

INCOME AND ECONOMIES OF SCALE EFFECT ON HOUSEHOLD FOOD DEMAND IN PAKISTAN USING PSLM SURVEY DATA 2010-11

Comment [WM1]: These details should be taken to the study area description and methods

Effect of income and economies of scale on household food demand in Pakistan

[ABSTRACT] This paper determines the household food demand for various income groups in Pakistan namely: The Lower Income Group(≤ 8000), Lower-middle Income Group(8001-12000), Middle Income Group(12001-18000), Upper-middle Income Group (18001-35000) and Upper Income Group (35000+) Pakistani rupees respectively. The study uses Pakistan Social and Living Standard Measurement Survey (PSLM) 2010-11, data conducted by the Federal Bureau of Statistics (FBS), Government of Pakistan, and Islamabad. The food expenditures are the sum of monthly expenditures by each household on the following 17 major food items: wheat, rice, pulses, vegetables ghee, Milk (Fresh), butter, mutton, beef, chicken, fish, fruits, vegetables, salt, spices, sugar and gur. 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. A result of the study also indicates that food income elasticity is the highest (0.901) for the Lower-Middle Income Group and the same is the lowest (0.716) for the Upper Income Group. Similarly, household size elasticity is the highest (0.181) for the Upper Income Group and the same is the lowest (0.067) for Lower Income Group.

Comment [WM2]: I think the authors need to include a recommendation in the abstract

[Keywords] Household; Food demand; Income group; Income elasticity; Consumption trend; Household size elasticity; Monthly expenditure

1. INTRODUCTION

Household demand is a combination of two important words household and demand. Household refers to a single person or a group of persons who normally live and eat together and share kitchen, while demand is the quantities of goods and services that the consumers are willing and able to buy from the market at various prices (Cite the source).

Comment [WM3]: Only household is defined, how about demand?

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 researchers e.g(year) , ... have carried out research on household needs 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.

Comment [WM4]: The authors should cite the researchers and their results. What gaps exist in these previous studies and what their current work is addressing

Engel's law (1857) states that as income increases the consumer's spending upon food is decreased. It also implies that the income elasticity of food demand lies between zero and one. It means that increase in expenditures on food items by the consumers is less than the increase in income of the consumers (Timmer et al., 1983). A number of studies are accomplished both for developed and developing countries that confirm the Engel's law regarding the household's behavior evaluation. The validity of the Engel's law regarding the consumption patterns of the household have been tested by research studies. Western households in the United States consume less food energy,

Comment [WM5]: The authors should cite some of these studies and their results to show the gaps upon which their study is based.

46 protein, iron, thiamin and niacin but more calcium and vitamin A as compare to Southern
47 households and household consumption of vitamin A, vitamin C, and calcium is largely affected by
48 income

49 (Nayga, 1994). Functional description of Engel's Law is known as Engel curve which describes that
50 how household expenditure on a particular good or a service varies with change in total income or
51 expenditure. Budget share Engel curves depict how the share of household expenditures on a
52 specific good or service changes with variation in income (Chai & Moneta, 2010a). Engel curve of
53 a commodity reflects its income elasticity and indicates whether a particular good is an inferior,
54 normal or a luxury good (Chai & Moneta, 2010b). No established theory subsists that could explain
55 the pragmatic shape of Engel curves and their associated income elasticity values. Ernst Engel
56 himself argues that households have a hierarchy of wants that determines the shape of Engel curves.
57 As household income rises, some incentives become more prominent as far as household
58 expenditures are concerned that dominates consumption patterns such as starvation, ultimately
59 become satisfied at higher income levels (Witt, 2001). The specific objectives of the present study
60 are following.

61 **OBJECTIVES:-**1) To determine the household food demand pattern among different income
62 groups in Pakistan. 2) To ~~measure-determine~~ the ~~effect of~~ economies of scale ~~effect on~~ household
63 consumption by including the household size as an independant variable in Engel curve equation. 3)
64 To estimate Engel elasticities and finally to suggest some policies.

