

ESTIMATION OF CONSUMER UNIT SCALES IN CONSUMPTION EXPENDITURE OF AGRO CLIMATIC ZONE-II OF SOUTH GUJARAT

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ABSTRACT

The household family expenditure depends upon household size and composition in addition to income. Households of different composition have varied needs, which raise the problem of determining their economic preferences, so development of adult equivalent scale are pre-requisite of economic analysis in consumption expenditure of household. The result on adult equivalent scale suggested that, the largest proportionate share of consumption expenditure on different commodity groups was accounted by female of 20 to 40 years age in rural area. On other hand, in urban sector, in general, their share was relatively low, when compared to the age group of 13 to 20 years age in total milk and milk products (TM) and total non-food (TNF) commodities groups.

KEYWORDS: Consumer Unit Scale, Food and Non Food, South Gujarat

INTRODUCTION

The term adult equivalent scale or consumer unit was suggested by Farrel in 1952. This approach permits all the households (H.H) to be dealt with the same footing. Consumer adult equivalent scale has been estimated by using different methods (viz., ordinary least square technique, method of iterative procedure and method of weighted least squares technique) by various research workers.

Due to different requirement of different members within the family, the ordinary least square technique can be adopted for estimating the consumer adult equivalent scale for estimating per capita income/expenditure. The standardization of consumer unit can be done by using without intercept regression technique. This method has been tried by Bhuyan (1973), Jain (1983) and Shiyani and Singh (1996).

The modified version of iterative procedure was used by Singh and Nagar (1973) to obtain the estimate of equivalent weight for total expenditure. This modified approach was suggested for the type of study which involves data collection at the survey stage of consumption of at least one item individual member wise in the sample households. This approach has also been used by Prais and Houthakker (1955), Singh and Nagar (1978) and Sing and Patel (1982).

When the numbers of members in a household are used as a measure of family size, it ignores the variation in age-sex composition among the households. Therefore, consumption unit were standardised in consumer unit scale by assigning suitable weights to individual members of the household according to individual's personal characteristics.

MATERIAL AND METHODS

The primary data of 240 (120 each from rural and urban) households on demographic factors, occupational features, consumption level, expenditure on milk and milk products (TM), other foods (TF) and non-food items (TNF) were collected through personal interview of the respondents with the help of pre-tested structured interview schedule by using multi stage sampling design. The expenditure data on the 'food' and 'non food' item (variables) were taken through the given items i.e. liquid milk, ghee, other milk product, cereal, pulses, sugar and gur, fruit, oils, spices, vegetables, fish/ egg/ non veg, beverage/ non beverage and non food item. For further analysis, four new variables they are total milk and milk products (TM) which included liquid milk, ghee and other milk product, other foods items (TF) which included cereal, pulses, sugar and gur, fruit, oils, spices, vegetables, fish/ egg/ non veg, beverage/ non beverage and non-food items (TNF). Classification of data was done on the basis of spread of expenditure of the respondent households.

Estimating Adult Equivalent Scales

In view of non-availability of data on consumption expenditure of specific item by the individual member of the household, the researcher in the past have been used the regression technique for estimating the specific and income/expenditure weight for various age-sex groups. In this study, data could be obtained on actual consumption expenditure of all food and non-food items taken together for the family as whole. The same technique was used by Sarkar (1981), Jain (1983) and Shiyani and Singh (1996) for estimating the consumer adult equivalent scale for different commodities. The standardization of consumer unit has been done by using regression technique without/zero intercept

Regression Procedure

Regression analysis technique was adopted for estimating the consumer equivalent adult scale for the three main group as well as total expenditure. The following form without intercept regression model was fitted.

$$X_j = b_1n_{1j} + b_2n_{2j} + b_3n_{3j} + b_4n_{4j} + b_5n_{5j} + b_6n_{6j} + \epsilon_j \quad (1)$$

$$\text{And } Y_{ij} = b'_1n_{1j} + b'_2n_{2j} + b'_3n_{3j} + b'_4n_{4j} + b'_5n_{5j} + b'_6n_{6j} + \epsilon_j \quad (2)$$

