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Food Label Use and Its Relation to Dietary Intake among US Adults

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ABSTRACT

Rates of diet-related chronic disease combined with the lack of current data on patterns of food label use by the US population warrant re-examination of the use and potential influence of this public health tool. The purpose of this study was to describe the prevalence of food label use and the association between food label use and nutrient intake in a nationally representative sample of US adults who participated in the 2005-2006 National Health and Nutrition Examination Survey. Data on food label use were collected during the interview portion of the survey, and nutrient intake was estimated using the average of two 24-hour dietary recalls. In this sample, 61.6% of participants reported using the Nutrition Facts panel, 51.6% looked at the list of ingredients, 47.2% looked at serving size, and 43.8% reviewed health claims at least sometimes when deciding to purchase a food product. There were significant differences ($P<0.05$) in food label use across all demographic characteristics examined. Significant differences ($P<0.05$) in mean nutrient intake of total energy, total fat, saturated fat, cholesterol, sodium, dietary fiber, and sugars were observed between food label users and non-users with label users reporting healthier nutrient consumption. The greatest differences observed were for total energy and fat and for use of specific nutrient information on the food label. Despite food label use being associated with improved dietary factors, label use alone is not expected to be sufficient in modifying behavior ultimately leading to improved health outcomes.

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The continued rise in rates of obesity and diet-related chronic disease over the past several decades has culminated in a public health crisis that warrants re-examination of approaches designed to combat these disorders. Poor dietary practices, including overconsumption of energy (1,2), high intakes of saturated fat and sodium (2), and low intakes of fruits, vegetables, and fiber (2-4) are contributing to diet-related chronic disease and have resulted in speculation that poor diet and physical inactivity will surpass tobacco use as the leading preventable cause of death among US adults (5).

The 1990 Nutrition Labeling and Education Act allowed for the creation of a standardized food label introduced in May 1994 with the aim of combating obesity and diet-related chronic disease by providing consumers information at the point of purchase that would assist in selecting foods in accordance with dietary recommendations. Current regulations require all packaged food items regulated by the Food and Drug Administration to display on the label information on serving size, number of servings, total energy, energy from fat, total fat, saturated fat, cholesterol, sodium, carbohydrates, dietary fiber, sugar, protein, vitamin A, vitamin C, calcium, iron, and *trans* fat (6), with selection of these nutrients based on their role in chronic disease etiology or nutrient deficiency (7). The percent daily value for nutrients reflective of a 2,000-kcal/day diet and a list of ingredients must also be provided for foods with more than one ingredient (6). Health claims must be limited to statements about disease reduction and evaluated by the Food and Drug Administration before use (6).

Previous research indicates that between 45% and 80% of US adults report reading food labels (8-13), and this practice is correlated with improved dietary patterns (12-16). Various characteristics have also been found to influence food label use (8,9,11-14,16-21), such as age, sex, level of education, income, and household size. Results have not been uniform, with the proportion of adults reporting label use differing between studies and inconsistencies observed in several characteristics thought to be associated with use. Due to the fact that rates of obesity and diet-related chronic disease have continued to rise since implementation of food label standardization, a timely re-evaluation of the prevalence of use and potential health-related benefits of this public health tool is needed. Therefore, the purpose of this

study was to describe the prevalence of food label use among US adults using data from the 2005-2006 National Health and Nutrition Examination Survey (NHANES) and to examine the association between food label use and nutrient intake in this nationally representative sample of US adults.

METHODS

NHANES is a continuous survey of non-institutionalized US civilians conducted by the National Center for Health Statistics of the Centers for Disease Control and Prevention that is used to monitor the health and nutritional status of the country (22). During the 2005-2006 NHANES, 10,348 individuals participated in the interview portion of the survey (response rate 80.5%), and 9,950 underwent the physical exam (response rate 77.4%) (23). For this study, only participants who were older than age 18 years and answered questions on food label use (n=5,502) were used for prevalence of label use estimations. Participants who were older than age 18 years, answered questions on food label use, and completed two 24-hour recalls with 2-day reported energy values between 500 and 5,000 kcal (n=4,454) were used to estimate differences in nutrient intake between food label users and nonusers. This study was deemed exempt by the Teachers College (Columbia University) Institutional Review Board.

