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Determinants of Dairy Product Consumption Patterns: The Role of Consumer Perception on Food Quality Attributes

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ABSTRACT

This study examines the factors that determine consumption patterns of dairy products amongst Sri Lankans. Caswell's Classification on Food Quality, which identifies a large number of attributes that determine the overall quality of a food products (e.g. food safety, nutrition, label, package, taste and appearance etc), was used to develop the analytical framework. Data were collected from 500 households during February to April 2013 in which consumption patterns of several dairy products, including powdered milk, fresh milk, yoghurt, butter, curd etc. were considered. Upon performing a Principle Component Analysis, indices were derived to reflect the extent to which each household perceives the importance of various food quality attributes in their consumption decisions of which the values ranged from 0 to 1 (1 – absolutely important; 0 – not at all). It was found that powdered milk was the most frequently consumed (75% purchased weekly) followed by yogurt (40%) and butter (20%). The Mean index values showed that consumers judge nutrition to be the most influential food quality attribute, while sensory factors (taste, appearance) and food safety guided the purchasing behavior of powdered milk. The estimates from an Ordered Probit Regression show that demographic factors, including age, gender, income level and ethnicity have a significant impact on household consumption.

KEYWORDS: Consumer perceptions, Consumption patterns, Dairy products, Food quality

INRODUCTION

Sri Lanka with a population growth rate of 0.9%, similar to many Asian countries, significant transformation is taking place in the country's food marketing system as a result of industrialization, economic growth, urbanization, globalization, and trade liberalization.

The annual per capita consumption of milk of Sri Lankan has grown by nearly 200% from 13 kg/year to 36 kg/year since 1981. These changes have led to more affluent consumers who demand higher quality food products which are differentiated through branding, labeling information and a variety of quality attributes to meet consumers' increasingly diverse needs and preferences (Ishida et al., 2003).

Additionally as consumers become more educated they tend to become more conscious about health and wellness issues related to food choices and diet. All of these factors are driving shifts in Asian diets away from starch-based staples (e.g. rice) and increasing demand for wheat-based, meat and dairy products as well as fruits and vegetables.

The dairy industry in Sri Lanka is one of the most important industries of the country that has tremendous potentials in developing the economy. Also this sector is dominated by imports, mainly in the form of full cream milk powder (FCMP). Annually about 72420 MT FCMP is imported which provides a cheaper product than locally processed fresh milk. Having such a great potential to be self sufficient with dairy production, yet the country produces only 20% of the requirement of the milk and related products. Rest of the market requirement is directly imported from several other countries that spend Rs.36 billion every year with great difficulties.

The consumption patterns and taste in food are often shaped by family life cycle and the number, age, and gender of people in the household, and occupation (Kotler and Keller, 2006). The consumer's decisions in product and brand choices are greatly influenced by income level, stability, personality, self concept, core values and life style. The consumers' characteristics, buying behavior and preferences vary over the consumers' life time (Miftari, 2009). Also family is considered to be one of the most important consumer buying groups in the society.

Many studies have been carried out in both developed and developing countries to study the consumption and purchasing behavior in general and the dairy consumption in particular. However, this issue has not been empirically analyzed in the context of Sri Lanka to the best knowledge of the authors. Therefore, the primary aims of this paper are to (1) explore Sri Lankan consumers' purchasing patterns and the relative importance of various food qualities attributes when purchasing dairy products (DPs) and (2) investigate factors influencing Sri Lan-

-kan consumers increasing demand for DPs in general and powdered milk in particular.

METHODOLOGY

Sri Lankans consume diverse types of DPs (i.e. milk powder, fresh milk, yoghurt, curd, ice cream, butter and cheese). The consumption patterns and the increased demand for dairy products are influence by both food quality attributes such as process, cues, values, food safety measurements, sensory and nutritional factors (Caswell, 2000) as well as demographic factors (i.e. age, gender, level of education etc). Thus the relationship between the consumption of dairy products and the above mentioned factors can be established as shown in equation 1 below.

$$Y_{ij} = \beta_0 + \beta_1*AGE + \beta_2*CST + \beta_3*GEN + \beta_4*CHL + \beta_5*INC + \beta_6*ETH + \beta_7*PRO + \beta_8*CUE + \beta_9*VAL + \beta_{10}*FDS + \beta_{11}*SEN + \beta_{12}*NUT + \beta_{13}*PRO + \varepsilon \quad (1)$$

