

DETERMINANTS OF FOOD LABEL USE IN SINGAPORE

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Outline

- The Singaporean Context
- Food Labeling in Singapore
- Literature Review: Determinants of Food Label Use
- Research Questions
- Study Design
- Methodology
- Findings
- Discussion
- Implications for policymakers and practitioners



Population: 5million

74%
Chinese

13%
Malay

9%
Indian

...

GDP Per Capita: 3rd highest globally

Middle & upper income, upwardly mobile

Dietary habits transform; low home cooking

Processed food
consumption

Gradual rise in
obesity

Food label
use

Health
consciousness



Manufacturer-Consumer health information bridge

Increasingly used around the world

False & misleading claims adversely affecting use

Determinants of Use

DEMOGRAPHICS

- Age: Inconclusive
- Education: Direct

PSYCHOSOCIAL

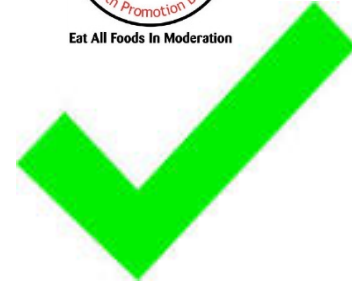
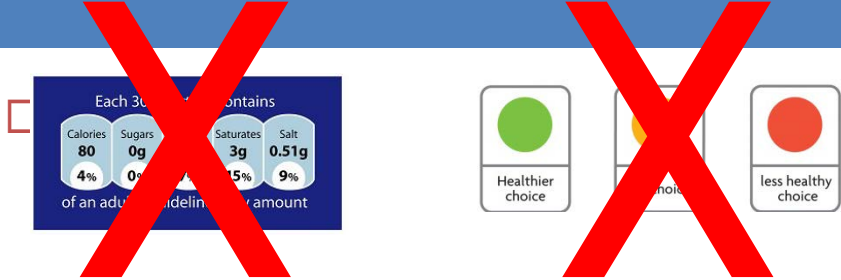
- Prior nutritional knowledge
- Ease of use: Direct
- Trust: Direct
- Skepticism: Inverse
- Perceived benefits: Direct

