INCOME DIVERSITY OF AGRICULTURAL HOUSEHOLDS IN PUNJAB AND ITS DETERMINANTS

Thesis

Submitted to the Punjab Agricultural University
in partial fulfilment of the requirements
for the degree of

MASTER OF SCIENCE
in
AGRICULTURAL ECONOMICS
(Minor Subject: Statistics)

By

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CERTIFICATE I

This is to certify that the thesis entitled **"Income Diversity of Agricultural Households in Punjab and Its Determinants"** submitted for the degree of **M.Sc.** in the subject of **Agricultural Economics** (Minor subject: **Statistics**) of the Punjab Agricultural University, Ludhiana, is a bonafide research work carried out by **Souradipta Das (L-2019-BS-260-M)** under my supervision and that no part of this thesis has been submitted for any other degree.

The assistance and help received during the course of investigation have been fully acknowledged.

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ABSTRACT

The present study was conducted to identify the pattern of rural income diversification, its determinants and its impact on inequality. The study was based on unit-level data from two rounds of National Sample Survey Office (NSSO) on Situation Assessment. The first survey was conducted in 2002-03 and was named as Situation Assessment of Survey of Farmer Households in India and the second survey was conducted in 2012-13 and was named as Situation Assessment of Agricultural Households in India. Crop income was the major constituent of household income and its share in total income increased but the share of non-farm income decreased. The bottom one per cent of the agricultural households run the deficit for total income, for the upper 25 per cent of household it was more than three times. It showed a widespread income inequality among various categories of rural households. The relationship between income diversification and rural household income pointed towards distress diversification by relatively poor households. The Simpson diversity index value for Punjab was low in both years because of the high degree of specialisation in cropping activities. Marginal farmers and semi medium farmers became diversified with these 10 years but the large farmers became specialized with time. The Simpson diversity index for the marginal and small were considerably higher than that of the medium and large farmers. It was due to the reason that marginal and small categories were deriving their income from crops, dairying and wage labour in agriculture. Age, non-farm income source, landholding size and irrigated land size were the main determinants of household income diversification. The analysis indicated that crop income contributed maximum in total inequality and was inequality triggering in its effect. While livestock and, wages and salaries and non-farm business sources were the potential sources to bridge the inequality gap in the entire state. The result of Theil index emphasized that the intra-landholding and inter-landholding inequality was the main contributor in total inequality in the year 2002-03 and 2012-13 respectively.

Keywords: livelihood diversification, Simpson diversification index, non-farm employment, income distribution, Gini coefficients, income inequality

ਖੋਜ ਦਾ ਸਿਰਲੇਖ	:	ਪੰਜਾਬ ਵਿਚ ਖੇਤੀ ਪਰਿਵਾਰਾਂ ਦੀ ਆਮਦਨ ਵਿਭਿੰਨਤਾ ਅਤੇ ਇਸਦੇ ਨਿਰਧਾਰਕਾਂ ਦਾ ਮੁਲਾਂਕਣ
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ਸਾਰ ਅੰਸ਼

