ESTIMATION OF DEMAND FOR PROCESSED FRUIT AND VEGETABLES PRODUCTS IN PROFESSOR COLONY (PESHAWAR)

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ABSTRACT
The study aimed at to explore the level of consumption and analyze the factors responsible for demand of processed fruit and vegetables products in Peshawar during the year 2009. The household consisted of 5 members (mean value= 5.4), with an average monthly income of Rs.49045 through 2 earners per household. Jam, juices of mango, orange & apple and pickles were in general use; however, the consumption of these products varied by number of users and quantity consumed. On average, a household consumed 1.2360 kg of jam per month. The econometrically estimated demand model for jam shows that the price of jam inversely affects the demand for jam whereas income of household positively affects the quantity demand for jam. The effects of the presence of children and adults in households turn out to be insignificant and the results show that categories of class-I officers use 0.04 Kgs more jams than class-III employees. The value of own price elasticity and income elasticity was -3.29 and 0.06 respectively in case of jam which indicates that demand for jam is price elastic and income inelastic. In case of mango, orange and apple juices, the average monthly consumption per household was 3.8, 5.7 and 3.9 litres respectively. The demand for all three juices is price-elastic, but income-inelastic. The average consumption of pickles is 0.51 Kgs, per household per month. The demand for pickles appears to be price and income-inelastic. The demand for almost all processed fruit and vegetables products is income inelastic. This
suggests that increase in income causes less-than-proportionate increase in demand, but increase in price brings more-than-proportionate decrease in quantity demanded.

Keywords: Estimation; Demand; Processed Fruit; Vegetables; Products

INTRODUCTION

Most of the food items in modern society are available in processed form. The advanced society is in need of readily served food products for example breakfast, lunch and dinner. Therefore all these should be processed and ready to be served on the spot. Among processed foods the product processed from fruits and vegetables have special importance in daily diet of human beings. The main objective of fruit and vegetables processing is to supply wholesome, safe, nutritious and acceptable food to consumers throughout the year.

Fruits and vegetables are perishable products and thus can not be stored and kept for long period of time. A major chunk of the total production of vegetables and fruits is consumed or exported in raw/fresh form and only a small proportion of it is processed. (Iqbal and Munir Ahmad, 2004). Processing prolongs the life of fruits and vegetables and ensures it’s off season availability. Processing not only enhances the life of perishable products but also creates a good market relative to that in raw form. It helps to withdraw the surplus produce from the market in the post harvest season, stabilizes the prices and assists in maintaining a stock of fruits and vegetables to meet the demand in off seasons. In most of the developing countries agriculture is the main sector of their economies. Therefore, agriculture in these countries contributes substantial proportion of gross domestic product. Agriculture almost in all developing countries is contributing a lot towards the development of non-farm sector as well. One of the important features of modern agriculture is the value addition in terms of processing the agricultural products. In this regard the processing of fruits and vegetables is very important. (Ali and Abdullah, 2002).

The fruits and vegetables are processed into squashes, juices, jams, jellies, marmalades, pickles and syrup etc. Jam contains 30% moisture, 70% sugar and 10-25 mg/100g vitamin C. Thus processing offer a variety of ways of consuming fruits and vegetables. Jam and jelly, and fruit-in-syrup are being used by more and more people as dessert while jams and marmalades are finding way on to the breakfast tables of an ever greater number of people. Pickles and salads are becoming indispensable items for adding spice and flavor to the food. In line with growing health awareness and changing demographics, demand for processed fruits and vegetables is expected to increase in the long
term. Health concerns have also driven demand for processed fruits and vegetables as consumers look for healthier and more nutritious options for their diets.

