Original Research Article

CONSUMPTIONPATTERN AND INCOME ELASTICITY OF DEMAND OF MAJOR FOOD ITEMS AMONG FARM HOUSEHOLDS IN ANDHRA PRADESH

ABSTRACT

~~The study aimed to~~We examined food consumption pattern of farm households in Andhra Pradesh.Income 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 thataverage household monthly food expenditure 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. Theincomeelasticities of demand formajor food items were greater than one except for sugar in LIG indicating its inelastic behaviour.

Keywords: Food Consumption pattern, income elasticities, food expenditure, farm households.

Introduction

Food is the basic need and fundamental right of every human being. Food consumption isreferred as the quality and quantity of food intake by theindividual family members or households. Generally, the performanceof 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 (Nasurudeen *et al.*, 2006 and Shah *et a1*., 2017).There was a shift in diet towards food and animal products from food grains in a study ~~conducted~~ by Chatterjee *et al., 2006*. The changein the consumption pattern 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 than earlier etc.Of all the factors, household income and prices of foodwere major drives in changing the consumption pattern.Ensuring a balance between the demand and supply of food is one of the important tasks of government in a developing economy. Demand for food is expected to increase with rise in income/population. The data on present and future demand patterns and

Comment [SF1]: reference

Comment [SF2]: source

Comment [SF3]: This macroeconomic term of consumption is not necessary food. Besides, your study is microeconomic focused- households. So why not focus on micro-context rather than juxtaposing micro on macro

Comment [SF4]: Shift from what?

Comment [SF5]: Were subjects farming households or where was the study?

Comment [SF6]: ??

Comment [SF7]: Source

the changes according to income and prices is needed to assess the impact of any economic policies, infrastructure development and changes in technology. For the projection of demand for food items, the estimation of income and price elasticities also needed (Salazar *et al*.,2005). Therefore, an attempt has been made to study the food consumption pattern of farm households in Andhra Pradesh.The specific objectives of the study are, a)To study the food consumption pattern of the farm households and b)To estimate the incomeelasticities and price elasticities of demand for major food items.

Methodology

Sample selection

Multistagesampling technique was followed for selection of suitable sample for the present study.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. Two districts were selected from each region based on the highest per-capita income of the districts according to theDistrict Domestic Product published by Directorate of Economics and Statistics of Andhra Pradesh. Two mandalsfrom each district were selected based on highest per capita income of mandals according to Mandal Domestic Product. Two villages were selected from each of the selectedmandals based on the revenue of villages and households from each village were selected randomly based on proportionate to size constituting a total of 240 households.The selected households were post stratified into three groups based on the income of household i.e., low-income group (LIG) whose monthly income was less than or equal to Rs.15000, middle-income group (MIG) whose monthly income was in between Rs.15000 and Rs.30000 and high-income group (HIG) whose monthly income was more than Rs.30000. 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.

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 Muellbauerwas used as detailed below.

$$Wi = \alpha_i + \Sigma\, \gamma_{ij} \log (P_j) + \beta_i \log [\frac{Xi}{P}]$$

Comment [SF8]: You have shown no need for such research.

You stated throughout your introduction that food consumption changes are driven by multiple covariates. Which of the covariates you stated is at play in A. Pradesh that warrants readership attention?

In other words, what is the problem about current or ongoing food consumption pattern and food demand that is worthy of study?

Comment [SF9]: The paper is full of passive sentences. Write active sentences

Comment [SF10]: There is a selection bias in this sampling approach you used. So you purposively stratified the districts based on income per-capita. So already. So, all things remaining constant, households in the selected district are self-identified as high income. How then do you now classify the high income group into low-income, middle-income, etc. By choosing to select only high income regions, you bias your sample selection.

