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DEMAND PROJECTIONS AND CONSUMPTION PATTERN ANALYSIS AT PROVINCIAL LEVEL IN PAKISTAN

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Abstract

Fluctuations in income and population are imperative elements for changing the structure of food demand. In perspective of the significance of food demand examination for provinces of Pakistan, this study investigates the demand elasticities and household consumption behaviour both at the provincial and national level in order to plan the future level of demand for certain food items. The Almost Ideal Demand System (AIDS) model is applied on the Household Integrated Income and Consumption Survey (HIICS) 2015-2016 for demand analysis. The results show that socioeconomic factors such as household size, profession and literacy of head play a significant role in explaining the pattern of food demand along with prices and income. The per capita household projected demand from 2016 to 2040 shows that Khyber Pakhtunkhwa (KPK) will exceed Punjab province in terms of total per capita consumption of all food items with the passage of time.

Keywords: Demand Projection, Consumption Pattern, AIDS, SUR.
JEL Classification: D10; D12; D13; Q18; R21.

I. Introduction

Examination of food demand is an essential concern of developing countries as it is connected with food security. Many developing countries, including Pakistan, face the situation of an increase in poverty, hunger and food insecurity.[1] There is strong evidence that an increase in the price of food items and a decrease in real wages greatly impact poverty and food security through the channel of consumption pattern in the country [Malik, et al. (2015)]. One of the main elements of future demand is the demand elasticities that provide valuable understanding for policy analysts to understand the pattern of growth in food consumption. Demand elasticities are affected by both the

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1 World Bank (2010) and Harttgen and Klasen (2012).

level of income attained and the quantities of food consumed. A correct estimate of demand elasticities is essential not only in getting price and expenditure elasticities but also in getting reliable estimates of future food demand projection. These elasticities also act as prerequisite for the design of various policies; for example, policy design for indirect taxation and subsidies requires an understanding of these elasticities for taxable commodities in the projections for future food consumption.

After Independence, the policymakers focused on accomplishing and keeping up self-reliance in the production of food. Subsequently, the green revolution in the 1960s expanded the efficiency of the agriculture sector [Ahmad (2010)]. Although Pakistan is an agriculture-based economy, many of its population live below the poverty line. About 40 per cent of Pakistani children under the age of 5 are stunted [Irfan Ullah, et al. (2018)]. The enhancements in efficiency could not surpass a specific threshold due to the high growth rate of population as compared to the productivity growth rate. From 1980 to 2010, the growth rate of the agriculture sector was consistent between 2 per cent and 5 per cent, while the population growth rate was 2.6 per cent.

Moreover, from 2000 to 2005, the agricultural growth rate and population growth rate decreased to 2.10 per cent and 1.9 per cent, respectively. The agriculture sector demonstrated a negative growth of –2.2 per cent and –0.1 per cent, respectively, while the population raised at 2.1 per cent and 1.8 per cent in 2000 and 2002, respectively. From the year 2007 to 2010, the growth rate of the agriculture sector was 1 per cent and 0.6 per cent, respectively, while in a similar period, the population growth rate was 1.8 per cent and 1.7 per cent, respectively. Because of such high population growth and lower agriculture growth, the country remains a net importer of several essential food items. Fluctuation in the production of food commodities over time has turned the nation into a food deficient country [Zaheer (2013)].

The household consumption pattern plays a vital role in designing efficient food and farming policies and it helps in better understanding of the impact of government policies on consumption pattern, health, environment and food security outcomes [Lusk and McCluskey (2018)]. There is a strong link between food policies and food consumption; better food policies help reduce poverty and improve health [Unnevehr, et al. (2010)]. For this purpose, obtaining in-depth knowledge of the important factors of food demand, i.e., demand elasticities, is crucial for designing effective policies in order to enhance food access. A variety of empirical studies on consumption patterns have been carried out in Pakistan including Ahmad, et al. (1987), Malik, et al. (1987) (1988), Suleri and Haq (2009), Shahzadi (2010), Aziz and Malik (2010), and so forth.

The studies mentioned above have discussed various issues concerning the consumption pattern of rural and urban households. Most of the studies used HIES data and the Engel curve technique to point out the differences in rural-urban household consumption patterns in Pakistan. The findings of these studies show that the fluctuations in income, population explosion and industrialisation are accountable elements for changing the structure of food demand. The present study represents a step forward

to analyze the impact of household size, age, income elasticities, occupation, education, and region on household consumption pattern both at the national and provincial level. These factors are explored in order to plan the future level of demand of certain food items, like, vegetable, meat, milk, clarified butter, pulses, sugar, and food grain. For a particular country, demand elasticity provides useful information to policy makers in designing the policies related to the growth pattern of national food consumption. There is a great impact of the income level and the amount of food consumed by the consumer. The estimation of complete demand functions is beneficial for finding price and income elasticities; estimating these elasticities is very valuable for the food demand projection [Aziz, et al. (2011)]. Household Integrated Survey (HIES) is widely used to examine the alterations in the living standard of household across the country. Household Integrated Economic Survey HIES data is beneficial to improve the economic conditions of the household/ individual, as it helps the policymakers to make appropriate policies regarding socioeconomic development and public investment. Therefore, the Household Integrated Income and Consumption Survey (HIICS) 2015-2016 data is used in the present study.

The Almost Ideal Demand System (AIDS) model presented by Deaton and Muellabauer in 1980 is applied in this study. Outcomes of the analysis will help the policymakers in making appropriate food policy. Additionally, the food demand analyses will help devising food policy which will guarantee food security in the country.

The present study is divided into different sections. Section II covers the Literature Review. Section III discusses the methodology, data sources. Section IV shows results of consumption patterns of household and demand projections at the provincial level in Pakistan. Lastly, Section V contains concluding remarks and policy implications.

II. Review of the Literature

Research about the consumers' consumption pattern began in Northern Europe during the 80s, but the most significant study related to consumers' budget allocation was conducted by Stigler in 1954. According to him, the households with low income allocate the most portion of the budget to food items, and there is a reduction in this portion as income increases. His study is considered the first generalisation based on the survey data and has gained importance in modern microeconomics. The household consumption pattern not only plays a significant role in dealing with micro problems but also helps in dealing with macro problems and designing efficient food farming policies. Therefore knowing the consumer's consumption pattern, not only improvement in the micro and macro-level strategies can be made, but it also helps make a better future forecast.

There is a need for a better understanding of the impact of government policies on consumption patterns and the impact of consumers' consumption patterns on health, environmental and food security outcomes [Lusk and McCluskey (2018)]. There is a

strong link between food policies and the consumption of food. Better food policies help in reducing poverty and improving health [Unnevehr, et al. (2010)].

In Pakistan, various studies have been conducted using distinctive data composition and models to evaluate household consumption behaviour. Still, most studies come up with the findings that there is a huge difference in household consumption pattern at the provincial and regional levels. Considering the consumption dissimilarity at provincial and regional level, a single policy cannot be made for all. There are various factors that cause dissimilarities in consumption patterns [Ahmad, et al. (1987), Malik, et al. (1988), Haider and Zaidi (2017)].

Income level is one of the significant factors that have an impact on consumption patterns. Besides, due to the change in household income, the demand for various commodities changes depends on their nature that is found by their elasticities [Ali (1985), Prokeinova and Hanova, (2016)]. According to Aziz and Malik (2010), in the rural region with a higher income group, spending on meat and vegetables rises to weigh against the urban region. However, spending on fruit and milk products is more likely to increase with higher incomes in both urban regions and rural region. In addition, the size of the household has a significant effect on spending on household food. Amir and Bilal (2012) conclude that with the increase in income, the spending of poor people on necessities increases while rich people increase their spending on luxuries. To examine the household consumption pattern in Pakistan, Shahzadi (2010) used PPHS data for the time period of 2010; used four commodities groups, i.e., food and non-food items, durable goods, and utilities. The study outcomes demonstrated that most of the expenditure had been allocated to activities that are not productive. Moreover, the study finds a negative relationship between a household's total income and its food budget share. Similarly, remittances increase the household income, which decreases the spending on food items while on the other hand, spending on durable and non-food items increases.

Ullah, et al. (2017) have investigated the demand elasticity of selected food items on a panel data of household Integrated Economic Survey and utilising the Quadratic Almost Ideal Demand System (QUAIDS). They found that in terms of price, the demand for all the food items taken is inelastic. All the selected food items act as everyday goods as the expenditure elasticity is positive. Most of the Hicksian cross-price elasticities are signed positively, representing food items to substitute each other. In contrast, compensated own-price elasticities are signed negatively for all selected food items. To find the household consumption pattern and demand elasticity of food items in Pakistan, Jalil and Khan (2018) used HIES data and (QUAIDS) for the time period 2000 to 2015. They find that over the last fifteen years, consumption patterns have changed significantly. Household spending shares have changed from cereal food items to dairy products, milk products, fruits and vegetables. At the provincial level, a vast difference in income elasticities, has been observed because of the difference in the preferences and taste. Also, the own-price elasticity shows that all the items other than

mangoes and chilli are necessities. Khalil, et al. (2012) examined the expenditure and consumption behaviour of seven food products in the case of Pakistan and found negative Marshallian own cost price elasticities for all the food commodities, excluding fish and mutton in rural regions.

From the previous studies related to household consumption patterns, it is observed that the price of the commodities also has a significant role in the consumption pattern. The decrease in the price level will result in an increase in the purchasing power of the household and vice versa. Households change consumption patterns in response to change in purchasing power due to the change in the price of the commodities [Haider and Zaidi (2017)]. Further, Haq, et al. (2011) used HIES data Flexible LA/AIDS model for the year 2004-05 in order to investigate the food demand behaviour of rural and urban households for Punjab. They found that the demand for all groups of food items included in their study was price inelastic. The estimated elasticity values are mostly dependent on the functional form used to measure them; the underline functional form changes, the estimated values of elasticities will also change. The change that occurs on the estimated values not only depend on the magnitude of the change in functional form but also on nature of data used.

