

Expenditure elasticities of selected food items for different class of families in India – panel regression approach

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ABSTRACT

The pattern of food consumption expenditure of different class of families is a good indicator of the economic status and their standard of living and also shows the relative importance of individual items in the consumption basket. As long as the consumption patterns at the household level show that per capita direct consumption of food grains have been declining and that livestock products and fruits and vegetables has been increasing for a fairly long time. The analysis of food consumption pattern and factors affecting consumption expenditure on food items would help in designing appropriate policies related to food production and make the availability of major non-food items. In the present study, the researcher has been tried to examine the income effects on selected food items for different class of families by applying the panel regression approach. The data of monthly per capita consumption expenditure on selected food items by different expenditure classes for different states were available in 55th (1999-2000) and 61st (2004-2005) rounds. It was observed that the random factors are affecting on the consumption expenditure on various food items by the all class of families. Hence in the majority cases, the expenditure elasticities of different food items have been derived by random effects model. The expenditure elasticity of cereals and vegetables has been found to be varying between high to low values from the 'very poor' families to 'poor' families. In the case of 'rich' families expenditure elasticity of cereals is found to be negative which implies that with increase in the total expenditure, the rich families have decreased the share of cereal consumption. In the case of pulses, the expenditure elasticity is found to be varying between high to low values from 'non-poor' families to 'very poor' families. Like cereals, the expenditure elasticity of pulses is negative for 'rich' families.

Keywords : Consumption, Expenditure Elasticity, Panel Regression.

JEL Classification : C33, C53, O13

1. Introduction

Consumption is defined as the total value of expenditures on goods and services for the current use by the household sector (Henderson and Poole, 1991). In the consumption basket of people, food consumption is the foremost basic need gets priority in the patterns of expenditure of people, especially the economically backward families. The factors like income of the people and prices of food items are leading factor which affect on food demand and ultimately its affect on access to food demands affordability. The factors such as income, prices, individual preferences and beliefs; cultural traditions as well as geographical, environmental, social, and economic factors all intersect in a complex manner to shape the dietary consumption pattern (WTO, 2003).

The pattern of food consumption expenditure of different class of families is a good indicator of the economic status and their standard of living and also shows the relative importance of individual items in the consumption basket. People belonging to different classes of income have different structures of consumption. Rich people spend more for each class of items in absolute terms, but they spend low percentage of income for food and basic needs and poor people spend higher percentage of income on food and other basic needs. In short, the propensity to consume will be higher for poor and the propensity to save will be higher for rich (Glenn and Kenneth, 1987).

As long as the consumption pattern at the household level show that per capita direct consumption of food grains have been declining and that livestock products and fruits and vegetables has been increasing for a fairly long time (K.T. Geetha, 2011). There has been a switch in preferences towards non-cereal items such as meat/fish and fruit/vegetables (Ray, 2005).

The analysis of food consumption pattern and factors affecting consumption expenditure on food items would help in designing appropriate policies related to food production and make the availability of major non-food items. It has special significance because it is most important component for low and middle income groups. In the present study, the researcher has been tried to examine the income effects on selected food items for different class of families. The expenditure elasticities have been derived for examined the income effects on consumption of selected food items by different class of families.

2. Review of Literature

Kumar P. et.al (2011) has focused on the changes in food consumption pattern of Indian households and estimation of the demand parameters of major food commodities. The major food commodities included in this study are cereals, pulses, edible oil, fruits and vegetables, milk, sugar, meat, fish and eggs, as they constitute more than 95 percent of the total food consumed by the Indian households. The food demand elasticities had been estimated by using alternative methodological tools, namely Quadratic Almost Ideal Demand System (QUAIDS) and Food Characteristics Demand System (FCDS) model to enable a comparative as well as a realistic estimation. The household consumption expenditure data were collected from the NSSO covering the years 1983, 1987-88, 1993-94, 1999-00 and 2004-05 pertaining to 38th, 43rd, 50th, 55th and 61st rounds, respectively. The sample households were categorized into four expenditure income groups like very poor, moderately poor, non-poor lower and non-poor higher. This study concluded that, The demand elasticities had observed to vary widely across income groups, and food commodities. The estimated income elasticities had been found to vary across income classes and were the lowest for cereal groups and highest for horticultural and livestock products. The magnitudes of elasticities had estimated higher for lower income groups and these tend to decrease as income increases. The analysis of price

and income effects based on the estimated demand system suggested that with increase in food price inflation, the demand for staple food (rice, wheat and sugar) may not be affected adversely but, that of high value food commodities is likely to be affected negatively. Therefore, the study had cautioned that if inflation in food prices remains unabated for an extended period, there is the possibility of reversal of the trend of diversification and that of consumers returning to cereal-dominated diet, thus accentuating under nourishment.

