The Demand for a Balanced Diet by the Next Generation: New Evidence from a Choice Based Conjoint Analysis

Ekanayake, E.M.M.P.S.,*[1] Kanuwana, K.G.N.[2] and Edirisinghe, J.C.[1]

[1]*Department of Agribusiness Management, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), 60170, Sri Lanka*

[2] *National Youth Corps, Ministry of National Policies and Economic Affairs, 420, Bauddhaloka Mawatha, Colombo 07, Sri Lanka*

**Corresponding Author:*
Email: madhu199161@gmail.com

ABSTRACT

Healthy lifestyle, directly and indirectly enhances the socio economic status of people. In this manner, dietary practices in young age will impact adult health, decades from now. Therefore this study attempted to identify the acceptance towards a balanced diet among youth using a choice based Conjoint Analysis. For this, primary data were collected by a pretested questionnaire from a stratified random sample of 200 youth from Kurunegala district representing all 30 Divisional Secretariats. All respondents were presented with a choice set comprised of variations of the "shaped plate" introduced by Ministry of Health in Sri Lanka and considered as the general balanced diet plate suitable for Sri Lankans. Nine choice cards were generated for three "shaped plate" attributes including carbohydrate, protein, vegetables and an additional monetary attribute, price. A Rank Ordered Logistic Regression was used to analyse the results which revealed that all four attributes have shown a significant effect on selecting a diet by youth. In addition to this, the research failed to identify a significant relationship between choice and socio economic variables such as gender and educational level. According to the results, it is obvious that majority of youth considers the price and nutritional value of the diet. This study reveals that Marginal Willingness to Pay values imply an increase in willingness towards protein, vegetables and indicates a less consideration on carbohydrate contain food. Based on the current research, it is reasonable to say Sri Lankan young generation considers price, nutritional value of diet and shows similar behaviour with global trend.

KEYWORDS: Balanced diet, Choice based conjoint analysis, Youth

Introduction

Balanced diet is a key aspect in nutrition that influences public health. Subsequently, response of people into this matter is variant from time to time. During recent decades, people's choices towards certain food items have been changed convincing a need of concurrent awareness on food consumption trends of people around the world. Better level of nutrient intake at a country positively influence the country's long run sustain

economic growth because of its positive influences on physical work capacity of the labour force and thereby labour productivity.

As far as the Sri Lankan cuisine is considered, it shows a unique difference from Western and Mediterranean diets. It mainly consists of rice, vegetables, salads, animal and plant protein food items. A balanced diet is a diet that provides the correct amounts of food energy and nutrients, needed during the day to cover the dietary requirements of the person consuming it. A balanced diet must be composed of a variety of food items from different food groups, so that it contains essential macronutrients and micronutrients that a person needs (Burgess and Peter, 2004).
According to present scenario, "Shaped plate" introduced by Ministry of Health in Sri Lanka can be considered as the general balanced diet plate suitable for Sri Lankans. Ministry of Health, further describes that a plate with a balanced diet should comprise 50% carbohydrate, 17% protein, and 33% vegetables and greens of 100% of total plate.

In fact, it has been revealed that in the long run, malpractices in dietary intake in young age will lead to an increase in the risk of acquiring Non Communicable Diseases (NCDs). Furthermore, the epidemic of NCDs in adults reduces productivity and increases the cost of health care. For a sustainable economic growth, further addressing the health related issues, specifically prevalence of diseases and tolerance of labor force to disease are needed. Therefore, nutrition related wellbeing must be fulfilled adequately. Among all the age groups, youth can be identified as the most important category which needs to consume a balanced diet as the young people are the ones who contribute to the country's economic and social activities in the near future. According to current Sri Lankan context, youth is defined as people between 15-29 years of age. (Ministry of Youth affairs and Skills Development, 2014).

