Spatio-Temporal Variations in the Pattern of Agricultural Labour in Punjab: A Geographical Study

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Abstract

Use of Agricultural labour in Punjab is closely associated with the agrarian structure of the state. The adoption of new agricultural technology under the name of Green Revolution in mid 1960’s has largely affected the agricultural labour absorption. The present paper has examined the spatio-temporal variations in the pattern of distribution of agricultural labour at tehsil level in Punjab. The data on agricultural labour for census years of 1991 and 2011 collected from Primary Census Abstracts have been used to conduct the analysis. Maps prepared with the help of ArcGis 10.0 software have been used to present the patterns. The analysis showed that the rural and scheduled castes populations are strongly positively and significantly correlated with level of agricultural labour use in the southwestern plains of the state while central plains and north-eastern sub-mountainous regions with higher literacy rates and proportion of other workers have reported lower percentage of agricultural labour. The study has found that vast areas of the state have recorded a decrease in the proportion of agricultural labour during 1991-2011, due to increase in mechanization of farm operations, increased casualization of labour and shift of workforce from farm to non-farm sectors. In view of the declining agricultural labour in the state, there is a strong need to implement the crop diversification policy along with enhancing wage rates to engage labour in the farming operations of the state. Diversion of area from labour intensive paddy to parallel crops and promotion of labour saving machinery in its transplantation season is suggested to address the challenge of shortage of migrant labour during peak seasons.

Keywords: Agricultural Labour, Farm Operations, Farm Mechanization, Non-Farm Sector, Scheduled Castes Population, Rural Population
Introduction

Land, labour and capital are basic three assets on which agricultural activity depends in an area. In that context, agricultural labour is defined as an economic activity where a landless worker is paid for doing manual work in carrying out the agricultural operations. Agricultural labour is closely associated with the changes in agrarian structure in Punjab. The adoption of new agricultural technology under the name of green revolution along with mechanized intensive cultivation have largely affected the agricultural labour absorption in different agricultural practices in the state of Punjab (Laxminarayan, 1982; Barsat, 2007; Hussain, 2006; Billings and Singh, 1970; Randhawa, 1974; Chadha, 1986; Parihar, 1980; Sidhu, 1991; Chatha et al., 1991; Rangi and Sidhu, 2004; Sidhu and Singh, 2004; Grewal and Kahlon, 1974; Johal, 1975; Sidhu and Sidhu, 1992; Singh, 1995; Bhalla and Singh, 2001; and Kaur, 2005). The use of labour varies with the variations in practices used in different parts of the state. Therefore, in the present research paper, the spatio-temporal variations in the pattern of distribution of agricultural labour at tehsil level have been examined in Punjab. An emphasis has been laid to analyze the determinants affecting the distribution of agricultural labour during 1991 and 2011 Censuses in the state.

Data Sources and Methodology

The secondary data on agricultural labour in Punjab during 1991 and 2011 has been collected from A-Series (Primary Census Abstract, 2011), Census of India. The present study has used agricultural labour data, derived from the data on main workers, which is available at village and ward levels. The main workers are those workers who had worked for six months or more in a year. Punjab had 46 tehsils in 1991 and the number increased to 77 in 2011, due to change in administrative structure. For making data comparable at tehsil level, the tehsil boundaries of 1991 have been adjusted to 2011 census for studying the change in spatial patterns of agricultural labour in the state. The adjustment of data of 1991 to 2011 has been done by segregating the village wise data of old tehsils to the new tehsils which otherwise was not possible in using the marginal workers data which is not available at village and ward levels.
The data relating to the other explanatory factors has been assessed from various volumes of Statistical Abstract of Punjab, published by the Economic and Statistical Organization, Punjab. An extensive literature survey has been carried out to supplement the discussion on various aspects of labour.

Agricultural labour percentages and averages have been calculated at tehsil level. These numeric findings have been presented using tables. Maps have been prepared to give a clearer picture of the spatial patterns as well as changes in the pattern of distribution of agricultural labour in the state with the help of ArcGis 10.0 software.

The relationship of agricultural labour with factors like rural population, scheduled caste population, Other workers and literacy rate has been tested through Karl Pearson’s Coefficient of Correlation. Among these factors, rural population and scheduled castes population are considered to be positively associated with use of agricultural labour.

