An Analysis of Household Meat Consumption Patterns in Pakistan

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Abstract

This study analyzes household meat consumption patterns as a whole for overall Pakistan, its urban and rural areas and its four provinces and then individually for beef and chicken for overall Pakistan. It also measures the economies of scale effect in household meat consumption. The results of the study indicate that all the expenditure elasticities of meat are positive and less than one in Pakistan and its four provinces. Monthly expenditures by the household on meat items rise as the income of household increases but proportionately less than increases in income. Elasticities of meat for four provinces of Pakistan show that all the expenditure elasticities of meat are positive in all the four provinces. The study finds beef and chicken as necessity items in Pakistan. Based on the findings, it is suggested that the imposition of any type of taxes on meat and meat products should have justification and rationalization and population control measures should be properly implemented.

1. Introduction

Household demand has two important features. On one side, it is about the household itself. On the other side, its focus is on the demand. "The household is defined as the person or a group of persons living in the same dwelling" (Sheffrin, 2003). It is the fundamental residential unit in which different economic, social, and domestic activities take place and where a common kitchen is shared (Haviland, 2003). Consumption pattern of the households is analyzed by conducting household level surveys both in developing and developed countries.

The use of different goods and services by a person, family or society as a whole, in order to gain physical as well as mental satisfaction, is known as demand. This use of goods and services exhibit household expenditure pattern. The term utility measures the level of satisfaction or welfare that is provided by utilization and allocation of income on purchases of different goods and services.

According to Engel's law (1857) as a result of an increase in income, the share of expenditures by the household on food items decreases. This situation is depicted and described by noting income elasticity for food items which has the value between zero and one implying that food items are the necessities. It also implies that food expenditures grow slower than the

growth in consumer income (Timmer *et al.,* 1983). Engel curve is a graphical representation of Engel's Law (Chai & Moneta, 2010a).

Use of Engel elasticities is a common practice for the household consumption pattern investigation. Elasticity measures the proportionate change in one variable (the dependent variable) due to a proportionate change in another variable (the independent variable). Thus, if expenditures on a certain commodity are in the same proportion to that of total expenditure then Engel elasticity has the value of unity. Similarly, Engel elasticity exceeds unity (is less than one) if expenditures on a good grow more than growth in income (grow less than growth in income). Based upon the values of Engel elasticity, one can classify the commodities into necessities, normal goods, and luxuries. A certain good is a necessity if the value of Engel elasticity is less than one. It is a normal good if the value of Engel elasticity is equal to one and a luxury if the value of Engel elasticity is greater than unity, respectively. The estimates of elasticities provide the basis for offering policy suggestions for the demand management and supply of consumption goods in an economy.

There is a strong relationship between the development of any economy and the consumption patterns. Consumption patterns determine the extension or contraction of business and production related activities because the production and thus decisions related to the level of investment are connected to consumption patterns in the country. Owing to their significance and importance in economic literature, household consumption patterns have been analyzed in different countries, involving the simplest form to very complex one and utilizing different types of data with employment of a variety of econometric techniques to draw fruitful inferences. The analysis of demand patterns provide much information about the nature of household utility function and help to forecast current as well as the future need of population in a country. Owing to the fact that well-being of persons in a society is affected by human activities and patterns of consumption, the analysis of consumption may provide much information about a society i.e. the preferences and income level of the persons in a society etc.

On one side, the consumption of different goods and services by the households takes place as it provides them utility. On the other side, the consumption of goods and services is a symbol and indicator of the lifestyle of the different persons in a society. The consumption patterns also reflect that whether a commodity is a necessity or a luxury for different persons and how the patterns of consumption change whenever there is a change in the income levels of the households.

Like many other food items, meat and meat products provide a variety of nutrients. The protein content of meat has been assigned a high biological value. However, meat and meat products face severe criticism too due to the presence of fat contents. Meat also provides vitamin B and especially vitamin B12 and many other micronutrients like iron, zinc, vitamin A and vitamin D as the same is lacking in many of other dietary sources (Cosgrove & Mairead, 2005). Along with the above aspects of the nutritional value of meat and meat products, like many goods and services, the analysis of consumption patterns of meat as a whole and by type has its own significance and the same can provides fruitful inferences too. Such investigation about the household consumption patterns of meat as a whole and by type can tell a lot about the nature of these commodities, regarding the demand and supply decisions and regarding the marketing aspects on the other side.

