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Rural-Urban Differences in Consumption Patterns: An Application of QUAIDS

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Abstract

The main focus of this study is to estimate the rural-urban income and own price elasticities across a range of consumption quintiles. The analysis revolves around computation of expenditure/income and price elasticities (own price and cross price) including the compensated and uncompensated elasticities of food items using HIES data (2010-2011). The Quadratic Almost Ideal Demand system is used to estimate the parameters of the food commodity groups and estimation was done by SUR technique. The results of the study showed that the poorest families in Pakistan are the most vulnerable section of the society as their expenditures are greater on food items as compared to the expenditures of richest households taken into analysis. Expenditure elasticity of fruits was found to be highest in both rural and urban sectors and this is reasoned by the current economic scenario in the country where higher tax rates, consumer preferences and low salaries determine what people prefer in food consumption to a greater extent. Lack of dietary diversion is one major reason for such unique consumption patterns across rural-urban households in the country, thus, suggesting that policies inclined towards income will play an important role to achieve the goal of balanced diet prevalence in Pakistan.

Keywords: Consumer Demand Analysis, HIES, Income and Expenditure Elasticities

JEL Classification: B21, D11, D12

1. Introduction

Food is a fundamental requirement that has a huge economic impact on the life of households in Pakistan. In this view, acquiring in-depth knowledge of factors influencing food demand becomes imperative so that inclusive and effective agricultural, nourishment and social policies can be

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formulated for smooth, better and cheap access to food materials. Food demand elasticities illustrate chief evidence in this regard and are empirically estimated with the help of econometric procedures. Besides, these income and price elasticities, there are some other determinants that directly or indirectly affect demand for food and also help in improvising these policy options for strengthening the households in getting healthier food. These majorly comprise of effects of varying incomes on per head expenditure trends in rural as well as urban regions, the influential presence of economies of scale in food expenditure of households having different number of members, and the concurrent impact of total household expenditures together with their settlement position and size of family on nutrition expenses in any country. Measurement of elasticity estimates provide a useful analysis of consumer demand analysis and it gives a meaningful direction to the policy makers interested in determining the tax direction. Since, the aim of the study is to conduct a detailed analysis of expenditure elasticities, price elasticities, cross-price elasticities and own-price elasticities of food groups so that consumption differences between various households across rural-urban sectors can be observed easily. The study is organized into six sections. Section 1 introduces the topic under discussion and Section 2 focuses on the price elasticities from HIES data, section 3 is based on the data and estimation procedure while section 4 talks about the QUAIDS model and Section 5 and 6 are based on the results and conclusion of the study.

2. Price Elasticities from HIES Data

Deaton and Grimard (1992) adopted the methodology of Deaton (1988, 1991) and analyzed the demand patterns of different commodities using Household Integrated Survey of (1984-85) Pakistan. A rural-urban analysis has been done for various households across the country. In this study, for the purpose of analysis, price data set provided in HIES has been used instead of independent data set of prices in order to get the unit values. Cross-price elasticities, own price elasticities and expenditure elasticities have been computed.[2]

[2] Unit values have been computed by multiplying price by the quantity demanded of that specific group.

Deaton (1997) used data from the U.K. Family Expenditure Survey (FES) form 1970 to 1986, under a variety of alternate parametric and nonparametric estimation techniques and concluded that the Working-Leser form was not suitable for some commodities, while for others commodities like food, Engel curves did appear to be very close to being linear in log income. The study confirmed that the share equations quadratic in the logarithm of total expenditure might provide a good and suitable approximation to the Engel relationship in the raw micro data. After analyzing the U.K data and Engel curvature, the study recommended that Quadratic Almost Ideal Demand System (QUAIDS) should be constructed so as to nest the Almost Ideal demand model that has leading terms that are linear in log income while QUAIDS (Banks, Blundell, and Lewbel, 1997) involved including the empirically indispensable rank 3 quadratic terms.

In addition to this, the study considered QUAIDS (Banks, Blundell, and Lewbel, 1997) model as the most reasonable and empirically best model to analyze demand systems after a preliminary data analysis and the study presented nonparametric kernel regressions, quadratic polynomial regressions, and point wise confidence intervals for the nonparametric Engel curves of five commodity groups in a three-year period in the middle of sample considered.[3] Furthermore, the study exposed that the quadratic Engel curve preferences satisfy integrability without the requirement of the constant ratio-restriction that necessitates the rank 3 specification for any demand system that is linear in functions of income. Moreover, to use any functional model, it must satisfy the four criteria of additivity, homogeneity, non-negativity and symmetry. These conditions are derived from the New Classical demand theory. And, to choose any functional form satisfying such conditions is a matter of attention and great interest for the analysis of consumer behavior. Adding up restriction, homogeneity condition and symmetry condition must be fulfilled in the model for its usefulness and

[3] Also see Abramovsky et al. (2012) for a meticulous discussion on QUAIDS model.

validity and QUAIDS (Banks, Blundell, and Lewbel, 1997) satisfied almost all the assumptions of complete demand system.[4]

3. Data and Estimation Procedure

The data for prices is collected from Pakistan Bureau of Statistics (PBS), in the form of two published data sets. First data set consists of prices of 374 commodities included in consumer basket by district level with base year of 2000-01. Their weights are not in public domain. And, second data set comprises of 92 composite price indices of these commodities, when categorized together in aggregate form. Unlike former data set, these 92 composite commodities are weighted. The missing data on prices of commodities was obtained by filtering the respective households according to their district, and the month in which they were surveyed. As current studies empirical work entails both price indices and weights, so second price data set of 92 composite items is utilized in case of overall food groups.

