PalArch's Journal of Archaeology of Egypt / Egyptology

"ESTIMATION OF FOOD CONSUMPTION PATTERN OF PAKISTAN; APPLICATION OF THE QUAIDS MODEL USING MICRO-DATA"

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Jawaria Rashid , Ijaz Hussain , "Estimation Of Food Consumption Pattern Of Pakistan; Application Of The Quaids Model Using Micro-Data" , Palarch's Journal Of Archaeology Of Egypt/Egyptology 18(10), 1162-1174. ISSN 1567-214x.

Keywords:QUAIDS Model, Elasticities, Food Demand System.

ABSTRACT:
This paper has three motivational aspects one is the changing food consumption pattern. Two is the detailed food demand analysis and three is the future prediction for food policy analysis. The theme of the paper is to examine the consumption pattern of the 10 major food groups of Pakistan by using the Quadratic Almost Ideal Demand System (QUAIDS). This paper uses HIES data (Round XI), year 2015-16. Marginal effects of economic and demographic variables are estimated. We also estimated the expenditure elasticities as well as price elasticities (Marshallian and Hicksian elasticities). The results show that all the expenditure elasticities and price elasticities are significant in most of the food groups. Their own-price elasticities have the highest value showing the importance of its own-price with respect to their demand. As for as cross-price elasticities are concerned, they show the mixture of the complementary and substitute groups, as are represented by their signs.

INTRODUCTION

Rapid economic growth and rising population have greatly affected the food consumption pattern at the global level in general, and at the country level, in particular. Therefore, it became necessary to explore the effect of these changes on the food consumption pattern in our country. Detailed food demand analysis will not only give us a latest situation about the food demand, but its empirical findings will also be helpful to predict the future demand for food and thus it will greatly help the food policy analysis. Becausethe parameters and

elasticitiesestimate obtained from the demand models are very useful in policy analysis about the food demand. Hence,research on the food demand analysis is helpful for policy formulation to produce the food commodities for the rapidly rising population of the country. The food demand analysis will guide us the production of various food commodities which is necessary to fulfill their future need without affecting the food insecurity. The present study is an attempt, in this regard, to analyze the food demand analysis. Keeping in view the above consideration, the present study is an attempt in this respect such that the parameter estimates as well as predicted elasticities could be made for future food policy.

In the beginning, the literature contains the food demand studies using the single equation model, that is working-leser model. Working-leser model was criticized by the researchers under the ground that consumers decide the purchase of different commodities simultaneously, by keeping in view their budget constraints. This means that the consumers allocate their budget among the different food commodities by considering all these commodities simultaneously. This clearly rejects the estimation of each food demand (budget share) in isolation. Resultantly, the studies used the estimation of the food demand system. But until recently, the studies lacked to show the impact of various socio-economic characteristics on the food demand analysis. Since the socio-economic factors also affect the food demand analysis, therefore it is necessary to include the various socio-economic characteristics of the households.

The major objective of this paper is the estimate the food demand system by also considering the 10 major food groups along with consideringthe various socio-economic characteristics of the households. The organization of this paper is as under:The first section describes the background of the research issue. Then follows the literature review. In the third section, methodology is discussed, which contains the proposed model estimation techniques and data source. In the fourth section, we discuss the results of the model, the last section concludes the present study.

LITERATURE REVIEW

Since the food demand analysis is not new in the literature of economic theory, the techniques used in the food demand analysis improved, overtime. There has been concurrent improvement in the nature and quality of the data as well as the estimation techniques.Therefore, the earlier literature moved fromfundamental techniques to the advanced ones.In literature, many types of models used in the food demand analysis

Over time, theoretical improvements occurred in the methodology of food demand modelsby considering the flexible form of the model. This improvement has resulted into use of Quadratic Almost Ideal Demand System (QUAIDS) model.The food demand studies, starting from the late 1990's until recently, have used the QUAIDS model. Some of them are briefly explained below.