Literature Review

During last span, rapid shift in the consumer behaviour related to nutrition aspect is emerging. Signs of dietary transition is convincing from many previous studies, in which people shift from plant energy intake toward a larger share of dietary energy from animal sources (Grigg, 1995). This change of dietary intake and activity change appears to have accelerated by varying degrees in different regions of the world. In fact, it is evident that dietary and activity changes are paralleled by major changes in health status, as well as by major demographic and socioeconomic changes. (Popkin, 2002). With reference to the projection of projecting to 2050, it is expected that the share of cereals in calories for food use will continue to decline slowly from 54 percent in 2001 to 49 percent in 2030 and 46 per cent in 2050. Consequently, major shifts in dietary patterns, from consumption of basic staples towards more diversified diets are occurring throughout the world. (Kearney, 2010) points out that all regions show an increase in vegetable oil, sugar and sweeteners as well as meat consumption over the past several decades.

On the other hand animal based protein sources which also encourages less land usage than plant based food production is getting popular in many regions. The results of an empirical analysis shows that, at initial stages, meat consumption increases

with income, but from a certain point onwards higher levels of income lead to lower levels of meat consumption. It also indicates that culture and religion can cause differences in meat consumption within and between countries (Vranken *et al.*, 2014). Furthermore, globalization of diets include shifts from local markets toward global trade in commodities, like animal food, and processes, as people and ideas spread throughout the world and thereby results a change in consumption (Lang, 2002). As noted earlier, in developing countries, income growth particularly in Asia has resulted a shift from grain based diets to livestock based diets (FAO, 2003).

Further, improvements in health affect income by making human capital more productive. Being unhealthy reduces the ability to work productively along with the ability and incentives to invest in human capital (Bleakley, 2010). Increases in calorie consumption lead to great work effort and income. Efficiency of workers in terms of efforts supply depends on their wages through the nutrients that their income allows them to purchase (Dawson and Sanjuan, 2011). Investment in proper diet is sustained over several generations, the implication is that there will be increases in average size of labor force participants and improved function. In the pace of widespread mal nutrition, investments in improved diets can lead to a long run increases in the rate of economic growth (Cole, 1971).

According to Grigg, as income increases, the elasticity of demand for basic food falls below unity and eventually becomes negative. One of the key changes that can be seen is that when a threshold GNP per capita is reached, further increases in the income are devoted to food other than starchy staples like animal food, fruits and vegetables and sugar (Grigg, 1996). Further, it has been come to light that there also may be an impact of food price in selecting a balanced diet as income is related to health through its effect on social participation and the opportunities to control life's circumstances (Marmot 2002). Previous literature further supports for the above mentioned point depicting that the overall composition of people's diets corresponds to their income (Vranken *et al.*, 2014). Previous studies often figure out that in most industrial countries, the effects of increased income have generally been considered as beneficial, resulting in better quality diets, better healthcare, lower morbidity and mortality from infectious diseases and lower risk of obesity (Marmot 2002).

In general, when standard of living are low, increasing income favour more food and especially more food of animal origin, while the consumption of staple food drops (Grigg, 1995a). Income and differences in the cost of the different types of protein seem the principal causes of spatial variation in the consumption of protein, (animal protein, and animal protein) as a percentage of all protein. It has been mentioned that the map of protein consumption represents the level of economic development (Grigg, 1995b).

Several researches reveal that the income is recognized as one of the factors that determine food choice. And there is a strong relationship between household expenditure and the total energy requirement (Vringer and Blok, 1995). Increased income or lower prices have led to the increased consumption of animal-based food and processed food. While those that are well educated can choose to adopt a healthy

lifestyle, the poor have fewer food choices and more limited access to nutritional education. Below income levels of $5000 per capita per year, large changes in food supply and dietary composition occur for relatively small annual per capita GDP changes (Gerbens-Leenes, 2017). It has been further described that prices can be a barrier for healthy food consumption, especially among low-income groups of the population (Jetter & Cassady, 2006). When investigating on consumer choices Willingness to pay (WTP) and Marginal Willingness to Pay (MWTP) estimates have been long used in economics as a demand-revealing indicator. In addition, WTP is a welfare measure that corresponds to the amount an individual would be willing to pay to secure the change in the quality of a product (Hanemann, 1991). In nutrition, WTP can be used as an estimator for healthy attributes in food to measure the amount a consumer would be willing to pay to secure the potential benefit for their health that is obtained from consuming the product (Dolgopolawa, 2016).

