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How Do Consumers Use Nutrition Labels on Food Products in the United States?

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Abstract

This study examined how consumers use food labels in the United States. Based on the results from the cluster analysis, eight nutrition label questions from the Health and Diet Survey fell into 2 categories of label usage: for shopping or for dietary decisions. Survey respondents reported equal or more consideration of nutrition-label information for dietary choices than for shopping decisions in 2008 compared with prior survey years. Female consumers, frequent label users, well-educated, consumers aged 50 to 59, or consumers with any health issues were significantly more likely to use food labels for all kinds of purposes than their corresponding counterparts.

THE NUTRITION FACTS (NF) panel seen on almost all packaged food labels in the United States serves a number of purposes. The 1973 food labeling regulations, for example, required detailed nutrition labeling as a remedy for potentially misleading nutrition claims for consumers.[1] In 1990, the Nutrition Labeling and Education Act extended the disclosure requirement to all packages to help consumers make even better dietary choices by providing nutrition information in a total diet context and informing purchase and consumption decisions.[2]

Since 1994, the U.S. Food & Drug Administration (FDA) Health and Diet Survey (HDS) has tracked responses to questions about whether and how much consumers use NF for each of 8 possible purposes. These include shopping, checking whether advertising claims are true, avoiding unwanted ingredients, and meal planning. Besides contributing to an evaluation of how well the panel is meeting its intended mandates, the questions offer an opportunity to assess changes in consumer usage over time and to identify factors that predispose people toward different types of NF use.

The earliest results on the NF questions from the 1994-1995 HDS surveys[3] showed a highly skewed distribution of reported uses for the NF and suggested that consumers mainly use NF as a reliable source of product information to make purchase decisions. Consumers were less likely to report using NF as a way to check claims or help in meal planning or portion control. This pattern of results is consistent with the original intention of the NF. Shopping, the first step in achieving a healthier diet, seemed to be the major domain of application for NF. A question remains as to whether or not this pattern might have changed over time, because of consumers' increased experience and familiarity with NF since 1995. It could also reflect extensive educational efforts to encourage more healthful eating that have taken place over this time.

Data on food labels usage include the 1994 and 1995 HDS surveys along with subsequent HDS surveys conducted in 2002 and 2008. The following research questions are addressed:

1. Has the pattern of reported usage of the food label changed since the 1994-1995 tracking period?
2. Are there common themes that simplify the description of individual usage profiles across the 8 food label use questions? What are they? Do they provide insight as to how consumers use NF?
3. What are the demographic antecedents, if any, of distinct individual food label usage styles?

Methods

The HDS is a national telephone survey, administered periodically by the U.S. FDA. Since 1982, the HDS has been used to gather information on consumer awareness, attitudes, and practices related to health and diet issues. The HDS is publicly accessible by request from the FDA. For details about the survey and the published work, contact consumer studies at CFSAN, FDA. After requesting the data, the authors of this study concatenated 4 survey waves of HDS into 1 combined dataset by stacking them on top of each other. All 4 waves of HDS (1994, 1995, 2002, and 2008) were collected using single-stage random digit dialing telephone surveys. The original sample sizes were 1945, 1001, 2743, 2584, respectively, and overall response rates were 25%, 50%, 30%, and 22%, respectively.

All of the survey data were collected using random digit dialing with the selected respondent being the adult (18+) in the household with the most recent birthday. Each survey wave covered the entire 50 US states and the District of Columbia. Surveys took about 20 minutes on a residential landline.

Sample weights were assigned to adjust for factors including number of landlines and adults in the household, gender, race, age, and education. The final analytic sample includes 5892 respondents from all 4 years. Characteristics of the overall sample and the sample by survey year were summarized in Table 1.

