Appendix A.
Review of Literature

Review of literature on nutrition labeling and restaurant point-of-purchase labeling
[Contributors to literature review: Amy Lando, Jordan Lin, Andrew Estrin, Amber Jessup, David Zorn, Clark Nardinelli]

Nutrition labeling

The Nutrition Labeling and Education Act (NLEA) (1990) gave FDA authority to require a Nutrition Facts panel on the label of most packaged foods. The Facts panel states the standardized serving size, the number of calories per serving and the amount and percent of the Daily Value (DV) per serving for specified nutrients. (The Daily Value is a reference amount for daily intake of a nutrient in a 2000 calorie diet.) Before NLEA, nutrition labeling was required only in certain instances, such as when claims were made about nutrient content.
In addition to the Nutrition Facts panel, FDA also permits specified nutrient content claims and health claims on food labels. FDA defines criteria for nutrient content claims, such as "low in fat" or "a good source of calcium". Health claims highlight a relationship between a food or nutrient and a disease or health-related condition, such as calcium intake and reduced risk of osteoporosis.

Social science research methods

Before NLEA, FDA conducted consumer research about the usefulness of potential choices for the Facts panel format. Since NLEA, a number of researchers have studied how consumers use the Facts panel, nutrient content claims, and health claims (separately and in combination) to make dietary choices. Consumer research is used to assess people's knowledge, attitudes, perceptions, and preferences for a topical subject area or reactions to any type of stimuli. Depending on the the goals of the project, research methods may include qualitative data collection, quantitative surveys or experimental studies.

- In qualitative research, open-ended questions are used to elicit unstructured consumer reactions and thoughts to different topics or stimuli. Qualitative research, including the focus group format, is useful for obtaining the range of consumer opinions about a given topic and is often conducted as a preliminary step, before quantitative surveys or experimental studies. Unlike experimental studies or quantitative surveys, results from focus groups and other qualitative studies are not generalizable to any population.
- In quantitative surveys, information is collected by structured questionnaires and the resulting data categorized by demographic and other characteristics. When the survey sample is nationally representative, the results provide population estimates and the conclusions can be generalized nationally. Nationally representative surveys can help inform policy makers, risk assessors, and health educators of the knowledge, attitudes and self-reported behavior of the U.S. public about a certain topic.
- Experimental studies test consumer response to manipulated stimuli, such as real or hypothetical food labels that vary in format or content. Each respondent is randomly assigned to an experimental group that responds to a particular type of food label. The response of each group is recorded, and differences in response across groups are attributed to the corresponding experimental conditions or labels. Experimental studies

can statistically test differences in consumers' understanding of and ability to use different label information and formats.

- Intervention studies are another type of experimental study. Intervention studies measure differences in peoples' behavior when specific conditions are varied according to an experimental design. For example, intervention studies may examine purchasing behavior in grocery stores or eating behavior in restaurants in which different types or amounts of nutrition information are presented.

Food label use

Research clearly shows that most Americans are familiar with and use the Nutrition Facts panel. In a 2002 FDA survey, 69 percent of the U.S. population reported using food labels often or sometimes when they buy a product for the first time (FDA, 2003). People reported using the food label for many reasons, most commonly to see how high or low the food is in calories and in nutrients such as fat, sodium, or certain vitamins.

Many consumers do not fully understand the information on the Facts panel, even as they use it to make dietary choices. One study suggest that percent DV information helps consumers judge the healthfulness of a food better than absolute amounts of nutrients alone (Levy, Fein, and Schucker, 1996). However, in a national survey (FMI, 1996) less than half of respondents could accurately identify the meaning of the percent DV for fat and another study found that DVs are not helpful for consumers to make correct judgments about the healthiness of a product (Barone et al, 1996)..

Some experimental food label studies have found that, when presented with nutrient content claims or health claims in the absence of the Nutrition Facts panel, consumers can be misled into thinking a product is healthier than it really is (Ford et al., Roe et al.). These misperceptions may be remedied if consumers also look at the Facts panel. For example, regardless of the fat and fiber claims on the front of packages with varying fat and fiber content, consumers who were asked to read the Facts panel could correctly identify a product as being low or high fat (Garretson and Burton). Varying the level of fiber made no difference in the consumers' perceptions of the healthfulness of the food. This suggests that fat is a more salient nutrient to consumers than is fiber. Similarly, regardless of their education level, consumers presented with the Facts panel could judge product healthfulness correctly even in the presence of an implied claim about heart health ("It Does Your Heart ♥ Good!"). However, without the Facts panel, consumers were significantly more likely to be influenced and potentially misled by health claims (Mitra et al).

In the above studies, the research subjects were specifically directed to consult the Facts panel. However, in a study that gave respondents the option to look at any part of a food package, consumers did not look at the Facts panel to verify claim information, but truncated their examination to just the claim on the front of the package (Roe, Levy and Derby). This resulted in incorrect inferences about the product healthfulness, particularly about nutrients not mentioned on the front. Although more research in this area is needed, this study provides some evidence that consumers do not customarily verify front panel information by consulting the Nutrition Facts panel.