Paul S. B. (2011) has presented some estimates for India that demonstrate that structural changes in the impact of income on food demand have been significant factors driving the changes in dietary patterns in this rapidly growing economy. This paper tries to take stock of the nutritional status of various income groups and how it has changed over time. Author had selected two specific 'thick' rounds, viz., 38th and 61st, to reflect any changes in a long-run period spanning before and after the economic reforms undertaken in 1991. A Quadratic Almost Ideal Demand System is estimated for six food groups. The estimation results confirm a shift in taste of both rural and urban households that explains low demand for nutrient-rich inexpensive food and a greater variety of expensive sources of nutrients. The quality of diet has been falling in terms of excessive fat intake with no sign of significant improvement in diet quality in terms of other nutrients. He had estimated the expenditure elasticities in rural areas for food items like cereals, pulses, milk, meat, fish & chicken and vegetable/fruits to 0.57, 0.78, 2.40, 1.27 and 0.88 for 2004-05. The price elasticities had estimated to -0.60, -0.85, -0.94, -1.20 and -0.85 respectively for 2004-05. In urban areas, the expenditure elasticities of these food items found to be 0.51, 0.73, 1.73, 1.37 and 0.99 respectively and the own price elasticities were found to be -0.69, -0.79, -0.90, -0.89 and -0.83 respectively.

Prasad A.R. (2005) has examined the responsiveness of consumption expenditure on specific food items to the change in total food consumption expenditure during 1950-51 through 1999-2000 for Indian economy. This study is based on the Central Statistical Organisation (CSO) estimates of private final consumption expenditure in the domestic market taking into account the specific food items of consumption expenditure and their related aggregates. Time Series Data used in this study on private final consumption expenditure of specific food items in domestic market for 50 years and population for the corresponding years have been drawn from various publications of National Account Statistics. The real time series data on Private Final Consumption Expenditure of specific food items at constant (1993-94) prices are used in order to adjust the changes in prices and the estimates of parameters obtained provide correct idea about the nature of commodity. This study concluded that, the commodity group per capita food consumption expenditure increased at the compound rate of 0.98 per cent per annum. This growth rate is lower than the growth rate estimated for per capita consumption expenditure (1.34 percent). The per capita consumption expenditure on food items cereals & bread, sugar & gur and oil and oilseeds increased at the compound rate of 0.41 percent, 0.54 percent and 0.75 percent respectively and pulses declined at the rate of 0.78 percent annum, respectively.

Majumder A. (1980) had made an attempt to compare the performance of the Linear Expenditure System (LES) with that of Almost Ideal Demand System (AIDS) on Indian consumer expenditure data for the rural and the urban sectors separately. These data had compiled from National Sample Survey Organization, 7th Round (October 1953 – March 1954) to 28th round (October 1973 – June 1974). The nine groups of items for which expenditure pattern is analysed are; (i) cereals and cereal substitute (ii) milk and milk products, (iii) edible oils, (iv) meat, fish and egg, (v) sugar etc. (vi) other food items (i.e. spices, salt, beverage, prepared food etc. (vii) clothing, (viii) fuel and light, and finally (ix) other non food items. The analysis has been carried out at two levels of aggregation, viz., one

with the item-wise estimates of average per capita expenditure for all households in each round and another at a somewhat disaggregated level in which for each round estimates of average per capita expenditure for three ordinal groups of population, namely 30 per cent, the middle 40 per cent and the richest 30 per cent have been used. The comparison of the AIDS and LES has been made with particular reference to the income and price elasticities estimated from the two models. In the view of fact that the LES based estimates of the price elasticities are restricted due to the additivity of the direct utility function, the comparison with AIDS would bring out the qualities of the LES based elasticity estimates.

Research studies related to the present study clearly shows that the entire researchers had adopted the QUAIDS model and LES for deriving the expenditure elasticities of different class of families. There is no attempt to be made to use the panel regression approach specially fixed and random effects models to calculating the expenditure elasticities. Hence, in the present study researcher has decided to apply the panel regression approach to derive the expenditure elasticities of selected food items for different class of families.