Determinants unstudied in Singapore

Lack of rigorous theoretically-grounded inquiry

Food Labeling Regulations

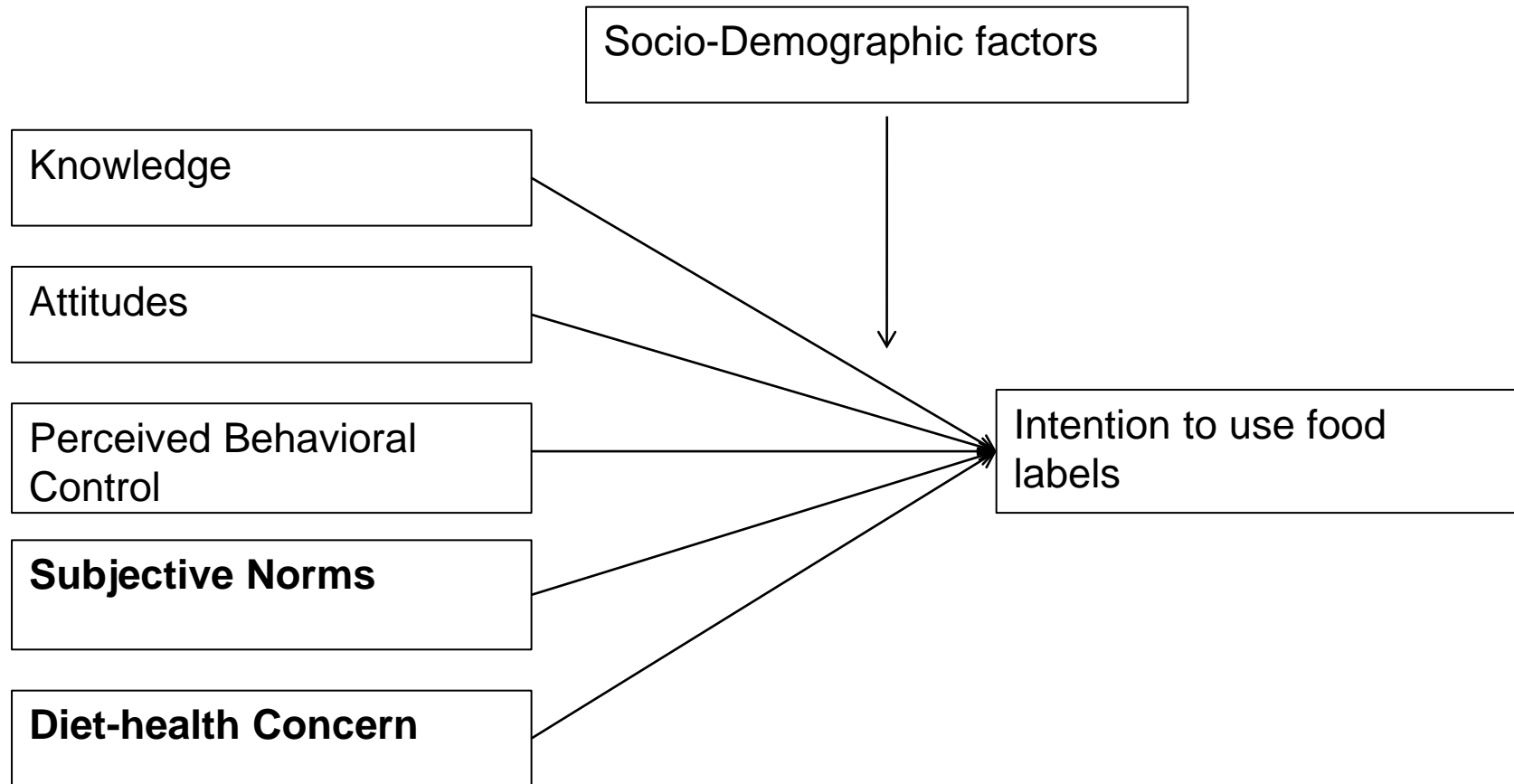
- Product name
- Ingredient list
- Allergen labeling
- Quantity
- Drained weight
- Country of origin
- Manufacturer details
- Packer
- Local vendor
- Nutrition Information Panel (allowed)



Third Party Seals



Theoretical Framework



Research Questions

- RQ1: What is the level of knowledge and understanding about food label use among Singapore's supermarket shoppers?
- RQ2: How do psychosocial factors relate to food label use differ by gender, ethnicity and age?
- RQ3: Do the TPB factors influence food label use?
- RQ4: To what extent does subjective norms and diet health concern add to the predictive power of the TPB in explaining food label use?

Methods

- Shop-intercept survey
- NTUC FairPrice (prominent grocery stores in Singapore)
- Convenience sampling
- 15-20 minute paper-based survey
- Incentives: Shopping vouchers Singapore \$10 (USD8)



Questionnaire

- 36-item questionnaire
- Demographics
- Knowledge (18-item index)
- TPB Constructs
 - **Attitude:** “The Nutrition Information Panel that appears on many food packages is a useful tool for consumers.”
 - **Subjective Norm:** “Most people who are important to me think that I should read food labels when I purchase food.”
 - **Perceived Behavioural Control:** “What is your perceived ease of understanding of the seven food label elements below?”
 - **Diet Health Concern:** Importance of eating healthy foods
 - **Intention to use:** “When you purchase a food product for the first time, do you look at the nutrition information panel on the package?”

Analytical Strategy

- Step 1: Factor analysis with Varimax rotations
- Step 2: Evaluate normality of distributions
- Step 2: Descriptive analysis (demographics, knowledge)
- Step 3: Demographic analysis of DVs (age, ethnicity)
- Step 4: Linear regression to evaluate TPB's relevance

Participant Profile

Variable	% (n=200)
Gender	
Male	36.5
Female	63.5
Race	
Chinese	75.5
Malay	8.5
Indian	7.0
Caucasian	9.0
Age	
10-19 years	16.0
20-29 years	32.5
30-39 years	22.0
40-49 years	18.5
50 and above	11.0
Education	
Primary School/Secondary School (O/N level)	35.0
Junior College/Polytechnic Diploma/Advanced Diploma	27.0
Bachelor or Post-bachelor Degree	37.5
Income	
\$1,000 and less	18.6
\$1,001- 3,000	25.1
\$3,001- 5,000	16.6
\$5,001- 7,000	8.0
More than \$7,000	6.0
Declined to answer	25.6