The production of fruits and vegetables in Pakistan is satisfactory, but the situation in processing is not encouraging. In case of some of the fruits and vegetables, it seems that we confront with the problem of over production; the post harvest prices drop the levels that growers even do not recover their costs of production in some situations. Storage and processing facilities are so rare that a sizeable volume of the output deteriorates. A permanent solution to this problem is the creation of a regular and stable derived demand from processing industry. However, the demand for the processed fruits and vegetables products is generally considered to be limited to a small high-income segment of a society. The per capita consumption of vegetables in Pakistan is very low. People in upper income strata consume well above the national calculated average, while the bulk of the rural population and large percentage of the poorer strata among the urban population consume very few vegetables. (Mari and Lohano, 2007). The per capita per day consumption of vegetable in Pakistan is almost half of the recommended level of 200 grams per person per day (Farooq and Ali, 2002). It is a general view that such products do not form part of the normal diet of common masses because of the high price of products and poverty of common people. Here I will study the effect of price and income changes on demand for processed fruits and vegetables, the consumption pattern of processed fruits and vegetables by various households in Agricultural Professor Colony Peshawar as well as and the factors responsible for the demand of such products. More specifically, the study has to pursue the following objectives.

Objectives of the Study

1) To study the consumption patterns of processed fruits and vegetable products by various households in the study area.

2) To estimate the demand function for important processed fruits and vegetables products in the study area.

3) To estimate the price and income elasticity of demand for the respective fruit and vegetables.

4) To recommend policy prescriptions based on findings of the study.
MATERIALS AND METHODS

This section discusses research site, sampling procedure, data collection and analysis of collected data for this study.

Research Site and Sampling

This study was carried out in professor colony of Agricultural University Peshawar. Data were collected from Professors and class III employees. In order to have a manageable sample at hand, an appropriate sample size was decided in relation with total population. Therefore, 100 households were randomly selected as sample.

Since the study related to the households processed fruit and vegetables consumption, the female heads of the households were contacted for detailed interview and collection of the needed data and information.

Data Collection

A comprehensive interview schedule was prepared to collect data from the respondents (lady heads of the household). Each respondent was interviewed personally at her home. Data was collected on household size and structure (including number of children, adults -both male and female -and aged persons), income of households along with number of earners in each household and quantity, price and value of processed fruit and vegetable products, which has been consumed by the households.

Data Analysis

A number of techniques, from the simple averages to the use of econometric modeling, have been applied to analyze the data. More specifically, the following analytical techniques were used.

1. For household size and structure, mean number of children, adults and aged were estimated along with standard deviations. For income per household and per earner, again mean values along with standard deviations and minimum-maximum ranges were estimated.

2. For number of processed fruit and vegetable products, household users and their proportions have been estimated as percentage of the total respondents.
3. For average consumption of all processed fruit and vegetables products, mean values of consumption per month along with descriptive statistics including standard deviation, minimum-maximum range and coefficient of variation have been estimated.

4. For estimation of demand function of apple jam, juices of mango, orange and apple and pickles as a function of various factors, the following econometric models were used.

\[ D_{jm} = f (PJ, CH, AD, AG, HI, D) \]
\[ D_{mj} = f (PM, PO, PA, CH, AD, AG, HI, D) \]
\[ D_{oj} = f (PO, PM, PA, CH, AD, AG, HI, D) \]
\[ D_{aj} = f (PA, PM, PO, CH, AD, AG, HI, D) \]
\[ D_{pi} = f (PP, CH, AD, AG, HI, D) \]

Where D stands for demand and subscripts namely jm, mj, oj, aj, and pi denote apple jam, mango juice, orange juice, apple juice, and pickle, respectively. Other abbreviations are explained, as follows:

- PJ = price of jam
- PM = price of mango
- PO = price of orange
- PA = price of apple
- PP = price of pickle
- CH = number of children per household
- AD = number of adults per household
- AG = number of aged person per household
- HI = household monthly income
- D = Dummy for monthly income where 
  \[ = 1 \] for professors having \( \geq \) Rs.30,000 monthly income.
  \[ = 0 \] for class III employees having \( \leq \) Rs. 30,000 monthly income.