On the other hand, market research conducted by Nielson unveils the fact that purchasing decisions are becoming increasingly complicated and nowadays consumers tempt to consider the nutritional content of food as well as the environmental and social impact, production source and health benefits. Notably, health attributes are most important to emerging-market respondents and along with that, younger consumers are most willing to pay a premium for health attributes (Nielson, 2015).

Accordingly, food of healthy categories reported the strongest sales growth in developing regions between 2012 and 2014. But staples like bread and cereal declined 3% and 8% respectively (Nielson, 2015).

A recent market survey of average prices of fresh produce in Sri Lankan markets, states that a normal family would need Rs.450 per day to fulfil the 33% on the plate (Tillekerathne, 2015). If so, when there are 4 members in a family, it will cost around Rs125 per person per meal. But there is a limited recent investigations on the above matter with regard to Sri Lanka.

Human food choice is richly multi determined (Rozin *et al.,* 2002). When looking in to the influence of socio economic variables on food choice, results of a British research conducted in 1999 unveil that to achieve a certain healthy diet, independent predictive factors were spending more money, being a vegetarian, having a higher energy intake, having a lower body mass index (BMI) and being older (Cade *et al.*, 1999). Furthermore, there is some evidence that nutrition concern among youth was high regardless of income or education level **(**Dittus *et al.*, 1995).

According to (Brown *et al.* 2000), the school environment was considered as a "seedbed" for nutritional education to be nurtured and, the school was cited as being the prime medium for nutritional education by young consumers from both gender groups. On a positive note to the above, education until the 14 years of age is compulsory and free in Sri Lanka. Majority of the students, 86.1% study until upper secondary level (United Nations Sri Lanka, 2014).

Moreover, (Soyar *et al.* 2008) mentions young consumers within the selected age group (11-16 years) were clearly very aware of healthy eating requirements. Yet, a very slight differences occur between females and males relating to such knowledge.

Furthermore, young consumers' food preferences within the school and social environments did not indicate a contrasting difference.

According to past literature, food consumption pattern of people has been changed over time. Further, in day to day life, adults take purchasing decisions very often and youth rarely do so. Therefore it will be more precise if the perception of youth on nutrition aspect can be investigated through a method which directly interviews youth. Subsequently, choices of youth can represent the family food consumption patterns in near future as well. Therefore, this study attempts to identify the marginal willingness to pay for a balanced diet with special focus on identifying the relative willingness and to investigate whether socio economic characteristics play an important role on the choice.

Methodology

Theoretical Framework

Basics of Choice Based Conjoint Analysis

As this research study involves with the study of consumer perceptions, preferences, and choices in a set of choice situations, Conjoint Analysis was selected as technique of generating outcomes. It is concerned with determining the joint effect of levels of two or more attributes of stimuli on the total evaluative judgments of a set of stimuli (Rao, 2014). Conjoint analysis methods have been applied in a large number of applied marketing research projects like product design optimization (Green *et al.*,1981) and consumer preferences on food additives (Szucs *et al.*, 2014).

Conjoint analysis refers to any decomposition method that estimates the structure of a consumer's preferences in terms of the levels of attributes of the alternatives. Among four types of conjoint methods, choice-based conjoint analysis was used here as there is a significant development in the use of data elicited under hypothetical scenarios that mimic the marketplace on choice-based conjoint analysis and estimating part worth functions from such data using primarily, multinomial logit methods. Multinomial logit model belongs to the family of discrete choice analysis methods (Rao, 2014). These discrete choice analysis methods are based on Lancaster's model of consumer choice (Lancaster, 1966) and random utility theory (Thurstone, 1927).

