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## Role of Non-Farm Sector in Sustaining Rural Livelihoods in Punjab<sup>§</sup>

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### Abstract

The role of non-farm sector has been examined in promoting rural livelihoods in the state of Punjab, especially of the landless and marginal farm households who are often poor and derive a sizeable proportion of their income from non-farm activities. The non-farm income sources have been found to contribute towards reduction in income inequality. Owing to their lower level of education, lack of skills and capital, these households are engaged in relatively less-remunerative activities. The determinants of participation in non-farm activities have been identified and it has been found that larger family size, higher dependency ratio, small landholdings and social backwardness motivate farm households to participate more in the non-farm sector. Improvement in education and skills and creation of productive assets are crucial for enhancing their participation in more remunerative income-generating non-farm activities.

**Key words:** Non-farm sector, poor farmers, income inequality, rural livelihoods, Punjab

**JEL Classification:** D31, D63, I32, J40

### Introduction

The rural livelihoods in Punjab are under a continuous process of structural transformation in response to the dynamic changes taking place in the state economy. It has been a common tendency of households to diversify their income, assets and activities to enhance income and reduce risk; yet, hardly few households trace their total income to a single source. Hence, 'diversification is a norm' (Barrett *et al.*, 2001). However, there is a considerable difference in the nature and extent of livelihood diversification.

Diversification in employment and income is pronounced among those rural households which have

lower income levels and inadequate resource-base for engaging themselves in more productive income-generating activities, whereas the rich households diversify their economic base to further boost their already higher income levels (Vatta and Sidhu, 2007). The pattern of diversification depends on asset endowments, education, gender and proximity to the urban area (Little 2001).

Income diversification is largely driven by two sets of factors, namely *push factors* such as increasing risks in agriculture, declining profitability, increasing land fragmentations and mounting pressure on land which leads to a continuous fall in land-man ratio, and *pull factors* which are driven by the complementarities between farm and non-farm activities that create strong forward and backward linkages (Barrett *et al.*, 2001; Bhaumik, 2007). Basant and Joshi (1994) have identified that the diversification in agriculturally-developed villages of Gujarat was driven by economic growth and market demand. A similar pattern was

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explored by Ghosal (2007) based on the NSSO data. Unni (1991) has recorded a positive relation between agricultural productivity and non-agricultural employment. On the other hand, Verma and Verma (1995) have highlighted the distress-driven diversification from the farm to non-farm sector. Vatta and Sidhu (2007) have found that rural households in Punjab are engaged in 'last resort activities' in the non-farm sector, thus indicating distress diversification in the state (see also, Eapen, 2001; Ghuman, 2005).

The agrarian economy of Punjab which witnessed a high agricultural growth trajectory during the green revolution era, has now reached a plateau with agricultural growth experiencing a stagnation (Joshi, 2004). Agrarian crisis, backed by the soaring energy prices and inflationary pressure at the macroeconomic level, has further aggravated the vulnerability of rural livelihoods. Today, rural households have all the more strong reasons to be 'multi-active' in income and employment generating activities. While the importance of non-farm income has been increasing for all rural households, it is more pronounced for the landless, marginal and small farmers (Saleth, 1997; Vatta *et al.*, 2008). The non-farm sector has been an important alternative source to farm income, providing an opportunity for the sustenance of rural livelihoods. This paper discusses the nature of income diversification across different categories of rural households in Punjab, and its impact on income distribution.

## Data

The study is based on the primary data collected from 94 rural households in Punjab, selected by applying multistage random sampling procedure. At the first stage, the state was stratified into low, medium and high non-farm employment intensity districts based on the proportion of total workers engaged in the non-farm activities and this information was obtained from the *Statistical Abstracts of Punjab*. One district from each of these three categories of non-farm employment was selected for the study, viz. Ferozepur from low intensity, Kapurthala from medium intensity and Ludhiana from high intensity districts. At the next stage, one block from each district and then two villages from each block were selected for the survey. A list of all the households in each village was prepared and the households were classified based on their operational

landholding sizes: non-cultivating or landless, marginal (< 1 ha), small (1-2 ha), medium (2-6 ha) and large (> 6 ha). In each village, 14-18 households representing different land classes were selected in probability proportional to their size.

## Analytical Procedure

The proportion of workers employed in different activities and the extent of income accruing from these were estimated. The extent of income diversification was measured using Herfindahl's diversification index (DI). The value of the index ranges between 0 and 1; a larger value shows higher level of income diversification. The index was computed as per Equation (1):

$$DI = 1 - \sum_{i=1}^k S_i^2 \quad \dots(1)$$

where,  $S_i$  is the proportion of income from the  $i^{\text{th}}$  income source in the total household income.