In this study, first and foremost step to analyze original data set was that the taken data set was cleaned by removing outlier observations that can possibly lead to biasness in estimates. In order to perform estimation and simulation exercises, virtually all goods and services included in consumer basket are considered. Yet, suitability of the each and every single observation cannot be checked as often required in most of the intensive studies. Hence, a more conventional approach is followed in which observations with prices lying above and below the first and ninety ninth percentiles for every commodity group are omitted from the analysis.

The aforesaid unit values are basically used to construct the CPI and are observed at greater disaggregated level with respect to the consumer goods and services. Such level of disaggregation in not confined in HIES. To overcome this thing, a weighted average unit price gained in CPI data is harmonized with each taken consumed commodities or services in HIES. Hence, the unit prices and weights of the CPI commodities as given by FBS are considered. Finishing the data gathering and variable generation process

[4] Abramovsky et al. (2012), Dybczak et al. (2010), Lewbel (2007), Raychaudhuri et al. (2004), Denton and Mountain (2002) and Deaton (1997) also used QUAIDS model in view of studying consumer demand models.

specifically by getting the physical quantities and unit prices, all taken items are aggregated into ten aggregate commodity groups. With respect to every household and commodity bundle, total expenditure and quantities consumed are added up, while prices are gained by dividing former with latter. The compositional diversity of item groups across households presented different prices correspondingly.

This study presents the estimates of expenditure elasticities for rural and urban regions, Marshallian price elasticities of individual items for 1st and 5th expenditure quintiles, all for ten Aggregate Food Commodity (AFC) groups under scrutiny. These groups include spices, vegetables, sugar and gur, edible oil, pulses, meats, milk and milk products, tea, coffee and soft drinks, cereals and fruits. The elasticities are further attained for 1st (poorest) and 5th (richest) quintiles to weigh the consumption differences.

4. The QUAIDS

The QUAIDS (Banks, Blundell, and Lewbel, 1997) model has been used as the basic model for the complete demand system estimation in this study due its flexible functional form and nimbleness in estimation.[5] QUAIDS (Banks, Blundell, and Lewbel, 1997) is an extension of AIDS and LES and it provides a useful and realistic analysis of consumer demand by accompanying various households characteristic. Moreover, the model satisfies the basic properties of demand system including additivity, homogeneity, non-negativity and symmetry; therefore, the current study incorporates the QUAIDS model to compute elasticities.

QUAIDS (Banks, Blundell, and Lewbel, 1997) is a generalization of the Almost Ideal Demand System and it is based on the utility function given as;

[5] Dybczak et al. (2010), Lewbel (2007) and Raychaudhuri et al. (2004).

$$\ln V = \left\{ \left[\frac{\ln x - \ln a(p)}{b(p)} \right]^{-1} + \lambda(p) \right\}^{-1} \quad (1)$$

Where x is expenditure and a (p), b (p) and λ (p) are defined as;

$$\ln a(p) = \beta_0 + \sum_i \beta_i \ln(p_i) + \frac{1}{2} \sum_i \sum_j \gamma_{ij} \ln(p_i) \ln(p_j) \quad (2)$$

$$b(p) = \prod_{i=1}^{n} p_i^{\beta i} \quad (3)$$

$$\ln \lambda(p) = \sum_{i=1}^{n} \ln(p_i) \quad (4)$$

Where i=1,…, n denotes a good. Applying Roy's Identity to Equation 1 gives the following Equation for $w_{i,}$ the share of expenditure on good I in total expenditures is, for each household;

$$w_i = \beta_i + \sum_{j=1}^{n} \gamma_{ij} \ln(p_j) + \delta_i \ln\left(\frac{x}{a(p)}\right) + \frac{\lambda_i}{b(p)} \left(\ln\left(\frac{x}{a(p)}\right) \right)^2 \quad (5)$$

The demand system must satisfy the following properties i.e. additivity, homogeneity, symmetry, and negativity in order to be consistent with utility maximization. The first three must conditions can be imposed using linear restrictions on the parameters of the model;

Adding up;

$$\sum_{i=1}^{n}\beta_i = 1; \quad \sum_{i=1}^{n}\delta i = 0; \quad \sum \gamma ij = 0 \quad \forall j; \sum_{i=1}^{n}\lambda_i = 0 \qquad 6$$

The adding up condition implies that the sum of quantities demanded, evaluated at their respective prices, must equal the available total expenditure of the household.