Food label and diet

Correlations between food label use and diet have been reported in a number of studies. For example, survey respondents who used the Facts panel were more likely to consume a lower fat diet, both in the general population and among family clinic patients (Neuhouser et al, Kreuter et al). Clinic patients with health conditions such as high blood pressure and high cholesterol were more likely to look on the label for sodium and cholesterol information, respectively (Kreuter et al).

A limitation in interpreting cross-sectional surveys about label use and diet is that consumers who are concerned about their diet may be more likely to read the nutrition label. Thus, although label reading may be correlated with healthy diet practices, the cause of the healthier diet may be the concern about nutrition, not the label reading. For example, in one study that found lower total fat intake among label users than non-users, consumers with higher fat intakes were less likely to search for fat information on the label and food label use was strongly correlated with attitudes toward food labels (Lin and Lee). In another study using statistical analysis to control for different characteristics of label users and non-users, food label users had lower average percent of calories from total and saturated fat, cholesterol, and sodium than non-label users (Kim, Nayga, and Capps).

In an intervention study using grocery store shelf labels with nutrition information, the nutrition shelf labels increased the purchase of healthier alternatives in some product categories, but decreased the purchase of healthier alternatives in other product categories (Teisl and Levy). The authors suggested that consumers might use an implicit health risk "budget" to compensate for eating healthier foods in some categories where taste differences among choices were small, by eating less healthy foods in categories that had greater taste differences among choices. The ability to make such choices could be beneficial to consumers, although not leading to overall improvements in diet. The results support the idea that providing nutrient information may allow consumers to more easily switch consumption away from "unhealthy" products in those food categories where differences in other quality characteristics are relatively small.

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Restaurant labeling

In 1999, American households spent an average of $2,116 or 42 percent of their total food expenditure on food away-from-home (BLS 1999). According to the latest data, during 1994-6, away-from-home food, especially from restaurants and fast food locations, contributed 32 percent of daily intakes of energy calories, 32 percent of added sugars, and 37 percent of fat (ERS 2000). Thus, food away-from-home is an important part of American diets and more informed dietary choices away-from-home can potentially help reduce the risk of health problems such as obesity. Nutrition labeling on menus, including the use of claims and symbols, is one way to help consumers make more informed dietary choices. The effectiveness of labeling, however, depends largely on how consumers respond to the measure. Although the

NLEA does not mandate restaurant nutrition labeling, there is a body of research that has investigated consumer responses to nutrition labeling on food away-from-home.

A number of experimental studies have examined consumer behavior in cafeteria, restaurant and vending machine settings in response to nutrition information or health messages. The results of these studies are mixed; differences in results among studies may be due to differences in experimental designs, including size of sample, demographic characteristics of participants, experimental setting, length of study, type of nutrition information or health message and type of behavioral outcome studied.

In a British college cafeteria, display of calorie and nutrient content of food items on the menu board had a negative effect, resulting in higher calorie and fat intake at lunch (Aaron et al 1995). The differences were greater for males and for less restrained eaters. The authors stated that the results indicate the importance of assessing the motivational choices of potential recipients of nutrition education programs. A second study in a British sit-down restaurant with a limited menu found fewer participants selected an entrée marked as a lower fat option, although the difference was not statistically significant (Stubenitsky et al). However, those selecting the lower fat entrée had lower calorie and fat intake both from the entrée and from the complete lunch. Sensory expectations and post-meal acceptance measures were similar for the entrée in its regular or lower fat version, both when the lower fat version was labeled and when it was unlabeled.

In a cafeteria for the general public, prominent labeling of certain items as "lower caloric selections" had no effect on calories eaten or perceived calories eaten, either among restrained eaters (dieters) or unrestrained patrons (Johnson et al 1990). Restrained eaters did choose lower calorie meals, but their choices were not related to the presence of the "lower caloric selection" label. In a college cafeteria, changes in the proportion of patrons choosing items from various food groups resulted from labeling the caloric content of food items, highlighting healthier choices with a symbol, or providing tokens for monetary incentive for healthier choices (Cinciripini). Changes in food group selection with labels or tokens were different for males and females and for lean, normal or obese participants. Overall, calorie labeling decreased the selection of starchy foods and red meat items; healthier selection labeling with incentive tokens increased the selection of vegetables/soup/fruit/lowfat dairy, chicken/fish/turkey and salads and decreased the selection of high fat/dessert/sauces. In a family-style, table-service restaurant, special healthful entrees were highlighted by rotating messages: a nonspecific message, a healthfulness message and a taste plus healthfulness message (Colby et al). Sales of the healthful chicken or tuna entrees were higher when the taste plus health message was used than with the health alone message.