The present study aims to determine household meat consumption patterns as a whole for overall Pakistan, its urban and rural areas and its four provinces and then individually for beef

and chicken for overall Pakistan to measure the economies of scale effect in household meat consumption and finally to estimate expenditure elasticities of the demand system.

The remaining part of the study is organized as follows: Section 2 gives an overview of livestock sector in Pakistan. Review of literature is presented in Section 3. Section 4 focuses on the description of data. Section 5 is about methodology. The results and their discussion are given in Section 6. Finally, concluding remarks are presented in Section 7.

1.1 An Overview of Livestock Sector in Pakistan

Pakistan is an agricultural and a developing nation and it has been ranked at 145th out of 187 countries as it falls in the low Human Development Index (HDI), (UNDP, 2011). The total population of Pakistan is about 177.10 million, with 64% and 36% of total population in rural and urban areas, respectively (Economic Survey, 2011). The joint family system is the common family structure particularly in rural areas of Pakistan. Pakistan is ranked as the world's sixth most populous country (Population Clock, 2010). Pakistan is ranked 4th and 19th in the milk and meat production, respectively (The Dawn, November 4, 2012). A declining trend has been observed in the consumption and production of meat at the global level. According to a study, global meat production was about 297 million tons in 2011. The corresponding figure is about 350 tons in 2016 (www.brecorder.com). According to Livestock Survey (2006) conducted by Pakistan Bureau of Statistics, a total number of animals in Pakistan was 29.56 million while the number of poultry birds was 73.65 million. The share of livestock in Pakistan GDP is 11.4 % while its share in agriculture GDP is 53.2 %. Livestock share in total export of the country is 8.5 %. A number of dependent families on livestock is more than 8.5 million. Moreover, this sector provides the raw material for industry (Economic Survey of Pakistan, various issues).

Pakistan Economic Survey (2011-12) shows fascinating variations in meat production patterns of Pakistan relative to the fiscal year 2010-11. The red meat of beef and mutton has been shown to be replaced with that of chicken to some extent. The share of red meat in total meat production is 74.2% out of which shares of beef and mutton are 54.7% and 19.5%, respectively. Thus, poultry production rose by 7% during 2011-12 which implies that poultry production and its consumption are increasing steadily in the country. The factors responsible for this change in patterns in both production and consumption are the rising prices of red meat and reduction in its production. The above scenario indicates that the people of Pakistan have more propensities to consume poultry meat as compared to red meat (Pakistan Economic Survey, 2011-12).

2. Literature Review

There is a shift in economies of different developing countries and urbanization since last 25 years. The changes in lifestyle and taste that have been stimulated by urbanization have a substantial effect on patterns of food consumption. The demand for meat is increasing day by day because the population is increasing in developing countries, the consumption of meat has been transformed from beef, mutton, Chevon, and lamb to the consumption of poultry and fish due to changing costs, tastes and income of the people (Akbay & Boz, 2005). The relationship between total expenditures and expenditures on the meat of a country has been debated among economists. The relationship between total expenditures and expenditures on meat is positive as well as negative.

Burki (1997) investigates the fundamental variations in 8 main food items of consumer preferences by using time series data from 1972 to 1992 in Pakistan. The study shows the higher

own price elasticity for beef as compared to other products. The expenditure elasticities are positive for all the included commodities. However, the expenditure elasticity of chicken is greater than one in Pakistan.

Salvanes and Devoretz (1997) explore demand pattern for meat products and fish in Canada by using Canadian Food Expenditure Survey (CFES) data of the year 1986 at the household level. The study revealed negative own price elasticities while positive cross-price elasticities for meat. All the cross price and expenditure elasticities are shown to be significance at 1% level.

