

## Level of Income and Disparities among Agricultural Households in Punjab

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### Abstract

*Income inequality study is an important initial step toward poverty alleviation actions. The present study was designed to study income inequality among the agricultural households in Punjab. The study was conducted by using NSSO 70<sup>th</sup> round SAS survey. The sample size used to accomplish the study was 723 agricultural households. The findings of the study revealed that the average annual income of the agricultural households was Rs. 68058, Rs. 115376, Rs. 222708, Rs. 323803, Rs. 570908 and Rs. 1502084 for landless, marginal, small, semi-medium, medium and large farm-size categories, respectively. The share of income from agriculture increased as we move from landless toward large farm-size category. The share of the income from wages and salaries was the highest among the households with lesser operational holdings. There were huge disparities between the income of small and large farmers. The households belonging to the lowest quintile have income coming from diversified sources while the households in the upper income quintiles have income from agriculture and allied activities. Overall, the share of non-farm income in rural agricultural households was very less. Thus, it is recommended that agro-processing industries should be set up in rural areas and skill development centres should be established to increase the avenues of employment.*

**Keywords:** Income sources, Income inequality, Gini coefficient, and Gini decomposition

**JEL Classification:** D31, E64, O13, Q12, P36

### Introduction

Inequality is the most debated issues among social scientists around the world. There were no surplus resources in primitive societies to distribute among individuals but with agricultural development the surplus increased. Over the time, few individuals gained more control over these resources which increased inequality. A new class of more skilled and educated people emerged (i.e., scientists, managers, technicians, etc.) in modern economy and it was expected to re-establish egalitarian society but contrary happened i.e., the inequality is on the rise (Piketty, 2014; Stiglitz, 2012).

Inequality is broadly classified into inequality of opportunities and inequality of outcomes. The former denotes access to basic services like health, education, human development, etc. and later is measure of income, wealth and expenditure. Chronic inequality seriously affects occupational choices and socio-economic mobility (Todaro and Smith, 2007). People with low level of income find it difficult to lead good life (Silber, 2020). On the contrary, few believe that inequality can positively influence growth by providing incentives for innovation and entrepreneurship (Lazear and Rosen, 1981).

Income inequality estimates are the best measure of inequality in the society. A welfare state tends to distribute income equally among the members of the society. Higher income inequality tends to decrease aggregate demand in the economy as high-income group spends lower proportion. (OECD, 2015). Low-income households find it difficult to stay healthy, accumulate physical and human capital which negatively affects growth (Galor and Moav, 2004).

Inequality within subgroup as well as between the sub-groups affects the overall distribution. The studies on income inequality for the society as a whole are important as they give information on the extent of inequality; but the studies based on sub-groups provide useful insights and play key role in identifying the factors contributing to the inequality within a sub-group and to provide possible solutions to minimize them. In rural areas, agriculture is an important sub-group. Rural economy is transforming but it is still largely dependent on agriculture as it contributes 39.2 per cent share in rural Net Domestic Product and provides employment to 64.1 per cent rural workforce in India (Chand *et al*, 2017).

World inequality lab reported that inequality is increasing everywhere in the world. Same trends are observed in India as the income of top one per cent people in India has 22 per

cent share in national income whereas share of bottom 50 per cent is only 15 per cent (Himanshu et al, 2013). As income distribution and poverty are closely interrelated, inequality estimates assist in addressing problem of poverty. India has achieved food sufficiency in production yet population below poverty line is 29.5 per cent. Poverty among rural population is even higher (More and Singh, 2014). Hence, study of the income and its distribution is necessary to see the sources of income of different households and measures to improve income of the households at the lower tail of the distribution. Present enquiry is also an attempt to study a sub-group i.e., agricultural households.

### Data Sources and Methodology

The study was conducted for agricultural households in Punjab using data from NSSO 70<sup>th</sup> round Situation Assessment Survey (SAS) (Year 2012-13) of agricultural households. There were 723 households covered in Punjab with 76, 189, 147, 170, 120 and 21 agricultural households in landless, marginal, small, semi-medium, medium and large farm-size categories, respectively. Agricultural households have main source of income from crop cultivation and dairy production. To work-out the total income of agricultural household, income from crops and livestock are estimated by deducting paid-out costs from gross returns; net farm business income was used after deducting the expenses.