Homogeneity;

$$\sum_{j=1}^{n} \lambda_{ij} = 0 \ \forall \ i \qquad 7$$

Theoretically, the demand functions must be homogeneous of degree zero in income and price. The homogeneity condition considers a proportional change in all the prices and income. Hicksian demand functions are homogeneous of degree zero in prices and Marshillian demand functions are homogeneous of degree zero in both expenditures and prices. This rules out the possibility of money illusion.[6]

Symmetry;

$$\gamma_{ij} = \gamma_{ji} \qquad 8$$

Symmetry derives from the existence of consistent preferences, assuming that any cost function representing any consistent preference is twice continuously differentiable. Negativity cannot be imposed in such a manner but it can be estimated through Slutsky matrix to see if this condition is satisfied.

[6] For further details, see Aziz (2009)

If household demographics have to be considered then the demographic denoted as k=1,…,K can be theoretically entered as taste-shifters in the share equations and in order to maintain integrability , the part of α_i in ln a (p) in Equation 1 becomes;

$$\ln a(p) = \beta_0 + \sum_i \left\{ \beta_i + \sum_{k=1}^{K} \beta_{ik} z_k \right\} \ln(p_i) + \frac{1}{2} \sum_i \sum_j \gamma_{ij} \ln(p_i) \ln(p_j) \qquad 9$$

And the equation for budget shares then becomes;

$$wi = \beta i + \sum_{k=1}^{K} \beta_{ik} z_k + \sum_{j=1}^{n} \gamma_{ij} \ln(p_j) + \delta_i \ln\left(\frac{x}{a(p)}\right) + \frac{\lambda i}{b(p)} \left(\ln\left(\frac{x}{a(p)}\right) \right)^2 \qquad 10$$

The adding up condition now comes out to be;

$$\sum_{i=1}^{n} \alpha_i = 1; \quad \sum_{i=1}^{n} \alpha_{ik} = 0 \qquad 11$$

The stated adding up restriction supersedes the previous adding up condition;

$$\sum_{i=1}^{n} \alpha_i = 1 \qquad 12$$

4.1. Uncompensated and Compensated Elasticities in QUAIDS

The Uncompensated and compensated elasticities in QUAIDS (Banks, Blundell, and Lewbel, 1997) are given as;

$$e_{ij}^{u} = \frac{\psi_{ij}}{w_{ij}} + \delta_{ij} \qquad 13$$

Where δ_{ij} represents Kronecker delta.

The Slutsky equation allows us to derive Hicksian/compensated elasticities from Marshillian/compensated ones and vice versa:

$$e_{ij}^{c} = e_{ij}^{u} + e_i w_i \qquad 14$$

5. Results of Food Items using QUAIDS

Having discussed the basic equation of QUAIDS (Banks, Blundell, and Lewbel, 1997) and the formulae of compensated and uncompensated price elasticities, here comes the empirical analysis of the elasticity estimates of food items considered in the present study.

The model represented in equation 5 was initially estimated for the whole sample of households irrespective of their consumption quintiles. Afterwards, the households were fragmented in accordance with their consumption quintiles, and then models were estimated for each of them.

This study also assumes two stage budgeting where preference structure of consumers is such that, initially, they choose how to spend their income among groups of commodities such as food, transportation, health services, and education etc. At the second stage, the consumers allocate their budget in each group, as determined in the first stage, to commodities in that specific group.[7]

The empirical results obtained for the QUAIDS model illustrate that the sign of estimated parameters were in line with the theory. As a result of the second stage of two stage budgeting procedure, the estimated elasticities for the food items for the complete sample are represented in Table 1. The total estimated equations were eleven and the number of food commodity groups was ten, the eleventh equation was estimated for other goods and services. The expenditure elasticities were statistically significant for almost all food groups. They have positive signs for spices, vegetables, sugar and gur, edible oil, pulses, meats, milk and milk products, tea, coffee and soft drinks, cereals and fruits for all households including urban families and rural

[7] Also see Green and Alston (1990,1991)

families as well, thus, indicating a rise in their demand with rising incomes and vice versa.

Goods with income elasticities below zero are called inferior goods; goods with income elasticities between zero and one are called necessities while goods having income elasticity above one are luxuries. Elasticities can themselves vary with income, so e.g. a good that is a necessity for the rich can be a luxury for the poor (Lewbel, 2006).