RESULTS AND DISCUSSION

The results achieved during the course of study are presented as below General Characteristics of Respondent Households.
Household Size

Household size is an important factor determining demand for various food items. The average household size in the study area was 5 which is less than the national average that is 6.83 (Household integrated economic survey HIES, 2005-06). The detail pertaining to the consumption of family is given in table I. The figures in table show that on average every household has one child whereas the remaining 4 members are adult.

Table I Average size of household

<table>
<thead>
<tr>
<th>Particular children</th>
<th>Mean</th>
<th>S.D.</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children below 5</td>
<td>0.1400</td>
<td>0.37659</td>
<td>...........</td>
</tr>
<tr>
<td>Children 5 to 10</td>
<td>0.5400</td>
<td>0.82168</td>
<td>...........</td>
</tr>
<tr>
<td>Children 10 to 15</td>
<td>0.7100</td>
<td>0.90224</td>
<td>...........</td>
</tr>
<tr>
<td>Total children</td>
<td>1.3600</td>
<td>1.26155</td>
<td>25.75</td>
</tr>
<tr>
<td>Adults (16 to 60)</td>
<td>3.9800</td>
<td>1.62045</td>
<td>74.25</td>
</tr>
<tr>
<td>Total household size</td>
<td>5.3600</td>
<td>1.14287</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Survey data, 2009

Household income

On average, the monthly household income estimates at Rs.49045, with a minimum-maximum range of Rs.20000-Rs.172000 (Table II). On average, there were 2 earners per household, with an income of Rs.27,866 per earner per month as given in Table

Table II Average Income of Household

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Mean</th>
<th>S.D</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household income (Rs.)</td>
<td>49045</td>
<td>19095.46657</td>
<td>20000.00</td>
<td>172000</td>
</tr>
<tr>
<td>Number of earners (Nos)</td>
<td>1.76</td>
<td>0.90028</td>
<td>1.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Income per earner</td>
<td>27866</td>
<td>20261.73396</td>
<td>15000.00</td>
<td>95000.00</td>
</tr>
</tbody>
</table>

Source: Survey data, 2009
**Fruit and vegetables processed products: Number of User Households**

The survey has revealed that the processed fruit and vegetables products, namely jam, juices of apple, mango and orange and pickles prepared from vegetables are in general use in the study area. (Table III.)

**Table III Consumption of Processed Fruit and Vegetable Products by Number of Sampled Households**

<table>
<thead>
<tr>
<th>Processed Fruit &amp; Vegetables Products</th>
<th>Number of User Household</th>
<th>% of Total households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Jam</td>
<td>100</td>
<td>100.00</td>
</tr>
<tr>
<td>Apple Juice</td>
<td>98</td>
<td>98.00</td>
</tr>
<tr>
<td>Mango Juice</td>
<td>100</td>
<td>100.00</td>
</tr>
<tr>
<td>Orange Juice</td>
<td>70</td>
<td>70.00</td>
</tr>
<tr>
<td>Pickles</td>
<td>88</td>
<td>88.00</td>
</tr>
</tbody>
</table>

Source: Survey data. 2009

Table III shows that 100% households in the study area are using jams and mango juices, followed by apple juice (98%), pickles (88%) and orange juice (70%).

**Consumption of Processed Fruit & Vegetables Products**

**Apple Jam consumption**

Consumption of apple jam varies across households due to variation in household income level, taste and preferences and other factors. On average, a household consume 1.24 kgs of apple jam per month with a range of 0.45 to 2.00 kgs. The details relating to apple jam consumption are given in Table IV.
Table IV Consumption of Apple jam per house hold per month

