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Measurement and Sources of Income Inequality among Rural and Urban Households in Tamil Nadu

M. Uma Gowri* and T.R. Shanmugam

Department of Agricultural Economics, Centre for Agricultural and Rural Development Studies,
Tamil Nadu Agricultural University, Coimbatore - 641 003, India

*Corresponding Author E-mail: umanomics@gmail.com

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ABSTRACT

The present study was undertaken to determine the level of income inequality in Rural and urban households in Tamil Nadu by employing the Lorenz curve and Gini ratio. The study also aimed to briefly examine the contribution of each income sources to overall income inequality and determine the effect of some socio-economic characteristics of households on per capita income in the study region. The study examined 180 rural and 180 urban households distributed in Western Tamil Nadu region. There was a wide variation between the rural and urban households on asset ownership pattern and the most important asset owned by the households was agricultural assets in the rural and house property in the urban. Livestock assets formed relatively larger proportion of the rural asset, viz., 14.32 % against 2.08 % in the urban. Ownership of the selected consumer durables and business assets were more among the urban consumers than rural. Agricultural and livestock were the dominant sources of the income in the rural than urban among the income groups. The Gini coefficient in the rural sector among the different income groups ranged from 0.25 to 0.45, and it was 0.28 to 0.49 for urban sector. It revealed that the distribution of income in rural area was moderate or medium among the different income groups of people compared to urban areas. The income inequality was more pronounced among urban consumers.

Key words: *Income, Households, Lorenz, Gini Ratio, Inequality.*

INTRODUCTION

Income distribution has been a major concern in the determination of the level of economic growth and development of any country[13]. India is the largest democracy with consistent economic growth rate since independence. India is also third largest scientific and technological workforce[6]. In agriculture India produces sugar, groundnut, tea, fruits, rice, wheat, vegetables and milk in a large scale. With regard to demographic profile more than 720 billion i.e. One third of its population lives in rural areas[10]. Despite these developments, there is a wide gap between rural and urban India with respect to technology, living condition, economic empowerment etc. In rural India there is high number of Infant Mortality with low Life Expectancy at Birth Rate[9].

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Rural India mostly depends on agricultural sector[5]. The growth rate in agricultural sector (primary sector) is 2-3% when compared to secondary and tertiary sector which are growing at the rate of 8-12%. Due to this there is a large scale migration of labour forces from rural to urban in search of employment. 8-12% growth rate in the secondary and tertiary sector help Urban India as an emerging global information based economy still urbanization of poverty is a major concern[1]. In this paper an attempt is made to determine the level of income inequality in rural and urban households in Tamil Nadu with the help of selected socio-economic indicators. Apart from this, the contribution of each income sources to overall income inequalityis also discussed in this paper. The objectives of this paper are

- To determine the level of income inequality in rural and urban households in Tamil Nadu
- To find out the contribution of each income sources to overall income inequality
- To determine the effect of some socio-economic characteristics of households on per capita income

DATA BASE AND METHODOLOGY

Collection of data

Totally 360 sample households were selected based on multistage random sampling from Coimbatore, Erode and Tiruppur districts of Tamil Nadu. For the purpose of in depth investigation, the sample households were post stratified into three income groups based on monthly household income as Low Income Group (LIG), Middle Income Group (MIG) and High Income Group (HIG). It was reported in "Chapter on Housing Requirement Projection for IX plan (2007-2012).The households with income less than Rs.3300 month^{-1} were classified as EWS (Economically Weaker Section), between Rs.3301 and Rs.7300 as LIG; between Rs.7301 and Rs.14500 as MIG and above Rs.14501 as HIG. For the present study, EWS and LIG were grouped as LIG. Since LIG is a relevant base for analysis and interpretation of results which will fit in for suggesting policy framework. The distribution of sample households in different income groups by urban and rural categories is presented (Table 1).

Of the total sample of 360 respondents, 180 were from rural and 180 were from urban sector. Of the total sample of 360 respondents, 19 % were HIG, 39 % were MIG and 42 % were LIG.

Tools of analysis

Income distribution- Lorenz curve

Lorenz curve was used to represent and analyse the size distribution of income and wealth. The curve relates the cumulative proportion of income units to the cumulative proportion of income received when units are arranged in ascending order of their income. If the income is perfectly equally distributed, the Lorenz curve coincides with the diagonal and if the distribution is perfectly in equalitarian, the Lorenz curve coincides with the right angled sides of the triangle. For the present study, the Lorenz curve was obtained by plotting cumulative percentage share of income to the cumulative percentage of farm households. It was developed by Max O. Lorenz[8] in 1905 for representing inequality of the wealth distribution.

