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DETERMINANTS OF NUTRITIONAL STATUS - AN ECONOMIC ANALYSIS

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ABSTRACT
The study examined the determinants of calorie consumption pattern across different occupational groups in rural areas of Erode District of Tamil Nadu. Based on proportionate random sampling procedure, households representing farmers, agricultural laborers and other occupational groups were selected. The respondents were enquired about their general description of the family, income particulars, expenditure and consumption pattern. In order to find out the determinants of calorie availability, Two Stage Least Square estimate was used separately for all occupational groups. In the first stage income was taken as dependent variable, and in the second stage, calorie availability was the dependent variable and income entered as an independent variable from the first stage. The Two Stage Least Square estimates concluded that in all the occupational groups, the important variables, which determined the calorie availability, were food expenditure, education of the housewife, income and consumption unit.

KEY WORDS : Calorie availability- 2 Stage Least Square – Food Expenditure - Income – Education - Consumption Unit.

INTRODUCTION

Life cannot be sustained without adequate nourishment. Man needs adequate food to lead an active and healthy life. Satisfaction of hunger is usually the primary criteria for adequate food intake. However, satisfaction of hunger itself is not a safe guide for the selection of proper foods. For sustaining healthy and active life, diet should be planned on sound nutritional principles. At the time of independence; India confronted two major problems in the food front. One was the threat of famine and starvation due to low agricultural production and the lack of an appropriate food distribution and the other was chronic energy deficiency due to prevalence of infection. (Rajagopalan, 2003) The first three five year plans assured that economic growth would alleviate poverty and under nutrition. However, the benefits of development did not percolate to the poor, so in the fourth five-year plan, intervention programmes were developed to improve the nutritional status of vulnerable groups (mother and child). The fifth five-year plan implemented a cohesive "Minimum Needs Programme" covering education, water supply, health, sanitation and nutrition for the vulnerable section. The centrally sponsored Integrated Child Development Services Scheme (ICDS) for all state was developed as a National Programme addressing issues related to child development and nutrition. During the last few years, the Government of India as well as some state governments has initiated many programmes like Sampoorn Gramin Rozgar Yozana, Annapoorna, Antyodaya Anna Yojana, and Universal Noon-Meal Programme to improve the nutrition status of the poor people. Yet India faces several challenges in eliminating food and nutrition insecurity. It is a dire necessity to increase the nutrient intake of the vast majority of poor population and vulnerable sections of the society as part of the National Policy towards food security. Occupation of an individual plays an important role in calorie intake as the calorie requirement differs according to nature of work performed. Further level of income being an important determinant for intake of calories, the response of nutrient intake to changes in income is also expected to differ across different occupation groups. The estimates of determinants across different occupational groups are expected to provide valuable information for improving food and nutrition security in India.

MATERIALS & METHODS

Sampling Design

The study was taken with the objective of estimating the nutritional status of different occupational groups in a rural area. Such an attempt requires an area having all occupational groups viz., farmers, agricultural labourers and other occupational groups. Gobichettipalayam block in Erode district of Tamil Nadu has been selected for the study, because it has all the above said occupational groups. The block comprises of 32 revenue villages. Based on the total number of households, villages were first arranged in descending order. Then two villages in the top of the order, one in the middle and two in the bottom were selected so as to give equal representation to all the villages. Thus totally five villages were selected.
Households were stratified based on the occupation viz., farmer, agricultural laborer and others. Other occupational group comprises of government employees, businesspersons, weavers, watchman, building contractors, artisans, mill workers, those worked in

workshops, barbers, washer men, etc. Total sample size was fixed as 180 with 60 in each occupational group. This total size in each group was allocated among the villages based on proportional random sampling. To fulfill the objectives, the respondents were enquired about family particulars, asset position of the family, employment details and income sources. Regarding consumption aspects, those items which are consumed regularly in daily diet were recorded either on monthly or annual basis. In case of purchased items, actual quantities purchased from retail as well as from Public Distribution System were recorded. In respect of homegrown items, especially for farming group, the quantities were recorded in local weights and measurements and then converted into metric units.

Analytical Framework

The data were analysed for different occupational group. The calorie availability was used as an indicator of nutritional status (Haddad and Kennedy 1994) and as per the Planning Commission norms of India, 2400 calories per person per day for rural areas was taken into account for the study. In order to find out the total available calories, the quantity of each item consumed was multiplied with the nutrition content of the respective food commodity and finally all the values were summed up (Gopalan,1993). To overcome the age and sex difference, individuals constituting the family were converted into consumption unit and then per consumption unit per day was calculated. In the present study, Lusk coefficients were used for standardization of household into consumption units (Rao 1983).

Two stage least squares (2SLS).

