United States Department of Agriculture

USDA

Economic Research Service

Economic Research Report Number 63

August 2008

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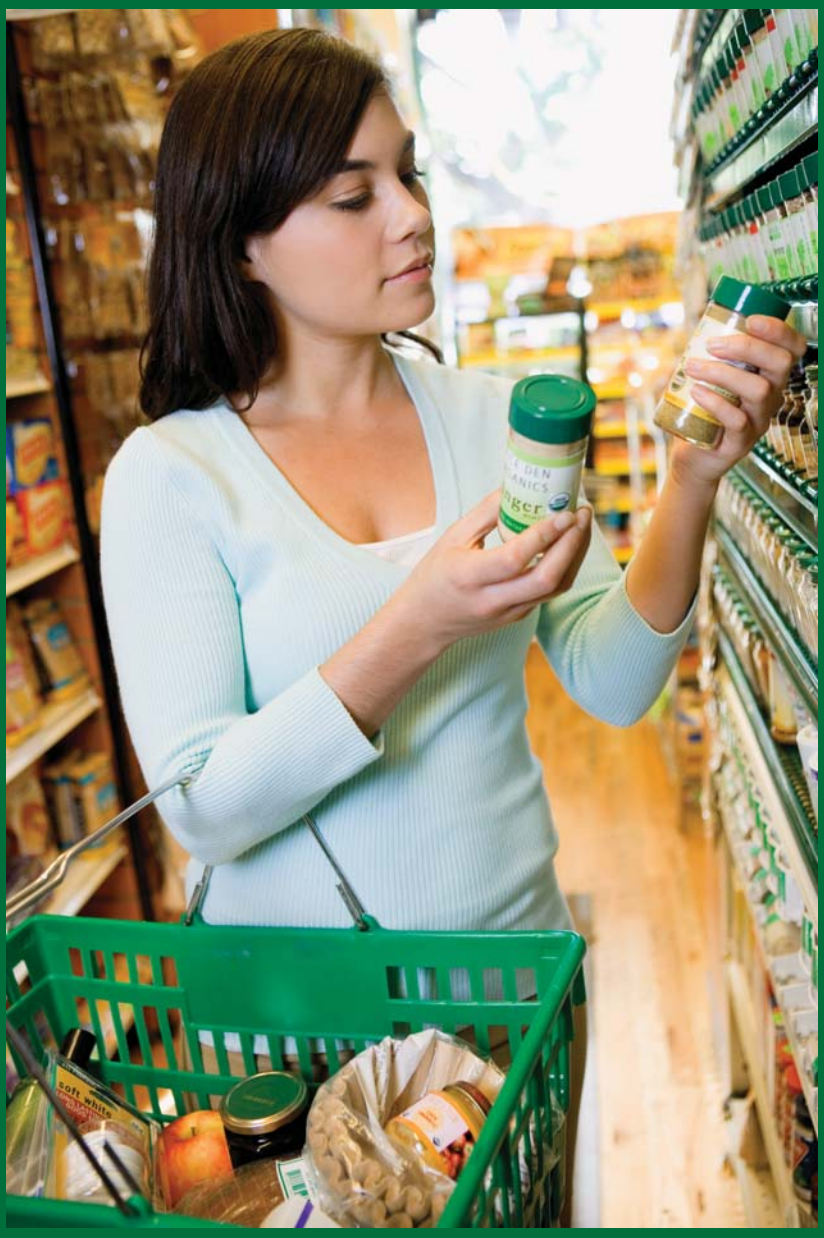

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National Agricultural Library Cataloging Record:

Todd, Jessica E.
The decline in consumer use of food nutrition labels, 1995-2006.
(Economic research report (United States. Dept. of Agriculture. Economic Research Service); no. 63)
1. Food—Labeling—United States.
2. Consumer behavior—United States.
3. Young consumers—United States.
I. Variyam, Jayachandran N. II. United States. Dept. of Agriculture. Economic Research Service. III. Title.
TP374.5

Recommended format for citation:

Todd, Jessica E., and Jayachandran N. Variyam. *The Decline in Consumer Use of Food Nutrition Labels, 1995-2006*, Economic Research Report No. 63, Economic Research Service, U.S. Dept. of Agriculture, August 2008.

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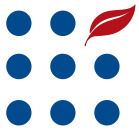

A Report from the Economic Research Service

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The Decline in Consumer Use of Food Nutrition Labels, 1995–2006

Jessica E. Todd and Jayachandran N. Variyam

Abstract

This report examines changes in consumers' use of nutrition labels on food packages between 1995-96 and 2005-06. The analysis finds that, although a majority of consumers report using nutrition labels when buying food, use has declined for most label components, including the Nutrition Facts panel and information about calories, fats, cholesterol, and sodium. By contrast, use of fiber information has increased. The decline in label use is particularly marked for the cohort of adults less than 30 years old.

Keywords: Nutrition Facts panel, Nutrition Labeling and Education Act, nutrition label use, Diet and Health Knowledge Survey, National Health and Nutrition Examination Survey

Acknowledgments

The authors appreciate reviewer comments received from Fred Kuchler, Economic Research Service (ERS); Conrad J. Choiniere, Food and Drug Administration (FDA); Lisa Szykman, College of William and Mary; and Mario F. Teisl, University of Maine. The authors also thank colleagues at ERS for their helpful comments and suggestions and Angela Anderson for editorial assistance and design.

Contents

Summary

Packaged and processed foods sold in the United States began carrying standardized nutrition labels in 1994 when the Nutrition Labeling and Education Act (NLEA) took effect. In addition to a standardized Nutrition Facts panel, the NLEA standardized serving sizes and placed limits on the content and format of health and nutrition claims on the front of packages. A major goal of the new labeling requirement was to increase access to nutrition information and improve consumers' ability to make healthful food choices.

What Is the Issue?

Source: USDA photo, Ken Hammond.

The current format of food nutrition labels and the informational campaign designed to educate consumers on their use are now over 10 years old. Since NLEA took effect, technological change has introduced new sources of nutrition information and the consumption of food away from home has continued to increase. Such changes may have affected the usefulness to consumers of standardized nutrition information on food packages. The Food and Drug Administration is currently considering changes to the format and content of food nutrition labels to encourage increased use. This report examines how consumer use of nutrition labels changed over the decade following the standardization by looking at the trend in use of various nutrition label components as well as how the trend in use differs across a number of demographic groups. Understanding the changing pattern of nutrition label use in the United States 10 years after NLEA can help inform changes to nutrition labels and interventions aimed at increasing use. Insight from the U.S. experience may also be helpful to policymakers in other countries considering mandatory nutrition labeling to achieve public health goals.

What Did the Study Find?

The study reveals that from 1995-96 to 2005-06, consumer use of nutrition labels when making food purchases declined. Consumer use decreased for most label components: it declined approximately 3 percentage points for the Nutrition Facts panel, 11 percentage points for the ingredient list, and 10 percentage points for the panel's information about calories, fat, cholesterol, and sodium. Only the use of information about fiber and sugars did not decline over the 10-year period. Use of fiber information increased by 2 percentage points, while that for sugars held steady.

The change in use of the Nutrition Facts panel varied by population groups over the 10-year period. The decrease in use was greatest for individuals

20-29 years old, those with no education beyond high school, and those who spoke primarily Spanish, a group that increased from 2 to 6 percent of the population over the 10-year period.

Younger adults and new residents in the country were least likely to have benefited from the public awareness campaigns conducted just after the new labels were introduced, suggesting that decline in use by those cohorts could be due, in part, to a relative lack of knowledge or awareness. The decline in use observed among the rest of the population suggests some depreciation in the value of the information conveyed since the initial awareness campaigns occurred.

The 2-percentage point increase in use of information about dietary fiber was led by an increase among individuals over age 30. This increase in use may be the result of the increasing popularity of low-carb diets, interest in identifying whole grain foods, or an aging population that is more aware of dietary fiber's health benefits.

How Was the Study Conducted?

Data from the Diet and Health Knowledge Survey, a supplement to the 1994-1996 Continuing Survey of Food Intakes by Individuals, as well as from the Diet Behavior and Nutrition module of the 2005-2006 National Health and Nutrition Examination Survey, were used to examine the change in label use over time. Although questions related to nutrition label use were similar in the two surveys, care was taken to ensure that the data were comparable for the analysis.