The Lorenz curve can often be represented by a function L (F), where F is represented by the horizontal axis, and L is represented by the vertical axis. For a population of size n, with a sequence of values y_i, i = 1 to n, that are indexed in non-decreasing order ($y_i \leq y_{i+1}$), the Lorenz curve is the continuouspiecewise linear function connecting the points (F_i, L_i), i = 0 to n, where $F_0 = 0$, $L_0 = 0$, and for i = 1 to n:

$$F_i = i/n$$
$$S_i = \Sigma\, y_i$$
$$L_i = S_i/S_n$$

For a discrete probability function f(y), let y_i, i = 1 to n, be the points with non-zero probabilities indexed in increasing order ($y_i<y_{i+1}$). The Lorenz curve is the continuous piece wise linear function connecting the points (F_i, L_i), i =0 ton, where$F_0 = 0$, $L_0 = 0$, and for i = 1 to n:

$$Fi = f\,(yi)$$

The inverse x (F) may not exist because the cumulative distribution function has jump discontinuities or intervals of constant values. However, the previous formula can still apply by generalizing the definition of x (F):

$$x(F_1) = \inf\{y: F(y) \geq F_1\}$$

Properties of the Lorenz curve

- A Lorenz curve always starts at (0, 0) and ends at (1, 1).
- The Lorenz curve is not defined if the mean of the probability distribution is zero or infinite.
- The Lorenz curve for a probability distribution is a continuous function. However, Lorenz curves representing discontinuous functions can be constructed as the limit of Lorenz curves of probability distributions, the line of perfect inequality being an example.

Gini ratio

Gini ratio is defined as twice the area between Lorenz curve and equalitarian line- a diagonal representing perfect equality as a proportion of the triangle below the diagonal. The Gini coefficient is the area between the line of perfect equality and the observed Lorenz curve, as a percentage of the area between the line of perfect equality and the line of perfect inequality. The higher the coefficient, the more unequal the distribution is. The Gini coefficient can ranges from 0 to 1; it is sometimes expressed as a percentage ranging between 0 and 100. More specifically, the upper bound of the Gini coefficient equals 1 only in populations of infinite size. In a population of size N, the upper bound is equal to $1 - 2 / (N + 1)$.

A low Gini coefficient indicates a more equal distribution, with 0 corresponding to complete equality, while higher Gini coefficients indicate more unequal distribution, with 1 corresponding to complete inequality. To be validly computed, no negative goods can be distributed. Thus, if the Gini coefficient is being used to describe household income inequality, then no household can have a negative income. When used as a measure of income inequality, the most unequal society will be one in which a single person receives 100% of the total income and the remaining people receive none (G=1); and the most equal society will be one in which every person receives the same income (G=0).

$$G = 1 + (1/n) - (2/n^2 Z) \sum_{i=1}^{n} (n + 1 - i) Y$$

Where, G- Gini ratio, n- Number of individuals, Y- Income received by household, Z- Mean income (ΣY/n)

RESULTS AND DISCUSSION

Family size and income

Out of 360 sample households, 50 % were rural and the remaining was from urban sector. The average monthly household income and family size are presented (Table 2).

The results showed that the average monthly income of urban and rural households worked out to Rs. 14,167 and Rs.16,621 respectively. On the contrary, the average number of earners in the rural sector was 1.90 as against 1.65 in the urban sector. Chi square test was conducted and found that there existed significant difference between rural and urban income. Chi square test was also conducted and found that there existed significant differences among LIG, MIG and HIG in both sectors. As expected, the urban household income was higher than the rural, even though the number of earners were less in urban sector. Similar results had been reported in Tanzania, by Lanjouw and Sparrow[7]. They found a significant relationship between impact of various form of income such as farm income, non farm income and off farm income on consumption pattern. Apparently the urban households have more employment opportunities, more often with higher earnings. The average family size was 5.08 and 4.44 respectively, in rural and urban households.

Occupational pattern

The occupational structure of the sample respondents in rural and urban sectors is presented (Table 3). The results showed that about 69 % of rural households were engaged in agricultural activities. In the case of urban sector, office workers accounted for 23.33 %

followed by businessmen with 18.89 % and non-agricultural labour with 14.44 %. The occupation was more diversified in the urban sector, whereas in the rural sector, agriculture formed the major share, since cultivators and agricultural labourers constituted nearly 69 % of the rural households. Thus urban households had more economic opportunities, a fact historically established.

Income distribution

The distribution of households based on income is presented (Table 4 and Table 5).The average income of rural households worked out to Rs.3571, Rs.12119 and Rs.26812 respectively for LIG, MIG and HIGs in rural sector and the corresponding figures wereRs.4295, Rs.14301 and Rs.31268 respectively, for LIG, MIG and HIG in the urban households. Chi square test was conducted and found that there existed significant differences among LIG, MIG and HIG in both sectors. Across groups, the urban households earned higher income than the rural households though the differences were not significant. Similar study reported by Gilbert *et al*[4]. It might be due to the fact that many of the rural households worked as casual labourers in the construction sectors during the off-season, which helped them to earn income much closer to their urban counterparts. One disquieting feature was that the rural LIG had a household size of 5.86, which might have led to lower per capita income.