By considering Lancaster's Consumer Theory, it is assumed that the utility of a product stems from different product attributes (Janssen and Hamm, 2012). Random Utility Theory, which explains dominance judgments between pairs of offerings where each alternative '*i*' in the choice set and utility level represented by;

$$U_i = V_i + \varepsilon_i \tag{1}$$

U_i = Utility of the ith alternative

V_i = Objective component of ith alternative

ε_i = Error component

Indirect utility from choice sets takes the form;

$$U_i = \beta_0 + \beta_1 \ln(\text{Price}) + \beta_2 \ln(\text{Protein}) + \beta_3 \ln(\text{Carbohydrate}) + \beta_4 \ln(\text{Vegetables and greens}) \quad (2)$$

The marginal value of any attribute change can be expressed as the ratio of the coefficients of any attribute. This equation can be estimated by considering conditional logit model. Price formula for the marginal rate of substitution between income and attribute can be expressed as;

$$\text{MWTP}_{\text{attribute}} = -\left(\frac{\beta_{\text{attribute}}}{\beta_{\text{monetory attribute}}} \right) \quad (3)$$

This is the marginal welfare measure that seeks for a change in any of the attributes sometimes known as marginal willingness to pay, MWTP (Kuruppu *et al*, 2014).

Identification of Choice Alternatives

In this research, nine choice cards were generated using SPSS version 14. Five attributes each having three levels had results 81 (3^4) possible choice combinations. Nine choice sets were generated using full factorial design.

"Shaped plate" introduced by Ministry of Health Sri Lanka has been considered as the general balanced diet plate suitable for Sri Lankans. Balanced diet plate contains 50% of carbohydrate 17% of protein and 33% of vegetables out of 100% of the total plate is used in the level 1(Table 1). Level 2 contains constituents similar to a common western type plate and level 3 contains constituents of food which are available in normal canteens in Sri Lanka.

Table 1: Attributes and Their Levels Used

Attribute	**Attribute levels**		
Carbohydrate(Percentage)	75%	50%	26%
Protein(Percentage)	24%	17%	9%
Vegetables(Percentage)	50%	33%	16%
Price(Rs/Plate)	220/=	150/=	80/=

Data Collection and Analysis

Data were collected from 200 youth of age in between 15-29 years. Survey was conducted in Kurunegala district representing all 30 Divisional Secretarial divisions in Kurunegala district. In order to reach youth in Ibbagamuwa, Ganewaththa, Ridigama, and Mawathagama DS divisions, trainees of National Youth Council gave their support. Rank Ordered Logistic Regression was employed to assess the relationships between the choice and the attributes (carbohydrate, protein, vegetables) using STATA version 14.

Experimental Design

Kurunegala district was used, as it is one of the largest districts in Sri Lanka, which has a moderate representation of demographical factors. Preliminary questionnaire was validated a pilot questionnaire with a representative sample of 20 respondents. Face to face interviews were conducted among 200 randomly selected respondents in Kurunegala district youth representing all 30 DS divisions (Figure 1).