It is also noticed that household size also affects household consumption patterns [Sinha and Hay (1972)]. As the household size increases, the spending on most food groups also increases but at a decreasing rate [Aziz and Malik (2010)]. Moreover, in order to examine the household demand for milk in Karachi, Yousaf and Khalil (2011) used the 2005-06 Household Integrated Economic Survey (HIES) and the Almost Ideal Demand System (AIDS). The outcome demonstrated that the significant factors of household milk consumption in Karachi were demographic composition by age and household expenditure. Further, to find the food demand of the household by anticipating the future level of demand of particular groups of food items in Pakistan, Hayat, et al. (2016) used PPHS data for the time period 2010. They used a simple growth model for the projection of the food demand while to estimate the demand elasticities, an Almost Ideal Demand System/Linear Approximation Model is used. They concluded that food grains, Clarified butter, sugar, vegetables, and pulses are considered necessities, whereas meat and milk are luxuries.

On the basis of uncompensated cross-price elasticities, vegetables and pulses, meat and clarified butter, sugar, and milk are identified as gross complements. They also found that household income had a positive impact on the demand of households on meat and milk products. In contrast, household size had a negative impact on household demand for milk and meat products.

The outcomes of the examination by Hayat, et al. (2016) are acceptable and carried essential policy implications. Still, their study concentrates only one demographic factor, that is age and few other factors like household size, education, region, etc., that have a reasonable effect on the household food demand have been unattended. The actual and projected per capita household demand reported in this study is an irra-

tionally high level for sugar, vegetable, and pulses. This study aims to identify differences in the consumption patterns of households and their sensitiveness to price and income change and highlight these differences among provinces and at the national level. Households with the same income level prefer to select different commodities bundles based on the household heads' educational level [Khan and Khalid (2012)].

Our study tries to contribute to the existing literature by including important demographic factors like education, occupation, household size, and household age to estimate the future level of household food demand both at the national and provincial levels by using the better technique, Almost Ideal Demand System (AIDS).

III. Methodological Framework for Demand Elasticities and Household Consumption Behavior

This study implemented the Linear Approximation Almost Ideal Demand System (LA/AIDS) model of Deaton and Muellbauer (1980) for the demand analysis. This system is based upon the cost function. The Marshillian demand function for i^{th} commodity is obtained by applying Shephard's lemma and utilising the indirect utility function, in which expenditure share of an i^{th} commodity is a function of prices and the related commodity expenditures as:

$$w_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} \, lnp_j + \beta_i \, ln[M \mid P] + \sum_{h=1}^{3} \varphi_{ih} Z_h + \theta_i E + \sum_{k=1}^{3} \pi_{ik} O_k + \varepsilon_i \qquad (1)$$

where

w_i is the budget (expenditure)share of the i^{th} commodity, i.e. $w_i = p_i q_i / \sum p_i q_i$ where q_i is the quantity of i^{th} commodity;

M is Per capita expenditure on all consumption items included in the model that is: $\sum p_i q_i / h$, where h is the household size;

p_j is the nominal price of the j^{th} commodity is measured as $p_j q_j / q_j$;

P is a price index and defines by Stones' index as $\sum w_j \, lnp_j$

The variables which represent the socioeconomic characteristics of the household include Z_h, E and O_k.

Z_h is an age group variable, when h = 1, it represents the number of household members having age less than six years (children), if h = 2, it represents the number of household members having age between 6 years to 15 years shows adolescents and if h = 3 denotes the number of household members having age over 15 years that is adults. For example, if a household comprises five family members with one child <6 years and a second between 6-15 years, two parents and one grandparent, then $Z_1 = 1$, $Z_2 = 1$, $Z_3 = 3$. E is for the literacy of the head of the household. It is a binary variable 1 for literate and 0 for illiterate.

O_k is representing the employment status of the household head that has four categories, i.e. farming, self-employed, employee and unemployed. Therefore, three

dummy variables are constructed such as, $O_{i1} = 1$, $O_{i2} = 0$, $O_{i3} = 0$ if farmer, $O_{i1} = 0$, $O_{i2} = 1$, $O_{i3} = 0$ for self-employed and $O_{i1} = 0$, $O_{i2} = 0$, $O_{i3} = 1$ for public/private sector employee. These are binary variables; if their sum is equal to zero representing the head is unemployed.

Few restrictions are imposed on the coefficients of AIDS to fulfil the requirement of utility maximisation. These are the adding-up restriction which ensures that the sum of expenditure shares always equal to one ($\sum w_i = 1$) and the consumer spends the entire income. This restriction is satisfied if $\sum_i \alpha_i = 1$, $\sum_i \gamma_{ij} = 0 \; \forall j$, $\sum_i \beta_i = 0$.

The homogeneity condition ensures that there is no money illusion which means that, the consumption quantities remain the same if all prices and income change by the same proportion. It requires $\sum_i \gamma_{ij} = 0 \; \forall i$.

The symmetry restriction implies that the Slutsky matrix of the compensated price effects is strictly negative definite which ensures that transitivity holds among the preferences. It is fulfilled if, $\gamma_{ij} = \gamma_{ji} \; 0 \; \forall \; i, j$.

The estimation of AIDS will be carried out by the Seemingly Unrelated Regression (SUR) method. The justification of using SUR instead of OLS is that the expenditure of one commodity is interlinked with the expenditure of another commodity, and assuming the error terms are unrelated to one another will generate biased estimates; therefore, in order to overcome this biasedness SUR is preferred over OLS estimates [Afolayan and Adeleke (2018)]. The SUR estimates the parameters of the system, accounting for heteroskedasticity, and contemporaneous correlation in the errors across equations. The system approach thus not only has the ability to improve the efficiency of the overall set of parameter estimates compared to single equation estimation, but it also allows the imposition of demand theory restrictions. The fact that observed budget shares always sum up to one and the disturbance term sum up to zero. The covariance matrix of the disturbance term will become singular, which generate the problems in estimation; therefore, one of the equation has to be dropped from the system. The coefficients of the dropped equation can be calculated by imposing adding-up, homogeneity and symmetry restrictions [Henningsen (2017)].

After estimating the coefficient of AIDS, formulas under Equation 2 to 6 are used for the calculation of elasticities, these are:

Uncompensated price elasticity

$$\varepsilon_{ij} = (\gamma_{ij} - \beta_i \bar{w}_j)/\bar{w}_i - \sigma \tag{2}$$

where $\sigma = 1$ for $i = j$ and zero otherwise. $\bar{w}_i$ represents the average expenditure share.

Income elasticity

$$\eta_i = (\beta_i / \bar{w}_i) + 1 \tag{3}$$

Compensated price elasticity

The compensated price elasticities are calculated by using the Slutsky equation in elasticity form as

$$\varepsilon^{*}_{ij} = \varepsilon_{ij} + \bar{w}_j \eta_i \tag{4}$$

Household age composition elasticities

$$\phi_{ih} = (\varphi_{ih} Z_h - \beta_i (Z_h / N)) \bar{w}_i \tag{5}$$

where N represent the total family size.

Moreover, the impact of a change in family composition on the expenditure of i^{th} commodity can be estimated as

$$\Omega_{ih} = [\varphi_{ih} - \beta_i \log ((N + 1) / N)]*100 \tag{6}$$

IV. Data Source

Household Integrate.d Income and Consumption Survey (HIICS) 2015-2016 is used in this study. It consists of 24086 households from Pakistan (PAK); among them, 5181 belongs to Khyber-Pakhtunkhwa (KP), 10430 belong to Punjab (PB), 6138 belong to Sindh (SN), and the remaining 2337 belongs to Balochistan (BL). The major food items selected for the analysis are **(i).** Food Grains (flour, wheat, refined or white Flour maize flour, basmati rice, other rice and other grains), **(ii).** Clarified butter (vegetable oil, hydrogenated vegetable oil and pure clarified butter), **(iii).** Meat (Beef, Mutton, Chicken, Fish and other poultry birds), **(iv).** Milk (fresh milk, yoghurt, buttermilk, cheese, butter, powder milk, baby formula milk and other milk products), **(v).** Sugar (Molasses and brown sugar), **(vi).** Pulses (Chickpeas Lentils, Red Lentils, Petite Yellow Lentils, white lentil and other lentils), **(vii).** Vegetables (Onion, Potato, Turnip, Radish, Garlic, Tomato, Cauliflower, Brinjal, Bottle Gourd, Lady Finger, Peas, Spinach, Apple Gourd, Sponge Gourd, Colocasia leaves, Chillies Green, Carrot, Cucumber, Lemon, Canned Vegetables/Olives/Sweet Corn, Mushrooms etc., others (Pumpkin, Cabbage spinach, fenugreek, coriander etc.).[2]
This study considers all the households of HIICS, if a surveyed household does not consume a commodity, then the price of that commodity is missing. In order to keep

[2] Justification for using HIICS 2015-2016 is that it is the most recent data provided by Pakistan Bureau of Statistics are dealing with household expenditure behavior and in literature no one use this recent survey, 24086 household indicates that our estimation covers the whole sample of HIICS 2015-2016. As we are interested to forecast the future pattern of food demand that's why we categorized the all food items into seven categories.

these (missing) observations in the analysis, missing prices are replaced by average prices in respected provinces and regions (rural/urban). The SPSS 18 software is used in order to arrange the HIICS 2015-2016 data set, and Eviews 9 software is used for the estimation of AIDS by SUR method. The expenditure equation for 'sugar'[3] is dropped from the system, and the coefficients of the dropped equation are calculated using the theoretical conditions imposed on the estimation process.

