

An Analysis of Household Demand for Major Food Items in Urban, Rural and Estate Sectors of Sri Lanka

N. J. C. Paraneetharan¹, J. Nigel² and T. Vinayagathan³

¹*PGIHS, University of Peradeniya, Sri Lanka*

^{2,3} *Department of Economics and Statistics, University of Peradeniya
Sri Lanka*

Keywords: *MLA/AIDS; Price Index; ISUR; Expenditure Elasticity*

Introduction

The analysis of food demand has received increased attention world-wide in the last few decades ever since food intake was found to have a strong empirical linkage with human health and labour productivity (Aromolaran, 2004). The estimated price elasticity of demand and income or expenditure elasticities of demand are regarded as important tools for policy design and planning. The study of food consumption patterns is crucial in Sri Lanka, which is categorized as a Food-Deficit country by FAO. In Sri Lanka, consumption expenditure contributed more than 70% of GDP (Economic and Social Statistics, 2018). However, it contributed only 38% of the total expenditure shares of an average household (HH) (Consumer Finances and Socio-Economic Survey, 2003/04). The HHs living in urban, rural and estate areas make expenditure on different commodities to attain their day to day requirements. The overall HH demand for food in Sri Lanka has been well documented. But, there no adequate study exists on HH demand for food based on sectoral wise using Sri Lankan data. Thus, the present study by complementing the existing HH demand for food studies, attempts to bridge the existing gap.

Objectives

The main objective of the study is to estimate consumer demand using expenditure elasticity and compensated price elasticity for the main groups of food in the urban, rural and estate sectors.

Methodology

This study used data from HIES surveys of 2016, 2012/13, 2009/10 and 2006/07 in the districts of Badulla, Kandy, Nuwara-Eliya and Ratnapura where a minimum of 5% of population lived in each of the three sectors. The total sample size was 13,881 HHs that covered urban - 2010; rural – 8508; estate - 3363 based on the two stage stratified sampling method of Neymann allocation. The survey conducted over a period of 12 consecutive months recording weekly consumption of 112 food items were selected according to the 10 main food groups namely rice, wheat flour, bread, pulses, coconut, meat, fish, milk & milk products, egg and vegetables. Weighted average prices were estimated for each of the main food groups.

In this study, the Modified Linear Approximation of the Almost Ideal Demand System (MLA/AIDS) was selected as the basic model for the aggregated complete demand system estimation due to its flexible functional form and nimbleness in estimation. In a short and snappy way the demand function of MLA/AIDS in budget share form can be expressed as:

$$W_i = \alpha_i + \sum_j \gamma_{ij} \ln(p_j) + \beta_i \ln\left(\frac{x}{P^L}\right) \quad (1)$$

Where, the major food groups $i = 1 \dots 10$, W_i = budget share of food of each group i , p_j = price of food group j , x = household's monthly total food expenditure, P^L = Laspeyres price index, α_i , β_i and γ_i are estimated parameters. The expenditure and compensated price elasticities can be then derived respectively as follows from the above equation:

$$\eta_i = 1 + \left(\frac{\beta_i}{w_i}\right) \quad \text{Expenditure elasticity} \quad (2)$$

$$\varepsilon_{ij} = -\delta_{ij} + \left(\frac{\gamma_{ij}}{w_i}\right) + \bar{w}_j \quad \text{Compensated price elasticity} \quad (3)$$

Where δ_{ij} is the Kronecker delta that is equal to one if $i = j$ (own price), and zero for $i \neq j$ (cross price). In this study, the sample mean is used for the point of normalization. Iterative Seemingly Unrelated Regression (ISUR) method of Zellner is used to estimate the parameters.

Results and Discussion

Overall significance of demand models of every food group under each sector was checked by using Zellner's ISUR. The result found that almost all food groups in all sectors are significant and a reasonable number of estimated coefficients of the explanatory variables are also significant. So, the use of MLA/AIDS model for aggregate food consumption analysis is found to be appropriate to this study.