3. Consumption Pattern of Selected Food Items of Different Class of Families

Generally, compared to the Total Consumption Expenditure, the Per Capita Consumption Expenditure gives the real standard of living of the population. So, monthly per capita expenditure (MPCE) is one of the important indicators of the status of general economic development of a nation. It is also one of the important components used for calculation of poverty ratio. An analysis of food consumption patterns and how they are likely to shift as a result of changes in income and relative price is required to assess the food security-related policy issues in the agricultural sector. This analysis is based on a matrix of price and income elasticities of demand for food groups. Debates on the issue of food security in terms of the country's self-sufficiency in production, future demand for cereals and other food items as well as the ability of households to meet their calorie requirements are of important policy relevance.

Before discussing about the price and income elasticities of selected food items for different class of families, it is necessary to study the consumption pattern at a disaggregate level. For this purpose, the families are classified into various groups such as very poor, poor, non-poor and rich¹. On the basis of recent poverty line in rural and urban area, we have classified these groups. In the methodology portion of this study, researcher has been provided detail about this classification. The knowledge of the proportions spent on the different items by the different groups of families is essential to implement various policies related to food security. Here, the attempt is made on distinct the proportion spent on various food items by the different class of families.

The data on monthly per capita consumption expenditure on selected food items shows that the consumption expenditure on selected food items have been increased by all class of families during the period of 1999-2000 to 2006-07. The extent of percentage increased in the monthly per capita consumption on all food items excepting cereals substitutes have been found to be higher for economically poor class of families than rich families. However, in the case of cereals substitute, the extent of percentage increased in monthly per capita consumption expenditure has been found to be higher for rich class families. Hence, one can say that the higher income class families have quickly shifted cereals to cereals substitute products over a period of time.

¹ Researcher has used recent poverty line given by planning commission to defined very poor, poor, non poor and rich class of families.

The data on proportion spent of monthly per capita consumption expenditure on selected food items by the different class of families given in the above table shows that out of the total monthly per capita consumption expenditure of very poor, poor and non poor class families, more than 50% share gone on food consumption during the both time period which researcher have been considered. The researcher has been observed that the budget on the selected food items have been increased for more food items by very poor class families than other class of families. However in the case of rich class of families, their budget share on different food items have been found to be declined for all selected food items during the period of 1999-2000 to 2006-07. These changes in the budget share on different food items sows that with increase the level of income of the poor families, their budget share on number of food items have increased due to the budgetary importance of the food consumption in total consumption

Table 1.1 : Monthly Per-Capita Consumption Expenditure on Selected Food Items by Different class of Families in India, (in Rs.)

| Food Items | 1999-2000 | | | | 2006-07 | | | | Percentage Change (%) | | | |
|---------------|-----------|--------|----------|--------|-----------|--------|----------|--------|-----------------------|-------|----------|-------|
| | Very Poor | Poor | Non-Poor | Rich | Very Poor | Poor | Non-Poor | Rich | Very Poor | Poor | Non-Poor | Rich |
| Cereal | 79.90 | 93.59 | 105.37 | 127.95 | 86.93 | 97.72 | 111.38 | 129.93 | 8.80 | 4.41 | 5.70 | 1.54 |
| Pulses & Prod | 11.10 | 14.90 | 19.58 | 30.13 | 13.44 | 17.25 | 22.86 | 32.80 | 21.05 | 15.82 | 16.73 | 8.84 |
| Milk & Prod | 11.28 | 21.19 | 41.09 | 107.76 | 15.64 | 25.69 | 49.94 | 113.64 | 38.71 | 21.22 | 21.54 | 5.45 |
| Edible Oil | 10.82 | 14.71 | 20.07 | 32.89 | 16.82 | 20.96 | 27.65 | 36.65 | 55.39 | 42.55 | 37.81 | 11.41 |
| MEF | 7.23 | 11.68 | 18.04 | 34.33 | 10.38 | 12.47 | 23.50 | 39.31 | 43.66 | 6.81 | 30.24 | 14.50 |
| Vegetables | 18.68 | 24.66 | 32.73 | 53.65 | 26.61 | 33.42 | 42.67 | 61.82 | 42.42 | 35.49 | 30.37 | 15.22 |
| Sugar | 5.88 | 8.18 | 11.44 | 18.89 | 7.81 | 9.57 | 13.43 | 19.92 | 32.89 | 16.95 | 17.37 | 5.44 |
| TF | 165.47 | 219.48 | 295.67 | 532.86 | 206.21 | 258.81 | 349.10 | 573.06 | 24.62 | 17.92 | 18.07 | 7.54 |
| TNF | 87.85 | 128.96 | 202.60 | 608.36 | 142.14 | 189.57 | 300.13 | 862.51 | 61.81 | 47.00 | 48.14 | 41.78 |

