of food consumed by the mth household member.

Under the assumption that the relevant functions have desirable properties to ensure unique interior solutions, the first-order conditions for the maximization of equation 1 subject to the three constraints give, among other relations, member-specific nutrient demand equations as a function of prices, income, personal and household characteristics, and u_m.

Introducing diet-health information explicitly into the model reflects its role as a factor mediating part of the causality from $\underline{x}$ to h. For example, consider a key component of $\underline{x}$, education. More educated persons are more efficient producers of health, because they are more informed about the true effects of inputs on health, and they have higher allocative efficiency, that is, ability to select a better input mix (Grossman and Kaestner, 1995). Education, therefore, affects health through information. Other personal characteristics that influence an individual's acquisition and use of information (for example, income) also play a similar role in the production of health.[2]

Making the role of information explicit, the reduced-form nutrient demand function for the mth household member may be written as:

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[2]Personal characteristics affect health production also through productive efficiency, that is, amount of health output from given amounts of inputs, and through tastes related to ethnic and cultural factors (Grossman and Kaestner, 1995).

$$\underline{c}_m = c(\underline{p}, I | \underline{x}_m, \underline{k}_m, u_m), \tag{5}$$

where $\underline{p}$ is a vector of prices, I is the household income, and $\underline{k}_m$ is a vector of diet-health information variables.

Data

Our data are from the 1989-91 CSFII-DHKS conducted by the Beltsville Human Nutrition Research Center (formerly the Human Nutrition Information Service) of the U.S. Department of Agriculture. The CSFII data were gathered over a period of up to 3 consecutive days. The DHKS was a detailed 30-minute follow-up survey to the CSFII. Our analysis is restricted to the main meal planner/preparer of the sample households, since diet-health knowledge of other household members is not collected. After eliminating cases with missing values, our final sample consisted of 3,845 observations out of 4,346, with complete 3-day intake data.

Intake and Information Measures

Meal planners' intake of fat, saturated fat, and cholesterol are measured by summing the level of these nutrients in each of the foods they reported consuming. Table 1 shows that, on average, respondents in our final sample consumed 63 grams of total fat and 22 grams of saturated fat, accounting for 35 and 12 percent, respectively, of their total energy intake. These are above the 30 and 10 percent levels for energy from total fat and saturated fat recommended under the dietary guidelines. The average cholesterol intake, at 238 milligram, is below the recommended level of 300 milligrams.

Meal planners' diet-health information levels for fat, saturated fat, and cholesterol are measured by their responses to three sets of DHKS questions listed in table 1. The first set of questions (healthy diet importance) measures the self-assessed importance of avoiding too much total fat, too much saturated fat, and too much cholesterol in one's own diet. The responses are measured on a 1-6 scale, 1 = not at all important, 6 = very important. Between 44 and 49 percent of the meal planners consider it very important to avoid too much fat and cholesterol in their diet.

The "healthy diet importance" questions as they appear in table 1 have two drawbacks. First, the response distribution for each question is highly skewed toward the sixth category. Second, as Variyam et al. (1996) have suggested, the responses may have some measurement error due to the wording of the questions. To reduce the effect of skewness and to reduce possible measurement error, we converted the 6-point scale to a 2-point scale by combining categories 1-5 to one category and retaining the sixth category as the second. These binary measures are denoted $INFO_1^{tf}$, $INFO_1^{sf}$, and $INFO_1^{ch}$ where the subscript 1 refers to the fact that these are the first set of information variables (out of three) and the superscripts tf, sf, and ch indicate total fat, saturated fat, and cholesterol, respectively.

The second set of questions (diet-disease awareness) measures meal planners' awareness of diet-disease links as indicated by the correct identification of health problems (for example, cancer and heart disease) related to the excess intake of total fat ($INFO_2^{tf}$), saturated fat ($INFO_2^{sf}$), and cholesterol ($INFO_2^{ch}$). Respondents were most aware of health problems related to cholesterol (72 percent) and least aware of health problems linked to saturated fat (57 percent).

The third set of questions measures the "nutrient content knowledge" of meal planners for dietary fats ($INOF_3^{tf}$/$INFO_3^{sf}$) and cholesterol ($INFO_3^{ch}$). Respondents were required to choose the correct answer from each of a series of questions about sources and occurrence of fats and cholesterol in common food items. Since there were no separate questions for saturated fat knowledge in the DHKS, we use the same measure of fat content knowledge for both total fat and saturated fat. While 90 percent knew that sour cream contains more fat than yogurt and that butter is higher in cholesterol than margarine, only 33 percent knew that polyunsaturated fats are more likely to be a liquid than a solid and only 41 percent knew that cholesterol is found in animal products like meat and dairy products.

Since the healthy diet importance questions are not anchored to any specific type of diet-health information, we interpret these variables as capturing the respondent's level of general diet-health information. In contrast, the diet-disease awareness and the nutrient content knowledge questions are anchored to specific types of health and diet information; the respondents are required to correctly identify a disease or food related to the nutrients. Therefore, we interpret these two sets of variables as capturing respondents' level of specific diet-health information. This general/specific distinction in the nature of the diet-health information measures should prove useful in interpreting the relative influence of the three information variables on intake.

Independent Variables

Table 2 lists the independent variables hypothesized to affect information and/or intake. The variables fall into five broad categories: Household characteristics, personal socio-demographic characteristics, personal dieting and health measures, shopping and leisure time habits, and survey-related controls. Most of these variables have been found to significantly influence nutrient intake in previous studies (for example, Morgan, 1986). We are unable to include food prices because the CSFII-DHKS did not gather price data. However, as in other cross-sectional food and nutrient intake studies, exclusion of prices is unlikely to be a major problem, because price variation across households is likely to be small. The extant price variation is captured by regional, urbanization, and survey year dummy variables.

Income is represented by gross household income before taxes. The expected effect of income is complicated. On the one hand, higher income may give better access to dietary information and thus affect diet-health information positively and fat and cholesterol intake negatively. On the other hand, intake of fat-rich foods such as meats may rise as income increases. *A priori* information is lacking on which of these effects will dominate. Both the household size and the presence of children in the household are likely to affect the intra-household allocation of resources and thus influence consumption decisions.

Among socio-demographic variables, we expect the years of schooling to have positive effects by enabling better acquisition and processing of diet-health information (Kenkel, 1991). The traditional role that females have played in food preparation/shopping leads us to expect that they have higher stocks of diet-health information than males. The race and age variables are expected to capture variations in information, food preferences, and consumption induced by cultural backgrounds and dietary habits. The employment status of the main meal planner is likely to affect time allocation for food preparation versus other activities and, hence, may affect nutrient intake (Horton and Campbell, 1991).

Since grains, fruits, and vegetables are low-fat and cholesterol-free foods, we expect vegetarians to have relatively lower fat and cholesterol intakes. Smokers are probably less concerned about health issues and, hence, may possess less diet-health information than nonsmokers.

Dummy variables for meal planners on a "special diet," on a "low-fat diet," and/or on a "low-calorie diet" are included to control for the likely lower fat and cholesterol intakes due to these dieting habits. Body Mass Index (BMI) is a ratio of the body weight (in kilograms) divided by the square of height (in meters). BMI is included to control for the effects of variations in the amount of food consumed due to weight and height.[3] We expect BMI to be positively related to fat and cholesterol intake, because fats are more energy-dense than complex carbohydrates. Thus, individuals with higher BMI's may receive more of their calories from foods high in fats and fewer calories from foods rich in complex carbohydrates (Dattilo, 1992).

Some variation in the intake data is likely to depend on whether the person reported each day's food intake to be less than usual or more than usual. Dummy variables with reported intake "usual" as the omitted category are used to control for these survey-related effects. Finally, we include four variables that are intimately related to a respondent's access to and use of nutrition information: Whether the person watches 5 or more hours of television each day, whether nutrition is very important while shopping for food, and whether the person compares nutrients for different brands of the same food, always or sometimes (rarely or never is the omitted category). While some amount of television watching may help a person gain information, an excessive amount of 5 or more hours per day is likely to hinder rather than help information gathering by curtailing alternative activities such as reading. Both the importance attached to nutrition while shopping and the habit of comparing nutrients while shopping are expected to be positively correlated with a respondent's diet-health information level.

Income, household size, schooling, age, and BMI are continuous variables and all the others are dummy variables. The sample is heavily weighted toward females (83 percent) and stay-at-home meal planners (55 percent). This is important to remember when generalizing or interpreting our empirical results.

Empirical Model and Estimation Method

Suppose c^n is the amount of nth nutrient consumed by a meal planner where n = total fat (tf), saturated fat (sf), and cholesterol (ch). Our empirical model is specified as:

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[3]In models which include BMI as an explanatory variable, the sample size is reduced from 3,845 to 3,800 due to missing BMI values.

$$c^n = \underline{\alpha}^{n\prime}\underline{x}_c + \beta_1^n INFO_1^n + \beta_2^n INFO_2^n + \beta_3^n INFO_3^n + \epsilon_c^n, \tag{6}$$

$$INFO_j^n = \underline{\gamma}_j^{n\prime}\underline{x}_j + \epsilon_j^n, \quad n = tf, sf, ch, \ and \ j = 1,2,3, \tag{7}$$

where $INFO_j^n$ denote the general or specific diet-health information variables, $\underline{x}_c$ and $\underline{x}_j$ are vectors of exogenous variables, $\underline{\alpha}^n$ and $\underline{\gamma}_j^n$ are conformable vectors of unknown coefficients, β_j^n are unknown scalar coefficients, and ϵ_c^n, and ϵ_j^n are error terms distributed independently and identically across individuals but assumed to be correlated across the equations for the same individual.

If $INFO_j^n$ are observed and measured on a continuous scale, the unknown coefficients in equations 6 and 7 can be consistently estimated by two-stage least squares. In our case, $INFO_1^n$ and $INFO_2^n$ are observed only on a binary scale, and $INFO_3^n$ is unobserved with multiple observed binary indicators. Therefore, we use econometric methods for unobserved endogenous variables, with one or more observed discrete indicators to specify and estimate the model parameters (Maddala, 1983, pp. 117-139).

Let Y_j^n denote the observed binary responses of $INFO_j^n$, j = 1, 2. Then, as in the usual probit model,

$$Y_j^n = \begin{cases} 1 & if \ INFO_j^n > 0 \\ 0 & otherwise, \end{cases} \tag{8}$$

and

$$Prob[Y_j^n = 1 | \underline{x}_j] = \Phi(\underline{\gamma}_j^{n\prime}\underline{x}_j), \quad n = tf, sf, ch, \ and \ j = 1,2, \tag{9}$$

where Φ represents the normal CDF.

