

## FOOD LABEL USAGE AMONG RESIDENTS OF THE VALIKAMAM AREA OF JAFFNA, SRI LANKA

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### Abstract

Food consumption patterns of Sri Lankan citizens are changing drastically towards fast and junk foods within the last decade. As a consequence of adverse food intake, Sri Lankan population has undergone the risk of obesity, raised blood pressure, raised blood sugar level and deposition of bad cholesterol. Labels not only aid consumer choices, but they also guide him to healthy living by avoiding adverse intake. Now a days, many fast food restaurants and supermarkets sell modern sophisticated foods rushed into Jaffna and consumers are also attracted towards such places. The objective of this study is to identify the socio-demographic features and individual behaviors that influence the food label usage and to identify the consumer groups in order to find out the market for food labeling. A total of 158 respondents were interviewed in Valikamam DS division for this survey. In order to identify the key determinants of whether an individual reads food labels when buying a familiar product, 15 explanatory variables were analysed using logistic regression. Therefore, the study concludes that the determinants that influence whether an individual reads food labels when buying familiar product. These include Special dietary status, marital status, whether an individual reads nutrition panel of familiar product and if the household income group earns less than 250000/=annually when other income group earn above or equal 400000/=annually. Among them, married and those who are not reading nutritional labels on familiar products have negative significant impacts.

**Keywords:** Socio-demographics, Logistic Regression, Nutritional Label.

### 1. Introduction

#### 1.1 Background

Food consumption patterns of Sri Lankan citizens are changing drastically towards the fast and junk foods in last decade. As a consequence of adverse food intake, the Sri Lankan population is undergoing the risk of obesity, raised blood pressure, raised blood sugar level and deposition of bad cholesterol. In that sense, we are in a situation to enlighten the consumers about the bond between food consumption choices and healthy life our ancestors preserved. In order to safeguard the consumers from food related health problems, governments intervene between the producers and consumers in the form of regulations. The Sri Lankan Government's Intervention is not a sole act, but also in other countries, several food acts are being amended until now.

Labelling means any written, printed or graphic matter that is present on the label, accompanies the food, or is displayed near the food, including that for the purpose of promoting its sale or disposal(FAO, 2001)

The amended Food labelling act requires a tag that opens up transparency between a consumer and producer on the characteristics of the food ,mainly regarding anyhealth

concerns. Sri Lanka safeguards their citizens by implying the food labelling act together with existing food regulations. No person shall sell, offer for sale, expose or keep for sale or advertise for sale, any food contained in a package or container unless such package or container is labelled in accordance with these regulations (Food labelling and advertising regulations 2005).

If the products are not labelled, consumers may not be fully aware of their nutrient content. Consumers must form their own beliefs about nutrient content based on advertising, public health messages and their general knowledge of food science. However, this eventually leads to underestimates or overestimates of the content of particular nutrients in unlabeled food items (Zarkin & Anderson, 1992).

Food labels not only a tag representing the price, Brand and shelf life, but also it opens up the nutritional facts behind the processed food. Price and brand are direct determinants of a consumer choice, but usage of labels is also studied as a factor in research literatures. The labels make the consumer willing to pay more for the food, as he seeks the aspects needed. Nutrition information on food items allows consumers to, eat a variety of foods, maintain a healthy weight, choose a diet with low saturated fat, and cholesterol, choose a diet with plenty of vegetables, fruits and grain products, use sugars only in moderation, use salt and sodium in moderation ( Falola, 2014).

Labels not only aid the consumer choices, but it also helps him to healthy living by avoiding adverse intake. As a consequence, consumer are able to reduce the risk of Diabetics, Heart diseases and obesity which are common food related issues.

## 1.2 Problem Statement

It is important to note that even the benefits are pronounced, with very few of the studies done on the consumers' attitudes and preferences on food labels in Sri Lanka, especially on Jaffna district. Now a days, many fast food restaurants and supermarkets sell modern, sophisticated and fast foods rushed into Jaffna and consumers are also attracted towards such places. There is less research done on district wise surveys which consist of econometric analysis on the above context. Now a days, many fast food restaurants and supermarkets sell modern sophisticated foods rushed into Jaffna and consumers are also attracted towards such places.

