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A Snapshot of Undergraduate Students' Nutritional Awareness, Levels of Food Label Use, and Perceptions of Their Health Status

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Abstract

College freshmen and sophomores exhibited lower levels of awareness of the health problems caused by insufficient intake of fiber than did seniors. Age and gender influenced awareness of calcium's role in the body. Age was also a determinant of students' awareness about cholesterol intake and health. Seniors and those living in households with more than three persons were more likely to read nutrition labels. Students who perceived themselves to be in excellent health had lower body mass indices, exercised more, and were more aware of the links between fiber intake and health status.

Keywords: calcium, cholesterol, fiber, health problems, nutritional awareness, students

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Introduction

Rising overweight and obesity rates in the United States have resulted in more severe health problems and a reduction in the pool of young adults healthy enough to serve in the military. Recent statistics suggest that two-thirds of Americans are overweight or obese and that adult obesity rates exceed 20% in all states. In 2016, Louisiana had the highest adult obesity rate in the United States, at 36.2%. Additionally, 13.2% of the two-to-four-year-old participants in the Women, Infant, and Children nutritional program and 21.1% of ten-to-seventeen-year-olds in the state were obese. Obesity-related diseases such as diabetes, hypertension, heart disease, arthritis, and cancer and the associated costs of treatment have risen steadily over the past decade, a trend that is projected to continue for the foreseeable future (Trust for America's Health and the Robert Wood Johnson Foundation, 2016a, b).

The 2009 *Report Card on Physical Activity & Health for Children and Youth* (Pennington Biomedical Research Center, 2009) documented that

(i) only 25% of Louisiana high-school children met the recommended 60 minutes of daily physical activity;
(ii) 36% of children between 10 and 17 years old were obese;
(iii) 27% of high-school students did not drink fruit juice and less than 4% ate fruits at least four times per day;
(iv) 57% of high-school students watched television more than two hours daily;
(v) almost 18% of high-school students smoked cigarettes;
(vi) 40% of male and 41% of African American high-school students were overweight or obese;
(vii) more than 30% of children in grades 6–12 exhibited symptoms of depression and about 12% had more than two chronic health conditions;
(viii) a higher proportion of children and youth living below the federal poverty level were overweight or obese compared to children at other socioeconomic levels.

Given that overweight and obese children often become overweight and obese adults and that the state is currently ranked first in adult obesity in the United States, some of the children and youth in the Pennington study must have maintained their obesity status. In fact closer examination of available statistics indicates that Louisiana residents ages 18–24 are becoming obese at the fastest rate. Thus, this segment of the population is a prime target for nutritional intervention programs.

Problem Statement

Undergraduate students make up a large percentage of the 18-to-24-year-old age group. Many of these students are living away from home for the first time and are completely responsible for their meals and other health-related decisions (Rozmus et al., 2005). Research suggests that many undergraduate students do not handle the freedom and independence of college life very well. In fact, they are more likely to engage in risky behaviors that can jeopardize their health (Matthews, Doerr, and Dworatzek, 2016; Brunt and Rhee, 2008). Students are notorious for skipping meals, avoiding nutritious foods (such as fresh fruits and vegetables), consuming less

than the recommended daily amounts of calcium, iron, and vitamin A, and eating high-fat diets (Smith, Taylor, and Stephen, 2000). They are also less likely to use nutrition facts labels when making food purchase decisions.

Nutrition facts labels are an important tool for expanding nutritional knowledge and fostering healthy eating habits, thereby reducing rates of overweight and obesity. Facts panels provide nutritional information at points of purchase and allow consumers to judge the overall healthiness of food products so that they can make informed purchasing decisions. However, consumers cannot effectively assess a food product's nutritional value unless they understand the labeling information (Cannoosamy, Pugo-Gunsam, and Jeewon, 2014). Thus, for nutrition educational programs to be successful, researchers must know how labels are currently used as well as participants' interest in learning how to use the labels and overall attitudes toward diet and health.