The household income was classified into four broad categories, viz. agricultural income, non-farm income, transfer income and other income. Agricultural income included income from crops, livestock, farm labour and the related activities. Transfer income consisted of the income from external as well as internal remittances and social security provisions such as old age/widow pension schemes and pensions after retirement. The 'other income' comprised rental income from agricultural and non-agricultural assets. Non-farm income sources were classified according to the National Industrial Classification, 2004.

The impact of an income source on overall inequality, either positive or negative, was examined using Gini decomposition procedure developed by Lerman and Yitzhaki (1985). The Gini coefficient in income is calculated as per Equation (2):

$$G = 2 \text{cov}[y, F(y)] / \bar{y} \quad \dots(2)$$

where,  $y$  and  $\bar{y}$  are the total and average income of the individuals, respectively, and  $F(y)$  is the cumulative distribution of income.

Gini decomposition analysis was carried out using Lerman and Yitzhaki's method (1985) as follows:

$$G = 2 \sum_{k=1}^K \text{cov}(y_k, F) / \bar{y} \quad \dots(3)$$

where,  $K$  is the number of income sources of the  $i^{\text{th}}$  household and  $\text{cov}(y_k, F)$  gives the covariance of an income source with cumulative distribution of total household income. The inequality estimate for a source is obtained by Equation (4):

$$G = \sum_{k=1}^K [\text{cov}(y_k, F) / \text{cov}(y_k, F_k)] \left[ 2 \text{cov}(y_k, F_k) / \bar{y}_k \left[ \bar{y}_k / \bar{y} \right] \right] \dots(4)$$

This can be summarized as:

$$G = \sum_{k=1}^K R_k G_k S_k \dots(5)$$

where,

$R_k = \text{cov}(y_k, F) / \text{cov}(y_k, F_k)$  is the Gini correlation between total income and source income ( $k$ ),

$G_k = 2 \text{cov}(y_k, F_k) / \bar{y}_k$  is the Gini coefficient of income source, and

$S_k = \bar{y}_k / \bar{y}$  gives the share of an income source in the total income,

The determinants of households' participation in a particular income-generating source were identified using probit analysis (Gujrati and Sangeetha, 2007). The estimated probit model is:

$$Pi = (Y = 1 / X) = F(\beta_1 + \beta_2 Xi) \dots(6)$$

where,  $F$  is the standard normal cumulative distribution function given by,

$$F = 1 / \sqrt{2\pi} \int_{-\alpha}^{\beta_1 + \beta_2 Xi} e^{-z^2/2} dz$$

and  $Y$  is a dichotomous dependent variable taking a value of 1 for those having access to a particular income source; 0 otherwise.

### Characteristics of Rural Households in Punjab

Some key characteristics of the sample rural households have been presented in Table 1. The average size of a rural household was of 6 persons. The average schooling was of 5 years; the large farm households had the higher level of schooling, while the landless had the lower level of schooling.

The landholding is a proxy of wealth, and it is evident from Table 1 that land distribution was highly disproportionate; the average landholding size being 19.82 acres for large farm households and 1.3 acres for marginal farm households. Most of the landless households belonged to the scheduled and backward castes, indicating their deprivation. Caste is an important social factor affecting distribution of assets and skill levels of rural labour force. Across different caste categories, the average household size was higher for scheduled castes (SC) (Table 2), while the average landholding size was higher for the upper castes. The education level of other backward castes (OBC) and SC households was also lower at 4.6 and 3.0 years, respectively as compared to 6.2 years for the upper caste households.

Agriculture was the major income source for rural households. It accounted for about 75 per cent of the total income of upper caste households and more than 70 per cent of backward and scheduled caste households. Non-farm income was the next important source.

**Table 1. Key socio-economic characteristics of sample rural households in Punjab**

Household category	Average household size (No.)	Average years of schooling (No.)	Average landholding size (acre)	Proportion of lower caste households (per cent)
Landless	5.7	3.6	-	93.61
Marginal	4.6	5.2	1.3	0.00
Small	6.1	6.2	3.62	4.25
Medium	6.4	5.8	6.12	2.13
Large	6.1	7.3	19.82	0.00
Overall	5.8	4.8	3.84	47.00

**Table 2. Key Socio-economic indicators across different caste groups in Punjab**

Particulars	Household type		
	General caste	Backward castes	Scheduled castes
Family size (No.)	5.8	5.2	6.2
Average landholding size (acre)	7.6	0.3	0.03
Years of schooling (No.)	6.2	4.6	3.0
Farm income (₹/annum)	225681 (74.94)	70467 (73.18)	68722 (71.22)
Non-farm income (₹/annum)	19928 (6.62)	17386 (18.52)	18936 (19.62)
Transfer income (₹/annum)	39957 (13.27)	8433 (8.75)	8828 (9.15)
Other income (₹/annum)	15553 (5.16)	-	-
Total household income (₹/annum)	301119	96286	96486

*Note:* Figures within the parentheses indicate per cent to the total income for a given caste category.

