



Consumption Pattern and Elasticities of Demand of Major Food Items among Farm Households in Andhra Pradesh

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

We examined food consumption pattern of farm households in Andhra Pradesh. Income and price elasticities were also estimated for major food items using AIDS model. The Primary data were collected from 240 farm households spread over in different regions of Andhra Pradesh. The results revealed that monthly food expenditure for all the income groups was Rs.7450. The per centage of food expenditure was high for meat followed by pulses, cereals, vegetables, oil and fruits for all the income groups. The income elasticities of demand for major food items revealed that cereals had low elasticities for all the income groups when compared to elasticities of livestock and horticulture products such as milk, meat, fruits, vegetables etc. Crop diversification and milch animals rearing

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should be strengthened for regular income to the farm households which will reduce the food expenditure inequalities among farm households.

Keywords: Food consumption pattern; income elasticities; food expenditure; farm households.

1. INTRODUCTION

Food is the basic need and fundamental right of every human being [1]. Generally, the performance of an economy is measured in terms of the trends and pattern of macroeconomic variables which include consumption, national income, investment, saving and employment. Among these, food consumption and per-capita income are the indicators of human development, however food consumption is a better indicator of human welfare. Apart from rapid economic transformation there are substantial changes in the diet pattern also during the post-economic reforms period [2,3]. There was a shift in diet from food grains towards animal derived products in a study by Chatterjee et al.,[4]. Food consumption pattern of household is an important barometer of individual welfare and well-being in any region. The change in the consumption pattern of households was due to many factors like rise in income, change in the prices, increase of women percentage doing jobs, lifestyle changes, increasing level of wealth in the middle-income group, urbanisation, awareness of health, improved facilities in accessibility and availability of food than earlier etc. [5]. Of all the factors, rise in the household income and changes in prices of food will considerably change the food consumption pattern [6]. Hence, it is important to analyse the food consumption pattern and its response to changes in income and prices to estimate the future demand for food. Estimation of income and price elasticities also needed for the projection of demand for food items [7]. Very few studies have been done at micro level on food consumption pattern and demand for food of the combined Andhra Pradesh state. After bifurcation from Telangana state there are no studies regarding food consumption pattern in Andhra Pradesh as far as the authors knowledge. Therefore, an attempt has been made to study the food consumption pattern of farm households in Andhra Pradesh to collect research and evidence on the present scenario at micro level. The specific objectives of the study are, a) To study the food consumption pattern of the farm households and b) To estimate the income

elasticities and price elasticities of demand for major food items.

2. METHODOLOGY

2.1 Sample Selection

For the present study, multistage sampling technique was followed for selection of suitable sample. In the first stage, the three regions of Andhra Pradesh state viz., north coastal region, south coastal region and Rayalaseema region were considered for the study. Secondly, two districts from each region viz., Vishakapatnam district and Srikakulam district from North Coastal region, Krishna district and Prakasam district from South Coastal region, Chittoor district and Anantapur district from Rayalaseema region were selected based on the maximum and minimum per-capita income for the districts respectively from each zone as per the District Domestic Product of Andhra Pradesh. Based on the Mandal Domestic Product report of Andhra Pradesh, twelve mandals were selected i.e., two mandals from each district as per the highest and lowest per capita income. Twenty-four villages i.e., two villages from each mandal were selected randomly. Households from each village were selected randomly in proportion of total farm households from the selected villages for the study constituting 240 sample households. The sample farm households were post-stratified based on the annual income of households. By arranging the annual income of sample households in the ascending order, three income groups viz. low, middle and high income were defined. Out of the 240 households 41.25 per cent (99 households) constituted as low-income group (LIG), 30.42 per cent (73 households) as middle- income group (MIG) and the rest 28.33 per cent (68 households) were grouped under high-income group (HIG). The monthly household income of the LIG was \leq Rs.15000, Rs.15000-30000 for MIG and $>$ Rs.30000 for HIG. The data on quantity wise food consumed by sample farm households, prices of food items and expenditure on food items were collected from the sample respondents through a pre-tested questionnaire.