## 1.3 Objective

This study tends to analyse the consumer's preference and attitudes about the food labels.

### 1.3.1 Specific objective

- To identify the socio-demographic features and individual behaviour that influence the food label usage
- To identify the consumer groups in order to find out the market for labelling

## 1.4 Hypothesis of this study

The following hypothesis would be tested in this study:

- Being married positively influences the label usage.
- Level of education, Household income positively influence the label usage.
- People under special dietary status and older people will positively influence the label usage.
- People on professional jobs positively influence the label usage
- Knowledge of the food planner and expenditure on grocery will have positive influence on label usage.
- Preference to buy labelled product positively signifies impact on label use

- Whether an individual reading ingredients on new product positively signifies impact on label use
- Whether an individual reading nutrition panel on familiar product positively signifies impact on label use

## **2. Methodology**

### **2.1 Description of the Study Area**

The Valikamam divisional secretariat divisions that are north, south, east, west and south-west were selected for this study. Over 50% of the population is involved in the agriculture sector in Valikamam region. Jaffna District is divided into four Sub divisions. They are Islands, Valikamam, Thenmaradchi and Vadamaradchi. The Land in Jaffna District could be characterized as flat with less than 5% slope. There are 1084 ponds and 2,433 ditches scattered all over the District with connected channels to conserve rain water. Excess water is easily drained into the sea/lagoon. The climate of Jaffna peninsula is considered to be tropical monsoonal with a seasonal rhythm of rainfall. The temperature ranges from 26 C to 33 C. Annual precipitation ranges from 696 mm to 1125 mm. The north east monsoon rain (October to January) accounts for more than 90 % of the annual rainfall. ([ejaffna.lk/travels/geography-and-climate/](http://ejaffna.lk/travels/geography-and-climate/))

For area of study, I have chosen Valikamam area within Jaffna district consist of 44.7% of the population where 117845 males and 132191 females residing. The study area majorly consist of rural features. (Department of Census and Statistics June 2008). 158 gramaniadhari divisions at the extent of 292.28sq kilometres of land is lying under valikamam region (Jaffna District secretariat 2012). An Estimated figure of 12,963 (for 11 GN divisions in uncleared area) is obtained from the 26 District Secretary of Jaffna district

### **2.2 Sampling Procedure**

Random sampling method was used to select the sample for this study. The survey was administered to 158 respondents of the valikamam area randomly. Number of samples from Kopay, Chankanai, Sandilipay, Uduvil and Tellipalai are 52,17,36,31,23 respectively.

### **2.3 Data Collection**

Data were collected mainly near the supermarkets like Cargills, Sathosa, Co-op city and private owned modern shops within the area of study after the shopping procedure of the respondent. Data were collected from June to July 2014 directly.

### **2.4 Instrument for Data Collection**

The well structured questionnaire with both closed and open ended questions prepared in the view of collecting data regarding house hold information, food label usage, food related health issues, opinions and perceptions about the food labels. The data was collected through direct interview with the respondents.

### **2.5 Method of Data Analysis**

#### **2.5.1 Data Analysis**

Data of this study were analyzed using descriptive statistics and logistic regression techniques. Logistic regression is the non linear model that was used to examine the nature of the relationship between the dependent and independent variables. Since the model is applied to find out the relationship between reading food labels when buying familiar product and identified explanatory variables.

#### **2.5.2 Econometric Model**

Logistic regression, being well suited for analyzing dichotomous outcomes, has been increasingly applied in social science research (Peng & So, 2002). The logistic regression model is a non-linear regression model that has a binary response variable. It is a very useful tool, especially in situations in which one wants to predict the presence or absence of a

characteristic or outcome based on values of a set of predictor variables (Agresti,1996). Logistic regression is similar to linear regression, but is suited to situations in which the dependent variable is dichotomous (Borooah & Vani,2002). Thus, in instances where the independent variables are categorical, or a mix of continuous and categorical, and the dependent variable is categorical, logistic regression is necessary.

