

WORKING PAPER

**Centre for Development Studies
Ulloor, Trivandrum
(India)**

Working Paper No. 94

LORENTZ RATIOS FOR DISTRIBUTION OF RURAL OWNERSHIP
AND OPERATIONAL LAND HOLDINGS, INDIA, 1971-72.

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July 1979

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This note has been prepared with two objectives. First, to explain the computational procedure for estimating Lorenz Ratio of a given distribution, and secondly to provide Lorenz Ratios thus estimated for land distribution in different States and Sub regions of India 1971-72.

Data Source: NSS 26th round, July 1971 - September 1972.
Report No.215, Tables on Land Holdings.

Computational Procedure: The NSS report provides, for each region in each State, the cumulative percentage of households and area owned/operated by size class of ownership/operational holding. We consider size classes as follows:

TABLE - A

<u>Size class No.</u>	<u>Class interval in acres</u>
0	0.00 (landless)
1	0.01 - 0.49
2	0.50 - 0.99
3	1.00 - 1.24
4	1.25 - 2.49
5	2.50 - 4.99
6	5.00 - 7.49
7	7.50 - 9.99
8	10.00 - 12.49
9	12.50 - 14.99
10	15.00 and above

Let P_i and Q_i be the cumulative percentages of households and area corresponding to the size class i , $i = 0, 1, 2, \dots, 10$. So, we have data in the following form:

TABLE - B

<u>Size class No.</u>	<u>Cumulative percentage of</u>	
	<u>Households</u>	<u>Area</u>
0	P_0	Q_0
1	P_1	Q_1
2	P_2	Q_2
3	P_3	Q_3
4	P_4	Q_4
5	P_5	Q_5
6	P_6	Q_6
7	P_7	Q_7
8	P_8	Q_8
9	P_9	Q_9
10	P_{10}	Q_{10}

Notice that $Q_0 = 0.00$, $P_{10} = Q_{10} = 100.00$

A good approximation for the Lorentz Ratio of the above distribution excluding the '0 group' is given by the following formula (Trapezoidal rule);

$$\text{Lorentz Ratio} = \frac{\left(P_1 Q_2 + P_2(Q_3 - Q_1) + P_3(Q_4 - Q_2) \right. \\ \left. + P_4(Q_5 - Q_3) + P_5(Q_6 - Q_4) + P_6(Q_7 - Q_5) \right. \\ \left. + P_7(Q_8 - Q_6) + P_8(Q_9 - Q_7) \right. \\ \left. + P_9(Q_{10} - Q_8) \right) \cdot 10000}{\sum Q_9} \cdot \frac{100}{\sum Q_9}$$

This formula can be easily used by computing one more column in the previous table (TABLE B). The previous table with the additional column computed is given below:

TABLE C

<u>Size class No.</u>	<u>Cumulative percentage of</u>		<u>Q_{i-1} - Q_{i+1}</u>
	<u>Households</u>	<u>Area</u>	
0	P ₀	Q ₀	-
1	P ₁	Q ₁	Q ₂
2	P ₂	Q ₂	Q ₃ - Q ₁
3	P ₃	Q ₃	Q ₄ - Q ₂
4	P ₄	Q ₄	Q ₅ - Q ₃
5	P ₅	Q ₅	Q ₆ - Q ₄
6	P ₆	Q ₆	Q ₇ - Q ₅
7	P ₇	Q ₇	Q ₈ - Q ₆
8	P ₈	Q ₈	Q ₉ - Q ₇
9	P ₉	Q ₉	Q ₁₀ - Q ₈
10	P ₁₀	Q ₁₀	-

First compute the sum of products of 2nd and 4th columns excluding the first and last rows and divide it by 10,000. Next subtract

from it ($C_0/100$) and you have the Lorentz Ratio for the distribution excluding the '0' size class. Let us denote it by L_0 . To find out the Lorentz Ratio for the distribution including the '0' size class, i.e., L_1 , say, compute as follows:

$$L_1 = 1 - \left(1 - \frac{P_0}{100}\right) \times (1 - L_0)$$

Let us see an example :

The first three columns in the following table are taken from the NSS report on Andhra Pradesh (See Page No.66 in NSS Report No.215.1, Vol.1)

<u>Size class</u> No.	<u>Cumulative percentage of</u> Households	<u>Area</u>	$Q_{i-1} - Q_{i+1}$
0	6.95	-	-
1	38.66	0.60	2.23
2	47.59	2.23	3.25
3	53.17	3.85	7.69
4	65.30	9.92	19.23
5	78.95	23.08	25.43
6	86.35	35.35	21.19
7	90.17	44.27	18.49
8	93.33	53.84	24.41
9	94.80	68.68	46.16
10	100.00	100.00	-

The fourth column has been computed from the third column as shown in TABLE C.

Now first we compute,

$$(38.66 \times 2.23) + (47.59 \times 3.25) + \dots + (94.80 \times 46.16) = 14055.18$$

Divide above by 10,000.

