

ESTIMATION OF URBAN-RURAL EXPENDITURE AND SIZE ELASTICITIES OF FOOD ITEMS IN PAKISTAN: EVIDENCE FROM PSLM DATA

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ABSTRACT

This study aims at the determination of the household consumption pattern of food items among different income groups in urban and rural of Pakistan and estimation of food expenditure and household size elasticities. The study evaluates the household food demand patters for various income groups in urban and rural area of Pakistan. Pakistan Social and Living Standard Measurement Survey (PSLM) 2007-08 data collected by Federal Bureau of Statistics (FBS), Government of Pakistan, Islamabad are used for the analysis purpose. Engel (Expenditure) elasticities are a powerful research tool in the analysis of household analysis. If expenditure on a certain item is proportional to income or total expenditure then the income elasticity of demand, better known as Engel elasticity is unity. The food expenditures are the sum of expenditures by each household on the following commodity groups: cereals, pulses, fruits, vegetables, dairy products, chicken, meat, fish, condiments, sugar, edible oils, drinks and miscellaneous food products. The household size and income elasticities are estimated to explain the food consumption trends in Pakistan. The results of the study indicate that all the income and household size elasticities are positive and significant at one percent level of significance. Results of the study indicate that the urban food consumption is higher in the upper income group (IG) while households belonging to other classes of rural area are more food responsive. Urban households depict higher size elasticities in overall, lower IG, lower-middle IG and middle IG whereas households belonging to upper-middle IG and upper IG of rural area are also more food responsive.

Keywords: Urban-Rural, Households, Income Groups, PSLM Data, Income Elasticities and Size Elasticities.

INTRODUCTION

Household demand is a combination of two important components household and demand. The household is defined as the person or a group of persons living in the same dwelling (Sheffrin, 2003). This is basically the fundamental residential unit in which economic production; consumption, inheritance, child rearing, and shelter are organized and carried out by all members. According to household surveys, household consists of persons who share kitchen. A household may be either a solitary being or a multi-person household.

On the other hand demand is basically the consumption of various types of goods and services by the members of a family in the society which is helpful for them to provide physical and psychological well-being and satisfaction. Consumption of various goods and services is the reflection of household expenditure pattern which are largely influenced by household composition, needs, taste and financial means. Economists use the concept of utility to define the level of satisfaction or welfare that comes from a specific allocation of income among different products.

Engel (Expenditure) elasticities are a powerful research tool in the analysis of household analysis. In economics the variation from proportionality of one variable with respect to another variable is measured by elasticity. Thus, if expenditure on a certain item is proportional to income or total

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expenditure then the income elasticity of demand, better known as Engel elasticity is unity. On the other hand, if expenditure on a certain item rises more proportionately relative to income, the Engel elasticity is greater than one. Similarly, if expenditure on an item rises less than proportionately relative to income, the Engel elasticity will be less than one. This concept is helpful in categorizing the commodities into different groups. The commodity is considered to be a necessity, normal and luxury if it has Engel elasticity less than one; equal to one and greater than unity, respectively. The elasticities of different commodities with respect to total expenditures are calculated and results are compared across the commodity and income groups (IG). These results provide the guideline for future policy implication in respect of the management of the demand and consumption of food commodities in the country.

The progress and development of any economy is related with the consumption in a way that it measures the welfare of the people who are making expenditure on the purchase of various consumption heads. Then again, it is helpful in the extension of business activities because the entire investment set up is dependent upon the consumption pattern in the country. Due to the importance of consumption in the economic theory, a number of researcher have carried out research on household deeds in Pakistan and in other countries ranging from its simplest form to very complicated by using different types of data and variety of econometrics techniques.

Functional description of Engel's Law is known as Engel curve which describes that how household expenditure on a particular good or a service varies with change in total income or expenditure. Budget share Engel curves depict how the share of household expenditures on a specific good or service changes with variation in income (Chai & Moneta, 2010a). Engel curve of a commodity reflects its income elasticity and indicates whether a particular good is an inferior, normal or a luxury good (Chai & Moneta, 2010b). No established theory subsists that could explain the pragmatic shape of Engel curves and their associated income elasticity values. Ernst Engel himself argues that households have a hierarchy of wants that determines the shape of Engel curves. As household income rises, some incentives become more prominent as far as household expenditures are concerned that dominates consumption patterns such as starvation, ultimately become satisfied at higher income levels (Witt, 2001).

The specific objectives of the present study are: to determine the household consumption pattern of various commodity groups of food items among different income groups in urban and rural of Pakistan; to measure the economies of scale effect in household consumption by including the household size as an explanatory variable in Engel curve equation and finally to estimate expenditure elasticities of demand system.