Bhatti and Khan (1999) show that production of beef is a major item in Pakistan's dairy industry. Cattle breed have been developed in past and present for the production of beef in Pakistan. Lack of resources and planning are major hurdles in the way of high output and growth in Pakistan. The research in the past mostly focuses on the nutritional aspects to produce the beef.

Farooq *et al.* (1999) describe the analysis of consumption by using data from one hundred seventy-seven paddy and wheat growing farm households in tehsils of Gujranwala, Ferozewala, and Daska in Punjab, Pakistan. Meat and dairy products are declared luxuries goods as expenditures on these goods were reduced as household size increases. Ma *et al.* (2003) examine consumption behavior for six livestock products in both urban and rural China by using a complete regional consumption dataset. It is shown that a major share of income is consumed on the meat of pork. There is a positive relationship between income and meat consumption. Gamba *et al.* (2005) investigate the domestic consumption patterns of meat in Urban Nairobi, Kenya. The results reveal that the high and middle-income households' meat consumption is higher than low-income households. Meat is a luxury good as they increase the meat consumption when their income increases. Prices affect meat consumption in case of product differentiation.

Gomna and Rana (2007) compare the importance of fish in two states of Nigeria. The price of fish is greater but consumption is lower in Lagos as compared to Niger State. In both of the states, the consumption of fish in households (that usually eat fish), was twice as compared to non-fishing households while the meat consumption was same in both the states. Beef has been frequently consumed followed by goat meat in both states. The study reports that people prefer fresh fish. March is the month in which the fish is consumed mostly.

Liu and Zlaus (2007) find a positive relationship between income and meat consumption in China. They forecasted the increase in meat demand in future with the increase in incomes and urbanization.

Raghavendra *et al.* (2007) discuss the consumption patterns of different meat types in India. The study also examined households' consumption preference for meat. Mutton and chicken are purchased by the majority than beef and pork. People consume meat due to freshness, price, and availability but the important one is the nutritive value earned from meat in urban areas. While in a rural area, the most important factors were taste, nutritional value, price, freshness, source, tenderness, and availability in descending order.

Ahmad and Arshad (2007) examine the household consumption patterns for 12 food and 10 non-food consumption items in Pakistan. The expenditure elasticities at all levels of income for 22 products are positive but negative for wheat for rural and urban households. It is found that Engel curves are steeper for non-food goods and the flatter for food goods.

Syrovatka (2007) investigates the household demand pattern for various meat and meat products in Czech. Meat and meat products are luxuries goods as elasticity is greater than one. There is a positive relationship between income and meat and meat products.

Raghavendra (2007) examines the consumption patterns of different meat types by individuals and retailer consumers. The primary data has been utilized for analysis for the year 2006-2007 in Dharward. The majority of the households used chicken and mutton followed by beef and pork. Almost 64.44% husbands in urban areas while 70.37% in rural areas mad decisions about meat consumption. Almost 54 percent households preferred mutton; 32 percent chicken; 12 percent beef and 1 percent pork in urban areas. While in rural areas, 46 percent households preferred chicken; 43 percent mutton; 9 percent beef and 2 percent pork.

Babu *et al.* (2010) analyze the consumption patterns of meat in rural Chittoor, Andhra Pradesh, and India. It was revealed that poultry meat is preferred by rural households as compared to mutton, pork, chevon (mutton) and beef. Religious beliefs and cost of the meat are very important for rural people in determining the consumption patterns of meat. The study found that 70 percent people preferred poultry meat; 21 percent mutton; 7.0 percent chevon but only a small number of people 1 percent like pork. Eighty-eight percent people consume meat due to a liking for it; habituated are 8.5 percent; 2 percent on children's demand and 1.5 percent due to arrival of guests. Some 60.5 percent households consumed chicken weekly; 34.5 percent fortnightly and 5 percent monthly. Mutton is consumed by 60 percent of the households once a month; 36 percent fortnightly while 4 percent weekly.