Comment [SF11]: The AIDS model has several weaknesses which biases the parameter estimates (see Lewbel and Pendakur (2009); Hovhannisyan et al. 2020). The preferred approach is to use the EASI or GEASI approach (see Lewbel and Pendakur (2009);Hovhannisyan et al. 2020, etc). The EASI/GEASI model offers four major advantages over the LA/Q-AIDS model: First, EASI budget shares are linear in parameters, conditional on real expenditures. Second, EASI demands are not constrained by the theoretic rank limit of Gorman. Third, unobserved preferences heterogeneity are taken into account via EASI error terms, which are equivalent to random utility parameters. Fourth,, EASI demands can be polynomials or splines of any order. The GEASI model also has added advantage of being able to account for pre-committed demand and unobserved preferences.

Where Wi 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.

α_i is constant. The γij 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 βi 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.

Results and Discussion

Consumption pattern of Major Food Items

Themonthly per capitaconsumption of selected food items in terms of physical quantities and expenditure in monetary terms of food items was analysed and the resultsare presented in the Table 1.

The monthly consumption of cereals was highest for HIG (43.35 kg) followed by LIG (40.56 kg) and MIG (38.34 kg). The examination of individual grain composition of all cereals revealed that rice was the most consumed cereal for all the categories of farmers with more than 75 per cent of total consumption of cereals. For LIG group, consumption of rice (78.99 per cent) was followed by wheat (8.77 per cent), *jowar* (7.12 per cent), *ragi* (5.05 per cent), ~~etc.~~ Similar pattern was observed in MIG group. For HIG group, rice (72.80 per cent) consumption was followed by wheat (10.54 per cent), *ragi* (6.80 per cent), other millets (6.50 per cent) and *jowar* (3.34 per cent). The consumption of other millets was almost negligible for LIG and MIG groups.

The average monthly household consumption of pulses in the state was 7.85 kg. The pulses consumption was high for HIG (8.42 kg) followed by MIG (7.79 Kg) and LIG (7.40 Kg). Blackgram (36.43 per cent), redgram (27.13 per cent) and bengalgram (15.66 per cent) were found to be the major consumed pulses. For LIG, the consumption of blackgram was 2.73 kg followed by redgram (1.96 kg), bengalgram (1.50 kg), greengram (0.76 kg), cowpea (0.45 kg), etc. For MIG the consumption of blackgram was 2.74 kg followed by redgram (1.86 kg), bengal gram (1.20 kg), greengram (1.10 kg) and cowpea (0.89 kg). For HIG, the consumption

Comment [SF12]: What does this mean? Consumption per capita or total consumption or what?

Comment [SF13]: Unclear, rewrite

Comment [SF14]: Not clear. % of the food consumed or % of the population of income group?

Comment [SF15]: What is the sub-sample in each of the groups?

Comment [SF16]: How did you get the state results? Or the 240 farmers in high-income districts reflects the entire state? Refer to comment on selection bias.

of blackgram was 3.12 kg followed by redgram(2.57 kg), greengram(1.31 kg), bengalgram(1.01 kg) and cowpea(0.41 kg).

The average monthly household consumption of meat was 9.37 kg in the Andhra Pradesh.HIG consumption of meat was high (11.26 kg) followed by MIG (9.29 kg) and LIG (7.60 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 meat consumption of the sample households. The average monthly household consumption of egg was 4.06 kg in the region. Egg consumption was high for HIG (4.85 dozen) followed by MIG (4.50 dozen) and LIG (2.85 dozen) revealing an increase of egg consumption than past times. The average consumption of spices and oil were 0.18 kg and 4.38 kg respectively. HIG had more consumption of oil and spices compared to MIG and LIG.

Comment [SF17]: See comments above

The consumption of fruits and vegetables was high for HIG followed by MIG and LIG. The average consumption for fruits was 2.90 kg and for vegetables it was 10.50 kg. Fruits consumption was 1.71 kg for LIG, 2.45kg for MIG and 4.54 kg for HIG. The average monthly household consumption levels of milk, beverages, sugar and convenience food were 8.08L, 2.50 kg, 2.80 kg and 4.16 kg in the state. 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 consumption of rice was highest for LIG and wheat consumption 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 consumption of pulses which are good sources of protein was high for HIG indicating the nutrition consciousness of HIG households. The 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 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 wasconsumed by almost all sample households and also offered to labour engaged in agriculture to reduce tiredness of work.

