Label Use and Importance Rankings for Selected Milk Labeling Attributes

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Results from a random telephone survey of households in 13 southern states suggest that 80 percent of respondents use labels when making food purchasing decisions. Label users are more likely to be college-educated, female, living in the East South Central Region, and to be childless or to have children between the ages of five and twelve. Age is invariant to label use; however, older respondents are more likely to assign higher importance ratings to caloric, fat, sodium, and cholesterol content than to price, expiration date, and brand when buying fresh-fluid milk.

The passage of the Nutritional Labeling and Education Act of 1990 (NLEA) and its implementation in mid-1994 expanded the role of the Food and Drug Administration and the United States Department of Agriculture in ensuring that food labels now offer more complete, useful, and accurate information than in the past. Thus the new food labels now contain information on serving size; servings per container; levels of fat, sodium, and cholesterol; and total carbohydrates, dietary fiber, protein, and other nutrients. They also conform with the uniform-definition rule for describing a particular food's nutrient content, such as "low-fat" and "light." Under the NLEA, products labeled as "low-fat" must not contain more than three grams of fat per serving. Although the new food labels were introduced in mid-1994, those for reduced-fat dairy products, including fluid milk, were exempt from the uniform definition rule until January 1, 1998. After that date, 2-percent and 1-percent milk were classified as reduced fat and low-fat, respectively, and labeled accordingly.

Dairy products are important sources of calcium, vitamins, minerals, and protein, but they are also a source of fat (Gerrior, Putnam, and Bente 1998). In fact, between 1970 and 1994, daily per-capita consumption of fat from dairy products increased from 19 to 20 grams. Milk and milk products contributed 12 percent of total fat and 24 percent of saturated fat to the U. S. food supply during this time period (Putnam and Allshouse 1999). One of the premises for mandating food labels and uniform standards was that consumers would make healthier food choices if they had a reliable source of nutritional information. According to this premise, consumers would now be able to compare the fat content of whole milk with that of low-fat milk and make informed decisions as to which milk to buy. Because cultural, psychological, behavioral, socioeconomic, and regional factors also affect milk purchase decisions, these factors must be considered in assessing food labels' success in changing eating habits and diet quality.

Previous studies suggest that regional consumption and expenditures on fluid milk in the South differ from those at the national level (Boehm 1975, Huang and Raunikar 1983, Jensen 1995, Raunikar and Huang 1984). Additionally, consumption and expenditure patterns are statistically significantly associated with socioeconomic characteristics such as gender, race, age, income level, and household size (Gould 1995, Heien and Wessells 1988, Jensen 1995). The importance consumers place on certain health-related attributes, such as a particular food's cholesterol content, also influences consumption (Smith, Harrmann, and Warland 1990; Variyam 1999; Variyam, Blaylock, and Smallwood 1997).

In 1995 Guthrie and her colleagues used data from the 1989 Continuing Survey of Food Intakes by Individuals and the Diet and Health Knowledge Survey to assess whether socioeconomic, demographic, and heath-related characteristics, nutri-

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tional knowledge, and attitudes affected label use. Positive associations were found between the likelihood of using nutrition labels and educational level, gender, household composition, knowledge about nutrition, and concerns about nutrition and food safety. Specifically, the results suggested that label users were more likely to have at least some college education, to be women, to live in multiperson households, to have some knowledge about nutrition, to think the *Dietary Guidelines for Americans* are important, to be concerned about nutrition and product safety, and to have a higher consumption of vitamin C and a lower consumption of cholesterol.

Nayga's (1996) study suggested that label users were more likely to be women and to be well educated. Additionally, meal planners who placed a higher priority on nutritional content over taste and those who perceived their diets as healthy were more likely to use the nutritional information on food packages. Use of nutritional information also was statistically significantly linked to household size, race, employment status, urbanization, region, age, and household income. Brunt and Schafer (1997) observed that 20 to 30 percent of the adults in the United States had limited reading skills, and that an additional 25 to 30 percent were functionally illiterate. However, in reviewing the available nutrition education materials, the authors found that two-thirds of the materials were written at or above the ninth-grade reading level. Poor readers often have limited general knowledge, low decoding skills, and limited ability to generalize and use abstract reasoning. These barriers can therefore prevent a large number of consumers with poor reading skills from using the information on Nutrition Facts labels (Brunt and Schafer 1997).

Mojduszka and Caswell (2000) investigated the market's effectiveness in providing consumers with information about the quality of processed foods prior to NLEA's passage. They hypothesized that the likelihood that manufacturers provided nutrition information panels on processed foods depended on the food's nutrient content and its price. The nutrients studied were calories, fat, cholesterol, sodium, fiber, sugar, protein, vitamin A, and vitamin C. The authors concluded that NLEA's passage resulted from the ineffectiveness of markets—particularly the failure of food manufacturers to provide consumers with nutritional information on processed foods.

The reviewed studies on food labels used data from before NLEA's 1994 implementation. Despite these studies, our literature search did not reveal any studies linking label use with importance rankings of the attributes on the labels of fresh-fluid milk. Therefore, our study not only adds to the body of knowledge on nutrition label use but also provides food processors and the government with insights concerning how consumers in the South are using labeling information to rate the nutritional and non-nutritional attributes on the labels of fresh-fluid milk. Assessing the extent to which consumers are actually using labels is paramount in determining the effectiveness and practicality of the measures passed under NLEA. Consequently, it is important to examine whether consumers are using labels in their buying decisions and how they rank the information on these labels. Because consumers' knowledge about nutrition and their eating habits can conflict, this study assesses the level of label use in the southern United States and how consumers apply the nutritional and non-nutritional information on the labels of fresh-fluid milk when making their milk purchasing decisions.

