

# Use of Nutritional Information in Canada: National Trends between 2004 and 2008

Samantha Goodman, BA<sup>1</sup>; David Hammond, PhD<sup>1</sup>; Francy Pillo-Blocka, RD, FDC<sup>2</sup>; Theresa Glanville, PhD, PDT<sup>2</sup>; Richard Jenkins, PhD<sup>3</sup>

## ABSTRACT

**Objective:** To examine longitudinal trends in use of nutrition information among Canadians.

**Design:** Population-based telephone and Internet surveys.

**Setting and Participants:** Representative samples of Canadian adults recruited with random-digit dialing sampling in 2004 (n = 2,405) and 2006 (n = 2,014) and an online commercial panel in 2008 (n = 2,001).

**Main Outcome Measures:** Sociodemographic predictors of label use, use of nutrition information sources, and nutrient content information.

**Analysis:** Linear and logistic regression models to examine predictors and changes over time.

**Results:** Food product labels were the most common source of nutritional information in 2008 (67%), followed by the Internet (51%) and magazines/newspapers (43%). The Internet was the only source to significantly increase during the study period (odds ratio = 1.39;  $P < .001$ ); however, the frequency of reading food product labels increased since 2004. Food selection based on *trans* fat increased significantly in 2006 (odds ratio = 1.43;  $P < .001$ ) after mandatory labeling of *trans* fat on packaged foods. Taste and nutrition were consistently the primary factors guiding food choice.

**Conclusions and Implications:** Food product labels and the Internet are nutrition information sources with broad reach. More comprehensive labeling regulations were associated with increased use of labels and nutrient information over time.

**Key Words:** nutritional surveys, nutrition labeling, product labeling, nutrition information sources (*J Nutr Educ Behav.* 2011;43:356-365.)

## INTRODUCTION

The prevalence of obesity in Canada and other industrialized nations is a leading threat to public health. Recent estimates indicate that 61% of adult Canadians and more than a quarter of Canadian children and youth are either overweight or obese.<sup>1</sup> It has been suggested that more than \$6.0 billion, or 4% of health expenditures in Canada, is attributable to overweight and obesity.<sup>2</sup> Obesity is a primary risk factor for a range of chronic diseases, including type 2 diabetes, cardiovascular disease, osteoarthritis, and several types of cancer.<sup>3,4</sup> Diet is estimated to account for

approximately 30% of cancers in industrialized countries, second only to cigarette smoking as the largest modifiable risk factor for cancer.<sup>5</sup>

Promoting healthful eating through public education remains a primary objective of nutrition policy.<sup>6</sup> Despite increases in the number and scope of media channels<sup>7</sup> and educational interventions, relatively few studies have examined the use of nutrition information sources at the population level. A recent Canadian study found that magazines, books, the Internet, and food labels were the most frequent sources of nutritional information.<sup>8</sup> Canadians reported dietitians, physicians, books,

and the government as the most credible nutrition information sources.<sup>8</sup> The use of specific nutrition information sources has also been found to vary according to education level: a US study reported that individuals with less education relied significantly more on physicians, television, and neighbors as sources of nutrition information compared with those with higher levels of education.<sup>9</sup>

Nutritional labels on prepackaged food products are unique among educational interventions for their broad reach and frequency of exposure. The Canadian government introduced mandatory nutrition labels on prepackaged food products in 2003, with an implementation date of December 2007 for smaller manufacturers.<sup>10</sup> Product labels are a prominent source of nutrition information for many consumers; especially those pursuing a healthful diet,<sup>11,12</sup> women,<sup>13,14</sup> individuals with high levels of education and greater income,<sup>15,16</sup> and younger adults.<sup>14</sup> Label use has been associated with greater nutritional knowledge<sup>12,16</sup>

<sup>1</sup>Department of Health Studies, University of Waterloo, Waterloo, Ontario, Canada

<sup>2</sup>The Canadian Council of Food and Nutrition, Mississauga, Ontario, Canada

<sup>3</sup>Jenkins Research Inc, Ottawa, Ontario, Canada

Address for correspondence: David Hammond, PhD, Department of Health Studies and Gerontology, University of Waterloo, 200 University Ave West, Waterloo, Ontario, N2L 3G1, Canada; Phone: (519) 888-4567 ext 36462; Fax: (519) 886-6424; E-mail: dhammond@uwaterloo.ca

©2011 SOCIETY FOR NUTRITION EDUCATION

doi:10.1016/j.jneb.2011.02.008

and healthier eating habits.<sup>16,17</sup> Nutrition labeling regulations have also been linked to improvements in the nutritional content of foods by manufacturers. For example, the *trans* fat content of prepackaged products in Canada decreased after the addition of *trans* fat to the mandatory list of nutrient information disclosed on product labels in 2005.<sup>18</sup>

To date, few studies have tracked trends in use of nutrition labels or other sources of nutrition information over time. The current study had 2 primary objectives: (1) to track trends in nutritional sources, label use, factors guiding food choice, and nutrient content information sought by consumers over time; and (2) to examine sociodemographic predictors of these outcomes. The study sought to characterize trends in nutrition information and the use of product labels, using data from 3 national surveys conducted with Canadian adults in 2004, 2006, and 2008.

## METHODS

### Survey Design

Data from the current study are from the Tracking Nutrition Trends (TNT) survey, conducted on behalf of the Canadian Council of Food and Nutrition. The TNT surveys were conducted with national samples of Canadian adults to track national trends in nutrition knowledge, attitudes, and behaviors. To date, 7 waves of the TNT survey have been conducted, beginning in 1989.<sup>19</sup> The current study reports data from the last 3 waves of the survey (2004, 2006, and 2008). The original data sets for the first 4 survey waves were unavailable for analysis, and a number of core measures were either absent or asked using a different format in these surveys.

The fieldwork and data processing and analysis for all 3 waves of the survey were conducted in-house by TNS Canadian Facts.<sup>20</sup> The 2004 (n = 2,405) and 2006 (n = 2,014) surveys were conducted by telephone in February to March 2004 and May to June 2006, respectively. The data were weighted to be nationally representative of the Canadian population aged 18 years and older according to

age, sex, and region using estimates from the 2001 Canadian Census. The original samples were drawn with a plus-digit, random-digit dialing process to select the household.<sup>20</sup>

The 2008 survey (n = 2,001) was completed in May 2008 with an online commercial panel. The sample for this survey was randomly drawn from the TNS Canadian Facts proprietary consumer panel. The TNS panel includes more than 95,000 Canadian respondents with a cross-section of sociodemographic characteristics. The sample was drawn to be representative of the Canadian population aged 18 years and older according to age, within sex and region, using estimates from the 2006 Canadian Census. A total of 9,012 invitations were sent and 2,001 eligible surveys were completed. Data were weighted to account for minor discrepancies between the sampling plan and profile of completed respondents. Ethics approval was granted by the Office of Research Ethics at the University of Waterloo.