ਮੌਜੂਦਾ ਖੋਜ ਦੌਰਾਨ ਪੇਂਡੂ ਆਮਦਨ ਦੀ ਵਿਭਿੰਨਤਾ ਦੀ ਸੰਚਰਨਾ, ਇਸਦੇ ਨਿਰਧਾਰਕਾਂ ਅਤੇ ਅਸਮਾਨਤਾ ਉਪਰ ਇਸਦੇ ਪ੍ਰਭਾਵ ਦਾ ਅਧਿਐਨ ਕੀਤਾ ਗਿਆ। ਅਧਿਐਨ ਸਥਿਤੀ ਮੁਲਾਂਕਣ 'ਤੇ ਨੈਸ਼ਨਲ ਸੈਂਪਲ ਸਰਵੇ ਆਫਿਸ (ਂਸ਼ਸ਼ੋ) ਦੇ ਦੋ ਦੌਰਾਂ ਦੇ ਇਕਾਈ-ਪੱਧਰ ਦੇ ਆਂਕੜਿਆਂ ਤੇ ਅਧਾਰਿਤ ਸੀ। ਪਹਿਲਾ ਸਰਵੇਖਣ ਭਾਤਰ ਵਿੱਚ ਕਿਸਾਨੀ ਘਰਾਂ ਦੇ ਸਰਵੇਖਣ ਦੀ ਸਥਿਤੀ ਮੁਲਾਂਕਣ ਦੇ ਨਾਮ ਅਧੀਨ ਸੰਨ 2002-03 ਦੌਰਾਨ ਅਤੇ ਦੂਜਾ ਸਰਵੇਖਣ ਇਸਨੂੰ ਭਾਤਰ ਵਿੱਚ ਖੇਤੀ ਨਾਲ ਜੁੜੇ ਘਰਾਂ ਦੀ ਸਥਿਤੀ ਮੁਲਾਂਕਣ ਦੇ ਨਾਮ ਅਧੀਨ ਸੰਨ 2012-13 ਦੌਰਾਨ ਕੀਤਾ ਗਿਆ। ਘਰਾਂ ਦੀ ਆਮਦਨ ਦਾ ਵੱਡਾ ਹਿੱਸਾ ਫ਼ਸਲਾਂ ਤੋਂ ਹੋਣ ਵਾਲੀ ਆਮਦਨ ਸੀ ਅਤੇ ਕੁੱਲ ਆਮਦਨ ਵਿੱਚ ਇਸਦੇ ਹਿੱਸੇ ਵਿੱਚ ਵਾਧਾ ਹੋਇਆਂ ਪਰ ਗੈਰ-ਖੇਤੀ ਆਮਦਨੀ ਵਿੱਚ ਕਮੀ ਆਈ। ਖੇਤੀ ਕਰਨ ਵਾਲੇ ਸਭ ਤੋਂ ਹੇਠਲੇ ਇੱਕ ਪ੍ਰਤੀਸ਼ਤ ਘਰ ਕੁੱਲ ਆਮਦਨ ਵਿੱਚ ਕਮੀ ਤੋਂ ਪ੍ਰਭਾਵਿਤ ਸਨ, ਉਪਰਲੇ 25 ਪ੍ਰਤੀਸ਼ਤ ਪਰਿਵਾਰਾਂ ਲਈ ਇਹ ਤਿੰਨ ਗੁਣਾ ਤੋਂ ਵੀ ਜ਼ਿਆਦਾ ਸੀ। ਜਿਸ ਤੋਂ ਪੇਂਡੂ ਪਰਿਵਾਰਾਂ ਦੀ ਆਮਦਨ ਵਿੱਚ ਬਹੁਤ ਵਧੇਰੇ ਅਸਮਾਨਤਾ ਦਾ ਪਤਾ ਚੱਲਿਆ। ਆਮਦਨ ਵਿਭਿੰਨਤਾ ਅਤੇ ਪੇਂਡੂ ਪਰਿਵਾਰਾਂ ਦੀ ਆਮਦਨ ਦੇ ਆਪਸੀ ਸਬੰਧ ਨੇ ਗਰੀਬ ਪਰਿਵਾਰਾਂ ਦੇ ਦੁੱਖੀ ਹੋਣ ਵੱਲ ਇਸ਼ਾਰਾ ਕੀਤਾ। ਫ਼ਸਲੀ ਗਤੀਵਿਧੀਆਂ ਵਿੱਚ ਬਹੁਤ ਵਧੇਰੇ ਮੁਹਾਰਤ ਹੋਣ ਕਾਰਨ ਦੋਨਾਂ ਸਾਲਾਂ ਦੌਰਾਨ ਪੰਜਾਬ ਲਈ ਸਿੰਪਸਨ ਵਿਭਿੰਨਤਾ ਸੂਚਕਾਂਕ ਘੱਟ ਸੀ। ਇਹਨਾਂ ਦਸ ਸਾਲਾਂ ਦੌਰਾਨ ਸੀਮਾਂਤ ਕਿਸਾਨ ਅਤੇ ਅਰਧ ਮੱਧਿਅਮ ਦਰਜੇ ਦੇ ਕਿਸਾਨ ਨੇ ਵਿਭਿੰਨਤਾ ਅਖਤਿਆਰ ਕਰਦੇ ਗਏ ਪਰ ਵੱਡੇ ਕਿਸਾਨ ਸਮੇਂ ਨਾਲ ਮੁਹਾਰਤ ਹਾਸਲ ਕਰਦੇ ਗਏ। ਸੀਮਾਂਤ ਅਤੇ ਛੋਟੇ ਕਿਸਾਨਾਂ ਲਈ ਸਿੰਪਸਨ ਵਿਭਿੰਨਤਾ ਸੂਚਕਾਂਕ ਦਰਮਿਆਨੇ ਅਤੇ ਵੱਡੇ ਦਰਜੇ ਦੇ ਕਿਸਾਨਾਂ ਤੋਂ ਜ਼ਿਆਦਾ ਸੀ। ਇਸ ਦਾ ਕਾਰਨ ਇਹ ਸੀ ਕਿ ਸੀਮਾਂਤ ਅਤੇ ਛੋਟੇ ਕਿਸਾਨਾਂ ਦੀ ਆਮਦਨ ਦਾ ਮੁੱਖ ਸਰੋਤ ਫ਼ਸਲਾਂ, ਡੇਅਰੀ ਅਤੇ ਖੇਤ ਮਜ਼ਦੂਰੀ ਸੀ। ਉਮਰ, ਆਮਦਨ ਦੇ ਗੈਰ-ਖੇਤੀ ਸਰੋਤ, ਕਾਸ਼ਤ ਅਧੀਨ ਰਕਬਾ ਅਤੇ ਸਿੰਚਈ ਅਧੀਨ ਰਕਬਾ, ਪਰਿਵਾਰਾਂ ਦੀ ਆਮਦਨ ਦੇ ਮੁੱਖ ਨਿਰਧਾਰਕ ਸਨ। ਵਿਸ਼ਲੇਸ਼ਣ ਤੋਂ ਇਹ ਪਤਾ ਚੱਲਿਆ ਕਿ ਫ਼ਸਲ ਤੋਂ ਹੋਣ ਵਾਲੀ ਆਮਦਨ ਦਾ ਕੁੱਲ ਅਸਮਾਨਤਾ ਵਿੱਚ ਬਹੁਤ ਵੱਡਾ ਯੋਗਦਾਨ ਸੀ। ਜਦੋਂ ਕਿ ਸਾਰੇ ਰਾਜ ਵਿੱਚ ਆਮਦਨ ਦੀ ਆਸਮਨਤਾ ਨੂੰ ਪੂਰਨ ਲਈ ਪਸ਼ੂ ਪਾਲਣ ਅਤੇ ਤਨਖਾਹ ਅਤੇ ਮਜ਼ਦੂਰੀ ਅਤੇ ਗੈਰ-ਖੇਤੀ ਕਿੱਤੇ ਆਮਦਨ ਦਾ ਪ੍ਰਮੁੱਖ ਸਰੋਤ ਸਨ। ਥੀਲ ਸੂਚਕਾਂਕ ਦੇ ਨਤੀਜਿਆਂ ਤੋਂ ਪਤਾ ਚੱਲਿਆ ਕਿ ਸੰਨ 2002-03 ਅਤੇ 2012-13 ਵਿੱਚ ਕੁੱਲ ਅਸਮਾਨਤਾ ਵਿੱਚ ਇੰਟਰਾ-ਲੈਂਡਹੋਲਡਿੰਗ ਅਤੇ ਇੰਟਰ-ਲੈਂਡਹੋਲਡਿੰਗ ਅਸਮਾਨਤਾ ਦਾ ਪ੍ਰਮੁੱਖ ਯੋਗਦਾਨ ਸੀ।