V. Results and Discussions

The estimated parameter of the AIDS model of all the provinces of Pakistan along its corresponding adjusted R^2 is shown in Table 1. It shows how much variation in demand for a particular commodity is explained by the linear relation between the dependent and explanatory variables. Adjusted R^2 ranges from 0.065 for clarified butter in Khyber Pakhtunkhwa to 0.543 for vegetables in Sindh. The highest adjusted R^2 is observed for vegetables and the lowest for pulses across provinces and Pakistan.

The socioeconomic factors play a significant role in explaining the pattern of food demand, along with prices and income. Results show that the educated households tend to consume more milk, meat and vegetable in Khyber Pakhtunkhwa and Punjab, foodgrain in Balochistan, meet, milk, clarified butter, pulses and vegetable in Sindh, whereas, in overall Pakistan, the educated heads have more tendency toward the consumption of clarified butter, meat, milk and vegetables and less toward the consumption of food grain and pulses. In all the provinces, if the head of a family is in the agriculture profession they are eating more clarified butter, milk and vegetables. However, in Khyber Pakhtunkhwa, these households prefers to consume food grain. In Khyber Pakhtunkhwa and Punjab, self-employed persons increase the consumption of milk and decrease the consumption of food grains significantly. Public/private sector employee decreases the consumption of food grain, clarified butter, pulses and vegetables and increases the consumption of meat and milk. These dynamics do not remain the same for the rest of the provinces; for example, in Balochistan, self-employed heads significantly reduce the consumption of food grain, whereas public/private sector employees significantly reduce the consumption of both food grains and vegetables and the rest of the commodities are unimportant for them. In Sindh, self-employed heads significantly reduce the consumption of food grain only and increase the consumption of remaining commodities, and public/private sector employees have more tendencies toward the consumption of food grains, Clarified butter and milk and less toward pulses and vegetables. It is clear that employment status matters a lot in determining the consumption patterns of households; consumption patterns for the head in the agriculture profession are approximately opposite to the person being self-employed or a public/private sector employee.

[3] Households allocate minimum expenditure to sugar among all the commodities, this pattern is observed across all the provinces except Sindh, therefore, we omit the equation of sugar from the system.

TABLE 1

Parameter Estimates of the LA/AIDS Model for Various Food Commodity Groups

	Khyber Pakhtunkhwa		Balochistan		Punjab		Sindh		Pakistan	
	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.
α_1	-0.176	0.000	-0.131	0.002	0.234	0.000	0.424	0.000	0.159	0.000
β_1	0.090	0.000	0.080	0.000	0.027	0.000	**-0.002**	0.675	0.036	0.000
γ_{11}	0.050	0.000	0.053	0.000	0.060	0.000	0.095	0.000	0.066	0.000
γ_{12}	-0.032	0.000	-0.015	0.000	-0.024	0.000	-0.025	0.000	-0.029	0.000
γ_{13}	-0.006	0.005	-0.009	0.001	-0.012	0.000	-0.017	0.000	-0.008	0.000
γ_{14}	0.006	0.059	-0.006	0.076	**0.001**	0.788	-0.017	0.000	-0.005	0.000
γ_{15}	-0.004		-0.003		-0.006		0.003		-0.002	
γ_{16}	-0.008	0.000	0.004	0.013	-0.004	0.000	-0.003	0.000	-0.005	0.000
γ_{17}	-0.006	0.000	-0.024	0.000	-0.013	0.000	-0.036	0.000	-0.016	0.000
φ_{11}	**0.001**	0.656	0.002	0.097	-0.004	0.001	0.010	0.000	0.002	0.007
φ_{12}	0.006	0.000	0.004	0.005	0.013	0.000	0.013	0.000	0.012	0.000
φ_{13}	-0.007	0.000	-0.003	0.014	0.001	0.070	0.007	0.000	0.001	0.004
θ_1	-0.049	0.000	-0.050	0.000	-0.067	0.000	-0.056	0.000	-0.036	0.000
π_{11}	0.031	0.000	-0.068	0.000	-0.062	0.000	-0.065	0.000	-0.039	0.000
π_{12}	-0.055	0.000	-0.023	0.049	-0.068	0.000	-0.069	0.000	-0.066	0.000
π_{13}	-0.017	0.000	-0.011	0.093	-0.008	0.008	0.011	0.018	-0.012	0.000
α_2	0.337	0.000	0.360	0.000	0.526	0.000	0.371	0.000	0.458	0.000
β_2	-0.040	0.000	-0.037	0.000	-0.063	0.000	-0.047	0.000	-0.057	0.000
γ_{21}	-0.032	0.000	-0.015	0.000	-0.024	0.000	-0.025	0.000	-0.029	0.000
γ_{22}	0.073	0.000	0.057	0.000	0.096	0.000	0.039	0.000	0.084	0.000
γ_{23}	**0.004**	0.132	-0.015	0.000	-0.024	0.000	0.011	0.000	-0.017	0.000
γ_{24}	**-0.003**	0.316	0.006	0.010	-0.010	0.000	**0.000**	0.862	0.003	0.031
γ_{25}	-0.017		-0.005		-0.016		-0.014		-0.019	
γ_{26}	-0.011	0.000	-0.012	0.000	-0.016	0.000	0.016	0.000	-0.002	0.098
γ_{27}	-0.014	0.000	-0.017	0.000	-0.007	0.000	-0.029	0.000	-0.021	0.000
φ_{21}	**0.000**	0.849	**0.000**	0.831	**0.000**	0.949	0.001	0.067	**0.000**	0.929
φ_{22}	0.003	0.000	0.005	0.000	0.007	0.000	0.004	0.000	0.005	0.000
φ_{23}	0.005	0.000	0.005	0.000	0.008	0.000	0.007	0.000	0.007	0.000
θ_2	**-0.001**	0.750	0.005	0.021	-0.006	0.000	0.004	0.017	0.001	0.089
π_{21}	0.005	0.086	0.041	0.000	0.052	0.000	0.038	0.000	0.036	0.000
π_{22}	**0.007**	0.173	**0.004**	0.503	**-0.007**	0.128	0.009	0.068	**0.002**	0.525
π_{23}	**-0.002**	0.334	**0.000**	0.870	-0.014	0.000	0.010	0.000	-0.006	0.000

Continue....

TABLE 1 *(Continued)*

Parameter Estimates of the LA/AIDS Model for Various Food Commodity Groups

	Khyber Pakhtunkhwa		Balochistan		Punjab		Sindh		Pakistan	
	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.
α_3	-0.162	0.000	0.161	0.000	-0.166	0.000	-0.249	0.000	-0.195	0.000
β_3	0.029	0.000	-0.024	0.000	0.020	0.000	0.035	0.000	0.030	0.000
γ_{31}	-0.006	0.005	-0.009	0.001	-0.012	0.000	-0.017	0.000	-0.008	0.000
γ_{32}	**0.004**	0.132	-0.015	0.000	-0.024	0.000	0.011	0.000	-0.017	0.000
γ_{33}	0.034	0.000	0.094	0.000	0.078	0.000	0.070	0.000	0.074	0.000
γ_{34}	0.007	0.017	-0.020	0.000	**0.002**	0.328	-0.014	0.000	**0.001**	0.689
γ_{35}	-0.006		-0.021		-0.012		-0.023		-0.010	
γ_{36}	-0.018	0.000	-0.017	0.000	-0.017	0.000	-0.012	0.000	-0.021	0.000
γ_{37}	-0.015	0.000	-0.013	0.000	-0.016	0.000	-0.016	0.000	-0.018	0.000
φ_{31}	-0.002	0.032	**0.000**	0.611	-0.003	0.000	-0.009	0.000	-0.003	0.000
φ_{32}	-0.005	0.000	-0.003	0.000	-0.005	0.000	-0.008	0.000	-0.006	0.000
φ_{33}	**-0.001**	0.128	0.002	0.001	-0.001	0.068	-0.003	0.000	-0.002	0.000
θ_3	0.019	0.000	0.019	0.000	0.026	0.000	0.027	0.000	0.010	0.000
π_{31}	0.016	0.000	0.009	0.085	0.031	0.000	0.025	0.000	0.024	0.000
π_{32}	0.021	0.000	**-0.004**	0.534	0.032	0.000	0.026	0.000	0.025	0.000
π_{33}	0.009	0.000	**0.004**	0.288	0.004	0.005	-0.006	0.044	**-0.002**	0.155
α_4	-0.126	0.000	-0.109	0.006	-0.468	0.000	-0.475	0.000	-0.317	0.000
β_4	0.044	0.000	0.040	0.000	0.112	0.000	0.103	0.000	0.081	0.000
γ_{41}	0.006	0.059	-0.006	0.076	**0.001**	0.788	-0.017	0.000	-0.005	0.000
γ_{42}	**-0.003**	0.316	0.006	0.010	-0.010	0.000	**0.000**	0.862	0.003	0.031
γ_{43}	0.007	0.017	-0.020	0.000	**0.002**	0.328	-0.014	0.000	**0.001**	0.689
γ_{44}	-0.015	0.006	-0.017	0.000	0.009	0.048	0.055	0.000	-0.026	0.000
γ_{45}	0.005		0.019		-0.009		-0.021		0.005	
γ_{46}	0.007	0.000	0.017	0.000	0.004	0.002	**0.001**	0.325	0.016	0.000
γ_{47}	-0.007	0.010	**0.001**	0.463	0.004	0.015	-0.006	0.001	0.007	0.000
φ_{41}	-0.003	0.002	**0.001**	0.658	0.004	0.000	-0.004	0.000	-0.001	0.044
φ_{42}	-0.014	0.000	-0.010	0.000	-0.025	0.000	-0.015	0.000	-0.021	0.000
φ_{43}	-0.006	0.000	-0.009	0.000	-0.021	0.000	-0.017	0.000	-0.016	0.000
θ_4	0.020	0.000	0.022	0.000	0.041	0.000	0.022	0.000	0.026	0.000
π_{41}	-0.098	0.000	-0.026	0.002	-0.097	0.000	-0.033	0.000	-0.077	0.000
π_{42}	0.036	0.000	**0.003**	0.757	0.044	0.000	0.017	0.046	0.036	0.000
π_{43}	0.024	0.000	**-0.003**	0.593	0.023	0.000	**-0.002**	0.593	0.031	0.000

Continue....

