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# THE CONTRIBUTION OF VARIOUS NON-FARM INCOME SOURCES IN REDUCING INCOME INEQUALITY ACROSS DIFFERENT FARM SIZES: A COMPARISON OF BARANI PUNJAB AND COTTON/WHEAT SINDH

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Non farm sector is playing a vital role in reducing income inequality among rural households. The aim of the present paper is to decompose the non-farm income of rural households and to analyze the contribution of each source towards non-farm income inequality across different farm sizes in two agro-climatic zones, i.e. Barani Punjab and Cotton/Wheat Sindh. Household income and expenditure survey of Pakistan for the year 2005-06 has been used. The Coefficient of Variation and Gini Coefficient are used for inequality decomposition. The results show that for all farm size categories self employment is the major contributor in household's non-farm income and its inequality in both zones. Its share in non-farm income is higher in Barani Punjab while its contribution to non-farm income inequality is higher in Cotton/Wheat Sindh. In Barani Punjab the household having land between 12.5 to 25 acres are earning highest share from self employment while in Cotton/Wheat Sindh the big land lords earns more from it. Besides, it is biggest contributor in non-farm income inequality in both zones.
**Keywords:** Non-farm, farm size, income inequality, agro-climatic zones

## INTRODUCTION

Inequality in resource distribution always affects the economic and social well being of rural farm households. In these agrarian countries, land is highly unequally distributed thus the benefits from agriculture growth are transferred to big landlords hence creating a substantial income gap between landlord and landless farmers. The increasing income inequality is closely linked with relative and absolute poverty in rural areas. Absolute poverty is a matter of acute deprivation, hunger, premature death and sufferings. A person is considered poor if his or her income level falls below some minimum level necessary to meet basic needs. This minimum level is called the poverty line and relative poverty is a measurement of the resources and living conditions of population in relation to others (Schwartzman, 1998).

At the start of the 21st century, 1.2 billion people live on less than US $ 1 a day and 2.7 billion people live on less than $ 2 a day. Poverty is present in both urban and rural areas of world but 63 percent of total worldwide poverty is witnessed in rural people (World Bank, 2000). The share of South Asia in world population is 22 percent but it has more than 40 percent of the world's poor (Haq, 2006). Pakistan is one of these suffering countries where the incidence of poverty is always high. According to World Bank estimates poverty head count ratio in Pakistan is 36.1 percent and about 62 million people were below the poverty line. Here agriculture is the basic source of earning for 44.7 percent of total labor force (GOP, 2009). It is totally dependent on land which is highly unequally distributed so its returns always creates income gap among households. To reduce this income gap landless households are shifting towards other more remunerative sources like non-farm sector.

Non-farm income includes, i) self-employment, i.e. the revenues from different enterprises, ii) wage employment i.e. wage earnings of paid employee, iii) agro processing i.e. turning primary agricultural products into other commodities for market (Nasir, 2008). Non-farm income is helpful in reducing the income inequality and poverty directly and indirectly by improving the performance of the agriculture sector through investing the cash in productivity enhancing inputs.

Although non-farm income is contributing significantly in household's income but potential gains in this sector is not fully realized. The aim of this paper is to determine the share of various sources in total non-farm income and to inequality among households belonging to different farm size categories in two agro-climatic zones. After a brief introduction, Section 2 describes the material and methods, Section 3 presents the results and discussion and Section 4 presents conclusion and recommendations.

## MATERIALS AND METHODS

Household Income and Expenditure Survey data (HIES, 2005-06) has been used to conduct the analysis. Out of nine agro-climatic zones (Pickney, 1989), rural areas of two zones have been selected for comparison, i.e. Barani Punjab (Islamabad, Rawalpindi, Chakwal, Attock, Jehlum) and

Cotton/Wheat Sindh (Khairpur, Nawabshah, Ghotki, Tharparkar, Mir Pur Khas, Sukkhar, Nowshero Feroze, Hyderabad, Sanghar, Tando Mohd Khan). The zones have been selected because of significant difference in income composition. Agriculture is the major income source in Cotton/Wheat Sindh while non-farm income is leading income source in Barani Punjab. For the purpose of measuring income inequality, data about non-farm income sources (i.e. Wages/Salaries, Self Employment, Transfers and Rental Income) and operated farm area has been used. Non-farm income sources are:

- **Wages/Salaries:** It includes wage earnings of paid employee from job, received in both cash and kind.
- **Self Employment:** It includes the revenues from different enterprises.
- **Rental Income:** It comprises of rent received from ownership of assets e.g. land, buildings and agricultural equipments.
- **Transfers:** It includes domestic and foreign remittances received, zakat/usher received, pensions, money received from benevolent and provident fund, committees received, gift assistance and cash received from inheritance and dowery.

