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# **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, calories from fat, total fat, trans fat, saturated fat, cholesterol, and sodium. The data are from 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 sodium and more fiber daily than the non-users (Neuhouser, Kristal and Patterson, 1999; Nayga, 2000).

➤ Nutrition label usage promotes the consumptions of fruits and vegetable (Kreuter et al, 1997).

### So what socioeconomic factors can affect nutrition labels usage?

- The findings are **inconsistent** in the literature
  - Mixed age effects: positive (Coulson 2000); negative (Kim, Nayga, and Capps 2001a; 2001b)
  - Mixed income effects: positive (Kim, Nayga, and Capps 2001a); negative (Drichoutis, Lazaridis 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, calories from fat, total fat, Trans fat, saturated fat, 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

$$U=U(x, t, H, K)$$

Where U denotes household utility, x denotes the quantity of good purchased, t denotes the time allocation of family members, H denotes the health status and K denotes personal characteristics.

**Budget constraint :**

$$p * x = y + w * tw$$

where y denotes the unearned income, w denotes wage rate, tw denotes time allocated to work, and p denotes the price vector for the corresponding goods.

**Time constraint:**

$$tw + th + to = T$$

Where th denotes time allocated to housework, to denotes time allocating to other activities.

**Health production constraint :**

$$H=H(xh, S, L, E)$$

where xh denotes good consumptions which will promote 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:**

$$L = L(p, w, y, T, S, E, K)$$

## Empirical Model: Ordered Probit Model

➤ Fit to the specific characteristic of **the data-indexed dependent variable**

$$L_i = \beta_{ij} * S_{ij} + \epsilon_i$$

$L_i$ =indexed number of nutrition label use frequency for specific nutrition i (i=1 to 7)

$S_{ij}$ =the jth socio-economic determinant of label use for nutrition i

$\beta_{ij}$ =the coefficient to be estimated

$\epsilon_i$ = a random error term

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

➤ **Dependent variables:**

- Specific nutrition label use frequency
  - value 1 ~ "always" value 4 ~ "rarely"
  - value 2 ~ "most of the time" value 5 ~ "never"
  - value 3 ~ "sometimes"
- Denoted by 'L' in the model above

➤ **Independent variables:**

- Continuous variables: age, age square, 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-DHKS 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 Social-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**)

variable	always	most of time	sometimes	rarely	never
age	-0.033***	0.0036***	0.0012***	-0.0020***	-0.011***
education	0.0084*	0.0038*	0.0013*	-0.0021*	-0.011*
householdsize	-0.0062*	-0.0028*	-0.00091*	0.0015*	0.0083*
income	0.0034*	0.0015*	0.00050*	-0.00085*	-0.0046*
agesquare	-0.000058***	-0.000026***	-8.6e-06***	0.000015***	0.000078***
female	0.052***	0.024***	0.0085***	-0.013***	-0.072***
hispanic	-0.060***	-0.031***	-0.015**	0.013***	0.093***
white	-0.049***	-0.022***	-0.0069***	0.012***	0.066***
black	-0.039**	-0.019**	-0.0075*	0.0090**	0.056**
married	0.00023	0.00010	0.000034	-0.000057	-0.00031
heardguideline	0.050***	0.022***	0.0074***	-0.012***	-0.067***
heardpyramid	0.053***	0.026***	0.011***	-0.012***	-0.079***

The single (\*), double (\*\*), triple (\*\*\*) asterisks are at 10%, 5% and 1% significant levels respectively.

- The ordered probit model allows nonconstant marginal effects.
- For the two nutrition knowledge variables:
  - The largest marginal effects are on those who never read labels. One unit increase in those knowledge will decrease the probability of the trans fat label being never read by about 7% and 8% respectively.
  - One unit increase in those knowledge will significantly increase the probability of the trans fat labels being always read by 5%.
  - The results are similar for the other six nutrition.

## Effects of Nutrition Knowledge Across Different Nutrition

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

	calories	calories from fat	total fat	trans fat	saturate d fat	Cholest erol	sodium
calories	S						
calories from fat	S	S					
total fat	S	S	S				
Trans fat	S	D(5%)	D(5%)	S			
	S	D(10%)	S	S			
saturated fat	S	S	D(5%)	S	S		
	S	D(5%)	D(1%)	D(5%)	S		
Cholesterol	S	S	S	S	S	S	
	S	S	S	S	D(1%)	S	
Sodium	S	S	S	D(10%)	S	S	S
	S	D(1%)	D(1%)	D(5%)	S	D(1%)	S

"S" means the nutrition knowledge has the same effects on the two nutrients; "D(x)" means the effects are different at x significant level. For every blank of the table, there are two rows. The first row denotes the effects of "heardguideline" and the second row denotes the effects of "heardpyramid". And the table should be symmetric along the diagonal line.

## Effects of Nutrition Knowledge for Normal Weight People and Abnormal Weight People

- Chow-tests are performed
- Most of the effects are the same

	calories	calories from fat	total fat	Trans fat	saturated fat	Cholest-erol	sodium
heardpyramid	S	S	S	S	S	S	S
Heardguideline	S	S	S	S	S	D(5%)	S

"S" means the nutrition knowledge has the same effects on the two nutrients; "D(x)" means the effects are different at x significant level..

## Socio-economic Profiles across Time

- Chow-tests are performed
- For total fat, all the effects are the same across time. For sodium, the changes are biggest and significant.

	age	agesqu -are	educat -ion	househol -dsize	income	female	Hispa- nic	white	black
calories	D (5%)	S	D (10%)	S	S	S	S	S	S
total fat	S	S	S	S	S	S	S	S	S
saturated fat	S	S	D (10%)	S	D (10%)	S	D (5%)	S	S
cholester ol	S	S	S	S	D (5%)	S	D (10%)	S	S
sodium	S	S	D (5%)	S	S	D (1%)	D (5%)	S	S

"S" means the nutrition knowledge has the same effects on the two nutrients; "D(x)" means the effects are different at x 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.