In equation 8, $INFO_j^n$ is an underlying index variable that directly generates the observed binary response when it takes on values greater than zero. The model is slightly different for $INFO_3^n$ since it has multiple indicators. Let Y_{3k}^n denote the multiple observed binary responses of $INFO_3^n$, where k = 1, ..., 5 for n = tf, sf, and k = 1, ..., 4 for n = ch. Then , we assume that each Y_{3k}^n is generated by an underlying index Y_{3k}^{n*} which is, in turn, generated by the unobserved $INFO_3^n$:

$$Y_{3k}^n = \begin{cases} 1 & if \ Y_{3k}^{n*} > 0 \\ 0 & otherwise, \end{cases} \tag{10}$$

and

$$Y_{3k}^{n*} = \lambda_{0k}^n + \lambda_{1k}^n INFO_3^n + \zeta_{3k}^n, \tag{11}$$

where λ_{0k}^{n} is a scalar intercept, λ_{1k}^{n} is a scalar loading parameter, ς_{3k}^{n} is an independently and identically distributed error term. The error terms are assumed to be uncorrelated with each other as well as with the error terms in equations 6 and 7. Equation 11 is a standard one-factor measurement model formalizing the notion that the multiple indicators indirectly measure the directly unobserved $INFO_3^n$. Specifying probit models for each of the indicators of $INFO_3^n$, we have:

$$Prob[Y_{3k}^{n} = 1 | INFO_3^{n}] = \Phi(\lambda_{0k}^{n} + \lambda_{1k}^{n} INFO_3^{n}). \tag{12}$$

For each nutrient, n, equations 6-12 constitute a system with two censored endogenous regressors and one latent endogenous regressor with multiple censored indicators. The presence of the latent endogenous regressor with multiple censored indicators means the system parameters cannot be estimated by the traditional Heckman two-step procedure. We instead use the minimum distance (or minimum chi-square) method to estimate the unknown model parameters. The method uses estimates of the reduced form of equations 6-12 and the restrictions imposed by the structural form to estimate all the system parameters by iteratively minimizing a minimum distance function (Chamberlain, 1984; Newey, 1987).

Results

The estimation of equations 6-12 gives three sets of results for each nutrient: The estimated intake equation, information equation, and reduced form of the intake equation obtained by substituting the estimated information equations into the estimated intake equation. The estimated intake equation coefficients give the direct effects of the independent variables on intake. Coefficients of the estimated reduced-form intake equation give the indirect effects of the independent variables on intake.

The intake equation was specified in log-linear form with the dependent variable (grams of total fat intake, grams of saturated fat intake, or milligrams of cholesterol intake) and the independent variables income and BMI expressed in logarithms. Thus, coefficients of the latter variables can be interpreted as elasticities. Age, schooling, and household size were entered in levels. Therefore, the coefficients of these variables give the percentage change in nutrient intake in response to a unit change in each variable. The remaining independent variables are dummy variables; their coefficients can be interpreted as approximate percentage change in intake for the respective category, compared with the base category (the exact percentage change is given by $100[\exp(\beta) - 1]$, where β is the coefficient).

We began by estimating equations 6-12 for each nutrient with a version that included all three endogenous information variables in the intake equation. However, in each case we were unable to get convergence of the minimum distance function due to the collinearity between $INFO_2$ (diet-disease awareness) and $INFO_3$ (nutrient content knowledge).

Therefore, we proceeded by estimating two separate sets of models that included either $INFO_2$ or $INFO_3$.

The two sets of estimated intake equations for total fat, saturated fat, and cholesterol are reported in tables 3 to 5. The columns under MDE1 and MDE2 report minimum distance estimates of intake equations that include $INFO_1$ and $INFO_2$, and columns under MDE3 and MDE4 report minimum distance estimates of intake equations that include $INFO_1$ and $INFO_3$. MDE1 and MDE3 versions contain the same set of independent variables: Log income, schooling, age, household size, female, black, Hispanic, employment status, children, household region, urbanization, survey year, and whether each day's reported intake was less than usual or more than usual. MDE2 and MDE4 versions add several additional explanatory variables that may be potentially endogenous: Log BMI, smoking status, vegetarian status, diet status, disease/sickness status, and household food-stamp or WIC participation. Columns under OLS report ordinary least squares estimates of intake equations, with specifications corresponding to MDE1 and MDE3.

The last two rows of tables 3-5 present goodness-of-fit measures. R_M^2 is a goodness-of-fit measure for the entire model computed as:

$$R_M^2 = \frac{Q_b - Q_M}{Q_b}, \tag{13}$$

where Q_b and Q_M are the minimized values of the minimum distance function for a base model and the hypothesized model. The base model is a restricted model in which the intake and information equations are constrained to include only the intercepts. The R^2 is the regular coefficient of determination for the intake equation.

The R_M^2 for all MDE models is consistently above 0.8, indicating a good fit relative to models that include only intercepts. The R^2 for intake equations ranges from 0.17 to 0.20 for total fat and saturated fat, and from 0.13 to 0.15 for cholesterol. These values are fairly typical for empirical nutrient intake equations.

Since there are two endogenous information variables in each estimated intake equation, we need at least two instruments to identify the information equations. We use four dummy variables indicating more than 5 hours of television viewing (TV5), importance of nutrition while shopping for food (Nutri-import), and use of food labels for nutrient comparison (always = Nutri-comp1, sometimes = Nutri-comp2) as instruments. The choice of these instruments is justified by the fact that, *a priori,* as discussed in the previous section, they are closely correlated with a respondent's diet-health information level. The availability of four variables gives us two degrees of freedom for testing the validity of these instruments using the Wu-Hausman test. The test statistic is reported in the third-to-the-last row of tables 3-5. In all cases, the test statistics are below the 99 percent critical value and in all but one of the smaller models (MDE1 and MDE3) the test statistics are below the 95 percent critical value. Thus, the choice of instruments appears satisfactory, although weaker under the expanded models (MDE2 and MDE4).

Turning to diet-health information variables, the coefficient estimates of $INFO_1$ (healthy diet importance) are consistently negative across models, implying that greater self-assessed importance of avoiding too much of total fat, saturated fat, and cholesterol translates into lower intake of these nutrients. Under MDE1 and MDE2, the $INFO_1$ estimates are significant at the 1-

percent level based on a one-sided t-test. However, under MDE3 the estimate in the cholesterol equation is not significant at the 5-percent level and under MDE4 the estimates are not significant at the 5-percent level for saturated fat and cholesterol. The sizes of the $INFO_1$ coefficient estimates in the saturated fat and cholesterol equations are much smaller under MDE3 and MDE4, compared with those under MDE1 and MDE2. These instabilities in the $INFO_1$ coefficient under MDE3 and MDE4 may be an indication of collinearity between $INFO_1$ and $INFO_3$ (nutrient content knowledge). The coefficient estimates of $INFO_3$ support this view. The standard errors of $INFO_3$ estimates are relatively large and the estimate is not significant at the 5-percent level under MDE4 in the cholesterol equation. Finally, the test statistics for the overidentifying restriction are consistently smaller under MDE1 and MDE2, compared with MDE3 and MDE4. Taken together with the fact that the models were not estimable when all three information variables were included, these results suggest that $INFO_3$ does not accurately account for much additional variation in intake beyond that explained by $INFO_1$ and $INFO_2$.[4] Therefore, the discussion below focuses on the results for MDE1 and MDE2.

The $INFO_2$ (diet-disease awareness) coefficient estimates are consistently negative and significant at the 1-percent level in the total fat and saturated fat equations and under MDE1 in the cholesterol equation. Under MDE2 in the cholesterol equation, the estimate is significant at the 5-percent level. These results confirm our expectation that, holding a variety of consumer characteristics constant, better awareness of nutrient-related health problems leads to significant reductions in the intakes of total fat, saturated fat, and cholesterol. The sizes of $INFO_2$ coefficient estimates are broadly comparable across models and equations, pointing to the stable effect of diet-disease awareness on intake. Interestingly, $INFO_2$ estimates are two- to four-times the $INFO_1$ estimates in size. This size differential has an economic interpretation given the distinct facets of diet-health information that $INFO_1$ and $INFO_2$ measure. As noted earlier, $INFO_2$ captures consumers' stock of specific diet-health information in the form of their ability to name specific health problems due to excess nutrient intake, whereas $INFO_1$ represents consumers' stock of general information in the form of their general notions about diet control, unrelated to any specific diet-health information. Since avoiding health problems has transparent and tangible economic benefits, $INFO_2$ is a better measure of the economic costs of diet choice than $INFO_1$ and, thus, has a larger effect on intake.

A comparison of estimates under OLS and MDE1 suggests the importance of treating information variables as endogenous. The estimates of $INFO_2$ have an unexpected positive sign under OLS in all three intake equations and the estimate has a large t-value in the total fat equation. These signs are reversed to the expected negative sign under MDE. Also, the MDE estimates of $INFO_2$ are larger (in absolute terms), compared with OLS estimates in the total fat

[4]This conclusion is identical to the one derived from our earlier analysis of dietary fiber intake. While a fiber intake equation with all the three information variables was estimable with the appropriate signs, the nutrient content knowledge coefficient was not statistically significant at the 10-percent level under a one-sided t-test. The healthy diet importance coefficient was significant at the 10-percent level and the diet-disease coefficient was significant at the 1-percent level. When the nutrient content knowledge variable was dropped, the other two variables had larger coefficients and the healthy diet importance variable became statistically significant at the 5-percent level.

and saturated fat equations. These results suggest that studies attempting to measure the effect of information on health behavior need to treat information variables as endogenous.

The difference between MDE1 and MDE2 specifications is that MDE2 includes eight additional explanatory variables that are potentially endogenous. Unfortunately, we lack proper instruments to control for these endogenous variables. However, examining the intake equation estimates under the two specifications in tables 3-5 and the estimates of the information equations under the two specifications reported in tables 6-8, it can be seen that the inclusion of these additional variables has little effect on inferences on the other explanatory variables that appear in both specifications. In particular, there is no change in inference on the information variables between MDE1 and MDE2 (at the 5-percent level for a one-sided test) in tables 3-5. Since the results seem to be robust to the inclusion of additional variables under MDE2, we focus the remainder of the discussion on the MDE2 estimates.

The coefficients of the explanatory variables appearing in the intake equations give their direct effects on intakes. All of these variables, except BMI, plus the four instruments also appear in the information equations. The explanatory variables in the information equations have indirect effects on intake, and these indirect effects can be estimated by substituting the estimated information equations into the intake equations. The sum of direct and indirect effects is the total effect of exogenous variables on intake. Tables 9-11 report these direct, indirect, and total effects.[5] For each exogenous variable, the direct and indirect effects can be translated into predicted changes in intake due to a change in that exogenous variable, holding other exogenous variables constant. Such predicted changes for selected exogenous variables are reported in tables 12-14.