Objectives

The study's objectives are to determine whether label use or nonuse is independent of importance ratings of selected nutritional and non-nutritional attributes on the labels of fresh-fluid milk, to assess the influence of sociodemographic and regional (SDR) characteristics on label use and importance ratings of selected milk labeling attributes, and to develop profiles of selected groups of label users and nonusers.

The Consumer Survey

The study's data were compiled from a stratified random sample of telephone subscribers in 13 southern states during summer 1998. Subscribers lived in following regions: (1) East South Central Region (Alabama, Kentucky, Mississippi, and Tennessee); (2) South Atlantic Region (Florida, Georgia, North Carolina, South Carolina, and Virginia); and (3) West South Central Region (Arkansas, Louisiana, Oklahoma, and Texas). The survey was geared toward the primary grocery shopper or meal

preparer in each household. Data were collected on the respondents' label usage, importance rankings for nutritional (calories, fat content, sodium content, and cholesterol content), and non-nutritional (price, expiration date, and brand) information on milk labels, and their SDR characteristics. The survey contained 1801 respondents; however, only 1421 answered all questions completely.

In terms of label use, respondents were asked if they used food labels when making food purchasing decisions. If labels were used, the follow-up question asked them to rank the importance of the following attributes when they bought fresh-fluid milk: calories, fat content, sodium content, bar codes for pricing information, expiration date, cholesterol content, and brand name versus store brand. Respondents ranked the attributes according to the following rating scale: (1) not at all important; (2) not very important; (3) somewhat important; (4) very important; and (5) extremely important. The information collected on respondents' SDR characteristics included age, education, employment status, food stamp participation, gender, household composition, household income, household size, marital status, race, religion, and area of residence. A marketing research firm conducted the survey.

Variable and Model Selections

Consumer theory asserts that utility or satisfaction is derived from consumption of goods and services. The act of consumption, however, embodies the satisfaction that consumers derive from particular characteristics of these goods and services. Thus the decision to use food labels and the ratings assigned to selected attributes on the labels of fresh-fluid milk will depend on the levels of satisfaction consumers derive from using labels and fresh-fluid milk. Guthrie et al. (1995) and Nayga (1996) suggest that the use of nutrition labeling is an act of information search and that, theoretically, the search will continue as long as the marginal cost (lost wages or leisure time) associated with searching is less than the marginal benefits (better food choices and more nutritious diet) resulting from the search. Within this framework, they postulate that nutrition label use, a proxy for information search, is linked to consumers' characteristics, knowledge, decision-making strategies, situation variables, marketing environment, and product importance.

In the spirit of Guthrie et al. (1995) and Nayga (1996) we hypothesize that a set of factors, such as respondents' characteristics (age, education, gender, and race), situation variables (household size, household composition, marital status, and household income), and marketing environment (area of residence) explain decisions to use or not use nutrition labels, and subsequent ratings of the labeling attributes on fresh-fluid milk. The selection of these factors also is consistent with other studies on U.S. food consumption patterns, including consumption of fresh-fluid milk and dairy products (Boehm 1998; Devine et al. 1999; Gould 1995; Heien and Wessells 1998; Huang and Raunikar 1983; Jensen 1995; Raunikar and Huang 1984; Variyam 1999; Variyam, Blaylock, and Smallwood 1995 and1997; Weimer 1998).

Based on diffusion theory, we further hypothesized that nutrition-label users (early adopters) are more likely to be younger and to have higher levels of education and household incomes than non-users (Boone and Kurtz 1998). They are also more likely to be women and live in multi-person households (Guthrie et al. 1995). Thus, age, education, household income, household size, household composition, and marital status are expected to influence label use positively. No *a priori* assumptions are advanced for race and area of residence. These SDR characteristics also are expected to influence importance ratings of the selected nutritional (calories, fat, sodium, and cholesterol) and non-nutritional (price, expiration date, and brand) attributes on the labels of fresh-fluid milk.

Assuming that older respondents are more concerned about nutrition and health than younger respondents, they are more likely to regard the nutritional-labeling attributes on fresh-fluid milk labels as very or extremely important. Household size and composition, and marital status may lead to higher ratings being assigned to the nutritional attributes to the extent that primary grocery shoppers or meal preparers want to give their families healthier foods. Higher levels of education increase the likelihood that consumers know about the links between diet and health. Weimer (1998) found a direct association between respondents' nutritional knowledge and the selection of more balanced diets for household members. Similar findings also were reported

by Nayga (1996), and Variyam, Blaylock, and Smallwood (1995 and 1997). Household income is closely linked to education; therefore, other factors being constant, higher-income respondents may regard the nutritional characteristics of fresh-fluid milk as an important factor in their milk purchasing decisions. In general, women are the primary grocery shoppers in the household. They therefore make the majority of decisions pertaining to food choices and nutrition and are more likely to rank the nutritional attributes higher than men.

