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Inter-regional Analysis of Levels, Patterns, and Distribution of Income of Farm Households in Rural Punjab

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ABSTRACT

In the present study, inter-regional analysis of levels, patterns, and distribution of income among the farm households is studied. The results of the study reveal that the average annual income of an average farm household is the highest in the high, followed by medium, and low productivity regions. There are considerable differences in the income levels across all the regions. The farm business income is the major source of income and its relative share in the total income is the highest in the low, followed by medium and high productivity regions. All the farm-size categories enhance their income with non-farm activities across all the regions. The per capita income of an average farm household is the highest in the high productivity region and the lowest in the medium productivity region. The concentration of household income is highly skewed in the high productivity region, less skewed in the low productivity region. The distribution of per capita income is more uneven in the high, followed by medium and low productivity regions. Inequalities in the distribution of per household income are greater than the per capita income across all the regions.

Key-words: income, productivity, regions, rural, Punjab.

INTRODUCTION

After independence, the New Agricultural Technology (NAT) was adopted to achieve self-sufficiency in food-grain production in India initially focusing on the states such as Punjab, Haryana, and Western Uttar Pradesh. The adoption of NAT consisting of high yielding varieties of seeds, chemical fertilisers, and irrigation facilities helped to achieve a high growth trajectory (Gulati *et al.*, 2017). The spread of NAT was highly skewed in favour of certain states and regions, and led to a high growth in agricultural output in selected regions, while some regions suffered from stagnancy or poor growth in agricultural output. The first decade following Green Revolution was believed to have increased inter-state disparities in development and incomes (Chand & Chauhan, 1999). Bhalla and Singh (1997; 2001); Bhalla and Alagh (1979); Sawant and Achuthan (1995); and Sawant (1997) argued that regional disparities was increased during the first phase of Green Revolution, and these have declined during the second phase due to the spread effect of the HYV technology. Moreover, during the 90's, in the reform era, situation still deteriorated leading to substantial deceleration in agricultural output and productivity. The deceleration in agricultural production affected the rural poor adversely and increased inequality further (Banerjee & Kuri, 2014). The regional variations in agricultural productivity were partly due to disparities in resource endowments, climate and topography and also due to historical, institutional, and socio-economic factors. Punjab is agriculturally progressive state of India and the Green Revolution had seen its highest adoption in this state (Chand *et al*, 2011). Consolidation of holdings, development of irrigation, high capital investment, improved infrastructure and strong institutional reforms and net-work provided very conducive environment for the success of NAT in the state (Singh & Kaur, 2018). The Green Revolution had led to an increase in farm production and consequently, income of farmers (Sain *et al.*, 1978). But the technology led to sustained unbalanced growth among the different regions, and widened the income disparities among the farm population in the same region as a result of the unequal sharing of benefits between the small and large farmers (Chowdhury, 1970). The Green Revolution had aggravated the existing disparities in the levels of income in the different regions and segments of the society (Nagaraja & Bathaiah, 1985; and Sadhu & Mahajan, 1980).

Singh *et al.* (2017a) examined the levels and pattern of income of farmers across the regions in rural Punjab. The study revealed that the average household and per capita income of an average farm household was the highest in the Central Plains, followed by South-West, and Shivalik Foothills regions; and the distribution of per household and per capita income was relatively more uneven in the Shivalik Foothills region. Kaur *et al.* (2018) revealed that there were considerable variations in the income levels of farmers across the regions in rural areas of Punjab. Farm households in all the regions supplemented their income with allied activities like dairying. Income level of farmers in the highly developed region namely Central Plains region was relatively high in comparison to the Shivalik Foothills and South-West regions which were less developed regions. Kaur (2016) organized a study to examine the socio-economic conditions of farmers in rural Punjab, and revealed that the average household income of farmers in the Shivalik Foothills region is low because of agricultural productivity of this region is low due to small landholdings, lack of irrigation facilities, declining soil fertility, etc.

The present study is an attempt to analyse the inter-regional levels, patterns, and distribution of income among the farm households in the rural areas of Punjab.