Objectives

The study's overall objective is to document nutritional awareness, food label use, and perceptions of health status among a randomly selected group of university students. The specific objectives are to (i) determine awareness about health problems caused by excessive intake of cholesterol and insufficient intake of fiber and calcium (as well as factors shaping awareness); (ii) assess how frequently participants read food labels and factors associated with label use; (iii) examine the extent to which nutritional awareness, label use, weight status, and exercise routine influence students' perceptions of their health.

Methods and Procedures

The study's data were compiled from a random sample of 441 university students during the spring and fall of 2008. The survey captured students' general attitudes toward health and diet, use of food labels, perceptions of their health status, and demographic characteristics (age, academic classification, household size, marital status, family's total annual household income, race, and gender). To assess awareness, students were asked whether they had heard about any health problems caused by not eating enough fiber and calcium or by eating too much cholesterol. The response categories were "yes" and "no." For frequency of food label use, students were asked how often they read food labels. The response categories were "often," "sometimes," "rarely," and "never." For overall health status, students were asked to rate their own health as "excellent," "very good," "good," "fair," or "poor."

Empirical Models

The dependent variables FIBAWARE, CALAWARE, CHOAWARE, LABLUSER, and HEALTHOV are discrete; therefore, ordinary least squares regression models are inappropriate because the estimated coefficients will be biased. With this in mind, we selected discrete modeling techniques to estimate the unknown parameters. Based on our hypothesis that awareness and food label use influence perceptions of health status, we used a two-stage approach to incorporate the predicted values from the awareness and label use models into the

health status model. For modeling purposes, the response categories for label usage were reduced to two: those who read labels often or sometimes ("often/sometimes") and those who rarely or never read them ("rarely/never"); those for perception of health status were reduced to three ("excellent," "very good/good," and "fair/poor"). Collapsing categories is permissible because the categories are nominal and the widths between categories are meaningless. The dependent and independent variables, their definitions, and summary statistics are displayed in Table 1. We used the binomial probit and ordered probit models to analyze the data and generate the unknown parameters.

Table 1. Variable Definitions and Summary Statistics.

Definitions	Names	Means	Standard Deviation
Explanatory Variables			
Age in Years	AGE	20.4444	7.7176
Household Size	HSIZE	3.3084	1.6855
Female=1; Male=0	FEMALE	0.5805	0.4940
Freshman=1; Otherwise=0	FRESHMAN	0.3537	0.4187
Sophomore=1; Otherwise=0	SOPHMORE	0.2041	0.4035
Junior=1; Otherwise=0	JUNIOR	0.1678	0.3741
Senior=1; Otherwise=0	SENIOR*	0.2132	0.4010
Weight Status	BMI	26.6109	6.0470
Minutes Exercised	MINEX	37.0272	38.3856
Dependent Variables			
Awareness of Fiber (Yes=1; No=0)	FIBAWARE	0.3628	0.4814
Awareness of Calcium (Yes=1; No=0)	CALAWARE	0.6485	0.4780
Awareness of Cholesterol (Yes=1; No=0)	CHOAWARE	0.6667	0.4719
Label Use ("Often/Sometimes"=1; "Rarely/Never"=0)	LABLUSER	0.7664	0.4236
Health Status (Poor/Fair=0; Very Good=1; Excellent=2)	HEALTHOV	0.9433	0.7592

Notes: *Reference or omitted variable.

Empirical Results and Discussion

Descriptive Statistics

From Table 1, the average age of students was 20 years and the average household size was about four persons. Women comprised 58% of the sample, and the majority of participants were freshmen (35%). On average, participants were overweight (BMI of 26.6) and exercised about 37 minutes per week. Participants reported awareness about the health benefits of fiber consumption (36%), calcium (65%), and cholesterol (67%). Prior to collapsing the response categories, 31.1% of respondents reported that they read labels often, 28.6% reported reading labels sometimes, 16.8% said they rarely read labels; and 11.6% indicated that they never read food labels. The reported findings for perceptions of overall health were poor (7.3%), fair (24.5%), good (42.2%), very good (20%), and excellent (6.1%).