The number of earners was 2.28, 2.12 and 1.31 respectively for LIG, MIG and HIGs in the rural households and it was 2.39, 1.51 and 1.06 respectively for LIG, MIG and HIGs in the urban households. The number of earners was higher in the rural households across all the income groups. Since the farm level earning of the workers were reported low in rural areas, many of the family members used to go for employment in agriculture related activities. Similar study observed in South Africa by Faber and Drimie[3]. Another feature observed was that both household size and size of earning were positively correlated.

The distribution of households by household size in rural and urban areas of different income groups is presented in Table 6. The household size of five and six accounted for about 59 %, 53 % and 33 %, respectively, for LIG, MIG and HIGs in the rural households and it was 51 %, 33 % and 39 % respectively, for LIG, MIG and HIGs in the urban households, The table reiterates that size of family was relatively bigger in LIG irrespective of rural or urban areas.

Literacy level

An analysis of educational status of household heads revealed that about 28 % of head of households were illiterates and over 29 % of them had primary school education (Table 7). In the case of rural LIG, the level of illiteracy was highest with 32.61 %; about 39 % of the household heads had primary education and 26.09 % had attained secondary education. As income increased, the educational level had improved; similar study was depicted by Dzioubinski and Chipman[2], and Rosegrant *et al*[11]. For example, among the rural HIGs, 31.82 % had secondary level education, followed by 20.45 % with primary level education. Moreover, about 32 % of the people were either graduates or post-graduates or having technical education.

In the urban sector only 14.40 % of the heads of households were illiterates. Among the urban LIGs, 40.58 % had primary education and only 26.31 % had secondary level education. In the case of urban MIG and HIGs, the educational level was high with less than 10 % under illiterates. It was not surprising to note that urban household heads had acquired higher education, as the educational facilities and awareness were more in urban setting.

Housing pattern

The ownership pattern of houses in rural and urban sectors by various income groups is presented (Table 8). It could be seen from the table that about 93 % of the rural MIG households owned housing property against 53.85 % of the urban counterparts. In rural sector, the percentage of ownership increased with the enhancement in income, even though not significantly. But the trend was not so in urban households. About 70 % of LIG and

MIG possessed own house compared to 54 % of MIG in urban sector. In both the sectors, the low income group houses were clustered together. Majority of LIG households had thatched roofs and few with tiled roofs. By and large, tiled houses were predominant in rural villages. Most of the houses owned by middle and high income groups in the urban sector and few houses in the high income group in the rural sectors had pukka houses with terraced roofs; similar results presented in Bangladesh by Samad and Hossain[12]. Few households in urban and rural high income groups had more than one house.

Standard of living of different socio economic groups in the study region

To assess the standard of living of the households in the study region, the ownership of assets, consumer durables and income level by various sources were analyzed and presented in the following section.

Ownership of assets

The household assets distribution in rural and urban sectors among various income groups is shown (Table 9). The most important asset owned by households was house property in the urban and agricultural assets in rural sector. Agricultural assets comprised of land, irrigation structures, agricultural equipment and machinery, Livestock assets formed relatively a larger proportion of the rural asset at an average of 9 % against 4 % in the urban. Ownership of selected consumer durables and business assets was more among the urban than rural households. In general, there was a wide variation between the rural and urban households on asset ownership pattern. A study by Saweda and Winterelson[13] on "Asset versus Consumption, Poverty and Poverty Dynamics in the presence of Multiple Equilibrium in Rural Ethiopia" found that physical and human assets were good predictors of consumption expenditures in rural Ethiopia.

Source of income

The sources of income which were derived from the various activities differed between the urban and rural areas and also among the income groups (Table 10). Agriculture and livestock were the dominant source of income in the rural than in urban among the income groups. The income from agriculture ranged from Rs.1129 to Rs.16980 per month in the rural and Rs.521 to Rs.1005 in the urban across income groups. The average household income in business was Rs. 1187 in rural and Rs. 4392 in urban areas. Similarly the income from salary was much higher in urban than in rural across income groups. The agricultural wage earning in rural and non agricultural wage earning in urban were higher in the respective groups. The income from the house property was higher in urban than rural. There were variations in average income between the sectors and also within the sectors in the study region.

Ownership of consumer durables

One relatively objective measure of change in the standard of living is the ownership of durables and capital assets (Table 11). There had been a sizable increase in the share of household owning consumer durables, when we move from LIG to HIG. In fact, the proportion of household owning radio and TV was higher in both sectors. The owning durable items like bench, chair, table and fan were higher in MIG and HIG. The % of owning two wheeler was more in the HIG and MIG. In general, urban people owning durables were high in relation to rural people. The percentage of households owning consumer durables shows that HIG in both sector and urban MIG had better standard of living in relation to other income groups.

Income distribution

Lorenz curve

The distribution of income among the sample respondents in both rural and urban areas is furnished (Table 12). For the purpose of the study of the income concentration and distribution, Lorenz curves were drawn separately for all the three groups separately. The results of Lorenz curve are furnished (Fig 1 to Fig 6).