### Measures

**Sociodemographic measures.** Sociodemographic measures included sex (male/female), age (18-24, 25-34, 35-44, 45-54, 55-64, and  $\geq$  65 years), household income before taxes (below \$35,000; \$35,000-59,000; \$60,000 and above; not stated), education (high school or less; any college [ie, technical or vocational postsecondary education]; university), presence of children in the home (no/yes), dieter (defined as having tried a popular diet in the past year) (no/yes) and being the primary household meal planner (0 = no; 1 = yes; 2 = shared equally).

**Sources of nutrition information.** Participants were presented with a randomized list of 11 possible nutrition information sources and were asked to indicate whether they personally sought information on food and nutrition from each source in the past year (0 = no; 1 = yes). The 11 sources included family physician/health professional, dietitian, magazines, newspapers or books, government materials, food company materials/advertisements, radio/TV programs, food product labels, friends/relatives/colleagues, fitness/weight loss

programs, health association materials, and the Internet. The 2008 survey also asked participants to rate the credibility of each of these sources on a 5-point scale (1 = not at all credible and 5 = extremely credible).

**Frequency of nutrition label use.** Frequency of label use was measured with the question, "Thinking specifically about labels on the various food product labels you buy (other than the brand name or flavor), how often do you read the labels?" (1 = never, 2 = only the first time I buy a product, 3 = sometimes, 4 = usually, 5 = always).

**Perceived nutrition knowledge.** Participants' self-rated knowledge about nutrition was measured through the question, "How knowledgeable would you say you are about nutrition?" and scored on a 4-point scale (1 = not at all knowledgeable and 4 = very knowledgeable).

**Factors guiding food selection.** Factors guiding consumer food choice were examined with the question, "How important are each of the following factors when choosing the food you eat?" Participants rated the importance of each of 4 factors (taste, nutrition, convenience or ease of preparation, and cost) on a 4-point scale (1 = not at all important and 4 = very important).

**Nutrient content.** The extent to which participants selected foods according to specific nutrients was measured with the question, "How often, if ever, do you select foods that you eat based on the amount of a specific nutrient that the food contains?" Participants indicated the frequency by which they chose foods according to a randomized list of 13 nutrients on a 4-point scale (1 = often and 4 = never).

### Analysis

Comparisons of point estimates across survey waves were analyzed with  $\chi^2$  tests for proportions and analysis of variance for means. Multivariate tests were conducted with logistic and linear regression analyses to

examine sociodemographic predictors and to take into account differences in the sample profile across waves. Regression models were conducted for 4 primary outcomes: (1) sources of nutrition information (0 = no versus 1 = yes), (2) frequency of label use (1 = never to 5 = always), (3) factors guiding food choice (1 = very important versus 0 = other), and (4) food selection based on specific nutrient contents (1 = sometimes or often versus 0 = other). The analyses were conducted in 2 steps: in step 1, the unadjusted model included only survey year as a predictor variable; in step 2, the following sociodemographic predictors were added to the adjusted model: sex, age, income, education, presence of children in the home, having tried a popular diet, and being the primary meal planner. Odds ratios (ORs) and confidence intervals (CIs) were examined for significant differences ( $P < .05$ ). Visual inspection of histograms for variables included in the linear regression model (ie, frequency of reading food product labels) indicated that the data were reasonably normally distributed. All data shown are weighted and estimates from the adjusted model are presented unless otherwise stated.

## RESULTS

The total study sample consisted of 6,420 Canadian adults aged 18 years and older. Table 1 shows the sample characteristics by survey year. Overall, the sample contained relatively equal numbers of individuals with different educational backgrounds and income levels. However, there were more female than male respondents in every survey year (Table 1).

### Sources of Nutrition Information

Participants indicated whether they had obtained information on food and nutrition from each of 11 sources in the past year. Figure 1 indicates the sources of nutrition information used by Canadian adults in 2004, 2006, and 2008. As Figure 1 shows, food product labels were the most common source of nutrition information in all survey years (used by 76%, 77%, and 67% of participants in 2004, 2006,

**Table 1.** Sociodemographic Data for Canadian Adults Participating in the Tracking Nutrition Trends Survey, by Survey Year (n = 6,420; Unweighted Data)

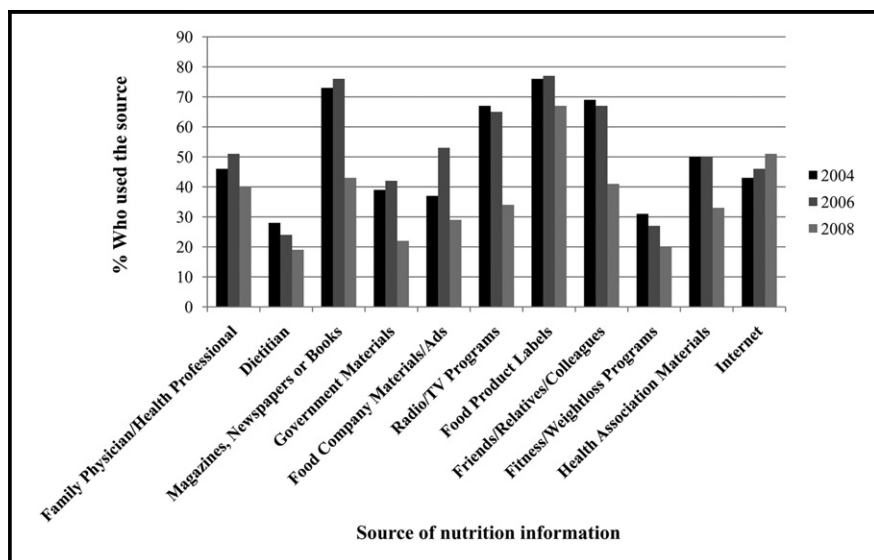
	Percentage		
	2004 (n = 2,405)	2006 (n = 2,014)	2008 (n = 2,001)
Sex			
Male	35	33	44
Female	66	67	56
Age, y			
18–24	13	10	5
25–34	18	17	16
35–44	23	21	17
45–54	19	20	25
55–64	13	15	25
≥ 65	14	17	13
Education			
High school or less	39	36	36
Any college	28	28	36
University degree	33	36	28
Household Income			
Not stated	21	20	0
< \$35,000	22	20	34
\$35,000–\$59,000	27	24	27
≥ \$60,000	30	36	39
Children in the home			
No/not stated	66	67	70
Yes	34	33	30
Primary meal planner			
No	21	17	15
Yes	72	73	61
Shared equally	7	9	24
Dieter			
Yes	9	9	10

and 2008, respectively). Although magazines, newspapers, and books were the second most common source in 2004 and 2006 (used by 73% and 76% of respondents, respectively), they were used by only 43% of individuals in 2008. The Internet was the second most common source of nutritional information in the 2008 survey.