One recent study compared the effect of health messages and lowered prices, separately and together, on the purchase of healthy food items in a counter-service, delicatessan-style restaurant (Horgen and Brownell 2002). Price decreases alone, rather than a combination of price decreases and health messages, were associated with increased purchases of some healthy food items over a 4-month period. The authors suggested that health messages may have paradoxical effects if foods labeled as healthy are assumed to taste bad.

Restaurant patrons at a table-service restaurant for university students and staff indicated their labeling preferences among menus using an apple symbol to highlight healthy selections, menus using colored dots to highlight specific nutrition guidelines, or a leaflet listing numeric values for nutrient content (Almanza and Hsieh). Both the apple symbol and the leaflet were preferred over the colored dots, and were considered more attractive, less time-consuming and

easier to use. The apple symbol was preferred over the leaflet by women patrons and those younger or less educated. However, this study did not examine whether patron labeling preferences were related to consumption behavior. Previous FDA research has suggested that label format preference does not necessarily equate to format effectiveness (Levy, Fein, and Schucker 1992).

An experimental study, conducted by mail using a consumer household research panel of primary food shoppers, found interactions between the effects of a heart disease claim and a Nutrition Facts panel on either a package for a frozen lasagna entrée or a menu listing a lasagna entree (Kozup, Creyer, and Burton 2003). When no nutrition information was present and there was a heart disease claim on the package or menu, subjects thought that regular consumption would reduce the risks of heart disease and stroke, and the claim had a positive effect on their attitudes toward the food, its healthiness, and intention to purchase the food. Regardless of presence or absence of the heart disease claim, better nutrient content had a positive effect on perception of the food's relationship to heart disease risk as well as a positive effect on attitude toward the food, the healtfulness of the food and intention to purchase. Poorer nutrient content had corresponing negative effects. Addition of the claim to positive nutrition information further increased the perception of reduced heart disease risk, but did not increase other positive attitutes compared with nutrition information alone. Addition of the claim to negative nutrition information (inconsistent with the claim) had no effect on product evaluations and led to a negative impression of the credibility of the manufacturer or restaurant marketing the food. In a further experiment, evaluations of a menu item were affected by alternative items presented. If the nutrition information of alternative items was more favorable, then the evaluations of the item were less positive, and vice versa. This suggests that the alternative or nontarget menu items served as a reference for the target items. If the nutrition information of alternative items was present, then the positive effect of the heart disease claim was limited to perception of the food's reduction of heart disease risk.

Practical problems in restaurant labeling and obstacles to labeling as reported by large restaurant chains have been reviewed (Boger 1995, Almanza 1997). Problems include the fact that NLEA guidelines were developed for packaged foods, not restaurant food, with respect to serving sizes and criteria for health and nutrient content claims; different sized portions for lunch and dinner; variability of menu item from day to day. A suggestion for further research was whether consumers use nutrition information on packaged foods differently than in restaurants (Almanza 1997).

In summary, consumers have mixed reactions to nutrition information in cafeterias and restaurants. Both health claims and listing of nutrition information have been found to be capable of producing positive influences on consumer evaluations of menu items and the influences appear to be strongest when nutrition information about alternative menu items is absent. Although nutrition information may influence choices and attitudes, other factors may be more salient: whether the respondent is on a diet, attitudes toward nutrition, price of food, health claim vs. nutrition information, taste/perceived taste.

Restaurant references

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Restaurant studies from the Economic Research Service

An analysis of studies received from the USDA Economic Research Service (their own and others) show that eating away from home, particularly increasing consumption in fast food restaurants, is correlated with increases in BMI. Further, the per capita number of restaurants in a state was positively related to individual's BMI and the probability of being overweight. These studies are summarized in the following charts, used courtesy of USDA ERS.

Question 1 (and 4): Correlations between BMI and Consumption of Foods Away From Home (FAFH)