ਮੁੱਖ ਸ਼ਬਦ: ਅਜੀਵਿਕਾ ਵਿਭਿੰਨਤਾ, ਸਿੰਪਸਨ ਵਿਭਿੰਨਤਾ ਸੂਚਕਾਂਕ, ਗੈਰ ਖੇਤੀ ਰੋਜ਼ਗਾਰ, ਆਮਦਨ ਵਿਤਰਣ, ਗਿੰਨੀ ਗੁਣਾਂਕ, ਆਮਦਨ ਅਸਮਾਨਤਾ

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CHAPTER- I

INTRODUCTION

In India, Punjab has an excellent history of agricultural growth, where the transformation of the farming and rural economy occurred due to the ideal combination of environmental, institutional and technological factors and turned it into the "Granary of India" (Bhalla *et al* 1990; Gulati *et al* 2017). With substantial economic growth and noticeable economic transformation, agriculture still contributes more than 26 per cent of the gross state value added (GSVA) at a constant price in 2016-17 and employs about 36 per cent of the workforce (Economic Survey, 2017-18). The average monthly income per agricultural household in Punjab was Rs 18,059 during 2012–13, which was the highest amongst all Indian states (NSSO 2014). The economic growth benefited all the sections of the society as it also led to a considerable reduction in poverty over time. Therefore, the choice of an equitable development strategy instrument depends on a deeper understanding of the different components of household income and factors influencing income distribution.

The agricultural economy in Punjab, with its dominant but skewed farm base, lead to the 1960s green revolution. However, it faces severe challenges of income stagnation due to falling profitability (Joshi 2004). The state is suffering from paddy-wheat monoculture, the overuse of natural resources, depleting groundwater, a rise in the cost of crop cultivation and the decreasing profitability of farming. More than two-thirds of farmers operating less than 10 acres of land in the state earn lesser than an average Punjabi family (Sidhu 2002). Of the 30 lakh unemployed youth, nearly 70 per cent belong to rural areas. Over time, the share of rural farming households deriving the largest share of their income declined considerably from 33.0 per cent to 28.9 per cent, and that of agricultural labour from 27.7 per cent to 24.6 per cent between 1993-94 and 1999-2000 (Government of India 2001). As a result, Punjab's rural economy has seen a rapid transformation with the share of agriculture in net state domestic product (NSDP) declining from 48.2 per cent in 1960-61 to 23.3 per cent in 2004-05. But rural worker dependence on agriculture declined marginally, with close to 55 per cent of rural workers still seeking livelihoods in the agriculture sector. In the 1970s and 1980s, the farmer's incomes, which grew by 8 to 9 per cent annually, only increased marginally by 1.21 per cent annually in the 1990s (Joshi 2004).

Due to the dynamic changes in the state over time, the rural economy in Punjab has undergone structural changes (Pavithra and Vatta 2013). The incidence of landlessness is increasing and an observable decrease in the capacity of agriculture to absorb labour. Continuously falling farm profits and limited progress in crop diversification seriously affected job opportunities in the Punjab agricultural sector (Sidhu *et al* 2012). The decline in

the number of operational holdings from 11.17 lakh during 1990-91 to 9.97 lakh during 2000-2001 indicated that growing numbers of rural households are exploring their livelihood outside agriculture. The elasticity of employment concerning aggregated production fell from 0.54 in the 1970s to 0.36 in the 1980s. Now this rate is less than 0.20 (Sidhu 2002). The demand for human labour in agriculture fell to 421.93 million man-days in 2000-01 from 479.3 million man-days in 1983-84. A decline in agricultural job elasticity decreased demand for jobs by 10 per cent in the crop sector (Sidhu and Singh 2004). Agriculture, traditionally employing more than 3/4th of rural people, is increasingly not seen as the key to creating more jobs (Adhikari 2000). It affected the livelihood of farmers and landless households, who were unable to derive decent earnings from agriculture and failed to shift towards the non-farm sector. Moreover, globalization and market liberalization raised new obstacles to small-scale farm viability (Patnaik and Chandrasekhar 1995; Shiva *et al* 1999; Bhalla and Singh 2009). Approximately 87 per cent of Indian farmers are small farmers with less than or equal to one hectare of land (GOI 2014a). Thus, the crisis has significant consequences for the reduction of poverty and food and nutrition security.