### **2.5.3 Ordinary Least Squares (OLS) and Dichotomous Dependent Variables**

While estimates derived from regression analysis may be robust against violations of some assumptions, other assumptions are crucial, and violations of them can lead to unreasonable estimates. This is often the case when the dependent variable is a qualitative measure rather than a continuous, interval measure. If OLS Regression is done with a qualitative dependent variable:

- It may seriously misestimate the magnitude of the effects of independent variables.
- All of the standard statistical inferences (e.g. hypothesis tests, construction of confidence intervals) are unjustified .
- Regression estimates will be highly sensitive to the range of particular values observed (thus making extrapolations or forecasts beyond the range of the data especially unjustified)

### **2.5.4 OLS Regression and the Linear Probability Model (l pm).**

The regression model places no restrictions on the values that the independent variables take on. They may be continuous interval levels, but they may be only positive or zero or they may be dichotomous (dummy) variable.

The dependent variable, however, is assumed to be continuous. Because there are no restrictions on the independent variables, the dependent variables must be free to range in value from negative infinity to positive infinity. However, there are several potential problems with OLS regression using a binary dependent variable. One such example is Heteroskedasticity, errors are not normally distributed, linearity

According to the phenomena described above, Logistic regression is selected for further analysis. Statistical software can be used to obtain the estimates for such model; Stata statistical software version 11 is used to draw the conclusions.

### **2.5.5 Model Specification**

The logit model was selected for the regression in this analysis because its asymptotic characteristic constrains the predicted probabilities to a range of zero to one. The logit model is also favored for its mathematical simplicity and is often used in a setting where the dependent variable is binary. As the survey utilized in this analysis provided individual rather than aggregate observations, the estimation method of choice was the maximum likelihood estimation (Gujarati, 1992). Among the beneficial characteristics of MLE are that the parameter estimates are consistent and asymptotically efficient (Pindyck&Rubinfeld, 1991).

The model assumes that the probability that an individual read the food label when buying a familiar product,  $P_i$ , is dependent on a vector of independent variables ( $X_{ij}$ ) associated with consumer  $i$  and variable  $j$ , and a vector of unknown parameters  $b$ . The likelihood of observing the dependent variable was tested as a function of variables which included socio demographic and consumption characteristics.

$$P_i = F(Z_i) = F(\alpha + \beta X_i) = 1 / [ 1 + \exp (-Z_i)]$$

Where:

$F(Z_i)$  = represents the value of the standard normal density function associated with each possible value of the underlying index  $Z_i$ .

$P_i$  = the probability that an individual read the food label when buying a familiar product given knowledge of the independent variables  $X_i$

$e$  = the base of natural logarithms approximately equal to 2.7182

$Z_i$  = the underlying index number or  $\beta X_i$

$\alpha$  = the intercept

And  $\beta X_i$  is a linear combination of independent variables so that:

$$Z_i = \log [P_i / (1 - P_i)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \epsilon$$

Where:

$i=1,2,\dots,n$  are observations

$Z_i$  = the unobserved index level or the log odds of choice for the  $i$ th observation

$X_n$  = the  $n$ th explanatory variable for the  $i$ th observation

$\beta$  = the parameters to be estimated

$\epsilon$  = the error or disturbance term

The dependent variable  $Z_i$  in the above equation is the logarithm of the probability that a particular choice will be made. The parameter estimates do not directly represent the effect of the independent variables. To obtain the estimators for continuous explanatory variables in the logit model, the changes in probability that  $Y_i = 1(P_i)$  brought about by a change in the independent variable,  $X_{ij}$  is given by:

$$\left( \frac{\partial P_i}{\partial X_{ij}} \right) = \left[ \frac{\partial \log \left( \frac{P_i}{1 - P_i} \right)}{\partial X_{ij}} \right] \cdot \left[ \frac{P_i (1 - P_i)}{P_i} \right]^2$$

For qualitative discrete variables, such as the explanatory variables used in this study,  $\frac{\partial P_i}{\partial X_{ij}}$  does not exist. Probability changes are then determined by:

$$\left( \frac{\partial P_i}{\partial X_{ij}} \right) = P_i(Y_i = 1) - P_i(Y_i = 0)$$