**Spatial Distribution of Agricultural Labour in Punjab, 2011**

It is a known fact that Punjab practices intensive and commercial agriculture. As high as of 83 percent of its total area is under cultivation, more than 90 percent of which is irrigated. However, agricultural labour shares only 4.21 percent out of 30.46 percent main workers in Punjab (Table 1). The agricultural sector in the state engages only about 13.82 percent of total main workers as labourers. This proportion varies considerably from one part of the state to another largely due to variations in socio-economic, demographic and physical factors that control the application of machinery and labour. Map 1 shows the distribution of agricultural labour in Punjab in 2011.
Table 1: Work Participation Rate by Industrial Category of Workers in Punjab, 2011

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Workers</th>
<th>Total Workers (WPR %)</th>
<th>Main Workers (WPR %)</th>
<th>Marginal Workers (WPR %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cultivators</td>
<td>6.97</td>
<td>6.50</td>
<td>0.47</td>
</tr>
<tr>
<td>2.</td>
<td>Agricultural Labourers</td>
<td>5.73</td>
<td>4.21</td>
<td>1.52</td>
</tr>
<tr>
<td>3.</td>
<td>Household Workers</td>
<td>1.39</td>
<td>1.08</td>
<td>0.31</td>
</tr>
<tr>
<td>4.</td>
<td>Other Workers</td>
<td>21.59</td>
<td>18.67</td>
<td>2.92</td>
</tr>
<tr>
<td>5.</td>
<td>Punjab</td>
<td>35.67</td>
<td>30.46</td>
<td>5.21</td>
</tr>
</tbody>
</table>

Source: Primary Census Abstract, Census of India, 2011

Following types of areas are clearly identified:

1. Areas of high proportion of agricultural labour (above 20 percent)
2. Areas of moderate proportion of agricultural labour (10-20 percent)
3. Areas of low proportion of agricultural labour (below 10 percent)

**Areas of high proportion of agricultural labour (above 20 percent)**

Areas with high proportion (above 20 percent) of agricultural labour include 26 tehsils of Punjab. In this category, Fazilka tehsil stands at the top with a value of 33.17 percent which is higher than the state of Chhattisgarh (30.41 percent) that ranks third in the country. Out of these 26 tehsils, more than two thirds belong to the southwestern plains of Punjab while the remaining are spread over the central plains of the state. The major reasons for high prevalence of agricultural labour in these areas are higher rural population, higher scheduled castes population, less number of other workers and lower literacy rates. Moreover, manual harvesting of wheat, cotton and paddy by a large number of small and marginal farmers, due to their less mechanized farming
operations largely explain the high share of agricultural labour in the southwestern plains of Punjab (Gill, 1985 and Singh, 1997).

**Areas of moderate proportion of agricultural labour (10-20 percent)**

As many as 30 tehsils of Punjab constitute the areas of moderate proportion of agriculture labour. A large majority of these is located in the central plains. High proportion of other workers (50-65 percent) and high literacy rate (below 70 percent) are responsible for the moderate proportion of agricultural labour in the central plains tehsils. Highly mechanized farming operations and cultivation of crops like wheat, paddy (except transplantation) and maize and notable share of farm workforce in non-farm activities also explain relatively lower percentage of agricultural labour in this region (Ghuman et al., 2007 and Singh, 2003).

**Areas of low proportion of agricultural labour (below 10 percent)**

Low percentage of agricultural labour (below 10 percent) is a feature of 21 tehsils which are scattered all over the central plains and north-eastern sub mountainous area in the state. Lowest percentages of agricultural labour have been recorded in Ludhiana-East (2.49 percent) and Jalandhar-I (2.65 percent) tehsils of the central plains. Almost all these tehsils are much more urbanized and literacy rate is above 80 percent in most parts. As a consequence, the larger share of main workers is categorized as other workers and hence low proportion of agricultural labour.
Punjab Agricultural Labour 2011
Data by Tahsils

As Percentage to Main Workers

Units                  | > 20 | 10 - 20 | < 10 |
-----------------------|------|---------|------|
25                     | High | Moderate| Low  |
30                     |      |         |      |
21                     |      |         |      |

State Average - 13.82
Maximum Value - 33.17
Minimum Value - 2.49

Source: Primary Census Abstract, Census of India, 2011

Map 1
Relatively lower rural population and lower scheduled castes population also explain low availability of workers to work as agricultural labour. Table 2 below shows the relationship between agricultural labour and selected demographic factors. Clearly, agricultural labour is strongly positively related with the share of rural and scheduled castes population. It is strongly and significantly negatively associated with literacy rates and proportion of other workers.