65 2. METHODOLOGY

66 The data for this study is drawn from the Pakistan Social and Living Standards Measurement
67 (PSLM) Survey 2010-11, conducted by the Federal Bureau of Statistics, Government of Pakistan,
68 Islamabad. It is based upon two-stage stratified sampling design. This survey based on a national
69 sample, covers the universe consisting of all the four provinces of Pakistan. This study uses a
70 sample of 16320 households out of total 16341 households covered by the PSLM 2010-11 due to
71 unreported and missing values for 21 households. The expenditures in the form of only paid
72 consumption are used for calculation because the goal of study is to compare consumption patterns
73 within various income groups. The food consumption groups are wheat, rice, pulses, vegetables
74 ghee, Milk (Fresh), butter, mutton, beef, chicken, fish, fruits, vegetables, salt, spices, sugar and gur.
75 Frequency of food items data in PSLM 2010-11 is of two types i.e. fortnightly and monthly. The 14
76 days data is first converted into monthly information and then both of these groups are joined to
77 make the household total food consumption during the month. Thus the dependent variable is the
78 natural log of the monthly expenditures on food items. The total household expenditures are used as
79 an alternative for income as an independent variable because of the fact that income data generally
80 suffers from measurement errors and may also include a transitory component of income (Burney &
81 Khan, 1991). The use of total expenditures instead of income is a common practice in Engel curves
82 estimation because the expenditures mostly reflect the permanent income of the households.
83 Household total expenditures and household size are calculated in the form of natural log and then
84 are used as an independent variable in this regression analysis. Household size indicates the
85 numbers of persons living in the single house. This variable is computed in the natural log form of
86 total family size of the household. Having certain advantages, the family size is used as a separate
87 independent variable. The same is valuable to directly determine the economies of scale effect,
88 avoids the loss of information problem and gives more efficient results regarding the household
89 members (Malik & Sarwar, 1999)

90 **Table 1: Households Distribution among Different Income Groups**

Comment [WM6]: The authors need to clearly state the research problem being addressed in regard to income and economies of scale on household food demand. This is generally lacking and I wonder how the objectives were arrived at. What were the key research question?

Monthly Income	Number of Household	Percentage of Household
Lowe Income Group	3762	23.05
Lower Middle Income Group	6300	38.60
Middle Income Group	2803	17.18
Upper Middle Income Group	1342	8.23
Upper Income Group	2113	12.94
Overall	16320	100

Source:- Calculations using PSLM 2010-11 data.

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 (≤ 8000), Lower-middle Income Group(8001-12000), Middle Income Group(12001-18000), Upper-middle Income Group (18001-35000) and Upper Income Group (35000+), respectively.

For calculating income elasticities, the Ordinary Least Squares (OLS) method of regression analysis is used on the basis of both common practice as well as convenience. The cross section data is based on the assumption that all the households face the same prices for every commodity so it is difficult to capture the impact of price variation on consumption pattern. The price effects can be determined by using the unit values, calculated as the expenditures of consumption items divided by the quantities of items used as a proxy for prices (Tokoyama et al., 2002). The economic theory of consumer behavior is based upon the assumption that consumer attempts to maximize the utility of goods and services subject to the given budget constraint. Consumption of various commodities are usually taken in terms of expenditure rather than quantities in the Engel's curve approximation because the expenditure takes much care of the quantity and the quality of the goods consumed to seize the problem of aggregation of heterogeneous items (Burney & Khan, 1991). It is further assumed for cross sectional data that all the households face same prices for all commodities. So the Engel curve equation can be written as:

$$E_i = \alpha_i + \beta_i Y + \mu_i \quad (1)$$

Where E_i is quantity demanded or expenditure on i th consumption head by i th household is total income of the household, α and β are the unknown parameters to be estimated and μ_i is stochastic error term. The choice of an appropriate functional form in estimating the Engel's curve has been a matter of great interest. There are so many functional forms that are used to estimate the Engel curves but yet no single form found its general acceptance (Islam and Siwar, 2005). Thus by incorporating total expenditure and household size as independent variables in Engel curve equation and taking the natural log the functional form gives as follows:

$$\ln F_i = \alpha_i + \beta_i \ln E_i + \gamma \ln HS_i + \mu_i \quad (2)$$

Where F_i is food expenditure by i th household, E_i is total expenditure by i th household, HS_i is household size and μ_i is the stochastic error term.