The following model was developed to predict the likelihood of reading food label when buying a familiar product (i.e. those who always or quite often read food label on familiar food products they purchase). The model was tested under the specification:

$$\text{Depv} = \beta_0 + \beta_1 \text{mstatus} + \beta_2 \text{age} + \beta_3 \text{occu} + \beta_4 \text{know} + \beta_5 \text{edu1} + \beta_6 \text{edu2} + \beta_7 \text{edu3} + \beta_8 \text{grocery} + \beta_9 \text{prefer} + \beta_{10} \text{ingnew} + \beta_{11} \text{nutrfam} + \beta_{12} \text{dietstat} + \beta_{13} \text{hh1} + \beta_{14} \text{hh2} + \beta_{15} \text{hh3} + e$$

$\text{Depv} = 1$  if the participant always or quite often read food label on familiar food products they purchase and 0 otherwise, here the dependent variable was a dichotomous variable defining that "Do the respondent always or quite often read the food label when buying a familiar product?" and took the value of 1 if the respondent was reading the food label and 0 if not. The independent variables were the socio-economic factors and individual purchasing behavior. The hypothesized independent variables were:

$\text{mstatus}$  = marital status (dummy variable, 1=married and 0=not married)

$\text{age}$  = Age in years

$\text{occu}$  = Occupation (dummy variable, 1=professional, 0=not professional)

$\text{know}$  = Nutritional knowledge of food planner (None = 1, low = 2, medium = 3 and high = 4)

$\text{edu1}$  = Educational level of the respondent studied ordinary level or below

$\text{edu2}$  = Educational level of the respondent studied advanced level

$\text{edu3}$  = Educational level of the respondent following or completed Diploma or Graduated or post graduated

$\text{grocery}$  = monthly expenditure on grocery (Sri Lankan Rupees)

prefer =Whether the respondent preferred to buy labelled product or not( 1=if answered yes  
0=if not)

ingnw= reading ingredients when buying familiar

product(1=always,2=quite often,3=sometimes,4=rarely,5=never)

nutrfam=reading nutrients when buying familiar product(0=reading,1=not reading)

dietstat= if respondent under special dietary status or vegetarian

hh1= house hold income below 25000/=

hh2= house hold income equal or above 25000/= and below 400000/=

hh3== house hold income equal or above 400000/=

### 3. Result and Discussion

#### 3.1 Results of Econometric Analysis

Logistic regression was used to investigate the determinants of whether an individual always or quite often read the food label when purchasing a familiar product within Valikamam area of Jaffna district. The table below represents the results for logistic regression analysis and the variables included in our method explain 78.91% of the food label respondents. Out of 15 independent variables used, one became significant at 10% level and four at 5% level.

Logistic estimation of selected explanatory variables on the dependent variable that is whether an individual always or quite often read food label when purchasing familiar goods.

**Table 1:** Results of logit analysis

	<b>Coef</b>	<b>dy/dx</b>	<b>P&gt;z</b>
<b>dietstat*</b>	7.627917**	4.83e-07	0.034
<b>knowledge</b>	2.511886	8.01e-09	0.105
<b>ingnew</b>	-0.2206962	-7.03e-10	0.735
<b>nutrfam</b>	-9.059941**	-2.89e-08	0.011
<b>prefer*</b>	-4.42616	2.23e-07	0.586
<b>grocery</b>	0.0001631	5.20e-13	0.337
<b>mstatus*</b>	-7.153104**	-8.73e-07	0.036
<b>occupation*</b>	0.9733591	3.63e-09	0.786
<b>edug1*</b>	5.627131	8.72e-08	0.264
<b>edug2*</b>	0.1978623	6.61e-10	0.951
<b>edug3*</b>	-7.695148	-1.51e-08	0.298
<b>hh1*</b>	5.852208**	2.81e-07	0.033
<b>hh2*</b>	-31.04042	-5.75e-09	0.993 0.068
<b>hh3*</b>	6.951227***	6.25e-07	

		46	
<b>age</b>	-0.2068428	-6.59e-10	0.144
<b>_cons</b>	9.922346		0.998

(\*) dy/dx is for discrete change of dummy variable from 0 to 1  
(\*\*)=significant at 5%level, (\*\*\*)=significant at 10% level

Table represents the estimation of the parameters of logistic model. The overall goodness of fit as reflected by Prob> Chi2 (0.0000) was good. The parameter coefficients cannot be interpreted directly, after the transformation to marginal (dy/dx), and then only it is interpreted. Marginal effect of independent variables indicate probability variation of being in group if one unit changes.