Table 1. Descriptive Statistics (Unweighted Percent) of the Analytic Health Diet Surveys by Clusters and for the Overall Samplea

Variables	For Dietary Decisions (n = 697), %	No Difference (n = 1304), %	For Shopping Decisions (n = 3981), %	Overall Sample (N = 5982), %
Year				
1994	11.3	20.1	68.6	24.7
1995	9.4	23.4	67.2	11.8
2002	10.8	22.0	67.2	31.7
2008	13.6	22.4	64.0	31.7
Gender				
Male	12.6	20.3	67.0	36.5
Female	11.1	22.6	66.3	63.5
Education				
Less than high school	19.2	25.1	55.8	6.8
High school graduate	15.2	23.2	61.6	28.5
Some college	10.7	22.1	67.1	27.1
College graduate	8.3	19.9	71.8	37.6
Race				
Non-Hispanic white	10.3	20.9	68.8	76.6
Non-Hispanic black	17.6	23.9	58.5	12.3
Hispanic of any race	16.1	26.7	57.3	6.5
Non-Hispanic others	11.6	24.4	64.0	4.6
Age, y				
18-29	12.6	20.5	67.0	12.0
30-39	10.7	18.9	70.5	18.2
40-49	10.4	21.6	68.0	20.0
50-64	11.3	23.5	65.2	20.6
65-101	13.0	23.1	63.9	29.3
Accumulative incomeb				
Low (<30%)	18.5	27.0	54.5	12.4
Medium (30%-59%)	13.2	22.7	64.1	38.2
High (60%-79%)	10.4	20.0	69.6	21.3
Top (80%-100%)	7.6	19.6	72.9	28.1
Health conditions				
No health problem	10.5	21.1	68.4	64.9
Had any health problem	13.9	23.1	63.0	35.1
Label usage when buying for the first time				
Rarely or never	15.6	20.9	63.6	15.0
Sometimes	14.0	13.1	72.8	24.6
Often	9.7	25.6	64.7	60.5

[a]Data: Health and Diet Surveys 1994, 1995, 2002, 2008.

[b]The percentage is the ranking of the household income adjusted by Current Consumer Price Index.

Source: How Do Consumers Use Nutrition Labels on Food Products in the United States?

Variables

In 1994, 1995, 2002, and 2008, the FDA HDS posed 8 food label usage questions to respondents who said that they had used food labels when they bought a product for the first time (about 90% of the total respondents). The question was introduced: “People tell us they use food product labels in many different ways. When you look at food labels, either in the store or at home, how often, if at all, do you use the labels in the following ways?”

The 8 domains pertaining to food label usage are listed later, along with the corresponding term within parentheses.

Would you say you often, sometimes, rarely or never use the label .... (a) To help you decide which brand of a particular food item to buy (Brand); (b) To figure out how much of the food product you or your family should eat (Much); (c) To compare different food items with each other (Compare); (d) To see if something said in advertising or on the package is actually true (True); (e) To get a general idea of the nutritional content of the food (Nutrition); (f) To see how high or low the food is in listed attributes, such as calories, salt, vitamins, or fat (Hi_Low); (g) To help you in meal planning (Plan); (h) To see if there is an ingredient that you or someone in your family should avoid[4] (Avoid).

For each question, the answer options were as follows: 1 = often, 2 = sometimes, 3 = rarely, or 4 = never. The response categories were then reverse-coded, with higher numbers denoting more frequent usage.

We also looked at the frequency of label usage and the respondent's health conditions. Frequency was based on the comment question: “I'd like you to think about the labels on many food products that list ingredients and provide nutrition and other information. When you buy a product for the first time, how often do you read this information?” Health condition was considered a dummy variable, in response to:

Have you ever been told by a doctor or other healthcare professional that you have any of the following health conditions? I don't need to know which condition, just whether you have ANY of them—high blood pressure, diabetes, high cholesterol, heart disease, obesity, overweight, or cancer.

Statistical analyses

All data analyses in this article were performed using SAS 9.2. To answer the first research question, we used descriptive frequencies to see whether there were any trends in NF label usage. A hierarchical cluster analysis was used to see whether the 8 food label usage questions fell into any patterns in the second question and focused on the first-level clusters.