<table>
<thead>
<tr>
<th>Processed Fruit &amp; Vegetables Products</th>
<th>Mean Consumption (Per Month)</th>
<th>Standard Deviation</th>
<th>Minimum-Maximum Range</th>
<th>Coefficient of Variation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Jam (Kgs.)</td>
<td>1.2360</td>
<td>0.53054</td>
<td>0.45-2.00</td>
<td>42.9</td>
</tr>
</tbody>
</table>

Source: Survey data. 2009

Estimated demand model for apple jam

Using the data on consumption of jam and its related aspects, we estimated demand model of jam; the empirical results are provided in following model 4.1.

\[ D_{jam} = 4.996 - 0.026P_{J} + 0.054C_{H} + 0.16A_{D} + 0.000001496H_{I} + 0.38D \]

\[
(0.377) \quad (0.002) \quad (0.035) \quad (0.030) \quad (0.000) \quad (0.072)
\]

\[
(13.247) \quad (-13.203) \quad (1.543) \quad (0.549) \quad (0.742) \quad (0.503)
\]

\[ R^2 = 0.682 \quad F= 40.230 \quad DW = 1.936 \]  

(4.1)

(Figures in 1st and 2nd parenthesis represent standard errors and t-ratios, respectively).

The coefficient of determination \( R^2 \) shows that 68% variation in dependent variable is explained by the explanatory variables. Our \( F_{\text{cal}} > F_{\text{tab}} \) (40.230>2.29) at 5 percent level of significance shows that the model is overall good fit. Our DW=1.936 falls in no autocorrelation region (dl=1.57 & du=1.78) so we can conclude that there is no autocorrelation problem in the model.

Results of the study show that, as per economic theory, the price of jam (PJ) inversely affects and income of household (HI) directly affects the demand for jam (Djam); these effects with own-price (PJ) remained statistically significant at 0.05 level of significance. The effect of presence of children (CH) and adult (AD) people in households remained statistically insignificant at 1.543 and 0.549, respectively. The coefficient of dummy for professors having income higher than Rs.30,000 (D) have turned out to be insignificant, suggesting that there are no significant differences between demand for apple jam across professors and class III employees.
Mango, Orange & Apple Juices consumption

On average, a household consumes mango juice 3.79 litres, orange juice 5.74 litres and apple juice 3.94 litres as shown in Table V.

Table V Average Consumption of Mango, Orange and Apple Juices per household per month

<table>
<thead>
<tr>
<th>Processed Fruit &amp; Vegetables Products</th>
<th>Mean Consumption (Per Month)</th>
<th>Standard Deviation</th>
<th>Minimum-Maximum Range</th>
<th>Coefficient of Variation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mango Juice (Litres)</td>
<td>3.7875</td>
<td>1.85945</td>
<td>1.00-7.50</td>
<td>49.1</td>
</tr>
<tr>
<td>Orange Juice (Litres)</td>
<td>5.7400</td>
<td>4.05515</td>
<td>0.00-30.00</td>
<td>70.6</td>
</tr>
<tr>
<td>Apple Juice (Litres)</td>
<td>3.9400</td>
<td>1.50089</td>
<td>0.00-7.50</td>
<td>38.1</td>
</tr>
</tbody>
</table>

Source: Survey data. 2009

Table V shows that the use of orange juice has varied heavily across households (CV = 70.6%) relative to that of the apple and mango juices (CV = 38.1% and 49.1%).

Estimated demand model for mango juice

The empirical results of the econometrically estimated demand for juices of mango, orange and apple are as follows.

\[
D_{mj} = 8.400 - 0.078PM + 0.000PO - 0.014PA + 0.178CH - 0.097AD + 0.000008514HI + 0.150D
\]

\[
(0.693) (0.005) (0.003) (0.005) (0.114) (0.090) (12.119) (-15.229) (0.073) (-2.715) (1.569) (-1.076)
\]

\[
R^2 = 0.766 \quad F= 42.908 \quad DW= 1.898 \quad (4.2)
\]

(Figures in 1st and 2nd parenthesis represent standard errors and t-ratios respectively).
The coefficient of determination, $R^2$ shows that 76% variation in dependent variable is explained by the explanatory variables. As our $F_{cal} = 42.908$ is greater than $F_{tab} = 2.09$ at 5 percent level of significance. Therefore, the model is overall good fit. Our $DW = 1.898$ falls in no autocorrelation region ($dl = 1.528$ & $du = 1.826$) so there is no autocorrelation problem in the model.