Source : NSSO, 55th round, 61st round**Table 1.2 : Proportion of Monthly Per Capita Consumption Expenditure Spend on Selected Food items by Different class of Families**

| Food Items | 1999-2000 | | | | 2006-07 | | | | Differences 1999-2000 and 2006-07 | | | |
|---------------|-----------|-------|----------|-------|-----------|-------|----------|-------|--------------------------------------|-------|----------|-------|
| | Very Poor | Poor | Non-poor | Rich | Very Poor | Poor | Non-Poor | Rich | Very Poor | Poor | Non-poor | Rich |
| Cereal | 32.24 | 27.74 | 21.96 | 12.56 | 25.49 | 22.15 | 17.88 | 10.00 | -6.75 | -5.59 | -4.09 | -2.56 |
| Pulses & Prod | 4.37 | 4.30 | 3.98 | 2.83 | 3.84 | 3.85 | 3.60 | 2.46 | -0.53 | -0.45 | -0.38 | -0.37 |
| Milk & Prod | 4.21 | 5.82 | 8.10 | 9.82 | 4.33 | 5.68 | 7.77 | 8.26 | 0.13 | -0.14 | -0.34 | -1.56 |
| Edible Oil | 4.27 | 4.22 | 4.04 | 3.01 | 4.83 | 4.70 | 4.35 | 2.78 | 0.57 | 0.48 | 0.31 | -0.23 |
| MEF | 2.80 | 3.28 | 3.59 | 3.11 | 2.95 | 2.85 | 3.68 | 2.94 | 0.15 | -0.43 | 0.09 | -0.17 |
| Vegetables | 7.42 | 7.12 | 6.62 | 4.88 | 7.73 | 7.51 | 6.77 | 4.59 | 0.31 | 0.39 | 0.15 | -0.29 |
| Sugar | 2.28 | 2.33 | 2.32 | 1.84 | 2.21 | 2.13 | 2.12 | 1.53 | -0.06 | -0.20 | -0.20 | -0.32 |
| Total Food | 65.55 | 63.38 | 59.96 | 48.86 | 59.50 | 58.04 | 55.13 | 42.21 | -6.05 | -5.34 | -4.83 | -6.65 |

Source : NSSO, 55th round, 61st round

4. Objectives of Study

Present study undertaken with the core objective of derived the expenditure elasticity of selected food items for different class of families and to know how the different class of families response to consumption of selected food items with change in their level of income.

5. Methodology

Methodology is an important component of research. In order to fulfil the objectives of the study, an appropriate methodology for conducting the study is essential. This section deals with the description of the nature and sources of data and analytical tools and techniques employed which are all parts of research methodology.

Panel regression analysis deals with two-dimensional panel data. Present study is based on the secondary data on monthly per capita consumption expenditure various food items which had been collected from official website of the NSSO. This data are usually collected over time and over the same states. The regression is run over these two dimensions.

A common panel data regression model is as follows;

$$MPCEF_{xst} = \alpha + \beta MPTCE_{st} + dt \text{ URBAN} + \epsilon_{st} \dots\dots\dots (1)$$

Where,

$PMCEF_{xst}$ = Monthly Per Capita Consumption Expenditure on food item x for state s.....n and for the year t.....m;

$MPTCE_{st}$ = Monthly Per Capita Total Consumption Expenditure for state s.....n and for the year t.....m. α , β and ϵ are the parameters of model.

$URBAN$ = binary dummy variable for the urban areas (1 for the rural and 0 for urban area)

The error ϵ_{st} is very important in this analysis. Assumptions about the error term determine whether we speak of fixed effects or random effects. In a fixed effect model, ϵ_{st} is assumed to vary non-stochastically over s or t making the fixed effect model analogous to a dummy variable model in one dimension. In a random effect model, ϵ_{st} is assumed to vary stochastically over s or t requiring special treatment of the error variance matrix.

Panel data analysis has three more-or-less independent approaches:

- 1) independently pooled panels;
- 2) random effects models;
- 3) fixed effects models or first differenced models.