Abdulaiet al. (1998)used QUAIDS and estimated the price and expenditure elasticities by using the Swiss data by using the seven food groups collected by the Federal Office of Statistics (BSF) in 1998. The empirical results show that most of the estimates of the elasticities are less than one with negative sign, implying the food demand is inelastic.

Taylor et al. (2003) introduced the theoretically plausible demand functions and applied to the US data take from the Consumers' Expenditure Survey by discussing the restrictions of the neo-classical theory of the demand analysis and applied it empirically. This study also empirically investigated the marginal demographic effects, own-and-cross-price effects by using QUAIDS model which are found to be consistent with underlying economic theory used in the food demand analysis.

Matsuda (2006) performed the simulation exercise to check the validity of the model. The study concluded that if combination of composite variable and elasticity formula is used,

the QUAIDS model could better be linearly approximated for obtaining the realistic and robust estimates of the demand models.

Kumar et al. (2011) examined the food demand in India by applying the QUAIDS and using the data set collected by National Sample Survey Organization (NSSO) covered the years 1983, 1987-88, 1993-94, 1990-00 and 2004-05. This study included all the food and non-food commodities in the sample households and estimated the expenditure and price elasticities. The results showed that the magnitude of the elasticities reduces with increasing the income groups.

Irz and Kosmanns (2013) analyzed the consumption pattern of dairy products in Finland by using the time series data of period from 1975 to 2010 for six food commodities by using the QUAIDS model. The empirical results showed that there had been change in the consumption pattern in dairy products in Finland. That is, the consumers changed their demand for traditional and less- processed categories (butter and milk) towards more processed dairy products (cheese and sour milk products).

Sola (2013)selected QUAIDS model to compare the relationship of food insecurity situation with the food demand analysis in Ondo state of Nigeria. The results showed that rice, bean, flour, meat, vegetables and fruits wee normal goods or they are treated as luxuries, as their elasticities were larger than one.

Wong, Selvanathan and Selvanathan (2015)used the QUAIDS model for meat consumption demand in Australiaand concluded that Australians currently used 40% of their food expenditure on meat. The estimated results confirmed beef as a luxury, while mutton, lambs, chicken and pork are price inelastic.

Gostkowski (2018) analyzed the consumer demand for Polish economy by using the time series data of the period 1999- 2015. The study also included the socio- economic variables in the model in the QUAIDS model. The elasticities of communication, education, transport, recreation, restaurants and hotels, were elastic (larger than one) with highest value for restaurants and hotels.

Several other studies in the developing countries are also emerging in the use of QUAIDS model. Examples include Abdulai and Aubert (2004) using Tanzanian food expenditure data, Meenakshi and Ray (1999) using Indian food expenditure data, Gould and Villarreal (2001) using food expenditure data from urban China, Molina et al. (2005) using aggregate consumption data from Peru.Dey (2000), Kumar and Dey (2004),Dong et al. (2004),Shinoj and Mathur (2006), Dey et al. (2008), Molokoet al. (2018) and Bopape and Myers (2007) have also used QUAIDS model.

In case of Pakistan, the prior studies on assessment of demand functions can be divided into 3 main parts:

- Single Equation Models (Working Lesser Model)
- Rigid System of Equations
  (Linear Estimation System & Extended Linear Estimation System)
- Flexible System of Equations
  (Almost Ideal Demand System & linear approximation AIDS)

Single equation model arises the difficulty of expenditure endogeneity while other is Inflexible system of equations based on the assumption that the Marginal Utility of one commodity is independent of the use of another commodity which Deaton criticized in 1975. According to Deaton, that this assumption is not appropriate for food items because these items can never move separately. Therefore, in 1980, Deaton &Muellbaer developed a consumer demand model known as AIDS, a more adaptable model than the Rigid Estimation System.