Furthermore, data has been analyzed according to landholdings (includes land owned, land rented in and leased land on crop share base). To measure the share of each non-farm income source according to different farm sizes percentage income distribution has been used. Households with non zero income in each source have been considered in the analysis.

Percentage of total non-farm income = $(Y_i/Y) \times 100$ ..... (1)

Where i = 1, 2, 3 and 4.

In equation (1) $Y_i$ and Y are the annual income from ith source and total annual non-farm income respectively. To draw implications for the whole population of two zones, all the related variables have been multiplied by a specific raising factor (by weight method) which differs according to the primary sampling unit. To determine the contribution of each non-farm income source in income inequality according to different farm sizes decomposition analysis based on coefficient of variation and Gini coefficient has been conducted. Respondents with non zero total non-farm income have been considered here. For the *Coefficient of Variation* methodology of Shorrocks (1982) and Ercelawn (1984) has been followed i.e.

$$c_i = \rho_i (\sigma_i / \mu_i) / (\sigma / \mu) \quad \text{..... (2)}$$

$$w_i = \mu_i / \mu \quad \text{..... (3)}$$

and $$\sum w_i c_i = 1 \quad \text{..... (4)}$$

For the *Gini Coefficient* methodology developed by Pyatt *et al.* (1980) is followed i.e.

$$g_i = R_i (G_i / G) \quad \text{….....……..(5)}$$

$$w_i = \mu_i / \mu \quad \text{.....……..(6)}$$

and $$\sum w_i g_i = 1 \quad \text{……..……..(7)}$$

Where:

$$R_i = \text{cov}(y_i, r) / \text{cov}(y_i, r_i) \quad \text{……..……..(8)}$$

$$G_i = (2 / n_i \mu_i) \text{ cov}(y_i, r_i) \quad \text{.....……..(9)}$$

$$G = \sum (\mu_i / \mu) R_i G_i \quad \text{……. (10)}$$

In above equations $c_i$ and $g_i$ are relative concentration coefficient of ith source in non-farm income inequality, $\rho_i$ is correlation coefficient between ith source and total non-farm income, $\sigma_i$ and $\sigma$ are standard deviation of income from ith source and of total non-farm income, respectively, $w_i$ is the share of ith source in total non-farm income, $\mu_i$ and $\mu$ are the mean annual income from ith source and from all non-farm sources, respectively, $w_i c_i$ and $w_i g_i$ are factor-inequality weights of the ith source in non-farm income inequality, $R_i$ is the correlation ratio in which cov $(y_i, r)$ and cov $(y_i, r_i)$ are covariances of ith source income with non-farm income rank and of ith source income with ith source income rank, $G_i$ and G are Gini Coefficients of ith source and of total non-farm income, respectively.

The values of correlation coefficient ($\rho_i$) and correlation ratio ($R_i$) range from (-1, 1) and value of $w_i$ is always positive and less than one. $G_i$ is always positive and ranges from 0 (equally distributed) to 1 (unequally distributed). The income source having $c_i$ and $g_i$ greater than one (less than one) shows increasing (decreasing) income inequality source.

## RESULTS AND DISCUSSION

This section discussed the results, firstly of relative share of each source of non-farm income, and secondly, the decomposition of non-farm income inequality into various sources.