Where,

Y_{ij}	=	Increase the consumption of dairy products
β_0 to β_{19}	=	Coefficients
CST	=	Civil status (Married=1, Single = 0)
GEN	=	Gender (Male = 1, Female = 0)
CHL	=	Children (Yes = 1, No = 0)
INC	=	Income
AGE	=	Age
ETH	=	Ethnicity
CUE	=	Cues
VAL	=	Values
FDS	=	Food safety
SEN	=	Sensory
NUT	=	Nutrition
PRO	=	Process
ε	=	Error term

Data Collection and Analysis

A questionnaire was designed to ascertain information on (a) demographic factors of the respondent (b) perception on dairy products (c) purchasing frequency of dairy products (d) perception on milk powder and (e) the probability of purchasing one more dairy product and one more buying unit of milk powder. To determine respondents' attitudes towards dairy products (in general), statements were specified to reflect each food quality attribute. Both positive and negative statements were included in this section to avoid biasing answers (Boniface, 2012).

The respondents were in turn asked to indicate how strongly they agreed or disagreed on a 4 point liker scale (1 = strongly disagree and 4 = strongly agree).

Age was taken as categorical variable representing the age level of respondent. Child is a dummy variable indicating the presence of children in the household. Gender is a dummy variable indicating the respondent was a male (Boniface, 2012).

In order to reveal the purchasing behaviour of households for different income levels, we divided income levels into three groups: income levels, below Rs. 15,000 (INC1), in between Rs 16,000 to Rs. 50,000 (INC2) and above Rs. 50,000 (INC3). INC1 was chosen as a reference group that represents those respondents with characteristics omitted from the explanatory variables. Since the variable was coded as a dummy variable, omission of at least one variable is necessary to avoid the dummy variable trap and ensures that perfect multi-collinearity is avoided (Selim et al., 2004).

Likewise the ethnicity was divided into Sinhalese, Tamils and Muslims and Sinhalese was taken as the reference group.

Households from the Kurunegala and Puttlam in the North Western Province of Sri Lanka were taken as the samples for the survey to determine the consumption pattern of dairy products and the consumer perception on food quality attributes. The questionnaire was pre tested with 50 households upon which the real survey was carried out by administering the validated questionnaire among 500 households.

Descriptive statistics, Principle Component Analysis and Ordred Probit Regression were used to analyze the data using SPSS (version 21) and STATA (version 11).

Principal Component Analysis

Principal Component Analysis (PCA) is statistical technique that linearly transforms an original set of variables in to a substantially smaller set of uncorrelated variables that represents most of the information in the original set of variables. Then this method reduces dimensionality of the original data set.

The attitudinal statements for the DPs and FCMP were tested using PCA, the Eigen value above 1 were extracted and Jolliffee' s simulation studies, the cut off value as 0.7 for correlation matrices 0.7λ, where the λ is the average Eigen value of the covariance matrix were retained (Jolliffee, 2008)

Development of the Index

Based on the responses given for each of the statement that came under the factors considered indices were derived to reflect the extent to which each household perceives the

importance of various food quality attributes in their consumption decisions of which the values ranged from 0 to 1 (1 – absolutely important; 0 – not at all)

$$\text{Index} = [\sum_{i=1}^{n}(n/ls)] \ / N \qquad (2)$$

Where,

n	=	Response on the likert scale
ls	=	Likert scale associate with the response of s^{th} statement
N	=	Maximum potential score

Empirical Model

Ordered Probit model was used to factors influencing the probability a consumer increased their consumption of (1) one more dairy product and (2) one more buying unit of milk powder specified in equation 1. The same independent variables were use for both models except for the *PRO* variable which was omitted in the model specified for FCMP consumption.

RESULTS AND DISCUSSION

Descriptive Statistics of the Sample

The descriptive statistics of the sample are reported in Table 1.

Table 1. Descriptive statistics

Variables	%	Mean
Age		0.249
18-30	40.2	
31-45	28.4	
46-60	25.0	
Above 61	6.2	
Education		NA
Primary	14.0	
G.C.E.(O/L)	30.6	
G.C.E.(A/L)	28.6	
Tertiary	26.8	
Gender		0.562
Male	56.2	
Female	43.8	
Income (Rs. 000')		0.574
<15	15.8	
15-30	47.8	
31-50	27.2	
Above 61	9.2	
Civil status		0.738
Married	73.8	
Single	26.2	
Ethnicity		NA
Sinhalese	31.8	
Tamils	23.8	
Muslims	44.4	
HH size		4.314
Employment		0.476