Logistic regression models were conducted to examine changes in the use of each information source across survey waves, as well as sociodemographic predictors of use. The use of every nutritional source significantly decreased from 2004 to 2008, with the exception of the Internet, which increased significantly from 2004 to 2008 (OR = 1.39; 95% CI = 1.22–1.58;  $P < .001$ ). As shown in Table 2, logistic regression analyses indicated that women were significantly more likely than men to seek nutri-

tional information from 8 of the 11 information sources. The association between age and information sources varied, depending on the source: older participants were significantly more likely to report receiving information from family physicians or a health professional, a dietitian, food product labels, and health association materials, whereas younger participants were more likely to report receiving information from acquaintances, fitness or weight loss programs, or the Internet.

As indicated in Table 2, there was a consistent association between higher income and greater use of all sources, with the exception of information from a dietitian, acquaintances, and health association materials. The influence of education level was more mixed: individuals with a college or university education



**Figure 1.** Nutrition information sources among Canadian adults, presented by survey year ( $n = 6,235$ ).

were significantly more likely than those with a high school education or less to get information from magazines, newspapers or books, government materials, food product labels, acquaintances, fitness or weight loss programs, health association materials, and the Internet. However, highly educated individuals were less likely to get information from a family physician or health professional or from food company materials or advertisements.

As Table 2 shows, primary meal planners were significantly more likely to seek information from a dietitian and government materials and less likely to receive information from fitness and weight loss programs. Shared meal planners were more likely to receive information from a family physician or health professional, a dietitian, magazines, newspapers or books, government materials, radio or TV programs, food product labels, health association materials, and the Internet. Finally, those who had tried a popular diet in the past year were significantly more likely than those who had not dieted to receive information from a family physician or health professional, a dietitian, food company materials or advertisements, food product labels, fitness or weight loss programs, health associations, and the Internet.

Figure 2 reflects the percentage of participants who used each of the nutrition information sources in 2008, as

well as the percentage who rated each source as 4 or 5 on the credibility scale (for the purpose of this analysis, 4 = very credible and 5 = extremely credible). Food product labels were the only information source in the “high use, high credibility” quadrant of the matrix, indicating that more than 50% of participants had both used the source in the past year and rated it as “very” or “extremely” credible. Dietitians, health associations, physicians, and government materials also scored highly (above 50%) in perceived credibility.

### Frequency of Label Use

Participants were asked to report how often they read nutrition labels on prepackaged food products. Figure 3 displays the frequency of label use for the 3 survey years. The frequency of reading food labels significantly increased over time, from 2004 to 2006 ( $\beta = .05$ ;  $P < .001$ ) and 2006 to 2008 ( $\beta = .04$ ;  $P < .005$ ). Linear regression analyses examined the frequency of label use and sociodemographic predictors, as well as a self-rated measure of nutritional knowledge. All of the covariates included in the model were significant predictors of food label usage. Women read food product labels significantly more often than men ( $\beta = .07$ ;  $P < .001$ ), and the frequency of reading labels significantly increased with age ( $\beta = .03$ ;  $P = .01$ ). More frequent label use was also asso-

ciated with higher levels of income: individuals in the highest income bracket read labels significantly more often than those in the lowest or middle income brackets ( $\beta = .05$ ,  $P = .004$ ;  $\beta = .04$ ,  $P = .02$ , respectively), and individuals who chose not to state their income read labels significantly less often than those in the lowest or middle income brackets ( $\beta = -.03$ ,  $P = .03$ ;  $\beta = -.04$ ;  $P = .007$ , respectively). Label use also increased with higher levels of education, such that participants with a college or university education read labels significantly more often than those with a high school education or less ( $\beta = .05$ ,  $P < .001$ ;  $\beta = .04$ ;  $P = .006$ , respectively). Dieters read labels significantly more frequently than nondieters ( $\beta = .07$ ;  $P < .001$ ), and primary meal planners read labels significantly more often than those who were not the primary meal planner ( $\beta = .04$ ;  $P = .02$ ). Frequency of label use was significantly higher for those who reported that they were “somewhat” or “very” knowledgeable about nutrition compared with those who reported that they were “not very” or “not at all” knowledgeable ( $\beta = .21$ ;  $P < .001$ ). Finally, individuals with children reported reading labels significantly less frequently than those without children ( $\beta = -.05$ ;  $P < .001$ ).

### Nutrient Content Information

Participants were presented with a list of 13 nutrients and asked to indicate how often they selected foods according to the amount of the specific nutrient. As Figure 4 indicates, fiber was the most common nutrient influencing food selection in each of the survey years, followed by protein, vitamins, calories, and total fat. Logistic regression modeling was conducted to examine changes across years and sociodemographic factors predicting the likelihood that participants “sometimes” or “often” selected foods according to each nutrient. As shown in Table 3, respondents were less likely to select food according to carbohydrates, vitamins, protein, and calcium in 2008 compared with 2004. *Trans* fat was the only nutrient to significantly increase between 2004 and 2006 and one of only 2 nutrients (*trans* fat and sodium) to increase significantly from 2004 to

**Table 2.** Sociodemographic Predictors of Sources of Nutrition Information Among Canadian Adults, OR (95% CI) (n = 6,235)