Table 1: Expenditure elasticity of food groups (2006 - 2016)

Sector	Rice	WF	Bre	Pul	Veg	Meat	Fish	Egg	Coc	Milk
Urban	0.87	0.84	0.20	0.95	0.81	1.10	0.48	0.55	0.78	0.81
Rural	0.82	0.72	0.46	0.82	0.78	1.15	0.87	0.38	0.81	0.86
Estate	1.06	0.76	0.71	1.10	0.79	1.56	1.00	0.96	0.76	0.41

The results of Table 1 reveal that, as expected to theory and some of the existing empirical studies (eg. Chikobola *et al.* 2016; Ahmad *et al.* 2015), the expenditure elasticities of demand for the selected main food groups are relatively high in all three sectors. Expenditure elasticity for wheat flour, bread, vegetables, egg, coconut and milk food items are categorized as normal and necessary goods in all sectors. Meat is categorized as luxury food group in all three sectors, while rice, pulses and fish food items considered as luxury foods in estate sector.

Table 2: Compensated own price elasticity of food groups (2006 - 2016)

Sector	Rice	WF	Bre	Pul	Veg	Meat	Fish	Egg	Coc	Milk
Urban	-0.66	-0.24	-1.06	-0.49	-0.63	0.70	0.52	0.40	-0.43	-0.10
Rural	-0.70	-0.86	-0.82	-0.40	-0.68	1.09	0.39	0.29	-0.71	-0.26
Estate	-0.52	-2.91	-1.05	-0.58	-0.60	1.34	0.55	0.20	-0.75	-0.80

Table 2 reveals that as expected by theory and some of the existing empirical studies (eg. Chikobola *et al.* 2016; Ahmad *et al.* 2015), compensated own price elasticity of demand for rice, pulses, vegetables, fish, egg, coconut and milk food items are inelastic in all three sectors which indicates that the consumers are insensitive to own price changes. But wheat flour, bread and meat in the estate sector, bread in the urban sector, and meat in the rural sector are considered to show elastic demand. Thus price changes affect the demand for the food item in a greater extent as compared to the other food groups. Table 3 reveals that for example, rice is categorized as substitutes for wheat flour,

bread, pulses, vegetable, fish, egg and coconut food items, while meat and milk food items are classified as complements in urban sector. It is also noted that bread-rice and egg-bread cross-price elasticities depict the substitute effects and fish-milk shows the complement effects which are very high in urban sector.

Table 3: Compensated cross price elasticity in urban sector (2006 - 2016)

	Rice	WF	Bread	Pulse	Veg	Meat	Fish	Egg	Coc	Milk
Rice		0.63	1.04	0.03	0.05	-0.15	0.33	0.12	0.02	0.12
WF	0.10		-0.61	-0.08	-0.05	-0.02	0.01	-0.80	0.05	-0.24
Bre	0.14	-0.49		0.04	0.04	-0.45	-0.21	1.14	-0.08	-0.38
Pul	0.00	-0.12	0.08		0.01	0.01	-0.01	0.10	0.02	-0.02
Veg	0.03	-0.21	0.23	0.03		-0.14	0.21	0.01	0.23	0.07
Meat	-0.02	-0.02	-0.53	0.01	-0.03		-0.04	-0.55	-0.12	0.21
Fish	0.05	0.01	-0.26	-0.00	0.05	-0.04		0.07	-0.06	0.09
Egg	0.00	-0.28	0.49	0.02	0.00	-0.20	0.02		-0.07	0.06
Coc	0.00	0.11	-0.21	0.03	0.12	-0.26	-0.12	-0.39		0.00
Milk	-0.10	0.20	0.42	-0.02	0.01	0.14	-1.14	-0.53	0.0	

Table 4: Compensated cross price elasticity in rural sector (2006 - 2016)