The study was aimed to estimate the relationship between calorie availability and income. Each of these variables depended on different independent variables and also there was an influence between the two dependent variables. Ordinary regression cannot be a best fit for these types of equations. Hence it was decided to use 2 SLS, in which the above conditions were satisfied. In order to find out the determinants of calorie availability 2SLS analysis was used. It uses the information available from the specification of an equation system to obtain a unique estimate for each structural parameter. Intuitively, the first stage of 2SLS involves the creation of an instrument while the second stage involves a variant of instrumental variable estimation. In the present study the cross sectional data collected from the sample respondents were subjected to 2SLS analysis and separate analysis were run for different occupational groups. Information collected on income, calorie availability, educational status, expenditure pattern, networth, size of holding, number of milch animals, number of earners, household size and lusk coefficient were used as variables.

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a) Two Stage Estimation for Farmers

$YPC^* = b0 + b_1 OWNAR + b_3 NETWTH + b_4 MLA + b_5 HHTOT + b_5 HED$

$CALA = b0 + b_1 YPC^* + b_2 FEPC + b_3 CU + b_4 WED$

b) Two Stage Estimation for Agricultural labourers

$YPC^* = b0 + b_1 ER + b_2 NETWTH + b_3 HHTOT + b_4 HED$

$CALA = b0 + b_1 YPC^* + b_2 FEPC + b_3 CU + b_4 WED$

c) Two Stage Estimation for other Occupational groups

$YPC^* = b0 + b_1 ER + b_2 NETWTH + b_3 HHTOT + b_4 HED + b_5 WED$

$CALA = b0 + b_1 YPC^* + b_2 FEPC + b_3 CU + b_4 WED + b_5 H$

The definition of the variables are given below

YPC	-	Per capita income per month, which enters as an independent variable in the second stage
OWNAR	-	Size of the land holding
NETWTH	-	Value of all assets
MLA	-	No of milch animals
HHTOT	-	Household total size
ER	-	No of Earners in the household
HED	-	Level of Education of the head. It takes the value 0 for
	-	illiterates, 1 for primary, 2 for secondary and 3 graduation.
CALA	-	Calorie availability per capita per day
FEPC	-	Households food expenditure per capita per month.
CU	-	Consumption Unit of the household
WED	-	Education of the Housewife.

RESULTS AND DISCUSSION

The analysis of calorie availability for each occupational group reveals that the average per consumption unit per day calorie availability of farmers was found to be 2476 Kcal. This was comparatively higher than the recommended level of 2400 Kcal for rural areas. The average calorie availability for an agricultural labourer was estimated as 2420 Kcal and for others it was 2251 Kcal. Calorie availability for each occupation group was determined by various factors. Inorder to find out the determinants of calorie availability 2 Stage Least Square estimation was used.

1. Determinants of Nutritional status of Farmers

The results of the First Stage of Two Stage Least Squares Estimates for farmer's category where the income was taken as dependent variable is presented in the Table 1. It could be seen from the table that the estimated R square value of the analysis was 0.91, which meant about 91 per cent of the variation in the dependent variable could be explained by the given independent variables. The results of the analysis showed that the variables size of the farm, number of earners, number of milch animals and education of the head of the household were statistically significant at one- percent and five per cent level respectively and had the expected positive influence over the income. Only the variable, household size, showed a negative relation with income, i.e. one additional person in the family would reduce the household income by Rs. 34.40 (because as the household size increased then the per capita income decreased.)

The coefficient values for the other independent variables can be interpreted as follows. One acre increase in size of the farming will increase the income by Rs. 361.90. Similarly one member increase in number of earners will increase the income by Rs. 418.10 and one unit increase in number of milch animals will increase the income by Rs. 115.60.Thus from the results of the analysis it was evident that educated farmers because of their scientific knowledge and contact with agricultural extension service increased their income compared to other farmers. Likewise, livestock also played a major role in increasing farmers income.

TABLE 1: First Stage Estimation of Two -Stage Least Squares of Farmers

Y: Income

S.No	Variables	Coefficient	Standard Error	Probability Value	t value
1.	Constant	-358.80	133.40	0.007	-2.68
2.	Size of the farm	361.90***	49.20	0.000	7.35
3.	No of Earners	418.10***	59.10	0.000	7.07
4.	Networth	0.81	0.50	0.611	0.50
5.	No of milch animals	115.60**	39.10	0.003	2.95
6.	Household size	-34.40	23.80	0.148	-1.40
7.	Education of Head	136.00**	46.40	0.003	2.93
	R square	0.91			

***-Significant at one per cent level, **-Significant at five per cent level

Table- 2 presents the results of the Second Stage of the Two-Stage Estimate were the calorie availability was taken as a dependent variable. The results presented showed an R square value of 0.74, which meant that 74 per cent of the variation in the dependent variable was explained by the given independent variables. The variables such as education of the wife, per capita food expenditure, and the per capita income are statistically significant and had the positive influence over the calorie availability. Only the variable consumption unit showed a negative influence over the calorie availability, i.e. one unit increase in the consumption unit would decrease the per capita calorie availability by 94.01 calories (because this variable was a per capita measure). One rupee increase in the food expenditure would increase the calorie availability by 0.77 calories. Similarly one year increase in the education level of the wife would increase the calorie availability by 365 calories and one rupee increase in the income would increase the calorie availability by 0.30 calories. Thus from the results it is evident that in case of farmer's group, education level of the wife played a crucial role in per capita calorie availability of the family.