But, despite all its attractive properties, Bank et al. (1997) observed that AIDS do not obtain the non-linear effect of income that is a consumer good can turn from a luxury good

into a necessity good after a specific level of income. Therefore, Bank etal. (1997) presented QUAIDS approach for this purpose. QUAIDS is quite famous in estimation the consumption patterns across the world. But unfortunately, in case of Pakistan, it is not well discussed. We find few studies in this respect i.e., Jalil etal. (2018), Naz etal. (2018), Haider et al. (2017), Zaidullahet al. (2016) and Iqbal & Anwar (2014). These studies calculated consumption pattern in Pakistan by using the QUAIDS model. So, our comprehensive literature review illustrates that very limited studies using QUAIDS in Pakistan to assess food demand system with a more flexible approach. Therefore, it was important to conduct this study and tried to fill the existing knowledge gap. Further, with the availability of detailed dataset and computational techniques, we are in a position to undertake such in-depth analysis at the segregated level by keeping in view the different socio-economic conditions of the households which also motivated the author.

METHODOLOGY

Construction of Food Groups:

We have used the composite food group approach. As all the relevant food items are considered together in the form of a single food group. In constructing each food group, all the relevant food items are considered through calculating their weighted mean. All the relevant food items are given proportionate weights, then all weight is added up to form the composite food group. The same procedure is adopted for constructing their respective quantities. We have constructed 10 food groups namely, wheat, other cereals, tea, sugar, milk, ghee and oil meat, beverages and juices, fruits and vegetables and miscellaneous food items.

Importance of QUAIDS Model:

Our choice of using QUAIDS model in this paper is based on the following reasons: it allows the flexibility in the functional form. That is, it uses the quadratic term of logarithm of total food expenditure in order to change of some commodities from luxury to necessity with increase in the income of the household. More specifically, commodities are luxuries for ones and the necessities for others. It also considers the effect of economic and demographic variables of the households on the demand for food. The QUAIDS model is estimated in its flexible form, without imposing linearity on the price aggregators, and corrections for econometric problems of expenditure endogeneity and censoring.

Model Specification:

The QUAIDS model is derived from indirect utility function (V) of the consumer, as already referred as well as applied in the demand analysis by Deaton and Muellbauer(1980), Banks et al.(1997), Dong, Gould and Kaiser (2004), Poi (2012), and Ansah et al. (2020) is given by

$$\ln v(m, p) = [\{\frac{\ln(m)-\ln a(p)}{b(p)}\}^{-1}] + \lambda(p)]^{-1} \quad (1)$$

Where p is vector of prices, m is a household food expenditure, λ is homogenous function of degree zero in prices; a (p), b(p), λ (p) are the functions of vectors of prices. ($\frac{\ln(m)-\ln a(p)}{b(p)}$) is the indirect utility function of the Price Invariant Generalize Logarithmic (PIGLOG) which is the system with budget shares are linear in log of total expenditure. a(p) is homogenous and differential function of degree one in prices.

The price index is given by Transcendental Logarithm Function:

$$\ln a(p) = \{\alpha_0 + \sum_{j=1}^{n} \alpha_j . \ln(p_j) + \frac{1}{2}\sum_{j=1}^{n}\sum_{k=1}^{n} \gamma_{jk} \ln(p_j) \ln(p_k)\} \quad (2)$$

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

$$\lambda(p) = \{\sum_{j=1}^{n} \lambda_j p_j\} (4)$$

The next step is the application of Roy's identity to the above-mentioned indirect utility function. We have ultimately derived the following budget share equation

$$w_j = \frac{\partial \ln a(p)}{\partial \ln pj} + \frac{\partial \ln b(p)}{\partial \ln p_j} (\ln m) + \frac{\partial \lambda}{\partial \ln pj} \frac{1}{b(p)} (\ln m)^2 \quad (5)$$