Subtract from it $(68.68/100)$

Thus, we get the Lorentz Ratio, $L_0 = 0.7197$ (excluding '0' size class)

Lorentz Ratio for the distribution including the '0' size class will be given by:

$$L_1 = 1 - \left(1 - \frac{6.95}{100}\right) \times (1 - 0.7197) = 0.7392.$$

Lorentz Ratios For the Distributions of Rural
Land Holdings (State and Region wise), 1971-'72

Lo : Excluding the 0' size class

L1 : Including the 0' size class

State	Region	<u>Operational holdings</u>		<u>Ownership holdings</u>	
		Lo	L1	Lo	L1
Andhra- Pradesh	All	0.7408	0.8342	0.7192	0.7392
"	Coastal	0.7611	0.8688	0.7461	0.7680
"	Inland Northern	0.6887	0.7716	0.6807	0.6963
"	Inland Southern	0.7146	0.8026	0.7148	0.7335
Assam	All	0.5830	0.7014	0.6218	0.7163
"	Flains	0.5907	0.7105	0.6239	0.7195
"	Hills	0.4209	0.4579	0.4833	0.5599
Bihar	All	0.6440	0.7175	0.6864	0.7000
Bihar	Southern	0.5275	0.5669	0.5193	0.5354
Bihar	Northern	0.6615	0.7323	0.7139	0.7286
Bihar	Central	0.6820	0.7698	0.7360	0.7463
Orissa	All	0.6275	0.7211	0.6403	0.6783
Orissa	Coastal	0.6313	0.7305	0.6303	0.6598
Orissa	Southern	0.6035	0.6968	0.6416	0.6975
Orissa	Northern	0.6015	0.6957	0.6011	0.6423
Kerala	All	0.6784	0.7160	0.6888	0.7378
Kerala	Northern	0.6837	0.7141	0.6952	0.7379
Kerala	Southern	0.4349	0.5084	0.6757	0.7303

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State	Region	Operational holdings		Ownership holdings	
		Lo	L1	Lo	L1
Karrataka	All	0.6789	0.7745	0.6546	0.6977
"	Coastal & Ghate	0.7105	0.8448	0.8309	0.9101
"	Inland Eastern	0.5403	0.6139	0.5402	0.5905
"	Inland Southern	0.6111	0.7154	0.6135	0.6518
"	Inland Northern	0.6205	0.7392	0.6076	0.6342
Rajasthan	All	0.5576	0.5923	0.5662	0.5789
"	Western	0.4249	0.4642	0.4497	0.4613
"	Northern	0.5561	0.6048	0.5522	0.5689
"	Southern	0.3908	0.3995	0.4467	0.4516
"	Southern	0.4874	0.5454	0.4957	0.5277
Gujarat	All	0.6820	0.7893	0.6793	0.7224
"	Eastern	0.5342	0.6103	0.5336	0.5758
"	Plain Northern	0.6693	0.7663	0.6657	0.7105
"	Plain Southern	0.7997	0.9177	0.6719	0.7561
"	Dry area	0.5299	0.6487	0.5411	0.5682
"	Saurashtra	0.5617	0.7025	0.5569	0.5904
Madhya Pradesh	All	0.5946	0.6633	0.6084	0.6459
"	Eastern	0.6039	0.6710	0.6255	0.6659
"	Inland Eastern	0.4531	0.4975	0.5927	0.6291
"	Inland Western	0.5960	0.7004	0.6031	0.6494
"	Western	0.5412	0.6218	0.5758	0.6066
"	Northern	0.5517	0.6354	0.5514	0.5885

State	Region	Operational holdings		Ownership holdings	
		Lo	L1	Lo	L1
West Bengal	All	0.6434	0.7538	0.6699	0.7022
"	Himalayam	0.5121	0.6000	0.6257	0.7007
"	Eastern Plains	0.6316	0.7241	0.6384	0.6558
"	Central Plain	0.7254	0.8518	0.7236	0.7583
"	Western Plain	0.5855	0.6609	0.6073	0.6298
Maharashtra	All	0.6655	0.7961	0.6654	0.7001
"	Coastal	0.6479	0.7542	0.6745	0.7577
"	Inland Eastern	0.6698	0.7556	0.6616	0.7254
"	Inland Northern	0.6072	0.7375	0.6324	0.6863
"	Inland Central	0.6113	0.7517	0.6150	0.6615
"	Inland Eastern	0.6258	0.7532	0.6332	0.6685
"	Eastern	0.6205	0.7376	0.5949	0.6527
Uttar Pradesh	All	0.6742	0.7078	0.6339	0.6506
"	Himalaya	0.5986	0.8059	0.7262	0.8407
"	Western	0.6084	0.7323	0.6322	0.6391
"	Central	0.5456	0.6349	0.5829	0.5918
"	Eastern	0.5652	0.6252	0.5987	0.6027
"	Southern	0.6573	0.7830	0.6548	0.6741
Punjab	All	0.7538	0.8981	0.7703	0.7867
"	Northern	0.7865	0.9220	0.7838	0.7999
"	Southern	0.6825	0.8412	0.7390	0.7561
Tamil Nadu	All	0.7189	0.8368	0.7485	0.7913
"	Coastal Northern	0.6637	0.7856	0.6981	0.7291

State	Region	<u>Operational holdings</u>		<u>Ownership holdings</u>	
		Lo	L1	Lo	L1
Tamil Nadu	Coastal Southern	0.7328	0.8137	0.7728	0.8334
"	Inland	0.7365	0.8564	0.7590	0.7957
Jammu & Kashmir	All	0.4362	0.4737	0.4248	0.4303
"	Mountainous	0.4894	0.5825	0.4661	0.4684
"	Outer Hills	0.3638	0.3773	0.3881	0.4037
"	Thelum Valley	0.3779	0.3938	0.3794	0.3820