Both income and schooling have positive direct effects on intakes. Except for the effect of schooling on cholesterol, these effects are significant at the 1-percent level under a two-sided t-test. This implies that holding the other explanatory variables and the diet-health information level constant, those with higher income or schooling tend to consume diets richer in fats and cholesterol, compared with those with lesser income or schooling. At the same time, however, those with higher income or schooling tend to have substantially greater diet-disease awareness as indicated by the positive and highly significant income and schooling coefficients in the $INFO_2$ equations under MDE2 in tables 6-8. Based on the estimated conversion factor, $\phi(\hat{\underline{\gamma}}'\bar{\underline{x}})$ in table 7, for example, an additional year of schooling or an additional \$10,000 in annual household income increases the probability of being aware of specific health problems due to too much saturated fat intake by 3 percent. From the predicted direct and indirect effects in tables 12-14, it can be seen that these higher levels of diet-disease awareness due to income and schooling translate to substantially lower net intakes of total fat, saturated fat, and cholesterol: 69, 59, and 43 percent lower for income, and 70, 76, and 126 percent lower for schooling. For cholesterol, the negative indirect intake effect of schooling is large enough to make the total effect negative, 0.7 milligram lower, although the effect is not significant.

[5]The standard errors of the indirect and total effects were computed using the delta method.

In contrast to the positive effects of income and schooling on $INFO_2$, these variables have no substantial effect on $INFO_1$ (except for the marginal effect of schooling on $INFO_1^{sf}$). In tables 12-14, this translates to little or no indirect effects for income and schooling on intakes through $INFO_1$. These results support our interpretation of $INFO_2$ and $INFO_1$ as capturing specific and general health information levels of individuals. Specific information (diet-disease awareness) was more likely acquired by a formal search process, requiring some investment in time and effort such as reading health literature, while general information (healthy diet importance) may have been acquired through less formal means requiring less investment in time and effort. Thus, our result that much of the fats- and cholesterol-lowering effects of income and schooling on intake is through $INFO_2$ and not $INFO_1$ has a key implication: It confirms the allocative efficiency hypothesis that states that higher human capital promotes healthier choices through better acquisition and use of health information. Although previous studies have included income and schooling to capture the allocative efficiency effect, most have not shown the effect as explicitly as above.

The intake of all three nutrients decreases with age. Holding diet-health information and exogenous variables constant, an additional year of age decreases total fat intake by approximately one-fifth of a gram of fat, one-tenth of a gram of saturated fat, and four-fifths of a milligram of cholesterol. The total effects are similar except for saturated fat, which is lower by 15 percent from the direct effect due to the significantly higher $INFO_1$ level of older individuals.

Female intakes, not surprisingly, are much lower than male intakes. The direct effects reduce female intake of fat, saturated fat, and cholesterol by 15 grams, 6 grams, and 85 milligrams, respectively, compared with the male intake of these nutrients. Female meal planners, however, also benefit from the greater importance they attach to avoiding too much fat and saturated fat in their diet. This indirect effect reduces their fat and saturated fat intake by an additional gram and half-gram, compared with male meal planners.

For a given information level, black meal planners have significantly lower intakes of fat (5 grams) and saturated fat (3 grams), compared with white meal planners. Black meal planners, however, also have lower awareness of health problems related to these nutrients. This lower specific information level increases their fat and saturated fat intake and helps offset the direct effect. The pattern is similar for Hispanic meal planners, although their diet-disease awareness level is higher than for blacks. The total effect of Hispanic ethnicity is to lower fat intake by 4 grams and saturated fat intake by 2 grams, compared with meal planners of other ethnic groups.

The indirect effect of the lower diet-disease awareness levels of black and Hispanic meal planners is much more substantial in the case of cholesterol than for fats. The lower diet-disease awareness of blacks, compared with other races, contributes nearly three-fourths (20 milligrams) of their 27 milligrams higher intake of cholesterol. For Hispanics, the direct effect that lowers their cholesterol intake, compared with other ethnic groups, is nullified by the indirect $INFO_2$ effect that increases their cholesterol intake. The total effect is a 9-milligram higher cholesterol intake by Hispanics, which although sizable is statistically insignificant. The clear implication of these results is that blacks and Hispanics stand to benefit considerably from better information about diet-health relationships.

Vegetarians, as expected, have substantially lower intake of all three nutrients, compared with non-vegetarians. The direct effect, rather than indirect effects, is predominant, indicating that a vegetarian diet in itself is contributing to lower intakes rather than higher information levels of vegetarians.

Meal planners' dieting status has a significant influence on intake with two notable results. First, those who reported being on a low-calorie diet achieve lower intakes of fat, saturated fat, and cholesterol than those who reported being on a low-fat diet. Second, the low-fat diet effect is principally indirect while the low-calorie diet effect is principally direct. These results may be an indication that a substantial part of the national trend toward lower intakes of fats and cholesterol has been achieved through diet changes related to weight control. Putler and Frazao (1994) argue that individuals attempting to reduce fat intake often substitute one source of fat with another, such as substituting meat with fat-rich dairy products, thus limiting the effect on their net fat intake. The larger effect of low-calorie diet may be occurring, because calorie reduction requires watching both fat and carbohydrate intakes so that there is less substitution of one fat source for another.

The effects of whether a meal planner has been diagnosed with a chronic health condition such as high blood cholesterol provides one illustration of the importance of isolating direct and indirect effects. For a given diet-health information level, those with an identified health condition tend to have higher intakes of fat and saturated fat. Those with a chronic health condition, however, also tend to have higher levels of $INFO_1$ and $INFO_2$. This may be because they are under a doctor's or health specialist's care. The higher diet-health information level exerts a negative effect on their fat and saturated fat intake, rendering their total fat and saturated fat intake not significantly different from those without disease. If the information variables had not been included in the intake equation, only the total effect of no significant difference would have been known.

Meal planners whose households participate in the Food Stamp or Women, Infants, and Children Programs have significantly higher intakes of all three nutrients. Information effects are insignificant, particularly for saturated fat and cholesterol, and 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 participant diets before focusing on their diet-health knowledge.

The results for the indirect effects of the instruments, the last four variables in tables 12 -14, buttress our argument that acquiring the specific diet-health information measured by $INFO_2$ requires more investment in time and effort relative to the general diet-health information measured by $INFO_1$. Those who watch television excessively (defined as 5 or more hours of television a day) are no different from those who watch less television with respect to $INFO_1$. Excess television watchers, however, are handicapped by lower $INFO_2$, likely because they have less time for information-enhancing activities such as reading. Consequently, they have significantly higher intakes of all three nutrients, compared with those watching less television. The habit of comparing nutrients on food labels requires some effort, and those who do it always (variable nutri-comp1) tend to gain larger reductions in fat and saturated fat through $INFO_2$ than through $INFO_1$. The nutri-import variable, indicating meal planners' attitude toward the importance of nutrition while shopping for food, is probably the least related to the effort required for gathering specific information. Not surprisingly, this variable has a larger effect on intake through $INFO_1$ than $INFO_2$.

Conclusions

Our results affirm the key role of diet-health information in determining the intake of dietary fats and cholesterol. Moreover, information about specific links between diet and health seems to have a larger effect on intake than information related to general notions about healthy diets. Acquiring specific information requires more investment in time and effort than acquiring general information. Therefore, variables such as income and schooling that determine a person's ability to acquire information may be expected to have a larger effect on intake through specific information. This, in fact, is the allocative efficiency hypothesis, and our results confirm it. Estimated effects of time spent viewing television and the habit of comparing nutrients in food labels add veracity to this conclusion.

Isolating the direct and indirect effects has highlighted the relative informational roles of exogenous variables on intake. Findings on the differing effects of race, ethnicity, dieting status, and program participation through direct and indirect effects may be useful for guiding nutrition education programs. Recommendations for specific dietary changes will have to await a similar analysis of the informational effects of exogenous variables on food groups.

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Table 1--Fat, saturated fat, and cholesterol: Intake amounts and response to information questions

Item	Amount of intake	Percent of total calories
Nutrient intake:	*Gram*	*Percent*
Total fat	63.0	34.6
Saturated fat	22.0	12.0
	Milligram	
Cholesterol	238.2	--

	Not at all important 1	2	3	4	5	Very important 6
Healthy diet importance:			*Percent*			
Avoiding too much fat	5.8	4.6	9.3	17.4	18.8	44.1
Avoiding too much saturated fat	4.1	4.0	8.8	15.5	22.8	44.8
Avoiding too much cholesterol	4.0	3.8	7.6	14.2	21.1	49.3

	No	Yes
Diet-disease awareness:	*Percent*	
Heard about health problems related to fat	33.5	66.5
Heard about health problems related to saturated fat	42.6	57.4
Heard about health problems related to cholesterol	27.6	72.4

	Correct	Incorrect
Nutrient content knowledge:	*Percent*	
Fat and saturated fat--		
Hamburger regular/ground	89.3	10.7
Pork spare ribs/loin chops	76.0	24.0
Hot dogs/ham	67.1	32.9
Sour cream/yogurt	90.0	10.0
Steak porterhouse/round	63.2	36.8
More likely liquid	33.0	67.0
Cholesterol--		
Butter/margarine	91.2	8.8
Egg yolks/whites	88.8	11.2
Cholesterol free	60.2	39.8
Cholesterol found in	40.8	59.2

Note: The item "More likely liquid" is for the question "Which kind of fat is more likely to be liquid rather than a solid: polyunsaturated; saturated; equally likely to be liquids?" Item "Cholesterol free" asked, "If a food is labeled cholesterol free, is it also: either high or low in saturated fat; low in saturated fats; high in saturated fats?" Item "Cholesterol found in" asked, "Is cholesterol found in: animal products like meat and dairy products; vegetables and vegetable oils; all foods containing fat or oil?" In each case, the correct choice is the first one. The rest of the nutrient content knowledge items are in response to the question: "Based on your knowledge, which has more fat or which has more cholesterol?" The correct choice is listed first.

-- = Not applicable.

Table 2--Explanatory variables

Variable description	Abbreviation	Mean
Household characteristics:		
Annual income before taxes ('000 $)	Income	23.0
Household size	Household size	2.6
Children present (less than 20 years old)	Children	40.3
Participated in WIC or FSP[1]	Program	16.6
Region--		
Midwest	Midwest	24.3
South	South	37.7
West	West	19.7
Northeast (omitted)	--	18.3
Urbanization--		
Suburb	Suburban	42.2
Nonmetro	Nonmetro	27.0
City (omitted)	--	30.8
Personal - socio-demographic:		
Schooling (years)	Schooling	11.8
Age (years)	Age	48.2
Sex-female	Female	83.1
Race-black	Black	13.9
Ethnic origin-Hispanic	Hispanic	7.1
Employment--		
Not employed	Not employed	55.2
Employed part-time	Part-employed	13.8
Employed full time (omitted)	--	31.0
Personal - diet-health:		
Smoke cigarettes now	Smoker	25.7
Vegetarian	Vegetarian	2.8
On a special diet	Special diet	17.5
On a special diet, low-fat diet	Low-fat diet	8.4
On a special diet, low-calorie diet	Low-calorie diet	5.2
Disease[2]	Disease	22.2
Body Mass Index (BMI)	BMI	25.8
Shopping and leisure:		
More than 5 hours TV/day	TV5	20.9
Nutrition very important when shopping	Nutri-import	61.0
Compare nutrients when shopping--		
Always	Nutri-comp1	13.6
Sometimes	Nutri-comp2	42.1
Rarely/never (omitted)	--	44.3

See footnotes at the end of table.