Where $W_j$showing the budget share for goods j.By replacing equations (1), (2), (3) and (4) in equation (5), we get QUAIDS model:

$$w_j = \alpha_j + \sum_{k=1}^{n} \gamma_{jk} \ln pj + \beta_j \ln\left\{\frac{m}{a(p)}\right\} + \frac{\lambda j}{b(p)} [\ln\left\{\frac{m}{a(p)}\right\}]^2 \quad (6)$$

j=1,……..,10

Demand system also considered the socio-demographic features of the households, we used Ray's (1983) scaling technique presented by Poi 2012, who extends Ray's work (1983) as follows

$$e_h(P, z, u) = \bar{m}_o(z) \times \Phi(P, z, u) \times e^R(P, u) \quad (7)$$

Where$e_h(P, z, u)$ is Household's Expenditure Function (p = price vector, **z** = socio-demographic vector and u = utility) while $\bar{m}_o(z)$ and $\Phi(P, z, u)$ both are showing effect of socio-demographic factors on entire expenditure and on relative expenditure respectively.$e^R(P, u)$ is Showing expenditure function of a reference household.

This functional form has a distinct advantage of resulting in expenditure share equations that closely mimic their counterparts without demographics. η_k' shows that the kth column of s x n parameter matrix η Then, we get expenditure share model with socio-demographic factors as:

$$wj = \alpha_j + \sum_{k=1}^{n} \gamma_{jk} \ln p_k + (\beta_j + \eta_k' z) \ln\left\{\frac{m}{\bar{m}_o(z)a(p)}\right\} + \frac{\lambda j}{b(p)c(p,z)} \left[\ln\left\{\frac{m}{\bar{m}_o(z)a(p)}\right\}\right] 2 \quad (8)$$

By considering all the relevant demographic variables in the model, the model will have the following form

$$wj = \alpha_j + \sum_{k=1}^{n} \gamma_{jk} \ln p_k + (\beta_j + \eta_k' z) \ln\left\{\frac{m}{\bar{m}_o(z)a(p)}\right\} + \frac{\lambda j}{b(p)c(p,z)} \left[\ln\left\{\frac{m}{\bar{m}_o(z)a(p)}\right\}\right] 2 + \theta_1 age + \theta_2 gen + \theta_3 edu\_h + \theta_4 age1 + \theta_5 age2 + \theta_6 age3 + \theta_7 age4 + \theta_8 alt\_mat + \theta_9 ad\_eq + \theta_{10} ms\_u + \theta_{11} ms\_dw + \theta_{12} es\_u + \theta_{13} es\_e + \theta_{14} es\_se + \varepsilon_i$$

Where, 'Age' is age of the Head, 'gen' is gender of the head, 'edu_h' is education of the Head, 'age1', 'age2', 'age3', 'age4' is number of persons falling in these age brackets, 'atl_mat' is the no. of persons in family with at least matric education, 'ad_eq' is the adult

equivalent, 'ms_u' (unmarried head), 'ms_dw' (divorced/widow head), 'es_u' (unemployed head), 'es_e' (employer head), 'es_se' (self-employed head)

Gender of the head. Marital and employment status of the head are the qualitative variables shown through the dummy variables in the econometric model. In each dummy variable, one category is considered as a base category.

Since the consumers allocate their consumption expenditure on all food groups collectively, therefore it gives rise to the expenditure endogeneity for which single equation will be irrelevant resulting into giving the biased and inconsistent estimates. Therefore, all the 10 budget share equations will be estimated simultaneouslythough iterated seemingly unrelated regression procedure. The iterated feasible generalized least squares method is used to obtain the coefficients. However, to satisfy the requirements of utility maximization, the adding-up, homogeneity, and Slutsky symmetry restrictions are observed as follows:

i). Adding- up: $\sum_{j=1}^{n} \alpha_j = 1$, $\sum_{j=1}^{n} \beta_j = 0$, $\sum_{k=1}^{n} \gamma_{jk} = 0$, $\sum_{k=1}^{n} \lambda_j = 0$,

ii). Homogeneity: $\sum_{k=1}^{n} \eta_{rk} = 0$

iii). Symmetry: $\gamma_{jk} = \gamma_{kj}$

In STATA, QUAIDS command automatically imposed these conditional restrictions in the estimation and last expenditure share equation is excluded to avoid a singular error covariance matrix being produced. Also note that the specific share equation omitted has no effect on the resulting parameters.