The remaining part of study is organized as follows: Review of literature is presented in section 2. Section 3 focuses on the description of data. Section 4 is about methodology. Results and their discussion are given in section 5. Finally, concluding remarks are presented in section 6.

LITERATURE REVIEW

The review of literature is helpful to obtain the base and in depth evaluation of proficient knowledge and understanding of previous research studies related to household consumption trends that have been conducted so far both nationally as well as at internationally. This section reviews the theoretical as well as empirical literature on the analysis of household demand system.

Malik *et al.*, (1987) differentiate between the rural and urban household consumption pattern for six consumption heads in Pakistan. The econometric examination is based upon the Household Income and Expenditure Survey (HIES) data of the years: 1963-64, 1966-67, 1968-69, 1969-70, 1970-71, 1971-72, 1979 and 1984-85. The linear functional form of the Engel curve is estimated with the help of Two Stage Least Square (2SLS) approach. Food and clothing group shows the same consumption function for all survey data except for 1963-64 in case of both rural and urban households. Housing elaborates the dissimilar pattern in all years while for miscellaneous items, the similar pattern is observed in the survey data of 1963-64 and 1966-67 in both regions. The urban-rural utility behavior for furniture & fixture are identical while for fuel & lightening are divergent from the initial period towards 1971-72 and for remaining intervals the opposite case is observed.

Burney & Khan (1991) compare household consumption pattern for 12 commodity groups in the rural and urban areas of Pakistan. Household Income and Expenditure Survey (HIES) data of the year 1984-85 is used and households are divided into six income groups in order to check the validity of Engel's Law. Linear and double logarithmic functional forms are employed to estimate marginal expenditure shares and expenditure elasticities by utilizing Ordinary Least Square (OLS) technique. The impact of household size is also determined which shows different trends of economies of scale not only among various commodity groups but also among different income groups in each sector. They find that marginal expenditure shares of food and other necessities decline except transport & communication where expenditure rise among higher income groups. The expenditure elasticities of food & drinks, fuel & lighting, household effect, health care and durables are relatively higher for rural households as compared to the urban households.

The highest and lowest food elasticity is observed for Poland and British middle-class survey respectively. All expenditure and household size elasticities with respect to food are similar but unequal (Houthakker, 1957). It is further observed that Western households consume less food energy, protein, iron, thiamin and niacin but more calcium and vitamin A as compare to Southern households. Household consumption of vitamin A, vitamin C, and calcium is largely affected by income and income elasticities are relatively small for poor as compare to rich households (Nayga, 1994).

The trend of food consumption away from home is most common in the Midwest and South as compare to the Northeast. Households belongs to whites group are more likely to consume food away from home as compare to the black households. Most of the expenditure elasticities are positive and less than unity (Byrne & Capps, 1996).

The own-price and expenditure elasticities of food are more elastic as compare to the elasticities of clothing, housing, durable goods and other items. Fruits price elasticity is higher as compare to vegetables however; lower value vegetables are most price elastic in the whole vegetable group (Han & Wahl, 1998). It is observed that the consumption of rice, oil, bread, soft drink, sugar and milk is most common among urban households while yam and cassava flour are the major consumed items of rural households. In case of meat items beef, goat meat and fish are majorly consumed in the urban areas while bush meat and ponma in the rural areas. The consumption of eggs, beans and such type of protein are very lower due to high cost of these products and less awareness of the households about its importance (Obayelu *et al.*, 2009).

Anwar (2009) demonstrates the monetary and non-monetary terms of consumption inequality among various households in rural and urban areas of Pakistan. The household consumption inequality is a dominant outcome of the overall inequalities of the society. It is examined that the rich-poor and the urban-rural inequality for health and education facilities is declined during 2005 due to the government interventions. The consumption and opportunities inequality is more prominent in urban areas as compared to rural areas and poor and middle income groups are more sensitive to such type of inequalities. It is concluded that poor households have less access to fuels, electricity, education, telecommunications, water sanitation and health facilities as compared to the rich households.

Baber & Shahnawaz (2010) conduct the urban-rural consumption comparison for nine food groups in Pakistan. Double log functional form and Ordinary Least Square (OLS) method are used to determine the expenditure and household size elasticities by utilizing the 2004-05 data of Pakistan Integrated Household Survey (PIHS). Fruits and cereals have higher expenditure elasticities for urban households and meat, vegetables, pulses, edible oil and fats show high expenditure elasticities for rural households. The entire food group is found to be necessities because the expenditure elasticities are significantly positive and less than unity. Vegetables and meat expenditures increase for fruits, fish, and milk products for urban households. Size elasticities are also significant and for most of food groups i.e. the expenditures are increasing less than proportionate to the increase in household size.