Gini ratio

To analyze the distribution of income among the sample respondents, the Gini ratios were arrived at for the sample respondents in

different income group in both rural and urban areas and they are listed (Table 12). The Gini coefficient in the rural sector among the different income groups ranged from 0.25 to 0.45, and it was 0.28 to 0.49 for urban sector. It revealed that the distribution of income in rural area was moderate or medium among the different income groups of people compared to urban areas. The inequality distribution was more pronounced in urban areas. Among the different income groups, HIG in both rural and urban sector had more of uneven distribution than LIG and MIG in both sectors, because the value of Gini coefficient was more 0.45 and 0.49 in rural HIG and urban HIG respectively, followed by MIG (0.35 for rural and 0.36 for urban) and LIG (0.25 for rural and 0.28 for urban).

Table 1: Distribution of sample households based on income

Income Groups	Coimbatore		Erode		Tiruppur		Total
	Urban	Rural	Urban	Rural	Urban	Rural	
LIG (< Rs.7300)	24 (6.67)	22 (6.11)	26 (7.22)	27 (7.50)	26 (7.22)	24 (6.67)	149 (41.39)
MIG (Rs.7301-14500)	22 (6.11)	25 (6.94)	25 (6.94)	22 (6.11)	24 (6.67)	24 (6.67)	142 (39.44)
HIG (> Rs.14501)	14 (3.89)	13 (3.61)	09 (2.50)	11 (3.06)	10 (2.78)	12 (3.33)	69 (19.17)
Total	60	60	60	60	60	60	360 (100.00)

(Figures in parenthesis indicates % to total)

Table 2: Average monthly income and family size

Sector	Household income (Rupees Month^{-1})	Family size (Number)	Number of earners
Rural	14,167	5.08	1.90
Urban	16,621	4.44	1.65

Table 3: Occupational structure of sample households

Occupation	Rural		Urban	
	Number	%	Number	%
Cultivators	51	28.33	9	5.00
Agricultural labourers	73	40.56	7	3.89
Office workers	10	5.56	42	23.33
Business man	11	6.11	34	18.89
Non- agricultural labour	10	5.55	26	14.44
Tailor	4	2.22	6	3.33
Carpenter	3	1.67	5	2.78
Driver	3	1.67	6	3.33
Construction worker	5	2.78	20	11.12
Others *	10	5.55	25	13.89
Total	180	100	180	100

* - Pensioners, Private Accountants, Mess Workers, Goldsmith etc.,

Table 4: Distribution of sample households based on income

Income Group	Coimbatore		Erode		Tiruppur		Total
	Urban	Rural	Urban	Rural	Urban	Rural	
LIG (< Rs.7300)	24 (6.67)	22 (6.11)	26 (7.22)	27 (7.50)	26 (7.22)	24 (6.67)	149 (41.39)
MIG (Rs.7301-14500)	22 (6.11)	25 (6.94)	25 (6.94)	22 (6.11)	24 (6.67)	24 (6.67)	142 (39.44)
HIG (> Rs.14500)	14 (3.89)	13 (3.61)	09 (2.50)	11 (3.06)	10 (2.78)	12 (3.33)	69 (19.17)
Total	60	60	60	60	60	60	360 (100.00)

(Figures in parenthesis indicates % to total)

Table 5: Distribution of sample households by groups

Income group	Number of households		Monthly income (Rs)		Family size		Number of earners	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
LIG (< Rs.7300/month)	73	76	3571	4295	5.86	4.97	2.28	2.39
MIG (Rs.7300-Rs.14500/month)	71	71	12119	14301	5.02	4.33	2.12	1.51
HIG (>Rs.14500/month)	36	33	26812	31268	4.36	4.01	1.31	1.06
Total	180	180	14167	16621	5.08	4.44	1.90	1.65

Table 6: Distribution of households by household size (%)

Household size	Rural			Urban		
	LIG	MIG	HIG	LIG	MIG	HIG
1	2.17	0	0	1.60	0	0
2	4.35	3.33	11.36	5.41	5.13	3.39
3	15.22	16.67	13.43	16.14	7.69	15.91
4	18.50	20.77	34.85	22.54	48.72	35.24
5	21.74	36.67	24.45	34.92	23.10	31.82
6	36.96	15.90	8.05	16.27	10.26	6.82
7	1.06	3.33	5.59	3.12	2.62	4.55
8 and above	0	3.33	2.27	0	2.48	2.27
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 7: Educational status of the heads of households

Educational Levels	Rural			Urban		
	LIG	MIG	HIG	LIG	MIG	HIG
No formal education	24 (32.61)	21 (30.00)	6 (15.91)	19 (25.00)	5 (7.04)	2 (9.09)
Primary	29 (39.13)	17 (23.33)	7 (20.45)	31 (40.58)	12 (16.91)	4 (11.36)
Secondary	18 (26.09)	19 (26.67)	12 (31.82)	20 (26.31)	25 (35.21)	10 (29.55)
Graduate	2 (2.17)	7 (10.00)	5 (13.64)	4 (5.41)	11 (15.49)	7 (20.45)
Post graduate	0	5 (6.67)	4 (11.36)	2 (2.70)	13 (18.31)	5 (15.91)
Technical (degree/ diploma)	0	2 (3.33)	2 (6.82)	0	5 (7.04)	5 (13.64)
Total	73 (100)	71 (100)	36 (100)	76 (100)	71 (100)	33 (100)