Among the above models, which model is a better model for our data set is to be determined by using different statistical tests like Joint test, Breusch-Pagan test and Hausman test. The joint test is used for the selection between pooled OLS model and fixed effect model. The Breusch-Pagan test is used for the selection between pooled OLS model and random effects model and Hausman test used for selection between the fixed effects model and the random effects model.

The researcher has calculated the own price, cross and expenditure elasticities of selected food items for disaggregate class of families viz. families of very poor, poor, non poor and rich classes. The classification of these families is based on recent poverty line given by planning commission of India. Following criteria has adopted to define the various classes of families;

Very Poor : Monthly Per capita Consumption Expenditure (MPCE) is below 75% of the poverty line.

Poor : MPCE is between 75.0% of Poverty line to Poverty Line.

Non-Poor : MPCE is between Poverty Line and 150 of Poverty Line.

Rich : MPCE is more than 150 percent of Poverty Line.

After the calculation of monthly per capita consumption expenditure of selected food items and monthly per capita total consumption expenditure for different class of families, the whole data sets entered into the statistical computer software namely GRETL. After then, the selection of appropriate panel regression model and derived the expenditure elasticities.

6. Data

The data of monthly per capita consumption expenditure on selected food items by different expenditure classes for different states were available in 55th (1999-2000) and 61st (2004-2005) rounds. Hence, the researcher has been compiled the data from this rounds publication. Researcher has calculated the monthly per capita consumption expenditure on selected food items for the families in four group viz. 'Very-Poor', 'Poor', 'Non-Poor' and 'Rich' class families. The results of the panel regression approach are presented as follows;

7. Results and Discussion

7.1 Expenditure Elasticities of Selected Food Items for 'Very Poor' Families

Table 7.1 (a) : Selection of Panel Regression Model for Calculation of Expenditure Elasticities of Selected Food Items - 'Very Poor' Families

| Food Items | Joint Test (P value) | Breusch-Pagan test (P value) | Hausman test (P value) | Selection among the Fixed Effect/Random Effect/Pooled OLS methods |
|---------------------------------|----------------------|------------------------------|------------------------|---|
| Cereals | 0.000 | 0.000 | 0.931 | Random Effects |
| Pulses | 0.000 | 0.000 | 0.521 | Random Effects |
| Milk | 0.000 | 0.000 | 0.969 | Random Effects |
| Edible oil | 0.000 | 0.000 | 0.963 | Random Effects |
| Meat, Fish & Chicken | 0.000 | 0.000 | 0.688 | Random Effects |
| Vegetables | 0.000 | 0.000 | 0.494 | Random Effects |
| Sugar | 0.000 | 0.000 | 0.908 | Random Effects |
| Total Food | 0.000 | 0.003 | 0.436 | Random Effects |

Source : Estimated by Researcher

In the consumption basket of selected items, the random effects model has been found to be the best. Hence, the random effects model has been used for determining expenditure elasticities of these food items.

Table 7.2 (b) : Expenditure Elasticities of Selected Food Items in India ‘Very Poor’ Families

| Food Items | Intercept | Elasticity | Urban Dummy | R ² |
|----------------------|-----------|------------|-------------|----------------|
| Cereals | -0.19 | 0.78*** | 0.07** | N.A. |
| Pulses | -0.27 | 0.46*** | -0.02 | |
| Milk | -3.42** | 1.07*** | -0.16** | |
| Edible oil | -6.50*** | 1.59*** | 0.11** | |
| Meat, Fish & Chicken | -3.12 | 0.93* | -0.04 | |
| Vegetables | -3.12*** | 1.07*** | 0.06* | |
| Sugar | -2.29** | 0.74*** | -0.01 | |
| Total Food | 0.05 | 0.91*** | 0.03** | |

Source : Estimated by Researcher *** 0.01 Significance level, ** 0.05 Significance Level

*0.10 Significance Level N.A. - R² is not applicable as Random Effect is selected

The expenditure elasticities of milk, edible oil, and vegetables have been found to be greater than one (i.e. 1.07, 1.59 and 1.07 respectively), which implies that monthly per capita consumption expenditure of these food items is more responsive to the change in the monthly per capita consumption total consumption expenditure of the ‘very poor’ families. The expenditure elasticities of food items like cereals, pulses, meat, fish & chicken and sugar have been found to be less than one. Therefore, it can be concluded that these food items are basic necessities for the ‘very poor’ families. The lowest expenditure elasticity has been noted for pulses and the highest for edible oil.