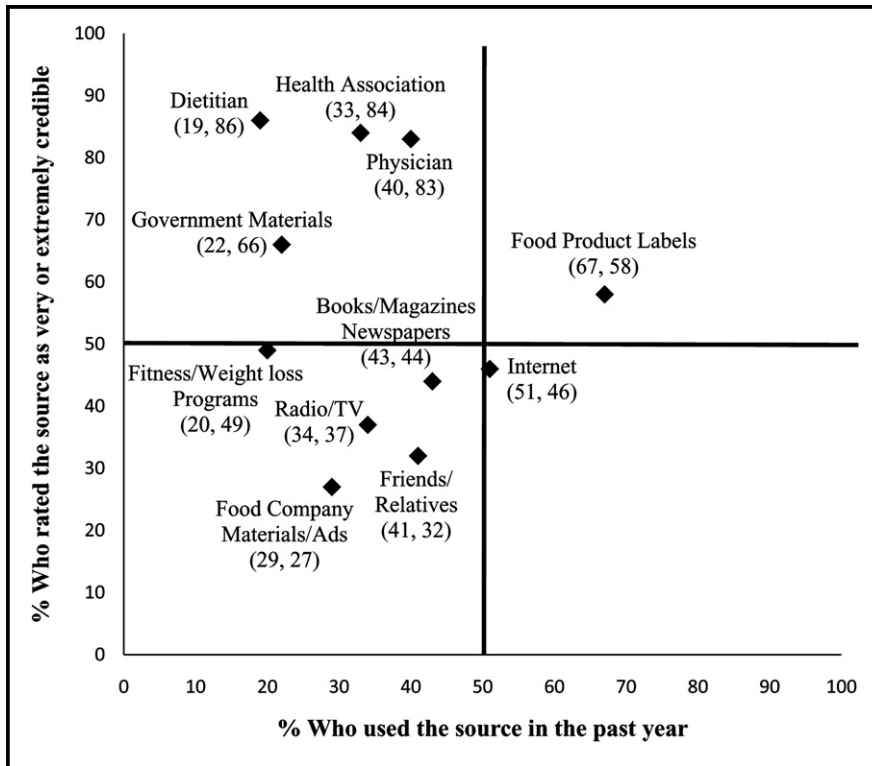
	Physician	Dietitian	Print Media	Government Materials	Food Industry	Radio/TV	Food Labels	Acquaintances	Fitness/Weight Loss Programs	Health Association	Internet
<b>Year (2004, Reference)</b>											
2006	0.62*** (0.55-0.70)	0.78*** (0.68-0.89)	1.13 (0.98-1.30)	1.09 (0.97-1.24)	0.67*** (0.59-0.75)	0.90 (0.79-1.02)	1.07 (0.92-1.23)	0.91 (0.80-1.04)	0.81** (0.71-0.93)	1.00 (0.89-1.13)	1.12 (0.99-1.27)
2008	0.39*** (0.34-0.44)	0.55*** (0.47-0.65)	0.26*** (0.23-.30)	0.42*** (0.37-0.49)	0.24*** (0.21-0.27)	0.24*** (0.21-0.27)	0.62*** (0.54-0.72)	0.31*** (0.27-0.36)	0.50*** (0.42-0.58)	0.48*** (0.42-0.55)	1.39*** (1.22-1.58)
<b>Age</b>	1.05** (1.01-1.08)	1.07** (1.03-1.11)	0.99 (0.96-1.03)	1.03 (0.99-1.06)	1.01 (0.98-1.05)	0.99 (0.96-1.03)	1.04* (1.00-1.08)	0.89*** (0.86-0.92)	0.96* (0.92-0.99)	1.10*** (1.07-1.14)	0.90*** (0.87-0.93)
<b>Sex (Male, Reference)</b>											
Female	1.18** (1.05-1.32)	1.21** (1.07-1.38)	1.75*** (1.55-1.98)	1.00 (0.89-1.13)	1.11 (0.99-1.24)	1.09 (0.97-1.22)	1.40*** (1.23-1.58)	1.36*** (1.21-1.53)	1.33*** (1.17-1.52)	1.44*** (1.29-1.61)	1.11 (0.99-1.24)
<b>Education (High school or less, Reference)</b>											
College	0.95 (0.84-1.08)	1.05 (0.90-1.21)	1.30*** (1.14-1.49)	1.28*** (1.12-1.47)	1.07 (0.94-1.22)	1.01 (0.88-1.15)	1.45*** (1.26-1.67)	1.21** (1.06-1.37)	1.25** (1.08-1.45)	1.24** (1.09-1.40)	1.66*** (1.46-1.88)
University	0.87* (0.77-0.99)	1.04 (0.90-1.20)	1.78*** (1.56-2.04)	1.53*** (1.35-1.74)	0.87* (0.76-0.98)	1.12 (0.99-1.27)	1.50*** (1.31-1.72)	1.22** (1.07-1.38)	1.17* (1.01-1.35)	1.29*** (1.14-1.45)	2.14*** (1.89-2.43)
<b>Income (&lt; \$35,000, Reference)</b>											
Not stated	1.28** (1.07-1.53)	0.93 (0.76-1.14)	1.13 (0.93-1.38)	1.07 (0.89-1.28)	1.20* (1.00-1.43)	1.10 (0.91-1.32)	1.12 (0.92-1.37)	0.99 (0.83-1.19)	1.05 (0.86-1.28)	1.09 (0.91-1.30)	1.13 (0.94-1.35)
\$35,000-\$59,000	1.02 (0.88-1.18)	1.06 (0.89-1.25)	1.28** (1.10-1.49)	1.08 (0.92-1.26)	1.07 (0.93-1.25)	1.24** (1.07-1.44)	1.14 (0.97-1.33)	1.12 (0.96-1.30)	1.03 (0.87-1.22)	1.08 (0.93-1.24)	1.24** (1.07-1.43)
≥ \$60,000	1.24*** (1.08-1.42)	1.09 (0.93-1.28)	1.34*** (1.16-1.55)	1.16* (1.00-1.34)	1.25** (1.09-1.43)	1.20* (1.04-1.38)	1.31*** (1.13-1.52)	1.14 (0.99-1.31)	1.23* (1.05-1.44)	1.05 (0.92-1.20)	1.36*** (1.18-1.56)
<b>Presence of children in the home (No, Reference)</b>											
Yes	1.02 (0.92-1.15)	0.88* (0.77-1.00)	1.17* (1.03-1.32)	1.21** (1.07-1.36)	1.10 (0.98-1.23)	1.05 (0.93-1.18)	1.03 (0.91-1.17)	1.09 (0.97-1.23)	1.02 (0.90-1.16)	0.92 (0.82-1.03)	1.40*** (1.25-1.57)
<b>Primary meal planner (No, Reference)</b>											
Yes	1.07 (0.94-1.23)	1.37*** (1.16-1.62)	1.02 (0.88-1.18)	1.21** (1.05-1.40)	1.05 (0.92-1.21)	0.96 (0.83-1.10)	1.05 (0.91-1.23)	0.95 (0.83-1.10)	0.82* (0.70-0.96)	1.00 (0.87-1.14)	0.92 (0.80-1.06)
Shared	1.24* (1.04-1.49)	1.44** (1.16-1.79)	1.31** (1.08-1.58)	1.30** (1.07-1.57)	1.13 (0.94-1.35)	1.26* (1.04-1.51)	1.27* (1.04-1.55)	0.95 (0.79-1.14)	0.99 (0.81-1.21)	1.30* (1.03-1.47)	1.20* (1.00-1.43)
<b>Tried popular diet in past year (No, Reference)</b>											
Yes	1.23* (1.03-1.48)	1.31** (1.07-1.60)	1.06 (0.87-1.30)	0.94 (0.77-1.14)	1.21* (1.00-1.46)	0.99 (0.82-1.20)	1.44** (1.15-1.81)	1.11 (0.91-1.34)	3.57*** (2.97-4.30)	1.33** (1.10-1.59)	1.91*** (1.58-2.30)

CI indicates confidence interval; OR, odds ratio.

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ .

Note: Asterisks denote significant differences tested in a logistic regression model of sources of nutrition information by survey year, in which the following sociodemographic variables were used as predictors: age, sex, education, income, presence of children in the home, primary meal planner, tried popular diet in the past year.





**Figure 2.** Perceived credibility and use of nutrition information sources among Canadian adults in 2008 (n = 1,945). Numbers in parentheses refer to the y and x axes.

2008. Table 3 also shows sociodemographic correlates of food choice.

**Factors Guiding Food Choice**

Participants were asked to rate the importance of 4 factors guiding food choice: taste, nutrition, cost, and convenience/ease of preparation. A logistic regression was conducted, in which 1 = very important and 0 =

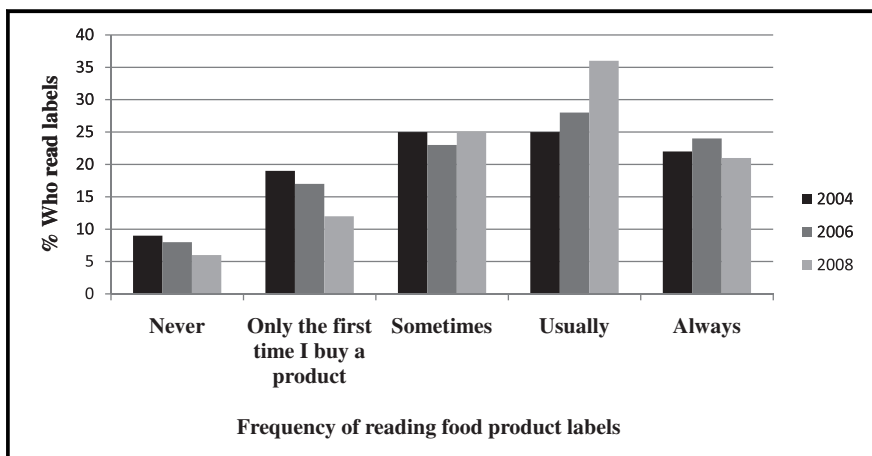
other. Results indicated that taste was the most important factor in food choice in 2004 (72%), 2006 (71%), and 2008 (76%), with a significant increase between 2006 and 2008 (OR = 1.27; 95% CI = 1.06-1.42; P = .002). Nutrition remained the second most important factor guiding food choice in all 3 survey years; however, its importance decreased significantly in 2006 (67%) to 2008 (51%; OR = 0.48; 95% CI = 0.41-0.55; P < .001).

The importance of convenience or ease of preparation increased significantly from 2004 (26%) to 2006 (29%; OR = 1.20; 95% CI = 1.05-1.38; P = .008) and remained significantly different from 2008 (31%; OR = 1.26; 95% CI = 1.09-1.45; P = .001). The increase from 2006 to 2008 was nonsignificant. Finally, the importance of cost increased significantly from both 2004 (31%) and 2006 (30%) to 2008 (45%) (OR = 1.86, 95% CI = 1.63-2.14, P < .001; OR = 1.81, 95% CI = 1.57-2.08, P < .001, respectively), and cost was significantly more important for lower-income individuals. There was no significant difference in the importance of cost in 2004 compared with 2006.

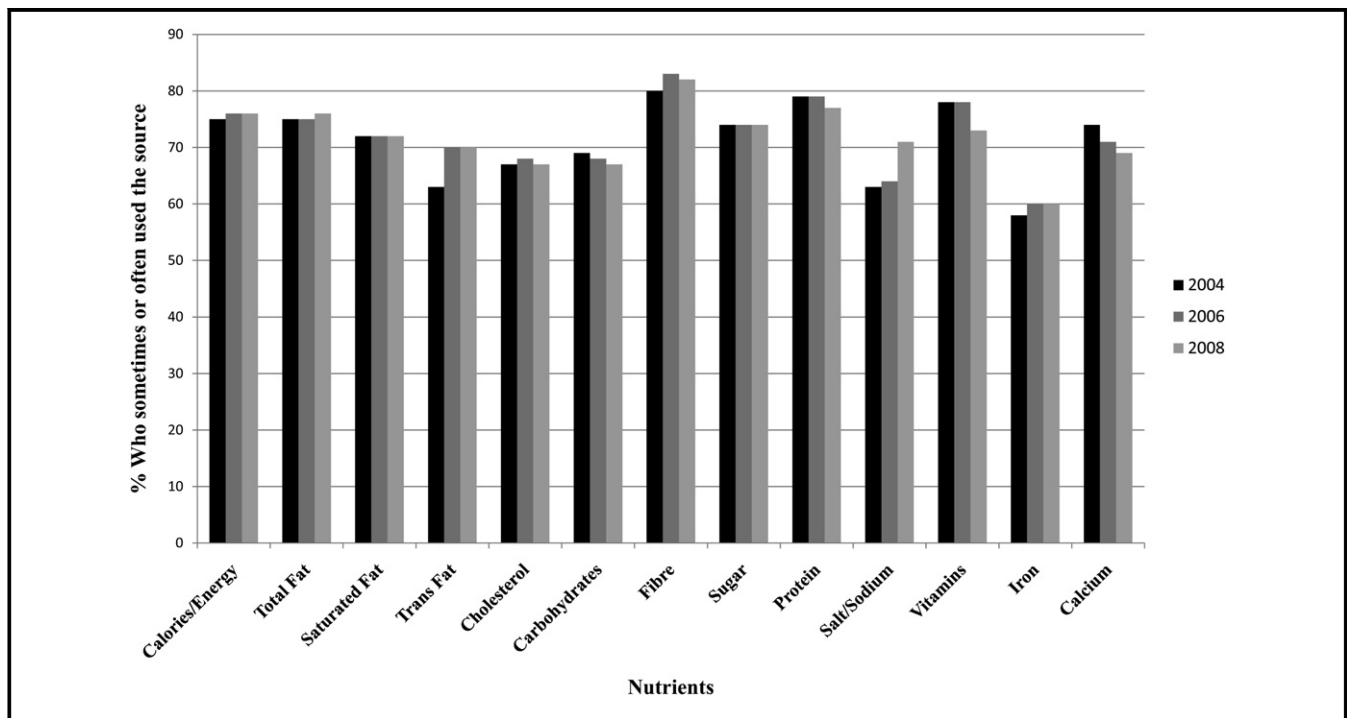
**DISCUSSION**

To our knowledge, this is the first study to examine national trends in sources of nutrition information during an extended period. The findings highlight the importance of food product labels as an increasingly prominent source of nutrition information for Canadian consumers. Product labels were the most common source of nutrition information for Canadians across all 3 survey years and the only information source to score highly on both level of use and credibility. Dietitians were rated as the most credible source of information; however, less than a quarter of respondents had received nutrition information from a dietitian in the past year. These results are generally similar to previous research findings regarding the credibility of dietitians, physicians/health professionals, government materials, and health associations as credible sources of food information.<sup>6,9</sup>