TABLE 2: Second Stage Estimation of the Two Stage Least Squares of Farmers

Y: Calorie Availability

S.No	Variables	Coefficient	Standard Error	P value	t value
1.	Constant	1736	273.85	0.000	6.33
2.	Food Expenditure	0.77**	0.29	0.009	2.60
3.	Education of wife	365***	7.03	0.000	5.20
4.	Consumption unit	-94.01*	55.29	0.089	-1.70
5.	Income	0.30**	0.10	0.003	2.89
6.	R square	0.74			

***- Significant at one per cent level, **- Significant at five per cent level , *-Significant at ten per cent level

2. Determinants of Nutritional Status of Agricultural Laborers' Group

In case of agricultural labourers group the key factors that are likely influenced the income of the household are number of earners, household size, net worth, number of milch animals and education of the head. The factors that likely determined the nutritional status are per capita income per month, consumption unit, per capita food expenditure per month and education of the housewife. The results of First Stage Estimation of Two-Stage Least Squares are given in the Table 3.

TABLE 3. First Stage Estimation of Two -Stage Least Square of Agricultural Labourers

Y: Income

S.No	Variable	Coefficient	Standard error	Probability value	t-value
1.	Constant	276.40	56	0.000	4.93
2.	Number of Earners	150.20***	24.9	0.000	6.03
3.	Household size	-63.30***	16.25	0.000	-3.89
4.	Net worth	0.543	0.37	0.150	1.46
5.	Number of Milch animals	124.50***	27.64	0.000	4.50
6.	Education of the head	23.10	27.7	0.400	0.83
7.	R square	0.60			

***- Significant at one percent level

The results of the analysis showed an R square value of 0.60, which meant that 60 percent of the variation in the dependent variable was explained by the given independent variables. The independent variables such as the number of earners and the number of milch animals had significantly influenced the dependent variable. Only the household size showed a negative influence with that of dependent variable.*i.e* one member increase in the household size would decrease the income of the household size by 63.30 rupees. One member increase in the number of earners would increase the income of the household by 150.20 rupees. Similarly one unit increase in number of milch animals would increase the income by 124.50 rupees.Thus the results of the study indicated that in case of labourers group, number of earners and number of milch animals played a significant role in improving the income of the household. The analyses of Second Stage of the Two-Stage Least Square Estimation were the calorie availability was taken as a dependent variable is given in the Table 4.

TABLE 4. Second Stage Estimation of the Two Stage Least Square of Agricultural Labourers

Y: Calorie Availability

S. NO	Variables	Coefficient	Standard Error	Probability value	t value
1.	Constant	1707	358	0.000	4.76
2.	Consumption unit	-232**	74	0.001	-3.13
3.	Income	1.32*	0.600	0.027	2.20
4.	Food Expenditure	2.70***	0.803	0.000	3.36
5.	Wife education	3.36	136	0.900	0.02
6.	R square value	0.50			

* **-Significant at one per cent level , **-Significant at five per cent level , *-Significant at ten per cent level

It could be inferred from the Table 4 that R square value for the second stage estimation was 0.50, which meant 50 per cent of the variation in the dependent variable was explained by the selected independent variables. Variables such as income and food expenditure are statistically significant at five percent and one per cent level respectively and have the expected positive influence over the dependent variable. Consumption unit showed a negative influence over the dependent variable. One unit increase in the consumption unit would decrease the calorie availability by 232 calories. One rupee increase in the income of the household would increase the calorie availability by 1.32 calories. Likewise one rupee increase in the food expenditure would increase the calorie availability by 2.70 calories. Thus the results of the analysis suggested that the level of education of the wife did not show any influence over the calorie availability. This means instead of formal education, women in labourer category should have specific and functional knowledge about nutrition and food habits. This is in accordance with Wadkar *et al.,* (1988).