TABLE 1 *(Continued)*

Parameter Estimates of the LA/AIDS Model for Various Food Commodity Groups

	Khyber Pakhtunkhwa		Balochistan		Punjab		Sindh		Pakistan	
	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.
α_5	0.339		0.089		0.224		0.356		0.264	
β_5	-0.038		0.001		-0.024		-0.032		-0.026	
γ_{51}	-0.004		-0.003		-0.006		0.003		-0.002	
γ_{52}	-0.017		-0.005		-0.016		-0.014		-0.019	
γ_{53}	-0.006		-0.021		-0.012		-0.023		-0.010	
γ_{54}	0.005		0.019		-0.009		-0.021		0.005	
γ_{55}	-0.039		0.006		-0.008		0.018		-0.010	
γ_{56}	-0.021		-0.035		0.000		-0.026		-0.022	
γ_{57}	0.082		0.039		0.051		0.062		0.059	
α_6	0.058	0.000	0.187	0.000	0.173	0.000	0.142	0.000	0.133	0.000
β_6	**-0.002**	0.130	-0.015	0.000	-0.018	0.000	-0.017	0.000	-0.012	0.000
γ_{61}	-0.008	0.000	0.004	0.013	-0.004	0.000	-0.003	0.000	-0.005	0.000
γ_{62}	-0.011	0.000	-0.012	0.000	-0.016	0.000	0.016	0.000	-0.002	0.098
γ_{63}	-0.018	0.000	-0.017	0.000	-0.017	0.000	-0.012	0.000	-0.021	0.000
γ_{64}	0.007	0.000	0.017	0.000	0.004	0.002	**0.001**	0.325	0.016	0.000
γ_{65}	-0.021		-0.035		0.000		-0.026		-0.022	
γ_{66}	0.068	0.000	0.026	0.000	0.033	0.000	0.023	0.000	0.035	0.000
γ_{67}	-0.017	0.000	0.017	0.000	**-0.001**	0.676	**0.000**	0.899	-0.002	0.005
φ_{61}	-0.001	0.043	-0.001	0.081	-0.001	0.038	**0.000**	0.156	-0.001	0.000
φ_{62}	-0.001	0.014	0.001	0.002	0.004	0.000	0.001	0.000	0.002	0.000
φ_{63}	-0.001	0.001	0.001	0.001	0.004	0.000	0.002	0.000	0.002	0.000
θ_6	-0.003	0.001	**0.000**	0.921	**0.000**	0.602	0.002	0.007	-0.001	0.080
π_{61}	0.012	0.013	0.019	0.007	0.012	0.000	0.007	0.000	0.012	0.000
π_{62}	**-0.003**	**0.003**	-0.005	0.008	**0.000**	0.038	0.008	0.001	**0.000**	0.753
π_{63}	-0.003	**0.002**	-0.006	-0.007	-0.005	0.000	-0.007	0.000	-0.005	0.000
α_7	0.730	0.442	0.478	0.431	0.499	0.000	0.431	0.000	0.499	0.000
β_7	-0.082	-0.045	-0.053	-0.039	-0.052	0.000	-0.039	0.000	-0.052	0.000
γ_{71}	-0.006	-0.024	-0.013	-0.036	-0.016	0.000	-0.036	0.000	-0.016	0.000
γ_{72}	**-0.014**	-0.017	-0.007	-0.029	-0.021	0.000	-0.029	0.000	-0.021	0.000
γ_{73}	-0.015	-0.013	-0.016	-0.016	-0.018	0.000	-0.016	0.000	-0.018	0.000
γ_{74}	-0.007	**0.001**	0.004	-0.006	0.007	0.015	-0.006	0.001	0.007	0.000
γ_{75}	0.000	-0.006	-0.002	0.023	0.007		0.062		0.059	

Continue....

TABLE 1 *(Continued)*

Parameter Estimates of the LA/AIDS Model for Various Food Commodity Groups

	Khyber Pakhtunkhwa		Balochistan		Punjab		Sindh		Pakistan	
	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.
γ_{76}	-0.017	0.017	**-0.001**	0.000	-0.002	0.676	**0.000**	0.899	-0.002	0.005
γ_{77}	0.058	0.042	0.035	0.063	0.044	0.000	0.063	0.000	0.044	0.000
φ_{71}	0.002	**0.000**	0.001	0.001	0.002	0.007	0.001	0.003	0.002	0.000
φ_{72}	0.006	0.002	0.004	0.002	0.004	0.000	0.002	0.000	0.004	0.000
φ_{73}	0.007	0.002	0.006	0.003	0.005	0.000	0.003	0.000	0.005	0.000
θ_{7}	0.015	**0.002**	0.008	0.005	0.004	0.000	0.005	0.000	0.004	0.000
π_{71}	0.011	0.011	0.024	0.016	0.020	0.000	0.016	0.000	0.020	0.000
π_{72}	**0.001**	**-0.002**	**0.004**	0.013	0.004	0.206	0.013	0.000	0.004	0.025
π_{73}	-0.006	0.005	0.002	**-0.001**	**-0.001**	0.026	**-0.001**	0.450	**-0.001**	0.146
Commodity Group	**Adjusted R^2**									
1	0.163		0.248		0.227		0.306		0.211	
2	0.163		0.176		0.387		0.335		0.328	
3	0.065		0.288		0.212		0.194		0.173	
4	0.202		0.111		0.303		0.248		0.214	
6	0.165		0.073		0.163		0.105		0.097	
7	0.309		0.355		0.378		0.543		0.355	

Source: Authors' estimation's based on HIICS data of Pakistan for the year 2015-16.
Note: Figures in bold format represents insignificant coefficients, having P value greater than 10 per cent.
Figures in italic format represent the coefficients of expenditure equation for sugar, calculated by using the theoretical restrictions of homogeneity, symmetry and adding up restriction.

The estimated elasticities of income/expenditure, uncompensated/Marshallian own, cross-price and compensated own, cross-price are shown in Table 2 and Table 3, respectively. Income elasticities provide the estimates of how much change in the consumption of a particular commodity arises due to a relative increase in income. It identifies the nature of commodity; either the specific commodity is necessity, luxury or inferior, depending upon income elasticity. All estimated income elasticities are positive in all Pakistan's regions, so there is no inferior commodity among the selected food items. In the case of overall Pakistan, the estimated income elasticities of Clarified butter, sugar, pulses and vegetables are less than one, which shows that these commodities are necessities.

In contrast, estimated income elasticities of food grain, milk and meat are greater than one, which shows that these are luxuries. Necessities are the commodities which people buy all the time and easy to afford. Therefore, clarified butter,

TABLE 2

Estimated Income and Uncompensated Own and Cross Price Elasticities of Demand for Various Food Commodity Groups

Commodity Group	With respect to Income	With respect to Price						
		Food grain	Clarified butter	Meat	Milk	Sugar	Pulses	Vegetable
Khyber Pakhtunkhwa								
Food Grain	1.239	**-0.955**	-0.119	-0.039	-0.021	-0.039	-0.037	-0.042
Clarified butter	0.722	-0.114	**-0.457**	0.053	0.02	-0.1	-0.059	-0.063
Meat	1.303	-0.178	-0.003	**-0.667**	0.029	-0.077	-0.213	-0.192
Milk	1.287	-0.069	-0.062	0.019	**-1.142**	0.017	0.029	-0.078
Sugar	0.292	0.079	-0.207	-0.039	0.201	**-0.064**	-0.347	0.085
Pulses	0.967	-0.111	-0.168	-0.28	0.119	-0.324	**0.053**	-0.254
Vegetable	0.272	0.22	-0.016	-0.064	0.048	0.042	-0.101	**-0.402**
Balochistan								
Food Grain	1.214	**-0.935**	-0.074	-0.05	-0.04	-0.085	-0.004	-0.088
Clarified butter	0.761	-0.008	**-0.599**	-0.064	0.065	-0.015	-0.058	-0.081
Meat	0.808	0.000	-0.087	**-0.227**	-0.136	-0.155	-0.119	-0.082
Milk	1.367	-0.192	-0.001	-0.227	**-1.196**	0.151	0.127	-0.028
Sugar	1.024	-0.477	-0.081	-0.364	0.323	**0.288**	-0.604	-0.108
Pulses	0.785	0.134	-0.134	-0.21	0.262	-0.482	**-0.618**	0.264
Vegetable	0.586	-0.068	-0.089	-0.067	0.056	-0.032	0.185	**-0.569**
Punjab								
Food Grain	1.088	**-0.836**	-0.094	-0.044	-0.018	-0.067	-0.019	-0.053
Clarified butter	0.652	-0.025	**-0.407**	-0.107	0.023	-0.07	-0.067	0.001
Meat	1.302	-0.27	-0.406	**0.142**	-0.038	-0.191	-0.272	-0.267
Milk	1.498	-0.153	-0.135	-0.025	**-1.073**	-0.064	-0.011	-0.037
Sugar	0.472	-0.264	-0.245	-0.225	-0.084	**0.301**	0.042	0.003
Pulses	0.698	0.021	-0.211	-0.262	0.139	0.021	**-0.431**	0.025
Vegetable	0.509	0.029	0.027	-0.112	0.145	0.000	0.025	**-0.624**
Sindh								
Food Grain	0.994	**-0.724**	-0.071	-0.049	-0.047	-0.093	-0.008	-0.102
Clarified butter	0.711	-0.053	**-0.714**	0.099	0.055	-0.067	0.114	-0.145
Meat	1.346	-0.292	0.057	**-0.337**	-0.198	-0.242	-0.132	-0.199
Milk	1.565	-0.288	-0.089	-0.132	**-0.797**	-0.147	-0.019	-0.09
Sugar	0.392	-0.397	-0.155	-0.362	-0.288	**0.783**	-0.464	0.493
Pulses	0.657	0.058	0.392	-0.203	0.091	-0.522	**-0.513**	0.04
Vegetable	0.627	-0.208	-0.209	-0.117	0.014	0.235	0.019	**-0.362**

Continue....