Table 1 shows the percentage distribution of various sources of non-farm income in two zones across different farm sizes. The share of self employment income is highest in Barani Punjab and Cotton/Wheat Sindh for households having 0 to less than 5 acres (63 and 89 percent, respectively) and 12.5 to less than 25 acres (91 and 96 percent, respectively). Households having 5 to less than 12.5 acres in Barani Punjab, are receiving highest share of non-farm income from transfers (47 percent), in contrast to Cotton/Wheat Sindh where the share of self employment (84 percent) is highest. While the households having 25 to less than 50 acres in both zones are receiving major share of non-farm income from transfers, i.e. 67 percent in Barani Punjab and 100 percent in Cotton/Wheat Sindh. For households having 50 acres and above, rent and wages are major contributor in non-farm income in Barani Punjab, i.e. 50 percent for each while in Cotton/Wheat Sindh self employment is sole non-farm income source. The results are somewhat contradictory to the findings of Croppenstedt (2006) in rural Egypt, who found that for the landless and small farmers the share of wages is highest, i.e. 49.8 percent followed by transfers, i.e. 19.3 percent.

**Table 1. Distribution of non-farm income across different farm sizes in two zones (percentage)**

| Farm Area (acres) | Barani Punjab | | | | | Cotton Wheat Sindh | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Wage | Self Employ-ment | Rent | Tran-sfer | Total Non-farm Income | Wage | Self Employ-ment | Rent | Tran-sfer | Total Non-farm Income |
| **No land to< 5** | 3 | 63 | 2 | 32 | 100 | 1 | 89 | 8 | 2 | 100 |
| **5 to <12.5** | 8 | 43 | 2 | 47 | 100 | 6 | 84 | 0 | 10 | 100 |
| **12.5 to <25** | 1 | 91 | 3 | 5 | 100 | 1 | 96 | 0 | 3 | 100 |
| **25 to <50** | 0 | 0 | 33 | 67 | 100 | 0 | 0 | 0 | 100 | 100 |
| **≥ 50** | 50 | 0 | 50 | 0 | 100 | 0 | 100 | 0 | 0 | 100 |
| **Total** | 3 | 63 | 3 | 31 | 100 | 1 | 90 | 7 | 2 | 100 |

Table 2 indicates that among landless and small farmers (less than 5 acres) in Barani Punjab, self employment increases the non-farm income inequality (having $c_i$ and $g_i > 1$) while rest of three sources decrease non-farm income inequality ($c_i$ and $g_i < 1$). Factor inequality weights show that among these households, self employment contributes 79% to 92% in non-farm income inequality. The wages, rent and transfers have small contribution in non-farm income inequality. Self employment has large source Gini, correlation ratio and source weight, thus contributes more in non-farm income inequality. Landless and small farmers earn more from self employment and it leads to overall non-farm income inequality by distributing more income towards households engage in the self employment.

Table 3 illustrates that self employment increases non-farm income inequality ($c_i$ and $g_i > 1$) while all the remaining sources reduce it ($c_i$ and $g_i < 1$) among the households with less than 5 acres of land in the rural areas of Cotton/Wheat Sindh. The factor inequality weights explain that self employment accounts for 95% to 99% of non-farm income inequality and it widens the income gap between households who are involved in this sector and who are not involved.

In Barani Punjab and Cotton/Wheat Sindh zones self employment increases non-farm income inequality although its contribution is larger in the Cotton/Wheat Sindh (95% to 99%) than in the Barani Punjab (79% to 92%). Self employment generates more income in the Barani Punjab than in Cotton/Wheat Sindh and thus it contributes less in non-farm income inequality in Barani Punjab among land less and small farmers (having less than 5 acres of land).

Table 4 illustrates that in rural areas of Barani Punjab among households having 5 to less than 12.5 acres, self employment increases non-farm income inequality ($c_i$ and $g_i > 1$) and all other sources reduce it ($c_i$ and $g_i < 1$). Factor inequality weights show that non-farm income contributes from 60% to 91% in non-farm income inequality and the remaining three sources have limited effect on it. Self employment creates large income gap between those who are involved in this sector and those who are not involved. This large income gap is due to the reason that self employment provides high income to those who are involved.