Knowledge, frequency of reading ingredients when purchasing new food product, preference of individual to buy labelled product, expenditure on grocery, occupation, level of education, age, household income group above or equal 250000/= to below 400000/= were not found to be significant impact on the dependent variable.

### 3.2 People Under Special Dietary Status or Being Vegetarian

Group of people under special dietary status such as raised blood pressure, blood sugar, high cholesterol or anything that raises the awareness to the food intake shows positive significant impact at 5% level of significance. If the respondent are under special dietary status, it was denoted as 1, if not, it is 0. The results shows that when an individual is being on to the special dietary status, he /she will always or quite often read the food label when purchasing a familiar food product.

These results are in line with the study to determine consumer willingness to pay for nutritional labelling by Prathiraja and Ariyawardana (2003) and study examines the factors that influence consumers' perceptions or beliefs about food labels by (Nayga Jr, 1999).

### 3.3 Marital Status

Marital status is found to have negative significant impact at 5% level of significance. It is the dummy treated as 1 if the respondent got married and 0 if they are not. When the value approaches one, probability of always or quite often read the food label when purchasing a familiar food product decreases.

### 3.4 Reading nutritional information while purchasing familiar food products

Reading nutritional information when purchasing familiar food products shows negative significant impact at 5% level of significance on the dependent variable. To found out the response for independent variable following question asked. How often do you read the nutritional section of food labels, when buying a familiar product?"

The responses were categorised as follows:

0=Reading ,1=not reading

When an individual's behavior goes towards the "not reading," that will cause the dependent variable to be negative, meaning that he/she will not read the food label when purchasing familiar good.

### 3.5 Household Income Groups

Household income group earn less than 250000/=annually and other income group earn above or equal 400000/= annually have significant positive impact on the dependent variable. That represents respondents in the above categories are reading food labels always or quite often when purchasing a familiar product.

## Conclusion and recommendation

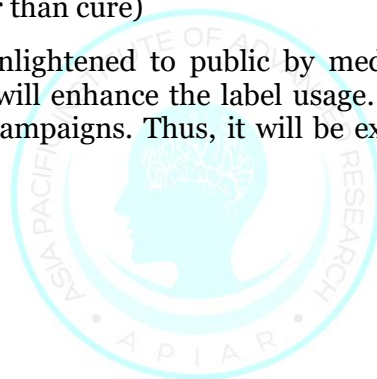
The main objective of this study is to explore the consumer attitudes and preferences towards food labels in Valikamam divisional secretariat area of Jaffna District. The entry of new restaurants and sophisticated packed foods in trend of fast food are conquering the people in the study area. They are much addicted towards it. Even though the Sri Lankan government formulated food labelling regulations, the people are not much aware of that. In that sense, this study would measure the awareness and attitudes of the consumers and the determinants at the background. A total of 158 respondents was interviewed for this survey. In order to identify the key determinants that whether an individual read food label when buying a familiar product, 15 explanatory variables were analysed using logistic regression.

Therefore, the study concludes the determinants that influence whether an individual read food label when buying familiar product. These include Special dietary status, marital status, whether an individual read nutrition panel of familiar product and Household income group earn less than 250000/=annually and other income group earn above or equal 400000/= annually. Among them, married and who are not reading nutritional label on familiar product have negative significant impact.

The empirical estimation of the logistic analysis shows a log likelihood of -10.927157, Prob > chi2 is 0.0000 and the Pseudo R2 0.7891 is this is shows that the model have a good fit.

People who are not under special dietary status are not aware of labels. They should be given proper awareness before getting diseased, possibly through nutrition awareness programs.(Prevention is better than cure)

Nutritional facts should be enlightened to public by media to improve the healthy food intake. As a consequence, it will enhance the label usage. Married people should be made aware of the health through campaigns. Thus, it will be expected to safeguard the families also.





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