(Figures in parenthesis indicates percentage to total)

Table 8: Income group wise housing facilities in the study region

Income group	% of respondents owning house	
	Rural	Urban
LIG	89.13	70.27
MIG	93.33	53.85
HIG	95.45	70.45

Table 9: Household asset distribution **(%)**

Type of Asset	Rural			Urban		
	LIG	MIG	HIG	LIG	MIG	HIG
Agricultural assets	59.71	63.09	65.56	26.32	22.13	19.89
Livestock	14.32	7.83	6.65	5.65	4.86	2.08
House property	24.46	26.76	23.90	46.49	47.23	49.76
Consumer durables	1.02	1.48	2.08	17.64	18.36	20.02
Business assets	0.49	0.84	1.81	3.90	7.42	8.25
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 10: Composition of monthly income **(Rupees Household^{-1})**

Sources of income	Rural			Urban		
	LIG	MIG	HIG	LIG	MIG	HIG
Agriculture	1129 (31.62)	7225 (59.62)	16980 (63.33)	521 (12.13)	942 (06.56)	996 (03.21)
Livestock	459 (12.84)	1512 (12.48)	2295 (08.56)	157 (03.62)	292 (02.04)	353 (01.11)
Business	47 (01.32)	878 (07.24)	2638 (09.84)	656 (15.27)	3321 (23.22)	9198 (29.42)
Salary	332 (09.26)	1741 (14.36)	3274 (12.21)	1045 (24.32)	7014 (49.05)	14558 (46.55)
Agricultural wage	1116 (31.24)	189 (1.56)	0.00 (0.00)	159 (3.71)	0.00 (0.00)	0.00 (0.00)
Non-agricultural	443	0.00	0.00	1462	333	0.00

wage	(12.40)	(0.00)	(0.00)	(34.04)	(02.33)	(0.00)
House property	47 (01.32)	475 (03.92)	1290 (04.81)	297 (06.91)	1948 (13.65)	4803 (15.36)
Dividend and interest	0	99 (0.82)	335 (01.25)	0.00 (0.00)	451 (03.15)	1360 (04.35)
Average monthly income	3571 (100.00)	12119 (100.00)	26812 (100.00)	4295 (100.00)	14301 (100.00)	31268 (100.00)

Table 11: Percentage of household's owning selected consumer durables

S. No.	Consumer durables	Rural			Urban		
		LIG	MIG	HIG	LIG	MIG	HIG
1	Cycle	35.71	25.09	25.56	36.32	22.13	19.89
2	Two wheeler	18.32	37.83	56.65	25.65	44.86	62.08
3	Car	0.00	16.76	23.90	0.00	17.23	29.76
4	Radio	54.02	83.48	95.45	67.57	87.18	97.73
5	TV	63.32	85.67	96.78	64.78	88.45	98.25
6	Grinder	11.23	66.87	77.87	13.43	67.76	78.86
7	Mixie	10.12	64.34	74.34	12.43	65.45	75.65
8	Furniture	08.32	45.32	65.76	08.65	46.54	66.54
9	Fan	24.43	76.65	89.87	25.64	77.86	90.32
10	Fridge	0.00	34.54	76.56	0.00	35.76	77.65
11	Washing machine	0.00	12.43	34.23	0.00	13.56	36.45
12	Gas stove	45.65	78.67	89.76	46.56	80.43	93.23

Table 12: Gini ratio for income distribution of the selected farm households

Sector	Income groups	Gini ratio
Rural	LIG	0.25
	MIG	0.35
	HIG	0.45
Urban	LIG	0.28
	MIG	0.36
	HIG	0.49