RESEARCH METHODOLOGY

For the purpose of the study, the multi-stage random sampling technique has been used to select the districts, development blocks, villages, and households. The whole state of Punjab was divided into three agricultural productivity regions. For calculating agricultural productivity, output of major ten crops was aggregated; and then, average of these crops was taken for the year 2013-14. The high productivity region consists of Moga, Jalandhar, Ludhiana, Sangrur, Kapurthala, Barnala, and Fatehgarh Sahib districts. The medium productivity region comprises Firozpur, Patiala, Faridkot, Hoshiarpur, S. B. S. Nagar, S. A. S. Nagar, Tarn Taran, and Bathinda districts. The low productivity region constitutes Amritsar, Sri Muktsar Sahib, Rupnagar, Mansa, Fazilka, Gurdaspur, and Pathankot districts. In order to cover the agro-climatic zones of the state and avoid the geographical contiguity, Ludhiana has been selected from the high productivity region (represent the Central Plains Zone), S. A. S. Nagar from the medium productivity region (represent the Shivalik Foothills Zone), and Mansa from the low productivity region (represent the South-West Zone). The survey includes all the development blocks; twenty-one development blocks in all were selected; and one village from each development block was selected. As many as 10 per cent farm households out of the total farm households were selected randomly for the survey. Thus, a representative sample of 510 farm households was taken up for the purpose of this study. Out of these, 264, 114, and 132 farm households were from Ludhiana, S.A.S. Nagar, and Mansa districts respectively. The present study relates to the agricultural year 2015-16. The statistical tools and techniques such as mean values and percentages have been used for tabular analysis. The Gini Coefficient values have been calculated to analyse the inter-regional income distribution.

RESULTS AND DISCUSSION

Levels of Household Income

The average annual income earned by the different farm-size categories across the regions has been presented in Table 1. The table reveals that the average annual income of an average farm household is the highest (Rs. 450087.00) in the high, followed by medium (Rs. 362801.00) and low (Rs. 355366.33) productivity regions. There are considerable differences in the income levels across the regions. In the high productivity region, an average farm household earns income worth Rs. 322523.56 as farm business income, Rs. 89177.45 from the sale of milk and milk products, Rs. 10568.18 by hiring out agricultural machinery/equipments, and Rs. 6704.55 through remittances. In the medium productivity region, farm business income is the important source of income contributing Rs. 280371.26 for an average farm household, followed by the sale of milk and milk products (Rs. 54368.33), pensions (Rs. 7026.32), and private service (Rs. 4947.37). In the low productivity region, farm business income contributes Rs. 279431.00 for an average farm household, followed by the sale of milk and milk products (Rs. 25869.41), leased out land (Rs. 16458.33), and hiring out agricultural machinery/equipments (Rs. 14352.27). The average household income is the maximum in the high productivity region, and the minimum in the low productivity region. The farm business income is higher among all the farm-size categories in the medium productivity region as compared to the other two regions. In this region, farmers have adopted crop diversification; and they have grown sunflower, maize, *basmati*, paddy, wheat, sugarcane, vegetables, and other crops. The vegetable crops are sold in the market of Chandigarh at relatively higher prices. In the high and low productivity regions, there is a lack of crop diversification due to unavailability of proper marketing system as well as Minimum Support Prices (MSP). The field survey has revealed the fact that farmers in the high productivity region are unable to divert to crops of vegetables, and also finding it difficult to sell their production at profitable rates on time. They do not have the capacity to pay rent of cold stores for storing their produce.

Table 1
Levels of Income of Farmers

(Mean Values in Rs. Per Annum)

Sources of Income	Marginal Farmers	Small Farmers	Semi-medium Farmers	Medium Farmers	Large Farmers	All Sampled Farmers
High Productivity Region						
Farm business income	110797.66 (60.01) [22674.87]	185018.68 (67.11) [35779.69]	363964.74 (73.33) [58234.36]	667450.78 (73.63) [90773.31]	1408222.36 (78.93) [214294.71]	322523.56 (71.67) [57145.11]
Sale of milk and milk products	57647.56 (31.22) [11797.64]	71560.33 (25.95) [13838.64]	90283.46 (18.19) [14445.35]	140543.76 (15.50) [19113.95]	254146.43 (14.24) [38674.46]	89177.45 (19.81) [15800.57]
Sale of livestock	1647.73 (0.89) [337.21]	1473.68 (0.53) [284.99]	2115.38 (0.43) [338.46]	6176.47 (0.68) [840.00]	7142.86 (0.40) [1086.96]	2564.39 (0.57) [454.36]
Rent from leased out land	596.59 (0.32) [122.09]	921.05 (0.33) [178.12]	0.00 (0.00) [0.00]	13411.76 (1.48) [1824.00]	0.00 (0.00) [0.00]	2191.29 (0.49) [388.26]
Hiring out labour in agricultural sector	426.14 (0.23) [87.21]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	142.05 (0.03) [25.17]
Hiring out labour in non-agricultural sector	3159.09 (1.71) [646.51]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	1053.03 (0.23) [186.58]
Hiring out agricultural machinery/equipments	1136.36 (0.62) [232.56]	3684.21 (1.34) [712.47]	16346.15 (3.29) [2615.38]	29705.88 (3.28) [4040.00]	39285.71 (2.20) [5978.26]	10568.18 (2.35) [1872.48]
Sale of seeds	17.05 (0.01) [3.49]	0.00 (0.00) [0.00]	2403.85 (0.48) [384.62]	5882.35 (0.65) [800.00]	0.00 (0.00) [0.00]	1236.74 (0.27) [219.13]
Sale of irrigation water	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]
Interest on lending money	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	1634.62 (0.33) [261.54]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	321.97 (0.07) [57.05]
Pensions	3788.64 (2.05) [775.35]	1934.21 (0.70) [374.05]	4009.62 (0.81) [641.54]	5470.59 (0.60) [744.00]	15428.57 (0.86) [2347.83]	4132.20 (0.92) [732.15]
Remittances	568.18 (0.31) [116.28]	5789.47 (2.10) [1119.59]	11538.46 (2.32) [1846.15]	9705.88 (1.07) [1320.00]	25000.00 (1.40) [3804.35]	6704.55 (1.49) [1187.92]
Scholarships	198.86 (0.11) [40.70]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	58.82 (0.01) [8.00]	0.00 (0.00) [0.00]	73.86 (0.02) [13.09]
Government service	163.64 (0.09) [33.49]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	22285.71 (1.25) [3391.30]	1236.36 (0.27) [219.06]
Private service	4022.73 (2.18)	5178.95 (1.88)	2307.69 (0.46)	18176.47 (2.00)	12857.14 (0.72)	6309.09 (1.40)