	Rice	WF	Bread	Pulse	Veg	Meat	Fish	Egg	Coc	Milk
Rice		0.52	-0.28	0.27	0.11	-0.54	-0.25	0.19	0.19	0.11
WF	0.08		0.28	-0.01	-0.03	-0.17	-0.16	-0.23	-0.00	0.16
Bre	-0.04	0.22		-0.08	0.09	0.20	-0.03	-0.35	0.06	-0.10
Pul	0.07	-0.01	-0.15		0.04	-0.45	0.03	0.06	0.00	0.05
Veg	0.07	-0.12	0.47	0.10		-0.38	0.04	-0.03	0.12	0.04
Meat	-0.08	-0.16	0.23	-0.27	-0.08		0.23	-0.28	0.05	-0.06
Fish	-0.04	-0.17	-0.03	0.02	0.01	0.25		-0.04	-0.02	0.16
Egg	0.01	-0.08	-0.15	0.01	-0.00	-0.10	-0.01		0.00	-0.21
Coc	0.06	-0.01	0.15	0.00	0.06	0.10	-0.04	0.00		0.09
Milk	0.13	0.26	-0.11	-0.06	0.04	-0.46	-0.62	-0.02	-0.12	

The results of Table 4 illustrate that, for example, wheat flour group has a substitute effect with rice, bread and milk food items whereas pulses, vegetable, meat, fish, egg and coconut food items show complement effects in rural sector.

Table 5: Compensated cross price elasticity in estate sector (2006 - 2016)

	Rice	WF	Bre	Pul	Veg	Meat	Fish	Egg	Coc	Milk
Rice		0.35	0.70	0.26	0.18	0.50	-1.03	-0.86	0.07	0.15
WF	0.06		1.42	0.26	-0.11	0.24	0.38	-0.76	0.01	-0.24
Bre	0.09	1.15		-0.07	-0.02	-0.64	-0.25	0.53	0.20	0.00
Pul	0.07	0.41	-0.14		0.01	-0.47	-0.24	0.19	0.09	0.45
Veg	0.12	-0.42	-0.11	0.04		-0.37	0.11	0.58	0.11	1.02
Meat	0.08	0.23	-0.74	-0.29	-0.09		-0.00	-1.03	-0.30	0.10
Fish	-0.18	0.38	-0.31	-0.15	0.03	-0.01		-0.23	-0.03	0.20
Egg	-0.05	-0.26	0.22	0.04	0.05	-0.38	-0.08		0.09	-0.69
Coc	0.02	0.02	0.49	0.12	0.05	-0.63	-0.06	0.56		0.01
Milk	-0.07	0.65	-0.89	-0.05	0.07	-0.00	0.21	0.39	0.06	

The results of Table 5 demonstrate that, for example, vegetable group has complementary relationships with wheat flour, bread and meat food items while substitution relationships exist with rice, pulses, fish, egg, coconut and milk food items. It is noted that wheat flour-bread, bread-wheat flour, milk-vegetable substitution effects and fish-rice and egg-meat complementary effects are very high in the estate sector.

Conclusion

The findings of price and expenditure elasticities of demand for the selected food groups could be used in projections for future food consumption. The high price elasticities of demand for many food items stress the importance of food price changes for households especially in the estate sector, and their reactions should be taken into account in the development of comprehensive agricultural and food policies in order to avoid unanticipated effects harming consumers. It is important that a number of different food sources be consumed and efforts should be made to encourage a wide variety of foods to improve the nutritional quality of diet and health of the population. Dietary diversity is one of the most important ways to ensure a balance of nutrients for people of all ages. The results of this study suggest that income oriented policies are important to achieve better nutrition and reduce the problem of unbalanced diets. In addition, complementing policies are necessary.

References

- Ahmad, N., Sheikh, M. R. & Saeed, K. (2015). Rural urban food consumption analysis in Pakistan: Expenditure elasticities approach, *Pakistan Journal of Commerce and Social Sciences*, Vol. 9 (1), pp.159-170.
- Aromolaran, A. B. (2004). Household income, women's income share and food calorie intake in South Western Nigeria, *Food Policy*, Vol.29, pp.507 – 530.
- Chikobola, M. M. & Edriss, A. K. (2016). Estimation of rural-urban expenditure and elasticities of food Items in Zambia: Evidence from living conditions monitoring survey, *Modern Economy*, Vol.7, pp 567-574.