### Table 2: Correlation between Agricultural Labour and Demographic Factors
(Karl Pearson’s Method)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Independent Factor</th>
<th>r Score</th>
<th>P-Value</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rural Population</td>
<td>0.534</td>
<td>&lt;.00001</td>
<td>p &lt; .01</td>
</tr>
<tr>
<td>2</td>
<td>Scheduled Castes Population</td>
<td>0.438</td>
<td>0.000068</td>
<td>p &lt; .01</td>
</tr>
<tr>
<td>3</td>
<td>Literacy Rate</td>
<td>-0.810</td>
<td>&lt;.00001</td>
<td>p &lt; .01</td>
</tr>
<tr>
<td>4</td>
<td>Other Workers</td>
<td>-0.905</td>
<td>&lt;.00001</td>
<td>p &lt; .01</td>
</tr>
</tbody>
</table>

Source: Computed from Primary Census Abstract, Census of India, 2011

Thus, it can be concluded that the areas of higher rural and scheduled castes population correspond with areas of high percentage of agricultural labour e.g. southwestern plains. On the other side, the areas with higher proportion of higher literacy rates and other workers have reported lower percentage of agricultural labour. These fall over the central plains and northeast sub-mountainous regions.

**Patterns of Change in Agricultural Labour in Punjab, 1991 and 2011**

The adoption of new agricultural technology consisting of bio-chemical and mechanical inputs led to changes in labour use pattern in Punjab. Among the major changes, mechanization of farm operations has led to the displacement of agricultural labour especially unskilled females (Kahlon and Gill, 1967; Rao, 1975; Chand et al., 1985; Sidhu, 1991; Chatha et al., 1991; Kaur, 1996; Human Development Report of Punjab, 2004; Kaur, 2005; Hussain, 2006; Barsat, 2007; and Jodhka, 2008). Secondly, many parts of the state have registered a decline in employment and increase in casualization of labour, due to the labour displacing techniques like weedicides and adoption of improved farm technology (Shah and Singh, 1970; Singh, 1995; Sidhu and Singh, 2004; and Singh, 2009). The displacement of local labour especially attached labour, due
to migrant labour (Singh, 1995; Sidhu et al., 1997; Sidhu and Singh, 2004; and Human Development Report of Punjab, 2004); shift of local labour to non-farm employment (Kaur, 2005; Ghuman et al., 2007; Toor et al., 2007; Jodhka, 2008; and Institute of Applied Manpower Research, 2013); migration of local labour especially scheduled castes to Gulf countries (Human Development Report of Punjab, 2004), conversion of small and marginal farmers to wage labourers (Singh and Bhogal, 2014), condition of agricultural labourers (Singh and Bhogal, 2016; and Singh and Singh, 2016) and agrarian distress (Sahay, 2016; and Uppal et al., 2018) are other important changes that have taken place regarding the labour use scenario in the state.

A comparison of agricultural labour data of 1991 and 2011 censuses shows that the state has experienced a significant decline in agricultural labour during this period. The proportion of agricultural labour was 23.82 percent in 1991 which reduced to 13.82 percent in 2011 in the state. The decline has occurred in 75 tehsils, covering 97.40 percent area of Punjab, while only 2 tehsils of the state have witnessed an increase in proportion of agricultural labour. The decline in agricultural labour however is not uniform and varies from a decrease of 21.61 percent in SBS Nagar tehsil of central plains to a minimum decrease of 0.76 percent in Sardulgarh tehsils of southwestern plains of the state. For analyzing the spatial pattern of changes in proportion of agricultural labour during 1991-2011 (Map 2), the state is categorized into the following types of areas:

1. Areas of high decrease (above 15 percent)
2. Areas of moderate decrease (10-15 percent)
3. Areas of low decrease (5-10 percent)
4. Areas of very low decrease (below 5 percent)

Areas of high decrease (above 15 percent)