	[823.26]	[1001.53]	[369.23]	[2472.00]	[1956.52]	[1117.85]
Small business	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	961.54 (0.19) [153.85]	10000.00 (1.10) [1360.00]	0.00 (0.00) [0.00]	1477.27 (0.33) [261.74]
Rent from buildings/ shops, etc.	409.09 (0.22) [83.72]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	136.36 (0.03) [24.16]
Others*	56.82 (0.03) [11.63]	171.05 (0.06) [33.08]	865.38 (0.17) [138.46]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	238.64 (0.05) [42.28]
Total	**184636.13 (100.00) [37786.00]**	**275731.64 (100.00) [53322.15]**	**496430.89 (100.00) [79428.94]**	**906582.78 (100.00) [123295.26]**	**1784368.79 (100.00) [271534.38]**	**450087.00 (100.00) [79746.96]**
Medium Productivity Region						
Farm business income	122862.24 (66.99) [21879.58]	192781.64 (71.88) [28748.14]	368115.71 (78.58) [55217.36]	673593.34 (87.29) [84199.17]	1438399.30 (83.68) [128428.51]	280371.26 (77.28) [42960.11]
Sale of milk and milk products	44074.04 (24.03) [7848.80]	59051.18 (22.03) [8805.88]	38300.00 (8.18) [5745.00]	47890.91 (6.21) [5986.36]	182400.00 (10.61) [16285.71]	54368.33 (14.99) [8330.63]
Sale of livestock	1153.85 (0.63) [205.48]	1176.47 (0.44) [175.44]	15833.33 (3.38) [2375.00]	5272.73 (0.71) [659.09]	0.00 (0.00) [0.00]	3052.63 (0.84) [467.74]
Rent from leased out land	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	916.67 (0.20) [137.50]	5454.55 (0.68) [681.82]	0.00 (0.00) [0.00]	622.81 (0.17) [95.43]
Hiring out labour in agricultural sector	288.46 (0.16) [51.37]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	131.58 (0.04) [20.16]
Hiring out labour in non-agricultural sector	2538.46 (1.38) [452.05]	2500.00 (0.93) [372.81]	0.00 (0.00) [0.00]	7636.36 (0.99) [954.55]	0.00 (0.00) [0.00]	2640.35 (0.73) [404.57]
Hiring out agricultural machinery/equipments	961.54 (0.52) [171.23]	1323.53 (0.49) [197.37]	2500.00 (0.53) [375.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	1096.49 (0.30) [168.01]
Sale of seeds	4711.54 (2.57) [839.04]	2058.82 (0.77) [307.02]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	14000.00 (0.81) [1250.00]	3377.19 (0.93) [517.47]
Sale of irrigation water	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]
Interest on lending money	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]
Pensions	4413.46 (2.41) [785.96]	5235.29 (1.95) [780.70]	20291.67 (4.33) [3043.75]	13636.36 (1.77) [1704.55]	0.00 (0.00) [0.00]	7026.32 (1.94) [1076.61]
Remittances	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	30000.00 (1.75) [2678.57]	1315.79 (0.36) [201.61]
Scholarships	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]
Government service	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	13500.00 (2.88) [2025.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	1421.05 (0.39) [217.74]
Private service	2307.69 (1.26) [410.96]	2823.53 (1.05) [421.05]	9000.00 (1.92) [1350.00]	10909.09 (1.41) [1363.64]	24000.00 (1.40) [2142.86]	4947.37 (1.36) [758.06]
Small business	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	7272.73 (0.94) [909.09]	0.00 (0.00) [0.00]	701.75 (0.19) [107.53]