Probit regression techniques were used, as appropriate, for binary outcome variables to test whether the observed changes in use remained significant once the changes in the demographic composition of the United States over the 10-year period were accounted for and to test for differences in the change in use across population groups defined by characteristics such as age, gender, race, and education. The results from the probit regressions were also used to estimate mean changes in label use, as well as for different population subgroups, when controlling for demographic characteristics.

Introduction

Since May 1994, most packaged and processed foods sold in the United States have displayed a standard Nutrition Facts label. The label provides information on the amount and percent of daily value per serving of calories, saturated fat, dietary fiber, and other major nutrients, vitamins, and minerals. Providing nutrition information in a standardized format was triggered by the Nutrition Labeling and Education Act (NLEA), which was signed into law in November 1990. The act authorized the Food and Drug Administration (FDA) to regulate nutrition labeling, health claims, and nutrient content claims for most packaged foods, fish, and fresh fruits and vegetables. While not covered by the NLEA, the U.S. Department of Agriculture's (USDA) Food Safety and Inspection Service (FSIS) instituted a parallel set of regulations for the labeling of meat and poultry products. Under FSIS's regulations, all multi-ingredient and processed meat and poultry products must carry the Nutrition Facts panel. For single-ingredient raw meat and poultry products, a voluntary labeling program is in effect.

A major goal of the new nutrition labeling regulations was to help consumers make more healthful food choices through better access to credible nutrition information (Taylor and Wilkening, 2008). The standardized nutrition information displayed in the Nutrition Facts label was expected to enable consumers to find information quickly, compare products, and to choose healthful foods. By many measures, the new labeling rules enforced by the FDA and FSIS have been successful in providing credible and consistent nutrition information to consumers. While only 60 percent of FDA-regulated food products carried some type of food label in 1990, 96 percent carried the Nutrition Facts panel in 1996 (Brecher et al., 2000). FDA's 2002 Health and Diet Survey showed that nearly 70 percent of adults used the nutrition label when shopping for food (FDA, 2004). According to USDA's Diet and Health Knowledge Survey, nearly 81 percent of consumers who used labels in 1995-96 reported that they made better food choices as a result. Using data gathered before and after NLEA's implementation, Moorman (1996) found that the new labels helped consumers acquire and comprehend more nutrition information.

While nutrition labels are ubiquitous and widely used today, there are good reasons to assess whether or not mandatory nutrition labeling is meeting a central goal of helping consumers to improve their diet and health outcomes. The diets of most Americans continue to fall short of dietary recommendations, and obesity has been increasing among all segments of the U.S. population. Moreover, the percentage of label users stagnated between 65 and 70 percent in the years immediately following NLEA (Variyam and Cawley, 2006). These concerns are discussed in a 2004 report from the FDA's Obesity Working Group, which recommended a variety of steps to encourage more individuals to use nutrition labels when making food purchases (FDA, 2004). In response to the Obesity Working Group's recommendations, FDA requested public comments on whether giving more prominence to the declaration of calories per serving would increase consumer awareness of the caloric content of packaged food and whether providing a percent daily value for total calories would help consumers understand caloric content in the context of a 2,000-calorie diet (FDA, 2005).

In September 2007, the FDA held a public hearing to assess the use of symbols on the front of food packages to better communicate nutrition information. Consumer studies in the United Kingdom found that color-coded "traffic light" symbols on packaged processed foods that indicated high, medium, or low levels for a few specific nutrients, such as sugars, fat, and sodium, helped consumers make more healthful food choices (Hignett, 2007). In addition, FSIS proposed new rules requiring nutrition labeling for raw, ground, or chopped meat and poultry products, which are presently under a voluntary labeling regime (USDA, 2001).

This report examines nutrition label use in 2005-2006 and how it has changed since standardized labels were introduced in 1994. The report also examines how use of specific elements, such as the Nutrition Facts panel, health claims, serving size, and nutrient information, such as calories, fat, and fiber, has changed over time. Further, the report provides a detailed look at sociodemographic factors associated with the changing patterns of label use. By identifying overall and group trends in nutrition label use, this study will inform policymakers and program developers currently working on interventions to increase label use by highlighting groups that may benefit most from targeted programs. There is widespread interest in the formulation of nutrition labeling strategies at the international level as well. Following the release of the World Health Organization's *Global Strategy on Diet, Physical Activity and Health*, a growing number of countries are implementing nutrition labeling regulations to achieve a public health goal to improve diets and reduce obesity (Hawkes, 2004). Insight from the U.S. experience may help other countries plan strategies to encourage nutrition label use.

Economics of Label Use

Food labels provide information about the nutrient content of foods and the ingredients used for preparation. Labels may also include additional information in the form of qualified claims about the nutrient content, such as "low-fat" or the relationship between a nutrient (or the food) and a disease or health-related condition (e.g., fat and heart health). This information can make it easier for consumers to improve the nutritional quality of their diet by identifying foods low in calories, fat, and sodium or rich in dietary fiber, vitamins, and minerals. Investigation of the determinants of label use often starts with Stigler's (1961) model of information search as a framework. The basic premise of Stigler's model is that individuals choose how much information to obtain (and process) based on the costs and expected benefits of the information search and processing.

Many factors specific to the individual may influence both the costs and benefits of nutrition information search. Time is the main cost of obtaining and processing a food's nutritional information. Individuals face varying opportunity costs of time, which are determined by the individual's wage and employment status, education and nutrition knowledge, and family structure. The benefits of nutrition information, which come in the form of improved diet quality and better health outcomes, also vary across individuals depending on how much they value their health, their current health status, and their ability to process the information obtained.

In contrast to time costs, the benefits are often not fully realized until well into the future, as it is not the single poor food choice that results in nutrition-related morbidities, but a long history of poor food choices. Thus, the benefits of nutrition information will vary as the discount rate for future benefits varies across individuals. Moreover, the benefits of obtaining information about any particular food within a specific food group/type are greater when the variability in nutrient content is high among the choice set.[1] In sum, label use is determined by the expected net benefit, which is likely a function of age, gender, education, employment status, current health status, knowledge about nutrition and health, as well as other factors that affect an individual's value of time, rate of discount of future health, and ability to process and use nutrition information to make healthful food choices.

[1]Stigler (1961) makes this point about the search for the lowest selling price for a particular good.

Many studies have examined the sociodemographic determinants of label use in the United States, finding that age, gender, and education are important factors. Specifically, women and more educated individuals, as well as those with special diet concerns or a high awareness of the relationship between diet and health, are most likely to use nutrition labels. The influence of other factors such as income, employment, and household size is less clear, as both positive and negative effects have been found in the literature (see Drichoutis et al. (2006) for a review of studies examining the determinants of label use). Other studies have examined how label use affects food purchases and overall diet quality (Hawkes, 2004). While a positive relationship between a more healthful diet and label use is often found, it is difficult to separate the effect of label use from an individual's motivation for choosing a more healthful diet, because individuals with special dietary needs or health and nutrition concerns (and thus, better diets in general) are more likely to use nutrition labels. In the present study, we use a detailed set of sociodemographic char-

acteristics to capture the different incentives that people face in their decision to use labels. We then examine how the effects of these factors on label use have changed over the 10 years following the introduction of mandatory nutrition labels.

Data

Our label use data come from USDA's 1994-96 Diet and Health Knowledge Survey (DHKS) and the Diet Behavior and Nutrition module of the 2005-2006 National Health and Nutrition Examination Survey (NHANES). The DHKS was a supplementary survey administered to one adult over 20 years of age from each household, who also responded to the 1994-96 Continuing Survey of Food Intakes by Individuals. The DHKS gathered information on the respondents' nutrition knowledge and attitudes, as well as their use of nutrition labels. The NHANES is conducted by the National Center for Health Statistics (NCHS) and, in 2005-06, included questions on dietary behavior and nutrition label use. Both the 1994-96 DHKS and the 2005-06 NHANES collected information about how often an individual used the Nutrition Facts panel, the ingredient list, serving size information, and health claims on food packages when purchasing food, as well as use of specific components on the Nutrition Facts panel (e.g., calories, fat, and fiber) among label users. The surveys also collected comparable information on family and sociodemographic characteristics of the respondents. Public-use files provide detailed documentation of these surveys (Tippett and Cypel, 1998; NCHS, 2007).