Author(s)	Source	Title	Data Source	Dependent Variable	Estimated Effect of FAFH-Specific	Estimated Effect of FAFH-General
Binkley, Eales, and Jekanowski	International Journal of Obesity (2000) 24, 1032-1039	"The relation between dietary change and rising US obesity"	CSFII 1994-1996	BMI	The average man who was 1.77m tall and consumed restaurant food was .9 kg heavier than those who did not eat at a restaurant. If he consumed food at FF places, he was .8 kg heavier. The average women who was 1.63m and consumed restaurant food weighed .2 kg more than a woman who did not consume FF.	For men, both fast food and restaurant consumption positively and significanlty impacted BMI. For women, only FF consumption positively and significantly impacted BMI.
Lin, Huang, and French	Submitted to the International Journal of Obesity	"Women's and Children's Body Mass Indices	1994-1996 and 1998 CSFII	BMI	All Women: a 1% increase in FAFH was associated with an 1.28 point increase in BMI. For high income women, this was associated with a 1.63 point increase in BMI	For all women, increasing the percent of meals consumed away from home significantly increased BMI. When seperating by income, effect was still significant for higher income women (>185% of poverty level). No such correlation for lower income women. No significant correlation for children either.
Chou, Grossman, and Saffer	"An Economic Analysis of Adult Obesity: Results from the behavioral risk factor surveillance system."	NBER: Working Paper 9247 http://www.nber.org/papers/w9247	1984-1999 BRFSS	Reported and Adjusted BMI	Increasing the number of restaurants was estimated to increase BMI by 1.7% and increase the probablity of being obese (PO) by 9%. Increasing the price of fast, restaurant and home food was estimated to increase BMI by .5, .2 and .35% respectively. These prices were estimated to increase the	The per capita number of restaurants in a state was positvely related to an individual's BMI and probability of being overweight. FF, Restaurant and Home Food prices were all negatively related to BMI
Kuchler and Lin	"The Influence of Individual choices and attitudes on adiposity"	International Journal of Obesity (2000) 26	CSFII 1994-1996	BMI	All respondents: a 1% increase in FAFH was associated with an .93 point increase in BMI. For women, this was associated with a 1.24 point increase. No significant increase for men	Overall, and for women, increasing the percent of meals consumed away from home significantly increased BMI.
Variyam	No title	ERS Presentation	NHANES I Follow-up study	BMI	Among the individuals who consumed <=10% of cals away-from-home, 34.2% of healthy weight became overweight over a 20-year period and 28% went from overweight t healthy weight.	Among those who consumed >10% of cals away-from-home 39.3% became overweight, and 18% went from overweight to healthy weight. (Note this was only a simple bivariate anaysis, so keep the usual caveats in mind.)

Question 2: Are Calories From Foods Purchased Away From Home More Dense?

Author(s)	Source	Title	Data Source	Note	Dependent Variable	Calories	Fat
Lin, Guthrie, and Frazao	FoodReview, Volume 24, Issue 2	"American Children's Diets Not Making the Grade"	NCFS 1987-1988 CSFII 1994-96	See Attached Chart			
Lin, Guthrie, and Frazao	ERS Service Report	"Away From Home Foods Increasingly Important to Quality of American Diet"	NCFS 1987-1988 CSFII 1994-96	See Attached Chart			
Mancino	PhD Thesis	"American's Food Choices: The Interaction of Information, Intentions, and Convenience	CSFII 1994-1996		Per Meal Caloric Intake and Per Meal Percent of Calories From Fat	Evaluated at the sample means and using the RDI, a man who ate a meal from home, a restaurant, or a fast food restaurant consumed and average of 807, 1097 and 1041 calories at that meal. A woman consumed 503, 702, and 664 calories, respectively	Evaluated at the sample means an individual who at a meal from home, a restaurant, or a fast food restaurant consumed an estimated 24, 30, and 32 percent of his or her calories from fat
Variyam	In the works	Are Nutrition Labels Effective	CSFII 1994-1996			After adjusting for other factors, at-home food is between 360 to 540 calories/kg less dense than FAFH	

Comparison of Total Calories and Caloric Density of Foods Prepared At Home and Food Prepared Away From Home

	1987-1988						1995					
	Average Intake	Benchmark	At Home	Away From Home	Restaurant	Fast-Food	Average Intake	Benchmark	At Home	Away From Home	Restaurant	Fast-Food
Calories	1876	*	1369.48	506.52	93.8	93.8	2043	*	1348.38	694.62	163.44	245.16
Percent of Calories From Fat	37	30	36.3	38.7	41.3	39.7	33.6	37	30	37.6	40.1	39.3
Percent of Calories from Saturated Fat	13.8	10	13.5	14.7	15.5	15.4	11.5	10	10.9	12.8	12.5	13.8
Milligrams of Cholesterol per 1000 calories	286	166	161	151	215	138	268	147	129	134	176	124
Milligrams of Sodium per 1000 calories	1672	1328	1678	1656	1824	1575	1637	1175	1630	1651	1873	1674
Grams of Fiber per 1,000 calories	7	10.7	7.5	5.8	5.8	5	7.4	10.4	8.1	6.1	6.2	5.6

Sample: Non pregnant, non-lactating individuals over the age of 2

Source: Lin, Guthrie, and Frazao 1999

	1987-1988						1994-1996					
	Average Intake	Benchmark	At Home	Away From Home	Restaurant	Fast-Food	Average Intake	Benchmark	At Home	Away From Home	Restaurant	Fast-Food
Percent of Total Calories			80	20	11	2	*	*	68	32	4	10
Percent of Calories From Fat	35.93	30	35.2	38	40.5	38.8	32.99	30	31.6	36.1	38.1	36.3
Percent of Calories from Saturated Fat	13.39	10	13	14.5	15.2	15.2	12.01	10	11.5	13.2	12.5	13.6
Milligrams of Cholesterol per 1000 calories	143	170	149	129	176	125	115	153	118	106	142	101
Milligrams of Sodium per 1000 calories	1616	1363	1637	1561	1674	1484	1575	1222	1570	1588	1721	1621
Grams of Fiber per 1,000 calories	6.4	8.2	6.6	6.2	5.2	4.9	6.7	7.3	6.9	6.2	6.2	5.6