The following formulas are used to derive the elasticities

(i). Expenditure Elasticity:

$$u_j = 1 + \frac{1}{w_j}\left[\beta_j + \eta_j' z + \frac{2\lambda_j}{b(p)c(p,z)} \ln\left\{\frac{m}{\bar{m}_o(z)a(p)}\right\}\right] \qquad (9)$$

(ii). The Marshallian (uncompensated) Price Elasticity:

$$\epsilon_{jk} = -\delta_{jk} + \frac{1}{w_j}\left(\gamma_{jk} - \left[\beta_j + \eta_k' z + \frac{2\lambda_j}{b(p)\,c(p,z)} \ln\left\{\frac{m}{\bar{m}_o(z)a(p)}\right\}\right] x \left(\alpha_k + \sum_l^n \gamma_{kl} \ln p_l\right) - \frac{(\beta_k + \eta_k' z)\,\lambda_j}{b(p)c(p,z)}\left[\ln\left\{\frac{m}{\bar{m}_o(z)a(p)}\right\}\right] 2\right) \qquad (10)$$

Where $\delta_{jk} = 1$ for j=k, and 0 otherwise.

(iii). From Slutsky equation, the Hicksian (compensated) price elasticities are obtained which are as follows:

$$\epsilon_{jk}^c = \epsilon_{jk} + \mu_j w_k$$

Data:

This study used the unit-record data collected by the Pakistan Bureau of Statistics (PBS) under the HIES, round XI (2015-16). This is nationally representative survey covering both the urban and rural regions of all the four provinces. It contains households'level detailed information about all the important aspects of the households, using the 2-stagestratified random sampling technique.

ESTIMATION & EMPIRICAL RESULTS

The estimated results are presented in three steps. First step showed the expenditure, own-price and cross-price effects. In step 2, we showed the coefficients of the demographic

variables. The elasticities are shown in the last step.

Expenditure Effect:
Table. 1 shows the effect of change in total food expenditure on the demand for specific food group. The results show that all estimates of expenditure effect for different food groups are statistically significant at 1% level However, the maximum effect of expenditure is found in the wheat (0.0772) food group, then in fruits & vegetables (-0.0600) and milk (0.0443).

Price Effect:
The results of allown-price effects are statistically significant except in miscellaneous food items. The maximum own-price effect is found in meat while minimum effect is found in other cereals. The rest of the detail of price effects is given in the Table 1.

Similarly, the cross-price effects of most of the food groups are also significant, but their magnitude are smaller than their own-price effects. It clearly implies that demand for each food group is highly influenced by its own-price rather than the other commodities' price. The signs of the cross-price effects indicated the nature of the commodity (substitute and complements). The details of cross price effects are given in Table 1.

Table 1. Expenditure, Own-price, and Cross price effects of major Food Groups.

FOOD GROUPS	Drinks	Fruits and Vegetables	Meat	Ghee and Oil	Sugar	Tea	Milk	Wheat	Other cereals	Misc.
Alpha	0. 0273*	0.0788*	-0.0850*	0.0911*	0.1424*	0.1680*	0.2248*	0.2455*	0.0429*	0.0641*
Expenditure Effect	-0.0123*	-0.0600*	0.0382*	-0.0116*	-0.0341*	-0.0115*	0.0443*	0.0772*	0.0062**	-0.0365*
Drinks	**-0.0171***									
Fruits and Vegetables	0.0035*	**0.0240***								
Meat	0.0044*	0.0005	**0.0568***							
Ghee and Oil	0.0001	-0.0040*	0.0014*	**0.0458***						
Sugar	0.0005**	-0.0027*	0.0033*	-0.0470*	**0.0463***					
Tea	0.0013**	-0.0067*	-0.0116*	-0.0064*	0.0020*	**0.0180***				
Milk	-0.0014***	-0.0025*	-0.0225*	0.0114*	0.0023*	0.0047*	**-0.0175***			
Wheat	0.0052*	-0.0088*	-0.032	-0.0003	-0.0030*	-0.0007	0.0215*	**0.0237***		