The Sample

NHANES collected label use information from individuals age 16 and above, but we limit our sample to individuals 20 and older because the DHKS was administered only to adults 20 and older. Since standardized labels became mandatory in the middle of 1994, we include only the DHKS respondents from 1995 and 1996 in our study. Some observations were dropped from each sample because the individual's education level was missing or unknown (35 from DHKS and 8 from NHANES), while an additional 54 individuals were dropped from NHANES because the interview was conducted via proxy and information on label use was not collected. The resulting final sample includes a total of 8,768 individuals: 3,851 from the DHKS (will be referred to hereafter as 1995-96) and 4,917 from the NHANES (will be referred to hereafter as 2005-06).

Changes in demographic characteristics of the U.S. population may contribute to observed differences in label use if those characteristics are important determinants of label use. We therefore begin by comparing individual characteristics across the two surveys. Our comparison is limited to individual and household characteristics that appear in both surveys:

- Age (measured in years with a maximum recorded value of 85)
- Gender
- Race (categorized as non-Hispanic White, non-Hispanic Black, Hispanic, and Other)
- Education (categorized as less than a high school diploma, high school graduate, 1-3 years of college, and 4 years or more of college)
- Survey language (an indicator for whether the interview was conducted in Spanish instead of English)
- Household size (the only household characteristic commonly available is household size, which has a maximum recorded value of seven members)[2]

[2] Income is another commonly included variable in studies on label use. Both surveys include a variable that measures the poverty-to-income ratio (PIR), but the two measures are not consistent across both surveys. The 1995-96 survey includes the household PIR while the 2005-06 survey includes the family PIR. A family is a subset of the entire household when nonrelated individuals also reside in the household. Approximately 11 percent of individuals in the sample live in households that include nonrelated individuals. Thus, to make the PIRs comparable, these individuals would need to be dropped from the sample. Approximately 5 percent of the 2005-06 sample has missing values for the family PIR as respondents refused to report family income, requiring that either these observations be dropped or the PIR be imputed. Our main findings, however, do not change when the PIR is included as a control variable (not reported).

Table 1 presents summary statistics for these demographic characteristics separately for each survey, as well as p-values from tests of the difference in means between the two surveys. The comparison suggests that some shifts in the demographic characteristics of the U.S. population occurred over the 10-year period. Average age increased by approximately a year, resulting from an increase in the share of the population over age 40. Education levels also appear to have increased slightly; a larger proportion of the population obtained at least some college education after completing high school. The proportion that was interviewed in Spanish tripled, from 2 percent in 1995-96 to 6 percent in 2005-06. Despite these changes in individual characteristics, the average household size remained constant, at just under three members.

Table 1
Sample means of individual and household characteristics, by survey

Characteristic	1995–96	2005–06	Test of difference (p-value)
Age	45.26	46.39	0.172
20–29 years old	20%	19%	0.292
30–39 years old	23%	19%	0.007
40–49 years old	19%	21%	0.094
50–59 years old	15%	18%	0.007
60 + years old	22%	23%	0.864
Born 1976–1985	0%	19%	0.000
Born 1966–1975	20%	19%	0.354
Born 1956–1965	23%	21%	0.211
Born 1945–1946	19%	18%	0.266
Born 1936–1945	15%	11%	0.000
Born prior to 1936	22%	12%	0.000
Male	48%	48%	0.879
White	76%	72%	0.286
Black	11%	11%	0.980
Hispanic	9%	11%	0.311
Less than HS diploma	15%	18%	0.142
HS graduate	33%	25%	0.000
Some college	25%	31%	0.000
4+ years college	27%	26%	0.850
Interviewed in Spanish	2%	6%	0.004
Household size	2.93	2.94	0.863
Observations	3,851	4,917	

Notes: HS=high school; weighted means; annual weights used for 1995-96, 2-year weights for 2005-06; p-values account for survey design.
Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

Measuring Label Use

In this section, we define the measures of nutrition label use that we analyzed and document adjustments that we made to ensure that those measures were consistent across the two surveys. Although the 2005-06 survey asked questions about label use that were similar to those in the 1995-96 survey, there are a few differences in the way the questions were posed, the order of the questions, or the allowed response categories. Both surveys asked how frequently the individual used the Nutrition Facts panel, the ingredient list, the serving size information, or health claims on food packages when making food purchases. However, there were slight differences in how the question about the Nutrition Facts panel was posed. In 1995-96, the question was worded, "When you buy foods, do you use the nutrition panel that tells the amount of calories, protein, fat, and such in a serving of the food often, sometimes, rarely, or never?" In 2005-06, however, the individual was shown an example of the Nutrition Facts panel and then asked, "How often do you use the Nutrition Facts panel when deciding to buy a food product? Would you say always, most of the time, sometimes, rarely, or never?" Individuals were also shown an example of a health claim on a food package when asked about frequency of use in 2005-06, but not in 1995-96. Given that the questions were similar, but not identical, differences in the use of the Nutrition Facts panel and health claims on packages should be interpreted cautiously.

Another difference in the two surveys is the response categories for the frequency of label use; in 2005-06, respondents had an additional allowable response. In our analysis, "Always" and "Often" responses are combined in the 2005-06 data for comparability to the 1995-96 response category of "Always/Often." We also created a binary "Regular Label Use" variable by combining the "Always/Often" and "Sometimes" categories to identify label users and the "Rarely" and "Never" categories to identify label nonusers. "Never Seen" and "Don't Know" responses were coded as "Never"; less than 2 percent of the population reported having never seen nutrition labels in both 1995-96 and 2005-06. Such a "Regular Label Use" binary indicator is consistent with many other studies on label use (Guthrie et al., 1995; Kristal et al., 1998; Neuhouser et al., 1999; Pérez-Escamilla and Haldeman, 2002; Variyam and Cawley, 2006).[3]

A final point concerns differences in the way the two surveys were administered. The 1995-96 survey was administered via telephone, while the 2005-06 was conducted in person with mockup cards as prompts. The visual clues and prompting used in the 2005-06 survey may affect reported use, thus the estimated change in use may be biased by this difference. This needs to be kept in mind when interpreting the results. We do not, however, expect any bias introduced by the change in survey format to vary across population subgroups.

[3]An alternative approach would be to look at any use by counting only those who reported never having used a label or nutrient information as nonusers, similar to Kim et al. (2000). We also constructed indicators of "any use"; these are summarized and compared in appendix table 1. Differences in use across time are generally larger, as suggested by the tabulations of frequency of use (tables 2 and 3). Studies have also used the ordinal measure of frequency of label use (see Nayga, 1996, 2000; Nayga et al., 1998).

Use of Nutrition Labels Is Changing Significantly

A decade has passed since standardized nutrition labels were introduced, and there have been marked changes in their use. Table 2 summarizes the responses for each of the four major label components along with the F statistic testing the null hypotheses that the distributions of responses are equal in the two periods.[4] In all cases, the differences in the distributions are statistically significant ($p<0.01$), suggesting that there has been a shift in the pattern of label use between 1995-96 and 2005-06. Most notably, the percentage of consumers who reported *never* using the label increased between 1995-96 and 2005-06 for the four major label components: Nutrition Facts panel by 5 percentage points, serving size by 9 percentage points, and both ingredient list and health claims by 11 percentage points. The share of the population that reported using these label components "sometimes" decreased between 1995-96 and 2005-06. The proportion reporting frequent use (always/often) increased for the Nutrition Facts panel and serving size, decreased for health claims, and remained constant for the ingredient list.

Individuals who reported using some type of nutrition information when making food purchases, even if rarely, were asked how frequently they looked for information about certain nutrients: calories, total fat, saturated fat, cholesterol, sodium, fiber, and sugars.[5] Table 3 presents tabulations of the proportion reporting the use of information on these seven nutrients. All distributions are significantly different between 1995-96 and 2005-06 ($p < 0.001$). For each nutrient, the proportion that reported never using increased and, except for fiber and sugar, the proportion that reported frequent use decreased between 1995-96 and 2005-06.

Figure 1 consolidates the information in tables 2 and 3 by presenting the proportion reporting regular use (always/often/sometimes) of the different

[4] The Chi-squared statistic is converted to an F statistic to correct for the survey design using a second-order Rao and Scott (1981, 1984) correction (StataCorp, 2007).