U.S. population is heterogeneous; therefore, ethnicity plays an important role in food choices (Devine et al. 1999). The variable for race captures culturally different consumption patterns and nutritional awareness between Caucasians and non-Caucasians. Variyam, Blaylock, and Smallwood (1997) suggest that non-Caucasians are more likely to be unaware of the links between diet and health in the consumption of saturated fat and cholesterol. In this regard, we hypothesize that Caucasians are more likely to rank the nutritional attributes higher than non-Caucasians. Regional differences exist in U.S. food consumption patterns. Therefore, we also hypothesize that importance ratings of the nutritional attributes on the labels of fresh-fluid milk differ across the three regions. The non-nutritional attributes on the labels of fresh-fluid milk also are

Table 1: Variables, Definitions, and Descriptive Statistics

Variable Names	Variable Definitions	Mean	Std. Deviation
Explanatory Variables:			
AGE	Respondents' age in years	43.8269	15.4426
HHSIZE	Number of Household members	2.8670	1.4751
CHILDU5	Presence of Children Under 5 = 1; Otherwise = 0	0.1900	0.3924
CHILD512	Presence of Children 5 to 12 = 1; Otherwise = 0	0.2463	0.4310
CHILD1318	Presence of Children 13 to 18 = 1; Otherwise = 0	0.2069	0.4052
NOCHILD**	No children = 1; Otherwise = 0	0.5292	0.4993
EDUCATION	College Graduate = 1; Otherwise = 0	0.3589	0.4799
MSTATUS	Married = 1; Otherwise = 0	0.5954	0.4910
LINCOME	Income < $35,000=1; Otherwise=0	0.4448	0.4971
MINCOME**	Income from $35,000 - $75,000=1;	0.4138	0.4927
HINCOME	Income > $75,000=1; Otherwise=0	0.1414	0.3487
WHITE	White = 1; Otherwise = 0	0.7980	0.4016
BLACK	Black = 1; Otherwise = 0	0.1379	0.3449
OTHRACE**	Neither Black nor White=1; Otherwise=0	0.0591	0.2359
GENDER	Female = 1; Otherwise = 0	0.7199	0.4492
WSCEN	Live in West South Central Region = 1; Otherwise = 0	0.3526	0.4779
SATLANT	Live in South Atlantic Region = 1; Otherwise = 0	0.4524	0.4979
ESCEN**	Live in East South Central Region = 1; Otherwise = 0	0.1949	0.3963

expected to be affected by the selected SDR characteristics. However, because of the paucity of information in the literature on how these characteristics are likely to affect the attributes, we advance no *a priori* assumptions on the directions of the signs for their coefficients.

The dependent variables reflect respondents' decisions whether or not to use nutrition labels and the importance they place on the nutritional and non-nutritional attributes on the labels of fresh-fluid milk. In the survey there were two response categories for use or nonuse of food labels and five for importance ratings for the selected attributes. Because the dependent variables for importance ratings provided information about relative comparisons and not magnitudes of differences, they were reduced from five categories to three: not important, not very or somewhat important, and very or extremely important. Given the two response categories for label use or nonuse and the three-ordered response categories for importance ratings, we selected the binomial logit model (BLM) and the ordered probit model (OPM) to estimate the relationships between the dependent and independent variables. All variables except age and household size are binary. Age is a continuous variable and household size represents the number of persons living in the household. The independent and dependent variables used in the study, their definitions, arithmetic means, and standard deviations are given in Table 1. The empirical models are discussed in the next section of the paper.

Table 1 (Continued): Variables, Definitions, and Descriptive Statistics

Variable Names	Variable Definitions	Mean	Std. Deviation
Dependent Variables			
LABELUSE	Use Label = 1; Do Not Use Label = 0	0.804	0.3974
CALMILK (Calories)	Not Important = 0 Not Very or Somewhat Important = 1 Very or Extremely Important = 2	1.1330	0.7363
FATMILK (Fat Content)	Not Important = 0 Not Very or Somewhat Important = 1 Very or Extremely Important = 2	1.3751	0.7407
SODMILK (Sodium Content)	Not Important = 0 Not Very or Somewhat Important = 1 Very or Extremely Important = 2	0.9782	0.7507
CHOLMILK (Cholesterol Content)	Not Important = 0 Not Very or Somewhat Important = 1 Very or Extremely Important = 2	1.2167	0.7502
PRICE	Not Important = 0 Not Very or Somewhat Important = 1 Very or Extremely Important = 2	1.2266	0.7076
EXPIRE (Expiration Date)	Not Important = 0 Not Very or Somewhat Important = 1 Very or Extremely Important = 2	1.8311	0.5169
BRAND (Brand Name or Store Brand)	Not Important = 0 Not Very or Somewhat Important = 1 Very or Extremely Important = 2	0.8290	0.7088

** indicates base variables omitted from models.

Empirical Models

As argued previously, the study uses the BLM to estimate use or nonuse of nutrition labels, and the OPM to estimate the models for importance ratings of the selected attributes. Had ordinary least squares been selected to estimate the models, the coefficients would be biased. The BLM can be written as follows.