Rent from buildings/ shops, etc.	96.15 (0.05) [17.12]	352.94 (0.13) [52.63]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	149.12 (0.04) [22.85]
Others	0.00 (0.00) [0.00]	882.35 (0.33) [131.58]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	30000.00 (1.75) [2678.57]	1578.95 (0.44) [241.94]
Total	**183407.43 (100.00) [32661.60]**	**268185.76 (100.00) [39992.61]**	**468457.38 (100.00) [70268.61]**	**771666.07 (100.00) [96458.26]**	**1718799.30 (100.00) [153464.22]**	**362801.00 (100.00) [55590.48]**
Low Productivity Region						
Farm business income	87901.00 (70.72) [20481.80]	183287.24 (75.39) [36443.08]	275982.10 (77.13) [47996.89]	568430.94 (83.08) [107702.71]	1197318.50 (81.37) [134909.13]	279431.00 (78.62) [54162.84]
Sale of milk and milk products	18495.78 (14.87) [4309]	29151.03 (11.99) [5796.11]	28979.17 (8.09) [5039.86]	28701.67 (4.19) [5438.21]	40462.50 (2.75) [4559.15]	25869.41 (7.28) [5014.34]
Sale of livestock	3437.50 (2.77) [800.97]	5838.24 (2.40) [1160.82]	2291.67 (0.64) [398.55]	6277.78 (0.92) [1189.47]	3125.00 (0.21) [352.11]	4215.91 (1.19) [817.18]
Rent from leased out land	0.00 (0.00) [0.00]	9764.71 (4.03) [1941.52]	15562.50 (4.35) [2706.52]	24555.56 (3.59) [4652.63]	128125.00 (8.71) [14436.62]	16458.33 (4.63) [3190.16]
Hiring out labour in agricultural sector	2187.50 (1.76) [509.71]	441.18 (0.18) [87.72]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	909.09 (0.26) [176.21]
Hiring out labour in non-agricultural sector	1562.50 (1.26) [364.08]	2117.65 (0.87) [421.05]	2083.33 (0.58) [362.32]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	1492.42 (0.42) [289.28]
Hiring out agricultural machinery/equipments	3333.33 (2.68) [776.70]	2058.82 (0.85) [409.36]	16854.17 (4.71) [2931.16]	39444.44 (5.76) [7473.68]	68750.00 (4.67) [7746.48]	14352.27 (4.04) [2781.94]
Sale of seeds	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]
Sale of irrigation water	0.00 (0.00) [0.00]	147.06 (0.06) [29.24]	208.33 (0.06) [36.23]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	75.76 (0.02) [14.68]
Interest on lending money	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	25000.00 (1.70) [2816.90]	1515.15 (0.43) [293.69]
Pensions	4177.08 (3.36) [973.30]	5205.88 (2.14) [1035.09]	1125.00 (0.31) [195.65]	2933.33 (0.43) [555.79]	1500.00 (0.10) [169.01]	3555.30 (1.00) [689.13]
Remittances	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	2500.00 (0.70) [434.78]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	454.55 (0.13) [88.11]
Scholarships	593.75 (0.48) [138.35]	397.06 (0.16) [78.95]	750.00 (0.21) [130.43]	0.00 (0.00) [0.00]	1250.00 (0.08) [140.85]	530.30 (0.15) [102.79]
Government service	0.00 (0.00) [0.00]	2673.53 (1.10) [531.58]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	6000.00 (0.41) [676.06]	1052.27 (0.30) [203.96]
Private service	1250.00 (1.02) [291.26]	0.00 (0.00) [0.00]	11041.67 (3.09) [1920.29]	4666.67 (0.68) [884.21]	0.00 (0.00) [0.00]	3098.48 (0.87) [600.59]
Small business	1354.17 (1.08) [315.53]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	8888.89 (1.30) [1684.21]	0.00 (0.00) [0.00]	1704.55 (0.48) [330.40]
Rent from buildings/ shops, etc.	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]	0.00 (0.00) [0.00]

Others	0.00 (0.00) [0.00]	2029.41 (0.83) [403.51]	458.33 (0.13) [79.71]	333.33 (0.05) [63.16]	0.00 (0.00) [0.00]	651.52 (0.18) [126.28]
Total	**124292.68** **(100.00)** **[28961.40]**	**243111.80** **(100.00)** **[48338.02]**	**357836.27** **(100.00)** **[62232.39]**	**684232.61** **(100.00)** **[129644.07]**	**1471531.00** **(100.00)** **[165806.31]**	**355366.33** **(100.00)** **[68881.58]**

Source: Field Survey, 2015-16
*Others include income from tailoring, hiring out vehicles, poultry, piggery, bee-keeping, etc.
Figures in brackets ( ) represent percentage of the total income.
Figures in brackets [ ] represent per capita income.