Sample:Children aged 2-17

Source: Lin, Guthrie, and Frazao 2001

Appendix B.
Sample Annotated Bibliography Entries

Authors: [illegible]
Date: June 2000
Title: The Effect of Food Label Use on Nutrient Intakes: An Endogenous Switching Regression Analysis
Citation: *Journal of Agricultural and Resource Economics* 25(1): 215-235.
Relevance: [illegible]

Focus

Kim et al. (2000) look at the impact that use of nutrition labeling has on five nutrient intakes (calories from total fat, calories from saturated fat, cholesterol, dietary fiber, and sodium). They use data from the 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS). They control for self-selection to use labels with an endogenous switching regression model. Use of the endogenous switching regression model allows them to also look at factors that influence label usage.

Data

As noted, the data comes from the 1994- 1996 CSFII and DHKS. They use observations on 5,203 individuals that completed both the day-1 and day-2 surveys and that had complete data otherwise. No indication is given of the sample size relative to the total sample.

In forming the variable that measures label use, they convert a four-point scale to a binary yes/no variable. Respondents were asked about their frequency of label use for each of the five nutrients studied in the analysis. They were given four response options: "often," "sometimes," "rarely," and "never." Kim et al. convert "often," "sometimes," and "rarely" responses into "yes" answers and "never" responses into "no" answers. This differs from the mapping used by Guthrie et al. (1995).

Statistical Methodology

The switching regression framework employed by Kim et al. is a standard application of this method. Maddala (1983, Section 8.3) provides a treatment of this method. In brief, the model involves estimating separate regressions for label users and non-users for each of the five nutrients. A third equation that uses the label use decision as a dependent variable is also estimated. The three equations (nutrient intake for label users, nutrient intake for label non-users, and the decision to use labels) are not independent and have non-zero correlations across the error terms. The system is estimated using full information maximum likelihood.

To estimate the impact that food labels have on nutrient intakes, Kim et al. follow a standard method employed in switching regression models. First, they calculate the predicted values for nutrient intakes for label users. This is done for each nutrient using the label user equation. Next,

they calculate the predicted values of nutrient intakes for label users using the label non-users' equation. That is, they take the label users and generate predicted values for nutrient intakes using the label non-users equation. The difference in the mean values of these predicted values represents the impact of label use on nutrient intake.

Results

The results of their statistical analyses indicate that label use has beneficial impacts for each nutrient. The use of labels is associated with:[28]

- A 16.1 percent decrease in the intake of calories from fat;
- A 15.1 percent decrease in the intake of calories from saturated fat;
- A 21.0 percent decrease in the intake of cholesterol;
- An 87.1 percent increase in the intake of dietary fiber; and
- A 0.9 percent decrease in the intake of sodium.

None of the estimated impacts were judged for their statistical significance, even though this is possible in a switching regression model.

Kim et al.'s analysis also look at the factors that influence label use. They find that income, education, a good knowledge of diet-health issues, being on a special diet, exercising regularly, and being the family meal planner are all positively associated with label use. Factors that are negatively associated with label use include: household size, age, being male, living in a non-metropolitan area, using food stamps, and being a smoker.

Relation to CFSAN Study

This study is **highly relevant** for the CFSAN study.

- The study focuses on the same issues that the CFSAN study will look at: how does use of labels affect nutrient intakes and what factors influence use of labels.
- The study uses the same data that will be used in the CFSAN analysis.
- We anticipate use of a similar method as is used in this analysis.

Comments

- The study looks at five nutrient intakes, which are likely to be related to one another. The method, however, does not attempt to account for any cross-equation relationships. We suggest that a seemingly unrelated regression (SUR) framework be investigated for use in combination with this method to capture cross-equation relationships.
- The use of a binary variable for label use may be too simplistic. We expect that more than three categories can be specified: "always uses labels," "sometimes or rarely uses labels,"

[28] Estimated percentages reflect our conversion of results reported in Table 5 of the paper to percentage numbers. In calculating these, we divided the "Before Using Nutrition Label" column by the "Net Change" column for the "Average Nutrient Intakes."

and "never uses labels." This would complicate the switching regression framework, but not to an unmanageable degree. This would also allow CFSAN to look at how influencing consumers that are "never" users to become "sometimes" users would affect nutrient intakes. Additionally, CFSAN could look at how influencing "sometimes" users to become "always" users would affect nutrient intakes.

- The statistical method does not appear to account for sampling weights.
- Restricting to respondents that are in both the day-1 and day-2 survey may result in sample selection that is uncontrolled by the switching regression framework.

Closely Related

Guthrie et al., 1995

Authors: Guthrie, Joanne F., Jonathan J. Fox, Linda E. Cleveland, and Susan Welsh
Date: July-August 1995
Title: Who Uses Nutrition Labeling, and What Effects Does Label Use Have on Diet Quality?
Citation: *Journal of Nutrition Education* 27(4): 163-172
Relevance: HIGH

Focus

Guthrie et al. (1995) look at the impact of the use of food labels on the intake of 26 food components (e.g., protein, total dietary fat, etc.). They use data from the 1989 Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS). They control for self-selection to use labels with Heckman's self-selection model. As part of their analysis, they also examine factors that influence the use of food labels.