$$(1) \qquad y^* = \beta'x + \varepsilon,\ \varepsilon \sim N[0, 1]$$

The vector y^* is unobserved. Instead, we observe $y = 1$ (label use) if $y^* > 0$ and $y = 0$ (nonuse) if $y^* \leq 0$. y^* is the vector of unobserved preferences; β, the vector of unknown parameters, reflects the impact of changes in x on the likely use or nonuse of nutrition labels; x is the matrix of explanatory variables (SDR characteristics); g is the vector of random stochastic errors; y, the outcomes vector, reflects the two response categories (label use or nonuse). The cumulative logistic distribution function for the BLM can be written as follows.

$$(2) \qquad \text{Prob}(y=1) = \frac{e^{\beta'x}}{1 + e^{\beta'x}}$$

The OPMs are used to estimate the relationships between respondents' importance ratings of the selected nutritional and non-nutritional attributes on the labels of fresh-fluid milk and their SDR characteristics. The OPMs can be expressed as follows.

$$(3) \qquad y^* = \beta'x + \varepsilon,\ \varepsilon \sim N[0, 1]$$

As in equation 1, y^* is unobserved. For the three-response categories, we would observe the following:

$$\begin{aligned} y &= 0 \quad \text{if } y^* \leq 0 \\ y &= 1 \quad \text{if } 0 < y^* \leq \mu_1 \\ y &= 2 \quad \text{if } \mu_1 < y^* \leq \mu_2 \end{aligned}$$

The μs are the unknown threshold parameters separating adjacent categories; y, y^*, β, x, and ε have been defined previously. Given the assumption that g is normally distributed across observations and the fact that there are three categories, there is only one threshold parameter. The three probabilities are as follows:

$$\begin{aligned} (4) \qquad &\text{Prob}(y = 0) = 1 - \Phi(\beta'x); \\ &\text{Prob}(y = 1) = \Phi(\mu_1 - \beta'x) - \Phi(-\beta'x); \\ &\text{Prob}(y = 2) = 1 - \Phi(\mu_1 - \beta'x). \end{aligned}$$

M is the cumulative standard normal distribution function, and $0 < \mu_1$ (Greene 1997). Both models were estimated under Newton's maximum likelihood procedure in *LIMDEP* computer software (Greene 1995).

Descriptive Statistics

Based on the summary statistics in Table 1, the average age of the respondents is 43.8 years and the average household size is about three persons. Almost one-fifth of the respondents live in households with children under the age of five, 25 percent live in households with children between the ages of five and twelve, 21 percent live in households with children between the ages of 13 and 18, and 53 percent of the households have no children. Thirty-six percent of the respondents are college educated and 60 percent are married. Forty-four and 14 percent of the respondents have household income levels below $35,000 and above $75,000, respectively. Eighty percent of the respondents are Caucasian and 14 percent are African-American. Seventy-two percent of the survey participants are women. Thirty-five percent of the respondents reside in the West South Central Region; 45 percent reside in the South Atlantic Region, and about 20 percent live in the East South Central Region of the United States. Eighty percent of primary grocery shoppers or meal preparers use food labels to make buying decisions.

Empirical Results and Discussion

The two-way contingency table shows the percentages of label users and nonusers and their corresponding ratings of the selected attributes on the labels of fresh-fluid milk (Table 2). According to the chi-square coefficients, label users are more likely to regard calories, fat, sodium, and cholesterol as very or extremely important factors in deciding whether to buy fresh-fluid milk. Compared to the nutritional attributes, label users place less importance on prices and expiration dates when purchasing fresh-fluid milk. Additionally, purchas-

ing decisions are independent of whether the milk is a brand name or store brand.

The Binomial Logit Model's Results

The BLM's results are presented in Table 3. The model's chi square (39.75) is statistically significant at the 1-percent level of probability and suggests that this model is a better predictor of the relationship between the dependent and independent variables than the intercept-only model. Six of the 14 SDR variables have coefficients that are statistically significant at the 5-percent level of probability or better. According to the results, college-educated and female respondents are more likely than non-college graduates and men to use labels when buying food products. Households with children under the age of five are less likely than those without children to use labels; those with children between the ages of five and twelve are more likely to use labels than households without children. Respondents residing in the West South

Table 2: Label Users and Non-Users and Ratings of Selected Attributes

Variables	User	Non-Users	χ^2	P-Value
	——PERCENTAGES——			
TOTAL	80	20		
CALMILK				
Not Important	68	32		
Not Very or Somewhat Important	79	21		
Very or Extremely Important	90	10	56.87***	0.00001
FATMILK				
Not Important	62	38		
Not Very or Somewhat Important	75	25		
Very or Extremely Important	89	11	87.42***	0.00001
SODMILK				
Not Important	70	30		
Not Very or Somewhat Important	82	18		
Very or Extremely Important	89	11	44.28***	0.00001
CHOLMILK				
Not Important	67	33		
Not Very or Somewhat Important	80	20		
Very or Extremely Important	87	13	48.98***	0.00001
PRICE				
Not Important	70	30		
Not Very or Somewhat Important	84	16		
Very or Extremely Important	81	19	21.59***	0.00002
EXPIRE				
Not Important	67	33		
Not Very or Somewhat Important	80	20		
Very or Extremely Important	81	19	11.49***	0.00032
BRAND				
Not Important	80	20		
Not Very or Somewhat Important	81	19		
Very or Extremely Important	79	21	0.45	0.79720

*** implies statistical significance at the 0.01 level of probability.

Central and South Atlantic Regions are less likely to use labels than those living in the East South Central Region of the United States.