It can be observed in Table 1 that fruits have the overall highest expenditure elasticity (1.268) and the value was found to be highest for both urban (1.342) and rural sectors (1.316). This indicates that fruits are luxury for both urban as well as rural sectors. The most inelastic food group was cereal for both the urban and the rural households.[8] As far as the estimates of own-price elasticities were concerned, it was observed that all the food groups exhibited negative signs as expected.[9] These results lead us to an interesting finding of the study i.e. for many households; fruits are a luxury and normal food item amongst all other food groups. Kakhki, Shahnoushi, and Rezapour (2010) also observed that fruits and meat were luxury goods for Iranian households in 1961-1986. However, meat just comes after the fruits in terms of the expenditure elasticity. So, meat is the most luxurious food group after fruit. This is backed by the reason that people in Pakistan are generally not conscious about their health so they rarely allocate their budget towards fruits and meat. One other reason for this is lack of awareness about the nutritional value of fruits as well as meat. There exist a substitutability between the meat and pulses, as both are rich source of protein so when affordability of any one of them decreases, the consumption of the other increases. Rural-urban comparison shows that meat is a necessity in all urban areas but a luxury for rural areas.[10] We observed that rural-urban difference in consumption patterns and it was found that urban counterparts were better off as compared to their rural counterparts.

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[8] These findings are somewhat similar to the results obtained by Haq and Cranfield (2011).

[9]The study of Kakhki, Shahnoushi and Rezapour (2010), also showed negative own price elasticities under AIDS.

[10]Also see Aziz et al. (2011)

Table 1: Expenditure and Uncompensated Own price Elasticity Estimates for Pakistan

	Expenditure			Own-Price		
Food Group	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
Spices	0.635	0.639	0.645	-0.376	-0.335	-0.421
Vegetables	0.722	0.72	0.753	-0.496	-0.453	-0.521
Sugar and Gur	0.72	0.555	0.889	-0.684	-0.715	-0.627
Edible Oils	0.631	0.712	0.689	-0.205	-0.296	-0.356
Pulses	0.759	0.639	0.639	-0.383	-0.425	-0.359
Meats	1.174	0.826	1.116	-1.026	-1.106	-1.235
Milk and Milk Product.	1.252	1.181	0.912	-1.084	-1.069	-0.978
Tea, Coffee and Soft drinks	0.733	0.665	0.665	-0.794	-0.675	-0.725
Cereals	0.511	0.496	0.419	-0.691	-0.574	-0.425
Fruit	1.268	1.342	1.316	-0.883	-0.758	-0.896

5.1. Results by Consumption Quintiles

The QUAIDS (Banks, Blundell, and Lewbel, 1997) model permits the calculation of elasticities for different consumption quintiles groups and HIES data materialized this happening. The income and price elasticities are computed for the poorest and the richest households and the results are presented in Table 2. The quintile wise analysis helps in understanding the manner in which consumption of the two extremes i.e. richest and the poorest households differ.

The Table 2 represents the expenditure (income) elasticities and uncompensated own-price elasticities for the poorest families considered in analysis. The expenditure elasticity estimates for all the food groups were positive for the poorest families and fruits came out to be a luxury for them as the value for its expenditure elasticity came out to be the highest (1.48) while the estimate of expenditure (income) elasticity of cereals was the least among all other food groups. This indicated that cereals were highly inelastic (0.647) consumption group for the poorest households and demand for cereals responded less to changes in the price for them. On the other hand, the signs of the own-price elasticities were negative for all food groups considered in the study. Having a look at Table 2, it is seen that meat, tea, coffee and soft drinks and milk and milk product groups have highly elastic attitude towards the change in own price, having own price elasticities -1.251, -1.124 and -0.965, respectively. The food groups of spices, vegetables, edible oils, pulses, tea, coffee, and soft drinks were observed to be a necessity for the 1st quintile despite that cereal were the least inelastic necessity item for the poorest households.

Table 2 represents expenditure and Marshallian own price elasticities for the 5th quintile. It can be noted that the expenditure elasticity estimates for the richest households were relatively lower for all the food groups ranging from spices to fruits when compared with that of 1st quintile households. This indicates that rich households will not spend more on food items when their income rises. All signs for values of own price elasticity is less than zero as expected with inelastic demand. The size of the individual price elasticity for the poorest households ranges from 0.215 (pulses) and 1.251 (meats). Meat has the highly elastic demand meaning that a little change in its own price will lead to their greater substitution in terms of other food items by all households.[11] Furthermore, the results also supported the fact that Sugar and Gur are a luxury for the poorest households but a necessity for the richest households.

[11] Similar results were obtained by Ahmed and Shams (1993). The study showed that low-income families in Bangladesh responded more due to income and price changes in meat.

Table 2: Expenditure and Uncompensated Own-price Elasticities for 1st Poor Quintile and Expenditure and Marshallian Own-price Elasticities for 5th richest Quintile

Food group	1st Quintile (Poorest households)		5th Quintile (Richest households)	
	Expenditure Elasticities	Own price Elasticities	Expenditure Elasticities	Own price Elasticities
Spices	0.725	-0.685	0.623	-0.627
Vegetables	0.867	-0.468	0.758	-0.214
Sugar and Gur	1.011	-0.825	0.954	-0.621
Edible Oils	0.854	-0.325	0.745	-0.189
Pulses	0.824	-0.215	0.754	-0.215
Meats	1.374	-1.251	1.284	-0.978
Milk and Milk products	1.428	-0.965	1.185	-0.885
Tea, coffee and soft drinks	0.895	-1.124	0.856	-0.621
Cereals	0.647	-0.652	0.512	-0.423
Fruit	1.485	-0.895	1.312	-0.579

5.2. Cross Price Elasticities

The values of the cross price elasticities are smaller, in absolute terms, when compared with expenditure and own-price elasticities. This is in fact true in case of uncompensated and compensated cross price elasticities shown in Table 3 and 4, respectively.