The data were differentiated into quintile groups according to the total income of the household to examine the share of various sources of income in each quintile group. The per cent share of different sources within each quintile is also analyzed.

### Gini coefficient

It is the measure of degree of concentration of income distribution.

$$G = \frac{2cov[yf(y)]}{\bar{y}}$$

where,  $G$  = Gini coefficient of total income  
 $y$  = total income  
 $f(y)$  = cumulative distribution of income  
 $\bar{y}$  = mean income of the sample

### Vertical Decomposition of Inequality

Where,  $S_k$  represents the share of source  $k$  in total income and reflects how important the income source is with respect to total income,  $G_k$  which is the source Gini corresponding to the distribution of income from source  $k$  indicating equality/inequality of income distribution from a given income sources, and  $R_k$  is the Gini correlation of income from source  $k$  with the distribution of total income indicating how a given income source is correlated to the total income of a household.

$$G_K = 2 * CoV \left( \frac{Y_k F_k}{\bar{Y}_k} \right)$$

$$R_K = \frac{CoV(Y_k, F)}{CoV(Y_k, F_k)}$$

Where,  $\bar{Y}_k$  the mean income from income source  $k$ ,  $CoV(Y_k, F_k)$  is the covariance between income component  $k$  and its cumulative distribution,  $CoV(Y_k, F)$  is the covariance between income component  $k$  and cumulative distribution of the total income

Further, using the Gini decomposition by income source, the effect of changes in a particular component on inequality can be estimated, holding income from all other sources constant. Assuming a change in each household's income from source  $k$  equal to  $e_k$ , where  $e$  is close to 1, then the partial derivative of the Gini coefficient with respect to a percentage change  $e$  in source  $k$  will be:

$$\frac{\partial G}{\partial e_k} = S_k(G_k R_k - G)$$

Then, the marginal effect of the income source relative to the overall Gini can be obtained by dividing by overall Gini coefficient ( $G$ ) as follows:

$$\frac{\partial G / \partial e}{G} = \frac{S_k G_k R_k}{G} - S_k$$

robustness of the marginal effect was examined by bootstrapping techniques.

## Result and discussion

### Socio-economic Characteristics of Agricultural Households

The socio-economic characteristics of the households are important determinants of the income of the household. Various characteristics of the agricultural households in Punjab are given under different sub-heads.

The average family size and number of the respondent households is presented in the Table 1. The average family size for Punjab was 5.39 members per household. The average family size was 4.71, 5.07, 5.06, 5.41, 6.38 and 7.05 for landless, marginal, small, semi-medium, medium and large farms, respectively. It was found that landless, marginal, small and semi-medium farms were at par. Similarly, medium and large farms were at par with each other.

The education level of the head of the agricultural households is presented in Table 2. A perusal of table reveals that 36.51 per cent respondents were illiterate, 52.28 per cent farmers were matriculate, 11.20 per cent farmers were senior secondary and above. It was found that percentage of illiterate household heads decreased with increase in farm-size. Majority of household heads were matriculate. Percentage of household heads having qualification senior secondary and above is lower in lower farm-size categories and vice-versa.

**Table 1: Family size of the agricultural households among different farm-size categories in Punjab**

Particulars	Landless (<0.01 ha)	Marginal (0.01-1.00 ha)	Small (1.01- 2.00 ha)	Semi-medium (2.01-4.00 ha)	Medium (4.01-10.00 ha)	Large (>10.00 ha)	Overall
Number of households	76 (10.51)	189 (26.14)	147 (20.33)	170 (23.51)	120 (16.60)	21 (2.90)	723 (100.00)
Average family size	4.71	5.07	5.06	5.41	6.38	7.05	5.39

Note: Figures in the parentheses are percentage to overall households

**Table 2: Education of the head for different agricultural households in Punjab**

Particulars	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall (Number)
Illiterate	38 (50.00)	74 (39.15)	49 (33.33)	52 (30.59)	47 (39.17)	4 (19.05)	264 (36.51)
Upto secondary	37 (48.68)	103 (54.50)	83 (56.46)	88 (51.76)	56 (46.67)	11 (52.38)	378 (52.28)
Senior secondary and above	1 (1.32)	12 (6.35)	15 (10.20)	30 (17.65)	17 (14.17)	6 (28.57)	81 (11.20)
Total	76 (100.00)	189 (100.00)	147 (100.00)	170 (100.00)	120 (100.00)	21 (100.00)	723 (100.00)