Summary Scores of Key Variables	Mean ^a (S.D)	Median ^b (25 th -75 th percentiles)
Knowledge (maximum score 18)	-	5 (4 - 8)
Attitude (max 5)	3.78 (0.72)	-
Subjective Norms (max 5)	3.35 (0.75)	-
Perceived Behavioral Control (max 5)	3.70 (0.63)	-
Diet-health Concern (max 5)	-	4.09 (3.72 - 4.55)
Intention to Use Food Labels (max 5)	3.34 (0.79)	-
Food Label Use (max 19)	-	13(10 - 16)

a: normally distributed | b: not normally distributed

Knowledge & Health Literacy

Knowledge of food label information	% Incorrect	% Correct
Which of the following calorie requirements is the % daily value based on?	78.5	21.5
If a food could be considered as a good source of a nutrient, the food should contain at least what percentage of that nutrient?	75.5	24.5
A natural claim means...		
One/some of the ingredients is/are natural	41.5	58.5
All the ingredients are natural	48.5	51.5
No additives have been added	59.5	40.5
No preservatives have been added	58.5	41.5
Food with a natural or fresh claim is less processed than food without such claims	84.0	15.5
Natural or fresh claim on food products means that food has not been excessively extracted	76.0	23.0
Natural or fresh claim on food products means that the food has not been significantly modified from its natural state	79.5	19.5
Natural or fresh food is healthier than food without such claims	80.5	18.5
Foods with fresh or natural claim has lesser risk of being polluted than food without such claims	67.5	31.0
Organic food is...		
Food free of artificial food additives	85.5	14.0
Food that is minimally processed	60.0	38.5
Food with fresh/natural claim	43.5	56.0
Organic food tastes better than non-organic food	55.5	44.0
Organic food has longer shelf life	48.0	51.0
Organic food has more health-related benefits than non-organic food	84.5	15.0
Organic food has less risk of being polluted than non-organic food	82.5	17.5
Health Literacy		
Based on the nutrition information in Product 1...		
How many grams of sugar are there in two servings of this product?	57.5	42.0
How many grams of fat are there in 50% of this pack?	44.5	55.5
How many servings are there in this product?	33.5	66.5
Is this product high in fat?	63.5	36.5

Psychosocial Factors by Gender

Variable	Male (n=73)	Female (n=127)
Knowledge (max score 18)	6.81(0.42)	5.50 (0.24)
Attitude (max 5)	3.75 (0.61)	3.73 (0.62)
Subjective Norm (max 5)	3.38 (0.73)	3.33 (0.42)
Perceived Behavioral Control (max 5)	3.68 (0.60)	3.71 (0.65)
Diet-Health Concern (max 5)*	3.95 (0.75)	4.14 (0.56)
Food Label Use (max score 19)	13.21 (0.50)	12.75 (0.38)

Comparison of means by independent t-tests

*Statistically significant at $p < 0.05$

Psychosocial Factors by Age

Variable	10-19 (n=31)	20-29 (n=65)	30-39 (n=44)	40-49 (n=37)	50 + (n=32)	p-value (ANOVA)
Knowledge (max score 18)	6.06 (2.29)	5.98 (2.36)	6.11 (2.81)	5.35 (3.11)	6.63 (4.08)	0.64
Attitude (max 5)	3.88 (0.57)	3.60 ^d (0.62)	3.66 ^d (0.60)	4.02 ^{b, c} (0.60)	3.64 (0.53)	0.01
Subjective Norm (max 5)	3.24 (0.76)	3.21 ^d (0.75)	3.27 ^d (0.63)	3.82 ^{b, c} (0.60)	3.39 (0.79)	0.00
Behavioral Control (max 5)	3.73 (0.76)	3.73 (0.58)	3.49 (0.57)	3.78 (0.72)	3.84 (0.60)	0.14
Diet-Health Concern (max 5)	4.01 (0.74)	4.09 (0.58)	4.04 (0.55)	4.28 (0.56)	3.98 (0.63)	0.29
Food Label Use (max 19)	11.68 (4.07)	13.75 (4.01)	11.61 (4.74)	13.91 (4.03)	13.14 (4.14)	0.02