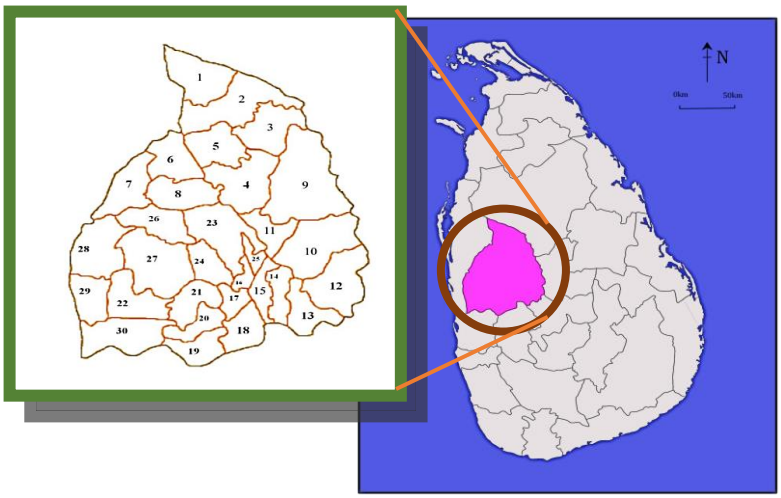

Figure 1: Map of the Data Collected Areas

Questionnaire consisted of two parts: *Personal Details* [Personal details questionnaire contains demographic factors (age, ethnicity, religion, domestic income, educational level) and vegetarians were evaluated] and *Choice cards* [Nine choice cards were generated using SPSS 14. All 9 cards were used without blocking].

Choice cards were presented pictorially as food plates indicating their price, carbohydrates, protein, and vegetables attributes. The use of pictures or visual props is considered as a good method for describing product concepts that involve larger numbers of attributes and levels within an attribute. (Rao, 2014). Microsoft Excel was used in estimating the portion sizes and GIMP 2 software was used for graphical designing of the nine choice cards. Pictures make the evaluation task more interesting for the respondent and reduce information load in the verbal descriptions. Further,

pictures increase the perceptual homogeneity across respondents. In addition, use of pictures allows for interaction effects to become more prominent in the evaluation process (Rao, 2014).

In each choice card, carbohydrate portion was represented by a picture of rice, bread and potatoes. Protein section of cards was depicted by a picture of a fish, meat, egg, dhal and peas. Similarly, vegetable and greens section was presented by an image consisting of a tomato, a carrot, green leaves, leaks and a cucumber. Each portion was named according to their relevant name, carbohydrate, protein, vegetables and greens (Figure 2). Price was indicated above each plate.

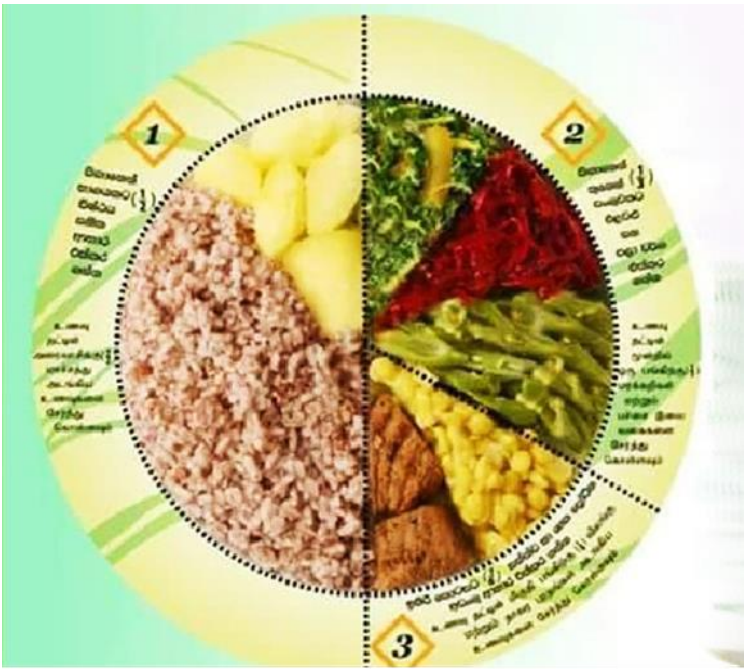

Figure 2: Model of a Shaped Plate Introduced by Ministry of Health

Respondents were asked to rate the choice cards from 1-9 and fill the personal details questionnaire assisted by a trained enumerator.

Results and Discussion

According to the descriptive statistics of the sample, majority (62%) were females. Most of the respondents have completed A/L (65%). About 10% of the respondents were leading a vegetarian lifestyle (Table 2).

Outcomes of Rank Ordered Logistic Regression

Data were analysed by using STATA version 14. In here positive co efficient of attributes imply that respondent's willingness to pay for the attributes in the food plate.