The coefficients of urban dummy have been found to be statistically significant for cereals, milk, edible oil and total food. These coefficients are positive for cereals, vegetables and total food which imply that the rural people elasticities of these food items are higher than urban people. However for milk the coefficient of urban dummy is negative which shows that the elasticity of milk is higher for the urban people than the rural people.

7.2 Expenditure Elasticities of Selected Food Items for ‘Poor’ Families

Table 7.2 (a) : Selection of Panel Regression Model for Calculation of Expenditure Elasticities of Selected Food Items - ‘Poor’ Families

| Food Items | Joint Test (P value) | Breusch-Pagan test (P value) | Hausman test (P value) | Selection among the Fixed Effect/Random Effect/Pooled OLS methods |
|----------------------|----------------------|------------------------------|------------------------|---|
| Cereals | 0.000 | 0.000 | 0.339 | Random Effects |
| Pulses | 0.000 | 0.000 | 0.299 | Random Effects |
| Milk | 0.000 | 0.000 | 0.883 | Random Effects |
| Edible oil | 0.000 | 0.000 | 0.999 | Random Effects |
| Meat, Fish & Chicken | 0.000 | 0.000 | 0.120 | Random Effects |
| Vegetables | 0.000 | 0.000 | 0.914 | Random Effects |
| Sugar | 0.000 | 0.000 | 0.957 | Random Effects |
| Total Food | 0.000 | 0.000 | 0.987 | Random Effects |

Source : Estimated by Researcher

In the case of ‘poor’ families, the random effects model has been used for all food items on the basis of Hausman test.

Table 7.2 (b) : Expenditure Elasticity of Selected Food Items in India - 'Poor' Families

| Food Items | Intercept | Elasticity | Urban Dummy | R ² |
|----------------------|-----------|------------|-------------|----------------|
| Cereals | 1.01*** | 0.58*** | 0.03 | N.A. |
| Pulses | -3.74*** | 1.05*** | 0.01 | |
| Milk | -8.37*** | 1.87*** | -0.04 | |
| Edible oil | -6.67*** | 1.58*** | 0.29*** | |
| Meat, Fish & Chicken | -4.29*** | 1.18*** | -0.12* | |
| Vegetables | -2.91*** | 1.04*** | 0.09** | |
| Sugar | -4.99*** | 1.18*** | 0.11** | |
| Total Food | -0.47*** | 0.99*** | 0.07*** | |

Source : Estimated by Researcher *** 0.01 Significance level, ** 0.05 Significance Level
N.A. - R² is not applicable as Random Effect is selected

The results of random effects model applied for all food items for poor class families are given in the above table. The expenditure elasticities have been found to be greater than one for all food items excepting cereals. Therefore, it can be said that the poor class families have changed their monthly per capita consumption expenditure by more than one percent for all food items excepting cereals when the monthly per capita total consumption expenditure changed by one percent. The high expenditure elasticities of these food items show that 'poor' families are highly responsive to change in food consumption of these items when their total consumption expenditure increases. The expenditure elasticity of cereals reported to be 0.58. The lowest expenditure elasticity is 0.58 for cereals and the highest is 1.87 for Milk.

The coefficients of urban dummy have been found to be statistically significant for edible oil, vegetables, sugar and total food. These coefficients are positive which imply that the rural people elasticities of these food items are higher than urban people.

7.3 Expenditure Elasticities of Selected Food Items for 'Non-Poor' Families

Table 7.3 (a) : Selection of Panel Regression Model for Calculation of Expenditure Elasticities of Selected Food Items – 'Non-Poor' Families

| Food Items | Joint Test (P value) | Breusch-Pagan test (P value) | Hausman test (P value) | Selection among the Fixed Effect/Random Effect/Pooled OLS methods |
|----------------------|----------------------|------------------------------|------------------------|---|
| Cereals | 0.000 | 0.000 | 0.359 | Random Effects |
| Pulses | 0.000 | 0.000 | 0.997 | Random Effects |
| Milk | 0.000 | 0.000 | 0.990 | Random Effects |
| Edible oil | 0.000 | 0.000 | 0.070 | Random Effects |
| Meat, Fish & Chicken | 0.000 | 0.000 | 0.963 | Random Effects |
| Vegetables | 0.000 | 0.000 | 0.040 | Fixed Effects |
| Sugar | 0.000 | 0.000 | 0.615 | Random Effects |
| Total Food | 0.000 | 0.000 | 0.776 | Random Effects |

Source : Estimated by Researcher

On the basis of above table, the random effects model has been selected for all food items excepting vegetables for 'non-poor' families. However, the fixed effect model for vegetables is recommended by the test.