Data

The data for this study is drawn from the Pakistan Social and Living Standards Measurement (PSLM) Survey 2007-08, conducted by the Federal Bureau of Statistics (FBS), Government of Pakistan

Islamabad. It is based upon two-stage stratified sampling design. This survey, based on a national sample, covers the universe consisting of all urban and rural areas of the four provinces of Pakistan apart from forces restricted areas. This study uses a sample of 6244 households from urban area and 9251 households from rural area out of total 15512 households covered by the PSLM 2007-08 due to unreported and missing values for 17 households. The expenditures in the form of only paid consumption are used for computation because the goal of study is to compare consumption patterns within various earning sets. The food consumption groups are as: cereals, pulses, fruits, vegetables, dairy products, chicken, meat, fish, condiments, sugar, edible oils, drinks and miscellaneous food products. Frequency of food items data in PSLM 2007-08 is of two types i.e. fortnightly and monthly. The 14 days data is first converted into monthly information and then both of these groups are joined to make the household total food consumption during the month. Thus the dependent variable is the natural log of the monthly expenditures on food items (PSLM, 2008).

The total household expenditures are used as a proxy for income as an explanatory variable because of the fact that income data generally suffers from measurement errors and may also include a transitory component of income (Burney & Khan, 1991). The use of total expenditures instead of income is a common practice in Engel curves estimation because the expenditures mostly reflect the permanent income of the households. Household total expenditures and household size are computed in the form of natural log and then are used as an explanatory variable in this regression analysis. Household size indicates the numbers of persons living in the single house. This variable is computed in the natural log form of total family size of the household. Having certain advantages, the family size is used as a separate independent variable. The same is valuable to directly determine the economies of scale effect, avoids the loss of information problem and gives more efficient results regarding the household members (Malik & Sarwar, 1993).

In order to determine the food demand pattern and to make the consumption comparison; households are divided into five income groups. Table 1 shows the household distribution with respect to different income groups at the national level, measured in Pakistani Rupee. Income groups include: The Lower Income Group (≤ 5000), Lower-middle Income Group(5001-10000), Middle Income Group(10001-15000), Upper-middle Income Group (15001-20000) and Upper Income Group (20001+), respectively.

Table 1. Households Distribution among Different Income Group by Region

Monthly Income Groups	Region	Number of Households	Percentage of Households
Overall	Urban	6244	40.30
	Rural	9251	59.70
≤ 5000 (Lower IG)	Urban	702	4.54
	Rural	2875	18.55s
5001-10000 (Lower-Middle IG)	Urban	2278	14.70
	Rural	3817	24.63
10001-15000 (Middle IG)	Urban	1394	8.99
	Rural	1289	8.32
15001-20000 (Upper-Middle IG)	Urban	648	4.19
	Rural	569	3.67
20001+ (Upper IG)	Urban	1222	7.89
	Rural	701	4.52
Total		15495	100

IG = Income group

Source: Computed from PSLM 2007-08.

METHODOLOGY

A functional form that is termed as the constant elasticity, log-log or double log specification which is undertaken in this study has been widely used for demand analysis by Houthakker (1957, 1965), Burney & Khan (1991), Baber & Shahnawaz (2010b). Though such a system is not consistent with the budget constraint and the theoretical restrictions on systems of demand equations but this is a frequently used specification of a system of demand equations and at best can be treated as a local approximation to the true system of demand equations (Griliches & Intriligator, 1983). A double-log specification has proven the most appropriate way of estimating the expenditure elasticity of demand and it generates more realistic expenditure elasticities (Baber & Shahnawaz, 2010).

Consider a complete system of demand equations for n goods consists of the n demand equations:

$$X_j = X_j(P_1, P_2, \dots, P_n, I, \mu_j) \quad j = 1, 2, \dots, n \quad (1.1)$$

where X_j is the demand for good j by a single household or a group of households, P_j is the price of good j, I is income which is the same as the expenditure on the n goods and μ_j is the stochastic term in the j^{th} demand equation.

In order to estimate the system (3.1) it is necessary to specify a particular functional form for the estimation of general relationship. Thus the n demand functions in (3.1) are specified as:

$$X_j = A_j P_1^{\eta_{j1}} P_2^{\eta_{j2}} \dots P_n^{\eta_{jn}} I^{\eta_{jI}} e^{\mu_j} \quad (1.2)$$

The linearization of (4.2) by taking logarithms leads to the log-log specification of the form:

$$\ln X_j = \alpha_j + \eta_{j1} \ln P_1 + \eta_{j2} \ln P_2 + \dots + \eta_{jn} \ln P_n + \eta_{jI} \ln I + \mu_j \quad (1.3)$$

where $\alpha_j = \ln A_j$. Considering the price effect constant, the η_j are the income elasticities of demand that can be computed as:

$$\eta_j = \frac{\Delta L_n X_j}{\Delta L_n I} = \frac{I}{X_j} * \frac{\Delta X_j}{\Delta I} \quad (1.4)$$

Present study uses a double logarithmic functional form to estimate demand pattern because of its certain advantages. It is simple as its estimation and interpretation is quite easy. It is most appropriate to estimate the demand pattern of grouped commodities (Islam & Siwar, 2005). The income or expenditure coefficient is also the coefficient of elasticity so there is no need of further calculation. It is an easy technique to determine the most efficient effect of household size (Houthakker, 1957).