Note: Figures in the parentheses are percentage to their respective totals

Age of the household head influence decision of choosing different income sources. The number of persons in different age groups have been presented in Table 3. Majority of the household heads fall in the age group of 30-60 years (67.50%). About 30 per cent were above 60 years of age and only 3.04 per cent household heads were in the age group of up to 30 years. In landless category, there were about 3.95 per cent household heads under the age of below 30 years, 76.32 per cent respondents were in the age group of 30-60 years and 19.74 per cent were above 60 years. In large farm-size category, there were no illiterate respondent under 30 years, 66.67 per cent respondents were in the age group of 30-60 years and 33.33 per cent respondents were above 60 years.

#### Size of Operational Holdings

The operational holding for different categories of agricultural households is given in the Table 4. The average size of the holdings in Punjab was 2.44 ha out of which around 81 per cent were having owned land. The size of operational holdings was 0.01 ha for landless, 0.29 ha for marginal households, 1.40 ha for small households, 2.76 ha for semi-medium households, six ha for medium households and 14.81 ha for large households.

#### Level of Income and Inequality among Agricultural Households

The level of the income of agricultural households

depends upon the extent of income derived from different income sources which in turn determines the inequality among these households. The analyses of the extent of participation in different income sources and the extent of income inequality across different agricultural households is discussed as under.

The income of the agricultural households in Punjab is among the highest in country. Pluriactivity among the agricultural households is a common phenomenon all around the world. The extent of pluriactivity is captured in Punjab (Table 5). It was the lowest among landless households as 73.68 per cent households have single source of income. Pluriactivity is having a direct relation with farm size and vice versa. In marginal farm-size households, around 32 per cent households are having single source of income, around 29 per cent households have two sources of income and around 40 per cent households have three or more sources of income. Among small, semi-medium, medium and large farm-size category households, most have two or more sources of income.

#### Source-wise Income of Agricultural Households

The sources of income of the agricultural households were quite diversified according to the land possession and education among the family members of the households (Table 6). The average income of the agricultural households was Rs. 2.97 lakh per household per annum. The income

**Table 3: Age of the head of the agricultural households for different farm-size categories in Punjab**

Particulars	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Young (<30 years)	3 (3.95)	10 (5.29)	4 (2.72)	7 (4.12)	1 (0.83)	-	22 (3.04)
Middle age (30-60 years)	58 (76.32)	139 (73.54)	102 (69.39)	105 (61.76)	74 (61.67)	14 (66.67)	488 (67.50)
Senior (>60 years)	15 (19.74)	40 (21.16)	41 (27.89)	58 (34.12)	45 (37.50)	7 (33.33)	213 (29.46)
Total	76 (100.00)	189 (100.00)	147 (100.00)	170 (100.00)	120 (100.00)	21 (100.00)	723 (100.00)

Note: Figures in the parentheses are percentage to their respective totals

share was the highest for the crops (70.23%) followed by wages and salaries (13.10%), livestock (13.02%) and non-farm business (3.64%).

The income of the landless and marginal farm-size agricultural households was quite different from rest of the farm-size categories. The average annual income of the agricultural households belonging to landless category was Rs. 68058 per household. The share of income from wages and salaries was the highest among landless category (78.97%) followed by livestock (13.63%), non-farm business (7.40%). The average annual income of the agricultural households belonging to marginal farm-size category was Rs 1.15 lakh per household. The marginal farm-size category has the highest income from wages and salaries (46.69%), followed by crops (23.43%), livestock (22.82%) and the least income from non-farm business (7.06%).