Baber and Shahnawaz (2010a) investigate the changes in consumers' preferences for meat and per person consumption from 1951-2005 by using time series data for Pakistan. Price and expenditure elasticities, as well as demand equations, have been estimated for beef, chicken, mutton, and fish. Own price elasticity is positive for mutton but negative for chicken, fish, and beef. Baber and Shahnawaz (2010b) compare the consumption patterns for urban-rural households of nine major food groups in Pakistan. Cereals and fruits show higher elasticities of expenditure in urban areas while meat, pulses, vegetables, fats and edible oil in rural areas. The entire food group is interpreted as necessities. Meat and vegetable expenditures increased as income increased in the urban sector.

Shireen *et al.* (2012) estimate consumption patterns of different food items for varying income groups in rural and urban Pakistan. Household size and Food expenditure elasticities have been estimated by using PSLM 2007-08 data. The food consumption is lower (0.681) in the upper-income group while higher (0.874) in lower income group in rural areas and the same is true for urban areas. Household size elasticity is higher i.e. 0.188 for upper-income group and is lower (0.099) for lower income group in urban sectors while in urban areas it is also lower 0.046 for lower income group and higher 2.087 for upper-income groups.

Sher *et al.* (2012) investigate food demand patters for five different income groups by using PSLM, 2007-08, data for Pakistan. They find different values of income and household size elasticities. The food income and household size elasticities are the highest for some income groups and the lowest for the other.

Nisar *et al.* (2012) estimate the income and household size elasticities, by utilizing PSLM (2007-08). All the estimated elasticities are positive as well as significant at one percent level for various commodities with different income groups. They find that energy resources, cheap housing schemes and transportation access should be provided to households.

3. Data

The data for the present study have been taken from Pakistan Social and Living Standards Measurement Survey (PSLM) 2007-08. Pakistan Bureau of Statistics (FBS), Government of

Pakistan, Islamabad is responsible for conducting this survey. These data have been collected, based on two-stage stratified random sampling design. This survey is a nationwide survey and comprises four provinces along with the rural and urban area of Pakistan. A total sample of the PSLM 2007-08 data is 15512 households.

The expenditures in the form of only paid consumption are used for computation because the goal of the study is to compare meat consumption patterns in Pakistan, its rural and urban areas and its four provinces. At first, total household expenditures on meat are analyzed for above-mentioned cases i.e. Pakistan, its rural and urban areas and its four provinces. Then, total household expenditures on individual meat category i.e. beef and chicken are analyzed separately just for overall Pakistan but not the mutton and fish. The reason is that the data on mutton and fish has missing values i.e. 12583 and 12281, respectively while the total sample size is 15512. The present study uses monthly data on household expenditures on meat items. However, data on expenditures were on the fortnightly and yearly basis, the same is converted into monthly household expenditures. Thus, the dependent variable is the natural log of the monthly expenditures on meat items: one as a sum of expenditures on all the four meat items and in the second case, the monthly meat expenditure on beef and chicken.

The total household expenditures have been used as independent variable and proxy for income. The reason for using the proxy is that income data normally suffers from the errors of measurement and can also contain a transitory element of income (Burney & Khan, 1991). It is a common practice that in the estimation of Engel curve, expenditures are used instead of income as expenditures are generally of permanent nature. Household size and total expenditures of the household have been used in natural log form as independent variables. The total numbers of persons that live in a house are considered as household size. The variable of household size has been used to determine the economies of scale effect.

4. Methodology

Ordinary Least Squares (OLS) estimation method is for the computation of expenditure elasticities as this method is simple and is used in common practice. The price effect on consumption pattern is difficult to measure as the data is cross-sectional in which it is assumed that all the household face same prices for all the commodities. The price effects can be determined by using the unit values, used as a proxy for prices (Tokoyama et al., 2002). The consumer behavior theory assumed that every person tries to maximize his or her with a given budget constraint. Consumption of various commodities is usually taken in terms of expenditure because they confiscate the problem of aggregation of heterogeneous items (Burney & Khan, 1991). So the Engel curve equation can be written as:

$$E_i = \alpha_i + \beta_i Y + \mu_i \tag{1}$$

where E_i are expenditures on meat by ith household, Y is total income (total expenditures) by the ith household, α and β are the unknown parameters to be estimated and μ_i is the stochastic error term.