TABLE 2 *(Continued.....)*

Estimated Income and Uncompensated Own and Cross Price Elasticities of Demand for Various Food Commodity Groups

Commodity Group	With respect to Income	With respect to Price						
		Food grain	Clarified butter	Meat	Milk	Sugar	Pulses	Vegetable
		Pakistan						
Food Grain	1.105	**-0.842**	-0.101	-0.033	-0.035	-0.06	-0.02	-0.059
Clarified butter	0.658	-0.055	**-0.437**	-0.074	0.08	-0.096	0.009	-0.085
Meat	1.338	-0.209	-0.254	**-0.178**	-0.057	-0.135	-0.259	-0.242
Milk	1.432	-0.175	-0.056	-0.035	**-1.218**	0.003	0.062	-0.012
Sugar	0.495	-0.196	-0.289	-0.161	0.189	**0.165**	-0.398	0.195
Pulses	0.791	-0.012	0.003	-0.334	0.315	-0.354	**-0.393**	-0.016
Vegetable	0.526	0.009	-0.109	-0.123	0.148	0.089	0.006	**-0.547**

Elasticity Matrix w.r.t Prices

	Uncompensated/Marshallian				
	Khyber Pakhtunkhwa	Balochistan	Punjab	Sindh	Pakistan
No relationship	0	1	1	0	0
Complements	29	32	29	30	30
Substitute	13	9	12	12	12

Elasticity Matrix w.r.t Income

	Elasticity Matrix w.r.t Income				
	Khyber Pakhtunkhwa	Balochistan	Punjab	Sindh	Pakistan
Luxury	3	3	3	2	3
Necessity	4	4	4	5	4

Source: Authors' estimation based on HICCS data of Pakistan for the year 2015-16.

sugar, pulses and vegetables are the most affordable commodities compared to meat, milk and food grains. These are the products that people are much more likely to buy when their income rises. Necessities are income inelastic commodities, and the share of expenditure on these commodities decreases as income rises. In contrast, luxuries are income elastic commodities and the share of expenditure on meat, milk and food grain increases as income rises. At the provincial level, except for Sindh, the estimated income elasticity of food grain is greater than one, which shows that food grain is a luxury commodity.

TABLE 3

Compensated Own and Cross Price Elasticities of Demand for Various Food Commodity Groups

Commodity Group	With respect to Price						
	Food Grain	Clarified butter	Meat	Milk	Sugar	Pulses	Vegetable
				Khyber Pakhtunkhwa			
Food Grain	**-0.492**	0.06	0.079	0.169	0.027	0.044	0.097
Clarified butter	0.155	**-0.352**	0.122	0.131	-0.062	-0.013	0.018
Meat	0.31	0.186	**-0.544**	0.23	-0.007	-0.129	-0.045
Milk	0.412	0.124	0.142	**-0.945**	0.087	0.114	0.067
Sugar	0.189	-0.165	-0.012	0.246	**-0.049**	-0.328	0.119
Pulses	0.25	-0.028	-0.188	0.268	-0.273	**0.116**	-0.145
Vegetable	0.323	0.023	-0.038	0.091	0.057	-0.084	**-0.372**
				Balochistan			
Food Grain	**-0.485**	0.115	0.102	0.093	-0.015	0.081	0.044
Clarified butter	0.274	**-0.48**	0.032	0.149	0.029	-0.005	0.001
Meat	0.301	0.039	**-0.126**	-0.048	-0.109	-0.063	0.005
Milk	0.315	0.213	-0.055	**-1.047**	0.23	0.224	0.12
Sugar	-0.097	0.078	-0.236	0.436	**0.348**	-0.532	0.003
Pulses	0.426	-0.011	-0.112	0.348	-0.437	**-0.564**	0.349
Vegetable	0.149	0.002	0.006	0.121	0.001	0.227	**-0.506**
				Punjab			
Food Grain	**-0.497**	0.104	0.029	0.226	-0.017	0.046	0.066
Clarified butter	0.178	**-0.288**	-0.063	0.169	-0.04	-0.028	0.072
Meat	0.136	-0.169	**0.23**	0.254	-0.131	-0.193	-0.125
Milk	0.314	0.138	0.076	**-0.738**	0.004	0.08	0.126
Sugar	-0.117	-0.159	-0.193	0.022	**0.322**	0.071	0.054
Pulses	0.239	-0.084	-0.215	0.296	0.053	**-0.389**	0.101
Vegetable	0.188	0.12	-0.077	0.259	0.023	0.056	**-0.568**
				Sindh			
Food Grain	**-0.381**	0.091	0.05	0.133	-0.04	0.04	0.003
Clarified butter	0.193	**-0.598**	0.171	0.185	-0.03	0.149	-0.07
Meat	0.174	0.277	**-0.202**	0.046	-0.171	-0.067	-0.057
Milk	0.254	0.166	0.025	**-0.513**	-0.064	0.056	0.075
Sugar	-0.262	-0.091	-0.323	-0.217	**0.804**	-0.446	0.535
Pulses	0.286	0.5	-0.138	0.211	-0.488	**-0.481**	0.11
Vegetable	0.008	-0.107	-0.054	0.129	0.269	0.05	**-0.296**

Continue....

TABLE 3 *(Continued)*

Compensated Own and Cross Price Elasticities of Demand for Various Food Commodity Groups

Commodity Group	With respect to Price						
	Food Grain	Clarified butter	Meat	Milk	Sugar	Pulses	Vegetable
	Pakistan						
Food Grain	**-0.467**	0.083	0.063	0.171	-0.004	0.045	0.061
Clarified butter	0.169	**-0.327**	-0.017	0.204	-0.063	0.048	-0.014
Meat	0.245	-0.032	**-0.062**	0.193	-0.068	-0.18	-0.097
Milk	0.311	0.182	0.09	**-0.951**	0.076	0.147	0.144
Sugar	-0.028	-0.207	-0.118	0.282	**0.191**	-0.369	0.249
Pulses	0.257	0.135	-0.265	0.464	-0.315	**-0.346**	0.07
Vegetable	0.189	-0.022	-0.078	0.247	0.116	0.038	**-0.49**

Elasticity Matrix w.r.t Prices

	Compensated/Hicksian				
	Khyber Pakhtunkhwa	Balochistan	Punjab	Sindh	Pakistan
Complements	14	12	13	16	16
Substitute	28	30	29	26	26

Source: Authors' estimation based on HICCS data of Pakistan for the year 2015-16.

Moreover, except for Balochistan, in Khyber Pakhtunkhwa, Punjab, and Sindh, meat is a luxury commodity as its income elasticity is greater than one. The per capita income of Balochistan is the lowest among the provinces, and meat is a necessity in Balochistan, which reflects that Baloch people are meat lovers. Milk is also considered a luxury commodity as its income elasticity is greater than one in all the provinces of Pakistan. The estimated income elasticity of clarified butter, pulses and, vegetables are less than one, which shows that these commodities are necessities in all the provinces of Pakistan. While except for Balochistan, the estimated income elasticity of sugar is less than one, which shows that sugar is a necessary commodity in Khyber Pakhtunkhwa, Punjab, and Sindh.

Marshallian/uncompensated price elasticities are the elasticities which are not adjusted for income. It reflects how much change in the demand for a particular commodity rises due to a relative increase in prices. This price effect further incorporates two effects of income effect and substitution effect. Own-price Marshallian elasticities estimate the sensitivity of quantity consumed of a product due to its own, and cross-price Marshallian elasticities estimate the sensitivity of quantity consumed of a product due to change in price. At the national level, the estimated uncompensated own-price

elasticity for all food items except sugar has a negative sign, which indicates that food grain, meat, milk, clarified butter, pulses and vegetables are everyday goods. The estimated elasticities for food grain, meat, clarified butter, pulses and vegetables are less than one. This shows that the households at the national level are least sensitive to the prices of these food items.

In comparison, milk is found to be the most price-sensitive. The interesting thing which came across during this study is the positive price elasticity of sugar so that it can be categorised as a Giffen commodity (in economics, a Giffen commodity is a product in which demand increases with the price). This is quite possible because the bundle of sugar comprises sugar, molasses and brown sugar, which are the main source of sweetener, and there is no other substitute available which should be used instead of sugar. Cross price elasticities give the relation between two goods. If the cross-price elasticity is negative, then the two goods are compliments, whereas its positive value indicates their relation to substitutes. In Khyber Pakhtunkhwa region, except pulses, all uncompensated own-price elasticity estimates have negative signs, explains the fact that price of a commodity itself has an adverse effect on its quantity demand and the negative value of uncompensated cross-price elasticity among pulses, vegetables, sugar and milk implies that they are gross compliments in consumption. In contrast, in the Balochistan region, except sugar, all uncompensated own-price elasticity estimates have negative signs. Moreover, in the Punjab region, other than meat and sugar, all the estimated uncompensated own-price elasticity of the commodities have negative signs, while in the Sindh region, except sugar, all the estimated uncompensated own-price elasticity of the commodities shows negative signs.

