Socio-economic Profiles of Nutrition Label Users

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Abstract

This paper aims to explore the socio-economic profiles of the nutrition label users and focuses on seven key nutrients: calories, fat, saturated fat, cholesterol, sodium, and sugar. The data are from the National Health and Nutrition Examination Survey (NHANES) 2005-2006 and Continuing Survey of Food Intakes by Individuals (CSFII) 1994-96. Similar conclusions are drawn from both data sets: those consumers who are older, better educated, higher income, female, and have higher nutrition knowledge will have higher probability to use nutrition labels; those consumers who are in larger size families and being either Hispanic or black have lower probability of using nutrition labels.

Background

After Nutrition Labeling and Education Act (NLEA) passed in 1990, health claims and specific nutritional information become available on food packages.

Nutrition Label usage: Promote healthy diet.
- Nutrition label users consume fewer calories from total and saturated fat, cholesterol and sugar more than the non-users (Neuhouser, Kristal and Patterson, 1999, Naya, 2000).
- Nutrition label usage promotes the consumption of fruits and vegetables (Kreuter et al., 1997).

So what socio-economic factors can affect nutrition labels usage?

- The findings are inconsistent in the literature:
  - Mixed age effects: positive (Coullon 2000); negative (Kim, Nayga, and Capps 2001b).
  - Mixed income effects: positive (Kim, Nayga, and Capps 2001a); negative (Dhochou, Lazaridou and Nayga 2005).

Research Aims

Further examine socio-economic profiles of Nutrition Label Users
- Adapt the ordered probit methodology
- Adapt the most up-to-date data: NHANES 2005-2006
- Address seven key nutrients: calories, fat, saturated fat, Trans fat, sugar, cholesterol, and sodium
- Compare with data from 1994-1996 CSFII and the Diet and Health Knowledge Survey (DHKS) to examine the nutrition label behavior changes over time

Theoretical Framework: Household Model

Objective Function: Quasi-concave utility function

\[ u(L, y, X, k) \]

Where \( u \) denotes household utility, \( y \) denotes the quantity of good purchased, \( L \) denotes the time allocation of family members, \( H \) denotes the health status and \( K \) denotes personal characteristics.

Budget constraint:

\[ p \cdot x + y = w + T \]

where \( p \) denotes the unit price, \( x \) denotes wage rate, \( w \) denotes time allocation to work, and \( T \) denotes the price vector for the corresponding goods.

Time constraint:

\[ t = t_0 + T \]

where \( t \) denotes time allocated to household work, to denote time allocation to other activities.

Health production constraint:

\[ H = h(x, y, L, E) \]

where \( h \) denotes good consumption which permit health, \( S \) denotes socio-economic factors, \( L \) denotes the frequency of checking nutrition labels and \( E \) denotes environmental factors.

Resulting Nutrition Label Usage Input Demand Function:

\[ L = L_p (p, w, y, x, S, E, K) \]

Empirical Model: Ordered Probit Model

- Fit to the specific characteristic of the data-indexed dependent variable:
  - Regression number of nutrition label use frequency for specific nutrition (j = 1 to 7)
  - Significant socio-economic determinants of label use for nutrition
  - Frequency of nutrition label use is estimated

Seven key nutrition (one model for each): calories, calories from fat, total fat, Trans fat, saturated fat, cholesterol, sodium

Dependent variables:
- Specific nutrition label use frequency
  - Value 1: "always" value 2: "seldom" value 3: "rarely" value 4: "most of the time" value 5: "never"
  - Denoted by \( L \) in the model above

Independent variables:
- Continuous variables: age, sex, income, and household size
- Dummy variables: Gender, race, marital status and two nutrition knowledge including "have you heard of MyPyramid" and "have you heard of Dietary Guidelines"
- Rank variables: Education (5 groups) and Income (12 groups)
- Note: The CSFII-C D 1994-1996 does not have data on marital status and nutrition knowledge.

Data

- NHANES 2005-2006: 3447 observations
- CSFII and DHKS 1994-1996: 4617 observations

Results of the General Socio-economics Factors

- Significantly positive impact: Age, Gender, Asian, Income, Education, Nutrition Knowledge
- Significantly negative impact: Household Size, Marital Status.

Example of Marginal Effect (Marginal Value of the Model of Trans fat)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effect</th>
<th>(95%) Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>0.0043*</td>
<td>(0.0031, 0.0055)</td>
</tr>
<tr>
<td>Income</td>
<td>0.0334*</td>
<td>(0.0309, 0.0359)</td>
</tr>
<tr>
<td>Age</td>
<td>0.0353*</td>
<td>(0.0313, 0.0395)</td>
</tr>
<tr>
<td>Income</td>
<td>0.0313*</td>
<td>(0.0277, 0.0353)</td>
</tr>
</tbody>
</table>

Effects of Nutrition Knowledge Across Different Nutrition

- **Chow-tests** are performed two-by-two
- **Most of the effects are the same**

<table>
<thead>
<tr>
<th>Nutrition</th>
<th>Calorific from fat</th>
<th>Total</th>
<th>Trans saturated fat</th>
<th>Cholesterol</th>
<th>Sodium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Fat</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Trans fat</td>
<td>B(5%)</td>
<td>B(5%)</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Saturated</td>
<td>B(5%)</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Fat</td>
<td>B(5%)</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Total fat</td>
<td>B(5%)</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>B(5%)</td>
<td>B(5%)</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Sodium</td>
<td>B(5%)</td>
<td>B(5%)</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>
| *"S" means the nutrition knowledge has the same effects on the two nutrients, "D(1%)" means the effects are different at a significant level.

Conclusions and Indications

- The profiles of nutrition label users are similar across the two time period: 1994-1996 and 2005-2006. Elder, educated, higher-income females from small families tend to check the nutrition labels more often.
- However, less-educated individuals from low-income big families are the most vulnerable groups. Policy interventions should aim towards promoting nutrition label usage among this group.
- The nutrition knowledge has large impact on those who never use nutrition labels and those who always check the label always.

Future Extensions

- Examine the nutritional label usage and nutrient intake portfolio of participants in supplemental nutrition assistance (SNAP)
- Examine the nutritional label usage and nutrient intake portfolio for subgroups, such as the Hispanic or Asian.