Where,

X_j = Total consumer expenditure of jth household

Y_{ij} = consumption/expenditure of ith commodity group in the jth household

n_{1j} = Number of pre-school children (upto 4 year) in the jth household

n_{2j} = Number of school going children (4-13 year) in the jth household

n_{3j} = Number of family members in age group 13-20 years age group

n_{4j} = Number of male family members in age group 20-40 years age group

n_{5j} = Number of female family members in age group 20-40 years age group

n_{6j} = Number of adult family members in age group of 40 years or more

ϵ_j = Random disturbance term having zero mean and constant variances (0, σ^2)

The parameter b_1, b_2, b_3, b_4, b_5 and b_6 were estimated by ordinary least square (OLS) method for both the areas and for all the seasons separately making total six set of estimate for each of main commodity groups. Similarly, b_1, b_2, b_3, b_4, b_5 and b_6 were estimated without intercept.

Developing Adult Equivalent Scale and Standard Household Size

The standard consumer unit was selected as adult of 40 years and above. Thus, adult equivalent consumer unit scales are

A	Pre-school children (up to 4 year)	$=\hat{b}_1 / \hat{b}_6$
B	School going children (4-13 years)	$=\hat{b}_2 / \hat{b}_6$
C	Adolescent (13-20 years)	$=\hat{b}_3 / \hat{b}_6$
D	20-40 years male	$=\hat{b}_4 / \hat{b}_6$
E	20-40 years female	$=\hat{b}_5 / \hat{b}_6$
F	40 years above	$=\hat{b}_6 / \hat{b}_6 = 1$

This consumer units were estimated separately for main commodity groups viz., Total expenditure on milk and milk product (TM), Total expenditure on other food items (without milk and milk product) (TF), Total expenditure on all non food items (TNF), Total expenditure/total consumer expenditure (TOT) for three seasons within each of the two areas.

The weighted household size was derived by using the consumer unit so estimated as follows.

$$\sum_{g=1}^6 w_{ig} n_{gj} = \frac{\hat{b}_1}{\hat{b}_6} n_{1j} + \frac{\hat{b}_2}{\hat{b}_6} n_{2j} + \frac{\hat{b}_3}{\hat{b}_6} n_{3j} + \frac{\hat{b}_4}{\hat{b}_6} n_{4j} + \frac{\hat{b}_5}{\hat{b}_6} n_{5j} + n_{6j} \tag{3}$$

And

$$\sum_{g=1}^6 w_{og} n_{gj} = \frac{\hat{b}'_1}{\hat{b}'_6} n_{1j} + \frac{\hat{b}'_2}{\hat{b}'_6} n_{2j} + \frac{\hat{b}'_3}{\hat{b}'_6} n_{3j} + \frac{\hat{b}'_4}{\hat{b}'_6} n_{4j} + \frac{\hat{b}'_5}{\hat{b}'_6} n_{5j} + n_{6j} \tag{4}$$

Where,

$$g = 1, 2, \tag{5}$$

W_{ig} = Specific adult equivalent scale for i th commodities group in the g th age-sex group.

W_{og} = Expenditure adult equivalent scale common to expenditure commodity group in g th age-sex group.

n_{gj} = number of person in g th age-sex group and j th household.

Thus,

z Standard household size of i th commodity group in the j th Household.

$$\sum_{g=1}^6 w_{og} n_{gj} =$$

Standard household size of total expenditure for jth household

Then,

$$\frac{Y_{ij}}{\sum_{g=1}^6 W_{ig} n_{gj}} =$$

Per consumer unit (adult equivalent scale) expenditure on ith commodity group.

$$\frac{X_{ij}}{\sum_{g=1}^6 W_{og} n_{gj}} =$$

Per consumer unit total expenditure for jth household

RESULT AND DISCUSSIONS

The household family expenditure depends upon household size and composition in addition to income. Households of different composition have varied needs, which raise the problem of determining their economic preferences. In this section, the results relating to specific scales and income scales have been presented.

Specific Scales

The specific expenditure scales together with total expenditure scale for different age-sex group with different seasons for rural and urban areas and also for the Agro Climatic Zone-II of South Gujarat as a whole are displayed in Table 1, 2 and 3, respectively. The magnitudes of the regression coefficient associated with the adult member and adjusted coefficient of multiple determinations (\bar{R}^2) have also been provided in the same tables.