Based on the results from the cluster analysis, the main focus variable was coded into 3 categories on the basis of the score differences between the clusters. The categories were as follows: (1) label usage style A (cluster 1-cluster 2 > 0 indicates leaning toward more frequent label usage as shopping aids); (2) label usage style B (cluster 1-cluster 2 < 0 indicates leaning toward more frequent label usage for dietary decisions); or (3) label usage style C: uses both styles equally (cluster 1-cluster 2 = 0).

An analysis of the research question on the relationships between demographic predictors and different label usage styles was conducted with adjusted odds ratios (AOR) from the multinomial logistic regression. Because the dependent variable (label usage styles) consisted of a categorical variable including 3 categories with no intrinsic ordering, the multinomial logistic model was used.

To describe overall label usage, we also created a label usage index to describe the overall label usage (ie, sum of Brand, Compare, Nutrition, Hi_Low, Much, Plan, True, Avoid). The purpose of creating this index was to address the second research question without imposing any assumptions about label usage styles.

To model the relationships between demographic predictors and overall label usage, estimates from the ordinary least squares regression (using the overall label usage as the dependent variable) were reported. The ordinary least squares regression is most appropriate here because the overall label usage is a true Interval variable.

Generalized linear models were incorporated and obtained the least squares means. Comparing with other means (arithmetic or weighted), the least squares means provide covariate-adjusted means on overall label usage for each predictor. This enables easy comparison while taking into account other effects.

To better understand the interaction effects between age and health status, we also used the nonparametric Jonckheere-Terpstra test to seek the trend for ordered differences among different categories where there is intrinsic ordering.[5] The respondents were divided into 6 groups according to their health condition and age: (1) 18 ≤ age ≤ 40, healthy; (2) 18 ≤ age ≤ 40, unhealthy; (3) 40 ≤ age ≤ 60, healthy; (4) 40 ≤ age ≤ 60, unhealthy; (5) age >60, healthy; and (6) age > 60, unhealthy. Each group was then analyzed for each of the 8 issues of food label usage. To make the household income comparable

from 1994 to 2008, cumulated income percentages (ranking income distribution in that year) were used with the income adjusted for inflation by the consumer price index of the year.

Findings

Figure 1 shows that once the effective date for compliance with the implementing regulations had passed in 1995, there were some increases in label usage for almost all purposes, compared with the numbers in 1994. About 76% of consumers reported that they "often" used the food label "to see how high or low the food is in nutrients such as calories, salt, vitamins or fat." Sixty percent reported that they "often" used the label to judge the nutritional quality of the food; 52% said that they used it "often" to compare foods. Forty-nine percent said that they used it "often" to decide which brands to buy; 48% of consumers said that they "often" used the food label to check for ingredients they wanted to avoid.