Income diversification contributes to sustainable economic transformation as it reduces income shocks during agricultural downtrends (Haggblade *et al* 2007; Fantini 2013; Newman and Kinghan 2015). The rural non-farm (RNF) sector is viewed as both a residual and systemic agent for rural economic transformation by supplementing agricultural income, reducing rural-urban migration and promoting income diversity among rural households (Vaidyanathan 1986; Ellis 1998; Shariff and Lanjouw 2004; Barret *et al* 2001; Lanjouw and Lanjouw 2001; Reardon *et al* 2007). In addition, this sector offers economic security to women in developing countries, unable to participate in the agricultural wage labour market.

A large proportion of the Indian farmers do not consider agriculture as profitable, and almost 40 per cent of them prefer to leave it to explore livelihood outside the agriculture sector (Kumar *et al* 2006). Income diversification in agriculturally developed regions occurs due to surplus agricultural extraction and investment in non-agricultural activities, while in agriculturally backward regions, it may be the source reason to maintain a steady flow of limited incomes (Barrett *et al* 2001; Haggblade *et al* 2010; Himanshu *et al* 2011). Households have commonly diversified their income, their assets and their activities to increase income and reduce risks. Income diversification is common as few households derive income from only a single source (Barrett *et al* 2001; Vatta and Sidhu 2007). The diversification of income largely depends on two sets of factors such as push factors and pull factors (Barrett *et al* 2001; Bhaumik 2007). The large income gaps in developing economies were substantially lowered by diversification (Clay *et al* 1989; Lanjouw 1998). However, the exposure to sources of income will differ considerably between the categories of land and castes in rural households

(Vatta 2007).

Three empirical assumptions like i) the income generated through these activities are sufficient to influence the distribution of rural income (ii) unequal distribution of non-farm income and (ii) that the unequally distributed source of income favours the poor, are used as the basis for claiming that non-farm employment reduces income inequality (Reardon *et al* 2000). Thus, the growth of non-farm jobs, indirectly influenced by farm wages, indirectly affects poverty. However, the effects of different sources of income on rural inequality can differ significantly. Consequently, there was a mixed effect on deprivation (Vatta and Sidhu 2007).

The rural economy of Punjab has witnessed a crisis in recent times. The situation is emerging out of a faster increase in agricultural production costs, a relatively slower increase in output prices and hence falling profitability. The efforts to diversify the economy towards industrial and service sectors have also failed to yield any significant result as these sectors could not provide reasonably remunerative employment to the rural youth on a large scale. Many past studies in Punjab have pointed towards distress driven income and employment diversification. A comprehensive analysis of the trends in income diversification and its nature can help design better plans for rural employment generation in the future. This research aims to respond to the questions like how is the current progress on the economic diversification of the agricultural households in Punjab, what are the fundamental determinants of the income level of the agricultural households in Punjab and what are the impact of income diversification on income distribution amongst the agricultural households which will help policymakers develop better strategies for Punjab in the future.

Objectives:

The present study was conducted with the following specific objectives.

i. To study the pattern and extent of income diversity among agricultural households in Punjab.

ii. To identify the determinants of spatial and temporal changes in the income diversity of agricultural households.

iii. To examine the impact of household income diversification on income distribution amongst agricultural households.

Hypothesis tested:

The present study attempted to test the following hypotheses:

1. Majority of the rural households derive their income from more than one source.
2. Age, landholding size, irrigated land, non-farm income source etc., affect the extent of rural income diversification.
3. Relatively poor rural households having a low level of human resources and limited assets, diversity to protect their already meagre incomes, while the more affluent households apportion most of the benefits of diversifying to more remunerative income sources.

CHAPTER- II

REVIEW OF LITERATURE

This chapter offers a concise description of the research literature. It provides an insight into the trend and existence of occupational diversification, which affects household livelihood choices, and the effect on income distribution and poverty. Based on the objectives of this study, there are three following categories of this chapter.

2.1 Pattern and extent of household income diversification.

2.2 Spatio-temporal changes in household income diversification and their determinants.

2.3 Impact of household income diversification on income distribution.

2.1 Pattern and extent of household income diversification

This section contains a brief overview of the trend and extent of occupational diversification. It also throws light on the regional patterns in shifting from farm to non-farm employment.

Dev (1990) examined the NSS data from the 27th and 38th survey and found a significant decline in agriculture workers from 1972 to 1983. The proportion decreased by 7 per cent for males and by 10 per cent for females. While the number of agricultural workers rose by about 1.5 per cent per annum, the non-farm jobs increased annually by 4.5 per cent in India. Employment opportunities in agriculture grew faster for female workers than their male counterparts, and the opposite was the case for the non-farm sector. The relationship between farm productivity and unemployment strengthened due to the rise in labour displacing technology during 1972-73 to 1977-78. The study projected the non-agricultural jobs in India to increase by 50 per cent from 1977-78 to 2001. Agricultural production positively influenced non-agricultural jobs.

Unni (1991) examined inter-regional variations in the proportion of rural non-agricultural labour and its factors in India by using data for 56 NSS regions of 15 major states. The share of non-agricultural workers increased from 16.3 per cent in 1961 to 22.4 per cent in 1983. The proportion of male agricultural labourers rose in all the states except in Punjab. A positive relation between farm productivity and the percentage of non-agricultural employment confirmed the hypothesis of agricultural growth. Likewise, the dominance of non-food crops in a region positively affected the percentage of male workers in transportation, storage, and communications. The study could not confirm the prevalence of the residual-sector hypothesis because of the low percentage of male workers in non-agricultural regions with a higher proportion of the more impoverished population. A large

proportion of non-agricultural population, mainly the landless workers, reflected excess labour supply for non-agricultural jobs.