Compensated own and cross-price elasticities of demand for various food items are presented in Table 3. Hicksian elasticities are adjusted for income changes; it shows after compensating the consumer how much change in the demand for a particular commodity arises due to a relative increase in prices. It only includes the substitution effect. If there is no difference between the own price compensated and uncompensated elasticities, indicate that compensation for a particular commodity is worthless. At the national level, the biggest difference between uncompensated and compensated own price elasticity has been observed in the case of food grain followed by milk, meat and clarified butter, which shows the price responsiveness becomes lower after compensating the consumer by maintaining the same real income in response to a price change. Whereas, in vegetable and pulses, the compensated and uncompensated own-price elasticities are approximately similar due to their small share in total income. It is suggested from the results that government should compensate the consumer when it observes a rise in the prices of food grain, milk, meat and clarified butter to maintain the same welfare level in case of price change. The cross-price compensated elasticities reflect that symmetry exist among the commodities. The cross-price compensated elasticities in sugar have a negative sign indicating that sugar is a complementary good against different food items. At the same time, milk is a substitutable commodity for different food items.

If the cross-price elasticity is negative, then the two goods are compliments, whereas its positive value indicates that the two goods are substitutes. The household age composition elasticity for all the region is shown in Table 4. The impact of change in age on household consumption reveals that keeping all other variables constant whenever there is an addition of a member in the household that will increase the demand for food items. At the same time, it reduces the purchasing power of household, which ultimately reduce the demand for food items, i.e., real income effect. The results of household age composition elasticity show that adding members of any category that is child, adolescent and adults reduce the demand of food grain, meat, milk and pulses in Khyber Pakhtunkhwa, food grain and milk in Balochistan, food grain, meat and milk in Punjab, meat and milk in Sindh, food grain, meat, milk for Pakistan. Notably, these commodities are categorised as luxurious items with respect to income

TABLE 4

Household Age Composition Elasticities

Commodity Group	Household Age Composition					
	Children	Adolescents	Adults	Children	Adolescents	Adults
	Khyber Pakhtunkhwa			Balochistan		
Food Grain	-0.038	-0.034	-0.208	-0.027	-0.038	-0.15
Clarified butter	0.045	0.119	0.297	0.039	0.135	0.265
Meat	-0.07	-0.192	-0.203	0.027	-0.001	0.183
Milk	-0.074	-0.256	-0.333	-0.071	-0.315	-0.561
Pulses	-0.009	-0.015	-0.042	0.024	0.122	0.233
Vegetable	0.255	0.535	1.118	0.115	0.251	0.503
	Punjab			Sindh		
Food Grain	-0.024	0.038	-0.036	0.028	0.057	0.082
Clarified butter	0.052	0.141	0.382	0.05	0.111	0.323
Meat	-0.086	-0.19	-0.224	-0.134	-0.199	-0.323
Milk	-0.057	-0.28	-0.652	-0.108	-0.266	-0.685
Pulses	0.046	0.212	0.553	0.039	0.111	0.294
Vegetable	0.148	0.32	0.901	0.146	0.253	0.684
	Pakistan					
Food Grain	-0.011	0.03	-0.046			
Clarified butter	0.053	0.14	0.366			
Meat	-0.09	-0.193	-0.265			
Milk	-0.075	-0.295	-0.577			
Pulses	0.024	0.128	0.278			
Vegetable	0.163	0.335	0.806			

Source: Authors' estimation based on HICCS data of Pakistan for the year 2015-16.

elasticity. Therefore, the addition of members of various age group enforced the households to cut the expenditure on luxurious food items. Table 5 reports the impact of a change in family composition on the expenditure of each commodity; accordingly, in Khyber Pakhtunkhwa, adding a child reduces the expenditure on food grain, meat, milk and pulses by 1.09, 0.53, 0.90 and 0.04 per cent. Adolescent reduces the expenditure on these commodities by 0.56, 0.89, 1.92 and 0.04 per cent and adults reduce the expenditure on these commodities by 1.83, 0.55, 1.21 and 0.06 per cent. Likewise, for the rest of the provinces, this information can be read from Table 5.

In summary, an increase in household size, keeping all other things constant, decreases the consumption of luxurious food items. A change in the household age com-

TABLE 5

Percent Change in Household Income Spent on Various Food Commodity Groups Due to Change in Family Composition

Commodity Group	Household Composition					
	Children	Adolescents	Adults	Children	Adolescents	Adults
	Khyber Pakhtunkhwa			Balochistan		
Food Grain	-1.094	-0.562	-1.83	-0.677	-0.575	-1.201
Clarified butter	0.503	0.826	1.02	0.418	0.902	0.909
Meat	-0.526	-0.886	-0.449	0.235	-0.027	0.502
Milk	-0.895	-1.92	-1.213	-0.532	-1.49	-1.357
Pulses	-0.044	-0.043	-0.057	0.091	0.3	0.294
Vegetable	1.296	1.663	1.713	0.555	0.745	0.767
	Punjab			Sindh		
Food Grain	-0.801	0.851	-0.273	1.059	1.3	0.774
Clarified butter	0.976	1.699	1.816	0.822	1.136	1.372
Meat	-0.615	-0.857	-0.385	-1.398	-1.282	-0.842
Milk	-1.278	-4.181	-3.843	-1.973	-3.068	-3.254
Pulses	0.214	0.648	0.667	0.206	0.372	0.405
Vegetable	0.922	1.266	1.417	0.712	0.767	0.856
	Pakistan					
Food Grain	-0.517	0.398	-0.677			
Clarified butter	0.817	1.355	1.546			
Meat	-0.652	-0.865	-0.457			
Milk	-1.209	-3.097	-2.563			
Pulses	0.103	0.37	0.344			
Vegetable	0.911	1.165	1.222			

Source: Authors' estimation based on HICCS data of Pakistan for the year 2015-16.

position brings significant changes in the quantities of various commodities consumed, and it can be observed from the positive association between the magnitude of the elasticity estimates and various age groups.

1. Projections Model for Food Demand

The future demand for food items is estimated by following the growth formula suggested by [Kumar, et al. (2009) and Hayat, et al. (2016)]. Accordingly, growth in population (N), changes in per capita real income (y) and consumption behaviour are the most important factors which influence future demand.

$$D_{ilt} = d_{il0} \times N_{lt} (1 + y_l \times \eta_{il})^t$$

Where D_{ilt} is the household demand for i^{th} commodity in l region (Khyber Pakhtunkhwa Balochistan, Punjab, Sindh and Pakistan) in period t; d_{il0} is the per capita consumption of the i^{th} commodity in region l in the base year (2015-2016), y_l is growth in per capita income for l region; η_{il} is the expenditure/income elasticity of demand for i^{th} commodity in l region (reported in Table 2); and N_{lt} is the projected population in the year t for region l.

2. The Demand for Food Commodities

Total and per capita household demand for food items in the base year 2015 is used for the projection of future food demand from the period 2016 to 2040. It can be seen from Table 6 that food grains, milk and vegetables are major consumption items across the provinces, having per capita average consumption of 220 Kg/year, 50 Kg/year and 59 Kg/year, respectively. Whereas in provinces, per capita average consumption of clarified butter is 25 Kg/year, meat is 9 Kg/year, and pulses are 10 Kg/year. Per capita consumption of food, grain and milk are high in Punjab, meat and vegetable in KPK, sugar in Baluchistan and Clarified butter in Sindh. The total per capita consumption of all food items are highest in Punjab that is 424.84 kg/year, then in KPK that is 408.83 kg/year; in third place, we have Sindh, and at last, we have Balochistan. These figures also indicate that Punjab and KPK are secure food provinces relative to Sindh and Baluchistan.

If the comparison is made on the actual per capita consumption of all food items of this study with the projected figures reported by Hayat (2016), we found contradictions in per capita household demand of meat, sugar, pulses and vegetable. Accordingly, in 2015 the projected per capita household demand for meat is 30.8 Kg/year; sugar is 93.9 Kg/year, pulsesis104.8 Kg/year and vegetables 144 Kg/year, respectively. This prediction is very different from the actual figures reported in Table 6. The error in projected values is generated by taking the wrong per capita household

TABLE 6

Per Capita Household Demand for Food Commodities in Base Year 2015

Commodities	Per Capita Household Demand (kg/year)				
	Khyber Pakhtunkhwa	Balochistan	Punjab	Sindh	Pakistan
Food Grain	236.3	202.31	236.42	204.67	224.68
Clarified butter	24.15	23.86	25.08	25.72	24.86
Meat	10.94	8.2	6.86	9.18	8.56
Milk	42.56	25.64	74.61	55.91	56.52
Sugar	18.83	20.79	14.02	18.38	17.04
Pulses	11.87	10.7	9.13	8.35	9.79
Vegetable	64.18	53.23	58.72	60.58	59.82

Source: Authors' estimation based on HICCS data of Pakistan for the year 2015-16.

demand for food items in the base year 2010. Mostly, per capita household demand for sugar and pulses was irrationally too high that was 96.1 Kg/year and 86.7 Kg/year, respectively. Therefore, the present study projected the demand for food items to come up with the right projections both at national and provincial levels.