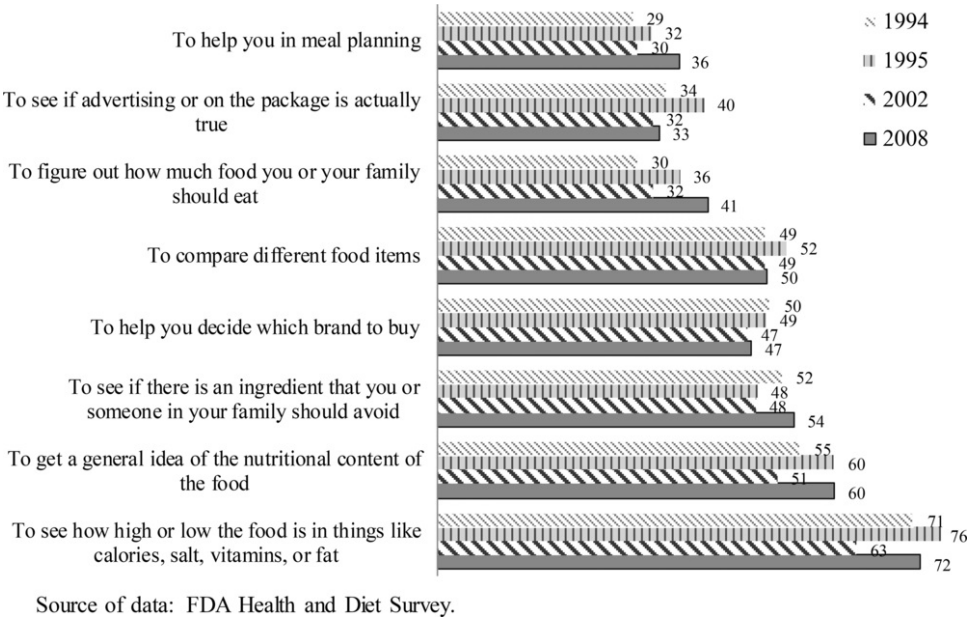

Figure 1 How consumers use food labels (percentage of those who say use "often"). From FDA Health and Diet Survey.

Source: How Do Consumers Use Nutrition Labels on Food Products in the United States?

Less-frequent uses for the food label included "to check if claims are true" (40%), "to figure out how much of the food you should eat" (36%), and "to help in meal planning" (32%). The reported label usage for these purposes decreased in 2002 and yet increased in some aspects in 2008, although the general pattern stayed the same. People reported that they used the NF labels for shopping rather than for dietary purposes.

To address research question 2, cluster analysis explored how the 8 survey questions were associated with each other. The 8 questions were grouped into 2 basic categories, which were in line with our shopping versus dietary decisions hypothesis. The first cluster included 4 items: Brand, Compare, Nutrition, and Hi_Low, which is in line with using food labels for shopping decisions. The second cluster

included the rest: Much, Plan, True, and Avoid that were consistent with the label usage for dietary purposes. Moreover, some items could be shopping decisions as well, depending on the scenario.

Based on the cluster analysis, consumers were subdivided into 3 distinct groups—using food labels mainly for shopping purposes (as shopping aids), using labels equally for both shopping and dietary purposes, and applying them mainly for dietary purposes. As shown in Table 1, the majority of respondents (about 65%) applied food labels mainly for shopping decisions, such as comparing one food or food product with another.

Slightly more than 20% examined food labels equally for both shopping and dietary decisions, and about 10% inspected food labels mainly for dietary decisions, such as for meal planning.

As for the overall label usage score, it had not changed much over the years (M = 24.6 and SD = 5.5), with the range between 8 and 32 (results not displayed). Thus, some respondents might have answered 1 (“never”) or 4 (“often”) for each of the 8 food label questions. A score of 24.6 implies that consumers on average answered 3 (“sometimes”) for all 8 questions. In terms of demographic distributions of label usage styles, consumers who were less educated, black, or Hispanic in lower-income brackets and who had health problems seemed to adopt labels for dietary purposes more frequently.

Ordinary least squares regression analysis addressed the third research question regarding significant relationships between demographic predictors and label usage styles. Regression results, presented in Table 2, had 2 dependent variables, usage style and overall usage. In terms of label usage style differences (see multinomial logistic model indicated in the first and second columns of Table 2), the odds of consumers using label information equally or more frequently for shopping decisions (eg, Brand, Compare, Nutrition, Hi_Low) than for dietary purposes (e.g., Much, Plan, True, Avoid) were higher in 1995 and 2002 than in 2008.