The proportion of Canadians who read nutrition labels on food products has increased during the same period in which mandatory labeling regulations were expanded for prepackaged food products in 2005 and 2007. The proportion of Canadians who reported that their choice of foods was influenced by *trans* fat levels also increased after the display of *trans* fat information on product labels in 2005. *Trans* fat was the only nutrient among the 13 assessed in the survey that increased in importance during this



**Figure 3.** Frequency of reading food product labels among Canadian adults, by survey year (n = 6,420).



**Figure 4.** Frequency of food choice based on content of specific nutrients among Canadian adults ( $n = 5,956$ ).

period. This increase may also reflect the establishment of a Trans Fat Task Force in 2005 and increasing media coverage of *trans* fat in Canada during the same period.<sup>21</sup> The findings also indicate that the caloric content on food product labels remains an important factor guiding food choice for Canadians, with more than three quarters of participants choosing foods according to calorie or energy content in all 3 survey years.

Patterns of individual-level differences in the use of food product labels were similar to those in previous research: use was higher among women, those with higher income and education, dieters, primary meal planners, and those who perceived themselves to be highly knowledgeable about nutrition. Unlike in previous studies, label use increased significantly with age, whereas previous research suggests that label use was highest among younger or middle-aged adults.<sup>14</sup> Overall, the pattern of results suggests that more comprehensive labeling requirements are associated with greater use of food product labels to guide food choice among Canadians.

Important sociodemographic differences were observed in the use of nutrition information more generally. Women, older Canadians, dieters, pri-

mary meal planners, and individuals with higher income levels consistently reported a greater number of information sources and greater use of nutrition information to guide their food decisions. These findings are generally consistent with previous research indicating that higher socioeconomic status<sup>15,16</sup> and individuals with healthier eating habits<sup>16,17</sup> are more likely to use nutrition information.

The results of this study also highlight the Internet as an increasingly important source of nutrition information for Canadians. This is consistent with research indicating that the Internet has become the most common source of general health information.<sup>22</sup> The Internet has both advantages and disadvantages as a source of nutrition information. Although the Internet is a convenient, free, and easily accessible source of nutrition information for many consumers, the quality and credibility of health information posted online is mixed.<sup>23,24</sup> Indeed, less than half of participants in the present study rated the Internet as a credible source of nutrition information. In contrast, more credible sources, including dietitians, government sources, health professionals, and health associations, may be more difficult to

access, particularly for lower-income participants. The findings highlight the importance of promoting online information from these credible sources. Indeed, a recent Canadian study found that commercial Web sites accounted for 80% of Internet visits and time spent seeking health and nutrition information but that the site providing the best advice was a non-commercial government-based Web site.<sup>25</sup> With the exception of the Internet, the use of all other information sources decreased significantly from 2006 to 2008. Although this finding could be a “real” decrease in the sources of nutrition information, changes in the survey mode in 2008 may also account for these changes, which are outlined in the study limitations below.

Taste and nutrition continue to be major influences on food selection in Canada. Although there was an apparent decrease in the importance of nutrition during the study period, this decline may be due to the shift in data collection from telephone to Internet survey in 2008. It is possible that a social desirability bias influenced participant responses in 2004 and 2006, such that participants may have been more likely to rate nutrition as very important when completing a telephone interview than when

**Table 3.** Sociodemographic Predictors of Food Choice Based on Nutrient Content Among Canadian Adults, OR (95% CI) (n = 5,956)