The estimates of adult equivalent scales for main commodity group for different seasons provided in Table 1 for urban households revealed that the age group of 13-20 years accounted the largest proportion share of expenditure in Total milk (TM) commodities groups in all seasons. For other commodities group i.e. TF, TNF and TOT of all seasons, it was revealed that the female in 20-40 years age group accounted the largest proportionate share of expenditure in different seasons of urban household except in TNF during summer and monsoon seasons. A perusal of Table 1 further revealed that the expenditure on total expenditure taken together, increase with the higher age group, except for 20-40 years group in all the seasons.

In rural area, (Table 2), it can be revealed that female in 20-40 years ages group accounted for the largest proportionate share of expenditure in different season for all main commodity group in rural households. This result is justified on the view that the female folk of Gujarat are involved in almost all type of physical work (like farming) in addition to the household work in rural areas. Additionally, these consumption items are considered as an essential part of diet for pregnant and nursing mother, a great majority of whom falls in this age group. The total expenditure of rural also increased with the higher the age group as if in urban area.

The adjusted coefficient of multiple determination (\bar{R}^2) for total expenditure on milk and milk products (TM), total expenditure for total food items other than milk and products (TF), total non-food items expenditure (TNF) and total expenditure (TOT) of main commodity groups were found to vary between 80.50 and 91.37 per cent in different season for urban, 72.50 and 86.66 per cent for rural and 86.30 and 93.84 per cent for overall. A perusal of the regression coefficients associated with adult more than 40 year old revealed that in the urban area on an average, an additional amount of `5155.61 was spent on total expenditure (TOT) for an addition of adult member in the family whereas the additional amount spent for TM, TF and TNF were `720.72, `1544.86, and `2890.03, respectively in summer season of urban area. The corresponding figures for rural area and overall were `3209.14, `566.54, `1266.26, `1376.35 and `4147.53, `608.23, `1408.72 and `2130.60, respectively, during summer season. Similarly, the results of monsoon and winter and for urban, rural overall household areas are presented in the Table 1, Table 2, and Table 3, respectively.

Income Scales

The differential age-sex composition of the family members also affected the total expenditure (income) of the households. Therefore, the family size has been standardized with respect to total consumer expenditure, using the information on age and sex of the family members of the sample households. For this purpose, the estimates of adult equivalent scales were obtained by regressing total consumer expenditure on the number of family members in different age-sex groups. The rural, urban and overall household's income scales are given in Tables 1, 2 and 3, respectively. From these tables, maximum TOT expenditure was found in summer season followed by monsoon and winter in urban areas. Not much different was found between the seasons so far as total consumption in urban area. In rural area, higher expenditure was found in summer followed by winter and monsoon season. The range of expenditure was much higher in rural than urban between different seasons.

A close examination of data revealed that taking an overall view, the maximum numerical value of adult equivalent scale was obtained for 20-40 years female and 13-20 years sex groups in urban households, implying that both the sex groups shared the highest proportion of total household expenditure. Children below 4 years were least expensive in this area. Similar trend was also found for rural and overall household, and also minimum and maximum values were found for child bellowed 4 years old and 20-40 years female group, respectively.

CONCLUSIONS

The result on adult equivalent scale suggested that, the largest proportionate share of consumption expenditure on different commodity groups was accounted by female of 20 to 40 years age in rural area. On other hand, in urban sector, in general, their share was relatively low, when compared to the age group of 13 to 20 years age in TM and TNF.

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Table 1: Equivalent Adult Scale for Different Commodity Expenditure Groups in Urban Households During Various Seasons