			5*							
Other cereals	0.0016*	-0.0010*	0.0085*	-0.0024*	-0.0002	0.0007*	-0.0060*	-0.0032*	**0.0008***	
Miscellaneous	0.0020*	-0.0024*	-0.0082*	0.0014*	-0.0014*	-0.0013*	0.0101*	-0.0019**	0.0012*	**0.0005**

Source Researcher's own calculations from HIES (2015-16) Dataset.*= significant at 1%, **= significant at 5%, ***=significant at 10%,

Demographic Variables' Effect:

Age of the head has significant effect on the demand for fruits and vegetables, ghee and oil, milk and miscellaneous food items. The effect of different age groups is insignificant in most of the food groups. Most of the food groups are positively influenced by the adult equivalence at the household level. The effect of the education of Head as well as family is positively significant, and its effect is larger than gender of the Head. As far as marital status of the head is concerned, the results showed that households whose head are either unmarried or divorced/ widowed, demand less for most of the food groups, as compared with the households whose heads are married. Those households whose heads are the employers, the demand for food is significantly different from the households whose heads are paid employees. However, the direction of the demand for food is mixed. Similarly, the demand for food group is significantly higher in those households whose heads are self- employed. But, here, most of the food groups have positive effect in self- employed heads. The demand for most of the food group is almost similar among the households whose heads are either paid employees or unemployed.

TABLE 2;Effects of Economic and Demographic Variables on Demand for 10 Major Food Groups

VARIABLES	Drinks	Fruits and Vegetables	Meat	Ghee and Oil	Sugar	Tea	Milk	Wheat	Other cereals	Misc.
Age of the Head	0.00003	0.00001**	0.00007	-0.00002***	-0.00001	0.00003	-0.00001**	-0.00002	-0.00007	-0.00002
Age_1 (0-5)	-0.0003	0.0009*	-0.0001	0.0000	-0.0002	-0.0003	0.0008	-0.0028*	0.0015*	0.001***
Age_2 (6-18)	-0.0001	0.0008**	-0.0011	0.0005	-0.0002	-0.0003	-0.0020	0.0008	0.0016	0.0000
Age_3 (19-40)	0.0004	0.0004	0.0002	0.0000	-0.0005	-0.0001	-0.0005	-0.0016	0.0015**	0.0002
Age_4 (>40)	-0.0001	0.0000	-0.0008	-0.0006	-0.0010*	0.0001	-0.0021	0.0013	0.0022*	0.00004
Adult equivalent	-0.001***	-0.0013*	-0.0006	0.0004	0.0007***	0.0007***	-0.0053*	0.0084*	-0.0011*	-0.0008
Gender_H	-0.0008	-0.0023	-0.005*	0.0015	0.0010	0.0023*	-0.005**	0.0083*	0.0016	-0.002**