For other farm-size categories, the average annual income was Rs 2.23 lakh, Rs 3.24 lakh, Rs 5.71 lakh, Rs 15.02 lakh for small, semi-medium, medium and large farm-size categories, respectively. The households belonging to

small farm-size categories have the highest income from crops (66.36%), followed by wages and salaries (17.82%), livestock (10.91%) and non-farm business (4.90%). The income of the agricultural households increased with increase in farm-size. The income from livestock was the highest for marginal farm-size category (22.82%). The second highest was for large farm-size categories (19.97%). The share of livestock income ranged between 8 to 14 per cent. The share of the wages and salaries decreases with the increase in farm-size. Non-farm business also decreases with increase in farm-size with exception of large farm-size category which is exceptionally high (6.85%). The average annual income of the agricultural households belonging to large farm-size category was Rs 15.02 lakh per household. The households belonging to large farm-size categories have the highest income from crops (70.84%), followed by livestock (19.97%), wages and salaries (2.34%) and non-farm business (6.85%).

#### Distribution of Income among Agricultural Households

The households were arranged into different quintile

**Table 4: Operational holdings of the agricultural households in Punjab**

Particulars	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Owned land (ha)	0.4 (100.00)	82.27 (147.57)	198.61 (96.71)	404.74 (86.33)	531.78 (73.89)	204.38 (65.71)	1422.18 (80.75)
Leased-in land (ha)	-	4.65 (8.34)	29.09 (14.16)	95.14 (20.29)	203.93 (28.33)	117.97 (37.93)	450.78 (25.6)
Leased-out land (ha)	-	31.17 (55.91)	22.33 (10.87)	31.03 (6.62)	15.97 (2.22)	11.33 (3.64)	111.83 (6.35)
TOH* (ha)	0.4 (100.00)	55.75 (100.00)	205.37 (100.00)	468.85 (100.00)	719.74 (100.00)	311.02 (100.00)	1761.13 (100.00)
Average operational holdings (ha)	0.01	0.29	1.40	2.76	6.00	14.81	2.44

Note: Figures in the parentheses are percentage to their respective TOH

\*TOH=Total Operational Holding

**Table 5: Number of income sources per household among different categories of agricultural households**

Farm-size category	No. of income sources			Total
	1	2	3 or more	
Landless	56 (73.68)	17 (22.37)	3 (3.95)	76 (100.00)
Marginal	60 (31.75)	54 (28.57)	75 (39.68)	189 (100.00)
Small	3 (2.04)	35 (23.81)	109 (74.15)	147 (100.00)
Semi-medium	7 (4.12)	23 (13.53)	140 (82.35)	170 (100.00)
Medium	-	18 (15.00)	102 (85.00)	120 (100.00)
Large	-	3 (14.29)	18 (85.71)	21 (100.00)
Overall	126 (17.43)	150 (20.75)	447 (61.83)	723 (100.00)

groups according to the income (Table 7). The lowest quintile (first quintile) has the average annual income of Rs 35342 while second quintile has the average income of Rs 99808, third quintile has the average income of Rs 180644, fourth quintile has the average income of Rs 319747 and the top income quintile (fifth quintile) has the average income of Rs 853076. The households belonging to the lowest income quintile have the highest share from wages and salaries (44.96%), followed by crops (27.28%), livestock (21.81%)

and non-farm business (5.95%). The households belonging to the second income quintile have about 40 per cent income from crops followed by wages and salaries (35.37%), livestock (19.83%) and non-farm business (5.14%). As we move to higher income quintile, the share of crop income increased from 64 to 76 per cent. The livestock income for these quintiles decreases as we move to higher income quintiles. The similar pattern was observed for wages/salaries and non-farm business.

**Table 6: Source-wise income of the agricultural household among different farm-size categories in Punjab**

(Rs/household/annum)

Farm-size categories	Income sources				Total income
	Crops	Livestock	Wages/ salaries	Non-farm business	
Landless	-	9277 (13.63)	53744 (78.97)	5037 (7.40)	68058 (100.00)
Marginal	27033 (23.43)	26331 (22.82)	53864 (46.69)	8148 (7.06)	115376 (100.00)
Small	147798 (66.36)	24304 (10.91)	39687 (17.82)	10920 (4.90)	222708 (100.00)
Semi-medium	256691 (79.27)	39012 (12.05)	23332 (7.21)	4768 (1.47)	323803 (100.00)
Medium	483718 (84.73)	48216 (8.45)	27900 (4.89)	11075 (1.94)	570908 (100.00)
Large	1064134 (70.84)	299997 (19.97)	35095 (2.34)	102857 (6.85)	1502084 (100.00)
Overall	208667 (70.23)	38689 (13.02)	38935 (13.10)	10826 (3.64)	297117 (100.00)