Continued--

Table 2--Explanatory variables--Continued

Variable description	Abbreviation	Mean
Survey-related:		
Year of CSFII-DHKS--		
1991	1990	34.1
1990	1991	32.0
1989 (omitted)	--	33.9
Amount of food eaten (day 1)--		
Less than usual	LTU1	17.7
More than usual	MTU1	6.4
Usual (omitted)	--	75.9
Amount of food eaten (day 2)--		
Less than usual	LTU2	13.2
More than usual	MTU2	3.4
Usual (omitted)	--	83.4
Amount of food eaten (day 3)--		
Less than usual	LTU3	12.4
More than usual	MTU3	3.6
Usual (omitted)	--	84.0

Note: Household income, household size, schooling, age, and BMI are continuous variables, and the others are dummy variables.
-- = Not applicable.
[1] Women, Infants, and Children (WIC); Food Stamp Program (FSP).
[2] A yes to the question "Has a doctor ever told you that you have heart disease/cancer/high blood cholesterol/stroke?"

Table 3--Estimates of log grams of total fat intake equation (absolute t-values in parentheses)

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
Intercept	4.275	3.213	3.054	4.246	3.349	3.096
	(40.65)	(8.73)	(8.58)	(40.43)	(8.10)	(6.74)
Healthy diet importance	-0.058	-0.097	-0.087	-0.053	-0.120	-0.114
($INFO_1^{tf}$)	(3.79)	(2.71)	(2.56)	(3.49)	(3.22)	(3.04)
Diet-disease awareness	0.052	-0.346	-0.321	--	--	--
($INFO_2^{tf}$)	(3.34)	(2.83)	(2.75)			
Nutrient content knowledge	--	--	--	0.002	-0.906	-0.930
($INFO_3^{tf}$)				(0.37)	(2.25)	(2.00)
Log income	0.022	0.091	0.095	0.026	0.140	0.153
	(2.13)	(2.94)	(3.35)	(2.44)	(2.39)	(2.33)
Schooling	0.034	0.286	0.277	0.045	0.490	0.511
(Years x 10^{-1})	(1.17)	(3.27)	(3.33)	(1.53)	(2.55)	(2.31)
Age	-0.047	-0.032	-0.035	-0.046	-0.031	-0.035
(Years x 10^{-1})	(8.59)	(3.79)	(4.33)	(8.49)	(3.04)	(3.42)
Female	-0.317	-0.259	-0.249	-0.316	-0.186	-0.174
	(15.57)	(8.13)	(8.07)	(15.46)	(3.58)	(2.98)
Black	-0.024	-0.101	-0.089	-0.027	-0.208	-0.208
	(1.03)	(2.52)	(2.47)	(1.14)	(2.40)	(2.22)
Hispanic	-0.064	-0.108	-0.120	-0.064	-0.278	-0.303
	(2.10)	(2.38)	(2.72)	(2.10)	(2.85)	(2.67)
Part-employed	-0.036	0.031	0.030	-0.033	0.001	-0.008
	(1.49)	(0.71)	(0.69)	(1.37)	(0.02)	(0.17)
Not employed	-0.001	0.003	0.010	-0.001	0.025	0.025
	(0.07)	(0.10)	(0.36)	(0.07)	(0.71)	(0.66)
Children	0.019	0.020	0.004	0.019	-0.005	-0.031
	(0.08)	(0.57)	(0.12)	(0.77)	(0.11)	(0.65)
Household size	0.003	0.005	0.008	0.003	-0.009	-0.006
	(0.35)	(0.42)	(0.76)	(0.38)	(0.61)	(0.41)
Log BMI	--	--	0.045	--	--	0.051
			(1.28)			(1.48)
Smoker	--	--	-0.027	--	--	-0.085
			(1.17)			(2.14)

See footnotes at the end of table.

Continued--

Table 3--Estimates of log grams of total fat intake equation (absolute t-values in parentheses)--Continued

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
Vegetarian	--	--	-0.086	--	--	-0.110
			(1.46)			(1.52)
Special diet	--	--	-0.124	--	--	-0.209
			(2.60)			(2.23)
Low-fat diet	--	--	0.033	--	--	0.178
			(0.64)			(1.52)
Low-calorie diet	--	--	-0.186	--	--	-0.128
			(3.37)			(1.34)
Disease	--	--	0.073	--	--	0.060
			(2.09)			(1.40)
Program	--	--	0.028	--	--	0.059
			(0.74)			(1.38)
Midwest	-0.045	-0.010	-0.010	-0.044	0.133	0.138
	(1.96)	(0.27)	(0.31)	(1.92)	(1.47)	(1.40)
South	-0.064	-0.045	-0.035	-0.064	-0.021	-0.013
	(3.00)	(1.46)	(1.17)	(3.00)	(0.54)	(0.34)
West	-0.086	-0.058	-0.048	-0.085	0.086	0.087
	(3.57)	(1.59)	(1.40)	(3.54)	(0.99)	(0.98)
Suburban	0.015	-0.008	-0.005	0.014	0.030	0.041
	(0.83)	(0.30)	(0.18)	(0.77)	(0.89)	(1.15)
Nonmetro	0.087	0.067	0.071	0.086	0.138	0.155
	(4.34)	(2.30)	(2.53)	(4.29)	(3.10)	(2.95)
1990	0.033	0.104	0.096	0.033	0.171	0.160
	(1.82)	(3.21)	(3.05)	(1.78)	(3.89)	(3.35)
1991	0.007	0.094	0.083	0.008	0.146	0.135
	(0.39)	(3.08)	(2.77)	(0.43)	(3.27)	(2.68)
LTU1	-0.069	-0.062	-0.050	-0.071	-0.063	-0.051
	(3.39)	(3.18)	(2.59)	(3.46)	(3.23)	(2.66)
MTU1	0.085	0.069	0.079	0.087	0.069	0.080
	(2.79)	(2.12)	(2.49)	(2.84)	(2.13)	(2.50)
LTU2	-0.138	-0.162	-0.158	-0.138	-0.160	-0.156
	(5.64)	(7.20)	(7.10)	(5.63)	(7.12)	(7.01)

See footnotes at the end of table.

Continued--

Table 3--Estimates of log grams of total fat intake equation (absolute t-values in parentheses)--Continued

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
MTU2	0.074	0.106	0.086	0.075	0.107	0.088
	(1.78)	(2.54)	(2.15)	(1.79)	(2.58)	(2.19)
LTU3	-0.156	-0.141	-0.140	-0.155	-0.143	-0.142
	(6.23)	(6.15)	(6.25)	(6.26)	(6.25)	(6.35)
MTU3	0.109	0.075	0.086	0.105	0.075	0.088
	(2.70)	(1.82)	(2.16)	(2.60)	(1.82)	(2.20)
Test of overidentifying restrictions[1]	--	5.12	6.86	--	6.17	8.59
R^2	0.159	0.169	0.194	0.157	0.168	0.194
R^2_M	--	0.847	0.844	--	0.846	0.842

-- = Not applicable.

[1] The test statistic is distributed as a χ^2 with two degrees of freedom; 95 and 99 percent critical values for a χ^2 (2) are, respectively, 5.99 and 9.21.

Table 4--Estimates of log grams of saturated fat intake equation (absolute t-values in parentheses)

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
Intercept	3.360	2.338	2.203	3.351	2.291	1.950
	(29.60)	(7.74)	(6.77)	(29.60)	(5.05)	(2.99)
Healthy diet importance	-0.132	-0.150	-0.131	-0.130	-0.111	-0.081
($INFO_1^{sf}$)	(8.19)	(5.46)	(4.77)	(8.08)	(2.54)	(1.50)
Diet-disease awareness	0.020	-0.304	-0.296	--	--	--
($INFO_2^{sf}$)	(1.20)	(3.09)	(3.02)			
Nutrient content knowledge	--	--	--	-0.005	-1.136	-1.403
($INFO_3^{sf}$)				(0.76)	(2.21)	(1.81)
Log Income	0.023	0.072	0.084	0.025	0.170	0.218
	(2.02)	(3.31)	(3.84)	(2.23)	(2.42)	(2.08)
Schooling	0.007	0.298	0.292	0.017	0.542	0.672
(Years x 10^{-1})	(0.22)	(3.34)	(3.33)	(0.53)	(2.42)	(1.97)
Age	-0.054	-0.043	-0.045	-0.054	-0.038	-0.042
(Years x 10^{-1})	(9.24)	(5.26)	(5.58)	(9.19)	(3.38)	(3.18)
Female	-0.327	-0.275	-0.269	-0.326	-0.195	-0.164
	(14.88)	(8.95)	(8.89)	(14.81)	(3.35)	(2.00)
Black	-0.066	-0.179	-0.175	-0.070	-0.270	-0.321
	(2.59)	(3.62)	(3.73)	(2.76)	(2.59)	(2.14)
Hispanic	-0.098	-0.151	-0.167	-0.101	-0.346	-0.431
	(2.98)	(3.20)	(3.56)	(3.08)	(2.85)	(2.34)
Part-employed	-0.037	0.006	0.010	-0.036	0.012	0.009
	(1.42)	(0.17)	(0.28)	(1.38)	(0.24)	(0.15)
Not employed	0.003	0.017	0.018	0.003	0.041	0.055
	(0.14)	(0.60)	(0.65)	(0.15)	(1.02)	(1.04)
Children	0.037	0.010	-0.008	0.037	0.005	-0.025
	(1.42)	(0.28)	(0.23)	(1.39)	(0.104)	(0.42)
Household size	-0.001	0.010	0.012	-0.001	-0.015	-0.016
	(0.12)	(0.89)	(1.12)	(0.12)	(0.85)	(0.78)
Log BMI	--	--	0.013	--	--	0.018
			(0.35)			(0.49)
Smoker	--	--	-0.030	--	--	-0.087
			(1.21)			(1.51)

See footnotes at the end of table.