		*	*				*			
Education_H	0.0005*	0.0001*	0.0007*	-0.0003*	-0.0002*	0.0000	0.0005*	-0.0014*	-0.0001	0.0001*
At least Matric	0.0011*	0.0005*	0.0018*	-0.0005*	-0.000***	-0.0001	0.0016*	-0.0046*	-0.0001	0.0005*
Unmarried	0.0017**	-0.0013**	0.0062*	-0.0031*	-0.0016*	-0.0016*	0.0013	-0.004***	-0.002**	0.0039*
Divorced/ Widow	0.0021**	-0.0039*	0.0004	-0.0025*	-0.0018*	-0.0022*	0.0153*	-0.0111*	0.0012	0.0024**
Employer	0.0080*	0.0012**	0.0063*	-0.0027*	0.0003	-0.0034*	0.0011	-0.0147*	-0.0014	0.0052*
Self Employed	-0.001***	0.0000	-0.0027*	-0.0020*	-0.0020*	-0.0014*	0.0108*	-0.0090*	0.0026*	0.0041*
Unemployed	-0.0007	0.0016*	0.0025*	0.0001	-0.0001	-0.0006	-0.0037*	0.0023***	-0.0015*	0.0001

Source Researcher's own calculations from HIES (2015-16) Dataset. *= significant at 1%, **= significant at 5%, ***=significant at 10%,

Elasticities:

The study estimated the Marshallian as well as the Hicksian elasticities. Since the pattern prevailed in both type of elasticities is almost the same, therefore their results are not explained separately. The overall pattern of results is discussed below.

The empirical findings indicated that all food groups had a positive expenditure elasticity of demand. However, drink, meat, milk and Miscellaneous food items are expenditure elastic (luxury) and hence could be considered as a, while fruits and vegetables are expenditure inelastic (necessity).

While analyzing the own-price elasticity across the food groups, it is evident from the results that own-price elasticity is the highest in case of each food group (as compared with the cross-price elasticities in both Marshallian and Hicksian elasticities) which implied that demand for each of the food group is highly influenced by its own-price. However, overall own- price elasticity is the highest in drinks (-1.6899) among all the food groups found in uncompensated elasticities. That is, demand for drink increase by 69% more than the decrease in its price. Similarly, drinks are also highly price elastic food groups in compensated elasticities.Conversely, the minimum own-price elasticity prevails in fruits and vegetables in both elasticities.

While discussing the results of cross-price elasticities, it is clear that the demand for each food group is not only influenced differently by the prices of different food groups, but the extend of the change in the demand is also different among different food groups (as shown in Table 3). It means that we have the variety of cross price effects among all the food groups depending upon the nature of the food group. However, positive and negative signs of

cross price elasticities show the substitutability and complementarity of the food groups, respectively.

Table 3; Expenditure. Own-price and Cross Piece Elasticities of 10 Major Food Groups of Overall Pakistan