The above stated empirical results suggest that own price exerts inverse effect and household income (HI) direct effect on quantity demand for mango juice, which is statistically significant. Significant negative sign of cross price of apple (PA) in demand model of mango juice indicates that apple juices are complement to mango juices. Insignificant positive sign of cross price of orange (PO) indicates that orange juices are substitute to mango juices. The positive signs of number of children (CH) and dummy (D) show that these two variables have direct relationship with demand for mango juice (Dmj) which is statistically significant. The negative sign of adult shows inverse relationship with demand for mango juices which is statistically insignificant.

*Estimated demand model for orange juice*

$$Doj = 17.812 - 0.041PO + 0.051PM - 0.024PA + 2.885CH - 4.418AD + 0.00006485HI + 3.311D$$

$$R^2 = 0.456 \quad F = 10.997 \quad DW = 1.832 \quad (4.3)$$

(Figures in 1st and 2nd parenthesis represent standard errors and t-ratios respectively)

The coefficient of determination, $R^2$ shows that 45% variation in dependent variable is explained by the explanatory variables. As our $F_{-cal} = 10.997$ is greater than $F_{tab} = 2.09$ at 5 percent level of significance. It shows that the model is overall good fit. Our $DW = 1.832$ falls in no autocorrelation region ($dl = 1.528$ & $du = 1.826$) so there is no autocorrelation problem.
The results suggest that own price exerts statistically significant inverse effect on quantity demanded for orange juice. Household income (HI) exerts statistically insignificant direct effect on quantity demand for orange juice. Insignificant negative sign of cross price of apple (PA) in demand function of orange juice indicates that apple juices are complement to orange juices. Insignificant positive sign of cross price of mango (PM indicates that mango juices are substitute for orange juices. The presence of number of children (CH) and adult (AD) in the demand function turn out to be statistically significant.. The coefficient of dummy (D) have turned out to be insignificant.

**Estimated demand model for apple juice**

\[
\text{Daj} = 2.206 - 0.016\text{PA} + 0.003\text{PM} - 0.002\text{PO} + 0.004\text{CH} - 0.117\text{AD} + 0.00003765\text{HI} + 0.257\text{D}
\]

\[
(0.915) \quad (0.007) \quad (0.007) \quad (0.004) \quad (0.150) \quad (0.119)
\]

\[
(2.411) \quad (-2.355) \quad (0.466) \quad (-0.465) \quad (0.029) \quad (0.982)
\]

\[
\text{R}^2 = 0.373 \quad F = 7.812 \quad \text{DW} = 1.916 \quad (4.4)
\]

(Figures in 1st and 2nd parenthesis represent standard errors and t-ratios respectively).

The coefficient of determination, \( R^2 \) shows that 37% variation in dependent variable is explained by the explanatory variables. As our \( F_{\text{cal}} = 7.812 \) is greater than \( F_{\text{tab}} = 2.09 \) at 5 percent level of significance, indicating that the model is overall good fit. Our \( \text{DW} = 1.916 \) falls in no autocorrelation region (\( \text{dl}= 1.528 \) & \( \text{du}= 1.826 \)) so there is no autocorrelation problem.

The results suggest that own price (PA) exert inverse and household income (HI) exert direct effect on quantity demanded for apple juice (Daj), these effects are statistically significant. Insignificant negative sign of cross price of orange juice (PO) in demand function of apple juice indicates that orange juices are complement to apple juices. Insignificant positive sign of cross price of mango juice (PM) indicates that apple juices are substitute to mango juices. The positive sign of number of children (CH) shows that number of children
have direct relationship with demand for apple juices (Daj), which is statistically insignificant. Presence of adult does not show significant effect on demand for apple juices. The coefficient of dummy (D) have turned out to be insignificant.