Continued--

Table 4--Estimates of log grams of saturated fat intake equation (absolute t-values in parentheses)--Continued

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
Vegetarian	--	--	-0.107	--	--	-0.210
			(1.84)			(2.02)
Special diet	--	--	-0.092	--	--	-0.311
			(2.30)			(2.16)
Low-fat diet	--	--	-0.011	--	--	0.223
			(0.22)			(1.27)
Low-calorie diet	--	--	-0.164	--	--	-0.014
			(3.25)			(0.11)
Disease	--	--	0.062	--	--	0.078
			(1.91)			(1.35)
Program	--	--	0.067	--	--	0.051
			(2.03)			(0.93)
Midwest	-0.057	-0.040	-0.038	-0.056	0.102	0.192
	(2.32)	(1.22)	(1.17)	(2.25)	(1.43)	(1.33)
South	-0.081	-0.065	-0.059	-0.082	0.043	-0.014
	(3.50)	(2.14)	(1.95)	(3.53)	(0.63)	(0.27)
West	-0.094	-0.038	-0.032	-0.092	0.111	0.150
	(3.64)	(0.98)	(0.87)	(3.54)	(1.09)	(1.10)
Suburban	0.021	0.005	0.006	0.021	0.043	0.061
	(1.06)	(0.17)	(0.24)	(1.05)	(1.20)	(1.31)
Nonmetro	0.081	0.080	0.082	0.082	0.147	0.182
	(3.76)	(2.78)	(2.89)	(3.79)	(2.95)	(2.48)
1990	0.018	0.061	0.051	0.020	0.109	0.116
	(0.921)	(2.11)	(1.83)	(1.01)	(2.06)	(1.65)
1991	-0.022	-0.008	-0.015	-0.020	0.065	0.075
	(1.12)	(0.32)	(0.56)	(1.05)	(1.17)	(1.00)
LTU1	-0.061	-0.059	-0.045	-0.061	-0.060	-0.045
	(2.77)	(2.85)	(2.23)	(2.76)	(2.91)	(2.30)
MTU1	0.091	0.087	0.102	0.092	0.085	0.100
	(2.77)	(2.49)	(2.95)	(2.78)	(2.44)	(2.89)
LTU2	-0.108	-0.135	-0.127	-0.109	-0.132	-0.124
	(4.09)	(5.53)	(5.27)	(4.10)	(5.43)	(5.18)

See footnotes at the end of table.

Continued--

Table 4--Estimates of log grams of saturated fat intake equation (absolute t-values in parentheses)--Continued

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
MTU2	0.055	0.059	0.048	0.056	0.060	0.049
	(1.23)	(1.29)	(1.08)	(1.24)	(1.31)	(1.12)
LTU3	-0.164	-0.150	-0.150	0.165	-0.151	-0.152
	(6.14)	(6.00)	(6.14)	(6.18)	(6.07)	(6.23)
MTU3	0.116	0.097	0.103	0.116	0.097	0.104
	(2.66)	(2.16)	(2.38)	(2.66)	(2.17)	(2.40)
Test of overidentifying restrictions[1]	--	5.11	7.52	--	5.35	7.66
R^2	0.164	0.165	0.191	0.164	0.165	0.191
R^2_M	--	0.833	0.827	--	0.831	0.825

-- = Not applicable.

[1] The test statistic is distributed as a χ^2 with two degrees of freedom; 95 and 99 percent critical values for a χ^2 (2) are, respectively, 5.99 and 9.21.

Table 5--Estimates of log milligrams of cholesterol intake equation (absolute t-values in parentheses)

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
Intercept	5.653	5.008	4.327	5.662	5.385	4.595
	(43.35)	(14.71)	(13.92)	(43.26)	(28.74)	(20.01)
Healthy diet importance	-0.087	-0.083	-0.066	-0.084	-0.038	-0.028
($INFO_1^{ch}$)	(4.68)	(2.93)	(2.44)	(4.54)	(1.08)	(0.82)
Diet-disease awareness	0.021	-0.333	-0.243	--	--	--
($INFO_2^{ch}$)	(1.03)	(1.99)	(1.86)			
Nutrient content knowledge	--	--	--	-0.016	-0.374	-0.276
($INFO_3^{ch}$)				(1.51)	(1.79)	(1.33)
Log income	0.033	0.090	0.089	0.036	0.083	0.085
	(2.48)	(2.68)	(3.28)	(2.73)	(2.65)	(2.77)
Schooling	-0.066	0.154	0.121	-0.055	0.082	0.060
(Years x 10^{-1})	(1.83)	(1.33)	(1.28)	(1.52)	(0.94)	(0.74)
Age	-0.037	-0.041	-0.038	-0.037	-0.030	-0.029
(Years x 10^{-1})	(5.42)	(4.07)	(3.94)	(5.40)	(3.76)	(3.75)
Female	-0.392	-0.356	-0.364	-0.391	-0.366	-0.371
	(15.48)	(9.81)	(11.35)	(15.41)	(11.56)	(12.51)
Black	0.161	0.027	0.027	0.154	0.071	0.065
	(5.47)	(0.36)	(0.46)	(5.25)	(1.21)	(1.21)
Hispanic	0.047	-0.132	-0.094	0.041	-0.044	-0.033
	(1.25)	(1.36)	(1.18)	(1.08)	(0.71)	(0.55)
Part-employed	-0.081	-0.041	-0.051	-0.078	-0.035	-0.047
	(2.69)	(0.90)	(1.27)	(2.59)	(0.79)	(1.08)
Not employed	0.009	0.016	0.010	0.010	0.018	0.012
	(0.38)	(0.48)	(0.33)	(0.41)	(0.62)	(0.43)
Children	0.082	0.068	0.058	0.080	0.038	0.033
	(2.69)	(1.69)	(1.57)	(2.62)	(0.93)	(0.80)
Household size	-0.009	-0.009	-0.013	-0.008	-0.004	-0.010
	(0.94)	(0.68)	(1.16)	(0.92)	(0.40)	(0.99)
Log BMI	--	--	0.215	--	--	0.219
			(4.92)			(5.04)
Smoker	--	--	0.012	--	--	-0.022
			(0.47)			(0.78)

See footnotes at the end of table.

Continued--

Table 5--Estimates of log milligrams of cholesterol intake equation (absolute t-values in parentheses)-- Continued

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
Vegetarian	--	--	-0.365	--	--	-0.305
			(6.88)			(5.67)
Special diet	--	--	0.029	--	--	0.002
			(0.70)			(0.04)
Low-fat diet	--	--	-0.025	--	--	-0.048
			(0.44)			(1.02)
Low-calorie diet	--	--	-0.155	--	--	-0.152
			(2.71)			(2.88)
Disease	--	--	-0.008	--	--	-0.029
			(0.27)			(1.06)
Program	--	--	0.066	--	--	0.074
			(1.88)			(2.33)
Midwest	-0.050	-0.015	-0.020	-0.049	-0.047	-0.041
	(1.73)	(0.35)	(0.56)	(1.70)	(1.41)	(1.30)
South	-0.056	-0.038	-0.034	-0.057	-0.074	-0.055
	(2.11)	(1.08)	(1.08)	(2.13)	(2.24)	(1.68)
West	0.003	-0.010	-0.008	0.002	-0.020	-0.010
	(0.09)	(0.25)	(0.23)	(0.08)	(0.55)	(0.28)
Suburban	-0.018	-0.030	-0.031	-0.018	-0.023	-0.023
	(0.80)	(1.00)	(1.12)	(0.80)	(0.87)	(0.92)
Nonmetro	0.056	-0.003	0.007	0.055	0.038	0.037
	(2.27)	(0.08)	(0.23)	(2.23)	(1.34)	(1.39)
1990	0.002	-0.093	-0.076	0.001	0.018	0.004
	(0.10)	(1.84)	(1.84)	(0.06)	(0.61)	(0.15)
1991	-0.044	-0.032	-0.040	-0.043	-0.009	-0.026
	(2.01)	(1.09)	(1.49)	(1.92)	(0.27)	(0.77)
LTU1	-0.095	-0.089	-0.078	-0.095	-0.089	-0.078
	(3.74)	(3.67)	(3.25)	(3.71)	(3.66)	(3.25)
MTU1	0.099	0.090	0.107	0.100	0.089	0.107
	(2.59)	(2.46)	(2.95)	(2.62)	(2.44)	(2.94)
LTU2	-0.168	-0.178	-0.176	-0.169	-0.178	-0.176
	(5.49)	(6.58)	(6.51)	(5.52)	(6.57)	(6.50)

See footnotes at the end of table.

Continued--

Table 5--Estimates of log milligrams of cholesterol intake equation (absolute t-values in parentheses)--Continued

Independent variable	OLS	MDE 1	MDE 2	OLS	MDE 3	MDE 4
MTU2	0.067	0.091	0.091	0.067	0.092	0.090
	(1.29)	(1.65)	(1.73)	(1.30)	(1.67)	(1.72)
LTU3	-0.137	-0.126	-0.127	-0.137	-0.125	-0.125
	(4.43)	(4.65)	(4.75)	(4.44)	(4.62)	(4.71)
MTU3	0.082	0.097	0.080	0.084	0.099	0.081
	(1.62)	(1.88)	(1.59)	(1.67)	(1.92)	(1.61)
Test of overidentifying restrictions[1]	--	4.09	5.93	--	5.11	6.31
R^2	0.131	0.131	0.151	0.132	0.130	0.151
R^2_M	--	0.816	0.818	--	0.815	0.817

-- = Not applicable.

[1] The test statistic is distributed as a χ^2 with two degrees of freedom; 95 and 99 percent critical values for a χ^2 (2) are, respectively, 5.99 and 9.21.

Table 6--Diet-health information equations estimates: Total fat (absolute t-values in parentheses)

Independent variable	MDE 1		MDE 2		MDE 3		MDE 4	
	$INFO_1^{tf}$	$INFO_2^{tf}$	$INFO_1^{tf}$	$INFO_2^{tf}$	$INFO_1^{tf}$	$INFO_3^{tf}$	$INFO_1^{tf}$	$INFO_3^{tf}$
Intercept	-0.986	-2.800	-1.244	-2.772	-0.951	-0.901	-1.205	-0.851
	(3.25)	(9.37)	(3.73)	(8.55)	(3.13)	(4.26)	(3.62)	(3.91)
Log income	-0.054	0.206	-0.026	0.203	-0.057	0.134	-0.029	0.134
	(1.78)	(7.05)	(0.79)	(6.57)	(1.87)	(7.49)	(0.89)	(7.10)
Schooling (Years x 10^{-1})	0.082	0.607	0.066	0.605	0.087	0.455	0.072	0.457
	(0.99)	(7.46)	(0.79)	(7.34)	(1.05)	(8.26)	(0.86)	(8.27)
Age (Years x 10^{-1})	0.043	0.024	0.032	0.011	0.041	0.010	0.031	0.004
	(2.77)	(1.59)	(1.97)	(0.71)	(2.68)	(1.24)	(1.88)	(0.47)
Female	0.249	0.072	0.220	0.086	0.245	0.100	0.218	0.102
	(4.17)	(1.26)	(3.69)	(1.48)	(4.12)	(3.15)	(3.64)	(3.13)
Black	-0.039	-0.203	-0.044	-0.164	-0.043	-0.196	-0.048	-0.185
	(0.60)	(3.15)	(0.67)	(2.54)	(0.66)	(5.52)	(0.74)	(5.19)
Hispanic	-0.090	-0.078	-0.107	-0.088	-0.098	-0.213	-0.116	-0.223
	(1.09)	(0.98)	(1.27)	(1.10)	(1.18)	(4.76)	(1.38)	(4.88)
Part-employed	-0.094	0.196	-0.098	0.216	-0.094	0.044	-0.098	0.036
	(1.35)	(2.83)	(1.40)	(3.09)	(1.35)	(1.22)	(1.40)	(1.00)
Not employed	-0.026	0.049	-0.042	0.078	-0.023	0.042	-0.038	0.042
	(0.47)	(0.87)	(0.74)	(1.37)	(0.41)	(1.43)	(0.67)	(1.40)
Children	0.064	-0.001	0.067	-0.012	0.061	-0.029	0.064	-0.043
	(0.91)	(0.02)	(0.95)	(0.18)	(0.86)	(0.78)	(0.91)	(1.13)
Household size	-0.027	-0.008	-0.020	0.005	-0.026	-0.018	-0.020	-0.013
	(1.28)	(0.40)	(0.96)	(0.23)	(1.26)	(1.63)	(0.94)	(1.20)
Smoker	--	--	-0.045	0.023	--	--	-0.044	-0.055
			(0.91)	(0.48)			(0.89)	(2.08)
Vegetarian	--	--	0.371	0.007	--	--	0.378	-0.033
			(2.80)	(0.05)			(2.86)	(0.49)
Special diet	--	--	0.167	-0.188	--	--	0.166	-0.163
			(2.07)	(2.33)			(2.06)	(3.57)
Low-fat diet	--	--	0.227	0.198	--	--	0.235	0.215
			(2.23)	(2.09)			(2.30)	(3.75)
Low-calorie diet	--	--	-0.136	0.183	--	--	-0.135	0.131
			(1.19)	(1.71)			(1.19)	(2.17)

See footnotes at the end of table.