3. Population Growth

A future level of population for region l from the year 2020 to 2040 is projected with the help of simple compounding formula;

$$N_{lt} = Present\ Population\ (1 + population\ grwoth\ rate)^{t}$$

The population growth rate is assumed at a constant average level of the population growth rate of the past eight years (from 2010 to 2017). The data on population (million) are taken from the Pakistan Economic Survey (various issues). The estimated average population growth rate for Khyber Pakhtunkhwa is 2.09 per cent, for Balochistan is 2.34 per cent, for Punjab is 1.82 per cent, for Sindh is 2.16 per cent, and for Pakistan is 1.99 per cent. Based on these figures, the projected population is reported in Table 7.

4. Income Growth

Per capita, real income growth rate at the provincial and national level is forecasted by employing Box and Jenkins (1970) methodology on the historical data of per capita real income growth rate from 1981 to 2017 published by Pakistan Economic Survey (various issues). Accordingly, ARIMA (1, 0, 0) is suitable to forecast

TABLE 7

Base Year and Projected Population for the Year 2020 to 2040

(Million)

Year	Pakistan	Khyber Pakhtunkhwa	Balochistan	Punjab	Sindh
2015	191.71	25.84	9.94	103.84	45.99
2016	195.39	26.36	10.16	105.67	46.96
2017	207.77	30.52	12.34	110.01	47.89
2020	220.43	32.48	13.23	116.13	51.06
2025	243.25	36.02	14.85	127.09	56.81
2030	268.44	39.94	16.67	139.08	63.22
2035	296.23	44.29	18.72	152.21	70.35
2040	320.52	48.11	20.53	163.59	76.63

Source: Authors' estimation based on 2017 Census of Pakistan, Bureau of Statistics.

the per capita real income growth rate from the year 2018 to 2040 for Pakistan, reported in Table 8. Whereas the projected values of provincial per capita real income growth rate are based on the average growth rate of 2007-2008, 2012-2013 and 2014-2015 reported in Pasha (2016), these are 2.93 per cent for Khyber Pakhtunkhwa, 0.18 per cent for Balochistan, 1.69 per cent for Punjab and 2.93 per cent for Sindh. We assumed that these annual growth rates would remain the same over the next few years.

5. Projected Demand for Food Items

Table 9 and 10 shows the total, and per capita household projected demand of various food items by region from the year 2016 to 2040 (with five-year interval). The increasing trend has been found in the future demand for food items. At the national level, per capita household demand for food grains clarified butter, meat, milk,

TABLE 8

Projected Growth Rates in Per Capita Real Income of Pakistan (% per annum)

Year	Growth Rate
2015	3.13
2020	2.56
2025	2.25
2030	2.25
2035	2.25
2040	2.25

Source: Authors' estimation based on 2017 Census of Pakistan, Bureau of Statistics.

TABLE 9

Total Demand for Various Food Commodity Groups from 2010 to 2030
(Million MetricTonnes/year)

Years	Food Grain	Clarified butter	Meat	Milk	Sugar	Pulses	Vegetable
				Khyber Pakhtunkhwa			
2015	8.95	0.91	0.41	1.61	0.71	0.45	2.43
2020	9.17	0.87	0.43	1.66	0.64	0.44	2.17
2025	12.16	1.07	0.57	2.22	0.74	0.57	2.5
2030	16.11	1.32	0.77	2.96	0.85	0.72	2.89
2035	21.36	1.63	1.03	3.95	0.99	0.92	3.33
2040	28.31	2	1.37	5.27	1.14	1.17	3.84
				Balochistan			
2015	3.84	0.45	0.16	0.49	0.39	0.2	1.01
2020	2.71	0.32	0.11	0.34	0.28	0.14	0.71
2025	3.07	0.36	0.12	0.39	0.31	0.16	0.8
2030	3.49	0.41	0.14	0.44	0.36	0.18	0.9
2035	3.96	0.46	0.16	0.5	0.4	0.21	1.02
2040	4.49	0.52	0.18	0.57	0.46	0.23	1.15
				Punjab			
2015	14.87	1.58	0.43	4.69	0.88	0.57	3.69
2020	30.07	3.08	0.89	9.82	1.69	1.12	7.12
2025	36.05	3.56	1.08	12.17	1.93	1.31	8.13
2030	43.22	4.11	1.32	15.1	2.2	1.51	9.29
2035	51.81	4.75	1.61	18.72	2.5	1.76	10.61
2040	62.1	5.49	1.97	23.22	2.85	2.04	12.12
				Sindh			
2015	7.72	0.97	0.35	2.11	0.69	0.32	2.29
2020	10.46	1.31	0.47	2.86	0.94	0.43	3.1
2025	11.66	1.46	0.52	3.19	1.05	0.48	3.45
2030	13	1.63	0.58	3.56	1.16	0.53	3.84
2035	14.48	1.82	0.65	3.97	1.3	0.59	4.28
2040	16.14	2.02	0.73	4.43	1.44	0.66	4.76
				Pakistan			
2015	35.38	3.92	1.35	8.9	2.68	1.54	9.42
2020	56.94	5.96	2.23	14.92	4	2.39	14.1
2025	69.9	7.01	2.8	18.89	4.63	2.84	16.37
2030	87.18	8.32	3.58	24.42	5.4	3.43	19.16
2035	108.77	9.88	4.59	31.57	6.3	4.13	22.42
2040	135.72	11.74	5.87	40.83	7.35	4.98	26.24

Source: Authors' estimation.

TABLE 10

Per Capita Demand of Various Food Commodity Groups 2010 to 2040
(Kg/year)

Years	Food Grain	Clarified butter	Meat	Milk	Sugar	Pulses	Vegetable	Total
				Khyber Pakhtunkhwa				
2015	236.3	24.15	10.94	42.56	18.83	11.87	64.18	408.83
2020	282.43	26.81	13.19	51.21	19.65	13.65	66.77	473.71
2025	337.55	29.77	15.91	61.62	20.5	15.7	69.48	550.53
2030	403.43	33.05	19.19	74.15	21.39	18.06	72.29	641.56
2035	482.17	36.7	23.14	89.23	22.32	20.76	75.22	749.54
2040	576.29	40.75	27.91	107.37	23.3	23.88	78.26	877.76
				Balochistan				
2015	202.31	23.86	8.2	25.64	20.79	10.7	53.23	344.73
2020	204.53	24.03	8.26	25.95	20.98	10.77	53.51	348.03
2025	206.78	24.19	8.32	26.27	21.17	10.85	53.8	351.38
2030	209.05	24.36	8.38	26.6	21.37	10.93	54.08	354.77
2035	211.34	24.52	8.44	26.93	21.56	11	54.37	358.16
2040	213.66	24.69	8.5	27.26	21.76	11.08	54.65	361.6
				Punjab				
2015	236.42	25.08	6.86	74.61	14.02	9.13	58.72	424.84
2020	258.97	26.49	7.64	84.54	14.59	9.69	61.29	463.21
2025	283.67	27.98	8.52	95.8	15.18	10.27	63.97	505.39
2030	310.73	29.56	9.5	108.55	15.8	10.89	66.77	551.8
2035	340.36	31.22	10.6	123.01	16.44	11.55	69.69	602.87
2040	372.83	32.98	11.81	139.39	17.1	12.25	72.74	659.1
				Sindh				
2015	204.67	25.72	9.18	55.91	18.38	8.35	60.58	382.79
2020	204.97	25.75	9.2	56.04	18.39	8.36	60.64	383.35
2025	205.27	25.78	9.22	56.17	18.4	8.37	60.7	383.91
2030	205.57	25.8	9.23	56.3	18.41	8.37	60.75	384.43
2035	205.87	25.83	9.25	56.43	18.43	8.38	60.81	385
2040	206.17	25.86	9.27	56.56	18.44	8.39	60.86	385.55
				Pakistan				
2015	224.68	24.86	8.56	56.52	17.04	9.79	59.82	401.27
2020	258.33	27.03	10.13	67.68	18.14	10.83	63.96	456.1
2025	287.38	28.81	11.52	77.67	19.04	11.69	67.31	503.42
2030	324.76	30.99	13.35	90.95	20.12	12.76	71.37	564.3
2035	367.18	33.36	15.49	106.58	21.26	13.94	75.69	633.5
2040	415.16	35.9	17.96	124.89	22.47	15.22	80.28	711.88

Source: Authors' estimation.

sugar, pulses and vegetables rises from 224.68, 24.86, 8.56, 56.52, 17.04, 9.79 and 59.82 kg/per year in 2015 to 415.16, 35.90, 17.96, 124.89, 22.47, 15.22 and 80.28 kg/year in the year 2040 respectively. The increase in consumption expenditure is the result of both rise in income and population growth. Over time, Khyber Pakhtunkhwa will surpass Punjab in terms of total per capita consumption of all food items.

VI. Conclusion

The purpose of the present paper is to analyse the consumption pattern of households at the provincial and national levels in Pakistan to project the future level of food demand of various food items using the Household Integrated Income and Consumption Survey (HIICS) 2015-16. The results suggest that socioeconomic factors play a significant role in explaining the pattern of food demand, i.e. the consumption pattern of households belonging to the agricultural sector is different compared to the consumption pattern of private/public sector or self-employed households. Based on the income elasticities of food items, clarified butter, sugar, pulses, and vegetables are the most affordable commodities compared to meat, milk and food grains. The compensated own price elasticities indicate that households are least sensitive to the prices of food grain, meat, clarified butter, pulses and vegetables and most sensitive to milk price. The uncompensated cross-price elasticities demonstrate that the government should compensate the consumer, when it observes a rise in the prices of food grain, milk, meat and clarified butter to maintain the same welfare level in case of price change. The consumption pattern of the household is different across the provinces; this may be due to geographical differences. Instead of making a single policy for a food support program for all the provinces, policymakers are suggested to make separate policies for each province. The study also shows that household size has a significant impact on the household consumption pattern as it decreases the nominal income of the household. Therefore, to improve the living standard of the household, various population control measures can be taken by the policymakers. The projected future food demand indicates that per capita demand for various food items like foodgrain, vegetable, meat, milk, clarified butter and sugar is high. Therefore, in order to fulfil the increasing demand, the government and policymakers have to take various steps in order to increase the productivity of the agricultural and dairy farming sector.