Table 5 explains that in Cotton/Wheat Sindh, self employment is sole contributor to non-farm income

**Table 2. Decomposition of non-farm income inequality among households having no land to < 5 acres in Barani Punjab**

| Income Source | $R_i$ | $G_i$ | $g_i$ | $c_i$ | $w_i$ | $w_ic_i$ | $w_ig_i$ |
|---|---|---|---|---|---|---|---|
| **Wages** | 0.19 | 0.93 | 0.27 | -0.09 | 0.03 | -0.00 | 0.00 |
| **Self Employment** | 0.98 | 0.87 | 1.26 | 1.46 | 0.63 | 0.92 | 0.79 |
| **Rent** | 0.68 | 0.97 | 0.98 | 0.64 | 0.02 | 0.01 | 0.02 |
| **Transfers** | 0.55 | 0.67 | 0.55 | 0.20 | 0.32 | 0.07 | 0.18 |
| **Total** | - | - | - | - | 1.00 | 1.00 | 1.00 |

**Table 3. Decomposition of income inequality among households having no land to < 5 acres in cotton / wheat Sindh**

| Income Source | $R_i$ | $G_i$ | $g_i$ | $c_i$ | $w_i$ | $w_ic_i$ | $w_ig_i$ |
|---|---|---|---|---|---|---|---|
| **Wages** | -0.24 | 0.91 | -0.28 | -0.15 | 0.01 | -0.00 | -0.00 |
| **Self Employment** | 0.99 | 0.86 | 1.06 | 1.10 | 0.90 | 0.99 | 0.95 |
| **Rent** | 0.51 | 0.89 | 0.58 | 0.22 | 0.08 | 0.02 | 0.05 |
| **Transfers** | 0.22 | 0.94 | 0.27 | -0.06 | 0.02 | -0.00 | 0.00 |
| **Total** | - | - | - | - | 1.00 | 1.00 | 1.00 |

inequality ($c_i$ and $g_i$ > 1) among household having land between 5 to 12.5 acres. It contributes 95% to 100% in non-farm income inequality while all other sources have almost no contribution in non-farm income inequality ($c_i$ and $g_i$ > 1). The reason is that income from self employment makes a major share (85%) in total non-farm income of households involved so widens the income gap between earners and non-earners.

Above discussion depicts that self employment is non-farm income inequality increasing source in both Cotton/Wheat Sindh and Barani Punjab zones but in Barani Punjab it contributes less, i.e. 60 to 91 percent in non-farm income inequality as compared with Cotton/Wheat Sindh i.e. 95 to 100 percent. The reason is that in Cotton/Wheat Sindh self employment contribution in non-farm income is relatively more i.e. 85%; almost double than 44% in Barani due to which it creates more income gap among households having land between 5 to 12.5 acres in Cotton/Wheat Sindh as compared with those in Barani Punjab.

Table 6 shows that for households having land between 12.5 to 25 acres in Barani Punjab all sources increase non-farm income inequality ($c_i$ and $g_i$ > 1) except transfer income which reduces non-farm income inequality ($c_i$ and $g_i$ < 1). Again in non-farm income inequality, self employment contributes a major share, i.e. 97% with only 3% share by wages and rent while transfer income reduces it. The results are similar to the findings of Adams (1999) that in rural Egypt, rent is income inequality increasing while transfers are income inequality decreasing source of income. The negative sign of relative concentration coefficients in some cases is due to negative correlation between source income and total non-farm income in that category.

Table 7 illustrates that in Cotton/Wheat Sindh among households having farm area between 12.5 to 25 acres, self employment is the sole contributor in non-farm income inequality ($c_i$ and $g_i$ > 1) while remaining three sources reduces it. The reason is that self employment contributes 92% in total non-farm income of household involved in this sector thus widens the income gap.

It is clear from above discussion that for households having land between in 12.5 to 25 acres, the self employment is the sole contributor in no-farm income inequality in Cotton/Wheat Sindh as compared to Barani Punjab where all sources except transfer income contributes in non-farm income inequality. The reason is that in Barani Punjab self employment generates less income than in Cotton/Wheat Sindh because of more diverse non-farm income sources in Barani Punjab.