The findings for households with children between the ages of five and twelve, gender, and education support the stated hypotheses for these variables' coefficients; the coefficient for households with children under the age of five does not. The results also suggest that the probability of using nutrition labels is invariant to age, household size, the presence of children between the ages of 13 and 18, marital status, household income, and race. Thus the likelihood of using nutrition labels is not influenced by these variables, and the null hypotheses that these variables have no influence on the probability of label use cannot be rejected.

Table 3: Binomial Logit Model's Results for Label Use

Variables	Estimated Coefficients	Marginal Effects
CONSTANT	1.3771***	0.2099***
	(3.1790)[a]	(3.2170)
AGE	-0.0012	-0.0002
	(0.2590)	(-0.2590)
HHSIZE	-0.0560	-0.0085
	(-0.7960)	(-0.7960)
CHILDU5	-0.3797*	-0.0579*
	(-1.8540)	(-1.8580)
CHILD512	0.3787*	0.0577*
	(1.9240)	(1.9300)
CHILD1318	0.0933	0.0142
	(0.4600)	(0.4600)
EDUCATION	0.4724***	0.0720***
	(2.9170)	(2.9410)
MSTATUS	0.2028	0.0309
	(1.2940)	(1.2960)
LINCOME	-0.1684	-0.0256
	(-1.0710)	(-1.0720)
HNCOME	0.2387	0.0364
	(0.9880)	(0.9890)
WHITE	0.0915	0.0140
	(0.3340)	(0.3340)
BLACK	0.1108	0.0169
	(0.3490)	(0.3490)
GENDER	0.3657**	0.0557**
	(2.4340)	(2.4440)
WSCEN	-0.4664**	-0.0711**
	(-2.2870)	(-2.2980)
SATLANT	-0.3827*	-0.0583*
	(-1.9360)	(-1.9430)
Log Likelihood	-683.9300	
χ^2 (14)	39.75***	

*, **, and *** imply statistical significance at the 0.10, 0.05, and 0.01 levels of probability, respectively.

[a] t-values are in parentheses.

Table 3 also shows the marginal effects on the probability of label use or nonuse for the continuous and binary variables. In the case of the continuous variable, AGE, the marginal effects are the partial derivatives of the label-use function with respect to the variable. In general, marginal effects measure changes in probabilities when binary variables are evaluated at zero and one, respectively. The marginal effects for each binary variable in Table 3 are evaluated at zero and one, respectively, while holding the other independent variables at their sample means (Greene 1997). Consequently, the results suggest that, *ceteris paribus*, respondents in households with children aged five to 12 are 6-percentage points more likely to use labels than households without children; college graduates and women are 7- and 6-percentage points more likely to use food labels, respectively, than non-college graduates and men; and respondents in households with children under the age of five and those residing in the West South Central and South Atlantic Regions are 6-, 7-, and 6-percentage points less likely, respectively, than their corresponding counterparts to use nutrition labels.

The Ordered Probit Models' Results

Table 4 shows the results from the seven OPMs for respondents' importance ratings of the selected nutritional and non-nutritional attributes on the labels of fresh-fluid milk. The chi-square coefficients for all seven models are statistically significant at the 1-percent level of probability, implying that the selected models perform better than the intercept-only models. The threshold parameters (μs) are also statistically significant at the 1-percent level of probability, suggesting that the response categories are ordered.

Three variables, AGE, GENDER, and WSCEN, have statistically significant coefficients for the response category, CALMILK. Thus older respondents and women are more likely to attach a

Table 4: Ordered Probit Models' Results for Selected Attributes on the Labels of Fresh-Fluid Milk