The results show that the farm business income is the major source of income across the regions. The relative share of farm business income in the total income is the highest (78.62 per cent) in the low, followed by medium (77.28 per cent) and high (71.67 per cent) productivity regions. In the high productivity region, an average farm household earns 19.81, 2.35, and 1.49 per cent income from the sale of milk and milk products, hiring out agricultural machinery/equipments, and remittances respectively. An average farm household in the medium productivity region earns 14.99, 1.94, and 1.36 per cent income from the sale of milk and milk products, pensions, and private service respectively. The relative shares of income from the sale of milk and milk products (7.28 per cent), rent from leased out land (4.63 per cent), and hiring out agricultural machinery/equipments (4.04 per cent) rank at the second, third, and fourth positions respectively in the low productivity region. It has been observed that the proportion of farm business income in the total income is the highest in the low productivity region because all the farm-size categories mainly depend on agricultural sector for their livelihood due to lack of other employment opportunities. All the farm-size categories enhance their income with non-farm activities across all the regions.

In the case of marginal farm-size category, the relative share of farm business income is the highest (70.72 per cent) in the low, followed by medium (66.99 per cent) and high (60.01 per cent) productivity regions. The proportionate share of income from the sale of milk and milk products appears at the second position across all the regions for this farm-size category. The relative share of income from this source is the highest (31.22 per cent) in the high, followed by medium (24.03 per cent) and low (14.87 per cent) productivity regions. In the high productivity region, 2.18, and 2.05 per cent of the total income comes from private service, and pensions respectively. In the medium productivity region, the next important sources of income are the sale of seeds, and pensions with relative shares of 2.57, and 2.41 per cent respectively for the marginal farm-size category. In the low productivity region, the marginal farm-size category acquires 3.36 per cent of the total income from pensions, and 2.77 per cent from the sale of livestock. The field survey has shown that the farmers from marginal farm-size category in the medium productivity region augment their income through production of seeds of onion, carrot, potato, and some other crops. It has also been observed from the field survey that the marginal farm-size category in the low productivity region owns relatively small, less productive, and scattered land holdings. In this region, the farmers from this farm-size category are unable to increase their meagre income by bringing more area under commercial crops through leased in land. They have not been given land on lease in the villages because after the cotton crop-failure, their economic condition has become more miserable, and the rent of leased in land of the previous years has not been paid yet by some households.

For the small farm-size category, the proportionate share of farm business income in the total income is the highest (75.39 per cent) in the low, followed by medium (71.88 per cent) and high (67.11 per cent) productivity regions. In the high productivity region, the sale of milk and milk products (25.95 per cent) is the second important source of income, followed by remittances (2.10 per cent), and private service (1.88 per cent). The proportionate share of income from the sale of milk and milk products (22.03 per cent), pensions (1.95 per cent), and private service (1.05 per cent) appears at the second, third, and fourth ranks respectively in the medium productivity region for this farm-size category. In the low productivity region, the small farm-size category gets 11.99 per cent of the total income from the sale of milk and milk products, 4.03 per cent from leased out land, and 2.40 per cent from the sale of livestock.

For the semi-medium farm-size category, the relative share of farm business income is the highest (78.58 per cent) in the medium, followed by low (77.13 per cent) and high (73.33 per cent) productivity regions. In the high productivity region, the semi-medium farm-size category earns 18.19 per cent of the total income from the sale of milk and milk products, 3.29 per cent from hiring out agricultural machinery/equipments, and 2.32 per cent from remittances. In the medium productivity region, average income from the sale of milk and milk products (8.18 per cent), pensions (4.33 per cent), and the sale of livestock (3.38 per cent) comes at the second, third, and fourth positions respectively. In the low productivity region, the semi-medium farm-size category receives 8.09 per cent of the total income from the sale of milk and milk products, 4.71 per cent from hiring out agricultural machinery/equipments, and 4.35 per cent from rent of leased out land. The relative share of income from remittances is the highest for the semi-medium farm-size category in the high productivity region because the number of migrated persons is the highest particularly for this farm-size category in this region. The field survey also brings out that the semi-medium farm-size category in the medium productivity region has better access to government jobs.

For the medium farm-size category, there are considerable variations in the relative share of farm business income across the regions. The medium productivity region has recorded the highest (87.29 per cent) share of farm business income, followed by the low (83.08 per cent) and high (73.63 per cent) productivity regions. In the high productivity region, the medium farm-size category gets 15.50 per cent of the total income from the sale of milk and milk products, 3.28 per cent from hiring out agricultural machinery/equipments, and 2.00 per cent from private service. In the medium productivity region, the relative share of income from the sale of milk and milk products (6.21 per cent), pensions (1.77 per cent), and private service (1.41 per cent) occupies the second, third, and fourth places respectively for this farm-size category. In the low productivity region, the proportionate share of income from hiring out agricultural machinery/equipments (5.76 per cent) ranks at the second; the sale of milk and milk products (4.19 per cent) ranks at the third; and rent from leased out land (3.59 per cent) ranks at the fourth place for this farm-size category. The medium farm-size category in the low productivity region has earned relatively more income from hiring out agricultural machinery/equipments as compared to other farm-size categories across the regions.