Table 1.Household Consumption Pattern of Major Food Items (Kg/Month)

Comment [SF18]: Household total consumption or consumption per capita?

Format table

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	32.04	78.99	29.41	76.70	31.56	72.80	31.00	76.09
Ragi	2.05	5.05	2.14	5.58	2.95	6.80	2.38	5.84
Wheat	3.56	8.77	4.20	10.95	4.57	10.54	4.11	10.08
Jowar	2.89	7.12	2.54	6.62	1.45	3.34	2.29	5.62
Other Millets	0.02	0.04	0.05	0.13	2.82	6.50	0.96	2.35
A) Cereals	40.56	100	38.34	100	43.35	100	40.74	100
Redgram	1.96	26.48	1.86	23.87	2.57	30.52	2.13	27.13
Greengram	0.76	10.27	1.10	14.12	1.31	15.55	1.05	13.37
Cowpea	0.45	6.08	0.89	11.42	0.41	4.86	0.58	7.38
Bengalgram	1.50	20.27	1.20	15.40	1.01	11.99	1.23	15.66
Blackgram	2.73	36.89	2.74	35.17	3.12	37.05	2.86	36.43
B) Pulses	7.40	100	7.79	100	8.42	100	7.85	100
Chicken	2.98	39.21	3.76	40.47	4.10	36.41	3.61	38.52
Fish	1.50	19.73	1.78	19.16	2.41	21.40	1.89	20.17
Mutton	3.12	41.05	3.75	40.36	4.75	42.18	3.87	41.30
C) Meat	7.60	100	9.29	100	11.26	100	9.37	100
D) Egg (in dozens)	2.85	100	4.5	100	4.85	100	4.06	100
E) Spices	0.01	100	0.04	100	0.5	100	0.18	100
F) Oil	4.25	100	4.33	100	4.57	100	4.38	100
G) Fruits	1.71	100	2.45	100	4.54	100	2.90	100
H) Vegetables	8.36	100	10.55	100	12.60	100	10.50	100
I) Milk (In Lit)	6.04	100	8.68	100	9.53	100	8.08	100
Tea	1.10	91.66	2.15	75.17	2.34	67.82	1.86	74.40
Coffee	0.1	8.33	0.71	24.82	1.11	32.17	0.64	25.60
J) Beverages	1.2	100	2.86	100	3.45	100	2.50	100
K) Sugar	2.14	100	3.17	100	3.10	100	2.80	100
L)Processed Food	2.45	100	3.82	100	6.22	100	4.16	100

Source: Collected and analysed data by the first author

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 absolute consumption expenditure of food items for LIG, MIG and HIG was Rs.74959, Rs.84527 and Rs.108717 respectively. The overall average food expenditure was Rs.89402. The 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 expenditure on pulses was Rs.12726, Rs.14816 and Rs.17076 per annum for LIG, MIG and HIG respectively. The expenditure on milk was less compared to the expenditure on other food itemsbecause 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.

Comment [SF19]: What is absolute expenditure?

Comment [SF20]: Average expenditure over what? Household average or per capita?

Thepercentage of expenditureto 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 cereals was 14.50 per cent, 14.00 per cent and 14.37 per cent for LIG, MIG and HIG respectively. The share of 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 pulsesredgram 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.Demand for fruits and vegetables was high with increased income due to their health benefits. Majority of LIG and MIG households rely on vegetables and some fruits they grown or locally available in farms as a supplement to the quantity they bought from the market. The milk expenditure was almost similar for all income groups as majority have milch animals. As observed fromTable 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.

Table 2. Expenditure Pattern of Farmers on Major Food Items (in Rs/year)

Comment [SF21]: Expenditure per capita or total expenditure or what?