Note: Figures in the parentheses are percentage to their respective total income



**Table 7: Distribution of income of agricultural households and its source-wise share in Punjab**

Quintiles	Income (Rs/annum)	Crops (%)	Livestock (%)	Wages/salaries (%)	Non-farm business (%)
Q1	35342	27.28	21.81	44.96	5.95
Q2	99808	39.67	19.83	35.37	5.14
Q3	180644	63.71	16.34	15.84	4.11
Q4	319747	73.53	13.56	9.72	3.19
Q5	853076	75.76	10.95	9.85	3.44
Average	297117	70.23	13.02	13.10	3.64

Note: The per cent share of different sources is out of annual income.

### Income Inequality among Agricultural Households

It becomes necessary to understand regional composition of income earned by agricultural households which makes large portion of rural population. Regional information on distribution of income sources among agricultural household is a great advantage to understand the core issues prevailing in the society. The income inequality among the agricultural households was calculated by using the Gini coefficient (Table 8). The overall Gini coefficient among agricultural households was 0.54 depicting high income inequality among different agricultural households in Punjab. Lorenz curve also depicted high income inequality (Appendix 1). The contribution of different sources of income in the overall Gini is also given. The crops Gini is the major contributor to overall Gini (0.79), livestock Gini is 0.11, wages and salaries is 0.07 and non-farm business is 0.03. The income from crops is found to be income inequality increasing source of income while the livestock, wages and salaries and non-farm business are inequality decreasing source of income. Out of all the income sources, crops and wages/salaries significantly affect the income inequality. Similar results were reported in the other study conducted for the region (Choudhary and Singh, 2019). The share of rural non-farm sector in the total income was negligible. However, it has been identified as inequality decreasing source of income in the literature (Himanshu et al. 2013; Pavithra and Vatta 2013; Birthal et al. 2014). Punjab can follow Chinese model of rural enterprises development to promote non-farm income

(Gulati and Fan 2008). The role of livestock income was although non-significant but the coefficient was inequality decreasing. The inequality decreasing effect of livestock income has been well established around the world (Adams and He 1995; Birthal, Joshi, and Kumar 2002; IEG 2015; Choudhary and Singh 2019).

### Conclusion and Policy Implications

The study concluded that larger farm-size households had multiple income sources while majority landless households have single source of income. There was huge gap between the income of large and small farmers. The share of income from agriculture increases as we move from landless toward large farms. The share of livestock and non-farm business was high on large farms. In first quintile, the income share of wages and salaries in the total income is the highest. For all other quintiles, share of the crop income in the total income is the highest. The share from livestock is income inequality decreasing in all the categories, except marginal and large farms. The wages and salaries are inequality increasing factors. In non-farm business, top one per cent population has 50 per cent share in income.

The landless mainly earned income from wages and salaries. Except landless and marginal, all other categories have more than 70 per cent income from agriculture. The distribution of income among agricultural households was highly skewed. Income from wages and salaries were income inequality decreasing factor while income from

**Table 8: Income inequality among agricultural households and its source-wise decomposition in Punjab**

Income sources	Share of source in total income ( $S_k$ )	Source gini ( $G_k$ )	Gini correlation ( $R_k$ )	Share in gini ( $\frac{S_k G_k R_k}{G}$ )	Elasticity ( $\frac{S_k G_k R_k}{G} S_k$ )
Crops	0.702	0.648	0.936	0.786	0.084 (0.024)*
Livestock	0.130	0.716	0.628	0.108	-0.022 (0.017)
Wages/Salaries	0.131	0.842	0.352	0.072	-0.059 (0.009)*
Non-farm business	0.036	0.965	0.528	0.034	-0.002 (0.007)
Total income		0.542			

crops increased inequality. The share of non-farm business income in rural agricultural households was very less. Thus, setting-up agro-processing industries is the need of the hour. These non-farm employment opportunities can be provided to marginal and small farmers on preference. The focus should be to establish skill development centres for employment generation.

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**Appendix 1: Distribution of agricultural households according to their income**