EXPENDITURE ELASTICITIES										
FOOD GROUPS	**Drinks**	**Fruits and Vegetables**	**Meat**	**Ghee and Oil**	**Sugar**	**Tea**	**Milk**	**Wheat**	**Other cereal**	**Misc.**
	1.5081	0.4730	1.3130	0.8695	0.8417	0.8273	1.2005	0.8594	0.8745	1.2456
UNCOMPENSATED ELASTICITIES										
Drinks	**-1.690**	0.1369	0.1210	-0.0620	-0.0101	0.0200	-0.1496	0.0177	0.0294	0.0784
Fruits and Vegetables	0.1090	**-0.2893**	0.0074	-0.0092	0.0235	-0.1255	0.0189	-0.2096	-0.0053	0.0070
Meat	0.0323	-0.0302	**-0.5067**	-0.0351	-0.0073	-0.1254	-0.2549	-0.3516	0.0601	-0.0943
Ghee and Oil	0.0036	-0.0191	0.0187	**-0.6207**	-0.3558	-0.0415	0.1123	0.0262	-0.0115	0.0185
Sugar	0.0129	-0.0030	0.0417	-0.5669	**-0.3903**	0.0370	0.0538	-0.0307	0.0034	0.0004
Tea	0.0256	-0.1044	-0.1951	-0.0886	0.0532	**-0.667**	0.1131	0.0284	0.0220	-0.0147
Milk	-0.0094	-0.0250	-0.1197	0.0243	-0.0083	0.0086	**-1.117**	0.0464	-0.0393	0.0388
Wheat	0.0181	-0.0503	-0.1057	0.0141	-0.0118	0.0043	0.1149	**-0.825**	-0.0015	-0.0165
Other cereals	0.0297	-0.0207	0.1769	-0.0288	0.0022	0.0207	-0.0902	-0.0101	**-0.976**	0.0223
Miscellaneous	0.0502	-0.0227	-0.2323	0.0062	-0.030	-0.0415	0.1763	-0.1890	0.0072	**-0.9698**
COMPENSATED ELASTICITIES										
Drinks	**-1.6524**	-0.0214	0.2892	0.1297	0.1094	0.1046	0.1749	0.3933	0.1087	0.1452
Fruits and Vegetables	0.1208	**-0.2703**	0.0602	0.0510	0.0610	-0.0989	0.1207	-0.0918	0.0196	0.0279
Meat	0.0650	0.0225	**-0.3602**	0.1318	0.0967	-0.0518	0.0277	-0.0246	0.1292	-0.0362
Ghee and Oil	0.0252	0.0157	0.1156	**-0.5102**	-0.2869	0.0073	0.2994	0.2427	0.0342	0.0569
Sugar	0.0339	0.0308	0.1355	-0.4599	**-0.3236**	0.0843	0.2349	0.1789	0.0476	0.0377
Tea	0.0462	-0.0712	-0.1029	0.0166	0.1188	**-0.6204**	0.2912	0.2344	0.0655	0.0219
Milk	0.0205	0.0231	0.0142	0.1769	0.0868	0.0759	**-0.8586**	0.3454	0.0238	0.0919
Wheat	0.0395	-0.0159	-0.0099	0.1233	0.0563	0.0525	0.2998	**-0.6109**	0.0437	0.0215
Other cereals	0.0514	0.0143	0.2745	0.0824	0.0715	0.0698	0.0980	0.2076	**-0.9305**	0.0610
Miscellaneous	0.0812	0.0272	-0.093	0.1645	0.0685	0.0284	0.4443	0.1212	0.0726	**-0.9147**

Source Researcher's own calculations from HIES (2015-16) Dataset

CONCLUSION:

The food consumption pattern of the Pakistani households isestimated by using the QUAIDS model by considering the 10 major food groups. In this context, recently available unit record data are used (HIES; Round XI-2015-16). The study concluded that all the expenditure effects are significant at 1% level, in which wheat has the highest effect. Then fruits and vegetables, and milk. All the price effects in all food groups are significant, except in miscellaneous food items. Cross-price effects of most of the food groups (on the other food groups) are also significant, but their magnitudes are smaller than their own-price effects. Demographic variables also affected the demand for food groups.All food groups havethe positive expenditure elasticity of demand. Similarly, own-price elasticities of all the food groups are significant. The effect of price of each food group is dominant on its demand. It implies that all the food groups are essential in food consumption pattern of the households. As regards the cross-price elasticities, though their effects are significant in almost all the food groups, but their magnitudes are smaller than the own-price elasticities. It clearly tells us that no one food group is completely substitutable for another, but the combination of all food groups is essential for households.

POLICY IMPLICATION:

Since we have the variety of the results based on scientific methodology, therefore number of policy options can be formulated in order to stabilize the food demand in the country. The role of the elasticities is very much essential in designing the food policies.Every food group is highly sensitive due to its own-price, therefore the emphasis is made on all food groups in order to remove food shortage in these food groups.

Based on the empirical evidence, it was established that households' demand for fruits and vegetables at its minimum level in Pakistan which are a good source of minerals, vitamins and micro-nutrients. Their insufficient consumption could have an adverse impact on nutritional security and health of households in Pakistan. In order to encourage the demand for fruits and vegetables, the price stability policy measures should be implemented to boost up the demand for fruits and vegetables in the country. Further, awareness campaign should be started in the masses for using the fruits and vegetables.

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