2.2 Data Analysis

Demand functions for food items were estimated by Almost Ideal Demand System (AIDS) and income elasticities were derived from them. The linear approximate AIDS model developed by Deaton and Muellbauer [8] was used as detailed below.

$$W_i = \alpha_i + \sum \gamma_{ij} \log(P_j) + \beta_i \log\left[\frac{X_i}{P}\right]$$

Where W_i is the dependent variable indicating expenditure share of the i^{th} commodity (Ex. cereals).

P_j (independent variable) is the price of each good j (Ex. pulses, fruits, vegetables, meat, edible oil) of AIDS model in the study.

X_i is the real expenditure of household.

P is the overall price index and it was approximated using Stone's index which is a log-linear analog of the Laspeyres price index in order to maintain the linear specification.

$\ln P = \sum w_i \ln P_i$, Where W_i is the mean of the expenditure share of the i^{th} commodity.

α_i is constant. The γ_{ij} parameters measure the change in the i^{th} commodity's budget share in response to a one per cent proportional change in the j^{th} commodity price with real income held constant. The β_i parameters, or the marginal budget shares, represent the change in the i^{th} commodity's budget share with respect to change in real income holding price constant.

The AIDS model satisfies the adding-up, homogeneity, and symmetry restrictions automatically. The adding-up requires $\sum \gamma_{ij} = 0$, $\sum \beta_i = 0$, homogeneity implies $\sum \gamma_{ij} = 0$ and symmetry implies $\gamma_{ij} = \gamma_{ji}$.

Following Chalfant [9], the income and price elasticities evaluated at the mean budget shares, will be derived from the parameters of the estimate equations using the formula:

$$\text{Expenditure elasticity: } \eta_i = 1 + [\beta_i / w_i]$$

$$\text{Own-price elasticity: } \xi_i = -1 - \beta_i - [\gamma_{ii} / w_i]$$

3. RESULTS AND DISCUSSION

3.1 Consumption Pattern of Major Food Items

The monthly per capita consumption of major food items in terms of physical quantities was

analysed and the results are presented in the Table 1.

The monthly per capita consumption of cereals was highest for HIG (14.44 kg) followed by LIG (13.50 kg) and MIG (12.76 kg). Rice was the most consumed cereal for all the income groups. For LIG group, per capita consumption of rice (10.68 kg) was followed by wheat (1.18 kg), *jowar* (0.96 kg), *ragi* (0.68 kg) etc. Similar pattern was observed in MIG group. For HIG group, per capita consumption of rice (10.52 kg) was followed by wheat (1.52 kg), *ragi* (0.98 kg), other millets (0.94 kg) and *jowar* (0.48 kg). The consumption of other millets was almost negligible for LIG and MIG groups.

The monthly per capita consumption of pulses was high for HIG (2.80 kg) followed by MIG (2.58 Kg) and LIG (2.46 Kg). For LIG, the per capita consumption of blackgram was 0.91 kg followed by redgram (0.65 kg), bengalgram (0.50 kg), greengram (0.25 kg), cowpea (0.15 kg), etc. For MIG the consumption of blackgram was 0.91 kg followed by redgram (0.62 kg), bengal gram (0.40 kg), greengram (0.36 kg) and cowpea (0.29 kg). For HIG, the per capita consumption of blackgram was 1.04 kg followed by redgram (0.85 kg), greengram (0.43 kg), bengalgram (0.33 kg) and cowpea (0.13 kg).

The monthly per capita consumption of meat was high for HIG (3.75 kg) followed by MIG (3.09 kg) and LIG (2.53 kg). The monthly per capita consumption of meat for all the sample households was 3.12 kg. Mutton comprised of major portion (41.30 per cent) followed by chicken (38.52 per cent) and fish (20.17 per cent) to the total per capita meat consumption of the sample households. The monthly per capita consumption of egg was 1.35 dozen in the for all the sample households. Per capita consumption of egg was high for HIG (1.61 dozen) followed by MIG (1.50 dozen) and LIG (0.95 dozen) revealing an increase of egg consumption than past times. The per capita consumption of spices and oil for all the households were 0.06 kg and 1.46 kg respectively. HIG had more consumption of oil and spices compared to MIG and LIG.