Table 2: Descriptive Statistics of Sample

Demographic character	Segment	Number N=200
Gender	Male	76
	Female	124
Education	Secondary	130
	Tertiary	70
Vegetarian	Vegetarian	20
	Non vegetarian	180

The outcomes of the Rank Ordered Logistic Regression, convinced that there is a significant relationship between choice and price of the meal. Similarly, it is depicted that the choice depends on the protein percentage. Furthermore, choice and vegetables percentage demonstrate a significant dependence while choice and the carbohydrate percentage also represents a significant relationship between them (Table 3).

Table 3: Results of ROL Regression

Choice	Coefficient	P Value	MWTP
Carbohydrate	-0.014	<0.000	-14
Protein	0.018	<0.000	18
Vegetables	0.014	<0.000	14
Price	-0.001	0.026	-
Gender	-0.006	0.962	-
Education	0.005	0.985	-
Vegetarian	0.007	0.998	-
Cons	5.001	0.000	-

Note: MWTP- Marginal Willingness to Pay

Protein and vegetables show a positive MWTP value while carbohydrates show a negative value. Therefore, preference of youth towards protein and vegetables shows a higher value than carbohydrate. Statistics also show that percentage household expenditure share of rice in Sri Lanka over the years, from 1981 to 2016, has declined from 31.5% to 13.6%. House hold expenditure share on protein rich food item, fish has increased from 4.9 % to 9.1%, while spending on milk improved from 3.3% - 8.9% (Weerahewa, 2018). MWTP values are graphically presented in Figure 3.

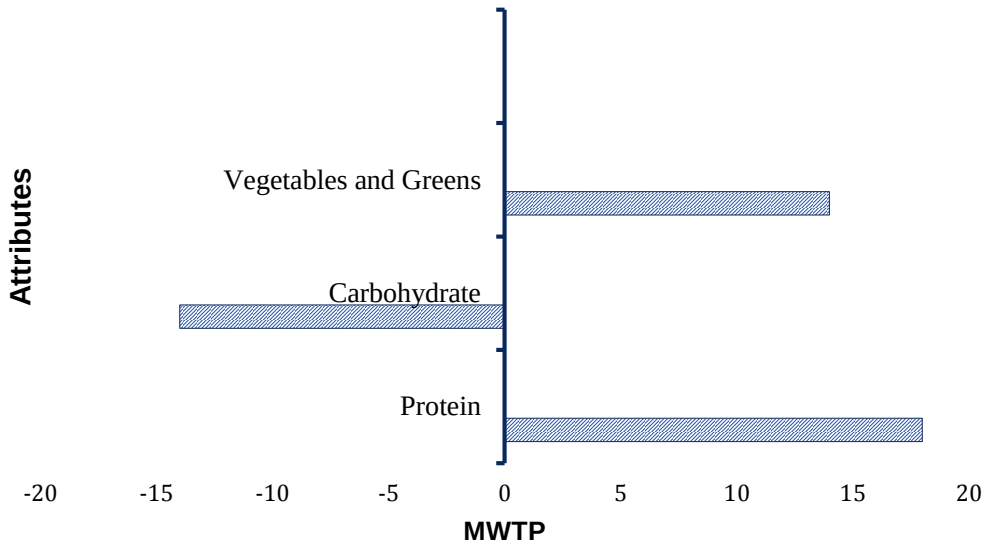

Figure 3: MWTP (Marginal Willingness to Pay)

The personal details included in the model failed to predicate a significant difference between food choices among youth who have learnt up to secondary level of education and tertiary level of education. In fact, according to current Sri Lankan context, education until Grade 9 is compulsory and free and 86.1% of students study until upper secondary level. According to the statistics of UNESCO Institute of Statistics, Literacy rate among youth in Sri Lanka is 98.15% (2010). So there is a possibility of exposing children and youth to nutritional related education from school.