The above stated empirical results suggest that, in all three cases of fruit juices, own prices exert statistically significant inverse effects on quantities demanded for mango juice, orange juice and apple juice (Dmj, Doj & Daj). Household income (HI) shows significant positive effect on demand for mango and apple juices compared to orange juices. The presence of children (CH) shows significantly positive effect on demand for orange juices (Doj) compared to other juices (Dmj & Daj), suggesting the preference of children for the orange juices. Presence of adult does not show significant effect on demand of two juices compared to orange juices, suggesting the preference of adult for the orange juices. The coefficient of dummy (D) for professors (class I) having income higher than Rs.30,000 have turned out to be insignificant, suggesting that there are no significant differences between demand for all three juices across professors and class III employees.

**Pickles consumption**

Consumption of pickles varies across households depending upon the price of pickles, income of households and family size. The average consumption of pickles in the study area is 0.51 kgs per household per month as shown in Table VI.

**Table VI Average Consumption of Pickles per household per month**

<table>
<thead>
<tr>
<th>Processed Fruit and Vegetables</th>
<th>Mean Consumption Per Month</th>
<th>Standard Deviation</th>
<th>Minimum-Maximum Range</th>
<th>Coefficient of Variation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickles Kgs</td>
<td>0.51</td>
<td>0.3187</td>
<td>0.00-1.28</td>
<td>62.6</td>
</tr>
</tbody>
</table>

Source: Survey data 2009
Estimated demand model for pickles

\[ D_{\text{pickle}} = 0.427 - 0.002PP + 0.041CH + 0.082AD + 0.000002377HI + 0.067D \]

(0.138) (0.0001) (0.027) (0.023) (0.000) (0.59)

(3.086) (-5.791) (1.479) (3.602) (1.471) (1.144)

\[ R^2 = 0.453 \quad F = 15.557 \quad DW = 2.140 \]

(Figures in 1st and 2nd parenthesis represent standard errors and t-ratios respectively)

The coefficient of determination, \( R^2 \) shows that 45% variation in dependent variable is explained by the explanatory variables. As our \( F_{\text{cal}} \) is greater than \( F_{\text{tab}} \) (15.557 > 2.29) at 5 percent level of significance, indicating that the model is overall good fit. Our DW = 2.140 falls in no autocorrelation region (\( dl = 1.57 \) & \( du = 1.78 \)) so we can conclude that there is no autocorrelation problem in the model.

Model 4.5 shows that own price of pickle has significant inverse effect on demand for pickle while household income (HI), number of children (CH) and adults (AD) in the household have positive effect on demand for pickles. The coefficient of dummy variable depicts that professors are consuming more pickle than class III by 0.06 kg per month.

Estimation of Elasticity of Demand

The estimated demand functions for apple jam, juices of mango, orange and apple and pickles given in model 4.1 through 4.5 provide slope coefficients, which can be used for estimation of elasticities of demand by using the following formula.

\[
\text{Elasticity} = \text{Slope} \left( \frac{\bar{P}/\bar{D}}{\delta D/\delta P} \right) = \left( \frac{\delta D/\delta P}{\bar{P}/\bar{D}} \right) \quad \text{(Price elasticity of demand)} \quad (4.6)
\]

\[
\text{Elasticity} = \text{Slope} \left( \frac{\bar{D}/\bar{HI}}{\delta HI/\delta D} \right) = \left( \frac{\delta D/\delta HI}{\bar{HI}/\bar{D}} \right) \quad \text{(Income elasticity of demand)} \quad (4.7)
\]