	ESTIMATED COEFFICIENTS						
	Nutritional Attributes				Non-Nutritional Attributes		
Variables	CALMILK	FATMILK	SODMILK	CHOLMILK	PRICE	EXPIRE	BRAND
CONSTANT	0.3042	0.2544	0.1035	0.3460*	0.5050***	1.5520***	0.5555***
	(1.5860)[a]	(1.2690)	(-0.5170)	(1.6920)	(2.5930)	(4.8590)	(2.8730)
AGE	0.0095***	0.0077***	0.0112***	0.1247***	0.0028	-0.0025	0.0073***
	(4.5320)	(3.5090)	(5.1400)	(5.7860)	(1.2980)	(-0.8020)	(3.3540)
HHSIZE	0.0402	0.0871***	0.0286	0.0696**	0.1467***	0.1589**	0.0870**
	(1.2010)	(2.6560)	(0.8770)	(2.0060)	(4.1040)	(2.4510)	(2.5400)
CHILDU5	-0.1559	-0.2544**	-0.1628*	-0.2171**	-0.1257	-0.0118	-0.0488
	(-1.5940)	(-2.5030)	(-1.6940)	(-2.2360)	(-1.3660)	(-0.0680)	(-0.5230)
CHILD512	0.0978	0.0731	0.0708	0.0198	-0.0525	0.2230	-0.0451
	(1.1020)	(0.7860)	(0.8060)	(0.2180)	(-0.5830)	(1.3540)	(-0.5130)
CHILD1318	-0.1093	-0.1717*	-0.0439	-0.1256	-0.0925	-0.0391	-0.1822**
	(-1.2040)	(-1.9090)	(-0.5030)	(-1.4120)	(-1.0330)	(-0.2420)	(-2.0200)
EDUCATION	0.0155	0.1499**	-0.1106	-0.0479	-0.1022 .	-0.0127	-0.2429***
	(0.2280)	(2.1510)	(-1.6210)	(-0.7080)	(-1.4810)	(-0.1190)	(-3.4980)
MSTATUS	0.0618	0.1569**	0.1753**	0.1236*	0.0198	-0.1147	-0.0406
	(0.8730)	(2.1350)	(2.5150)	(1.7110)	(0.2740)	(0.9340)	(-0.5670)
LINCOME	-0.0702	-0.0249	0.1153	0.0131	0.1564**	-0.2189*	-0.0268
	(-0.9840)	(-0.3440)	(1.6250)	(0.1820)	(2.2090)	(-1.8640)	(-0.3720)
HINCOME	0.1241	0.2137**	0.0545	0.1453	-0.2105**	-0.2879*	-0.0933
	(1.2940)	(2.1150)	(0.5690)	(1.5160)	(-2.1190)	(-1.9260)	(-0.9890)
WHITE	-0.1746	0.1092	-0.2630**	-0.2839**	-0.0319	-0.2481	-0.3480***
	(-1.4070)	(0.8450)	(-2.1130)	(-2.1930)	(-0.2550)	(-1.0790)	(-2.7770)
BLACK	0.0608	-0.0124	0.0410	-0.0278	0.2018	-0.3809	-0.0493
	(0.4280)	(-0.0830)	(0.2900)	(-0.1890)	(1.4230)	(-1.5120)	(-0.3470)
GENDER	0.2977***	0.1513**	0.1086	0.1204*	0.0777	0.1631	-0.1767***
	(4.3120)	(2.1470)	(1.6020)	(1.7720)	(1.1260)	(1.5810)	(-2.6370)
WSCEN	-0.1447*	-0.1740*	-0.1304	-0.1034	-0.0044	-0.1493	-0.1645**
	(-1.7050)	(-1.9580)	(-1.5360)	(-1.1960)	(-0.0530)	(-1.1030)	(-1.9890)
SATLANT	-0.1104	-0.0698	-0.0849	-0.1056	-0.1043	-0.1311	-0.1423*
	(-1.3910)	(-0.8260)	(-1.0550)	(-1.3020)	(-1.3030)	(-1.0260)	(-1.8310)
μ_1	1.2256***	0.9605***	1.1939***	1.1091***	1.3012***	0.2956***	1.3330***
	(29.7460)	(23.9440)	(29.4880)	(27.5730)	(30.0390)	(7.411)	(30.4730)
Log Likelihood	-1469.88	-1369.06	-1490.92	-1458.25	-1418.81	-550.65	-1436.13
$\chi^2(14)$	66.78***	76.37***	74.18***	73.36***	67.69***	58.73***	59.11***

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels of probability, respectively.

[a] t-values are in parentheses.

higher degree of importance to the caloric content of fresh-fluid milk than are younger respondents and men, respectively. West South Central residents are less likely to be concerned about the caloric content of fresh-fluid milk than are East South Central residents. The importance ratings assigned to fat content are linked to age, household size, the presence of children in the household, education, marital status, household income, gender, and area of residence. Older respondents, those residing in larger households, those who are more educated, married, have household incomes in excess of $75,000, and women rank fat content higher than their corresponding counterparts. Respondents living in households with children less than five years of age or between ages 13 and 18 and those from the West South Central Region of the United States are less likely than their corresponding counterparts to assign high importance ratings to the fat content of fresh-fluid milk when making buying decisions.

Age, the presence of children in the household, marital status, and race influence importance ratings for sodium content. Older and married respondents rank sodium content higher than younger and unmarried respondents. Households with children less than five years of age and Caucasians are less likely to be concerned about sodium content than are households without children and other races. Six of the variables, AGE, HHSIZE, CHILDU5, MSTATUS, WHITE, and GENDER, have statistically significant coefficients in the CHOLMILK equation. Based on these results, older respondents, those in larger households, married respondents, and women are more likely to place higher importance ratings on the cholesterol content of fresh-fluid milk than are their corresponding counterparts. Additionally, ratings for households with children below five years of age and Caucasians are more likely to be lower than those for households without children or other races.

Overall, the signs of the estimated coefficients conform to the stated hypotheses, except for household composition and race. The coefficients for AGE are statistically significant and positive for the four nutritional attributes and conform to the stated hypothesis. This finding suggests that older respondents are more likely to be concerned about nutrition and health. Furthermore, women are more likely to be conscious about nutrition than men. Married respondents also appear to be more concerned about the nutritional aspects of fresh-fluid milk than unmarried respondents. The hypothesized positive coefficients for the nutritional attributes as a group did not materialize for the following variables: CHILDU5; CHILD512; CHILD1318; and WHITE. The presence of children in the household or being a Caucasian has either a negative or no effect on the ratings, while CHILD512, LINCOME, BLACK, and SATLANT have no effects on any of the nutritional attributes.