	Calories	Total Fat	Saturated Fat	Trans Fat	Cholesterol	Carbohydrates	Fiber	Sugar	Protein	Sodium	Vitamins	Iron	Calcium
<b>Year (2004, Reference)</b>													
2006	1.04 (0.90-1.20)	1.01 (0.88-1.17)	1.00 (0.87-1.15)	1.43*** (1.24-1.63)	1.03 (0.90-1.17)	0.93 (0.81-1.06)	1.17 (0.99-1.38)	1.00 (0.87-1.15)	1.01 (0.87-1.18)	1.00 (0.88-1.14)	1.02 (0.88-1.18)	1.12 (0.98-1.27)	0.91 (0.75-1.05)
2008	0.95 (0.81-1.11)	1.06 (0.91-1.24)	0.98 (0.85-1.14)	1.42*** (1.23-1.64)	0.93 (0.81-1.07)	0.86* (0.75-0.99)	1.11 (0.93-1.31)	0.98 (0.84-1.14)	0.85* (0.73-1.00)	1.33*** (1.16-1.54)	0.74*** (0.63-0.86)	1.11 (0.97-1.27)	0.77*** (0.66-0.89)
<b>Age</b>													
	1.06** (1.02-1.10)	1.06** (1.02-1.10)	1.05** (1.01-1.09)	1.04 (0.10-1.07)	1.08*** (1.04-1.12)	1.06** (1.02-1.10)	1.18*** (1.13-1.23)	1.03 (0.99-1.07)	1.06** (1.02-1.10)	1.13*** (1.09-1.17)	1.02 (0.98-1.06)	1.04* (1.01-1.08)	1.07*** (1.03-1.11)
<b>Sex (Male, Reference)</b>													
Female	1.56*** (1.36-1.77)	1.59*** (1.39-1.81)	1.46*** (1.29-1.66)	1.49*** (1.32-1.69)	1.12 (1.00-1.27)	1.33*** (1.18-1.50)	1.59*** (1.38-1.85)	1.56*** (1.37-1.78)	1.28*** (1.12-1.47)	1.41*** (1.26-1.59)	1.48*** (1.30-1.69)	1.59*** (1.42-1.79)	2.28*** (2.01-2.58)
<b>Education (High school or less, Reference)</b>													
Any college	1.13 (0.97-1.31)	1.26** (1.09-1.47)	1.23** (1.07-1.42)	1.22** (1.06-1.40)	1.06 (0.92-1.21)	1.24** (1.08-1.43)	1.23* (1.04-1.45)	1.30*** (1.12-1.50)	1.11 (0.95-1.29)	1.11 (0.97-1.27)	1.09 (0.94-1.27)	0.94 (0.83-1.07)	0.98 (0.85-1.13)
University	1.04 (0.90-1.21)	1.43*** (1.24-1.66)	1.48*** (1.28-1.70)	1.42*** (1.23-1.62)	1.05 (0.92-1.20)	1.05 (0.92-1.20)	1.14 (0.97-1.34)	1.43*** (1.24-1.65)	1.05 (0.90-1.22)	1.08 (0.95-1.23)	1.04 (0.90-1.21)	0.93 (0.82-1.06)	0.93 (0.81-1.07)
<b>Income (&lt; \$35,000, Reference)</b>													
Not stated	1.07 (0.87-1.31)	1.64*** (1.33-2.02)	1.42** (1.16-1.73)	1.18 (0.97-1.42)	1.20 (0.99-1.45)	1.20 (0.99-1.46)	1.35* (1.07-1.71)	1.05 (0.86-1.29)	1.17 (0.94-1.46)	0.96 (0.80-1.16)	1.23 (0.99-1.53)	1.09 (0.91-1.31)	0.95 (0.77-1.16)
\$35,000-\$59,000	1.06 (0.90-1.25)	1.32** (1.12-1.55)	1.33** (1.13-1.56)	1.33*** (1.13-1.55)	1.21* (1.04-1.41)	1.18* (1.01-1.37)	1.22* (1.01-1.47)	1.03 (0.87-1.21)	1.13 (0.95-1.34)	1.10 (0.94-1.28)	1.07 (0.90-1.27)	1.05 (0.90-1.22)	1.03 (0.88-1.22)
≥ \$60,000	1.24** (1.06-1.45)	1.69*** (1.45-1.99)	1.61*** (1.38-1.88)	1.56*** (1.35-1.81)	1.21* (1.05-1.40)	1.45*** (1.25-1.68)	1.27** (1.07-1.52)	1.28** (1.09-1.50)	1.30** (1.10-1.53)	1.20* (1.03-1.38)	1.15 (0.98-1.35)	0.96 (0.83-1.11)	1.06 (0.91-1.23)
<b>Presence of children in the home (No, Reference)</b>													
Yes	0.90 (0.79-1.03)	0.93 (0.81-1.06)	0.94 (0.83-1.07)	0.84** (0.75-0.95)	0.91 (0.81-1.03)	0.79*** (0.70-0.89)	0.88 (0.76-1.01)	1.01 (0.89-1.15)	0.91 (0.79-1.04)	1.04 (0.92-1.17)	1.10 (0.96-1.26)	1.10 (0.98-1.24)	1.00 (0.88-1.14)
<b>Primary meal planner (No, Reference)</b>													
Yes	1.11 (0.95-1.30)	1.26** (1.08-1.48)	1.27** (1.09-1.48)	1.17* (1.00-1.35)	0.97 (0.84-1.13)	1.01 (0.87-1.17)	1.28** (1.08-1.52)	1.15 (0.98-1.34)	1.15 (0.98-1.36)	1.17* (1.01-1.35)	1.23* (1.05-1.44)	1.18* (1.02-1.36)	1.02 (0.88-1.19)
Shared	1.17 (0.95-1.43)	1.36** (1.11-1.68)	1.27* (1.04-1.56)	1.08 (0.89-1.32)	1.16 (0.96-1.41)	0.88 (0.72-1.06)	1.14 (0.91-1.42)	1.03 (0.84-1.26)	1.01 (0.81-1.24)	1.17 (0.96-1.41)	1.39*** (1.13-1.72)	0.85 (0.71-1.02)	1.00 (0.82-1.21)
<b>Tried popular diet in past year (No, Reference)</b>													
Yes	1.76*** (1.37-2.26)	2.14*** (1.63-2.79)	1.63*** (1.29-2.05)	1.63*** (1.31-2.04)	1.27* (1.04-1.56)	1.86*** (1.49-2.32)	1.71*** (1.29-2.27)	1.67*** (1.31-2.12)	1.33* (1.04-1.69)	1.11 (0.91-1.36)	1.03 (0.82-1.28)	0.76** (0.64-0.92)	0.82* (0.67-1.00)

CI indicates confidence interval; OR, odds ratio.

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ .

Note: Asterisks denote significant differences tested in a logistic regression model of food choice based on specific nutrient contents, by survey year. The following socio-demographic variables were used as predictors: age, sex, education, income, presence of children in the home, primary meal planner, tried popular diet in the past year.



completing an anonymous online survey. Indeed, studies have indicated that social desirability bias may be reduced in Internet compared with telephone surveys.<sup>26,27</sup>

The current study has several limitations common to survey research, including potential biases in the sample because of nonresponse and reliance on self-report. Most important, the survey mode changed in 2008 from telephone to online surveys. Online surveys are becoming increasingly common and offer several advantages over telephone surveys;<sup>26</sup> nevertheless, changes to survey modes may have changed response patterns. A small telephone survey was conducted in 2008 to compare responses to 3 of the TNT questions included in the 2006 telephone survey and the 2008 online survey. Lower levels of agreement were found in the online sample compared with the same questions administered by telephone on self-rated health and knowledge about nutrition. This may reflect greater "honesty" in the online environment or simply a different response pattern; regardless, the switch to online surveying in 2008 may have underestimated some trends compared with 2004 and 2006 data. Changes in the sampling strategy and the use of a consumer panel may also have changed the respondent profile, despite the size of the consumer panel from which the Web sample was drawn and the use of weights to match the census profile on key measures.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

The findings of the current study highlight the importance of food product labels as a policy tool to disseminate nutrition information. At present, existing labeling regulations are limited to prepackaged food products and do not apply to foods served in restaurants or fast-food outlets, which account for a significant proportion of dietary intake among Canadians.<sup>28,29</sup> The present study suggests that expanding the scope of mandatory labeling regulations to menus and menu boards—as has already occurred in several US jurisdictions—has considerable potential.<sup>30,31</sup> The findings also

underscore the growing importance of the Internet as an information channel for communicating health information and the potential for health professionals and health organizations to make greater use of the online environment. Finally, the findings reinforce the socioeconomic gradient in dietary patterns: individuals with lower levels of income are significantly less likely to report using nutritional information to select foods. Given the well-documented association between poor health status and low socioeconomic status,<sup>32</sup> greater efforts are required to increase access to and promote greater use of nutritional information among underserved populations.

## ACKNOWLEDGMENTS

Funding sources for the Tracking Nutrition Trends V, VI, and VII include Dairy Farmers of Canada, Effem Incorporated, GCI Group, General Mills Canada, Health Canada, Health Check, Kellogg Canada, Nestle Canada, and Unilever Canada. This research was also supported by the Propel Centre for Population Health Impact, a Canadian Institutes for Health Research New Investigator Award (DH), a Canadian Cancer Society Research Institute Junior Investigator Research Award (DH), an Ontario Graduate Scholarship (SG), a Canadian Institutes for Health Research (CIHR) Master's Award, and the Heart and Stroke Foundation of Canada and the CIHR/Training Grant in Population Intervention for Chronic Disease Prevention: A Pan-Canadian Program (Grant #: 53893) (SG).