### Diversity in Household Income Sources

This section gives a detailed account of the distribution of total income across different income sources for different categories of households (Table 3). The non-farm income contributed around 64 per cent to the total income of landless households and its share declined with the increase in size of operational holding. The share of non-farm income in the total household income was 26.7 per cent, 7.0 per cent and 8.5 per cent for marginal, small and medium farm-households, respectively.

The disparity in the non-farm income across the households was due to the nature of non-farm activities that the households relied on. While the households with productive assets diversified into more productive non-farm activities, landless, marginal and small households could have access to only relatively less-remunerative sources of non-farm income. Almost 19 per cent of the landless households relied on construction activities. However, large households did not derive any income from non-farm activities, which might be due to the reason that larger operational holdings assured sufficiently high incomes (12-times of marginal and almost 3-times of small farming households) and gainful employment opportunities to these households, thus reducing their tendency to divert towards non-farm activities which were less remunerative as compared to agriculture. The

agricultural income showed a positive relationship with the size of landholding, as expected. Small, medium and large farm households obtained about 85 per cent of their income from agriculture, while its share for landless and marginal households was 15 per cent and 36 per cent, respectively.

Only a few households reported to have transfer income. The share of transfer income was 9 per cent for landless, 29.2 per cent for marginal, 6.9 per cent for small, 7.3 per cent for medium and 13.8 per cent for large households. Such a wide variation in the proportion of transfer incomes, regardless of the size of operational holdings, is mainly due to the nature of transfer income that these households accessed. For the poor, the households' transfer income was mainly from social security contributions in the form of pensions received by the aged members/widows or in the form of internal remittances from a migrant family member. In the case of large and medium farm households, transfer income was mainly sourced from external remittances or in the form of pensions for the retired government officials.

The 'other income' mainly included rental income. The marginal and small farmers being unable to derive sufficiently high incomes from their holdings, tend to lease-out the land and seek employment in the non-farm sector. Such tendency was particularly strong amongst the marginal farmers. The large farmers,

**Table 3. Distribution of total household income across different income sources**

₹/annum)

Source of income	Household type				
	Landless	Marginal	Small	Medium	Large
A. Agriculture	15898 (14.84)	42379 (36.2)	184330 (84.9)	229321 (84.2)	529123 (84.1)
Crop production	-	16334 (38.5)	99338 (53.9)	152821 (66.6)	452201 (85.5)
Livestock	9864 (62.0)	23045 (54.4)	84992 (46.1)	76500 (33.4)	76922 (14.5)
Agricultural wages and other income	6034 (38.0)	3000 (7.1)	-	-	-
B. Non-farm	68434 (64.0)	31200 (26.7)	15250 (7.0)	23000 (8.5)	-
Manufacturing	12368 (18.1)	6000 (19.2)	10000 (65.6)	16000 (69.6)	-
Construction	13220 (19.3)	-	-	-	-
Wholesale and retail trade, hotels and restaurants	8340 (12.1)	-	-	1000 (4.3)	-
Transport, storage and communication	9000 (13.2)	7200 (23.1)	-	5000 (21.7)	-
Finance, insurance and real estate	6720 (9.8)	18000 (57.7)	4000 (26.2)	-	-
Community, social and personal services (CSP services)	18786 (27.5)	-	1250 (8.2)	1000 (4.4)	-
C. Transfer	13200 (8.91)	34200 (29.2)	15000 (6.9)	20000 (7.3)	86500 (13.8)
D. Other	9540 (8.9)	9200 (7.9)	2500 (1.2)	-	13200 (2.1)
E. Total income	107072 (100.0)	116979 (100.0)	217080 (100.0)	272321 (100.0)	628823 (100.0)

Note: For particulars A, B, C, D and E, figures within the parentheses represent the percentage of total income, and for the sub-components, percentage to total income under each category

however, tended to hire out their machinery services to small farmers and also derived some income from rents received from their non-agricultural properties. The income from other sources was 9 per cent for landless and 8 per cent for marginal households.