Table 3: Uncompensated (Marshallian) Price Elasticities[12] for Pakistan

	SP	VG	SG	EO	PL	ME	MMP	TCS	CR	FU
SP	**-0.376**	0.245	0.114	0.247	0.138	0.215	0.217	0.114	0.145	0.211
VG	0.214	**-0.496**	0.114	0.214	0.149	0.129	0.113	0.114	0.119	0.218
SG	0.002	0.334	**-0.684**	0.328	0.328	0.354	0.321	0.124	0.332	0.357
EO	0.415	0.758	0.692	**-0.205**	0.673	0.729	0.779	0.772	0.689	0.627
PL	0.423	0.785	0.714	0.814	**-0.383**	0.711	0.658	0.769	0.654	0.689
ME	0.428	0.017	0.001	0.129	0.021	**-1.026**	0.023	0.024	0.005	0.054
MMP	0.061	0.175	0.147	0.117	0173	0.002	**-1.084**	0.218	0.105	0.128
TCS	0.101	0.159	0.129	0.147	0.196	0.288	0.201	**-0.794**	0.210	0.224
CR	0.147	0.384	0.296	0.325	0.394	0.512	0.331	0.399	**-0.691**	0.367
FU	0.295	0.325	0.421	0.312	0.221	0.214	0.217	0.324	0.243	**-0.883**

Uncompensated (Marshallian) own price-elasticities are represented in Table 3. The signs of the uncompensated own price elasticities for all Pakistani households came out to be negative as per the expectation.[13] If Pakistan was considered on the whole, then the results revealed that edible oils had the lowest (0.205) inelastic value of with respect to its own price in absolute terms, and milk and milk products had the highest absolute value (1.026), thus, revealing that the consumer demand for the milk and milk products is elastic while it is inelastic in case of edible oils. The values that have been represented in 'bold' are the uncompensated own price elasticities

[12] Uncompensated own-price elasticity estimates are given in bold letters on principal diagonal.

Cereals (CR), pulses (PL), fruits (FU), edible oils and fats (EO), sugar and gur (SG), meats (ME), vegetables (VG), tea, coffee and soft drinks (TCS), and milk and milk products (MMP) and spices(SP).

[13] This result was also obtained and observed in the study of Teklu and Johnson (1987)

for Pakistan while the remaining figures in Table 3 are the cross price elasticities. The highest value of the cross price elasticity is 0.814 for pulses and edible oil and the lowest value of cross price elasticity is 0.001 for sugar and meat. This reflects that the substitution effect between pulses and edible oil is comparatively greater than it is between sugar and meat. However, the value is still less than unity, hence, it can be concluded from the given result that the substitution effect between food groups of sugar and meat is negligible. Similarly, the substitution effect between pulses and edible oil is also slightest as the value is less than unity.

Table 4: Compensated (Hicksian) Price Elasticities for Total Sample

	SP	VG	SG	EO	PL	ME	MMP	TCS	CR	FU
SP	**-0.345**	0.211	0.109	0.267	0.135	0.211	0.215	0.112	0.145	0.212
VG	0.204	**-0.452**	0.114	0.194	0.139	0.119	0.113	0.114	0.119	0.219
SG	0.005	0.294	**-0.713**	0.325	0.308	0.350	0.301	0.120	0.332	0.327
EO	0.445	0.692	0.712	**-0.254**	0.573	0.699	0.775	0.722	0.689	0.627
PL	0.373	0.735	0.724	0.784	**-0.325**	0.701	0.638	0.739	0.654	0.639
ME	0.391	0.014	0.001	0.131	0.031	**-0.885**	0.021	0.024	0.005	0.054
MMP	0.051	0.135	0.151	0.119	0173	0.002	**-0.924**	0.212	0.105	0.122
TCS	0.095	0.125	0.113	0.127	0.186	0.268	0.208	**-0.852**	0.210	0.204
CR	0.127	0.335	0.314	0.322	0.382	0.412	0.336	0.399	**-0.721**	0.317
FU	0.235	0.302	0.413	0.282	0.201	0.211	0.212	0.324	0.243	**-0.812**