For the estimation of the Engel curve, an appropriate functional form is very important and is of great interest. Engel curves have different functional forms for estimation and there is no agreement on a single form (Islam & Siwar, 2005). So using household size (HS), total expenditures (TE) as a proxy of income and dummy variable (D1) for the region and (D2) for the

source of a particular type of meat whether owned or not, as the independent variables in Engel curve equation and taking the natural log gives:

$$\ln E_i = \alpha_i + \beta_i \ln TE_i + \lambda_i \ln HS_i + \gamma_i D1 + \phi D2 + \mu_i \tag{2}$$

where E_i is meat expenditures by ith household, TE_i is a total expenditure by ith household, HS_i is household size, D1= 1 if the household is from rural area and 0, otherwise, D2= 1 if a particular type of meat is owned by the household and 0, otherwise and μ_i is the stochastic error term.

5. Results and Discussion

Results of expenditure and household size elasticities of meat in Pakistan and its rural and urban areas along with the standard errors of two alternative regressions i.e. Ordinary Least Square (OLS) regression and the Robust regression are reported in Table 1. The results show that all the expenditure elasticities of meat are positive and are less than one. It implies that meat is necessity item not only at country level but also at regional levels in Pakistan. Results also depict

Table 1: Expenditure and Household Size Elasticities of Meat in Pakistan and its Rural and Urban Areas

Variable	Pakistan	Rural	Urban
Intercept	-2.38(0.102)	-1.69(0.13)	-2.79(0.13)
Ln(TE)	0.94(0.11)	0.86(0.017)	0.99(0.015)
Ln (HS)	-0.021(0.12)	0.05(0.018	-0.07(0.017)
Region	0.056(0.12)		

Note: Dependent variable: Natural log of monthly meat consumption expenditures (LnM). Standard errors are in Parenthesis.

that the monthly expenditures by the household on meat item rise as the income of household increases but the increase in the expenditures on meat is less than the increase in the income of the household. This result, thus confirms the application of Eagle's curve.

As the study uses cross-section data and there is more likelihood of the presence of heteroscedasticity in such type of data, so for this purpose, robust regression is also applied in the study. The comparison of the standard errors of the OLS and robust regression show that the standard errors of both the regressions are same most of the times with occasional differences in case of rural and urban areas.

The household size has also been incorporated into the model in order to capture the effect of economies of scale at the country as well as provincial levels. The results of the computed household size elasticities indicate that household size elasticity for Pakistan and its rural and urban areas are in the range of 0.021 to 0.07, with positive values for rural areas and negative values for overall Pakistan and in urban areas. The standard errors of both the regressions are same.

The results of the region dummy variable show that the monthly expenditures by the household are more in rural areas by 0.056 units as compared to the households in urban areas in

overall Pakistan. Results of expenditure and household size Elasticities of Meat for four provinces of Pakistan along with the standard errors of both the regressions are reported in Table 2 and Table 3. The results show that all the expenditure elasticities of meat are positive and are less than one in Punjab, Sindh and KPK provinces while the same is positive but greater than one for the dummy variable are positive for all other provinces except Baluchistan, implying that

Table 2: Expenditure and Household Size Elasticities of Meat in Punjab and Sindh

Variable	KPK	Baluchistan
Intercept	-2.47(0.22)	-4.11(0.25)
Ln(TE)	0.96(0.024)	1.17(0.029)
Ln (HS)	-0.06(0.026)	-0.12(0.031)
Region	-0.59(0.024)	0.25(0.026)

Note: Dependent variable: Natural log of monthly meat consumption expenditures (LnM). Standard errors are in parenthesis.

meat is a necessity item in all the three provinces of Pakistan but the luxury item in Baluchistan. The comparison of the standard errors of the OLS and robust regression show that the standard errors of both the regressions are same in Punjab but are slightly different for all other provinces. The results of the computed household size elasticities show that household size elasticity for four provinces of Pakistan are negative and are in the range of -0.089 to -0.15. The coefficients of the dummy variable is positive for all other provinces except the KPK province and indicates that the difference in monthly expenditures by the household in rural and areas of Punjab, Sindh and Baluchistan provinces is of 0.082, 0.015 and 0.025 units, respectively.
The results of the computed household size elasticities show that household size elasticity for four provinces of Pakistan are positive and are in the range of 0.088 to 0.085 indicating that as the household size increase, the expenditures on beef and chicken increase but proportionately less as compared to increase in household size. The coefficients of the dummy variable for the source of a particular category of meat i.e. beef and chicken, are -0.057 and 0.040, respectively and indicate the magnitude of differences in monthly expenditures by the households in owned and non-owned cases in unit terms.