Basant and Joshi (1994) examined job diversification based on detailed micro-level data from six villages of Gujarat. Rural non-agricultural jobs were fostered by the nearby city's existence, land productivity, and land access through ties between agricultural prosperity, marketing, and urbanizations at the micro-level. Growth in the RNF was more pronounced in large villages with a relatively large internal market. Proximity to urban areas and infrastructure favoured non-agricultural jobs. The study showed a lack of significant internal demand for distress diversification into non-agricultural activities in small villages. Landlessness and other conditions of deprivation favoured higher participation among poor households forcing migration to the nearby areas for agricultural work. The study revealed the chance for coexistence with agricultural prosperity and good infrastructure. In such circumstances, households owning land might diversify into productive non-agricultural activities by enhanced access to resources and education. In contrast, poor households might engage in less paying non-farm jobs because of a lack of assets and education.

Rao (1995) examined intra-district patterns in rural non-farm jobs for women in Western Godavari using the 1971-91 census results. Initial stimulation and enormous change in agricultural activities during the 1980s and the development of female agribusinesses, including the processing of cashew kernels, tobacco processing and fruit juice manufacturers, were responsible for the growth of RNFE of women in delta and upland taluks. In the delta area, female work was high in the manufacturing, transport, storage and communication of households and non-households. In contrast, in the uplands, female jobs were high in construction, trade and trade. RNFE of female at the intra-district level showed growing patterns in all the regions with some discerning variations in growth rates due to agro-economic conditions. The study showed an increase in women's employment for growth, industry and trade. Further linkages in agriculture expanded work in grain mill product, tobacco processing etc. Improvement in agricultural income led to the expansion of trade and commerce.

Verma and Verma (1995) used NSS data from the 32nd round (1977-78), 38th round (1983) and 43rd round (1987-88) to examine the distress diversification from farm to the non-farm sector in the eastern region. There was inverse relationship between the farm size and percentage of non-farm households during 1983-84 to 1987-88 in all the states. In the non-farm operations, there was a greater job diversification for marginal classes. The study revealed a negative but significant association between non-farm employment and inter-linkages in local production. There was a strong relationship between the unemployment rate

and male rural non-agricultural work, which meant a rapid decline in agricultural absorption capacity pushed rural workers to the non-farm sector. Increasing landlessness, decreasing tenancy and increasing wage dependent production were other important reasons for such a relationship. The study rejected the interlinkage hypothesis favouring the residual-sector hypothesis and recommended improvement in interlinkages between the farm and non-farm sectors.

Prasad *et al* (2000) studied the income pattern of farm labour households in Bihar. The study revealed that the majority of agricultural labourers relied on hire out employment. Agricultural labourers earned 77.33 per cent of their annual income from crop farming and 7.95 per cent from dairy. Annual income was below Rs 15000 for about 74 per cent of the households.

In rural Kerala, Eapen (2001) examined many censuses and survey papers. The proportion of informal sector workers was higher in Kerala than the all-India averages. Casual female jobs fell from 48 per cent to 40 per cent in rural areas between1987-88 and 1993-94, while in urban areas it increased sharply from 23 per cent to 32 per cent. There was a substantial decline in daily jobs in towns. Nearly 60 per cent of the organized sector's jobs were in the private sector for females, while male workers dominated the public sector. The self-employment rate for males and females increased between 1983 and 1987-88 but declined later. Among secondary-school educated ladies, much of this increase led to improved access to education for better-off sectors. However, poor women were increasingly drawn into the informal sector, providing irregular employment to avoid joblessness and rising real incomes. There were desperate labour pressure as poorer women moved to the informal sector with weak working conditions (with incredibly challenging work and physical difficulties) outside the State.

Chadha and Sahu (2002) analyzed and compared the employment rate and trend of growth in the 1990s (post-reform period) with the 1980s (pre-reform period), based on the NSS data from different rounds. The rural non-agricultural opportunities slowed down in 11 major states of India during the post-reforms period. The structural shift of rural workers from agricultural to non-agricultural sectors was extremely uneven during both periods. In the rural non-farm sector, the proportion of employees varied greatly from 10.1 per cent in Madhya Pradesh to 44 per cent in Kerala, between 1993 and 1994, between 12.8 per cent and 51.5 per cent in 1999 -2000. The share of female workers in manufacturing decreased considerably during the post-reform period. The study recommended increasing public investments, rural education, training and better health for generating better quality jobs.

Singh (2003) found that the most significant number of workers were food and fruit

manufacturers and vegetable sellers, followed by craftsmen and workers. The largest share of non-farm households followed respectively by small and large-scale farm households. Education was the highest for those working in the government sector and the lowest for agricultural labour between the different farm and non-farm activity. In addition to the farm sector in rural Punjab, the non-farm sector level is higher. In farming, the revenue is higher than in non-farming. The study identified the number of farm work persons, training of people working for a non-farm workforce, age to the householder, farm dimensions, and herd size as significant determinants of RNF employment.

Rudrappan (2004) examined the trends in the production of rural jobs in India and Tamil Nadu during pre-reform and post-reform periods based on 2001 census data and the 55th round data of the NSS data. There was a decline in rural unemployment in India, and employment elasticity of farm production declined to just 0.1 during 1993-94 to 1999-2000 from 0.7 during 1987-88 to 1993-94. The number of workers in the farming sector had risen from 137.19 lakhs to (1987-88) 153.4 lakhs (1993-94) and then declined to 144.4 lakhs (1999-2000). The proportion of male workers in the primary sector was decreased steadily from 57.4 per cent in 1977-78 to 42.9 per cent in 1999-2000, while women's share dropped from 73.2 per cent to 62.8 per cent. Increasing landlessness, rising commodity prices, and inadequate farm credit have contributed to a decline in agriculture's self-employment opportunities over time. Due to the limited capacity of the agricultural sector to absorb an extra workforce, the growth of the non-farm sector as an alternative to the farm sector was emphasized. The study highlighted the need to encourage rural industries to generate rural employment as agriculture cannot absorb the increasing labour force.