[5] Use of label information on other types of nutrients was also collected, but not in both surveys. The 1995-96 survey also asked about vitamins and minerals, while the 2005-06 survey also asked about calories from fat, trans fat, and carbohydrates.

Table 2
Frequency of use of nutrition labels, by survey (weighted)

	1995–96	2005–06
Nutrition Facts panel F(2.77, 160.48) = 12.7986 P = 0.0000		
Never	22%	27%
Rarely	13%	10%
Sometimes	30%	23%
Always/often	35%	39%
Ingredient list F(2.89, 167.60) = 25.4006 P = 0.0000		
Never	21%	32%
Rarely	16%	16%
Sometimes	35%	25%
Always/often	27%	27%
Serving size F(2.73, 158.39) = 22.9368 P = 0.0000		
Never	29%	38%
Rarely	20%	14%
Sometimes	28%	21%
Always/often	23%	27%
Health claims F(2.83, 164.32) = 20.9801 P = 0.0000		
Never	26%	37%
Rarely	20%	18%
Sometimes	33%	28%
Always/often	21%	17%

Note: F statistic converted from the Chi-squared statistic to correct for the survey design using a second-order Rao and Scott (1981, 1984) correction (StataCorp 2007).
Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

types of label information in 1995-96 and 2005-06. The asterisk in the chart shows whether the differences in the responses between the two periods are statistically significant. Sixty-two percent of adults reported regular use of the Nutrition Facts panel when shopping for food in 2005-06. This is a decline of about 3 percentage points from 1995-96, although the change is not statistically significant ($p = 0.168$). By comparison, Variyam and Cawley (2006) reported 67 percent regular label use in 1998. FDA's estimates suggest a slight decline in regular use from 70 percent in 1994 to 69 percent in 2002 (FDA, 2004).

Figure 1 also shows that regular label use has significantly declined for the ingredient list, health claims, and all nutrients ($p < 0.05$) except for fiber and sugars. The decline in regular use is as high as 10 percentage points (ingredient list), although the percent decrease is greatest for health claims (17.2 percent). One positive finding is that, among those who use nutrition label information at all when shopping, regular use of fiber content information increased 4 percentage points (an increase of 7.3 percent from 1995-96).

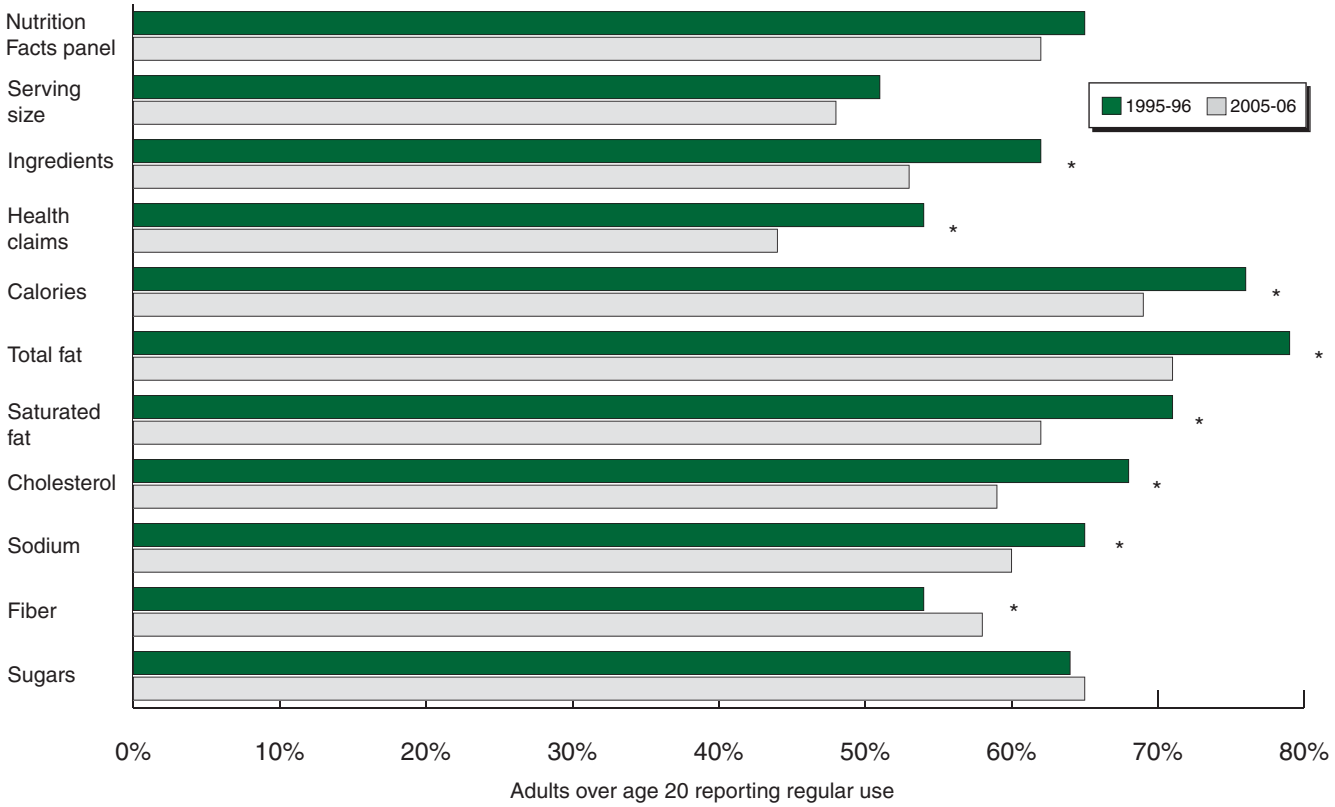
Table 3
Frequency of use of specific nutrient information, by survey

Calories		
F(2.70, 156.86) = 15.4649 P = 0.0000		
	1995–96	2005–06
Never	9%	17%
Rarely	15%	14%
Sometimes	33%	28%
Always/often	43%	41%
Total fat		
F(2.79, 161.61) = 15.9375 P = 0.0000		
Never	8%	15%
Rarely	13%	13%
Sometimes	29%	26%
Always/often	50%	46%
Saturated fat		
F(2.91, 168.61) = 21.5692 P = 0.0000		
Never	12%	21%
Rarely	18%	17%
Sometimes	29%	24%
Always/often	41%	38%
Cholesterol		
F(2.84, 164.96) = 24.3712 P = 0.0000		
Never	12%	23%
Rarely	20%	18%
Sometimes	30%	24%
Always/often	37%	35%
Salt/sodium		
F(2.94, 170.68) = 23.2938 P = 0.0000		
	1995–96	2005–06
Never	12%	22%
Rarely	22%	19%
Sometimes	30%	25%
Always/often	36%	34%
Fiber		
F(2.91, 168.94) = 50.8353 P = 0.0000		
Never	16%	24%
Rarely	30%	19%
Sometimes	34%	27%
Always/often	19%	31%
Sugars		
F(2.84, 164.54) = 27.2145 P = 0.0000		
Never	12%	18%
Rarely	24%	17%
Sometimes	33%	27%
Always/often	31%	38%

Note: F statistic converted from the Chi-squared statistic to correct for the survey design using a second-order Rao and Scott (1981, 1984) correction (StataCorp 2007).
Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

Figure 1

Regular use of nutrition label has declined for many types of label information



Notes: For nutrients, the proportions were calculated on a subset of individuals that report any use of the Nutrition Facts panel, the serving size information, ingredient list, and/or health claims. *indicates statistically significant change at the 5-percent level in the proportion reporting regular label use from 1995-96 to 2005-06.

Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition and Examination Survey.

Accounting for Demographic Changes

While our results indicate that use of nutrition information on food packages has decreased over the 10 years after standardized nutrition labels became mandatory, some of the decline may have been driven by demographic changes. As indicated in table 1, the demographic composition of the United States underwent some significant changes over the 10-year period. To test whether these demographic changes explain the observed changes in use, we estimate probit models for each of the binary indicators of regular label use described previously using pooled data from 1995-96 and 2005-06 of the form:

$$\Pr(y = 1) = \Phi(\mathbf{X}\boldsymbol{\beta} + \gamma T) \quad (1)$$

In equation 1, T is a dummy variable indicating whether the observation was from the 2005-06 period and $\mathbf{X}$ is a set of controls listed in table 1 comprised of gender, age/birth cohort dummies, education, ethnicity, survey language, and household size. A statistically significant coefficient on T (γ) indicates that, even after controlling for demographic characteristics, there was a significant change in label use over the 10-year period. The estimated coefficients, however, cannot be directly interpreted in terms of the magnitude of the change in use. For ease of interpretation, we use the coefficients from equation 1 to calculate the marginal effect, which estimates the magnitude of change in the probability of use over time.