Main Commodity group	Age sex group for Urban						Regression coefficient associated with adult	\bar{R}^2 %
	Preschool child (<4 yrs)	School Children (4-13) yrs	13-20 Yrs	20- 40 Yrs		Adult (>40 Yrs)		
				Male	Female			
	(n ₁)	(n ₂)	(n ₃)	(n ₄)	(n ₅)	(n ₆)		
SUMMER								
TM	0.314	0.456	1.597	1.266	1.139	1.000	720.720	83.63*
TF	0.240	0.316	0.682	0.923	1.199	1.000	1544.860	91.37*
TNF	0.091	0.184	1.487	1.133	1.343	1.000	2890.028	86.39*
TOT	0.167	0.262	1.261	1.089	1.271	1.000	5155.606	89.77*
MONSOON								
TM	0.258	0.364	1.583	1.216	1.178	1.000	726.647	84.67*
TF	0.166	0.298	0.795	0.936	1.271	1.000	1376.638	90.86*
TNF	0.046	0.287	1.452	1.045	1.353	1.000	2893.233	85.74*
TOT	0.108	0.301	1.293	1.039	1.307	1.000	4996.456	88.70*
WINTER								
TM	0.230	0.440	1.746	1.260	1.235	1.000	650.056	80.50*
TF	0.163	0.279	0.707	0.895	1.312	1.000	1393.504	89.70*
TNF	0.039	0.240	1.457	1.054	1.468	1.000	2831.049	86.84*
TOT	0.100	0.278	1.281	1.036	1.392	1.000	4874.571	89.05*

* Significant at 1% level of significance

Table 2: Equivalent Adult Scale for Different Commodity Expenditure Groups in Rural Households During Various Seasons

Main Commodity group	Age sex group for Rural						Regression coefficient associated with adult	R ² %
	Preschool child (<4 yrs)	School Children (4-13 yrs)	13-20 Yrs	20-40 Yrs		Adult (>40 Yrs)		
				Male	Female			
(n1)	(n2)	(n3)	(n4)	(n5)	(n6)			
SUMMER								
TM	0.510	0.743	0.887	0.669	1.432	1.000	566.537	73.42*
TF	0.058	0.730	0.765	0.664	1.192	1.000	1266.258	83.88*
TNF	0.396	0.556	0.928	0.644	1.459	1.000	1376.348	82.10*
TOT	0.283	0.658	0.857	0.656	1.349	1.000	3209.135	85.19*
MONSOON								
TM	0.574	0.608	1.043	0.759	1.537	1.000	505.594	76.26*
TF	0.077	0.749	0.830	0.702	1.277	1.000	1017.309	83.66*
TNF	0.430	0.322	1.089	0.714	1.609	1.000	1128.335	82.31*
TOT	0.313	0.540	0.981	0.714	1.472	1.000	2655.494	86.66*
WINTER								
TM	0.587	0.686	0.953	0.682	1.498	1.000	506.714	72.50*
TF	0.029	0.753	0.770	0.674	1.209	1.000	1104.364	82.71*
TNF	0.623	0.380	0.893	0.626	1.337	1.000	1302.040	76.54*
TOT	0.391	0.575	0.857	0.654	1.317	1.000	2913.065	82.73*

* Significant at 1% level of significance

Table 3: Equivalent Adult Scale for Different Commodity Expenditure Groups in Overall Households During Various Seasons

Main Commodity group	Age sex group for Rural						Regression coefficient associated with adult	R ² %
	Preschool child (<4 yrs)	School Children (4-13 yrs)	13-20 Yrs	20-40 Yrs		Adult (>40 Yrs)		
				Male	Female			
(n1)	(n2)	(n3)	(n4)	(n5)	(n6)			
SUMMER								
TM	-0.206	0.984	1.078	1.106	1.520	1.000	608.228	87.88*
TF	0.227	0.373	0.572	1.003	1.109	1.000	1408.715	93.75*
TNF	-0.102	0.677	1.082	1.038	1.343	1.000	2130.597	91.74*
TOT	-0.006	0.619	0.908	1.036	1.289	1.000	4147.528	93.84*
MONSOON								
TM	-0.260	0.849	1.116	1.070	1.494	1.000	602.874	89.14*
TF	0.187	0.403	0.624	1.005	1.158	1.000	1231.183	93.77*
TNF	-0.140	0.718	1.145	0.930	1.325	1.000	2158.691	91.01*
TOT	-0.057	0.641	0.980	0.974	1.299	1.000	3992.721	93.43*
WINTER								
TM	-0.274	1.036	1.161	1.077	1.609	1.000	548.109	86.30*
TF	0.206	0.337	0.562	0.984	1.167	1.000	1257.495	92.92*
TNF	-0.074	0.609	1.015	0.886	1.428	1.000	2091.474	90.85*
TOT	-0.012	0.581	0.890	0.945	1.369	1.000	3897.094	92.89*

* Significant at 1% level of significance