According to (Wardle *et al*, 2000) effect of knowledge is independent of educational level and occupational category, although both of which are known to be linked with food intake and nutrition knowledge (Wardle *et al*, 2000). Hence, nutrition related education is included in lower secondary level of schools and when students reach the age of 15, they are somewhat aware of the importance of having a balanced diet. In addition to this, it is a proven fact that school based environmental strategies can promote healthy eating among young people (Wechsler *et al.*, 2000). Accordingly, there is some evidence that when the educational level increases, consumers are less worried about food safety issues (Dosman *et al.*, 2001).

According to the results impact of gender is not significant among youth. It might be present due to the existing 100% gender parity among secondary and tertiary education in Sri Lanka (United Nations Sri Lanka, 2014). Similarly, it is said that there is a very slight difference between females and males relating to nutritional knowledge (Soyar *et al.*, 2008). Consequently former studies add a positive note to this results expressing the point that when it comes to Vietnamese, whose staple food is also being rice uncovers no difference in food consumption in terms of gender, age and educational level (Le, 2008).

Conclusions

The study revealed that the majority of youth consider nutritional value of the diet. Price becomes the most important, since gender, educational level and being a vegetarian haven't revealed a significant impact in choosing food by Sri Lankan youth. Marginal willingness to pay values imply an increase in preference towards protein containing food while indicating an improvement towards paying for vegetables and greens. As marginal willingness to pay for carbohydrate showed a negative value, carbohydrate containing food will be negatively attracted by young generation in Kurunegala district. As majority of the youth prefer to eat a balance diet and the major burden towards the willingness is the cost of food, policy makers can take necessary steps to promote home gardening and educate families on accessing nutritious food items that are available in locality. In addition lowering trade barriers will help to increase the purchasing power of consumers and will direct consumers towards more diversified diets.

Acknowledgments

The authors would like to express their sincere gratitude to all the respondents and staff at National Youth Corps for their time and support given.

References

Bleakley, H. (2010). Health, human capital, and development. Annu. Rev. Econ., 2(1), 283-310.

Brown, K., McIlveen, H., & Strugnell, C. (2000). Nutritional awareness and food preferences of young consumers. Nutrition & Food Science, 30(5), 230-237.

Burgess, A. & Peter, G. (2004). The Family Nutrition Guide, Food and Agriculture Organization of United Nations, 33.

Cade, J., Upmeier, H., Calvert, C., & Greenwood, D. (1999). Costs of a healthy diet: analysis from the UK Women's Cohort Study. Public health nutrition, 2(4), 505-512.

Cole, W. E. (1971). Investment in nutrition as a factor in the economic growth of developing countries. Land Economics, 47(2), 139-149.

Dittus, K. L., Hillers, V. N., & Beerman, K. A. (1995). Benefits and barriers to fruit and vegetable intake: relationship between attitudes and consumption. Journal of Nutrition Education, 27(3), 120-126.

Dolgopolova, I., & Teuber, R. (2016). Consumers' Willingness-to-pay for Healthy Attributes in Food Products: A Meta-analysis. In Agricultural & Applied Economics Association Annual Meeting.

Dosman, D. M., Adamowicz, W. L., & Hrudey, S. E. (2001). Socioeconomic determinants of health-and food safety-related risk perceptions. Risk analysis, 21(2), 307-318.

Dawson, P. J., & Sanjuán, A. I. (2011). Calorie consumption and income: panel cointegration and causality evidence in developing countries. Applied Economics Letters, 18(15), 1455-1461.

FAO (2003). World agriculture: towards 2015/2030. 238- 240.

Gerbens-Leenes, P. W. (2017). Dietary Transition: Longterm Trends, Animal Versus Plant Energy Intake, and Sustainability Issues. In Vegetarian and Plant-Based Diets in Health and Disease Prevention (pp. 117-134).

Green, P. E., Carroll, J. D., & Goldberg, S. M. (1981). A general approach to product design optimization via conjoint analysis. The Journal of Marketing, 17-37.

Grigg, D., (1995a). The nutrition transition in Western Europe. *Journal of Historical Geography*. 21 (3), 247–261.

Grigg, D. (1995). The pattern of world protein consumption. Geoforum, 26(1), 1-17.