## REFERENCES

1. Statistics Canada. Canadian Health Measures Survey. <http://www.statcan.gc.ca/daily-quotidien/100113/dq100113a-eng.htm>. Published June 29, 2010. Accessed June 17, 2010.
2. Anis AH, Zhang W, Bansback N, Guh DP, Amarsi Z, Birmingham CL. Obesity and overweight in Canada: an updated cost-of-illness study. *Obes Rev*. 2010;11:31-40.
3. National Institutes of Health. *A Report of the NIH Obesity Research Task Force*. Bethesda, MD: US Department of Health and Human Services; 2004.

4. Raine KD. *Overweight and Obesity in Canada: A Population Health Perspective*. Ottawa, Canada: Canadian Population Health Initiative and Canadian Institute for Health Information; 2004.
5. World Health Organization. *Population Nutrient Intake Goals for Preventing Diet-Related Chronic Diseases*. Geneva, Switzerland: World Health Organization; 2003. [http://www.who.int/nutrition/topics/5\\_population\\_nutrient/en/index15.html](http://www.who.int/nutrition/topics/5_population_nutrient/en/index15.html). Accessed June 17, 2011.
6. Nutrition and Healthy Eating. Health Canada Web site. <http://www.hc-sc.gc.ca/fn-an/nutrition/index-eng.php>. Updated February 8, 2010. Accessed June 17, 2011.
7. Dietitians of Canada. Advertising of Food and Beverages to Children: Position of Dietitians of Canada. <http://www.dietitians.ca/Downloadable-Content/Public/Advertising-to-Children-position-paper.aspx>. Published December 2010. Accessed June 17, 2011.
8. Marquis M, Dubeau C, Thibault I. Canadians' level of confidence in their sources of nutrition information. *J Can Diet Assoc*. 2005;66:170-175.
9. McKay DL, Houser RF, Blumberg JB, Goldberg JP. Nutrition information sources vary with education level in a population of older adults. *J Am Diet Assoc*. 2006;106:1108-1111.
10. Nutrition Labelling: Regulations and Compliance. Health Canada Web site. <http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/reg/index-eng.php>. Updated August 7, 2009. Accessed June 17, 2011.
11. Cowburn G, Stockley L. Consumer understanding and use of nutrition labelling: a systematic review. *J Public Health*. 2005;8:21-28.
12. Drichoutis AC, Lazaridis P, Nayga RM. Consumers' use of nutritional labels: a review of research studies and issues. *Acad Marketing Sci Rev*. 2006;9. <http://www.amsreview.org/articles/drichoutis09-2006.pdf>. Published 2006. Accessed June 28, 2011.
13. Rasberry CN, Chaney BH, Housman JM, Misra R, Miller PJ. Determinants of nutrition label use among college students. *Am J Health Educ*. 2007;38:76-82.
14. Drichoutis AC, Lazaridis P, Nayga RM, Kapsokafalou M, Chrysoschoidis G. A theoretical and empirical investigation of nutritional label use. *Eur J Health Econ*. 2008;9:293-304.
15. McArthur L, Chamberlain V, Howard AB. Behaviors, attitudes, and knowledge of low-income consumers

- regarding nutrition labels. *J Health Care Poor Underserved*. 2001;12:415-428.
16. Drichoutis AC, Lazaridis P, Nayga RM. Nutrition knowledge and consumer use of nutritional food labels. *Eur Rev Agric Econ*. 2005;32:93-118.
  17. Kreuter MW, Brennan LK, Scharff DP, Lukwago SN. Do nutrition label readers eat healthier diets? Behavioral correlates of adults' use of food labels. *Am J Prev Med*. 1997;13:277-283.
  18. Trans Fat Monitoring Program: High-lights. Health Canada Web site. [http://www.hc-sc.gc.ca/fn-an/nutrition/gras-trans-fats/tfa-age\\_tc-tm-intro-eng.php](http://www.hc-sc.gc.ca/fn-an/nutrition/gras-trans-fats/tfa-age_tc-tm-intro-eng.php). Updated April 17, 2009. Accessed June 17, 2011.
  19. Archive. Canadian Council of Food and Nutrition Web site. [http://ccfn.ca/in\\_action/archive.asp](http://ccfn.ca/in_action/archive.asp). Accessed June 17, 2011.
  20. We Are TNS. TNS Canada Web site. <http://www.tnscanada.ca/we-are-tns/wearetns.html>. Accessed June 17, 2011.
  21. Trans Fat Task Force. TRANSforming the food supply: Report of the Trans Fat Task Force. [http://www.hc-sc.gc.ca/fn-an/alt\\_formats/hpfb-dgpsa/pdf/nutrition/tf-gt\\_rep-rap-eng.pdf](http://www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/nutrition/tf-gt_rep-rap-eng.pdf). Published June 2006. Accessed June 17, 2011.
  22. Hong T. Contributing factors to the use of health-related websites. *J Health Commun*. 2006;11:149-165.
  23. Berland GK, Elliott MN, Morales LS, Algazy JI, Kravitz RL, Broder MS. Health information on the Internet: accessibility, quality, and readability in English and Spanish. *JAMA*. 2001;285:2612-2621.
  24. Morahan-Martin JM. How Internet users find, evaluate, and use online health information: a cross-cultural review. *Cyberpsychol Behav*. 2004;7:497-510.
  25. Ostry A, Young ML, Hughes M. The quality of nutritional information available on popular websites: a content analysis. *Health Educ Res*. 2008;23:648-655.
  26. Fricker S, Galesic M, Tourangeau R, Yan T. An experimental comparison of web and telephone surveys. *POQ*. 2005;69:370-392.
  27. de Leeuw ED. To mix or not to mix data collection modes in surveys. *JOS*. 2005;21:233-255.
  28. Canadian Council of Food and Nutrition. Tracking Nutrition Trends VII: An Initiative of the Canadian Council of Food and Nutrition. [http://www.ccfnc.ca/membership/membersonly/content/Tracking%20Nutrition%20Trends/TNT\\_VII\\_FINAL\\_REPORT\\_full\\_report\\_Sept.pdf](http://www.ccfnc.ca/membership/membersonly/content/Tracking%20Nutrition%20Trends/TNT_VII_FINAL_REPORT_full_report_Sept.pdf). Published August 2008. Accessed June 20, 2011.
  29. Canadian Restaurant and Foodservice Association. Foodservice facts. <http://www.crfa.ca/research>. Updated 2011. Accessed January 24, 2011.
  30. Berman M, Lavizzo-Mourey R. Obesity prevention in the information age: caloric information at the point of purchase. *JAMA*. 2008;300:433-435.
  31. Healthy Eating Research, Robert Wood Johnson Foundation. Menu Labeling: Does Providing Nutrition Information at the Point of Purchase Affect Consumer Behavior? <http://www.rwjf.org/files/research/20090630hermenulabeling.pdf>. Published June 2009. Accessed June 20, 2011.
  32. Sapolsky R. Sick of poverty. *Sci Am*. 2005;293:92-99.