Food Item	LIG	MIG	HIG	Overall
Cereals	10871 (14.50)	11837 (14.00)	15629 (14.37)	12779 (14.29)
Pulses	12726 (16.97)	14816 (17.52)	17076 (15.70)	14873 (16.63)
Egg	1519 (2.02)	1844 (2.18)	2447 (2.25)	1937 (2.16)
Oil	8160 (10.88)	9044 (10.69)	12618 (11.60)	9941 (11.11)
Milk	5102(6.80)	5303 (6.27)	5209 (4.79)	5205 (5.82)
Meat	16351 (21.81)	18408 (21.77)	22800 (21.97)	19189 (21.46)
Fruits	7732 (10.31)	7956 (9.41)	10374 (9.54)	8688 (9.71)
Vegetables	8606 (11.48)	9662 (11.43)	14930 (13.73)	11066 (12.37)
Spices	1200 (1.60)	1326 (1.56)	1512 (1.39)	1346 (1.50)
Sugar	680 (0.90)	720 (0.85)	422 (0.38)	607 (0.67)
Processed Food	892 (1.18)	1025 (1.21)	1200 (1.10)	1039 (1.16)
Beverages	1110 (1.48)	2586 (3.05)	4500 (4.13)	2732 (3.05)
Total	74959 (100)	84527 (100)	108717 (100)	89402 (100)

Source: Collected and analysed data by the first author
Note: Figures in parentheses indicate percentage to respective total

Income Elasticities of Major Food Items

The income elasticities of demand for major food items are presented in the Table 3. The income elasticities for cereals were 1.0168,1.0154 and 1.0127 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 supporting the Engel'stheory of less demand for necessary goods at higher income levels. The pulses were income elastic for all economic groups. The income elasticity of oil was high for MIG followed by HIG and LIG. For one per cent increase in the income, the elasticity of oil was increased by 1.66 per cent (>1 per cent) for MIG.The results inferred that HIG households were more health conscious in oil utilisation while LIG were affected by the rise in oil prices.The income elasticities for milk were elastic for all economic groups. As the income increases the demand for milk increased indicating that milk is essential food for all groups. The income elasticities for sugar were high for MIG and HIG then LIG. Sugar obtained from PDS was sufficient for LIG so the income elasticity for sugar was inelastic for LIG households.

The income elasticity for meat was high for HIG followed by MIG and LIG. With increase in income the expenditure on meat was increased. The elasticities of fruits were elastic for all the economic groups indicating the increase 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.

Table 3. IncomeElasticitiesof Demand for Major Food Items

Food Item	LIG	MIG	HIG
Cereals	1.0168	1.0154	1.0127
Pulses	1.2686	1.2482	1.0254
Oil	1.0242	1.6607	1.0684
Milk	1.0027	1.0288	1.0015
Sugar	0.9945	1.2413	1.1168
Meat and meat	1.0289	1.0208	1.2854

Comment [SF22]: What does the Engel's theory state with respect to income and food, and what does income elasticity >1 mean? This interpretation is incorrect.

Comment [SF23]: What does this mean in food policy or demand economics sense? It means that a percent change in income will increase the demand for the product by 1.66 percent--- which shows it's a luxury good and income elastic. Is there any support that cereals are luxury goods and income elastic in India or A. Pradesh? I am certain these foods are base diets.

Comment [SF24]: How did you arrive at these estimates from your model?

Comment [SF25]: All food these food items in the study area are luxury goods?

products			
Fruits	1.0854	1.1245	1.1354
Vegetables	1.0745	1.2583	1.6175

Source: Collected and analysed data by the first author

Price Elasticities of Demand for Major Food Items

The own price elasticities for food items of different income groups are presented in Table4. 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 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 hadprice 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. Theprice elasticityof pulseswas high for LIG showingthat LIG had real price effect when there is change in the prices of pulses.

Table 4. Price Elasticities of Demand for Major Food Items

FoodItem	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	-0.9875	0.1325
Sugar	-1.1746	-0.2612	-1.0269
Meatand 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

Comment [SF26]: Where are the cross-price elasticities?

Comment [SF27]: What does this mean?

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 as expected. The income elasticities of all the food items were more than one except sugar in LIG. The price elasticities of all food items were negative except for milk in HIG.

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