The total farm and non-farm income was disaggregated further to assess the relative importance of different income-generating activities. The details of income received from various farm and non-farm activities are presented in Table 4. The share of income from crops increased with the increase in landholding

size. The large farm households obtained 85.5 per cent of income from crops, followed by medium (67%) and small (54%) farm households. On the other hand, the share of livestock income declined with the increase in size of operational holding. The livestock contributed significantly to the total agricultural income of marginal (54.4%) and small (46.1%) households. The landless households obtained 62 per cent of their agricultural income from animal husbandry. Agricultural wage income accounted for 38 per cent of the total agricultural income of landless and marginal farm households.

**Table 4. Number of income sources across various farm-categories of rural household**

(in per cent)

No. of income sources	Farm size				
	Landless	Marginal	Small	Medium	Large
One source	16.0	10.0	-	-	-
Two sources	34.0	50.0	66.6	58.3	40.0
Three sources	30.0	30.0	16.7	25.0	40.0
More than three sources	20.0	10.0	16.7	16.7	20.0
Average number of income sources	2.62	2.4	2.5	2.5	2.9
<b>Diversification Index for income source</b>					
Farm income	0.50	0.62	0.50	0.51	0.33
Non-farm income	0.81	0.57	0.50	0.46	-
Transfer income	0.40	0.58	-	-	0.47
Total income	0.89	0.86	0.63	0.64	0.51
Source-wise DI	Farm income	Non-farm income	Transfer income	Other income	Total income
	0.51	0.82	0.53	0.80	0.80
Diversification Index for total income	0.89	0.86	0.63	0.64	0.51

Of the total non-farm income of landless households, the community-social-personal services accounted for the highest share (27.5%), followed by construction (19.3%) and manufacturing (18.1%). The share of trade, transport and finance related activities was 12.1 per cent, 13.2 per cent and 9.8 per cent, respectively. Participation in low income-generating activities, such as construction, which involves hard work, was noticed only in the case of landless households. The landless workers neither owned the productive assets nor had access to higher education and skill development, hence, they usually got absorbed in low-paid construction or community, social and personal activities.

The non-farm income to marginal farm households mainly accrued from finance, transport and manufacturing — 57.7 per cent, 23.1 per cent and 9.2 per cent, respectively. For small farm households, manufacturing accounted for 65.6 per cent, finance 26.2 per cent and community-social-personal services 8.2 per cent of the total non-farm income. The shares of manufacturing, trade, transport and community-social-personal services in the total non-farm income of the medium farm households were 69.6 per cent, 4.3 per cent, 21.7 per cent and 4.4 per cent, respectively. Though, non-farm income was derived from diverse sources, the quantum of income from these sources

was very small, reflecting that diversification towards these activities was largely distress-driven, dominated by least productivity opportunities.

There seems to be a complete lack of access to more remunerative non-farm activities for the landless and marginal households. Not only the source of household income, but the number of income sources also varied across different farm categories. The small, large and medium farm households accessed more than one income source. Amongst the landless and marginal farm households, 16 per cent and 10 per cent of the households, respectively had access to only a single income source (Table 4). It was significant to note that both landless and large, the two extreme categories on the basis of land ownership, had the highest proportion of households having more than three income sources.

The estimates of income diversification index (DI) of rural households also confirmed the extent of income spread across various income sources among the different household categories. The overall income diversification decreased with the increase in landholding size (Table 4). The non-farm income was most diversified with the index being 0.81 which was almost same as the extent of total income diversification; this was followed by transfer income and farm income. The extent of income diversification

**Table 5. Probit estimates for determinants of households' participation in various income-generating activities**

Variable	Farm income	Non-farm income	Other income
Caste (General caste=1, otherwise =0)	0.38 (0.77)	-1.54*** (0.48)	0.11 (0.41)
Family size (No.)	0.26** (0.11)	0.28 (0.10)**	-0.004 (0.07)
Operational land <sup>1</sup> (acres/household)	-	-0.13** (0.06)	-0.09 (0.08)
Operational land squared	-	-	0.004 (0.002)*
Livestock (No. of cattle and buffaloes)	0.02 (0.10)	-	0.05 (0.04)
Worker population ratio	1.99* (1.12)	1.71* (0.94)	-0.67 (0.73)
Gender of household head (Male=1, female=0)	0.01 (0.15)	-0.37 (0.02)	-0.66 (0.51)
Age of household head (years)	-1.71 (0.107)	0.13 (0.10)	0.03** (0.01)
Age squared	0.001 (0.001)	0.001 (0.00)	-
Education of household head (years of schooling)	-0.10* (0.06)	0.011 (0.04)	0.02 (0.03)
Constant	3.47 (4.09)	-4.71 (2.98)	-0.265 (0.514)

Note: \*, \*\* and \*\*\* indicate significance at 10 per cent, 5 per cent and 1 per cent levels of significance, respectively.