Data

The study uses data from the 1989 CSFII and DHKS. Their sample consists of 1,901 individuals that responded to the DHKS portion of the survey. The 1989 CSFII was designed to collect three days of food consumption data from respondents. The first day was (day-1) was collected using the 24-hour recall method (i.e., "What did you eat in the last 24 hours?"). The second and third day data were collected through a 2-day food record. Guthrie et al. only use the day-1 data in this study. They note that 1,548 respondents (of the 1,901 that completed the DHKS) submitted a full three days of food consumption data. Their reason for using the day-1 data only is to maintain sample size.

The study uses sampling weights in the statistical analysis, when appropriate. The sample design for the CSFII/DHKS calls for over-sampling of low-income households. Thus, the use of sampling weights in the analysis controls for the survey design.

In forming the variable that measures label use, Guthrie et al. convert a four-point scale into a binary yes/no variable. Respondents were asked about their frequency of label use for each of the five nutrients studied in the analysis. They were given four response options: "often," "sometimes," "rarely," and "never." Guthrie et al. convert "often" and "sometimes" responses into "yes" answers and "rarely" and "never" responses into "no" answers. This differs from the mapping used by Kim et al. (2000).

Statistical Methodology

The authors follow Heckman's standard model of self-selection to generate the coefficient estimates. In their analysis, individuals self-select to use nutrition labels. They first estimate a probit model for label use and then calculate the inverse mills ratio for each individual in the data. The inverse mills ratio is then added to the regression models that use the 26 food components as dependent variables. They estimate only one label-use equation rather than one for each food component. This differs from the Kim et al. (2000) study, where a separate label use equation was estimated for each of the five nutrient intakes investigated.

The basic regression equation for the food components regresses the amount of the food component on a set of explanatory variables that includes a zero-one binary variable for label use. The addition of the inverse mills ratio to the equation controls for self-selection to use labels.

One interesting aspect of this study is its use of principal components analysis (PCA) to pare down the number of variables that reflect individuals' "attitudes and values" that guide them in making food choices. The DHKS asks a number of questions regarding the individuals' preferences for either avoiding or ensuring the consumption of various food components. Inclusion of all of these variables in a regression framework would lead to significant multicollinearity. Using PCA, the authors are able to reduce the number of variables that reflect food choice values to two factors, thereby overcoming the multicollinearity problem.

Results

In the article, the authors only present the estimated coefficient for the zero-one binary variable for label use and the coefficient for the inverse mills ratio rather than the full regression model results (26 equations). For the 26 equations, only two show a significant impact of label use: higher intake of Vitamin C and lower intake of cholesterol. Additionally, self-selection only appears to be an issue for Vitamin C and cholesterol intakes.

Relation to CFSAN Study

This study is **highly relevant** for the CFSAN study.

- The study focuses on the same issues that the CFSAN study will look at: how does use of labels affect nutrient intakes and what factors influence use of labels.
- The study uses the same, but earlier, data that will be used in the CFSAN analysis.
- We anticipate use of a similar method as is used in this analysis.

Comments

- The study looks at 26 nutrient intakes, which are likely to be related to one another. The method does not attempt to account for any cross-equation relationships. We suggest that a seemingly unrelated regression (SUR) framework be investigated for use in combination with this method to capture cross-equation relationships.
- The use of 26 nutrient intakes is very broad. It appears that this restricts what they can say on any one nutrient intake.
- The study's use of a binary variable for label use may be too simplistic. We expect that three categories can be specified: "always uses labels," "sometimes or rarely uses labels," and "never uses labels."
- Restricting the sample to the day-1 data only may influence the results to an unknown degree. The use of day-1 data only was based on maintaining sample size. Restricting the sample to individuals with three days of data may also result in bias, however. Nevertheless, it may be possible to develop a panel analysis (individuals over days) that accounts for sample attrition (i.e., individuals that do not provide day-2 or day-3 data). This would expand the nutrient intake data.
- The results are not convincing that labels influence diet. Only two of the 26 food components, or eight percent of the regressions, have a significant coefficient for label use. At a five percent level of significance we can expect to be "wrong" about a statistical inference five percent of the time. This set of results comes close to that critical cut-off. More convincing results would involve a significant coefficient in one-third or more of the regressions.
- Not providing the full regression results limits our ability to fully assess this study. It would be interesting to see the signs and significance of all other variables included in the analysis.