Table 2. Multinomial Logistic Regression and Ordinal Least Square Models for Label Usage Styles as a Function of Survey Years, Demographics, and Consumer Health Conditions

	Usage Style (N = 5982)				Overall Usage[c] (N = 5982)	
	No Difference vs for Dietary Decisions[a]		Shopping vs Dietary Decisions[b]			
	AOR[d]	*P*	AOR	*P*	Estimate[e]	*P*
Year						
1994	1.04		1.09		0.62	f
1995	1.54	g	1.46	g	0.78	f
2002	1.32	g	1.21	h	0.03	
(2008)[i]						
Gender						
(Male)						
Female	1.28	g	1.24	g	0.81	f
Education						
(Less than high school)						
High school graduate	1.06		1.13		0.27	
Some college	1.35		1.62	j	0.50	g
College graduate	1.37		1.87	f	0.60	g
Race						
(Non-Hispanic white)						
Non-Hispanic black	0.76	g	0.61		0.17	
Hispanic	0.96		0.63	j	0.93	f
Non-Hispanic others	1.03		0.84		−0.71	g
Age						
(18-29)						
30-39	1.78		1.73		0.18	
40-49	2.78	g	2.21	g	0.18	
50-59	2.45	g	1.57		0.67	f
60+	2.94	g	2.27	g	−0.15	

Abbreviation: AOR, adjusted odds ratios.

[a]Using food labels for shopping decisions includes Brand, Compare, Nutrition, and Hi_Low. See the figure for definitions.

[b]Using labels for dietary decisions includes Much, Plan, True, and Avoid.

[c]Overall usage sums up all 8 items (Brand, Diff, Nui, Colft, Much, Plan, True, and Avoid; see the Figure for definitions). Range: 8-32; Mean = 24.6; SD = 5.5.

[d]These exponentiated estimates are adjusted odds ratios; 1 indicates no association; >1 means a positive association; <1 indicates a negative association.

[e]Ordinal least square estimates: 0 indicates no association; >0 means a positive association; <0 indicates a negative association.

[f]*P* < .001.

[g]*P* < .05.

[h]*P* < .10.

[i]Reference categories are within parentheses.

[j]*P* < .01.

[k]The percentage is the ranking of the household income adjusted by current consumer price index.

Source: How Do Consumers Use Nutrition Labels on Food Products in the United States?

Female consumers were more likely than male consumers (AOR = 1.28 or 1.24, both $P < .05$) to apply food labels equally or mainly for shopping decisions, rather than for dietary purposes. Compared with whites, black respondents (12.3% of the sample) paid equal attention to label usage for dietary and shopping decisions. Hispanic consumers (6.5% of the sample) used labels for dietary purposes rather than as shopping aids.

The interaction between age and health conditions was significant in predicting label usage styles, thus, the effect of age seems to depend on health conditions. For example, being in the 40 to 49 years age group was associated with the odds of using food labels mainly for shopping decisions rather than for dietary decisions by a factor of 2.21; but for those with health issues, the effect is exp[ln (2.21) + ln(0.89)] = 1.97. This means having health issues reduced the impact of the age factor (from 2.21 to 1.97) on odds of using food labels for shopping decisions as compared with for dietary decisions. Compared with healthy consumers, the odds of using food labels equally or mainly for shopping decisions for consumers more than 60 years of age with health issues magnified by a factor of 1.29 and 1.13 correspondingly (both $P < .01$).

After controlling for the covariates in the model, NF was used more frequently around the implementation of the Nutrition Labeling and Education Act in 1994 and 1995 than it was in 2008. Females, more educated individuals (some college or greater), relatively younger older individuals (50-59 years of age), consumers with any health issue, and frequent label users (used labels sometimes or often) were all significantly more likely to apply food labels for all kinds of purposes than their counterparts (ie, males, less than high school educated, 18-29 years of age, healthy consumers, and

consumers who rarely or never used food label when buying products for the first time). The predicted overall label usage score was 0.81 points higher for females than for males, holding all other variables constant. Hispanics were more likely (unstandardized regression coefficient (*b*) = 0.94, *P* < .01) to apply food labels for all purposes and non-Hispanic others were less likely (*b* = −0.71, *P* < .01) to apply food labels for all purposes than whites.