Table 4 represents the compensated (Hicksian) price elasticities for the total sample under analysis of this study. For the total sample under discussion, the signs of the compensated own price elasticity estimates were less than zero and correct and the highest absolute value was 0.924 for milk and milk products. On the other hand, the lowest value was found to be 0.254 for edible oil. It showed that a change in the price of milk and milk products

and edible oil will have a slight effect on consumer demand for edible oil and milk and milk products. However, the magnitude is relatively greater for milk and milk products as compared to edible oil and the demand for both food groups is still inelastic when changes in their own prices occur.[14] The values other than those represented in bold letters are for the cross price elasticities. The substitution effect between meat and sugar was negligible as the value of the cross price elasticity between the two food groups was 0.001; however, the two groups will act as substitutes for each other as the value is less than unity.[15]

5.3. Results by Quintiles

The Table 5 shows the Uncompensated (Marshallian) Price Elasticities for 1st Quintile (poorest households). The results of the table show that own price elasticities had expected signs and the absolute values of own price elasticities of ten food groups considered were less than unity which meant that change in the price of the groups itself brought a little change in the demand for the whole group itself. The greatest own price elasticity was 1.251 (meats) and the lowest value was for pulses (0.215). Meats has the highly elastic demand meaning that a little change in its own price will lead to their greater substitution in terms of other food items by the poorest households. Moreover, the values of uncompensated cross price elasticities for the poorest households were less than unity, thus, signifying inelastic consumer demand for these groups and it also meant that the substitution effect was less among these groups. The highest value of cross price elasticity of demand was found out to be 0.814 in case of pulses and edible oil for the poorest households. This means that the poorest households have inelastic demand for pulses and edible oil but the degree of substitutability between the two food groups is lower for the same reason that the elasticity value is less than one. The lowest value of uncompensated cross

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[14] Similar results were obtained by Taljaard, Alemu and Achalkwyk (2003) who also calculated Hicksian own price elasticities under AIDS.

[15] Taljaard, Alemu and Schalkwyk (2003) also found the substitution effect between all the good except chicken demand and pork price in South Africa. This was attributed to the fact that chicken was the only necessity as it was protein source for South Africans and pork was closer to being a luxury, hence, substitution effect was absent between them.

price elasticity of demand came out to be 0.001 in case of sugar and meat. These results were similar to the ones obtained for the uncompensated price elasticity estimates that were computed for Pakistan.

Table 5: Uncompensated (Marshallian) Price Elasticities for 1st Quintile

	SP	VG	SG	EO	PL	ME	MMP	TCS	CR	FU
SP	**-0.685**	0.245	0.114	0.247	0.138	0.215	0.217	0.114	0.145	0.211
VG	0.214	**-0.468**	0.114	0.214	0.149	0.129	0.113	0.114	0.119	0.218
SG	0.002	0.334	**-0.825**	0.328	0.328	0.354	0.321	0.124	0.332	0.357
EO	0.415	0.758	0.692	**-0.325**	0.673	0.729	0.779	0.772	0.689	0.627
PL	0.423	0.785	0.714	0.814	**-0.215**	0.711	0.658	0.769	0.654	0.689
ME	0.428	0.017	0.001	0.129	0.021	**-1.251**	0.023	0.024	0.005	0.054
MMP	0.061	0.175	0.147	0.117	0173	0.002	**-0.965**	0.218	0.105	0.128
TCS	0.101	0.159	0.129	0.147	0.196	0.288	0.201	**-1.124**	0.210	0.224
CR	0.147	0.384	0.296	0.325	0.394	0.512	0.331	0.399	**-0.652**	0.367
FU	0.295	0.325	0.421	0.312	0.221	0.214	0.217	0.324	0.243	**-0.895**

The Table 6 represents Compensated (Hicksian) Price Elasticities for 1st Quintile (poorest households) while Table 6 shows Compensated (Hicksian) Price Elasticities for 5th Quintile (richest households). It is important to note that compensated elasticities suggest variation in quantity demanded of specific good or service due to price shocks, while the variation in actual household expenditure caused by such changes in prices is offset by adjusting budgetary expenditures in order to keep utility level constant. The estimates of own price elasticities in both cases are correct with their expected negative signs. In case of poorest households, the highest absolute value of own price elasticity is against meat (1.351) while in case of the richest families, it came out to be 0.645 against milk and milk products. This

means that demand of meat for poor families was highly elastic and little changes in meat's price would cause a greater change in the demand for meat itself. On the other hand, demand for milk and milk products was inelastic for richest households but it was comparatively higher when compared to own price estimates of remaining food groups in case of richer families. Moreover, the cross price elasticity estimates for the poorest households were less than unity for almost all the food groups considered. Meat and vegetables, Tea, coffee and soft drinks, tea, coffee, soft drinks and edible oil, pulses and vegetables, fruits and tea, coffee and soft drinks were complements as their cross price elasticity was less than zero in case of poorest families. The signs of cross price elasticities were positive and the values were less than unity for households belonging to 5th quintile, with highest value for edible oil and sugar (0.992) and lowest for sugar and spices (0.002) and meat and milk and milk products (0.002).