3. Determinants of the Nutritional Status of Other Occupational Groups

In case of other occupational groups, variables that are likely influenced the income of the household are household size, networth, no of earners, education of the head and education of the wife. (Since most of the women in this group are educated upto the higher secondary level, education of the wife was taken to analyze its impact on household income). The factors, which are likely to influence the nutrition status are per capita food expenditure per month, per capita income per month, consumption unit, education of the wife and education of the head. The results of the First Stage of the Two Stage Least Square Estimation for the other occupational category are presented in the Table 5.

TABLE 5. First stage estimation of Two -Stage Least Square of Other Occupational Groups
Y: Income

S.No	Variable	Coefficient	Standard Error	Probability value	t value
1.	Constant	4.16	176	0.981	0.02
2.	Household size	-102.63**	36	0.004	2.85
3.	Net worth	0.110	0.559	0.640	0.18
4.	Number of earners	410.20***	109	0.000	3.76
5.	Education of Head	294***	56.1	0.000	5.24
6.	Education of wife	117.70*	54	0.031	2.17
7.	R square value	0.66			

***-Significant at one per cent level, **-Significant at five per cent level *-Significant at ten per cent level

It could be seen from the Table 5 that the R square value was 0.66, which meant that 66 per cent of the variation in the dependent variable was explained by the given independent variables. The result showed that the variables number of earners and education of the head are statistically significant at one per cent level and had a positive influence over the dependent variable. As expected the household size showed a negative influence over the income. One member increase in the household size would decrease the income of the household by Rs. 102. In the same way one member increase in the number of earners would increase the income of the household by Rs. 410.20. One year increase in education of the head would increase the income of the household by Rs. 294 and one year increase in education of the wife would increase the income by Rs. 117.Thus from the results of the study it is revealed that the number of earners in the household and education level of both the head of the household and wife played a significant role in improving the income of the other occupational group family. The results of the second stage of the Two-Stage Least Square estimation for other occupational group is given in (Table 6) .

TABLE 6. Second Stage Estimation of Two Stage Least squares of Other Occupational Groups
Y: Calorie Availability

S.No	Variable	Coefficient	Standard Error	P value	T value
1.	Constant	1557.8	301.4	0.000	5.16
2.	Income	0.1420	0.284	0.617	0.50
3.	Education of the Head	-100.54	123.9	0.417	-0.81
4.	Education of the wife	183.79**	69.6	0.008	2.64
5.	Per capita food expenditure	2.68***	0.734	0.000	3.65
6.	Consumption unit	-188.5***	56.03	0.000	-3.36
7.	R square value	0.50			

*** Significant at one per cent level, ** Significant at five per cent level

Table 6 shows that the R squared value for the above analysis was 0.50, which meant 50 per cent of the variations in dependent variable was explained by the given independent variables. The variables such as education of the wife and per capita food expenditure had shown significant influence and consumption unit had shown a negative influence over the calorie availability. One year increase in the education of the wife will increase the calorie availability by 183.79 calories and one rupee increase in the food expenditure would increase the calorie availability by 2.68 calories. In the same way one unit increase in the consumption unit would decrease the calorie availability by 188 calories. The results of the study indicated that in case of other occupational group income had not shown much influence over the dependent variable. This finding was in accordance with the findings of Ryan *et al.,* (1984).

CONCLUSION

- The Two Stage Least Square estimates concluded that in all the occupational groups the important variables which determined the calorie availability were food expenditure, education of the housewife, income and consumption unit.
- The study also indicated that though income plays a major role in calorie availability, increase in income doesn't always results in increase in nutritional status as in the case of other occupational groups. Sometimes increase in income can be diverted for consumption of non nutritional foods like junk foods. Thus to increase the nutritional status, the given income should be used for healthy dietary practices.
- Since the education of the housewife had a positive and significant influence on calorie availability, all efforts must be made to promote nutrition education among women especially in rural areas by emphasizing more on nutritive value of various foods, recommended dietary allowances, common recipes and their nutritive value, therapeutic diets etc.,

REFERENCES

Gopalan, C., Rama Sastri, B.V. and Balasubramanian, S. (1993) Nutritive Value of Indian Foods. National Institute

of Nutrition. Indian council of Medical Research Hyderabad.

Haddad, L and Kennedy, E. (1994) Choice of Indicators for Food Security and Nutrition monitoring. Food policy. 19(3): 329-343.

Rajagopalan, S. (2003) Nutrition: The challenges Ahead. The Hindu, Daily, March 2, 2003.

Rao, V.K.R.V. (1983) Food, Nutrition and Poverty in India (NewDelhi: Vikas publishing House pvt. Ltd),

Status in 6 Villages of Southern India, Research BulletinNo.7, ICRISAT, Patancheru, Andhrapradesh, India. p.15.

Wadkar, S.S., Borude, S.G and Naik V.G. (1988) Economics of Dietary Pattern of Cultivating Families in Sindhudurg District- Maharashtra , Indian Journal of Nutrition and Dietet, 25: 372