The percentage share of farm business income in the total income for the large farm-size category is 78.93, 83.68, and 81.37 for the high, medium, and low productivity regions respectively. In the high productivity region, the large farm-size category earns 14.24, 2.20, and 1.40 per cent of the total income from the sale of milk and milk products, hiring out agricultural machinery/equipments, and remittances respectively. In the medium productivity region, this farm-size category earns 10.61 per cent of the total income from the sale of milk and milk products, 1.75 per cent each from remittances, and other sources. In the low productivity region, the relative share of income from rent from leased out land (8.71 per cent), hiring out agricultural machinery/equipments (4.67 per cent), and the sale of milk and milk products (2.75 per cent) has occupied the second, third, and fourth place respectively for the large farm-size category. The field survey has revealed that the large farm-size category in the high productivity region is able to utilize agricultural machinery/equipments more efficiently at the minimum cost and with the maximum possible subsidies. In the medium productivity region, the large farm-size category households augment their income by hiring out transport vehicles.

However, the average family size varies from one farm-size category to another across the regions. Due to the differences in the average family size, it becomes imperative to study the per capita income levels across the regions. The results further reveals that the per capita income of an average farm household is worth Rs. 79746.96 per annum in the high, followed by low (Rs. 68881.58) and medium (Rs. 55590.48) productivity regions. The farm business income is an important component of per capita income across all the regions, followed by the sale of milk and milk products. The per capita income from farm business of an average farm household is Rs. 57145.11, Rs. 42960.11, and Rs. 54162.84 for the high, medium, and low productivity regions respectively. The per capita income from the sale of milk and milk products is the highest (Rs. 15800.57) in the high, followed by medium (Rs. 8330.63) and low (Rs. 5014.34) productivity regions. The category-wise analysis reveals that the per capita income for the marginal, small, semi-medium, and large farm-size categories is the highest, *i.e.*, Rs. 37786.00, Rs. 53322.15, Rs. 79428.94, and Rs. 271534.38 respectively in the high productivity region. However, the per capita income for the medium farm-size category is the highest, *i.e.*, Rs. 129644.07 in the low productivity region. The per capita income earned by the marginal, and semi-medium farm-size categories is the lowest, *i.e.*, Rs. 28961.40, and Rs. 62232.39 respectively in the low productivity region. The small, medium, and large farm-size categories earn the lowest per capita income, *i.e.*, Rs. 39992.61, Rs. 96458.26, and Rs. 153464.22 respectively in the medium productivity region. The field survey has revealed that the farm households in the high productivity region are economically better placed as compared to the medium and low productivity regions.

Distribution of Per Household Income

The inequalities in the distribution of income across the regions have been worked out by taking the cumulative percentages of per household and per capita income for each decile group after arranging the same in an ascending order. Table 2 demonstrates the distribution of household income across the regions. The table reveals that the distribution of household income is relatively more uneven in the high productivity region. The bottom 10 per cent farm households share 0.13 per cent of the total income, whereas the top 10 per cent farm households share 38.45 per cent of the total income in this region. The bottom 10 per cent farm households in the medium, and low productivity regions appropriate 1.12, and 1.23 per cent of the total income, and the top 10 per cent farm households share 37.97, and 37.26 per cent of the total income respectively. It is clear that the bottom 70 per cent farm households share 33.45, 31.74, and 32.66 per cent of the total income in the high, medium, and low productivity regions respectively. It is evident that the share of income earned by the bottom 70 per cent farm households is less than the share of income of the top 10 per cent farm households across all the regions.