The results of the computed household size elasticities show that household size elasticity for four provinces of Pakistan are negative and are in range of -0.089 to -0.15. The coefficients of the KPK province and indicates that the difference in monthly expenditures by the household in rural and areas of Punjab, Sindh and Baluchistan provinces is of 0.082, 0.015, and 0.025 units, respectively.

Table 3: Expenditure and Household Size Elasticities of Meat in KPK and Baluchistan

Variable	Punjab	Sindh
Intercept	-2.71(0.15)	-2.50(0.18)
Ln(TE)	0.96(0.016)	0.98(0.020)
Ln (HS)	-0.089(0.020)	-0.15(0.020)
Region	0.082(0.019)	0.015(0.021)

Note: Dependent variable: Natural log of monthly meat consumption expenditures (LnM). Standard errors are in parenthesis.

Table 4: Elasticities of Beef and Chicken in Pakistan

Variable	Beef	Chicken
Intercept	0.74(0.11)	0.52(0.097)
Ln(TE)	0.49(0.012)	0.53(0.010)
Ln (HS)	0.188(0.013)	0.085(0.012)
Region	0.037(0.013)	0.058(0.012)
Source	-0.057(0.015)	0.040(0.024)
Region	0.037(0.013)	0.058(0.012)
Source	-0.057(0.015)	0.040(0.024)

Note: Dependent variable: Natural log of monthly meat consumption expenditures (LnM). Standard errors are in parenthesis.

The results of the computed household size elasticities show that household size elasticity for the coefficients of the dummy variable for the region are positive for beef and chicken and indicate that the difference in monthly expenditures by the household in rural and areas of Pakistan is of 0.037 and 0.058 units, respectively.

6. Concluding Remarks and Policy Suggestions

The results of this study indicate that all the expenditure elasticities of meat are positive and less than one indicating that meat is necessity item not only in Pakistan but also in its four provinces. The results also depict that the monthly expenditures by the household on meat items rise as the income of household increases but the increase in the expenditures on meat is less that the increase in the income of the household. Thus, the validity of the Engle's curve is confirmed by the results. The results of the computed household size elasticities indicate that household size elasticity for Pakistan and its rural and urban areas are in the range of 0.021 to 0.07, with positive values for rural areas and negative values for overall Pakistan and in urban areas. Elasticities of Meat for four provinces of Pakistan show that all the expenditure elasticities of meat are positive

and are less than one in Punjab, Sindh, and KPK provinces while the same is positive but greater than one for Baluchistan, implying that meat is a necessity item in all the three provinces of Pakistan but the luxury item in Baluchistan. Results of meat elasticities for Pakistan show that all the expenditure elasticities of beef and chicken are positive and are less than one, implying that meat is a necessity item in Pakistan.

The use of dummy variable in order to capture the regional effects i.e. rural and urban area on the monthly expenditures by the household in both the regressions i.e. the one that uses the sum of expenditures on all four categories of meant as the dependent variable and the one that uses the monthly expenditures on individual category i.e. beef and chick show a slight difference in monthly expenditures on meat by the household in rural and urban areas. Similarly, the monthly expenditures on beef and chicken as captured by the use of dummy variable (D2) vary also when the same is owned by the household and when they are not. Results of the present study are in line with other studies conducted so far for Pakistan (for example see Burki, 1997; Farooq *et al.,* 1999); Baber & Shahnawaz, 2010a).

As the study finds the meat as a necessity item in all the cases except Baluchistan, it is suggested that imposition of any type of taxes on meat and meat products should have justification and rationalization. Furthermore, as the large family sizes make the household poorer for most of the consumption heads, so population control measures should be properly implemented.

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