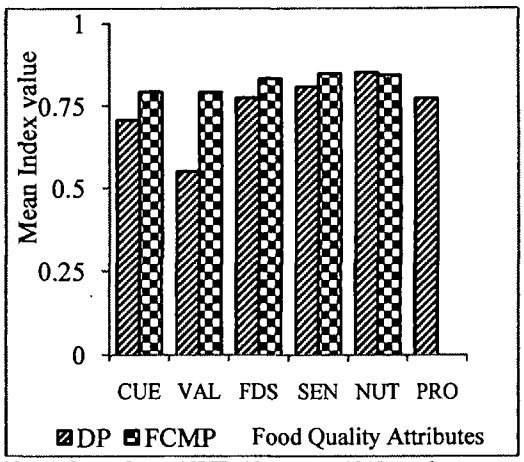
Note: NA-Not Available

Food Quality Attributes

The mean index values for food quality att ributes are shown in Figure 1. Generally almost all factors shown mean index values close to 1 indicating that the respondents perceive these factors to be important during purchase. Consumers mostly considering the quality attributes while purchasing FCMP compared to the consumption of DPs because of the higher purchasing frequency of FCMP.

Purchasing Behaviour of Dairy Products

The frequency of purchasing DPs: powdered milk, fresh milk, cheese, ice cream, butter, yoghurt, and other milk products are shown in Figure 2. FCMP is purchased regularly by many households and yoghurt also purchased weekly basis. Butter, ice cream and curd are purchased monthly basis by many households. Fresh milk is rarely purchased due to lack of accessibility and availability.



Note: Cue=Cues, NUT=Nutrition, VAL=values, FDS= Food safety, PRO=Process, SEN=Sensory

Figure 1. Food quality attributes

Outcome of Principal Component Analysis

The food quality attributes and the variables stated under each category are given in Table 2. The statements with values over the Jolliffe's cut off value were used for developing of the index for the Ordered Probit model.

Results of Ordered Probit Regression

Interestingly, compared to the food quality attributes, the demographic factors were seen to have a considerable influence on the purchase of DPs in general and FCMP in particular. As age increase by one unit both the probability of purchasing one more dairy product and one more buying unit (packet) of milk powder increase by 0.3%. Thus, older consumers in this study tend to be more likely than younger consumers to have increased their consumption of dairy products.