Closely Related

Kim et al. (2000)

C. Sample Pages from Spreadsheet of Restaurant Web Sites

Restaurant number	Name	description	Website	Nutrition info available online		
				interactive	pdf or html	"light" but no nutritional info
1	McDonald's	Fast Food	http://www.mcdonalds.com/countries	yes	yes	no
2	KFC	Fast Food	http://www.yum.com/nutrition/menu.a	yes	yes	no
3	Pizza Hut	Casual Dining	http://www.yum.com/nutrition/docume	yes	yes	no
4	Taco Bell	Fast Food	http://www.yum.com/nutrition/menu.a	yes	yes	no
5	A&W	Fast Food	http://www.yum.com/nutrition/menu.a	yes	yes	no
6	Long John Silver	Fast Food	http://www.yum.com/nutrition/menu.a	yes	yes	no
7	Au Bon Pain	Fast Food	http://www.aubonpain.com/	yes	yes	no
8	RED LOBSTER	Casual Dining	http://www.redlobster.com/homeflash	no	no	no
9	Olive Garden	Casual Dining	http://www.olivegarden.com/ourmenu	no	yes	no
10	Bahama Breeze	Casual Dining	http://www.bahamabreeze.com/food.	no	no	no
11	Smokey Bones Bar-b-q	Casual Dining	http://www.smokeybones.com/menu/	no	no	no
12	Starbucks	Coffee shop	http://www.starbucks.com/retail/nutri	yes	no	no
13	Chili's Grill & Bar	Casual Dining	http://www.chilis.com/menu/default.a	no	yes	no
14	Romano's Macaroni Grill	Casual Dining	http://www.macaronigrill.com/menu/d	no	no	no
15	On The Border Mexican	Casual Dining	http://www.ontheborder.com/menu/de	no	no	no
16	Maggiano's Little Italy	Casual Dining	http://www.maggianos.com/menu/de	no	no	no
17	Corner Bakery Cafe,	Fast Food	http://www.cornerbakery.com/default	no	no	no
18	Cozymels Coastal Mexic	Casual Dining	http://www.cozymels.com/menu/defa	no	no	no
19	Big Bowl Asian Kitchen	Casual Dining	http://www.bigbowl.com/menu/BIGBO	no	no	no
20	Rockfish Seafood Grill.	Casual Dining	http://www.rockfishseafood.com/	no	no	no
21	Wendy's	Fast Food	http://www.wendys.com/food/index.js	yes	yes	no
22	Sbarro	Fast Food	http://www.sbarro.com/	no	no	no
23	Krispy Kreme	Coffee and Doughr	http://www.krispykreme.com/nutri.pd	no	yes	no
24	Outback Steakhouse	Casual Dining	http://www.outback.com/menu/menu	no	no	no
25	Flemings Steak House	Casual Dining	http://www.flemingssteakhouse.com/	no	no	no
26	Roy's	Upscale	http://www.roysrestaurant.com/docs/	no	no	no

Restaurant number	Name	Nutrition info available in restaurant *						nutrition info coverage		Notes
		menu board	menu	tray	napkin	brochure	other	all items	info on partial or targeted items	
1	McDonald's					yes			yes	nutritional info for most popular items, food exchanges and recommendations
2	KFC							yes	yes	Additional healthier options menu
3	Pizza Hut							yes	yes	Info on healthier choices
4	Taco Bell							yes	yes	Additional info on Fresco or lower cal foods
5	A&W							yes	yes	Info on healthier choices
6	Long John Silver							yes	yes	Lower calorie suggestions--leave out the sour cream or tartar sauce, etc.
7	Au Bon Pain							yes	yes	Interactive Menu, lots of info and special nutrition info.
8	RED LOBSTER									Online menu with no nutrition info
9	Olive Garden		yes						yes	nutrition info on "Garden Fare" foods only.
10	Bahama Breeze									Online menu with no nutrition info
11	Smokey Bones Bar-b-q									Online menu with no nutrition info
12	Starbucks					maybe				
13	Chili's Grill & Bar		yes						yes	Guiltless Grill menu (in restaurant has fat but no calorie info)
14	Romano's Macaroni Grill									Online menu with no nutrition info
15	On The Border Mexican (									Online menu with no nutrition info
16	Maggiano's Little Italy									Online menu with no nutrition info
17	Corner Bakery Cafe,									Online menu with no nutrition info
18	Cozymels Coastal Mexic									Online menu with no nutrition info
19	Big Bowl Asian Kitchen									Online menu with no nutrition info
20	Rockfish Seafood Grill.									Online menu with no nutrition info
21	Wendy's					maybe		yes	yes	Interactive Menu, lots of info and special nutrition info.
22	Sbarro									Under construction -menu not available
23	Krispy Kreme									Hard to find nutrition page. Uses packaged food format for nutrition info
24	Outback Steakhouse									
25	Flemings Steak House									Online menu with no nutrition info
26	Roy's									Online menu with no nutrition info

APPENDIX H – Developing Effective Consumer Messages

Effective consumer health messages about weight management and obesity prevention should be research-based and take into account the values, beliefs, motivations, needs and behaviors that comprise the "consumer reality" of the target audience. It is important that these messages be clear, simple, and understandable and do not undermine the credibility and impact of public health agencies.