One-way ANOVA with $p < 0.05$ and Tukey's post-hoc test for between-group differences

a: significant difference with 10-19 group at $p < 0.05$

b: significant difference with 20-29 group at $p < 0.05$

c: significant difference with 30-39 group at $p < 0.05$

d: significant difference with 40-49 group at $p < 0.05$

e: significant difference with 50+ group at $p < 0.05$

Psychosocial Factors by Ethnicity

Variable	Chinese (n=150)	Malay (n=17)	Indian (n=14)	Caucasian (n=18)	p-value (ANOVA)
Knowledge (max score 18)	6.06 (2.80)	5.18 (3.20)	5.43 (4.15)	6.50 (4.64)	0.55
Attitude (max 5)	3.66 ^b (0.60)	4.32 ^{a, d} (0.65)	3.91 (0.51)	3.70 ^b (0.50)	0.00
Subjective Norm (max 5)	3.32 ^b (0.73)	3.92 ^{a, c} (0.64)	3.16 ^b (0.65)	3.35 (0.69)	0.01
Behavioral Control (max 5)	3.62 ^b (0.63)	4.08 ^a (0.67)	3.81 (0.42)	3.87 (0.61)	0.02
Diet-Health Concern (max 5)	4.03 ^c (0.59)	4.36 (0.49)	4.50 ^a (0.51)	4.01 (0.73)	0.01
Food Label Use (max 19)	12.87 (4.14)	14.58 (3.73)	12.42 (3.57)	12.11 (5.60)	0.33

Statistical test: One-way ANOVA with $p < 0.05$ and Tukey's post-hoc for between-group differences

a: significant difference with Chinese group at $p < 0.05$

b: significant difference with Malay group at $p < 0.05$

c: significant difference with Indian group at $p < 0.05$

d: significant difference with Caucasian group at $p < 0.05$

TPB to Predict Intention-to-use

	Model 1 $R^2 = 0.18$ ($p < 0.001$)				Model 2 $R^2 = 0.24$ ($p < 0.001$)			
Predictors	Intercept	SE	β	p-value	Intercept	SE	β	p-value
Constant	0.92	0.40	0.02		-0.24	0.48		0.62
Attitudes	0.27	0.10	0.21	.01	0.19	0.10	0.15	0.05
Social Norms	0.22	0.08	0.20	.01	0.24	0.08	0.22	<0.01
Behavioral Control	0.18	0.09	0.14	.04	0.19	0.09	0.15	0.03
Diet-health Concern					0.34	0.09	0.26	<0.001

Intention-to-use As A Predictor of Total Food Label Use

	Model 1 $R^2 = 0.14$ ($p < 0.001$)			
Predictor	Intercept	SE	β	p-value
Constant	6.12	1.23	-	<0.001
Behavioral Intention	2.03	0.36	0.38	<0.001

Discussion of Findings

- Knowledge
 - ▣ High use, low literacy
 - ▣ Can lead to lower use, adverse influence on diet choices
- Demographic analyses
 - ▣ 40-49 years most positive attitudes
 - ▣ Malays most positive attitudes
- TPB & Diet-health concern
 - ▣ Behavioral control stronger than attitudes, norms
 - ▣ DHC adds to predictive ability of TPB

Implications for Nutrition Education

- Study identifies segments for education dissemination
- 40-49 year olds can influence, older, younger groups
- Malays can influence fellow Malays & Indian groups
- More emphasis needed on Chinese, Indian groups
- Need to incorporate theoretical insights in community education programs

Implications for Food Labeling Policy

- Importance of public-private partnerships
- Discourse on food label harmonization in ASEAN
- Selective harmonization critical
 - Harmonization for food safety standards necessary
 - Harmonization of food labeling formats needs reconsideration
 - Study demonstrates targeted food labeling approach

Conclusions & Future Directions

- Importance of demographic and theoretical analyses for food labeling discourse
- Research paper on health literacy & usability currently underway
- Correlated research on sensory approaches to food label marketing