There are 11 tehsils of the state that have recorded a decrease ranging from a value of 15.35 percent in Amloh tehsil to 21.61 percent in SBS Nagar tehsil during 1991-2011. Except Pathankot in north-eastern sub-mountainous region, other tehsils are scattered over the urbanized central plains region. The high decrease of agricultural labour in these tehsils is attributed to the shift of local labour to other types of non-farm employment due mainly to upgrade of their status from rural to urban area in 2011 census.
Areas of moderate decrease (10-15 percent)
Out of 77 tehsils, 26 tehsils have experienced a decline ranging from 10.11 percent in Hoshiarpur tehsil to 14.85 percent in Chamkaur Sahib tehsil in the state. These tehsils form a contiguous belt spreading over central south-eastern plains regions and over adjoining tehsils of north-eastern sub-mountainous region of Punjab. Mechanization of farming operations, shift of local labour to other types of employment and migration of local scheduled castes labour especially males to Gulf countries are mainly responsible for moderately high decline in the proportion of agricultural labour during 1991-2011 in these areas.

Areas of low decrease (5-10 percent)
There are 24 tehsils which comprise areas of low decrease in proportion of agricultural labour in the state. Among these, Bathinda tehsil recorded a low decrease of 5.11 percent and Patiala tehsil on the other end has seen nearly 10 percent decline in agricultural labour. These areas of low decrease are mainly found on the western margins of central plains regions. The Sultanpur Lodhi tehsil of this belt has however recorded an increase of 1.54 percent in agricultural labour, due to emphasis on labour intensive vegetable farming. Few pockets in southern eastern central plains region have also recorded 5 to 10 percent decline in share of agricultural labour. Comparatively high proportion of area under vegetables, rice and potato where manual operations dominate have led to less release of labour for agriculture in these parts.

Areas of very low decrease (below 5 percent)
There are 14 tehsils falling mostly over southwestern plains region that have experienced a decline in the proportion of agricultural labour. The decrease ranges between as low as 0.76 percent in Sardulgarh tehsil of Mansa district and 4.81 percent in Faridkot tehsil of Faridkot district. The Fazilka tehsil however is an exception where the proportion of agricultural labour has increased during the study period due to depeasantization of marginal farmers. In most of these areas, lesser shift of agricultural labour to other non-farm occupations, low levels of urbanization, continued focus on cultivation of labour intensive crops particularly cotton supports the application of manual labour on the farms. Agriculture sector is able to provide
employment due to larger production and hence the decline has been low compared to other parts of the state.

Thus, almost all parts of the state have experienced a decrease in the proportion of agricultural labour during 1991-2011. This is ascribed to mechanization of farm operations; increase in non-farm employment in nearby urban centers; migration of local labour especially scheduled castes to Gulf countries and increase in casualization of labour. Agricultural labour however has
recorded an increase in a very small area comprising two tehsils namely Sultanpur Lodhi in the north central plains and Fazilka in the extreme southwestern part of the state. These two tehsils are distinctly known for cultivation of labour intensive vegetables and cotton respectively.

**Conclusion and Policy Recommendations**

The foregoing discussion reveals that the rural population dominated southwestern plains of Punjab have had higher proportion of agricultural labour as compared to more urbanized and relatively high literacy central plains and northeast sub-mountainous regions of the state. The analysis of Karl Pearson’s coefficient of correlation proved the hypothesis that the rural and scheduled castes populations are strongly positively and significantly correlated with agricultural labour in the state. Moreover, share of agricultural labour is strongly negatively associated with literacy rate in the state.

There were 73 tehsils out of 77 which recorded a decrease in the proportion of agricultural labour. This has happened on account of mechanization of farm operations, reduced labour days in agriculture, shift of local labour to non-farm employment, displacement of local labour especially attached labour, increase in casualization of labour and migration of local labour especially scheduled castes to Gulf countries in many parts of Punjab. The cultivation of labour intensive crops particularly vegetables and cotton along with manual harvesting of wheat by small and marginal farmers has led to increase in agricultural labour in a few pockets.

Thus, in light of farm mechanization induced agricultural development, displacement of agricultural labour from many farm operations and the shift towards higher wages in the non-farm sectors, there is an urgent need to implement the crop diversification policy along with enhancing wage rates to engage labour in the farming operations of the state. Diversion of area from labour intensive paddy to parallel crops and promotion of labour saving machinery in its transplantation season is suggested to address the challenge of shortage of migrant labour during peak seasons. The women labourers must be given some kind of monetary and technical help to work in the cultivation of labour intensive and high income earning crops. Women friendly machinery should be developed to encourage their participation in farm operations.
References