The last three columns of Table 4 give the estimated coefficients for non-nutritional attributes: price, expiration date, and whether the milk is a name brand or a store brand. According to the Table, household size and household income influence the importance ratings assigned to milk prices. Larger households and those with households incomes less than $35,000 attach more importance to prices than smaller households and those with incomes greater than $35,000. Larger households are more likely than smaller households to rank expiration date as important in their decisions to buy fresh-fluid milk. Larger households' preoccupation with expiration dates may be associated with purchases of larger quantities of milk; as a result they are more concerned about spoilage. Eight variables in the BRAND equation have statistically significant coefficients. According to these coefficients, older respondents and those in larger households place higher ratings on whether the milk is a brand name or a store brand than do their corresponding counterparts. Those living in households with children between the ages of 13 through 18 years old, college graduates, Caucasians, women, and West South Central and South Atlantic residents are less likely to regard brand as an important factor to their milk-purchasing decisions.

The OPMs' coefficients are difficult to interpret; therefore, their marginal effects are often used to describe relationships between response categories and explanatory variables (Greene 1997). These marginal effects represent changes in probabilities among the three rating scales and reflect shifts of probabilities from one response category to another; the total change sums to zero. Table 5 displays the marginal effects for variables with statistically significant coefficients from Table 4. The following inferences are drawn from Table 5's results. *Ceteris paribus*, women are 11 percentage points more likely than men to rank caloric content as very or

TABLE 5: Marginal Effects from the Ordered Probit Models for Variables with Statistically Significant Coefficients

Variables	MARGINAL EFFECTS		
	Not Important	Not Very or Somewhat Important	Very or Extremely Important
	Prob (y=0)	Prob (y=1)	Prob (y=2)
CALMILK			
AGE	-0.0027	-0.0008	0.0035
GENDER	-0.0849	-0.0245	0.1094
WSCEN	0.0412	0.0119	-0.0531
FATMILK			
AGE	-0.0018	-0.0013	0.0031
HHSIZE	-0.0202	-0.0145	0.0347
CHILDU5	0.0588	0.0423	-0.1011
CHILD1318	0.0397	0.0286	-0.0683
EDUCATION	-0.0347	-0.0249	0.0596
MSTATUS	-0.0363	-0.0261	0.0624
HINCOME	-0.0494	-0.0356	0.0850
GENDER	-0.0350	-0.0252	0.0601
WSCEN	0.0402	0.0289	-0.0692
SODMILK			
AGE	-0.0038	0.0001	0.0037
CHILDU5	0.0553	-0.0020	-0.0533
MSTATUS	-0.0596	0.0021	0.0574
WHITE	0.0894	-0.0032	-0.0862
CHOLMILK			
AGE	-0.0034	-0.0015	0.0049
HHSIZE	-0.0188	-0.0083	0.0271
CHILDU5	0.0586	0.0259	-0.0845
MSTATUS	-0.0333	-0.0148	0.0481
WHITE	0.0766	0.0339	-0.1104
GENDER	-0.0325	-0.0144	0.0469
PRICE			
HHSIZE	-0.0350	-0.0212	0.0562
LINCOME	-0.0373	-0.0226	0.0599
HINCOME	0.0502	0.0304	-0.0806
EXPIRE			
HHSIZE	-0.0169	-0.0093	0.0262
LINCOME	0.0233	0.0128	-0.0361
HINCOME	0.0307	0.0168	-0.0475
BRAND			
AGE	-0.0027	0.0008	0.0019
HHSIZE	-0.0321	0.0098	0.0224
CHILD1318	0.0672	-0.0204	-0.0468
EDUCATION	0.0896	-0.0273	-0.0624
WHITE	0.1284	-0.0391	-0.0894
GENDER	0.0652	-0.0198	-0.0454
WSCEN	0.0607	-0.0185	-0.0422
SATLANT	0.0525	-0.0160	-0.0365

extremely important; households with children less than five years of age are 10 percentage points less likely than households without children to rate fat content as very or extremely important; Caucasians are about 9 percentage points more likely than other races to rate sodium content as unimportant, and 11 percentage points less likely than other races to regard cholesterol content as very or extremely important to their purchases of fresh-fluid milk; high-income households are 8 and 5 percentage points less likely than middle-income households to rate price and expiration dates as very or extremely important, respectively; and college-educated respondents, and Caucasians are 9 and 13 percentage points, respectively, more likely than their corresponding counterparts to rank brand name as unimportant when making fresh-fluid milk purchases.

TABLE 6: Predicted Probabilities for Randomly Selected Groups of Label Users and Non-Users.

Age Groups	Respondents' Characteristics	PREDICTED PROBABILITIES	
(years)		Users Prob(y=1)	Non-Users Prob(y=0)
GROUP I			
(18-24)	22-year old; living in a 3-person household; without children; with a college degree; unmarried; with household income less than $35,000; African American; female; residing in the South Central Region; a label user	0.8769	0.1231
GROUP II			
(25-34)	32-year old; living in a 4-person household; with children under the age of 18; without a college degree; married; with household income less than $35,000; African American; female; residing in the East South Central Region; a non-label user	0.2454	0.7546
GROUP III			
(35-44)	38-year old; living in a 5-person household; with children under the age of 18; college educated; married; with household income between $35,000 and $75,000; other race; female; residing in the South Atlantic Region; a non-label user	0.1945	0.8055
GROUP IV			
(45-54)	47-year old; living in a 1-person household; without children under the age of 18; without a college degree; unmarried; with household income between $35,000 and $75,000; Caucasian; female; residing in the South Atlantic Region; a label user	0.7920	0.2080
GROUP V			
(55-64)	61-year old; living in a 2-person household; without children under the age of 18; without a college degree; married; with household income between $35,000 and $75,000; Caucasian; female; residing in the South Atlantic Region; a label user	0.8125	0.1875
GROUP VI			
(65-89)	70-year old; living in a 1-person household; without children under the age of 18; with a college degree; unmarried; with household income less than $35,000; Caucasian; female; residing in the West South Central Region; a label user	0.8218	0.1782