Since the population's age is likely to be an important factor affecting overall label use, we control for age in two ways. First, we use 10-year age group dummies, which models the probability of use in terms of an individual's age at the time of the survey.[6] Secondly, we replace age group dummies with 10-year birth year cohort dummies and drop those born between 1976 and 1985 (20-29 years old in 2005) from the analysis. By excluding adults born after 1975, we isolate the population surveyed in 1995-96 and most likely to be directly exposed to the awareness and education campaign at the time the new labels were introduced. If the campaign had any lasting effects on use, we would expect the change in use over the period for this subsample to differ from that of the entire population which includes the youngest adult cohort.

Equation 1 allows for an estimate of the mean change in the probability of use between 1995-96 and 2005-06, controlling for demographic changes. We also test whether changes in label use vary across population subgroups by expanding equation 1 to include interactions of each set of characteristics (e.g., age groups, education, ethnicity, and gender) with T:

$$\Pr(y = 1) = \Phi(\mathbf{X}\boldsymbol{\beta} + \gamma T + (T * \mathbf{X})\boldsymbol{\varphi} \quad (2)$$

We refer to equation 2 as the full interaction model. In this model, the significance of γ indicates whether there was a change in use over the survey period for the individuals represented by the omitted categories in the demographic controls. For the full sample, the omitted categories include individuals age 20-29, females, those with a high school diploma, self-identified as White, and those surveyed in English. The estimated coefficients on the interaction terms (φ) indicate whether the change in use differed for individuals

[6]Specifications were also run with age in years and its square; the estimated coefficients on the 2005-06 indicator were similar to those estimated with the age-group dummy variables.

with other characteristics. This is equivalent to testing whether the effects of demographic characteristics that predict label use have changed over the 10-year period. Identifying whether changes in label use vary across population groups can help policymakers design and implement interventions and education campaigns to increase label use and nutrition awareness. From the results of this expanded model, we estimate the change in label use for different age groups, education levels, race, and other characteristics.

Label Use Declining Among Young Adults

Table 4 reports the coefficients for equation 1 estimated for regular use of the Nutrition Facts panel, the serving size information, the ingredient list, and health claims. Column (a) reports results for the full sample when age is controlled for with age group dummy variables, while column (b) reports results for the subset of individuals born prior to 1976 when age is controlled for with birth year cohort indicators. In the first specification (column a), the coefficient on the 2005-06 indicator is negative and significant for all four outcomes, suggesting that label use declined over the period. The significance level is much lower for the Nutrition Facts panel and the serving size information ($p<0.10$) than for the ingredient list and health claims ($p<0.001$). When the sample is restricted to those born prior to 1976 and age group dummy variables are replaced with birth year cohort dummy variables, no significant difference is found for regular use of the Nutrition Facts panel and the serving size information. This suggests that the decrease in use of these two label components observed in the full sample may be driven by a decrease in use among individuals in the 20- to 29-year age group.

The results confirm that label use varies across individuals. Older individuals are more likely to use food labels regularly, especially the ingredient list and health claims. This finding is consistent with the hypothesis that older individuals have the potential to gain more from the health benefits of nutritional information. Other researchers, however, have found a negative association between age and label use (Drichoutis et al., 2006). Consistent with previous research (Guthrie et al., 1995; Nayga, 1996), our results indicate that men are less likely to use food labels, while individuals with more education are more likely to use them regularly. Race/ethnicity does not influence the probability of regular use of food labels, with the exception that Blacks and Hispanics are more likely to refer to health claims than Whites. The results suggest that there is no difference in the probability of regular use among individuals for whom the survey was conducted in Spanish, while individuals in larger households are less likely to refer to the ingredient list regularly (a result also found by Drichoutis et al., 2005).

Our findings are similar when we re-estimate equation 1 for regular use of information about five nutritional components (calories, total fat, saturated fat, cholesterol, and sodium), although the coefficient on the 2005-06 indicator is insignificant in the (b) specification for sodium (results reported in appendix tables 2 and 3). Interestingly, use of fiber and sugar information is estimated to have increased among individuals born prior to 1976, while no change is estimated for the full sample (app. table 3).

The probit coefficient estimates in table 4 cannot be directly interpreted in terms of the magnitude of the change in label use over the period. For this, we turn to the estimated changes in the probability of use (or the marginal effects) computed using the probit coefficients. Table 5 reports the change in probability of label use in 2005-06 compared with 1995-96 after controlling for demographic characteristics. Estimates for both (a) and (b) specifications, along with the unconditional differences in use observed across the period, are reported. One striking result that emerges from table 5 is that, except for fiber and sugars, the marginal effects calculated from the specification estimated on the full sample with age group controls (a) are larger in magnitude

Table 4

Probit results for regular use of Nutrition Facts panel, serving size, ingredient list, and health claims (coefficients reported)

	Nutrition Facts		Serving size		Ingredient list		Health claims	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
T (2005–06)	-0.0771*	-0.0000	-0.0895*	-0.0342	0.2861***	0.1664***	0.2487***	0.1994***
	(0.0436)	(0.0457)	(0.0476)	(0.0517)	(0.0440)	(0.0456)	(0.0437)	(0.0463)
30–39 years old	0.1240		0.0978		0.3743***	0.0736		
	(0.0932)		(0.0861)		(0.0833)	(0.0805)		
40–49 years old	0.1715**		0.1789**		0.4398***	0.1391*		
	(0.0846)		(0.0686)		(0.0757)	(0.0782)		
50–59 years old	0.3369***		0.1767**		0.5482***	0.1834**		
	(0.0752)		(0.0765)		(0.0702)	(0.0737)		
60 + years old	0.1509		0.1347		0.4495***	0.1990***		
	(0.0986)		(0.0839)		(0.0762)	(0.0724)		
Born 1956–1965		0.0978		0.0960		0.3172***		0.1041
		(0.0917)		(0.0872)		(0.0834)		(0.0814)
Born 1946–1955		0.1059		0.0907		0.3171***		0.1251
		(0.0860)		(0.0721)		(0.0771)		(0.0837)
Born 1936–1945		0.2705***		0.1839**		0.4591***		0.2496***
		(0.0815)		(0.0814)		(0.0750)		(0.0726)
Born prior to 1936		0.0154		0.0327		0.2943***		0.1434*
		(0.1115)		(0.0954)		(0.0876)		(0.0814)
Male	0.6465***	0.6607***	0.4866***	0.4873***	0.4870***	0.4999***	0.4412***	0.4329***
	(0.0468)	(0.0509)	(0.0352)	(0.0378)	(0.0390)	(0.0410)	(0.0469)	(0.0499)
Black	-0.0841	-0.0883	0.0659	0.0587	0.0965	0.0906	0.1283**	0.1260*
	(0.0554)	(0.0594)	(0.0708)	(0.0761)	(0.0672)	(0.0716)	(0.0614)	(0.0666)
Hispanic	-0.0501	-0.0928	-0.0232	-0.0471	0.0853	0.0363	0.2002**	0.1805**
	(0.0715)	(0.0781)	(0.0778)	(0.0840)	(0.0769)	(0.0789)	(0.0843)	(0.0899)
Other	-0.1044	-0.1340	-0.1296	-0.1554	-0.0015	-0.0374	-0.1671	-0.1574
	(0.1230)	(0.1273)	(0.1034)	(0.1086)	(0.1372)	(0.1439)	(0.1088)	(0.1130)
9–11 grade	0.3805***	0.3764***	0.2772***	0.2678***	0.2193***	0.2166***	0.3632***	0.3617***
	(0.0674)	(0.0705)	(0.0516)	(0.0540)	(0.0666)	(0.0721)	(0.0781)	(0.0827)
Less than 4 years college	0.3099***	0.2974***	0.1685***	0.1554***	0.2324***	0.2253***	0.1559**	0.1542**
	(0.0428)	(0.0463)	(0.0443)	(0.0465)	(0.0567)	(0.0611)	(0.0599)	(0.0625)
4+ years college	0.5250***	0.5038***	0.3046***	0.2996***	0.3901***	0.3895***	0.1903***	0.1744**
	(0.0581)	(0.0624)	(0.0538)	(0.0581)	(0.0668)	(0.0692)	(0.0633)	(0.0662)
Questionnaire in Spanish	0.0640	0.0714	0.0678	0.0833	-0.0103	0.0237	-0.0640	-0.0144
	(0.1286)	(0.1442)	(0.1317)	(0.1481)	(0.1293)	(0.1348)	(0.1180)	(0.1260)
Household size	-0.0222	-0.0231	-0.0072	-0.0070	-0.0350**	-0.0372**	-0.0013	0.0007
	(0.0162)	(0.0176)	(0.0158)	(0.0167)	(0.0146)	(0.0158)	(0.0150)	(0.0153)
Constant	0.4340***	0.5133***	0.0535	0.0995	0.0652	0.1623**	0.1296	0.1287
	(0.1096)	(0.1169)	(0.0987)	(0.1043)	(0.0761)	(0.0790)	(0.0942)	(0.0986)
Observations	8,768	7,704	8,768	7,704	8,768	7,704	8,768	7,704