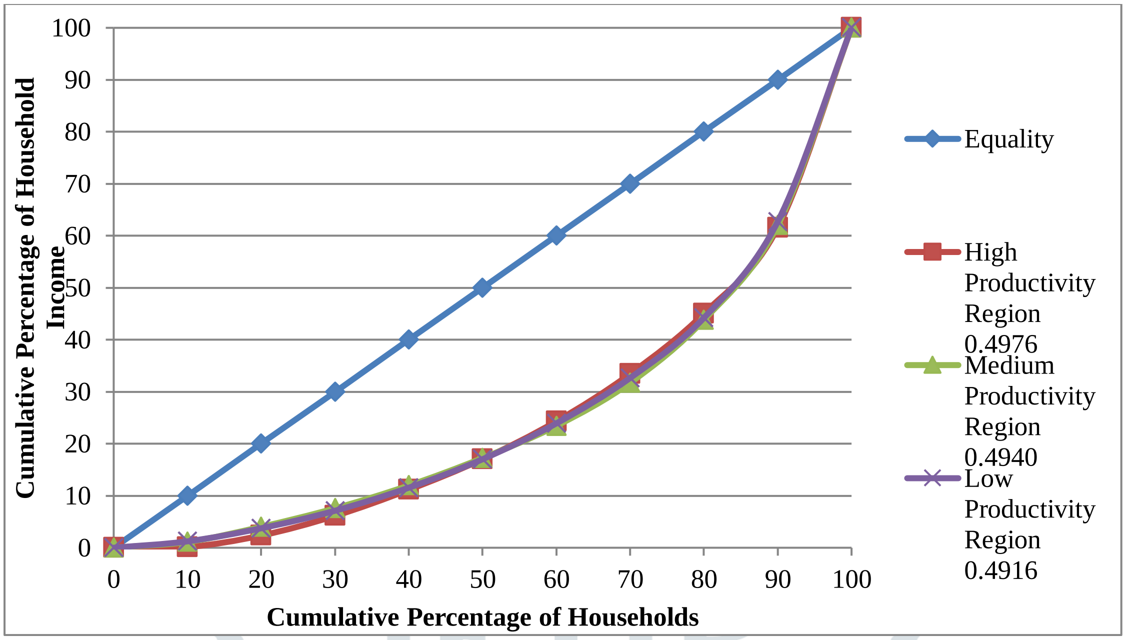
Table 2
Distribution of Per Household Income of Farmers

Cumulative Percentage of Households	Cumulative Percentage of Household Income		
	High Productivity Region	Medium Productivity Region	Low Productivity Region
10	0.13	1.12	1.23
20	2.35	4.03	3.75
30	6.13	7.58	7.12
40	11.15	11.97	11.55
50	17.04	17.26	17.03
60	24.32	23.44	23.92
70	33.45	31.74	32.66
80	45.07	43.84	44.22
90	61.55	62.03	62.74
100	100.00	100.00	100.00
Gini Coefficient	**0.4976**	**0.4940**	**0.4916**

Source: Field Survey, 2015-16

The Gini Coefficient values for the high, medium, and low productivity regions are 0.4976, 0.4940, and 0.4916 respectively. It proves that the concentration of household income is highly skewed in the high productivity region, followed by the medium productivity region, whereas the low productivity region has less skewed distribution of income. The Lorenz Curves drawn in Figure 1 clearly describe the concentration of household income across the regions.

Figure 1
Concentration of Household Income across Regions



Note: Based on Table 2

The figure highlights that there is relatively a large gap between the Lorenz Curve of the high productivity region and the line of equality. On the other hand, the difference between the line of equality and the Lorenz Curve of the low productivity region is relatively less. It reflects that inequality in household income is the maximum in the high productivity region, and the minimum in the low productivity region.

Distribution of Per Capita Income

The distribution of per capita income across the regions has been displayed in Table 3. The table reveals that the bottom 10 per cent persons of the farm households share only 0.45 per cent of the total per capita income in the high productivity region, whereas the corresponding figures for the medium, and low productivity regions are 1.31, and 1.63 per cent respectively. The top 10 per cent persons of the farm households share 34.08, 31.89, and 28.83 per cent of the total per capita income in the high, medium, and low productivity regions respectively.

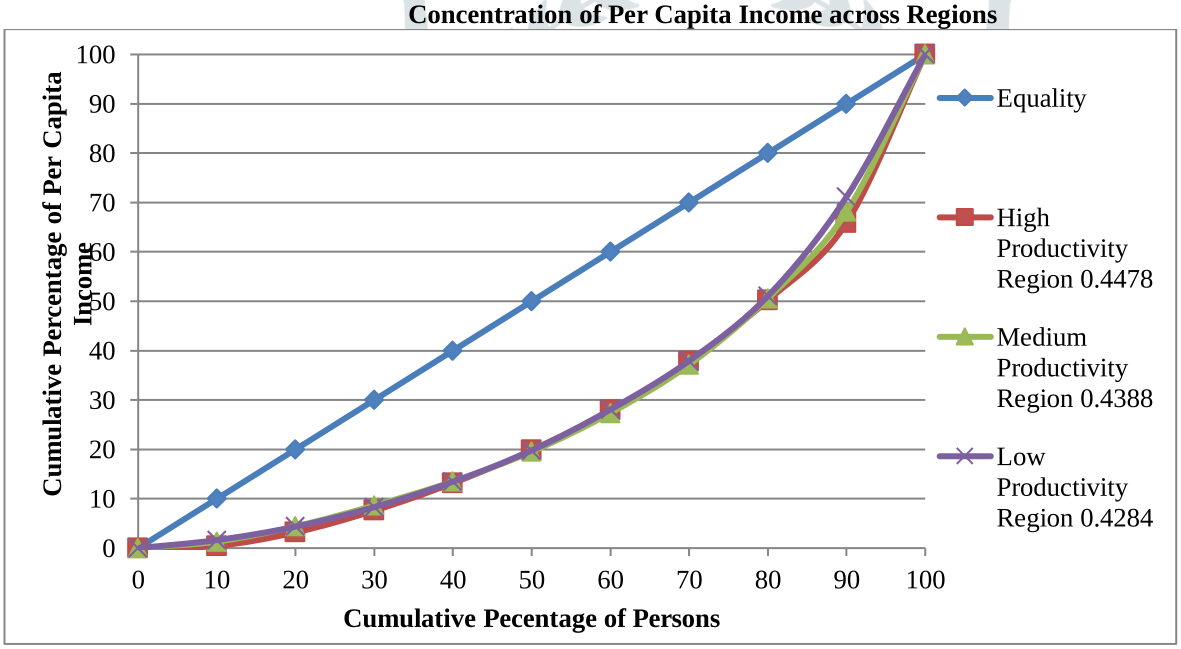
Table 3
Distribution of Per Capita Income of Farmers