The per capita consumption of fruits and vegetables was high for HIG followed by MIG and LIG. The per capita consumption for fruits was 2.90 kg and for vegetables it was 3.49 kg for all the sample households. Per capita consumption of fruits was 1.71 kg for LIG, 2.45kg for MIG and 4.54 kg for HIG. The per capita

consumption levels of milk, beverages, sugar and convenience food were 2.69 L, 0.83 kg, 0.93 kg and 2.07 kg for the sample households. The consumption for all these food items was high for HIG followed by MIG and LIG.

Rice was the major cereal consumed by all the income groups. The per capita consumption of rice was highest for LIG and wheat consumption per capita was highest for HIG. As wheat is less in fat and rich in protein, the higher income households were in favour of wheat consumption. The per capita consumption of pulses which are good sources of protein was high for HIG indicating the nutrition consciousness of HIG households. The per capita consumption of meat, egg, oil, fruits, vegetables and processed food was high for HIG than MIG and LIG due to the lower levels of income for LIG and MIG. Low-income households will consume more of sugar sweetened beverages than fruits and vegetables leading to poor diet quality. The per capita consumption of spices was high for HIG as they eat more meat and meat products where cooking needs more spices. Milk was the essential commodity consumed by all the income groups as milch animals domestication is common in farm households. Beverages like tea was consumed by almost all sample households and also offered to labour engaged in agriculture to reduce tiredness of work.

3.2 Expenditure Pattern of Major Food Items

The outlay on food items will be dependent on income and varies accordingly as expenditure is the function of income. As revealed from Table 2, the total expenditure on food items for LIG, MIG and HIG was Rs.6247, Rs.7044 and Rs.9060 per month respectively. The total expenditure on cereals was almost similar for LIG and MIG as major of the quantity of rice in cereals was supplied by Public Distribution System (PDS) to LIG group. The total expenditure on pulses was Rs.1060, Rs.1235 and Rs.1423 per month for LIG, MIG and HIG respectively. The expenditure on milk for all the income groups was less when compared to the expenditure on other food items because majority of the farm households owned milch animals for their milk consumption. Egg and meat consumption was increased during Covid-19 pandemic as a measure for building immunity. The consumption expenditure on oil, egg, meat, fruits, vegetables and processed food was high for HIG.

The percentage of expenditure to total household food expenditure of major food items as presented in Table 2 revealed that major proportion of food expenditure was spent on meat by all the income groups. The share of expenditure on cereals was 14.50 per cent, 14.00 per cent and 14.37 per cent for LIG, MIG and HIG respectively. The share of expenditure on pulses among all food items was high for MIG (17.52 per cent) followed by LIG (16.97 per cent) and HIG (15.70 per cent). The share of expenditure on vegetables and fruits was high for HIG than LIG and MIG. The proportion of expenditure on milk and oil was almost equal for all income categories.

The expenditure on cereals showed wide variation among the income groups. This is due to distribution of rice through PDS for LIG and for some MIG. Therefore, cereal expenditure was high for HIG. Among pulses, redgram which is the cheap source of protein for LIG was also supplied by PDS. So, the expenditure on pulses was low for LIG. The proportion of expenditure on oil and spices by the income groups are almost similar as oil and spices were purchased from the market by all income groups. With increase in the income, consumption expenditure on fruits and vegetables was increased by realising their health benefits. The milk expenditure was almost similar for all income groups as majority have milch animals. As observed from Table 2, the proportion of expenditure was same for meat and meat products for all income groups with slight difference as meat was consumed on weekly basis by all the income groups. The proportion of expenditure of beverages was high for HIG as they buy more branded products compared to LIG and MIG who rely on cheap or loose basis. The convenience food expenditure share was low for HIG as they are aware of unhealthy ready to eat/drink food items.