Notes: *** indicates significant at 99 percent confidence; ** indicates significant at 95 percent confidence; * indicates significant at 90 percent confidence; standard errors computed using the Taylor linearized variance estimation; (a) sample includes all adults in both time periods; (b) sample excludes adults 20-29 in 2005-06; blank indicates no coefficients reported when variables not included in the model.

Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

than with the birth year controls (b). This suggests that the decline in label use is greater when the youngest birth cohort is included in the analysis. In fact, when the youngest birth cohort is excluded, the use of Nutrition Facts panel, serving size, and sodium information do not decline significantly between 1995-96 and 2005-06. The opposite is true for the change in use of fiber information; the estimated marginal effect suggests that a smaller increase in use occurred over the period than is actually observed in the unconditional population point estimates.

We turn next to the results of the full interaction model, which explores differences in the change in use. We present both the overall mean marginal effects from specification (a), first presented in table 5, in the first row of tables 6 and 7. The remaining rows give the marginal change in label use for each characteristic while holding other characteristics constant. We see that the overall marginal change in label use in 2005-06 reported in the first row masks many differences in the change in use across population groups.

The estimates of the change in use of the Nutrition Facts panel by age group (table 6) reveal that the decrease in use is much larger among adults age 20-29 years. In addition, we see that the change across education groups varies considerably, ranging from a decline of about 6-7 percentage points among those with only a high school diploma to an *increase* in use of 3.8 percentage points among those who completed at least 4 years of college.

Table 5
Observed and estimated changes in probability of label information use (marginal effects), estimated from equation 1

	Observed change) (a)	Estimated change (a)	Observed change (b)	Estimated change (b)
Nutrition facts	-0.024	-0.029*	-0.003	-0.000
Serving size	-0.031	-0.036*	-0.011	-0.014
Ingredient list	-0.098***	-0.112***	-0.060***	-0.064***
Health claims	-0.092***	-0.099***	-0.079***	-0.079***
Calories	-0.064***	-0.075***	-0.040**	-0.048***
Total fat	-0.080***	-0.092***	-0.059***	-0.066***
Saturated fat	-0.086***	-0.102***	-0.062***	-0.062***
Cholesterol	-0.088***	-0.104***	-0.055***	-0.045***
Sodium	-0.058***	-0.074***	-0.032**	-0.018
Fiber	0.039**	0.022	0.066***	0.074***
Sugars	0.014	0.002	0.034**	0.040**

Notes: (a) sample includes all adults in both time periods (estimation conducted using age group control); (b) sample excludes adults 20-29 in 2005-06 (estimation conducted using birth cohort controls). *** indicates significant at 99 percent confidence; ** indicates significant at 95 percent confidence; * indicates significant at 90 percent confidence; standard errors computed using the Taylor linearized variance estimation. Marginal effects calculated at the sample mean. Marginal effects were also calculated by taking the mean of the individual marginal effects, however, only slight differences were observed; those reported are slightly larger than those estimated in the alternate, but the qualitative comparison to the unconditional difference across the surveys is unaffected by the calculation method for the marginal effects.
Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

Furthermore, we see that the decrease in use among those interviewed in Spanish is the largest at -25.3 percentage points. This result also holds when we look at use of serving size information, the ingredient list, and health claims. The decline in the use of the Nutrition Facts is also greater in larger households, but household size does not affect the change in use of any other label element (results not reported).

Differences in the change are also evident for use of information about specific nutrients (table 7). For calories, fat, and cholesterol, the decrease in use is greatest among individuals 20-29 years old (nearly double the mean decrease) and, in the case of fat, also among those in the 50- to 59-year age group. The change across education levels, however, appears not to vary with regard to specific nutrients, suggesting that education mainly affects whether individuals use nutrition labels at all, but not the type of information used among label users.

Table 6

Estimated change in probability of regular use of Nutrition Facts panel, serving size, ingredient list, and health claims between 1995-96 and 2005-06 surveys, by characteristic

	Nutrition facts	Serving size	Ingredient list	Health claims
Mean marginal effect	-0.029*	-0.036*	-0.112***	-0.099***
Age		*		
20–29	**-0.099**	**-0.086**	**-0.130**	**-0.113**
30–39	-0.039	-0.053	-0.143	-0.127
40–49	0.023**	-0.005	-0.068	-0.085
50–59	-0.025	-0.055	-0.118	-0.110
60+	-0.001	0.013*	-0.073	-0.049
Gender		***		**
Female	**-0.020**	**0.012**	**-0.089**	**-0.061**
Male	-0.037	-0.087	-0.124	-0.133
Education	**	*		
No HS diploma	-0.053	-0.068	-0.120	-0.083
HS diploma	**-0.066**	**-0.076**	**-0.133**	**-0.122**
Some college	-0.035	-0.010	-0.096	-0.107
4+ years college	0.038	0.004	-0.076	-0.062
Race				
White	**-0.010**	**-0.024**	**-0.094**	**-0.083**
Black	-0.060	-0.059	-0.101	-0.123
Hispanic	-0.092	-0.117	-0.177	-0.173
Other	-0.100	0.006	-0.147	-0.064
Survey language	***	***	***	***
English	**-0.020**	**-0.027**	**-0.098**	**-0.088**
Spanish	-0.253	-0.270	-0.319	-0.311

Notes: HS=high school; bold indicates omitted category; *** indicates significant at 99 percent confidence; ** indicates significant at 95 percent confidence; * indicates significant at 90 percent confidence; standard errors computed using the Taylor linearized variance estimation; significance reported in group category heading row represents joint significance over multiple categories and for a single dummy when indicator is binary (such as male); when categories are not jointly significant, significance of single interactions reported.

Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

Table 7

Estimated change in probability of regular nutrient information use on food labels between 1995-96 and 2005-06, by demographic characteristic

	Calories	Total fat	Saturated fat	Cholesterol	Sodium	Fiber	Sugars
Pooled mean marginal effect	-0.075***	-0.092***	-0.102***	-0.104***	-0.074***	0.022	0.002
Age	**	***	***				
20–29	**-0.169**	**-0.155**	**-0.162**	**-0.169**	**-0.095**	**0.018**	**0.020**
30–39	-0.051	-0.049	-0.036	-0.105	-0.054	0.031	0.023
40–49	-0.035	-0.017	-0.067	-0.059***	-0.048	0.040	0.003
50–59	-0.084	-0.156	-0.199	-0.116	-0.106	-0.009	0.001
60+	-0.037	-0.089	-0.061	-0.068	-0.062	0.020	-0.031
Gender	***			**	**	***	**
Female	**-0.043**	**-0.071**	**-0.079**	**-0.071**	**-0.044**	**0.053**	**0.025**
Male	-0.112	-0.112	-0.124	-0.142	-0.107	-0.020	-0.025
Education							
No HS diploma	-0.076	-0.108	-0.098	-0.061	-0.115	-0.013	-0.042
HS diploma	**-0.070**	**-0.101**	**-0.130**	**-0.100**	**-0.078**	**0.007**	**-0.015**
Some college	-0.103	-0.110	-0.117	-0.089	-0.046	0.040	0.023
4+ years college	-0.046	-0.050	-0.050*	-0.133	-0.070	0.032	0.021
Race	**					**	**
White	**-0.081**	**-0.082**	**-0.089**	**-0.105**	**-0.060**	**0.033**	**0.015**
Black	-0.050	-0.100	-0.142	-0.077	-0.074	-0.030	0.018
Hispanic	0.018	-0.086	-0.056	-0.063	-0.089	0.094	-0.022
Other	-0.194	-0.187	-0.244**	-0.206	-0.223**	-0.211	-0.197
Survey language				*			
English	**-0.075**	**-0.087**	**-0.100**	**-0.100**	**-0.067**	**0.020**	**0.008**
Spanish	-0.025	-0.169	-0.067	-0.162	-0.197	0.053	-0.161

Notes: HS=high school; bold indicates omitted category; *** indicates significant at 99 percent confidence; ** indicates significant at 95 percent confidence; * indicates significant at 90 percent confidence; standard errors computed using the Taylor linearized variance estimation; significance reported in category heading row represents joint significance over multiple categories and for a single dummy when indicator is binary (such as male); when categories are not jointly significant, significance of single interactions reported.

Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

Discussion

Since 1994, food shoppers have had access to standardized nutrition information for most foods sold in the United States. Today's food labels offer consistent and reliable information that can help consumers decide what to buy as part of a healthful diet. Although most adults report using nutrition labels regularly when shopping for food, the proportion declined between 1995-96 and 2005-06. At the same time, overall diet quality remains below healthful levels for most Americans (Guenther et al., 2007), and obesity and other diet-related health conditions, such as diabetes, are on the rise. The decline in label use detected in this study and the increase in adults that never use nutrition labels may have several implications for Federal nutrition labeling policy.

The general decline in label use and, specifically, the decline in the use of calorie information among label users lend support for the FDA's proposals to give more prominence to calorie information on the Nutrition Facts panel and to include a percent daily value for calories (FDA, 2005). The increase in the proportion of individuals who report never using nutrition labels when purchasing food suggests that new public awareness campaigns may be warranted. The new Web-based learning tool developed by the FDA to help consumers use calorie information and manage caloric intake may increase use of food labels and calorie information.[7] Similar steps may be needed to increase consumer use of ingredient information, which has declined by 11 percentage points between 1995-96 and 2005-06. This drop in use of ingredient information is a concern because the *2005 Dietary Guidelines* emphasize the consumption of whole grains. The ingredient list is the only way to identify foods with a significant amount of whole grains; claims on the front of the package do not always identify when a whole grain is a main ingredient in a food.

[7] This tool can be downloaded at http://www.cfsan.fda.gov/~ear/hwm/labelman.html.

The slight increase in the use of fiber information (and to a lesser extent, sugar) among label users, especially older adults, is a notable exception. The role of adequate fiber in promoting good health has received much attention in the press recently. The popularity of low-carb diets has also emphasized fiber content in foods. Thus, it appears that Americans are responsive to information linking diet, fiber, and health. Perhaps similar exposure to information about other nutrients in food will lead to increased label use, as well as increases in the use of information about specific nutrients such as calories, fat, and sodium.

The differences in the decline in use across age groups suggest that future policies or informational campaigns should target younger adults and adolescents. In June 2007, FDA unveiled the new "Spot the Block" program aimed at educating adolescents about the Nutrition Facts panel which appears to be a step in this direction (FDA, 2007). Other population groups that may also benefit from new informational campaigns include those who decreased their use the most over the 10-year period, specifically those with a high school education or less and predominantly Spanish-speaking residents. The reasons for the decline in use may differ across the two groups, so information directed to these groups may need to be adjusted accordingly.

It is important to note that we were unable to determine why label use has declined over the period. One possibility is that some population groups find nutrition information difficult to use or that the time and cognitive costs of using the information do not outweigh the perceived benefits. A recent study of patients with chronic illnesses, 89 percent of whom reported using food labels, found that many were unable to use the Nutrition Facts panel correctly (Rothman et al., 2006). Less than a third were able to correctly calculate the total carbohydrates in the various foods hypothetically consumed. While higher literacy and numeracy improved a patient's ability to use the labels correctly, many errors were still observed among even the most literate and numerate. This suggests that consumers may benefit from a change in the format of nutrition information on labels, particularly one that brings the format more in line with specific USDA dietary guidelines.

Other possible reasons behind the decline in use include an increase in the consumption of food away from home and an increase in the availability of nutrition information from other sources (e.g., the Internet, store shelf labels). The Consumer Expenditure Survey shows that the share of expenditures on food away from home increased from 38 percent in 1995 to 44 percent in 2005 (U.S. Department of Labor, 2007). Currently, nutrition information is not required or commonly available at restaurants or on prepared foods. Thus, nutrition labels mandated by NLEA provide information on a decreasing share of total food for the average consumer, which may decrease the benefit of reading labels.

The Pew Internet and American Life Project reports that between 1995 and 2005, the share of adults who use the Internet increased from 15 to 70 percent.[8] Numerous free and fee-based Internet sites currently provide nutrition information for specific foods, including many restaurant foods. Moreover, many Web sites pair the nutrition information with suggested menus and recipes; calorie consumption and exercise tracking capabilities; and discussion groups or chat rooms. Thus, consumers, particularly young adults, may find it more useful to access information on the Internet, where nutritional information on both food at home and food away from home is readily available and linked directly to support, daily dietary guidance, and planning tools.

[8]See published chart at http://www.pewinternet.org/trends/Internet_Adoption_3.18.08.pdf.

While an increase in product familiarity may decrease use of nutrition labels, since the early 1990s the number of new product introductions has doubled each year (Martinez, 2007), resulting in a larger array of products from which consumers can choose. Consequently, one would expect use to have increased rather than decreased. In light of this, the decline in use observed between 1995-96 and 2005-06 is even more curious. One explanation is that consumers are paying more attention to other product information on labels, such as organic certification, country of origin, or welfare issues (e.g., production processes such as free range or fair trade) at the expense of nutrition labels.

We find that use of nutrition labels has declined, but the reasons are unclear. Future research should aim to develop a better understanding of the consumer's search for nutritional information and the factors affecting choices that improve diet quality. Redesigning nutrition labels to make information more

accessible may increase use. Increasing access to and quality of information, however, can only go so far in achieving improvements in diet quality and public health. Achieving long-term changes also requires that consumers are motivated to use the information.

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Appendix table 1

Binary measures of any label use, by survey

	1995–96	2005–06	Difference	p-value
Nutrition Facts panel	0.78	0.73	-0.06	0.00
Serving size	0.71	0.62	-0.09	0.00
Ingredients	0.79	0.68	-0.10	0.00
Health claims	0.74	0.63	-0.11	0.00
Calories*	0.91	0.83	-0.08	0.00
Total fat*	0.92	0.85	-0.08	0.00
Saturated fat*	0.88	0.79	-0.10	0.00
Cholesterol*	0.88	0.77	-0.10	0.00
Salt/sodium*	0.88	0.78	-0.10	0.00
Fiber*	0.84	0.76	-0.07	0.00
Sugars*	0.88	0.82	-0.06	0.00

Notes: Proportions estimated using survey weights; *proportion calculated on subset of individuals that report using the Nutrition Facts panel, the serving size information, ingredient list, and/or health claims (3,134 observations in the 1995-96 survey and 3,668 observations in the 2005-06 survey).
Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

Appendix table 2

Probit results for regular use of calories, total fat, saturated fat, and cholesterol; individuals who report using the Nutrient Facts panel, serving size, ingredient list, or health claims (coefficients)