Grigg, D. (1996). The starchy staples in world food consumption. Annals of the association of American Geographers, 86(3), 412-431.

Janssen, M., & Hamm, U. (2012). Product labelling in the market for organic food: Consumer preferences and willingness-to-pay for different organic certification logos. Food quality and preference, 25(1), 9-22.

Kearney, J., (2010). Food consumption trends and drivers. Philos. Trans. R. Soc. B Biol. Sci. 365 (1554), 2793–2807.

Kuruppu, I. V., Edirisinghe, J. C., & Herath, H. M. L. K. (2014). Farmer' valuation of agro-bio diversity in home gardens. A case study in Kurunegala district; Proceedings of 13th Agricultural Research Symposium, 7-8 August, Wayamba University of Sri Lanka, 62-63.

Lancaster, K. J. (1966). A new approach to consumer theory. Journal of political economy, 74(2), 132-157.

Le, C. Q. (2008). An empirical study of food demand in Vietnam. ASEAN Economic Bulletin, 25(3), 283-292.

Marmot, M. (2002). The influence of income on health: views of an epidemiologist. Health affairs, 21(2), 31-46.

Ministry of Youth affairs and Skills Development (2014). National Youth Policy. Retrieved from: http://www.youthpolicy.org/national/Sri_lanka.

Nielson. (2015).We are what we eat healthy eating trends around the world. *Global Health and Wellness Report*. 10- 21.

Popkin, B. M. (2002). The dynamics of the dietary transition in the developing world. In The Nutrition Transition (pp. 111-129).

Rao, V. R. (2014). Applied conjoint analysis (p. 56). New York, NY: Springer.

Rozin, P. (2002). Human food intake and choice: Biological, psychological and cultural perspectives. ANDERSON, H.; BLUNDELL J. & CHIVA, M. Food Selection: from genes to culture. Levallois-Perret: Danone Institute, 7-24.

Soyer, M. T., Ergin, I., & Gursoy, S. T. (2008). Effects of social determinants on food choice and skipping meals among Turkish adolescents. Asia Pacific journal of clinical nutrition, 17(2), 208-215.

Szűcs, V., Guerrero, L., Claret, A., Tarcea, M., Szabó, E., & Bánáti, D. (2014). Food additives and consumer preferences: a cross-cultural choice based conjoint analysis. Acta Alimentaria, 43(Supplement 1), 180-187.

Thurstone, L. L. (1927). A law of comparative judgment. Psychological review, 34(4), 273-286.

Tillekerathna. V. (2016). Shape your meal to shape your body. Retrieved from: http://nutritionsocietyofsrilanka.org/shape-your-meal-to-shape-your-body.

UNESCO Institute of Statistics (2010). Retrieved from: http://tellmaps.com/uis/literacy/UisServlet?cmd=downloadexcel&topic=36705261.

United Nations Sri Lanka (2014). Millennium-Development-Goals-Country-Report. Available from: https://lk.one.un.org/wp-content/uploads/2016/05/Millennium-Development-Goals-Country-Report-2014.pdf (Accessed on 26th July 2017).

Vranken, L., Avermaete, T., Petalios, D., & Mathijs, E. (2014). Curbing global meat consumption: emerging evidence of a second nutrition transition. Environmental Science & Policy, 39, 95-106.

Vringer, K., Blok, K., (1995). The direct and indirect energy requirements of households in the Netherlands. Energy Policy. 23 (10), 893–910.

Wardle, J., Parmenter, K., & Waller, J. (2000). Nutrition knowledge and food intake. Appetite, 31, 205–228.

Wechsler, H., Devereaux, R. and Davis, M. (2000). Using school environment to promote physical activity and Healthy eating. *Science Direct,* **31**(2), 121-137.

Weerahewa, J., Gedara, P. K., & Wijetunga, C. S. Nutrition Transition in Sri Lanka: A Diagnosis. Ann Nutr Food Sci. 2018; 2 (2), 1020.