3. RESULTS

The computed food expenditure elasticities at Pakistan level are given in Table 2.

Table 2:- Food Income Elasticities by different income group

Income Group	Food Income or expenditure elasticity
Lower Income Group	0.869

Lower Middle Income Group	0.901
Middle Income Group	0.845
Upper Middle Income Group	0.819
Upper Income Group	0.716
Overall	0.781

Source:-Calculation from PSLM data Analysis

All the expenditure elasticities are less than one and significant at one percent level of significance implying that all food items include in the analysis are necessities in the whole calculation. Table 2 shows that food income elasticity is the highest (0.901) for the Lower-Middle income group and is the lowest (0.716) for Upper income group. Overall analysis depicts that the food consumption initially increases with increase in income but gradually declines for higher income groups. The expenditure elasticities show a little cyclical trend of elasticities in different income groups. The reasoning for this pattern may be explained in terms of quantitative as well as qualitative changes in terms of consumption basket. For a given quality of a commodity the immediate concern of a household is to consume the commodity up to a certain minimum desired level. If the household are not consuming the said commodity in the desired minimum level then the expenditure on that commodity increase with the increased level of income. Once the desired quantity is achieved the expenditure on that commodity decline with increase in income. As income continues to increase the household switch to a better quality of products thus expenditures starts increasing again. This pattern is repeated as income continues to increase.

Table 3:- Household size elasticities of Food by different Income groups

Income Group	Household Size elasticity
Overall	0.137
Lower Income group	0.067
Lower-Middle Income Group	0.085
Middle Income Group	0.154
Upper Middle Income Group	0.158
Upper Income Group	0.181

Source:-Calculation from PSLM data Analysis

The household size is also used as an independent variable in order to determine the economies of scale effect in the food demand pattern for various income groups. The calculated household size elasticities at Pakistan level are given in Table 3. Table 3 shows that household size elasticity is the highest (0.181) for the upper income group and the same is the lowest (0.067) for lower income group. Economies of scale effect may occur because the public goods within the household can be shared and the same serve their function without needing to be replicated in relation to the number of individuals within the household. Larger households may receive quantity discounts because they buy larger quantities. The size elasticities are also significant at one percent level and depict the specific effect in the food demand patterns analysis.

4. CONCLUSIONS

The study evaluates the double logarithmic analysis and OLS method of regression analysis to determine the household food demand pattern in Pakistan. The data for this purpose is drawn from Pakistan Social and Living Standards Measurement Survey (2010-11). The households are divided into five income groups. All the coefficients of food income elasticity and household size elasticities are positive and significant at one percent level of significance. The legitimacy of Engel's law is verified because

Comment [WM7]: Generally, the whole discussion lacks comparison with other studies. The authors need to show how their findings compare with studies done elsewhere in their field.

157 the proportion of food consumption is lower as compared to income. The household size analysis
158 confirms the existence of economies of scale for food consumption among various income groups.
159 The planning for future increase in food supply is mostly dependent upon accurate prediction of
160 future demand. As the estimates presented in this study are based on recent household level data, so
161 they are much beneficial to predict the true consumption pattern accurately. In particular, income
162 specific estimates are helpful to provide a better understanding of changes in food consumption
163 pattern by enabling policy makers to focus on households in different income groups.

Comment [WM8]: What are the key conclusion from the authors? The conclusions made do not reflect the two study objectives:

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