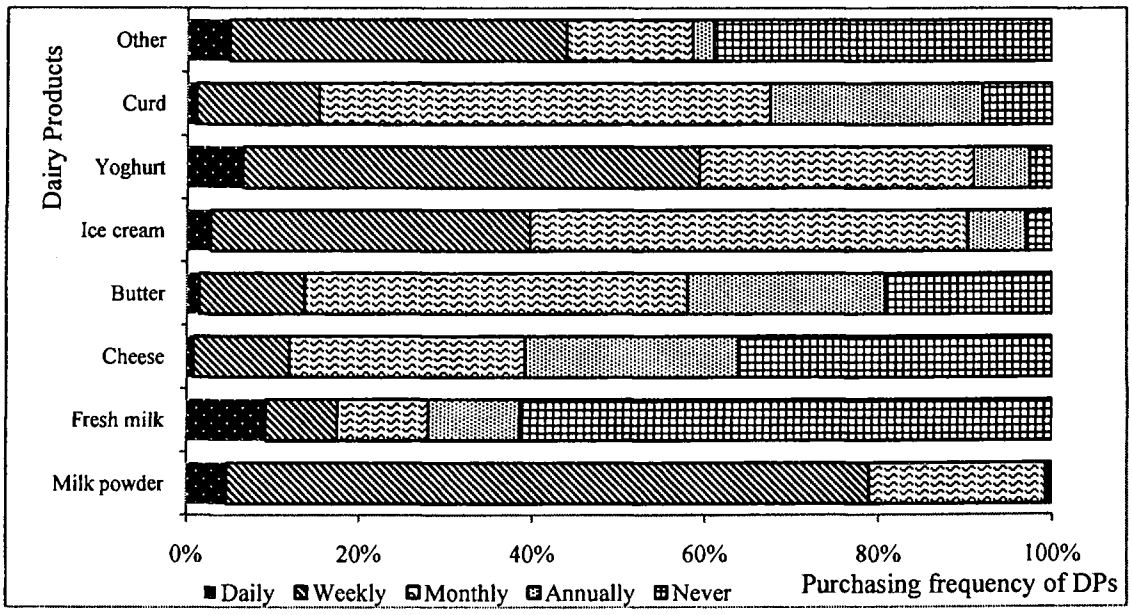


Figure 2. Purchasing pattern of dairy products

Table 2. Perception of dairy products and milk powder with factor loadings

Factors and related statements (Dairy products)	Factor loadings	Jolliffe's cut off value	Factors and related statements (Milk powder)	Factor loadings	Jolliffe's cut off value
Nutrition factor		0.342	**Food safety**		0.423
Good for health	0.695		Quality	0.604	
House hold necessity	0.526		Label	0.604	
Sensory		0.429	**Nutrition factor**		0.349
Appearance	0.613		Nutritional value	0.587	
Taste	0.613		Healthy	0.493	
Value		0.604	Necessary in diet	0.419	
Social status	1.52				
Process		0.372	**Sensory**		0.370
Location	0.417		Appearance	0.529	
Local products	0.592		Tastes better	0.529	
Imported products	0.582				
Food safety		0.379	**Cues**		0.398
Label	0.542		Price	0.569	
Quality certifications	0.542		Brand	0.569	
Cues		0.319	**Value**		0.519
Influence of family	0.400		Package	0.742	
Price	0.515		Physical factors	0.772	
Affordability	0.461		Functional attributes	0.752	
Specific brands	0.594				
Availability	0.490				

The probability of buying one more unit of dairy product and milk powder is decreased by 0.6% and 0.5% respectively when the buyer is a male of the household. This may be due to the fact that females are generally assumed to be more health conscious than men and they are significantly more likely to purchase and consume natural and fresh food.

Where the income level is of concern, compared to the lower income category, the purchasing levels of DPs by the middle and high income categories surprisingly were low. This may be due to the fact that with the increase in income, consumers tend to substitute them by other healthier products than the mentioned dairy products.

Also, the purchasing of FCMP packet significantly decreases that of the high income group may substitute them by other beverages.

The results reveal that ethnicity had a significant impact on purchasing behaviour. Compared to the Sinhala consumers, the Tamil and Muslim communities showed a significantly higher purchase of FCMP.

Table 3. Marginal effects and coefficients of Ordered Probit Regression

Variable	Dairy Products			Milk Powder		
	ME	Coefficient	P value	ME	Coefficient	P value
Demographic factors						
AGE	0.002	-0.090	0.169	0.003	-0.096	0.199
CST	0.006	-0.191	0.199	0.004	0.163	0.323
GEN	-0.006	0.221*	0.030	-0.005	0.202	0.116
CHL	-0.002	0.067	0.534	-0.026	0.098	0.394
INC2	-0.009	0.348*	0.009	-0.008	0.294	0.093
INC3	-0.026	0.963*	0.000	-0.023	0.879*	0.025
TML	0.009	-0.340*	0.014	0.008	-0.316	0.092
MSL	0.015	-0.554*	0.00	0.012	-0.452*	0.036
Food Quality Attributes						
CUE	0.008	-0.278	0.559	0.023	-0.862	0.086
VAL	-0.007	0.256	0.220	-0.015	0.578	0.322
FDS	-0.019	0.683*	0.048	-0.023	0.871	0.100
SEN	-0.009	0.316	0.417	0.022	-0.836	0.180
NUT	0.005	-0.167	0.661	-0.012	0.469	0.353
PRO	0.013	-0.481	0.227	-	-	-

*Note: * significant at 0.05 levels, ME - Marginal Effects*
FCMP: Log likelihood = (-728.588), LR chi^2 (13) = 70.58), Prob. > chi^2 = (0), Pseudo R^2= 0.0465
DPs: Log likelihood = (-734.244), LR chi^2 (14) = 65.33, Prob. > chi^2= 0, Pseudo R^2=0.0941426

The quality attributes did not post the anticipated impact on increasing purchasing behaviour. However food safety was a significant factor determining the increasing levels of consumption of dairy products. None of the other factors had a significant impact on determining increased levels of purchase.

CONCLUSIONS

The results of the study reveal that where the dairy products were of concern, milk powder, ice-cream, yoghurt and curd were the most favored products purchased by majority while supermarkets and grocery stores were also found to be the most preferred places of purchase. The purchasing behavior was determined by several factors. Demographic factors and socio economic factors such as age, gender, Income level, and ethnicity was seen to have a significant impact on the consumption frequencies of DPs and FCMP.

Results also suggest that while food quality was found to have a significant impact on increased consumption levels, consumers also pay considerable attention on the nutritional qualities and sensory factors during purchase. The outcomes of this study provide some insight for the possibility to promote the marketing channel and to improve the product innovation in dairy market in future. Thus, the results are vital for food marketers to adjust the quality of their products to respond effectively to the consumer demands for both intrinsic and extrinsic food quality attributes.

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