Where, \( \bar{D} \), \( \bar{P} \) and \( \bar{HI} \), respectively, are mean values of quantity demanded, prices and household income. Slope = \( (\delta D/\delta P) \) and \( (\delta D/\delta HI) \) are the coefficients attached with the respective explanatory variables included in equation 4.1 to 4.5. Using elasticity formulas (4.6) and (4.7) own-price and income elasticities are estimated and provided in Table (4.7).
Table VII Own price and Income Elasticities of Processed Fruit & Vegetable Products

<table>
<thead>
<tr>
<th>Products</th>
<th>Mean Value</th>
<th>Slop Coefficient</th>
<th>Estimated Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own-price</td>
<td>1.2360</td>
<td>-0.026</td>
<td>-3.29</td>
</tr>
<tr>
<td>Income</td>
<td>49045</td>
<td>0.000001496</td>
<td>0.06</td>
</tr>
<tr>
<td>Apple Juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own-price</td>
<td>3.9400</td>
<td>-0.016</td>
<td>-6.23</td>
</tr>
<tr>
<td>Income</td>
<td>49045</td>
<td>0.00003765</td>
<td>3.63</td>
</tr>
<tr>
<td>Orange Juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own-price</td>
<td>5.9850</td>
<td>-0.041</td>
<td>-0.29</td>
</tr>
<tr>
<td>Income</td>
<td>49045</td>
<td>0.00006485</td>
<td>0.53</td>
</tr>
<tr>
<td>Mango Juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own-price</td>
<td>3.7875</td>
<td>-0.078</td>
<td>-1.32</td>
</tr>
<tr>
<td>Income</td>
<td>49045</td>
<td>0.000008514</td>
<td>0.02</td>
</tr>
<tr>
<td>Pickles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own-price</td>
<td>0.5088</td>
<td>-0.002</td>
<td>-0.78</td>
</tr>
<tr>
<td>Income</td>
<td>49045</td>
<td>0.000002377</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Source: Derived from survey data, 2009

The values of own-price and income elasticity of apple jam, estimated at -3.29 and 0.06 indicating that the demand for jam is, therefore, price elastic and income inelastic.

The estimated own-price and income elasticity of demand for apple juices, respectively estimated at -6.232 and 3.63 indicating that the demand for apple juices is own-price and income elastic. The values of own-price and income elasticities of orange juice, estimate at -0.29 and 0.53 shows that demand for orange juice is price and income inelastic. The estimated own-price and income elasticities for mango juices estimate at -1.32 and 0.02 showing that the demand for mango juices is price elastic and income inelastic. The demand for pickles turns out to be price and income-inelastic.
CONCLUSION AND RECOMMENDATIONS

From the review of the findings presented above, it is inferred that the demand for almost all processed fruit products is income inelastic. The results also show that the demand for apple juice, mango juice and apple jam are price elastic while it is inelastic in case of orange juice and pickle. The presence of children influences the demand for processed fruit and vegetables. Household income shows some positive effects for processed fruit and vegetables. The coefficients of dummy for professors and class III employees have turned out to be insignificant except demand for orange juice, suggesting that there are no significant differences between demand for juices across inhabitants of professors and class III users.

Recommendations

Based on the findings of the study and conclusions drawn, the following recommendations are forwarded.

1) The results of this study are limited to a small area restricted to professor colony of Peshawar city. The research needs to be replicated in other parts of Peshawar as well as other cities of Khyber Pakhtunkhwa so that results can be generalized. The replication of study is therefore recommended.

2) New studies should also explore two additional aspects of the consumption of processed fruit and vegetables products, namely: (1) whether it is financial stress or other factors, which have limited consumption to a few products; (2) whether wealthy consumers consume more commodities and have higher level of consumption.

3) The results of present study have serious implications for producers of such products, that is, they should not raise prices of their products; otherwise their sale would reduce. It is recommended that such producers try to reduce their cost of production.
References


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