Butault (2005) studied income disparity between farm households in France using data from 1991 and 1997. The study revealed that disparities in the overall farm income were more critical than the disparities in total household income. Therefore, non-farm work may be considered a form of compensation for the farm's structural handicap. The income of the households with non-farm work was more stable and lowered income inequality. The local labour-market situation or the spouse's preference for non-farm labour were essential factors influencing farm household income.

Kumar (2006) contrasted the employment and earnings trends from agricultural and non-farm activities in Punjab and Bihar. The share of agricultural and related operations was 85 per cent in Punjab and 40 per cent in Bihar. Among non-farm workers, four per cent were working in government, semi-government and private sector employment in Punjab and six per cent in Bihar. The primary source of livelihood for landless labourers was ad-hoc and casual labour. The family labour contributed 70 per cent and 64 per cent in livestock sector

activities and 30 per cent and 36 per cent in farming sector activities in Punjab and Bihar.

Bhakar *et al* (2007) studied income and job trends in rural Chhattisgarh. In the study region, non-farm sources contributed the majority income, i.e., 69.57 per cent, followed by farm sources, i.e., 23.07 per cent and off-farm sources, i.e., 7.36 per cent. Thus, non-farm households generated 86.34 per cent non-farm income and 15 per cent off-farm income, while farm households generated 62.23 per cent non-farm income and 33.97 per cent farm income.

Ghosal (2007) analyzed mechanisms and routes of diversified rural employment before and after liberalization by using the NSS data. The rate of diversification of rural workers was more marked after the introduction of the policy reforms. The rapid increase in rural grants, the rise in state and central government expenditure for agriculture and public spending on rural development resulted in a significant increase in rural non-farm employment opportunities in the secondary and tertiary sectors during the 1980s. The expansion of education and changes in rural farm structure, resulting in land marginalization and coupled with capital-intense technology, were other factors that contributed to the shift in rural occupational structures. In Punjab, Bihar and Orissa, workers shifted rapidly from farm to non-farm sector. The composition of the rural labour market had significant regional shifts due to changes in rural unemployment rates, agricultural incomes and pay differentials between farming and non-farming sectors.

Mehta (2007) examined the income gaps between rural and urban areas in Bhutan. Although, the study pointed out that urban areas contributed about 69 per cent of overall income, the average monthly per capita income in urban Bhutan was more than four times higher than that in rural Bhutan. Income inequality was lower in rural areas with a Gini coefficient of 0.36, while it was much higher in urban areas (gini=0.58). More than 80 per cent of the productive assets were confined to urban areas. The skewed figure of bank loan disbursement highlighted that income inequality was also policy-induced.

Vatta and Sidhu (2010) studied household income trends in Punjab. The income classes of landless labourers, small and marginal farmers derived their significant share of income from non-farm sources. Inequalities in rural wages existed in both agricultural and non-farm sectors. Rural non-farm income was more equally distributed than rural farm income. All the agricultural labour households were poor. The cultivated area, the education of the workers and the number of sources of income have a significant impact on the income level of the farmers. Further, unequal distribution of the land resulted in a greater reliance on the non-farm income of the poor households. The study expressed the need to create unorganized or organized private sector rural non-farm jobs opportunities to encourage self-employment through education and skills training. Also, the development of semi-skilled

labour-intensive sub-sectors in the non-farm sector would improve access to more remunerative employment opportunities.

Abimola *et al* (2014) published a report on the diversification of rural livelihoods and income disparity in Nigeria's Oyo province. They concluded that income inequality was unfavourable to economic growth and development. Nearly half of the households followed both farm and non-farm strategy when only farm or non-farm strategy was followed by 14.3 per cent and 40.0 per cent, respectively. The income inequality among farming households was the lowest and the highest among non-farming households. It came out that non-farm wages contributed more to wage inequality. Age had a positive, and land had a negative impact on the non-farm policy being implemented.

Kaur and Singh (2014) examined the distribution of income among marginal and small farmers in rural Punjab by collecting data from regions with low, medium and high agricultural productivity, represented by Hoshiarpur, Faridkot and Ludhiana districts. The study revealed that per capita income and average household income were directly linked to farm productivity and farm size. The average farm household earned Rs 63373 per annum. The study also showed that marginal and small farmers maintained a minimum amount of spending even if they could not afford it in the short run. Creating awareness about different agricultural schemes and programs, providing credit facilities, creating ample job opportunities, securing agricultural products, providing insurance cover for unexpected losses, etc., were the key strategies to boost the income of small and marginal farmers.

Singh *et al* (2014) examined the income levels of Punjab farmers. The study argued that farm income had declined due to a faster increase in the cost of cultivation, and farm households found it tough to meet domestic expenses. There was considerable variation in the income level of various farm size categories. The study found that the situation was very pitiful for more than half (53%) of marginal farmers and one-fifth of small farmers. The study recommended an increase in allocations and implementation of different social protection schemes to raise the income of marginal and small farmers.