Bibliography

Afolayan R. B., and B.L. Adeleke, 2018, On the efficiency of some estimators for modeling seemingly unrelated regression with heteroscedastic disturbances, IOSR Journal of Mathematics, 14(4): 1-13.

Ahmad, E., S. Ludlow, and M.A. Hasan, 1987, Aggregate and regional demand response patterns in Pakistan, The Pakistan Development Review, 26(4):645-657.

Ahmad, M., and U. Farooq, 2010,The state of food security in Pakistan: Future challenges and coping strategies, The Pakistan Development Review, 49(4):903-923.

Ali, M. S.,1981, Rural-urban consumption patterns in Pakistan, Pakistan Economic and Social Review, 20(2): 85-94.

Ali, M. S., 1985, Household consumption and saving behavior in Pakistan: An application of extended linear expenditure system, The Pakistan Development Review, 24(1): 23-38.

Amir, H., and K. Bilal, 2012, Consumption pattern of different commodities in Pakistan, International Journal of Academic Research in Business and Social Sciences, 2(8): 395.

Asche, F., and C. R. Wessells, 1997, On price indices in the almost ideal demand system, American Journal of Agricultural Economics, Agricultural and Applied Economics Association, 79(4):1182-1185.

Aziz, B., 1997, Analysis of consumer demand systems using time series data of Pakistan, M. Phil. thesis submitted to Quaid-i-Azam University, Islamabad.

Aziz, B., 2004, Demand for meat and structural changes in Pakistan: An econometric analysis, Journal of Social Sciences and Humanities, 2(2): 55-80.

Aziz, B., and S. Malik, 2010, Household consumption patterns in Pakistan: A rural-urban analysis, Forman Journal of Economic Studies, 6: 1-25.

Aziz, B., K. Mudassar, Z. Iqbal, andI. Hussain, 2011, Estimating food demand elasticities in Pakistan: An Application of an almost ideal demand system, Forman Journal of Economic Studies, 7: 1-24.

Browning, M., and C. Meghir 1991, The effects of male and female labor supply on commodity demands, Econometrica, 59(4): 925–951.

Burki, A. A., 1997, Estimating consumer preferences for food, using Time Series Data of Pakistan, The Pakistan Development Review 36(2): 131–153.

Burney, N. A. and A. H. Khan, 1991, Household consumption patterns in Pakistan: An urban-rural comparison using Micro Data, The Pakistan Development Review 30(2): 145–171.

Cheema, A. A. and M. H. Malik (1984). Changes in consumption, employment and income distribution pattern in Pakistan. The Pakistan Development Review, 22(3): 131-145.

Cheema, A. A., and M. H. Malik, 1985, Changes in consumption pattern and employment under alternative income distribution in Pakistan, The Pakistan Development Review, 24(1): 1-22.

Deaton, A., and J. Muellbauer, 1980, An almost ideal demand system, The American Economic Review, 70(3): 312-326.

Haider, A., and M. Zaidi, 2017, Food consumption patterns and nutrition disparity in Pakistan,Paper presented in 34th Annual Conference of Pakistan Society of Development Economists.

Haq, U. Z., H. Nazli, K. Meilke, M.Ishaq, A. Khattak, A.H. Hashmi, andF.U. Rehman, 2011, Food demand patterns in Pakistani Punjab, Sarhad Journal of Agriculture, 27(2):305-311.

Harttgen, K., and S.Klasen, 2012, Analysing nutritional impacts of price and income related shocks in Malawi and Uganda, United Nations Development Programme.Working Paper.

Hay, F. G., and R.P. Sinha,1972, Analysis of food expenditure patterns of industrial workers and their families in a developing country, The Journal of Development Studies, 8(4): 425-446.

Hayat, N., A. Hussain, and H. Yousaf, 2016, Food demand in Pakistan: Analysis and projections, South Asia Economic Journal, 17(1): 94-113.

Henningsen, A., 2017, Demand analysis with the Almost Ideal Demand System, in: R. Package micEconAids. https://cran.r-project.org/package=micEconAids.

Hina, H., 2017, Household consumption behavior in Pakistan under the shadow of personal insecurity, MPRA Paper, 77410.

Ivanic, M., and W. Martin, 2008, Implications of higher global food prices for poverty in low-income countries, Agricultural Economics, 39(1): 405–416.

Jalil, A., and H. Khan, 2018, Consumption patterns and demand elasticities of selected horticulture products in Pakistan, Working paper, 4.

Khalil S., and H. Yousaf, 2012, Analysis of consumption and demand elasticities for food products in Balochistan, International Journal of Asian Social Science, 2(7): 1103-1122.

Khan, A., and U. Khalid, 2012, Consumption patterns of male and female headed households in Pakistan: Evidence from PSLM 2007-08, The Pakistan Development Review, 51(4):465-478.

Kumar, P., P.K. Joshi, and P.S. Birthal,2009, Demand projections for food grains in India, Agricultural Economics Research Review, 22(2): 237-243.

Lusk, J. L., andJ. McCluskey, 2018, Understanding the impacts of food consumer choice and food policy outcomes, Applied Economic Perspectives and Policy, 40(1): 5-21.

Malik, S., 1982, Analysis of consumption patterns in Pakistan, Pakistan Economic and Social Review, 20(2): 108-122.

Malik, S. and A. Babar, 2006, Surmising consumer demand system and structural changes using time series data for Pakistan, Pakistan Economic and Social Review, 44(1): 117-136.

Malik, S. and A. Rizwan, 1985, Analysis of household consumption in Pakistan, Government College Economic Journal, 28(2): 97-106.

Malik, S. J., K. Abbas, E. Ghani,and M.K. Niazi, 1987, Rural-urban differences and the stability of consumption behavior: An inter-temporal analysis of the household income and expenditure survey data for the period 1963-64 to 1984-85, The Pakistan Development Review, 26(4): 673-684.

Malik, S. J., M. Mushtaq, E. Ghani, and H. Mukhtar, 1988, Consumption patterns of major food items in Pakistan: Provincial, sectoral and inter-temporal differences, 1979-1985, The Pakistan Development Review, 27(4): 751-761.

Malik, S. J., H. Nazli, and E. Whitney, 2015, Food consumption patterns and implications for poverty reduction in Pakistan, The Pakistan Development Review, 54(4):651-669.

Mudassar, K., B. Aziz, and A. Anwar, 2012, Estimating consumer demand of major food items in Pakistan: A micro data analysis, Pakistan Journal of Life and Social Sciences, 10(1): 53-58.

Nazli, H., H. Haider, and A. Tariq, 2012, Supply and demand for cereals in Pakistan 2010-2030, PSSP working paper, 5,International Food Policy Research Institute.

Pinstrup-Andersen, P., and D.D. Watson II, 2011, Food policy for developing countries: The role of government in global, national, and local food systems, Cornell University Press.

Pasha, Hafiz A., 2016, Growth of the provincial economies, IPR Brief, Institute for Policy Reform.

Prokeinova, R. B., andM. Hanova, 2016, Modelling consumer's behaviour of the meat consumption in Slovakia, Agricultural Economics, 62(5): 235-245.

Rehman, A., 1963, Expenditure elasticities in rural West Pakistan, The Pakistan Development Review, 3(2): 232-249.

Shahzadi, A., 2010, Consumption pattern of Pakistani households; Evidence from Pakistan panel household survey-2010, MPhil dissertation, Pakistan Institute of Development Economics.

Siddiqui, R., 1982, An analysis of consumption pattern in Pakistan, The Pakistan Development Review, 21(4): 275-296.

Stigler, G. J., 1954, The early history of empirical studies of consumer behavior, Journal of Political Economy, 62(2):95-113.

Suleri, A. Q., and S. Haq, 2009, Food insecurity in Pakistan, Sustainable Development Policy Institute, Swiss Agency for Development and Cooperation, Working paper, 2.

Ullah, I., 2018, Food consumption in Pakistan: Applications of linear approximate almost ideal demand system (LA/AIDS), Doctoral dissertation, The University of Agriculture, Peshawar.

Ullah, M. Z.,H. Fatima, L. Almas, M.K. Vestal, and N. Akhter, 2017, Estimating demand elasticities for aggregate food groups using QUAIDS and Pooled HIES Data, Transylvanian Review,25(17):1-18.

Unnevehr, L., J. Eales, H. Jensen, J. Lusk, J. McCluskey, andJ. Kinsey, 2010, Food and consumer economics, American Journal of Agricultural Economics, 92(2): 506-521.

World Bank, 2010, Food price increases in South Asia: National responses and regional dimensions,South Asia Region, Sustainable Development Department, Agriculture and Rural Development unit.

Yousaf, H., and S. Khalil, 2011, Household milk demand function of Karachi city: An econometrics view, Pakistan Journal of Applied Social Sciences, 1(1): 12-23.

Zaheer, R., F. Omoregbee, A. Ighoro, S. Ejembi, G. Nandan, N.A.M. Jangubhai, and A.T. Patricia, 2013,Analysing the performance of agriculture sector in Pakistan, International Journal of Humanities and Social Science Invention, 2(5): 1-10.