During the in-home interview, participants were shown a food label model and asked how often they used the Nutrition Facts panel, list of ingredients, serving size information, or health claims when deciding to buy a food product with possible responses being "always," "most of the time," "sometimes," "rarely," "never," or "never seen." For participants reporting use of any section of the label, follow-up questions were asked on the use of specific information related to total energy, total fat, saturated fat, cholesterol, sodium, fiber, or sugars. For this study, those who reported using the food label "always," "most of the time," or "sometimes" were deemed food label users and those reporting "rarely," "never," or "never seen" as nonusers.

The average of two nonconsecutive 24-hour dietary recalls were used to obtain nutrient estimations. Recalls were conducted using an automated five-step multiple-pass method with three-dimensional measuring guides used to assist in portion size estimation (24). Nutrient composition was calculated from 24-hour recall using the US Department of Agriculture Food and Nutrient Database for Dietary Studies (version 3.0, 2008, Agricultural Research Service, Food Surveys Research Group, Beltsville, MD).

Data on participant age, sex, education, family poverty income ratio, race/ethnicity, language of exam, length of residence in the United States if foreign born, and household size were collected on participants during the in-home interview and used in this study. Body mass index, level of physical activity, and smoking status were collected during the physical exam. A composite score for physical activity was created for each participant by multiplying the number of times per month leisure time physical activity was reported on the leisure time physical activity questionnaire (25) by the duration of the activity and metabolic equivalent. Participants older than age 20 years who reported smoking cigarettes every day or on some days were classified as current smokers. Because no data were available on the current smoking status of participants younger than age 20 years, smoking status for these participants was determined by assessing the number of cigarettes smoked in the past 30 days. Participants aged 18 to 19 years who reported smoking one or more cigarettes over the past 30 days were considered current smokers, whereas those who reported smoking no cigarettes during the past 30 days were considered nonsmokers.

All analyses were performed using STATA software (version 10.1, 2007, STATA Corp, College Station, TX) and accounted for NHANES sampling design and study weights. Percentage of food label users by study characteristic were calculated for each section of the label and χ^2 tests used to examine differences in the proportion of users for each characteristic. Multiple linear regression was used to obtain mean differences in nutrient intake between food label users and nonusers adjusted for age, sex, education, poverty income ratio, race/ethnicity, country of birth, body mass index, recent weight loss attempt, smoking status, leisure time physical activity, and household size. Covariates were chosen a priori and included all available variables thought to potentially confound the association between label use and nutrient intake. All tests were two-tailed with statistical significance set at $P<0.05$. Taylor series linearization was used for variance estimations in all regression models.

RESULTS AND DISCUSSION

The final sample size for analyses examining the prevalence of food label use was 5,502 and for analyses examining mean differences in nutrient intake between food label users and nonusers 4,454. The weighted percentages of food label users for the total study sample and by demographic characteristics are shown in Table 1. In this sample, 61.5% of adults reported using the Nutrition Facts panel at least sometimes when deciding to purchase a food product, 51.6% used the list of ingredients, 47.2% used serving size, and 43.8% used health claims.

Examination of the percentage of food label users by demographic characteristics revealed highly discrepant rates of label use for various characteristics including age, sex, education, income, race/ethnicity, language of exam, and length of residence in the United States for those foreign born. These findings indicate that women (8,9,11,13,14,16,18-20,26), participants with greater education (8-11,16,19), and participants with higher income (9,10,14,16,19) were more likely to report using the food label and have been consistently observed in previous studies. Non-Hispanic whites reported more frequent use of food labels, which is inconsistent with previous research showing no observed differences of food label reading by race or ethnicity (9,11,16,19). Participants with limited English language skills had greatly reduced rates of label use, whereas label use among foreign-born participants was found to increase with duration of residency in this sample. This was the first study identified to observe this association with future research in this area needed to better understand the effects of language and acculturation as determinates of food label use.

The results of multiple linear regression examining mean differences in nutrient intake between label users