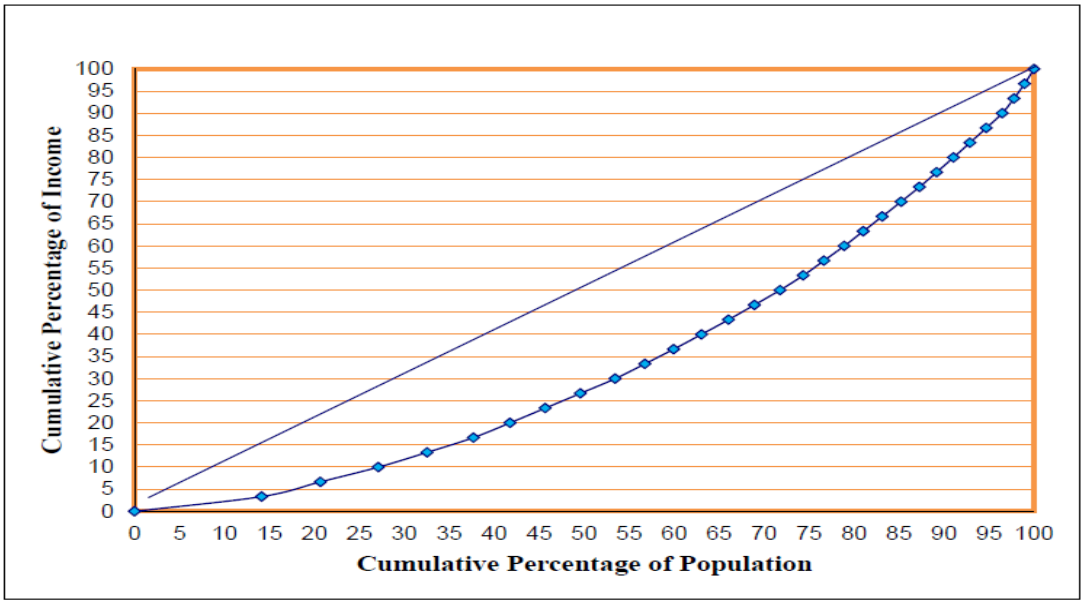

Fig 1: Rural high income group

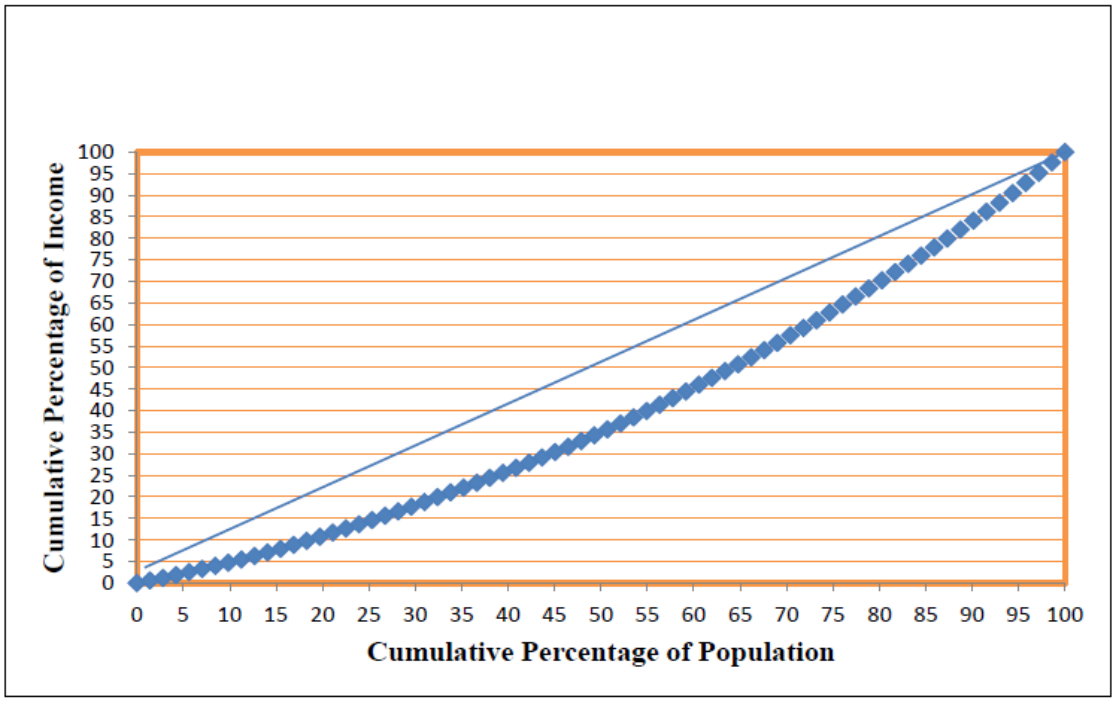

Fig 2: Rural middle income group

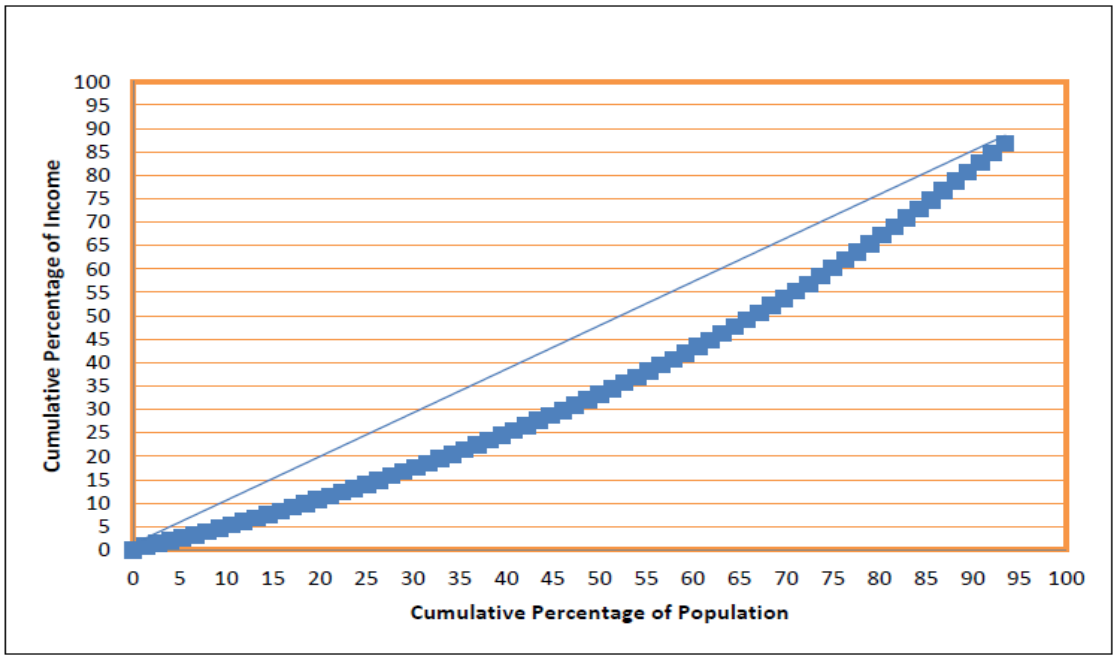

Fig 3: Rural low income group

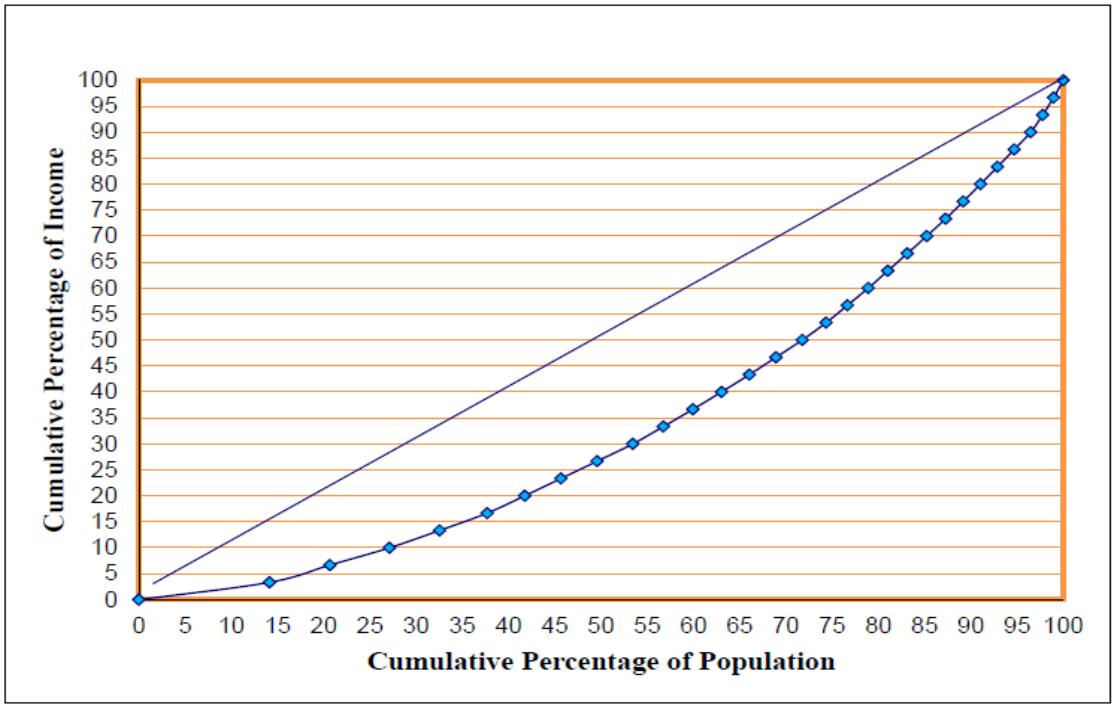

Fig. 4: Urban high income group

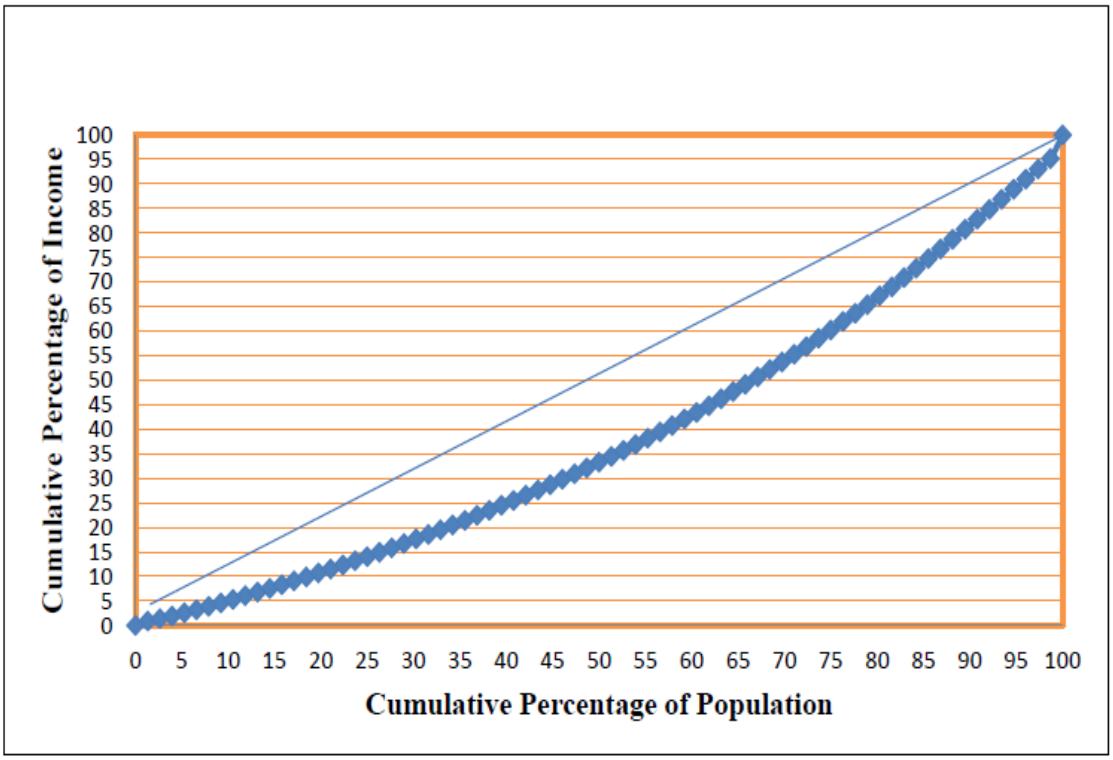

Fig. 5: Urban middle income group

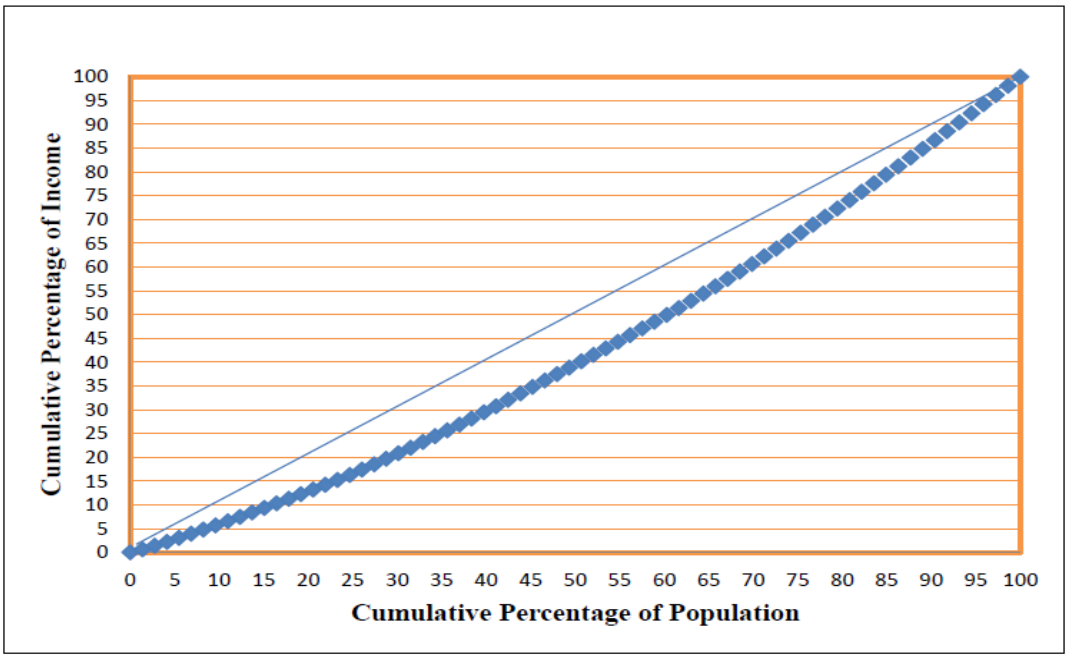

Fig. 6: Urban low income group

CONCLUSION

The outcome of the study wasaverage household size and the number of earners in the rural sector was comparatively higher than the urban. The average monthly income was more in urban than in rural, an analysis of household size, revealed that household size was maximum among the rural LIG and it was minimum among the urban HIG. The Gini coefficient revealed that the distribution of income in rural area was moderate or medium among the different income groups of people compared to urban areas. The income inequality was more pronounced among urban consumers.

- Policies that increase graduation status and that also promote equal access to education helps to reduce inequality.
- Labour market policies and institutions reduce inequality.
- Tax and transfer systems play a key role in reduces overall income inequality. Of the various types of taxes, the personal income tax tends to be progressive, while social security contributions, consumption taxes and real estate taxes tend to be regressive.

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