Since age and health status are correlated, we further investigated the relationships between the 2 using the nonparametric Jonckheere-Terpstra test. As shown in Table 3, the age effect on food label use was statistically significant for Brand (*P* = .001), Much (*P* < .0001), Nutrition (*P* = .002), Hi_Low (*P* < .0001), Compare (*P* = .042), Plan (*P* = .031), and Avoid (*P* < .0001).

Table 3. Jonchheere-Terpstra Tests for the Trend Effect of Age and Health Conditionsa

Label Usage Questions	%				*P*	
	Never	Seldom	Sometimes	Often	Age	Age × Health Conditions
a. Brand	9.6	13.5	29.7	47.2	.001	.0002
b. Much	17.4	19.9	28.1	34.6	<.0001	<.0001
c. Compare	8.2	12.6	29.7	49.5	.042	ns
d. True	14.5	19.6	31.8	34.1	ns	ns
e. Nutrition	5.0	10.1	29.4	55.5	.002	.009
f. Hi_Low	3.2	7.6	20.0	69.2	<.0001	<.0001
g. Plan	19.4	20.7	28.3	31.6	.031	.002
h. Avoid	16.8	14.4	19.3	49.6	<.0001	<.0001

Abbreviation: ns, not significant.

[a]Age is coded in 5 categories: (1) 18-30, (2) 30-40, (3) 40-50, (4) 50-60, and (5) 60+; age and health interactions are coded in 6 categories: (1) 18 ≤ age ≤ 40, healthy; (2) 18 ≤ age ≤ 40, unhealthy; (3) 40≤ age ≤ 60, healthy; (4) 40 ≤ age ≤ 60, unhealthy; (5) age > 60, healthy; (6) age > 60, unhealthy.

Source: How Do Consumers Use Nutrition Labels on Food Products in the United States?

As consumers aged, they tended to pay more attention to food brands and incorporate food labels to determine nutrition information and how much to eat, and so forth. Except for comparing foods with each other, significant differences also were detected for age and health status interactions. For example, older consumers with health issues tended to use the food label more often to check for ingredients they should avoid.

Discussion

Using 4 FDA comparable surveys, we investigated exactly *how* consumers use food labels. Around the implementation of the Nutrition Labeling and Education Act, prior work[6,7] indicated that consumers paid attention to only selected information on the label and suggested a more holistic approach in using food labels among the frequent users. These authors encouraged using labels not only as a shopping aid but also as a guide for healthy eating. Guidance on healthy eating usually involves dietary decisions, such as meal planning, that can happen at the grocery store before shopping or before or during meal preparation.

On the basis of the four comparable FDA Health and Diet surveys, we found that the general pattern of how consumers use food labels has not changed much since 1994-1995. Nonetheless, there was a slight increase in label usage for dietary decisions (eg, meal planning). Prior research[6,7] suggests that this increase can be seen as a good sign, as it may indicate more careful shopping decisions. The 8 questions on how consumers use the NF in the surveys were grouped into 2 categories, which were generally in line with our label usage for shopping decisions or dietary decisions (eg, meal planning) classifications.

Other than the holistic approach (eg, using labels for both shopping and meal planning purposes) and a task-specific approach (eg, using labels mainly as shopping aids[8]), studies[9–11] on consumer purchasing

behaviors also focused on the dichotomy between in-store decision making (generally unplanned purchases) and prestore decision making (planned purchases). Planned purchases refer to decisions that were entirely determined before entering the store, and unplanned purchases are generally brought on by in-store promotions or by the unavailability of planned purchase items.[9],[12]

The 2012 Point of Purchase Advertising International report showed that 76% of purchase decisions in grocery stores were made in-store as opposed to preplanning.[10] This represents about a 10% point rise when compared with comparable numbers from the previous 3 decades (69% in 1965, 65% in 1977, and 66% in 1986). According to Shimp and Andrews,[11] in-store purchasing was rising partly due to the effect of in-store promotions and point-of-purchase stimuli. Also, consumers primarily used an in-store decision-making approach to evaluate nutrition label information by attributes (eg, brands or nutrients).