There are six key questions to consider when developing research-based messages that encourage knowledge utilization:

1. What is the purpose?
2. Who is the target?
3. What is the promise (i.e., motivators)?
4. What is the support?
5. What is the image?
6. Where are the best opportunities for delivering the messages?

In determining the target audience(s) for research-based messages, it is important to consider that communication theory holds that more direct, population subgroup-focused messages typically have greater impact than messages that address a wider audience (e.g., the general public). At the same time, overweight and obesity have been identified as a national health problem, so it seems important to develop focused messages that affect large population subgroups.

Among private sector organizations, IFIC has been prominent in recent efforts to develop effective nutritional messages. IFIC uses a five-part system (Borra *et al.*, 2003):

1. Defining the relevant issues
2. Developing the initial message(s)
3. Examining candidate messages in focus groups
4. Refining the messages
5. Validating the messages in quantitative surveys

IFIC has drawn a number of conclusions from its efforts, many of which are supported by other researchers (Marietta *et al.*, 1999; Kennedy and Davis, 2000; Borra *et al.*, 2001; Patterson *et al.*, 2001; Balasubramanian and Cole, 2002; Ikeda *et al.*, 2002; Gans *et al.*, 2002; Borra *et al.*, 2003; Gans *et al.*, 2003; IFIC 2003):

1. Consumers will not react positively to messages unless the messages set forth concrete goals that consumers view as achievable.
2. Consumers perceive general nutrition guidelines as too abstract and requiring too much planning and calculation to translate into action.

3. Consumers are receptive to messages that make direct, concrete suggestions and therefore provide tools with which consumers may exercise choice. Consumers resist being told what they must do.
4. Goals should be incremental rather than monolithic so that consumers can receive continuous positive feedback. Concrete and incremental goals sustain and reinforce consumers' desire for autonomy. Equally important is that setting and achieving incremental goals provides more opportunities for reinforcement (both self and external), which is important for sustaining positive behaviors. Consumers view monolithic goals as unrealistic because they would have to make substantial changes in diet and habits.
5. Overemphasis on one or a few nutritional components of a diet may impede the overall goal of achieving a healthy, varied diet.
6. Health and nutrition messages should be developed with an awareness of the varied cultural backgrounds found among the American public; different ethnic and cultural groups exhibit different dietary patterns and practices.

In qualitative studies, consumers claim they do not wish to spend a significant amount of time reading and comprehending labels. This is borne out by the fact that many use health or nutrient content claims as indicators as to the overall quality of the product and do not check the nutrition facts panel on the back (Roe, *et al.*, 1999). Also, consumers appear to be confused by serving sizes, particularly by multiple servings listed on small packages, as well as by the %DV listed in the nutrition facts panel. Consumers use food labels for multiple reasons, including diet plans and pre-existing health conditions such as diabetes and heart disease, and look for macronutrients of concern. On the other hand, taste, convenience, price, mood and family preferences influence purchases and are often at odds with healthy eating. Such factors present challenges for developing effective messages.

Other findings indicate that adults do not like "diets" and do not believe they work over the long term (Borra *et al.*, 2003). They also question whether there is any new nutrition information that they will find useful. Also, the qualitative studies found that encouraging parents and children to work together resonated, as did messages promoting better appearance[29] and self-esteem. Consumers need to hear new kinds of information, or a re-packaging of old information in new and relevant ways, that will serve as "motivation to jumpstart new thinking and behaviors."

[29] At this time, FDA does not intend to use "better appearance" as a motivator for any of its obesity messages, given the larger concern about the effect such a focus may have on those with eating disorders (e.g., anorexia and bulimia).

APPENDIX I – Power of Choice

Power of Choice

The Power of Choice is an after-school program developed jointly by FDA and USDA's Food and Nutrition Service. The materials guide pre-teens toward a healthier lifestyle by motivating and empowering them to make smarter food and physical activity choices in real-life settings. A Leader's Guide, containing ten sequenced interactive sessions engage adolescents in fun activities that develop skills and encourage personal development related to choosing foods wisely, preparing foods safely, and reducing sedentary behaviors. Most activities require little or no pre-planning and are simple to do. The Leader's Guide also includes easy snack recipes, 170 Nutrition Facts cards, and posters on four key topics, and a computer disk provides supplemental activities to each of the 10 sessions, a self-training video for the leader, community support suggestions, and much more.

Current status: Currently, the Power of Choice is being distributed either in hard copy or it can be downloaded on the Team Nutrition Web site, USDA' Food and Nutrition service (http://www.fns.usda.gov/tn/Resources/power_of_choice.html). Of the original 15,000 copies published, less than 4,000 copies remain for free distribution to those belonging to USDA's Child Nutrition Programs (includes schools). Response from users has been virtually unanimously positive: "One of the best government products I've seen in a long time"; "I love this material. Please send me more"; "I think it's great! Exciting!! I've been needing something like this—thank you for doing such a great job".