Binomial Probit Results

The results from the four binomial models are displayed in Tables 2–5. Except for Table 4, the models' chi-square coefficients are statistically significant at the 1% level, suggesting that these models are better predictors of the relationships between the dependent and independent variables than the intercept-only models. The marginal effects in the tables measure the changes in probability for unit (1 or 0) changes in a particular discrete independent variable while holding the other independent variables at their sample means. Age and body mass indices are continuous variables; therefore, their marginal effects represent the partial derivatives of the dependent functions with respect to those variables while holding the other variables at their sample means.

Table 2. Binomial Probit Results for Awareness about Fiber.

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects	Standard Error
CONSTANT	-0.6532***	0.2431	-0.2438***	0.0895
AGE	0.0239***	0.0086	0.0089***	0.0032
HSIZE	0.0265	0.0384	0.0099	0.0143
FEMALE	0.0745	0.1274	0.0277	0.0473
FRESHMAN	-0.5138***	0.1641	-0.1844***	0.0560
SOPHMORE	-0.5346***	0.1855	-0.1844***	0.0578
JUNIOR	-0.2355	0.1892	-0.0850	0.0657
χ^2 (6)	27.2863***			

Notes: Triple asterisks (***) indicate statistical significance at the 1% level.

Awareness about fiber is influenced by age and academic classifications. According to these results, older students are more likely to be aware than younger students. Further, freshmen or sophomores are 18 percentage points less likely to know about the health-related illnesses associated with fiber consumption compared to seniors.

Table 3. Binomial Probit Results for Awareness about Calcium.

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects	Standard Error
CONSTANT	-0.0072	0.2411	-0.0027	0.0889
AGE	0.0178**	0.0089	0.0066**	0.0033
HSIZE	0.0092	0.0386	0.0034	0.0142
FEMALE	0.3401***	0.1257	0.1262***	0.0467
FRESHMAN	-0.3509**	0.1661	-0.1313**	0.0626
SOPHMORE	-0.1945	0.1878	-0.0732	0.0618
JUNIOR	-0.1381	0.1987	-0.0518	0.0756
χ^2 (6)	20.6924***			

Notes: Double and triple asterisks (**, ***) indicate statistical significance at the 5% and 1% level.

Awareness about calcium is influenced by age, gender, and academic classification (Table 3). Female students are about 13 percentage points more likely to know about calcium than male students. Seniors are also about 13 percentage points more likely to know about calcium than freshmen.

Table 4. Binomial Probit Results for Awareness about Cholesterol.

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects	Standard Error
CONSTANT	-0.0704	0.2430	-0.0255	0.0881
AGE	0.0255***	0.0093	0.0092***	0.0033
HSIZE	0.0173	0.0384	0.0062	0.0139
FEMALE	-0.0504	0.1271	-0.0182	0.0458
FRESHMAN	-0.0390	0.1651	-0.0147	0.0601
SOPHMORE	0.0074	0.1882	0.0027	0.0680
JUNIOR	-0.1513	0.1947	-0.0559	0.0732
χ^2 (6)	9.8774			

Notes: Triple asterisks (***) indicate statistical significance at the 1% level.

Age is the major determinant of awareness about cholesterol intake and diseases (Table 4), but as the overall model is statistically insignificant, this result should be interpreted cautiously.

Table 5. Binomial Probit Results for Label Use.