Continued--

Table 6--Diet-health information equations estimates: Total fat (absolute t-values in parentheses)--Continued

Independent variable	MDE 1		MDE 2		MDE 3		MDE 4	
	$INFO_1^{tf}$	$INFO_2^{tf}$	$INFO_1^{tf}$	$INFO_2^{tf}$	$INFO_1^{tf}$	$INFO_3^{tf}$	$INFO_1^{tf}$	$INFO_3^{tf}$
Disease	--	--	0.072	0.200	--	--	0.072	0.054
			(1.27)	(3.52)			(1.28)	(1.76)
Program	--	--	0.120	-0.104	--	--	0.116	-0.008
			(1.81)	(1.59)			(1.75)	(0.22)
Midwest	-0.053	0.114	-0.049	0.095	-0.054	0.200	-0.050	0.192
	(0.81)	(1.74)	(0.75)	(1.45)	(0.82)	(5.24)	(0.75)	(4.99)
South	0.064	0.022	0.084	0.007	0.061	0.033	0.081	0.023
	(1.06)	(0.36)	(1.37)	(0.12)	(1.01)	(1.01)	(1.32)	(0.68)
West	0.009	0.083	0.013	0.073	0.055	0.191	0.010	0.171
	(0.14)	(1.21)	(0.18)	(1.05)	(0.80)	(4.92)	(0.14)	(4.39)
Suburban	-0.044	-0.034	-0.047	-0.039	-0.046	0.029	-0.048	0.037
	(0.86)	(0.67)	(0.91)	(0.77)	(0.89)	(1.11)	(0.93)	(1.36)
Nonmetro	-0.057	-0.028	-0.066	-0.027	-0.056	0.069	-0.065	0.082
	(1.00)	(0.50)	(1.17)	(0.48)	(0.99)	(2.32)	(1.14)	(2.71)
1990	0.654	0.073	0.673	0.080	0.651	0.086	0.671	0.078
	(12.72)	(1.44)	(13.07)	(1.58)	(12.68)	(3.13)	(13.06)	(2.82)
1991	0.611	0.121	0.616	0.140	0.612	0.090	0.618	0.084
	(12.00)	(2.44)	(11.94)	(2.79)	(12.00)	(3.29)	(11.98)	(3.05)
TV5	0.035	-0.171	0.031	-0.184	0.024	-0.052	0.019	-0.049
	(0.66)	(3.68)	(0.57)	(3.82)	(0.45)	(2.35)	(0.35)	(2.13)
Nutri-import	0.687	0.060	0.676	0.056	0.693	-0.001	0.683	-0.006
	(15.39)	(1.43)	(15.07)	(1.34)	(15.50)	(0.04)	(15.18)	(0.25)
Nutri-comp1	0.357	0.213	0.338	0.196	0.352	0.082	0.333	0.067
	(5.50)	(3.88)	(5.16)	(3.55)	(5.41)	(2.75)	(5.05)	(2.29)
Nutri-comp2	0.123	0.086	0.109	0.066	0.115	0.042	0.098	0.035
	(2.75)	(2.57)	(2.42)	(1.98)	(2.55)	(2.31)	(2.16)	(1.95)
Conversion factor[1]	0.394	0.388	0.394	0.387	0.394	0.195	0.394	0.195
R^2	0.205	0.129	0.221	0.141	0.205	0.437	0.222	0.453

-- = Not applicable.

[1] Conversion factor multiplied by a coefficient estimate gives the predicted change in probability of the information variables due to a change in the corresponding explanatory variable.

Table 7--Diet-health information equations estimates: Saturated fat (absolute t-values in parentheses)

Independent variable	MDE 1		MDE 2		MDE 3		MDE 4	
	$INFO_1^{sf}$	$INFO_2^{sf}$	$INFO_1^{sf}$	$INFO_2^{sf}$	$INFO_1^{sf}$	$INFO_3^{sf}$	$INFO_1^{sf}$	$INFO_3^{sf}$
Intercept	-1.466	-2.641	-1.493	-2.676	-1.447	-0.795	-1.472	-0.782
	(4.90)	(8.82)	(4.61)	(8.23)	(4.83)	(3.93)	(4.54)	(3.73)
Log income	0.011	0.161	0.016	0.169	0.009	0.129	0.014	0.131
	(0.37)	(5.47)	(0.52)	(5.42)	(0.30)	(7.58)	(0.45)	(7.30)
Schooling	0.163	0.761	0.150	0.752	0.167	0.424	0.154	0.433
(Years x 10^{-1})	(1.98)	(9.44)	(1.80)	(9.21)	(2.03)	(8.15)	(1.85)	(8.22)
Age	0.067	0.009	0.050	-0.006	0.066	0.009	0.051	0.003
(Years x 10^{-1})	(4.35)	(0.59)	(3.17)	(0.37)	(4.29)	(1.16)	(3.12)	(0.34)
Female	0.191	0.056	0.186	0.066	0.191	0.092	0.187	0.096
	(3.24)	(0.96)	(3.12)	(1.13)	(3.24)	(3.07)	(3.14)	(3.11)
Black	-0.012	-0.380	-0.011	-0.353	-0.013	-0.183	-0.001	-0.180
	(0.18)	(5.74)	(0.17)	(5.29)	(0.20)	(5.47)	(0.16)	(5.29)
Hispanic	-0.045	-0.152	-0.046	-0.166	-0.048	-0.215	-0.047	-0.226
	(0.52)	(1.87)	(0.53)	(2.02)	(0.57)	(5.01)	(0.54)	(5.14)
Part-employed	-0.001	0.128	0.002	0.146	0.001	0.038	0.003	0.028
	(0.02)	(1.85)	(0.02)	(2.10)	(0.01)	(1.13)	(0.05)	(0.83)
Not employed	0.036	0.071	0.021	0.083	0.039	0.041	0.024	0.043
	(0.65)	(1.26)	(0.37)	(1.46)	(0.70)	(1.48)	(0.42)	(1.52)
Children	-0.069	-0.047	-0.055	-0.064	-0.074	-0.019	-0.061	-0.028
	(1.01)	(0.67)	(0.81)	(0.92)	(1.10)	(0.56)	(0.89)	(0.79)
Household size	-0.004	0.011	0.004	0.021	-0.004	-0.018	0.004	-0.015
	(0.22)	(0.51)	(0.20)	(1.03)	(0.19)	(1.79)	(0.21)	(1.45)
Smoker	--	--	0.028	0.056	--	--	0.029	-0.052
			(0.57)	(1.15)			(0.58)	(2.07)
Vegetarian	--	--	0.188	0.037	--	--	0.183	-0.058
			(1.48)	(0.29)			(1.44)	(0.90)
Special diet	--	--	0.124	-0.034	--	--	0.119	-0.160
			(1.53)	(0.42)			(1.47)	(3.68)
Low-fat diet	--	--	0.238	0.170	--	--	0.242	0.211
			(2.37)	(1.73)			(2.42)	(3.87)
Low-calorie diet	--	--	0.125	0.067	--	--	0.122	0.126
			(1.17)	(0.63)			(1.14)	(2.20)

See footnotes at the end of table.

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Table 7--Diet-health information equations estimates: Saturated fat (absolute t-values in parentheses)--Continued

Independent variable	MDE 1		MDE 2		MDE 3		MDE 4	
	$INFO_1^{sf}$	$INFO_2^{sf}$	$INFO_1^{sf}$	$INFO_2^{sf}$	$INFO_1^{sf}$	$INFO_3^{sf}$	$INFO_1^{sf}$	$INFO_3^{sf}$
Disease	--	--	0.163	0.163	--	--	0.162	0.051
			(2.90)	(2.88)			(2.88)	(1.74)
Program	--	--	0.016	0.011	--	--	0.013	-0.008
			(0.23)	(0.17)			(0.19)	(0.24)
Midwest	-0.019	0.060	-0.037	0.053	-0.023	0.178	-0.041	0.173
	(0.30)	(0.91)	(0.57)	(0.81)	(0.36)	(4.99)	(0.63)	(4.77)
South	0.111	-0.026	0.107	-0.054	0.105	0.030	0.099	0.024
	(1.87)	(0.42)	(1.79)	(0.87)	(1.77)	(0.99)	(1.66)	(0.77)
West	0.036	0.181	0.026	0.166	0.033	0.180	0.022	0.165
	(0.54)	(2.69)	(0.37)	(2.45)	(0.49)	(4.91)	(0.32)	(4.47)
Suburb	0.009	-0.045	-0.010	-0.041	0.009	0.022	-0.009	0.029
	(0.168)	(0.87)	(0.19)	(0.81)	(0.18)	(0.90)	(0.18)	(1.16)
Nonmetro	-0.047	0.010	-0.075	0.018	-0.046	0.060	-0.073	0.071
	(0.83)	(0.18)	(1.34)	(0.32)	(0.81)	(2.14)	(1.30)	(2.49)
1990	0.048	0.139	0.038	0.132	0.051	0.082	0.040	0.075
	(0.95)	(2.75)	(0.74)	(2.61)	(1.00)	(3.17)	(0.78)	(2.87)
1991	-0.058	0.076	-0.058	0.080	-0.058	0.084	-0.059	0.080
	(1.16)	(1.55)	(1.16)	(1.62)	(1.18)	(3.28)	(1.17)	(3.04)
TV5	-0.031	-0.186	-0.047	-0.199	-0.038	-0.048	-0.057	-0.040
	(0.60)	(3.99)	(0.91)	(4.13)	(0.73)	(2.33)	(1.08)	(1.94)
Nutri-import	0.695	-0.064	0.689	-0.071	0.701	0.005	0.696	0.008
	(15.65)	(1.48)	(15.32)	(1.64)	(15.76)	(0.24)	(15.45)	(0.34)
Nutri-comp1	0.412	0.234	0.364	0.208	0.401	0.080	0.350	0.063
	(6.38)	(3.95)	(5.57)	(3.52)	(6.11)	(2.83)	(5.26)	(2.24)
Nutri-comp2	0.207	0.107	0.200	0.074	0.210	0.037	0.205	0.023
	(4.68)	(2.84)	(4.49)	(1.99)	(4.66)	(2.32)	(4.50)	(1.70)
Conversion factor[1]	0.396	0.399	0.397	0.399	0.396	0.196	0.397	0.194
R^2	0.176	0.161	0.197	0.169	0.177	0.430	0.198	0.451

-- = Not applicable.