Inman et al[9] discovered that in-store, impulse purchases were most likely to happen with hedonic foods (eg, chocolate cake). Thus, the challenge appears to be in "nudging" consumers into using such information in a prestore fashion to aid in planning meals and balancing their overall diets. Certain strategies were advocated to decrease unplanned and, therefore, potentially unhealthful purchases.

For clinical nutritionists working with patients with weight management and diet-related symptoms, it is important to teach patients how to plan meals using the food label as an essential tool to increase mindful eating in nutrition therapy.[13] Furthermore, teaching patients how to read the labels correctly (eg, how to understand serving size)[14] or how to manage their total diet with NF labels may be more important than knowing whether they read food labels or not.[15]

Scholars often emphasize the importance of reading and understanding serving sizes when teaching patients proper usage of the NF.[14] Understanding and application of percent daily value (% DV) on a per serving basis has also been stressed as an important tool, especially for patients who are self-managing their clinical conditions (e.g., diabetes, hypertension). The rule of thumb is 5% and 20% as benchmarks to check whether certain ingredients are low or high. For example, the consumer education brochure on the U.S. FDA Web site talks about using "5% DV or less of sodium per serving is low; 20% DV or more of sodium per serving is high" as a general rule.[16]

The food label usage styles were associated with several demographic factors. Women, still representing the main shoppers in most households, tended to pay more attention to all types of label information. This was consistent with previous studies[17],[18] that found that females pay more attention to food labels in general than do males. The interaction between age and health issues was also significant in explaining food label usage styles in our study. Older consumers who had health issues were more attentive to avoiding foods that may be associated with a particular health issue than younger and healthier consumers.

Another factor was race/ethnicity. Compared with non-Hispanic whites, we found that Hispanics tended to use all types of label information, especially for dietary decisions. This finding was slightly different from a previous study[19] that found no differences in food label usage due to race/ethnicity.

In summary, increased usage of food labels was associated with being female, more education, and having relatively higher incomes. Schucker et al[20] found a weak association among demographic factors, such as age and income, with consumer purchasing behaviors. These differences may possibly be due to different methods and questions on food labels.

The strengths of this study rest on the use of the compiled FDA HDS from the past 2 decades to show the trends and changes in consumer food label usage. To our knowledge, the present study was the first to examine food label styles with 4 compatible national surveys. A feature of this particular study was the use of an innovative analytic approach to group how consumers use food labels.

However, the study also contains limitations. First, the HDS data are self-reported, cross-sectional survey data, which may include some response bias and are not definitive for establishing causal relationships. Second, the label usage questions may not capture all scenarios related to how people apply food label information when shopping and planning meals. The survey questions may not provide the most appropriate data for answering questions on when and where consumers consult the labels. Finally, many assumptions in classifying the label questions were made, and there may have been alternatives to classify label styles.

In conclusion, the dual rationale for nutrition labeling is reflected in our analysis (ie., consulting food labels for shopping and/or dietary decisions) with the finding that nutrition labels are being utilized mainly as shopping aids and not for dietary purposes. Government agencies should educate consumers about maintaining healthful dietary choices through smarter label interpretation and application of information. Education campaigns on food label information should target how to incorporate label usage in meal planning (eg, better understanding and usage of serving size information) for public health intervention. This should help consumers cut down on impulse purchases and help them achieve the ultimate nutritional goal of mastering a holistic perspective that links shopping, cooking, and consuming. However, the gap between using labels for shopping and for dietary purposes may not be bridged by nutrition labels alone. Innovative experimental studies are needed to further understand how to incorporate labels into the meal planning process, and whether this could be done at the point of purchase. For example, a consumer may use his or her smartphone to scan the label at the store and use his or her smartphone apps simultaneously for meal planning and healthy shopping and eating advice. Government agencies may also partner with online recipe sites frequented by consumers to teach consumers how to do meal planning.

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