<sup>1</sup>operational land was a perfect determinant of participation in farm income.

was highest amongst the landless households, followed by marginal farm households. The farm income of large households was least diversified as most of it was derived from crop production.

### Determinants of Household Participation in Different Economic Activities

The probit estimates have revealed that caste, operational landholding and worker population ratio determined the participation of a household in non-farm activities (Table 5). The probability of involvement in non-farm activities was high in the case of a household belonging to scheduled caste or backward caste. The households with higher worker population ratio were found to be more active in non-farm income generating activities and the same was true in case of farm income. The increase in family-size led to a lower per capita income, thus leading to the increased participation of such households in both

farm and non-farm activities in order to supplement their low incomes.

Land proved to be a perfect determinant of farm income, hence this variable was dropped from the analysis. However, size of landholding had a negative impact on the household's participation in the non-farm sector. This indicated that the households with larger landholdings concentrated more on remunerative farm income, whereas the households with smaller landholding sizes were engaged in non-farm activities to increase their overall income.

The 'other income' category included heterogeneous sources such as service pensions, external and internal remittances, etc. The age of household-head was a major determinant of this income source which was related to retirement or old-age pension. However, due to small sample size and fewer households having these income sources, the influence of other variables on this income was not clear.



**Table 6. Gini decomposition of inequality by income source**

Income source	Share in total income (Sk)	Gini coefficient for source (Gk)	Gini correlation with rank of total income (Rk)	Contribution of source income to total inequality (RkGkSk)	Proportional contribution of source to total inequality (RkGkSk/G)	Gini income elasticity (RkGk/G)
Farm	0.61	0.68	0.87	0.36	0.71	1.15
Non -Farm	0.22	0.68	0.28	0.04	0.08	0.36
Transfer	0.12	0.87	0.78	0.08	0.16	1.31
Rental	0.04	0.95	0.69	0.03	0.05	1.29
Gini for total income		0.51		0.51	1.00	

### Impact of Rural Household Income Diversification

The Gini coefficients were estimated to measure the extent of income inequality and the results are given in Table 6. The Gini coefficient for overall income was 0.52, signifying the prevalence of high income inequality in rural Punjab. The transfer income and other income were more unequally distributed than other sources; their Gini coefficients being 0.87 and 0.95, respectively. However, the Gini coefficient for farm and non-farm incomes was 0.68 each, indicating that the distribution of income from these two sources was fairly equal vis-à-vis to other sources.

It is worth noting that though non-farm sector enables the poor to enhance their incomes, the barriers for entry into productive activities lead to unequal distribution of gains. The Gini income elasticity value of more than one implies that an income source is inequality increasing, the value less than one indicates that the source is inequality reducing and the Gini income elasticity is one when the source does not affect the income distribution among the households. The Gini decomposition analysis shows that despite being a major income source for the landless and marginal households, the non-farm income had a similar impact on inequality as that of farm income. However, farm income, transfer income and rental income contributed to the increase in inequality among the households.

The farm income depends on the ownership of land; similarly the rental income accrues to those households who own land or farm assets like machinery, while transfer income is mostly from pensions and remittances and accrues to households having access to a permanent job or remittances. Hence,

asset, education and skills acted as barriers for the poor households in having access to such income sources. The non-farm income showed an inequality reducing effect; it also showed a lower correlation with the total income as compared to the other three income sources. Similar effects of farm and non-farm income sources on income distribution were reported by Birthal and Singh (1995) in western Uttar Pradesh.

### Conclusions and Policy Implications

The non-farm sector is an important component of the rural economy. It supports the livelihoods of rural poor by providing gainful employment, supplementing their meagre incomes and preventing them from falling further below the poverty line. Family size, caste, operational landholding and worker population ratio have been found to be the determinants of income diversification among rural households.

Land distribution is skewed in the rural areas; hence, there is a need to improve the access of these households to productive assets. They should be provided adequate training so that they may enhance their participation in higher income-generating activities through skill development rather than restricting themselves to the last resort activities. It is very important to improve the education levels of the rural households. Their participation in more productive non-farm economic activities should be enhanced. There is a need to promote non-farm sector by encouraging farm and non-farm linkages and by developing necessary infrastructural facilities. These efforts will not only help in generating additional employment opportunities but will also help in reducing the income gaps between the rich and the poor.

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