[1]Conversion factor multiplied by a coefficient estimate gives the predicted change in probability of the information variables due to a change in the corresponding explanatory variable.

Table 8--Diet-health information equations estimates: Cholesterol (absolute t-values in parentheses)

Independent variable	MDE 1		MDE 2		MDE 3		MDE 4	
	$INFO_1^{ch}$	$INFO_2^{ch}$	$INFO_1^{ch}$	$INFO_2^{ch}$	$INFO_1^{ch}$	$INFO_3^{ch}$	$INFO_1^{ch}$	$INFO_3^{ch}$
Intercept	-0.908	-1.631	-0.873	-1.603	-0.897	-0.589	-0.860	-0.535
	(3.05)	(5.22)	(2.67)	(4.76)	(3.01)	(2.45)	(2.64)	(2.11)
Log income	-0.005	0.164	0.008	0.159	-0.007	0.129	0.005	0.129
	(0.17)	(5.31)	(0.24)	(4.86)	(0.24)	(5.82)	(0.17)	(5.55)
Schooling	0.062	0.618	0.015	0.627	0.064	0.364	0.017	0.338
(Years x 10^{-1})	(0.74)	(7.43)	(0.18)	(7.42)	(0.77)	(5.91)	(0.20)	(5.52)
Age	0.057	-0.033	0.029	-0.039	0.057	0.010	0.030	0.004
(Years x 10^{-1})	(3.68)	(2.11)	(1.79)	(2.37)	(3.70)	(1.00)	(1.82)	(0.39)
Female	0.162	0.075	0.136	0.071	0.162	0.055	0.136	0.049
	(2.78)	(1.28)	(2.31)	(1.21)	(2.77)	(1.42)	(2.32)	(1.26)
Black	-0.064	-0.391	-0.061	-0.381	-0.068	-0.241	-0.065	-0.214
	(0.96)	(5.94)	(0.92)	(5.74)	(1.03)	(5.29)	(0.98)	(4.70)
Hispanic	-0.206	-0.506	-0.225	-0.499	-0.205	-0.238	-0.224	-0.246
	(2.36)	(6.10)	(2.52)	(5.93)	(2.35)	(3.98)	(2.52)	(4.09)
Part-employed	-0.020	0.139	-0.020	0.150	-0.020	0.138	-0.021	0.143
	(0.29)	(1.91)	(0.29)	(2.05)	(0.29)	(2.92)	(0.31)	(0.04)
Not employed	-0.039	0.059	-0.075	0.076	-0.039	0.042	-0.075	0.051
	(0.70)	(1.01)	(1.31)	(1.30)	(0.70)	(1.13)	(1.30)	(1.36)
Children	0.037	-0.014	0.040	-0.028	0.038	-0.089	0.042	-0.108
	(0.55)	(0.19)	(0.58)	(0.39)	(0.57)	(1.97)	(0.60)	(2.36)
Household size	-0.024	-0.009	-0.019	0.003	-0.024	0.001	-0.019	0.011
	(1.14)	(0.39)	(0.91)	(0.15)	(1.15)	(0.11)	(0.91)	(0.86)
Smoker	--	--	-0.049	0.071	--	--	-0.049	-0.076
			(1.00)	(1.41)			(0.99)	(2.27)
Vegetarian	--	--	0.131	-0.132	--	--	0.129	0.129
			(1.01)	(0.93)			(0.99)	(1.36)
Special diet	--	--	0.193	0.047	--	--	0.191	-0.038
			(2.33)	(0.55)			(2.31)	(0.68)
Low-fat diet	--	--	0.207	0.156	--	--	0.207	0.080
			(1.99)	(1.50)			(2.00)	(1.14)
Low-calorie diet	--	--	-0.069	0.035	--	--	-0.073	0.048
			(0.62)	(0.31)			(0.65)	(0.65)

See footnotes at the end of table.

Continued--

Table 8--Diet-health information equations estimates: Cholesterol (absolute t-values in parentheses)--Continued

Independent variable	MDE 1		MDE 2		MDE 3		MDE 4	
	$INFO_1^{ch}$	$INFO_2^{ch}$	$INFO_1^{ch}$	$INFO_2^{ch}$	$INFO_1^{ch}$	$INFO_3^{ch}$	$INFO_1^{ch}$	$INFO_3^{ch}$
Disease	--	--	0.267	0.077	--	--	0.265	0.029
			(4.74)	(1.34)			(4.70)	(0.76)
Program	--	--	0.023	-0.065	--	--	0.022	-0.035
			(0.34)	(0.96)			(0.32)	(0.80)
Midwest	-0.089	0.107	-0.086	0.076	-0.091	-0.002	-0.087	-0.022
	(1.36)	(1.57)	(1.31)	(1.11)	(1.39)	(0.05)	(1.31)	(0.50)
South	0.111	0.040	0.121	0.002	0.112	-0.052	0.124	-0.062
	(1.85)	(0.64)	(1.99)	(0.04)	(1.87)	(1.29)	(2.03)	(1.54)
West	0.011	-0.009	0.012	-0.052	0.012	-0.032	0.013	-0.051
	(0.15)	(0.12)	(0.17)	(0.72)	(0.17)	(0.69)	(0.19)	(1.09)
Suburb	-0.108	-0.005	-0.123	0.001	-0.105	0.006	-0.121	0.016
	(2.10)	(0.10)	(2.38)	(0.01)	(2.06)	(0.17)	(2.33)	(0.47)
Nonmetro	-0.141	-0.135	-0.159	-0.118	-0.140	-0.020	-0.158	-0.009
	(2.49)	(2.34)	(2.79)	(2.05)	(2.48)	(0.55)	(2.78)	(0.24)
1990	0.020	-0.249	0.010	-0.247	0.021	0.081	0.016	0.079
	(0.38)	(4.75)	(0.19)	(4.74)	(0.41)	(2.29)	(0.22)	(2.25)
1991	0.003	0.048	-0.018	0.058	0.004	0.108	-0.016	0.108
	(0.05)	(0.91)	(0.34)	(1.88)	(0.07)	(3.16)	(0.32)	(3.15)
TV5	0.040	-0.129	0.029	-0.146	0.043	-0.063	0.032	-0.049
	(0.76)	(2.65)	(0.55)	(2.87)	(0.82)	(1.92)	(0.60)	(1.47)
Nutri-import	0.718	-0.065	0.699	-0.092	0.716	0.041	0.697	0.040
	(16.19)	(1.47)	(15.44)	(2.03)	(16.11)	(1.42)	(15.39)	(1.34)
Nutri-comp1	0.459	0.115	0.431	0.128	0.462	0.120	0.434	0.108
	(6.81)	(1.91)	(6.33)	(2.01)	(6.80)	(2.86)	(6.35)	(2.49)
Nutri-comp2	0.239	0.107	0.235	0.097	0.244	0.116	0.241	0.116
	(5.30)	(2.84)	(5.15)	(2.23)	(5.37)	(3.82)	(5.24)	(3.79)
Conversion factor[1]	0.399	0.362	0.399	0.361	0.399	0.384	0.399	0.184
R^2	0.180	0.164	0.204	0.174	0.180	0.369	0.204	0.401

-- = Not applicable.

[1] Conversion factor multiplied by a coefficient estimate gives the predicted change in probability of the information variables due to a change in the corresponding explanatory variable.

Table 9--Direct, indirect, and total effects of selected independent variables on log grams of total fat intake under model MDE 2 (absolute t-values in parentheses)

Independent variable	Direct effect	Indirect effect $INFO_1^{tf}$	Indirect effect $INFO_2^{tf}$	Total effect
Log income	0.095	0.002	-0.065	0.032
	(3.35)	(0.76)	(2.55)	(3.14)
Schooling (Year x 10^{-1})	0.277	-0.006	-0.194	0.077
	(3.33)	(0.76)	(2.54)	(2.71)
Age (Year x 10^{-1})	-0.035	-0.003	-0.004	-0.042
	(4.34)	(1.57)	(0.68)	(7.56)
Female	-0.249	-0.019	-0.028	-0.296
	(8.07)	(2.10)	(1.32)	(14.56)
Black	-0.089	0.004	0.053	-0.032
	(2.47)	(0.65)	(1.85)	(1.47)
Hispanic	-0.120	0.009	0.028	-0.082
	(2.72)	(1.12)	(1.02)	(2.87)
Part-employed	0.030	0.009	-0.069	-0.031
	(0.69)	(1.24)	(2.10)	(1.32)
Log BMI	0.044	--	--	0.044
	(1.28)			(1.28)
Smoker	-0.027	0.004	-0.008	-0.031
	(1.17)	(0.87)	(0.48)	(1.94)
Vegetarian	-0.086	-0.033	0.002	-0.121
	(1.46)	(1.90)	(0.05)	(3.47)
Special diet	-0.124	-0.015	0.060	-0.078
	(2.60)	(1.61)	(1.77)	(2.95)
Low-fat diet	0.033	-0.020	-0.063	-0.050
	(0.64)	(1.68)	(1.60)	(1.62)
Low-calorie diet	-0.186	0.019	-0.059	-0.233
	(3.37)	(1.09)	(1.44)	(7.21)
Disease	0.073	-0.006	-0.064	0.003
	(2.09)	(1.12)	(2.18)	(0.14)
Program	0.028	-0.011	0.033	0.050
	(0.74)	(1.47)	(1.32)	(2.27)

See note at the end of table.

Continued--

Table 9--Direct, indirect, and total effects of selected independent variables on log grams of total fat intake under model MDE 2 (absolute t-values in parentheses)--Continued

Independent variable	Direct effect	Indirect effect		Total effect
		$INFO_1^{tf}$	$INFO_2^{tf}$	
TV5	--	-0.003	0.059	0.056
		(0.58)	(3.54)	(3.36)
Nutri-import	--	-0.059	-0.018	-0.077
		(2.60)	(1.12)	(5.17)
Nutri-comp1	--	-0.030	-0.063	-0.092
		(2.29)	(2.89)	(5.26)
Nutri-comp2	--	-0.010	-0.021	-0.031
		(1.75)	(1.81)	(2.73)

-- = Not applicable.