Table 7.3 (b) : Expenditure Elasticities of Selected Food Items in India ‘Non-Poor’ Families

| Food Items | Intercept | Elasticity | Urban Dummy | R ² |
|----------------------|-----------|------------|-------------|----------------|
| Cereals | 2.21*** | 0.38*** | 0.04 | N.A. |
| Pulses | -3.90*** | 1.06*** | 0.07 | |
| Milk | -7.60*** | 1.75*** | -0.02 | |
| Edible oil | -7.20*** | 1.62*** | 0.23*** | |
| Meat, Fish & Chicken | -4.27*** | 1.17*** | -0.08 | |
| Vegetables | -2.23*** | 0.92*** | 0.07** | 0.95 |
| Sugar | -3.11*** | 0.80*** | 0.11*** | N.A. |
| Total Food | 0.02 | 0.91*** | 0.07*** | |

Source : Estimated by Researcher *** 0.01 Significance level, ** 0.05 Significance Level
N.A. - R² is not applicable as Random Effect is selected

The expenditure elasticities of different food items like cereals, pulses, milk, edible oil, meat, fish & chicken, vegetables and sugar have been found to be 0.38, 1.06, 1.75, 1.62, 1.17, 0.92 and 0.80 respectively. So, the elasticities of milk, edible oil and meat, fish & chicken have been noted to be greater than one and for cereals, pulses, vegetables and sugar it is less than one. The expenditure elasticity has been found to be highest for milk and the lowest for cereals.

The coefficients of urban dummy have been found to be statistically significant for edible oil, vegetables, sugar and total food. These coefficients are positive which imply that the rural people elasticities of these food items are higher than urban people.

7.4 Expenditure Elasticities of Selected Food Items for ‘Rich’ Families

Table 7.4 (a) : Selection of Panel Regression Model for Calculation of Expenditure Elasticities of Selected Food Items- ‘Rich’ Families

| Food Items | Joint Test (P value) | Breusch-Pagan test (P value) | Hausman test (P value) | Fixed Effect/Random Effect/Pooled OLS |
|----------------------|----------------------|------------------------------|------------------------|---------------------------------------|
| Cereals | 0.000 | 0.000 | 0.050 | Fixed Effects |
| Pulses | 0.000 | 0.000 | 0.020 | Fixed Effects |
| Milk | 0.000 | 0.000 | 0.200 | Random Effects |
| Edible oil | 0.000 | 0.000 | 0.744 | Random Effects |
| Meat, fish & chicken | 0.000 | 0.000 | 0.989 | Random Effects |
| Vegetables | 0.000 | 0.000 | 0.963 | Random Effects |
| Sugar | 0.000 | 0.000 | 0.090 | Random Effects |
| Total Food | 0.000 | 0.000 | 0.001 | Fixed Effects |

Source : Estimated by Researcher

For the ‘rich’ families, the random effects model have been selected for the food items like milk, edible oil, meat, fish & chicken, vegetables and sugar and for the rest of food items the fixed effects model has been applied for deriving the expenditure elasticities.

Table 7.4 (b) : Expenditure Elasticities of Selected Food Items in India - 'Rich' Families

| Food Items | Intercept | Elasticity | Urban Dummy | R ² |
|----------------------|----------------|----------------|-----------------|----------------|
| Cereals | 6.02*** | -0.16** | -0.10*** | 0.88 |
| Pulses | 4.95*** | -0.23** | -0.29*** | 0.84 |
| Milk | 1.89** | 0.37*** | -0.30*** | N.A. |
| Edible oil | -3.35*** | 0.96*** | 0.16*** | |
| Meat, fish & chicken | 1.92** | 0.26** | -0.21*** | |
| Vegetables | 2.21*** | 0.27*** | -0.13*** | |
| Sugar | 0.45 | 0.32*** | 0.07 | |
| Total Food | 3.90*** | 0.34*** | -0.11*** | 0.95 |

Source : Estimated by Researcher *** 0.01 Significance level, ** 0.05 Significance Level
N.A. - R² is not applicable as Random Effect is selected

In the case of rich class families, the expenditure elasticities for cereals and pulses have been found to be negative (i.e. -0.16 and -0.23 respectively), which implies that with increase in total expenditure proportionate share on cereals and pulses has been declined. The expenditure elasticities of other all food items have been found to be less than one. Hence, it can be said that the food items like cereals and pulses are staple food items for richer families as well as other all food items are also less responsive to change in their income.