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects	Standard Error
CONSTANT	0.1426	0.2519	0.0425	0.0746
AGE	0.0139	0.0094	0.0041	0.0028
HSIZE	0.1263***	0.0419	0.0376***	0.0124
FEMALE	0.0972	0.1360	0.0291	0.0409
FRESHMAN	-0.3360*	0.1783	-0.1035*	0.0564
SOPHMORE	-0.2421	0.2019	-0.0759	0.0661
JUNIOR	0.1883	0.2299	0.0533	0.0616
χ^2 (6)	23.1251***			

Notes: Single and triple asterisks (*, ***) indicate statistical significance at the 10% and 1% level.

The likelihood of reading food labels rises with household size and falls with being a freshman (Table 5). Respondents from larger households are 3 percentage points more likely to read labels than those living in smaller households. First-year students are 10.35 percentage points less likely to read food labels than seniors.

Ordered Probit Results

Table 6 shows the results for the ordered probit model. The chi-square coefficient (χ^2 = 75.3101) and the threshold parameter (μ_1 = 1.2395) are statistically significant at the 1% level of probability, indicating that the model performs better than the intercept-only model. The statistically significant threshold parameter indicates that the response categories for health status are ordered. Four of the independent variables (PREFIBER, PRECAL, PRECHOL, and PRELABEL) are instrumental variables—the predicted values from the four binomial models. Their inclusion is based on our hypothesis that awareness and label use affect perceptions of overall health. From the results, heath perceptions are associated with body mass indices, minutes exercised, and awareness about fiber and calcium. The signs on the statistically

significant coefficients and the marginal effects (Table 7) suggest that students are less likely to perceive their health to be good, very good, or excellent as their BMI increases. Students who exercised regularly are more likely to rate their health as good, very good, or excellent. Further, participants who are aware of the health problems associated with insufficient fiber intake are 63 percentage points more likely to perceive themselves as having excellent health. Conversely, students who are unaware of the calcium-disease link are 89 percentage points more likely to rate their health as poor or fair.

Table 6. Ordered Probit Model's Results for Health Status.

Explanatory Variables	Estimated Coefficients	Standard Error
CONSTANT	0.7131	0.8074
BMI	-0.0330***	0.0095
MINEX	0.0091***	0.0016
PREFIBER	2.0447**	0.9229
PRECAL	-2.5624***	0.9807
PRECHOL	0.9338	1.0438
PRELABEL	0.8566	0.8646
χ^2 (6)	75.3101***	
μ_1	1.2395***	0.0769

Notes: Double and triple asterisks (**, ***) indicate statistical significance at the 5% and 1% level.

Table 7. Marginal Effects for Ordered Probability Model for Health Status.

Variables	Marginal Effects		
	Poor/ Fair Prob (y=0)	Very Good Prob (y=1)	Excellent Prob (y=2)
BMI	0.0114	-0.0012	-0.0102
MINEX	-0.0031	0.0003	0.0028
PREFIBER	-0.7084	0.0738	0.6346
PRECAL	0.8878	-0.0925	-0.7954
PRECHOL	-0.3235	0.0337	0.2898
PRELABEL	-0.2968	0.0309	0.2659

Summary and Conclusions

Louisiana's obesity rates have risen steadily over the past 20 years. Most of the growth has occurred in the 18–24 age group, with a disproportionate percentage among African Americans. The majority of the student body from which the sample was drawn was 18 to 24 years old and African American, making this setting an excellent choice for studying nutritional awareness, label use, and health perceptions among this demographic. Our results suggest that students are more likely to be aware of the health problems associated with insufficient intake of fiber and calcium than they are to be aware of the role of cholesterol. In all instances, freshmen are less likely to understand the disease-nutrient links or to use labels. Participants of normal weight or who exercised regularly are more likely to perceive their health as good, very good, or excellent.

Because levels of awareness and label use are low among freshmen, this group needs to be targeted for nutritional intervention. Our suggestion is that nutritionists and food scientists at the university partner with colleagues in other disciplines who teach the majority of freshmen to help them to incorporate nutritional information in their course syllabi. The approach would strengthen collaboration among scientists and expand the opportunity for students to receive nutritional information in a classroom setting.

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