Table 10--Direct, indirect, and total effects of selected independent variables on log grams of saturated fat intake under model MDE 2 (absolute t-values in parentheses)

Independent variable	Direct effect	Indirect effect		Total effect
		$INFO_1^{sf}$	$INFO_2^{sf}$	
Log income	0.084	-0.002	-0.050	0.032
	(3.84)	(0.52)	(2.67)	(2.88)
Schooling	0.292	-0.020	-0.223	0.050
	(3.33)	(1.67)	(2.82)	(1.63)
Age	-0.045	-0.007	0.002	-0.050
	(5.58)	(2.60)	(0.36)	(8.46)
Female	-0.269	-0.024	-0.019	-0.313
	(8.89)	(2.59)	(1.06)	(14.11)
Black	-0.175	0.002	0.104	-0.069
	(3.73)	(0.17)	(2.60)	(2.97)
Hispanic	-0.170	0.006	0.049	-0.112
	(3.56)	(0.53)	(1.68)	(3.45)
Part-employed	0.010	-0.000	-0.043	-0.033
	(0.28)	(0.02)	(1.75)	(1.30)
Log BMI	0.013	--	--	0.013
	(0.35)			(0.35)
Smoker	-0.030	-0.004	0.016	-0.017
	(1.21)	(0.56)	(1.07)	(0.95)
Vegetarian	-0.107	-0.025	-0.011	-0.142
	(1.84)	(1.41)	(0.29)	(3.77)
Special diet	-0.092	-0.016	0.010	-0.098
	(2.30)	(1.45)	(0.41)	(3.42)
Low-fat diet	-0.011	-0.031	-0.050	-0.092
	(0.22)	(2.15)	(1.51)	(2.76)
Low-calorie diet	-0.164	-0.016	-0.020	-0.200
	(3.25)	(1.13)	(0.61)	(5.66)
Disease	0.062	-0.021	-0.048	-0.007
	(1.91)	(2.47)	(2.07)	(0.34)
Program	0.066	-0.002	-0.003	0.061
	(2.03)	(0.23)	(0.17)	(2.48)

See note at the end of table.

Continued--

Table 10--Direct, indirect, and total effects of selected independent variables on log grams of saturated fat intake under model MDE 2 (absolute t-values in parentheses)--Continued

Independent variable	Direct effect	Indirect effect $INFO_1^{sf}$	Indirect effect $INFO_2^{sf}$	Total effect
TV5	--	0.006	0.059	0.065
		(0.89)	(3.39)	(3.76)
Nutri-import	--	-0.090	0.021	-0.069
		(4.87)	(1.63)	(4.23)
Nutri-comp1	--	-0.048	-0.061	-0.109
		(3.80)	(3.12)	(5.52)
Nutri-comp2	--	-0.026	-0.022	-0.048
		(3.40)	(1.88)	(3.86)

-- = Not applicable.

Table 11--Direct, indirect, and total effects of selected independent variables on log milligrams of cholesterol intake under model MDE 2 (absolute t-values in parentheses)

Independent variable	Direct effect	Indirect effect		Total effect
		$INFO_1^{ch}$	$INFO_2^{ch}$	
Log income	0.089	-0.001	-0.038	0.050
	(3.28)	(0.24)	(1.72)	(3.65)
Schooling	0.121	-0.001	-0.152	-0.032
	(1.28)	(0.18)	(1.80)	(0.88)
Age	-0.038	-0.002	0.010	-0.030
	(3.94)	(1.42)	(1.47)	(4.26)
Female	-0.364	-0.009	-0.017	-0.390
	(11.35)	(1.69)	(1.00)	(14.93)
Black	0.027	0.004	0.093	0.124
	(0.46)	(0.86)	(1.76)	(4.44)
Hispanic	-0.094	0.015	0.121	0.042
	(1.18)	(1.74)	(1.78)	(1.13)
Part-employed	-0.051	0.001	-0.036	-0.086
	(1.27)	(0.29)	(1.39)	(2.94)
Log BMI	0.215	--	--	0.215
	(4.92)			(4.92)
Smoker	0.012	0.003	-0.017	-0.002
	(0.47)	(0.92)	(1.15)	(0.09)
Vegetarian	-0.365	-0.009	0.032	-0.341
	(6.88)	(0.93)	(0.84)	(8.36)
Special diet	0.029	-0.013	-0.011	0.005
	(0.70)	(1.68)	(0.53)	(0.14)
Low-fat diet	-0.024	-0.014	-0.038	-0.076
	(0.44)	(1.56)	(1.17)	(1.83)
Low-calorie diet	-0.155	0.005	-0.009	-0.157
	(2.71)	(0.60)	(0.31)	(3.34)
Disease	-0.008	-0.018	-0.019	-0.045
	(0.27)	(2.14)	(1.09)	(1.82)
Program	0.066	-0.002	0.016	0.081
	(1.88)	(0.34)	(0.84)	(2.84)

See note at the end of table.

Continued--

Table 11--Direct, indirect, and total effects of selected independent variables on log milligrams of cholesterol intake under model MDE 2 (absolute t-values in parentheses)--Continued

Independent variable	Direct effect	Indirect effect $INFO_1^{ch}$	Indirect effect $INFO_2^{ch}$	Total effect
TV5	--	-0.002	0.035	0.033
		(0.53)	(1.95)	(1.84)
Nutri-import	--	-0.046	0.022	-0.024
		(2.44)	(1.57)	(1.28)
Nutri-comp1	--	-0.028	-0.031	-0.059
		(2.33)	(1.64)	(2.76)
Nutri-comp2	--	-0.016	-0.024	-0.039
		(2.22)	(1.75)	(2.60)

-- = Not applicable.

Table 12--Average change in grams of total fat intake due to change in selected independent variables under model MDE 2

Independent variable	Direct effect	Indirect effect		Total effect
		$INFO_1^{tf}$	$INFO_2^{tf}$	
Income[1]	5.316*	0.126	-3.667**	1.775*
Schooling[2]	1.554*	-0.032	-1.091**	0.431*
Age[3]	-0.199*	-0.016	-0.020	-0.235*
Female	-15.380*	-1.189**	-1.697	-18.265*
Black	-4.923**	0.214	2.927***	-1.782
Hispanic	-6.499*	0.507	1.538	-4.455*
Part-employed	1.663	0.478	-3.856**	-716
BMI[4]	0.025	--	--	0.025
Smoker	-1.521	0.221	-0.420	-1.720***
Vegetarian	-4.585	-1.723***	-0.113	-6.420*
Special diet	-6.879*	-0.809	3.346***	-4.340*
Low-fat diet	4.638	-2.759***	-8.8136	-6.935
Low-calorie diet	-12.308*	0.784	-3.890	-15.415*
Disease	4.123**	-0.352	-3.618**	0.153
Program	1.570	-0.598	1.912	2.883**
TV5	--	-0.154	3.376*	3.222*
Nutri-import	--	-3.342*	-1.025	-4.367*
Nutri-comp1	--	-1.605**	-3.413*	-5.018*
Nutri-comp2	--	-0.534***	-1.184***	-1.718*

Note: *, **, and *** indicate coefficient estimates significant at 1-, 5-, and 10-percent levels, respectively, under two-sided t-tests in table 9.
-- = Not applicable.
[1]Figures are for a doubling of income.
[2]Figures are for an additional year of schooling.
[3]Figures are for an additional year of age.
[4]Figures are for a doubling of the Body Mass Index.

Table 13--Average change in grams of saturated fat intake due to change in selected independent variables under model MDE 2

Independent variable	Direct effect	Indirect effect $INFO_1^{sf}$	Indirect effect $INFO_2^{sf}$	Total effect
Income[1]	1.630*	-0.042	-0.968*	0.621*
Schooling[2]	0.566*	-0.038***	-0.430*	0.097
Age[3]	-0.088*	-0.013*	0.003	-0.097*
Female	-5.760*	-0.522*	-0.415	-6.697*
Black	-3.306*	0.028	1.971*	-1.307*
Hispanic	-3.082*	0.111	0.906***	-2.065*
Part-employed	0.200	-0.004	-0.827***	-0.631
BMI[4]	0.246	--	--	0.246
Smoker	-0.572	-0.701	0.318	-0.324
Vegetarian	-1.935***	-0.447	-0.196	-2.578*
Special diet	-1.751**	-0.308	0.193	-1.867*
Low-fat diet	-0.407	-1.171**	-1.885	-3.463*
Low-calorie diet	-4.205*	-0.422	-0.522	-5.149*
Disease	1.203**	-0.41**	-0.929**	-0.140
Program	1.315**	-0.041	-0.067	1.208**
TV5	--	0.123	1.164*	1.287*
Nutri-import	--	-1.763*	0.409	-1.354*
Nutri-comp1	--	-0.890*	-1.142*	-2.032*
Nutri-comp2	--	-0.507*	-0.423***	-0.930*

Note: *, **, and *** indicate coefficient estimates significant at 1-, 5-, and 10- percent levels, respectively, under two-sided t-tests in table 10.
-- = Not applicable.
[1]Figures are for a doubling of income.
[2]Figures are for an additional year of schooling.
[3]Figures are for an additional year of age.
[4]Figures are for a doubling of the Body Mass Index.

Table 14--Average change in milligrams of cholesterol intake due to change in selected independent variables under model MDE 2

Independent variable	Direct effect	Indirect effect		Total effect
		$INFO_1^{ch}$	$INFO_2^{ch}$	
Income[1]	18.327*	-0.105	-7.955***	10.267*
Schooling[2]	2.499	-0.020	-3.144***	-0.665
Age[3]	-0.777*	-0.040	0.196	-0.621*
Female	-84.857*	-2.086***	-4.052	-90.995*
Black	5.903	0.867	19.964***	26.733*
Hispanic	-19.679	3.109***	25.464***	8.894
Part-employed	-10.201	0.268	-7.282	-17.216*
BMI[4]	0.215*	--	--	0.215*
Smoker	2.519	0.667	-3.576	-0.390
Vegetarian	-64.303*	-1.524	5.648	-60.178*
Special diet	5.976	-2.653***	-2.380	0.94
Low-fat diet	-4.584	-2.578	-7.202	-14.364***
Low-calorie diet	-29.126*	0.858	-1.617	-29.886*
Disease	-1.719	-3.582**	-3.813	-9.114***
Program	14.067***	-0.321	3.346	17.092*
TV5	--	-0.404	7.368***	6.965***
Nutri-import	--	-9.508*	4.624	-4.887
Nutri-comp1	--	-5.722**	-6.270	-11.992*
Nutri-comp2	--	-3.181**	-4.860***	-8.041*

Note: *, **, and *** indicate coefficient estimates significant at 1-, 5-, and 10-percent levels, respectively, under two-sided t-tests in table 11.
-- = Not applicable.
[1]Figures are for a doubling of income.
[2]Figures are for an additional year of schooling.
[3]Figures are for an additional year of age.
[4]Figures are for a doubling of the Body Mass Index.