**Table 4. Decomposition of non-farm income inequality among households having 5 to < 12.5 acres in Barani Punjab**

| Income Source | $R_i$ | $G_i$ | $g_i$ | $c_i$ | $w_i$ | $w_ic_i$ | $w_ig_i$ |
|---|---|---|---|---|---|---|---|
| **Wages** | 0.38 | 0.93 | 0.58 | 0.10 | 0.08 | 0.00 | 0.05 |
| **Self Employment** | 0.93 | 0.92 | 1.39 | 2.09 | 0.44 | 0.91 | 0.60 |
| **Rent** | 0.63 | 0.95 | 0.98 | 0.28 | 0.02 | 0.00 | 0.02 |
| **Transfers** | 0.65 | 0.67 | 0.71 | 0.16 | 0.47 | 0.08 | 0.33 |
| **Total** | - | - | - | - | 1.00 | 1.00 | 1.00 |

**Table 5. Decomposition of income inequality among households having 5 to < 12.5 acres in cotton / wheat Sindh**

| Income Source | $R_i$ | $G_i$ | $g_i$ | $c_i$ | $w_i$ | $w_ic_i$ | $w_ig_i$ |
|---|---|---|---|---|---|---|---|
| **Wages** | -0.21 | 0.71 | -0.20 | -0.24 | 0.06 | 0 | -0.01 |
| **Self Employment** | 0.97 | 0.84 | 1.13 | 1.18 | 0.85 | 1.00 | 0.96 |
| **Rent** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Transfers** | 0.52 | 0.80 | 0.57 | 0.14 | 0.10 | 0 | 0.05 |
| **Total** | - | - | - | - | 1.00 | 1.00 | 1.00 |

**Table 6. Decomposition of non-farm income inequality among households having 12.5 to < 25 acres in Barani Punjab**

| Income Source | $R_i$ | $G_i$ | $g_i$ | $c_i$ | $w_i$ | $w_ic_i$ | $w_ig_i$ |
|---|---|---|---|---|---|---|---|
| **Wages** | 1 | 0.55 | 1.06 | 1.06 | 0.01 | 0.01 | 0.01 |
| **Self Employment** | 1 | 0.55 | 1.06 | 1.06 | 0.92 | 0.97 | 0.97 |
| **Rent** | 1 | 0.55 | 1.06 | 1.06 | 0.03 | 0.03 | 0.03 |
| **Transfers** | 1 | -0.15 | -0.29 | -0.29 | 0.05 | -0.01 | -0.01 |
| **Total** | - | - | - | - | 1.00 | 1.00 | 1.00 |

**Table 7. Decomposition of income inequality among households having 12.5 to < 25 acres in cotton / wheat Sindh**

| Income Source | $R_i$ | $G_i$ | $g_i$ | $c_i$ | $w_i$ | $w_ic_i$ | $w_ig_i$ |
|---|---|---|---|---|---|---|---|
| **Wages** | -1 | 0.82 | -1.33 | -0.56 | 0.01 | 0 | 0 |
| **Self Employment** | 1 | 0.66 | 1.07 | 1.06 | 0.96 | 1.00 | 1.00 |
| **Rent** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Transfers** | -0.56 | 0.82 | -0.75 | -0.49 | 0.03 | 0 | 0 |
| **Total** | - | - | - | - | 1.00 | 1.00 | 1.00 |

***Conclusions*:** Non-farm sector is the hope for reducing the income gap among rural households of selected areas. Among non-farm income sources, the share of self employment is higher than wage, rent and transfer income in total non-farm income for most of farm size categories. Moreover, share of self employment in total non-farm income is relatively higher in Cotton/Wheat Sindh than in Barani Punjab. The reason is that non-farm sector is not much developed in Cotton/Wheat Sindh so households are mainly involved in self employment. In Barani Punjab, every sub-sector makes considerable contribution in the household's non-farm income. The self employment is the sole income inequality increasing source in both zones but its contribution towards non-farm income inequality is higher in Cotton/Wheat Sindh than in Barani Punjab. To reduce non-farm income inequality the major steps should involve the capacity building of landless household by providing them with better education and training, collateral free credit at low interest rate along with technical support to start and run lucrative non-farm activities on a reasonable scale. Development of infrastructure and proper dissemination of market information should be emphasized to reduce non-farm income inequality.

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