Table 6: Compensated (Hicksian) Price Elasticities for 1st Quintile

	SP	VG	SG	EO	PL	ME	MMP	TCS	CR	FU
SP	**-0.625**	0.051	0.218	0.148	0.124	0.215	0.341	0.347	0.014	0.042
VG	0.524	**-0.423**	0.635	0.517	-0412	1.012	0.721	0.625	0.897	0.325
SG	0.243	0.334	**-0.795**	0.257	0.325	0.921	0.412	0.231	0.425	0.314
EO	0.785	0.724	0.721	**-0.425**	0.812	1.112	0.812	0.547	0.782	0.661
PL	0.779	1.024	0.885	0.845	**-0.205**	1.124	0.875	0.954	1.012	0.798
ME	0.412	-0.047	0.021	-0.124	0.008	**-1.351**	0.012	-0.143	0.012	-0.014
MMP	0.012	0.158	0.179	0.081	0.042	0.321	**-1.065**	0.512	0.254	0.137
TCS	0.112	0.142	-0.125	-0.015	0.018	03141	0.112	**-1.104**	0.213	-0.124
CR	0.425	0.351	0.314	0.312	0.338	0.654	0.257	0.312	**-0.632**	0.274
FU	0.147	0.321	0.254	0.214	0.412	0.781	0.398	0.214	0.421	**-0.815**

In comparison to the poorest households, Table 7 shows the Uncompensated (Marshallian) Price Elasticities for 5th Quintile (richest households). The results of richest households revealed that meat had the maximum figure of own-price elasticity i.e. 0.978 which is closer to unity but less than one showing that the effect of its own price change will be there and it cannot be ignored. However, the estimated value falls below unity, the demand for meat is inelastic to changes in its own price when richest

households are taken into account. On the other hand, it was also discovered that the minimum observed own price elasticity was of edible oil (0.189). It meant that the consumer demand for edible oil was least responsive to changes in price of edible oil itself but meat demand was a bit more responsive to its own price change though the demand was still inelastic. Richest households had lower uncompensated (Marshallian) individual price elasticity of meat demand (0.978) than for the poorest households (1.251). Moreover, the cross price elasticity estimates for the poor families were less than unity for all the food groups but it was observed to be highest for edible oil and pulses (0.814) and lowest for sugar and meat (0.001). It can be said from the obtained result the degree of substitutability between sugar and meat was the least as compared to the degree of substitutability between edible oil and pulses and consumer demand for any one of them was less responsive to changes in price of the other.

Table 7: Uncompensated (Marshallian) Price Elasticities for 5th Quintile

	SP	VG	SG	EO	PL	ME	MMP	TCS	CR	FU
SP	**-0.627**	0.312	0.178	0.277	0.238	0.227	0.233	0.204	0.185	0.223
VG	0.304	**-0.214**	0.114	0.314	0.189	0.148	0.203	0.128	0.128	0.228
SG	0.012	0.364	**-0.621**	0.418	0.348	0.304	0.301	0.131	0.442	0.457
EO	0.315	0.788	0.792	**-0.189**	0.683	0.720	0.727	0.762	0.669	0.637
PL	0.427	0.785	0.714	0.814	**-0.215**	0.711	0.658	0.769	0.654	0.689
ME	0.428	0.017	0.001	0.129	0.021	**-0.978**	0.023	0.024	0.005	0.054
MMP	0.061	0.175	0.147	0.117	0173	0.002	**-0.885**	0.218	0.105	0.128
TCS	0.101	0.159	0.129	0.147	0.196	0.288	0.201	**-0.621**	0.210	0.224
CR	0.147	0.384	0.296	0.325	0.394	0.512	0.331	0.399	**-0.423**	0.367
FU	0.295	0.325	0.421	0.312	0.221	0.214	0.217	0.324	0.243	**-0.579**

Table 8: Compensated (Hicksian) Price Elasticities for 5th Quintile

	SP	VG	SG	EO	PL	ME	MMP	TCS	CR	FU
SP	**-0.592**	0.302	0.1938	0.298	0.338	0.249	0.278	0.124	0.224	0.215
VG	0.294	**-0.195**	0.247	0.305	0.257	0.398	0.289	0.224	0.289	0.254
SG	0.002	0.325	**-0.601**	0.398	0.485	0.897	0.521	0.131	0.521	0.325
EO	0.335	0.821	0.992	**-0.109**	1.024	1.254	0.951	0.935	0.669	0.958
PL	0.427	1.120	0.829	0.823	**-0.115**	0.711	0.935	1.082	0.938	0.789
ME	0.398	0.224	0.237	0.221	0.287	**-0.458**	0.335	0.198	0.321	0.201
MMP	0.081	0.325	0.147	0.117	0173	0.002	**-0.645**	0.298	0.389	0.128
TCS	0.091	0.459	0.312	0.298	0.354	0.782	0.548	**-0.591**	0.564	0.267
CR	0.129	0.514	0.512	0.435	0.412	0.772	0.331	0.492	**-0.412**	0.467
FU	0.275	0.558	0.508	0.421	0.547	0.987	0.508	0.489	0.598	**-0.614**