Ghosh *et al* (2016) in their study based on Sundarbans area of West Bengal stated that the majority (67%) of respondents were middle-aged, ranging between 31-60 years. Agriculture was the most favoured (78.33 per cent) primary occupation, followed by the fishery. As part of financial capital, it was found that 74.67 per cent of respondents have an annual income between Rs. 50,000 to 1 lakh, classified as a middle-income group. With an average experience of 11.08 years, human capital represents the intermediate level of education and high skills in agriculture/horticulture. Under natural capital, the average pond size of respondents was 1.37 bigha.

Narayanamoorthy (2017) conducted a study and concluded that farm incomes were not only meagre but experienced very high year-to-year fluctuations. Therefore, increasing the minimum support prices (MSPs) for crops might not guarantee higher incomes to the farmers without sufficient reinforcement of procurement infrastructure. However, the farm incomes could be increased continuously, in addition to compensatory MSPs for different crops, if procurement arrangements and other non-price incentives (technology, credit, and irrigation) are packaged and sequenced appropriately.

In a nutshell, the studies reviewed above reflect a shift to non-farm activities over time. For male workers, the transition was more prominent. In the secondary and tertiary sectors, the review highlights a general diversification varying across the regions. Some scholars have attributed these temporal shifts in employment patterns to distress factors and others to developmental factors.

2.2 Spatio-temporal changes in household income diversification and their determinants

Different research studies have confirmed the widespread diversification of workers in various non-farm activities. The determinants of diversification are equally essential to know. Some critical studies have been reviewed regarding Spatio-temporal changes in income diversification and its determinants and are presented below.

Jayaraj (1994) used Census data of 1961, 1971 and 1981 to examine the determinants of rural non-farm employment in Tamil Nadu. The proportion of male and female workers in domestic industries, other utilities, animal husbandry, forestry, etc., declined sharply over time, and that of construction workers remained almost the same. Also, the proportion of agricultural workers and those engaged in manufacturing, banking, trade, and transportation and storage increased steadily. The study highlighted the need to examine variables such as the size of the agricultural revenue, the literacy rate, both spatially and by industry, in a more divisive way. The study further emphasized the need to pay attention to the effect of urbanization on rural incomes and rural non-farm employment.

Eapen (1995) examined interdepartmental disparities in rural non-farm jobs in Kerala using the 1971, 1981 and 1991 census data. About 30 per cent of the rural male working population was engaged in the tertiary sector and about 15 per cent in the secondary sector. In the tertiary sector, employment had increased in all the sub-sectors, but it was the largest in trade and commerce, followed by transport and communications. Although the share of non-agricultural jobs at a district level varied, the coefficient was small and continued to decline over time. The study highlighted that generating non-farm employment in Kerala could significantly contribute towards rural prosperity. Migration and urbanization greatly affected rural non-agricultural work in 1981. The land-man ratio and proportion of marginal holdings

acted as the 'push' factors for shifting to non-farm employment. Other important factors were the share of farm labour, urbanization, the land-man ratio and the proportion of marginal holding. The negative factors became more prevalent during 1991, while the demand and distress induced factors played a significant role in deciding rural non-agrarian employment in 1981.

Sharma *et al* (1999) analyzed the changes in rural non-farm jobs in Himachal Pradesh at the district level. They established the factors behind the growth of non-farm activities by using quinquennial NSS data and decennial Population Censuses. Since 1971, rural non-farm jobs were rising, and the proportion of rural people employed in 'other than household industry' steadily increased in manufacturing, trade and transport, storage, and communication in all districts. On the other hand, the proportion of rural workers employed in the household industry was declining continuously. Demand-side variables like Gini ratio of operational resources, urbanization and area under non-food grains were the significant determinants of non-farm employment in 1981. Both demand and supply-side variables were equally crucial in deciding rural non-farm jobs in different activities in 1991. The optimistic and vital impact of the 'proportion of poor 'on rural non-farm jobs lent some credence to the validity of the distress diversification hypothesis.

Abdulai *et al* (2001) used rural household data from South Mali to examine the determinants of income diversification. A conditional fixed-effects Logit model was used to compensate for household-specific effects. The poorer households had fewer resources in non-cropping activities such as animal husbandry and non-farm jobs, and their income was less diversified. Relative lack of resources made it harder for the households to diversify away from subsistence farming. On the other hand, the proximity to local markets helped diversify to the non-crop sector, and more educated households were more likely to participate in the RNF sector. The study recommended that governments should continue to encourage income diversification by providing assets and better services to poorer households.

Ranjan (2006) published a report on diversifying occupations and access to rural jobs and outlined various push and pull factors for diversifying to non-farm work. For example, the shortage of arable and fertile land, decline in soil fertility, decreasing crop yields, lack of access to input markets, and natural resource depletion contributed to less remunerative non-farm practises. On the other hand, the higher labour and investment returns, reduced costs, continuing wages and some social benefits were the demand-pull factors.

Singh (2006) used the Census data (1991 and 2001), NSS reports and other published data to investigate the determinants, size and regional patterns for non-farm rural employment in Uttar Pradesh. There was a considerable disparity in rural non-farm jobs between

economically more developed and economically more backward regions. The differences in population density, urbanization and length of pucca roads significantly influenced rural non-farm employment. Although irrigation intensity and farm mechanization had a significant positive effect on non-farm employment, rural workers' crop index and net area affected it adversely. In addition, the proportion of electrified villages had a considerable impact on non-farm rural work.