Cumulative Percentage of Persons	Cumulative Percentage of Per Capita Income		
	High Productivity Region	Medium Productivity Region	Low Productivity Region
10	0.45	1.31	1.63
20	3.18	4.41	4.36
30	7.60	8.63	8.31
40	13.18	13.50	13.46
50	19.86	19.54	19.80
60	27.95	27.36	28.06
70	37.76	37.16	37.94
80	50.21	50.56	51.05
90	65.92	68.11	71.17
100	100.00	100.00	100.00
Gini Coefficient	**0.4478**	**0.4388**	**0.4284**

Source: Field Survey, 2015-16

In the comparison of share of the bottom 60 per cent persons with that of the top 10 per cent persons of the farm households, it is clear that the bottom 60 per cent persons of the farm households share 27.95, 27.36, and 28.06 per cent of the total per capita income in the high, medium, and low productivity regions respectively; and this share is less than that of the top 10 per cent persons of the farm households across all the regions. The distribution of per capita income is more uneven in the high, followed by medium and low productivity regions. The Gini Coefficient values for the high, medium, and low productivity regions are 0.4478, 0.4388, and 0.4284 respectively. The Lorenz Curves drawn in Figure 2 show the distribution of per capita income. It is observed that there is a large difference between the Lorenz Curve of the high productivity region and the line of equality. Thus, the concentration of per capita income is greater in the high productivity region. On the other hand, the low productivity region has less uneven distribution of per capita income because the difference between the Lorenz Curve of this region and the line of equality is relatively small. It is clear that inequalities in the distribution of per household income are greater than the per capita income across all the regions.

Figure 2
Concentration of Per Capita Income across Regions



Note: Based on Table 3

Conclusions and Policy Implications

The results of the study reveal that the average income of farm households is the highest in the high, followed by medium and low productivity regions. Farm business income has appeared at the first position, followed by income from the sale of milk and milk products across all the regions. The average farm business income is relatively higher in the medium productivity region due to the fact that farmers follow multiple cropping pattern. In the low productivity region, farmers have less farm business income due to low agricultural productivity. In order to enhance soil fertility in this region, soil health cards should be prepared for every farmer, and then, educate them about the proper use of fertilisers based on soil and crop-based parameters (Punjab State Farmers' and Farm Workers' Welfare Commission, 2018). Crop diversification from wheat-rice cropping pattern to other crops needs to be encouraged along with assured procurement at Minimum Support Prices. Farmers should be persuaded to go for labour intensive crops which give more returns against their labour. The remunerative prices of different crops, suitable for the state of Punjab must be announced and implemented (Singh *et al.,* 2017b). In order to generate gainful employment opportunities and assured additional income, agro-based industries should be established at the village level. It can help the farmers to sell their produce at fair prices without the exploitation of middlemen and traders. There is a need to establish producers' co-operatives in agro-based industries. It will provide gainful employment opportunities at their native place and the benefits of value addition would go to the farmers (Kaur *et al.,* 2018). The low productivity region should be the focus of such activities because farmers do not get sufficient job opportunities outside the agricultural sector.

The results highlight that the relative share of income from dairying is quite less in the low productivity region (7.29 per cent) as compared to the high (19.81 per cent) and medium (14.99 per cent) productivity regions. Thus, dairy farming should be encouraged in the low productivity region and other subsidiary occupations like poultry, piggery, bee keeping, fishery, etc. should be developed for raising the income of farmers. The government should provide loans either interest free or at low rates of interest for promoting subsidiary occupations and some training programmes must be organised in their native language to educate the farmers about subsidiary occupations. The study further shows that the distribution of household income is more uneven among the farm household across all the regions. Land reforms should be implemented earnestly and the distribution of land in favour of the marginal and small farm-size category farmers will increase their size of land holdings and farm business income as well.

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