3.3 Income Elasticities of Major Food Items

Monthly household expenditure data was taken as proxy for income in the AIDS model. The income elasticities of demand for major food items are presented in the Table 3. The income elasticities for cereals were 0.541, 0.421 and 0.296 respectively for LIG, MIG and HIG. The rice being the staple food in the state of Andhra Pradesh is supplied at free of cost for majority of LIG farm households. The income elasticity for cereals decreased with increase in income

Table 1. Monthly per capita consumption of major food items by households (Kg/person/household)

Food Item	LIG		MIG		HIG		Overall	
	Qty (Kg)	Per cent to total	Qty (Kg)	Per cent to total	Qty (Kg)	Per cent to total	Qty (Kg)	Per cent to total
Rice	10.68	78.99	9.80	76.70	10.52	72.80	10.33	76.09
Ragi	0.68	5.05	0.71	5.58	0.98	6.80	0.79	5.84
Wheat	1.18	8.77	1.4	10.95	1.52	10.54	1.37	10.08
Jowar	0.96	7.12	0.84	6.62	0.48	3.34	0.76	5.62
Other Millets	0.006	0.04	0.016	0.13	0.94	6.50	0.32	2.35
A) Cereals	13.50	100	12.76	100	14.44	100	13.57	100
Redgram	0.65	26.48	0.62	23.87	0.85	30.52	0.71	27.13
Greengram	0.25	10.27	0.36	14.12	0.43	15.55	0.35	13.37
Cowpea	0.15	6.08	0.29	11.42	0.13	4.86	0.19	7.38
Bengalgram	0.50	20.27	0.40	15.40	0.33	11.99	0.41	15.66
Blackgram	0.91	36.89	0.91	35.17	1.04	37.05	0.95	36.43
B) Pulses	2.46	100	2.58	100	2.80	100	2.61	100
Chicken	0.99	39.21	1.25	40.47	1.36	36.41	1.20	38.52
Fish	0.50	19.73	0.59	19.16	0.80	21.40	0.63	20.17
Mutton	1.04	41.05	1.25	40.36	1.58	42.18	1.29	41.30
C) Meat	2.53	100	3.09	100	3.75	100	3.12	100
D) Egg (in dozens)	0.95	100	1.5	100	1.61	100	1.35	100
E) Spices	0.05	100	0.04	100	0.08	100	0.06	100
F) Oil	1.41	100	1.44	100	1.52	100	1.46	100
G) Fruits	1.71	100	2.45	100	4.54	100	2.90	100
H) Vegetables	2.78	100	3.51	100	4.20	100	3.49	100
I) Milk (In Lit)	2.01	100	2.89	100	3.17	100	2.69	100
Tea	0.36	91.66	0.71	75.17	0.78	67.82	0.62	74.40
Coffee	0.03	8.33	0.23	24.82	0.37	32.17	0.21	25.60
J) Beverages	0.4	100	0.95	100	1.15	100	0.83	100
K) Sugar	0.71	100	1.05	100	1.03	100	0.93	100
L) Processed Food	0.81	100	1.27	100	2.07	100	1.38	100

Source: Collected and analysed data by the first author

Table 2. Monthly consumption expenditure on major food items by households (in Rs/household)

Food Item	LIG	MIG	HIG	Overall
Cereals	906 (14.50)	986 (14.00)	1302 (14.37)	1065 (14.29)
Pulses	1060 (16.97)	1235 (17.52)	1423 (15.70)	1239 (16.63)
Egg	127(2.02)	154 (2.18)	204 (2.25)	161 (2.16)
Oil	680 (10.88)	754 (10.69)	1051 (11.60)	828 (11.11)
Milk	425 (6.80)	445 (6.27)	434 (4.79)	435(5.82)
Meat	1362 (21.81)	1534 (21.77)	1900 (21.97)	1599 (21.46)
Fruits	644(10.31)	663 (9.41)	864.5 (9.54)	724 (9.71)
Vegetables	717(11.48)	805 (11.43)	1244 (13.73)	922 (12.37)
Spices	100(1.60)	110 (1.56)	126(1.39)	112(1.50)
Sugar	57(0.90)	60 (0.85)	35 (0.38)	50.58(0.67)
Processed Food	74.33(1.18)	85 (1.21)	100 (1.10)	86.5 (1.16)
Beverages	92.5(1.48)	215.5(3.05)	375 (4.13)	228 (3.05)
Total	6247(100)	7044 (100)	9060 (100)	7450 (100)