The coefficient of urban dummy has been found to be statistically significant for all food items excepting sugar. These coefficients are negative for food items like cereal, pulses, milk meat, fish & chicken and vegetables which imply that the elasticities of richer families of the rural area are lower than urban areas.

On the basis of above discussions it is concluded that the consumption of selected food items for families with lower income is greater influenced by random factors than families with higher income.

7.5 Comparison of Expenditure Elasticities of Selected Food Items for Different Class of Families

Table 7.5 : Comparison of Expenditure Elasticities of Selected Food Items for Different Classes of Families in India

| Food Items | Expenditure Elasticities | | | |
|----------------------|--------------------------|----------------|----------------|----------------|
| | 'Very Poor' | 'Poor' | 'Non-Poor' | 'Rich' |
| Cereals | 0.78*** | 0.58*** | 0.38*** | -0.16** |
| Pulses | 0.46*** | 1.05*** | 1.06*** | -0.23** |
| Milk | 1.07*** | 1.87*** | 1.75*** | 0.37*** |
| Edible oil | 1.59*** | 1.58*** | 1.62*** | 0.96*** |
| Meat, fish & chicken | 0.93** | 1.18*** | 1.17*** | 0.26** |
| Vegetables | 1.07*** | 1.04*** | 0.92*** | 0.27*** |
| Sugar | 0.74*** | 1.18*** | 0.80*** | 0.32*** |
| Total Food | 0.91*** | 0.99*** | 0.91*** | 0.34*** |

Source : Estimated by Researcher *** 0.01 Significance level, ** 0.05 Significance Level

N.A. - R² is not applicable as Random Effect is selected

On the basis of above table one can say that the expenditure elasticities of selected food commodities are positive and decline with increase in household income. The expenditure elasticities are much higher for poor households than for richer households. The consumption of food items like milk, edible oil, meat, fish & chicken and vegetables are highly responsive to change in the income of the 'very poor', 'poor' and 'non-poor' families. Therefore, when the income level of these families increases the demand for the food items like milk, edible oil, meat, fish & chicken and vegetables will increase at higher rate in future.

8. Conclusions

It has been concluded that the budget shares of cereals, pulses & pulses products, sugar, spices and for total food have considerably decreased for all classes of families during the period of 1999-00 to 2007-08. However the extent of decrease in budget share on cereals and pulses varied from high to low in the 'very poor', 'poor', 'non-poor' and 'rich' families respectively. On the other hand a budget share on vegetables has increased for 'very poor', 'poor' and 'non-poor' families. However in the case of 'rich' families, the budget share has increased for some items and decreased for other items, which means that the pattern is found to be complex.

It was observed that the random factors are affecting on the consumption expenditure on various food items by the all class of families. Hence in the majority cases, the expenditure elasticities of different food items have been derived by random effects model.

The expenditure elasticity of cereals and vegetables has been found to be varying between high to low values from the 'very poor' families to 'poor' families. In the case of 'rich' families expenditure elasticity of cereals is found to be negative which implies that with increase in the total expenditure, the rich families have decreased the share of cereal consumption. This share is increased by a greater proportion by 'very poor' families than 'poor' and 'non-poor' families which implies that with improvement of the economic condition of the people first of all they give higher priority to cereals than other food items. In the case of pulses, the expenditure elasticity is found to be varying between high to low values from 'non-poor' families to 'very poor' families. Like cereals, the expenditure elasticity of pulses is negative for 'rich' families.

The expenditure elasticity of milk is found to be greater than one excepting for the families of 'rich' class. Hence one can say that when income of these classes of families increases the consumption expenditure on milk also increases by a higher proportion. In the case of edible oil the expenditure elasticity is found to be greater than one for all classes of families.

The coefficients of urban dummy for different class of families implies that, the significant difference in the expenditure elasticities of cereals and milk exists only for two extreme class of families such as very poor and rich families of rural and urban areas. In the case of pulses, meat, fish & chicken only for the rich families of rural and urban area were found to be significant differed in term of expenditure elasticity. The coefficients of urban dummy for edible oil and total food were registered to be significant for all class of families. At last in the case of vegetables, the expenditure elasticity was found to be significant differed in rural and urban areas for the families of poor, non-poor and rich and for sugar it was significant differed for poor and non-poor families.

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