Table 6 shows the predicted probabilities for six randomly selected respondents by their SDR characteristics and label use or nonuse. For selection, the data were stratified into six age groups, a respondent was randomly selected from each group, and corresponding probabilities for use or nonuse of nutrition labels were determined. This approach allows profiles of likely users or nonusers of nutrition labels to be developed for marketing and nutritional education purposes. Of the six individuals selected, four use labels and two do not. Respondents with Group I's characteristics have an 88-percent chance of being label users and a 12-percent chance of not using nutrition labels. Respondents in Groups II and III are non-label users, and their corresponding probabilities are relatively low (0.25 and 0.19, respectively). A 47-year-old respondent who has the SDR characteristics outlined in Group IV has a 79-percent likelihood of being a label user. The final two respondents are label users, and their predicted probabilities for label use are 0.81 and 0.82, respectively. Based on the results from Table 6, younger (18-24) and older (45+) respondents appear more likely to use the information on the Nutrition Facts labels.

Concluding Remarks

NLEA's passage in 1990 mandated nutrition labeling on almost all processed foods. The new food labels were expected to result in substantial improvements in public health and thereby reduce health-care costs. NLEA's strategy was to encourage food manufacturers to improve the nutritional attributes of their products and encourage consumers to make more healthful food choices based on improved and expanded nutrition information (Guthrie et al. 1995). However, for this strategy to reduce health-care cost, consumers must understand the information on the labels and use it to make healthier food choices. Because of the diversity of the U.S. population, food choices and eating behavior are influenced by a wide range of factors including personal preferences, cultural values, lifestyle changes, family and friends, and the media (Dixon and Ernst 2001). Therefore, the issue of healthier food choices can become daunting.

Our study assessed the extent to which consumers in the South are using labels as a source of nutritional information. The objectives were to determine whether label use or nonuse is independent of importance ratings of selected nutritional and non-nutritional attributes on the labels of fresh-fluid milk, to assess the influence of socio-demographic and regional (SDR) characteristics on label use and importance ratings of selected milk labeling attributes, and to develop profiles of selected groups of label users and nonusers.

Eighty percent of the respondents reported using food labels when making food purchasing decisions. Results from the chi-square contingency tests suggested that label use was statistically significantly associated with six of the nutritional attributes, but was invariant to brand name. The BLM's results indicated that label users were more likely to be college educated, women, and to live in households without children or with children between five and 12 years of age, or in the East South Central Region of the United States.

The FATMILK model had nine statistically significant coefficients; the BRAND model had eight; the CHOLMILK model had six coefficients; SODMILK had four, while CALMILK, PRICE, and EXPIRE had three statistically significant coefficients. Consequently, consumers regard fat content as the most important attribute when buying fresh-fluid milk. Apart from the AGE and CHILD512 variables, the results were fairly consistent between the BLM and OPMs. Although not statistically significant in the BLM, age was an important determinant of ratings for the four nutritional attributes selected, and for one non-nutritional attribute. College graduates ranked fat content higher than any other attributes when buying milk, while women focused more on calories, fat, and cholesterol content. For households without children, fat, sodium and cholesterol content, and brand names were very or extremely important factors shaping milk-purchasing decisions. Households with children between the ages of five and 12 did not exhibit any preferences for the selected attributes. Finally, East South Central residents had greater concerns about calories, fat content, and brand when buying fresh-fluid milk.

Previous studies have suggested that although U.S. consumers believe that it is important to follow the *Dietary Guidelines for Americans*, belief and knowledge sometimes do not translate into behavior changes (Dixon and Ernst 2001). It therefore appears that consumers need to have constant

reminders of diet and health issues. The study's findings suggest that respondents are more preoccupied with milk brands than with nutritional content. Additionally, low-income households, those without college degrees, or African Americans are less likely to use nutrition labels. Low educational levels limit consumers' ability to process information and, thereby, limit use of nutrition labels. In our survey, 65 percent of the respondents did not possess a college degree, and had a lower probability of using label. As supported by our study, race played an important role in label use and importance ratings.

Given these findings and the high costs for treating diet-related illnesses, every effort must be made to get more consumers to read, comprehend, and use food labeling information to make healthier food choices. The most successful nutrition education programs have focused on behavior changes including self-evaluation, support groups, contractual agreements, and better access to nutritious foods (Dixon and Ernst 2001). Nutrition information could also be disseminated through the media, schools, the workplace, libraries, and social and religious organizations. Furthermore, food manufacturers could help by preparing more visuals for retailers to display near the particular food items. This strategy would give valuable nutritional information at points of purchase. With these intervention programs, the projected $3.6 to $21 billion savings from mandatory nutrition labeling may one day become a reality.

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