Table 9: Expenditure (Income) Elasticities for Pakistan and Provinces

Food Group	Pakistan	Punjab	Sindh	KPK	Bolochistan
Spices	0.635	0.524	0.615	0.712	0.624
Vegetables	0.722	0.732	0.698	0.652	0.724
Sugar and Gur	0.720	0.821	0.715	0..984	0.689
Edible Oils	0.631	0.634	0.689	0.645	0.785
Pulses	0.759	0.745	0.853	0.778	0.745
Meats	1.174	1.214	1.107	1.421	1.347
Milk and milk products	1.252	1.315	1.253	1.157	0.924
Tea, coffee and soft drinks	0.733	0.685	0.894	0.812	0.858
Cereals	0.511	0.475	0.534	0.487	0.547
Fruit	1.268	1.185	1.025	1.238	1.451

Table 10: Price Elasticities for Pakistan and Provinces

Food Group	Pakistan	Punjab	Sindh	KPK	Bolochistan
Spices	-0.376	-0.421	-0.345	-0.334	-0.354
Vegetables	-0.496	-0.531	-0.486	-0.854	-0.625
Sugar and Gur	-0.684	-0.598	-0.725	-1.051	-0.657
Edible Oils	-0.205	-0.159	-0.298	-0.354	-0.224
Pulses	-0.383	-0.289	-0.475	-0.512	-0.412
Meats	-1.026	-1.108	-0.928	-1.211	-1.119
Milk and milk products	-1.084	-0.798	-1.029	-1.185	-1.028
Tea, coffee and soft drinks	-0.794	-0.689	-0.897	-0.745	-0.658
Cereals	-0.691	-0.754	-0.625	-0.814	-0.651
Fruit	-0.883	-1.124	-0.954	-0.914	-0.824

In addition to these finding, estimates of expenditure elasticity for cereals was the lowest among all groups for all the provinces (see Table 9 and 10). In case of Pakistan, Fruits, milk and milk products and meat had the income elasticity greater than one which indicated that these groups were a luxury for Pakistan as whole. The same was true for Punjab, Sindh, and KPK for meat and fruits. However, results of Balochistan showed that milk and milk products was not a luxury item for the households as the income elasticity was closer to unity (0.924) but not greater than unity. Spices, Vegetables, Sugar and Gur, Edible Oils, Pulses Tea, coffee and soft drinks and Cereals were observed to be necessity goods for Pakistan as a whole because their expenditure (income) elasticity estimates fell between 0 and 1. On the other hand, estimated of price elasticities, shown in Table 10

exhibited, negative signs for all the food groups considered. Sign of price elasticities was negative in all cases for all the provinces and Pakistan as whole. This indicates that all food groups have inelastic demand i.e. a change in price of any of these food groups will not change their demand greatly, hence, setting them good for taxation.

6. Conclusion and Policy Recommendations

On the closing end, it can be said that the poorest families in Pakistan are the most vulnerable section in the society as their budget share expenditures are greater on food items as compared to the expenditures of richest households taken into analysis. The elasticity estimates clearly showed that richest households spent less on food items with rising income as they switch to consumption of non-food items and other durable goods. The richest families in Pakistan have lower expenditure elasticities and this has been supported by the results reported above. Consumption pattern of poor and rich households is significantly different and an interesting finding of the study was that sugar and gur was observed to be a luxury for poor households but a necessity for rich families. Moreover, the consumption patterns not only vary across rural-urban regions but they also differ across provinces. Expenditure elasticity of fruits was found to be highest in both rural and urban sectors and this is reasoned by the current economic scenario in the country where higher tax rates, consumer preferences and low salaries determine what people prefer in food consumption to a greater extent. Fruits are a luxury item for rural households because they cannot afford buying fruits in situation where they have to face a tight budget constraint to meet basic needs of life such food, shelter and clothing. This is not only a general perception that fruits are a luxury for many but findings of this study prove this assumption to be true as they are based on a large sample size. So, it can be said with confidence that fruits are a luxury for both urban and rural households as well as for rich and poor households. Another finding of the study was that most of the food groups showed substitution effect for each other.[16] This might be because of lack of dietary diversity in food that Pakistani households consume. 'There is a lack of dietary diversity in

[16] Klonaris (2009) and Taljaard, Alemu and Schalkwyk (2003) also support these results.

Pakistan because their diets are predominantly based on starchy staples with little animal products and few fresh fruits and vegetables', Aziz et al., 2011. Goods that are consumed are based on single food with little amounts of animal products or from plant, thus, necessitating a need to encourage consumption of a wide range of food to enhance nutritional quality and health of the masses. It is, therefore, important that a number of different food sources should be consumed and efforts must be made to promote consumption of a wide variety of foods that are greater nutritional value. This will not only improve the nutritional value of Pakistani households' diet and health of the population in general. As stated earlier, diversity in the diet will ensure a balance of nutrients for people of all ages. The results of this study suggest that policies inclined towards income will play an important role to achieve the goal of balanced diet prevalence in Pakistan.

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