	Calories		Total fat		Saturated fat		Cholesterol	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
T (2005–06)	-0.2279***	-0.1498***	-0.2980***	-0.2183***	-0.2823***	-0.1730***	-0.2792***	-0.1222**
	(0.0544)	(0.0525)	(0.0570)	(0.0579)	(0.0468)	(0.0465)	(0.0469)	(0.0466)
30–39 years old	0.0445		0.0931		-0.0277		0.0517	
	(0.0828)		(0.0761)		(0.0918)		(0.0842)	
40–49 years old	0.1271*		0.1364*		0.1683**		0.2254***	
	(0.0743)		(0.0774)		(0.0810)		(0.0690)	
50–59 years old	0.2450***		0.2984***		0.3663***		0.5184***	
	(0.0812)		(0.0667)		(0.0767)		(0.0771)	
60 + years old	0.1526*		0.2187**		0.3844***		0.6298***	
	(0.0810)		(0.0839)		(0.0841)		(0.0788)	
Born 1956–1965		-0.0108		0.0254		-0.0493		0.0804
		(0.0810)		(0.0757)		(0.0890)		(0.0811)
Born 1946–1955		0.0308		-0.0244		0.0849		0.2254***
		(0.0817)		(0.0817)		(0.0837)		(0.0754)
Born 1936–1945		0.1950**		0.3055***		0.4686***		0.5655***
		(0.0935)		(0.0718)		(0.0783)		(0.0836)
Born prior to 1936		0.0140		0.0724		0.2856***		0.5472***
		(0.0926)		(0.0969)		(0.0906)		(0.0843)
Male	-0.4158***	-0.4207***	-0.3768***	-0.3863***	-0.2405***	-0.2535***	-0.1368***	-0.1406***
	(0.0363)	(0.0391)	(0.0502)	(0.0526)	(0.0404)	(0.0415)	(0.0492)	(0.0522)
Black	-0.0996	-0.1185	-0.0666	-0.0798	0.0650	0.0579	0.1804**	0.1708**
	(0.0825)	(0.0886)	(0.0659)	(0.0715)	(0.0716)	(0.0778)	(0.0738)	(0.0803)
Hispanic	-0.0104	-0.0578	0.1116	0.0764	0.0369	0.0093	0.0831	0.0452
	(0.1212)	(0.1272)	(0.1425)	(0.1546)	(0.0990)	(0.1072)	(0.1109)	(0.1176)
Other	-0.0550	-0.0515	0.1048	0.1004	0.1655	0.1666	0.2541*	0.2645*
	(0.1446)	(0.1487)	(0.1240)	(0.1264)	(0.1184)	(0.1343)	(0.1416)	(0.1555)
9–11 grade	-0.1234	-0.0904	-0.1489*	-0.1194	-0.1390**	-0.1074*	-0.0951	-0.0776
	(0.0852)	(0.0891)	(0.0769)	(0.0809)	(0.0590)	(0.0612)	(0.0691)	(0.0711)
Less than 4 years college	0.1731***	0.1659***	0.1830***	0.1743***	0.1378***	0.1469***	0.0234	0.0093
	(0.0493)	(0.0535)	(0.0517)	(0.0549)	(0.0509)	(0.0524)	(0.0547)	(0.0596)
4+ years college	0.3083***	0.3209***	0.4266***	0.4336***	0.3145***	0.3289***	0.1284**	0.1354**
	(0.0672)	(0.0700)	(0.0626)	(0.0658)	(0.0582)	(0.0627)	(0.0580)	(0.0610)
Questionnaire in Spanish	-0.1347	-0.1356	-0.1287	-0.1106	-0.2766**	-0.2743*	0.1668	0.2376*
	(0.1649)	(0.1849)	(0.1230)	(0.1290)	(0.1380)	(0.1514)	(0.1263)	(0.1361)
Household size	-0.0311**	-0.0330**	-0.0158	-0.0171	-0.0010	0.0029	0.0136	0.0097
	(0.0151)	(0.0163)	(0.0203)	(0.0210)	(0.0191)	(0.0201)	(0.0170)	(0.0178)
Constant	0.7018***	0.7735***	0.7173***	0.8010***	0.3841***	0.4115***	0.1999**	0.2050**
	(0.0797)	(0.0850)	(0.0806)	(0.0831)	(0.0874)	(0.0876)	(0.0817)	(0.0838)
Observations	6,802	6,020	6,802	6,020	6,802	6,020	6,802	6,020

Notes: *** indicates significant at 99 percent confidence; ** indicates significant at 95 percent confidence; * indicates significant at 90 percent confidence; standard errors in parentheses, computed using the Taylor linearized variance estimation; (a) sample includes all adults in both time periods; (b) sample excludes adults 20-29 in 2005-06; blank indicates no coefficients reported when variables not included in the model; blank indicates no coefficients repoted when variables not included in the mode.
Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.

Appendix table 3

Probit results for regular use of salt/sodium, fiber, and sugars; individuals that report using the Nutrient Facts panel, serving size, ingredient list, or health claims (coefficients)

	Sodium		Fiber		Sugars	
	(a)	(b)	(a)	(b)	(a)	(b)
T (2005-06)	-0.1962***	-0.0490	0.0559	0.1887***	0.0057	0.1096**
	(0.0432)	(0.0479)	(0.0422)	(0.0461)	(0.0446)	(0.0482)
30–39 years old	0.0545		0.0718		0.2105**	
	(0.0800)		(0.0752)		(0.0792)	
40–49 years old	0.2508***		0.3404***		0.2475***	
	(0.0785)		(0.0685)		(0.0878)	
50–59 years old	0.4641***		0.5107***		0.4068***	
	(0.0811)		(0.0836)		(0.0806)	
60+ years old	0.6686***		0.5752***		0.5395***	
	(0.0687)		(0.0777)		(0.0770)	
Born 1956–1965		0.0789		0.1364*		0.1416*
		(0.0731)		(0.0750)		(0.0764)
Born 1946–1955		0.2478***		0.3450***		0.2334**
		(0.0810)		(0.0677)		(0.0914)
Born 1936–1945		0.5395***		0.5579***		0.3992***
		(0.0816)		(0.0862)		(0.0826)
Born prior to 1936		0.6266***		0.5387***		0.4706***
		(0.0752)		(0.0830)		(0.0836)
Male	-0.2742***	-0.2841***	-0.2083***	-0.2040***	-0.3075***	-0.3085***
	(0.0375)	(0.0400)	(0.0378)	(0.0404)	(0.0427)	(0.0449)
Black	0.3114***	0.3188***	0.1663**	0.1722**	0.0918	0.0903
	(0.0839)	(0.0919)	(0.0712)	(0.0757)	(0.0619)	(0.0660)
Hispanic	0.2047	0.1858	0.1971*	0.1774	0.0524	0.0475
	(0.1533)	(0.1650)	(0.1161)	(0.1236)	(0.1206)	(0.1291)
Other	0.1031	0.1175	0.2266*	0.2600*	0.2908**	0.3126**
	(0.1107)	(0.1161)	(0.1337)	(0.1342)	(0.1341)	(0.1431)
9 –11 grade	-0.0519	-0.0304	-0.0207	0.0189	-0.0613	-0.0432
	(0.0758)	(0.0818)	(0.0809)	(0.0866)	(0.0804)	(0.0854)
Less than 4 years college	0.0323	0.0185	0.1313**	0.1273**	0.1137*	0.0998
	(0.0538)	(0.0578)	(0.0529)	(0.0565)	(0.0594)	(0.0618)
4+ years college	0.1406***	0.1403**	0.2759***	0.2880***	0.1772**	0.1798**
	(0.0528)	(0.0570)	(0.0549)	(0.0580)	(0.0696)	(0.0721)
Questionnaire in Spanish	-0.0312	0.0187	-0.1184	-0.1092	0.1333	0.1908
	(0.1287)	(0.1418)	(0.1549)	(0.1671)	(0.1938)	(0.2146)
Household size	0.0095	0.0129	0.0074	0.0101	0.0378**	0.0422**
	(0.0173)	(0.0181)	(0.0180)	(0.0180)	(0.0157)	(0.0172)
Constant	0.1670**	0.1635**	-0.2464***	-0.2722***	0.1309	0.1654*
	(0.0783)	(0.0785)	(0.0700)	(0.0713)	(0.0914)	(0.0938)
Observations	6,802	6,020	6,802	6,020	6,802	6,020

Notes: *** indicates significant at 99 percent confidence; ** indicates significant at 95 percent confidence; * indicates significant at 90 percent confidence; standard errors in parentheses, computed using the Taylor linearized variance estimation; (a) sample includes all adults in both time periods; (b) sample excludes adults 20-29 in 2005-06; blank indicates no coefficients reported when variables not included in the model.
Source: ERS calculations using data from the 1995-96 Diet and Health Knowledge Survey and 2005-06 National Health and Nutrition Examination Survey.