Source: Collected and analysed data by the first author

Note: Figures in parentheses indicate percentage to respective total

supporting the Engel's theory of less demand for necessary goods at higher income levels. The pulses were income inelastic for all economic groups. The income elasticity of oil was high for LIG followed by MIG and HIG. For one per cent increase in the income, the expenditure of oil was increased by 0.96 per cent for LIG. The results inferred that HIG households were more health conscious in oil utilisation. The income elasticities for milk were elastic for LIG and inelastic for MIG and HIG. As the income increases the demand for milk increased indicating that milk is luxury food for LIG group. The income elasticities for sugar were high for LIG and MIG than HIG. Sugar obtained from PDS was sufficient for LIG so the income elasticity for sugar was highly inelastic for LIG households.

The income elasticity for meat was high for LIG followed by MIG and HIG. With increase in income the expenditure on meat was increased

for LIG and MIG. The elasticities of fruits were inelastic for all the income groups indicating the importance in fruit consumption with increase in awareness of health benefits of fruits consumption in all three groups of households. The elasticity of vegetables was high for HIG than MIG and LIG inferring the importance given to vegetables in daily diet with increase in income. For LIG, all the major food items were normal goods except milk and meat and for MIG, meat is the luxury good.

3.4 Price Elasticities of Demand for Major Food Items

The own price elasticities for food items of different income groups are presented in Table 4. It is evident from the table that the own price elasticities for all the food items under study were negative which are in conformity with the basic principles of the theory of demand i.e., increase

Table 3. Income (expenditure) elasticities of demand for major food items

Food Item	LIG	MIG	HIG
Cereals	0.541	0.421	0.296
Pulses	0.839	0.791	0.652
Oil	0.962	0.824	0.795
Milk	1.432	0.937	0.650
Sugar	0.502	0.374	0.125
Meat and meat products	1.324	1.564	0.951
Fruits	0.732	0.765	0.817
Vegetables	0.695	0.739	0.813

Source: Collected and analysed data by the first author

Table 4. Price elasticities of demand for major food items

Food Item	LIG	MIG	HIG
Cereals	-0.7433	-0.6145	-0.4314
Pulses	-0.8560	-0.7748	-0.5432
Oil	-1.0966	-0.5602	-0.6810
Milk	-0.2688	-0.1875	0.1325
Sugar	-1.1746	-0.2612	-1.0269
Meat and Meat products	-1.0928	-1.1087	-1.1338
Fruits	-0.4499	-0.4936	-1.2054
Vegetables	-0.7271	-1.0245	-1.4103

Source: Collected and analysed data by the first author

in price indices have inverse impact on quantities demanded. Cereals, pulses, fruits, vegetables, and milk price elasticities were less than unity, while oil, sugar, meat had price elasticities exceeding unity for LIG. For MIG, except meat and vegetables the price elasticities of all other food items had less than unity. For HIG price elasticities of sugar, meat, fruits and vegetables were more than unity. The price elasticity of cereals was highest for LIG than HIG and MIG as the price decreases the demand for cereals was increased in LIG. The price elasticity of pulses was high for LIG showing that LIG had real price effect when there is change in the prices of pulses.

4. CONCLUSION

The analysis of expenditure pattern on major food items in Andhra Pradesh state revealed that as household income increased, expenditure on food items was decreased. The income elasticities of all the food items revealed that all are normal goods except milk and meat for LIG, meat for MIG. The price elasticities of all food items were negative except for milk indicating in HIG remaining inelastic to change in the price. Majority of the sample farm households belong to low-income group due to low economic status. The government should effectively implement the schemes which enhance their economic condition for improving their standards of consumption.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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