Thus by incorporating total expenditure and household size as an explanatory in Engel curve equation and taking the natural log gives:

$$\ln E_{ij} = \alpha_{ij} + \beta_{ij} \ln E_j + \gamma_{ij} \ln H S_j + \mu_{ij} \quad (1.5)$$

RESULTS AND DISCUSSION

Present study uses double logarithmic regression analysis to compute the household food demand pattern by computing its relationship with household total expenditures and household size. This systematic investigation is deployed for both urban and rural areas of Pakistan separately by dividing the households into five income sorts. Ordinary Least Square (OLS) technique is employed. Estimation of double log regression (Equation 1.5) gives estimates of food expenditure and household size elasticities.

Results of the food expenditure elasticities for urban and rural areas are shown in Table 2 & 3. All the food expenditure and size elasticities for both the regions are significant at one percent level. Most of the elasticity coefficients exhibit quite little cyclical fluctuations among numerous income sorts.

Table 2. Food Expenditure Elasticities by Income Groups for Urban Area of Pakistan

Monthly Income Groups	Food Expenditures Elasticities
Overall	0.738*
(Lower IG)	0.862*
(Lower-Middle IG)	0.874*
(Middle IG)	0.732*
(Upper-Middle IG)	0.727*
(Upper IG)	0.681*

IG = Income group

Source: Author's Calculations using PSLM 2007-08 data.

Table 3. Food Expenditure Elasticities by Income Groups for Rural Area of Pakistan

Monthly Income Groups	Food Expenditures Elasticities
Overall	0.776*
(Lower IG)	0.879*
(Lower-Middle IG)	0.887*
(Middle IG)	0.871*
(Upper-Middle IG)	0.783*
(Upper IG)	0.581*

IG = Income group

Source: Author's Calculations using PSLM 2007-08 data.

All the food expenditure elasticities are less than one showing that all the included commodities are necessities in nature. The urban and rural food consumption is initially increasing with increase in income but it declines gradually as income of the households tends to increase. The urban food consumption is higher in the Upper IG. Households belonging to other income sorts of rural area are relatively more food responsive. The validity of Engel's Law is verified for food consumption because its elasticity estimate is less than unity and its value decreases with increase in income of households.

Table 4. Household Size Elasticities by Income Groups for Urban Area of Pakistan

Monthly Income Groups	Household Size Elasticities
Overall	0.165*
(Lower IG)	0.099*
(Lower-Middle IG)	0.105*
(Middle IG)	0.177*
(Upper-Middle IG)	0.155*
(Upper IG)	0.188*

IG = Income group

Source: Author's Calculations using PSLM 2007-08 data.

The household size is used as an explanatory variable in order to investigate the economies of scale effect. Results of the household size elasticities for urban and rural areas are shown in Table 4 & 5). Economies of scale effect may occur because some food items can be shared within the household.

Larger households may receive discounts as their quantity demanded is relatively high as compared to smaller households. Urban households depict higher size elasticities in overall, lower IG, lower-middle IG and middle IG whereas households belonging to upper-middle IG and upper IG in rural area are more responsive.

Table 5. Household Size Elasticities by Income Groups for Rural Area of Pakistan

Monthly Income Groups	Household Size Elasticities
Overall	0.118*
(Lower IG)	0.046*
(Lower-Middle IG)	0.070*
(Middle IG)	0.140*
(Upper-Middle IG)	0.203*
(Upper IG)	0.287*

IG = Income group

Source: Author's Calculations using PSLM 2007-08 data.

CONCLUDING REMARKS

The study evaluates the double logarithmic analysis to determine the household food demand pattern in urban and rural region of Pakistan. The data for this purpose is drawn from Pakistan Social and Living Standards Measurement Survey (2007-08). The households are divided into five income groups. All the coefficients of income and household size elasticities are positive and significant at one percent level of significance. The legitimacy of Engel's law is verified because the proportion of food consumption is lower as compared to income. The household size analysis confirms the existence of economies of scale for food consumption among numerous income sorts. The urban food consumption is higher in the Upper IG while households belonging to other classes of rural people are more food responsive. Urban households depict higher size elasticities in overall, lower IG, lower-middle IG and middle IG whereas rural households belonging to upper-middle IG and upper IG are more responsive.

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