Toor and Sidhu (2006) used primary data from 340 rural households to identify the determinants of RNF income in Punjab. The most crucial factor was working capital, which positively impacted rural non-farm income, followed by education. The effect of education was positive in manufacturing and production work, salaries and self-employment, but negative in repair and maintenance. In self-employment, trade, and commerce and repair and maintenance, the value of assets and the number of years after the beginning of rural non-farm production also strongly influenced the RNF income. On the other hand, work costs were positive and significant determinants for production, care, maintenance and operation.

Bhaumik (2007) examined the trend and determinants of occupational diversification in West Bengal. Rural households were fairly dependent on the non-farm sector in the advanced areas compared to the backward regions. The non-farm job rate for total employment in the developing region was higher than that in the backward region. The relationship between the non-farm percentage and the total income was negative. There was a higher degree of diversification among landless people and those in small-scale groups of farmers. Landless and sub-marginal farmers earned the bulk of their work and wage revenue from farm labour, non-farm wages, and self-employment in the non-farm industry. As the level of education increased, the tendency towards diversification grew. Nevertheless, for households from lower castes, the degree of diversification was less. The diversification level was strong for households living in some urban areas and those living in rural areas.

Vatta and Sidhu (2007) examined the income distribution trend for rural households by using data from 315 rural households. The study highlighted that family size and family labour positively influenced income diversification, but the size of operational holding negatively impacted it. The study emphasized that agricultural production, manufacturing and trade must be encouraged, and the state government encourage skill development to promote RNF employment and increase farm household income.

Micevska and Rahut (2008) conducted a study in India's Himalayas and showed that non-farm production accounted for nearly 60 per cent of household income. The services dominated the rural non-farm activities, and that the share of non-farm wage income exceeded the share of non-farm income in all rural household groups. Further, participation in

non-farm activities required household assets, characteristics and local features. Education (with higher income from higher education levels), household labour supply (positive to high-return activities), land assets (negatively), intergenerational effects (positive to self-employment), social status (negative for other backward classes) and regional location were the critical determinants of participation in non-agricultural employment.

Pham (2008) investigated during 1993-2002 the potential impact that trade policy could have on rural Vietnam's non-farm employment. A collection of person, household and collective characteristics determined the likelihood of participation in rural non-farm jobs. The key drivers of rural non-farm employment (RNFE) diversification were gender, ethnicity and education. The land was the principal physical asset of rural households and appeared to harm non-farm jobs, as more land fostered more focused farming. The infrastructure also had a significant effect on workforce engagement in the non-farm rural market. The study emphasized that the reform of trade policy had a substantial impact on rural non-farm employment. More liberalized farming encouraged non-farm diversification, and a lower level of protection in the non-farm sector discouraged non-farm incomes. The study revealed that diversification had a positive impact on household income, reduced rural poverty, women empowerment and could potentially resolve problems linked to increasing rural and urban migration.

Vatta and Garg (2008) examined trends and access to jobs and incomes in Punjab. The study revealed that the three most prominent non-farm sources of employment and income were government, social and personal services, followed by transportation and manufacturing for nearly 70 per cent of rural households. The decline in agricultural productivity and the almost depleted ability of the agricultural sector to further absorb the workforce were the primary reasons for livelihood diversification. The effect on rural non-farm employment and income was heavily influenced by gender, age, education, caste, family size, operational area, the participation rate in labour and the proximity to urban settlements.

Malek and Usami (2009) used Tobit regression to estimate determinants of non-farm income diversification by using data from 214 households in four villages in a traditionally established rural region of Bangladesh. Landholding and non-farm self-employment income had a positive relationship, whereas there was a negative relation between non-farm wage income and landholdings. Also, the education of the household head had negative associations with non-farm self-employment, but household head education had a very strong positive relation with non-farm wage employment. The authors also observed that crop income made the highest impact on income inequality, followed by livestock and wage employment income.

Senadza (2012) analyzed the trends and determinants of the diversification of non-farm income in rural Ghana. The study revealed that the non-farm sector provided the largest share of rural household's income in Ghana and served as the primary source of rural jobs. The RNF income accounted for about 43 per cent of rural household income. However, a male-headed household was likely to have less non-farm income relative to a female-headed household. In rural Ghana, unlike in Asia and Latin America, income from non-farm self-employment was more extreme than income from non-farm wage employment. Further, the household gender composition, employment, access to credit, age, energy, and markets were significant determinants of many farm and non-farm income activities. The study highlighted the need for strategies that could help rural households maximize benefits from income diversification.

Demissie *and Legesse* (2013) examined determinants of income diversification among rural households in Ethiopia by using cross-sectional data. The multinomial logit model used to classify factors affecting the involvement of rural households in non-farm or off-farm activities. In contrast, the Tobit model was used to identify the determinants of non- or off-farm income. The agricultural and related activities were the most fundamental source of income for rural households and contributing about 77 per cent of total household income. The remaining 23 per cent income was derived from non-agricultural activities. Almost 85 per cent of households were engaged in non-farm or off-farm activities. The livelihood assets (size of cultivated land, livestock holding), variables related to human capital (number of economically active family members, age and gender of head of household, presence of children attending school and household education level) and variables related to infrastructure were significant determinants of non-farm income participation and income from such sources.

The role of the non-farm sector in supporting rural livelihoods in Punjab was examined by Pavitra and Vatta (2013). It was estimated that landless households earned 64 per cent of all non-farm profits. The proportion of households with large, small and medium-sized farms was 26.7 per cent, 7.0 per cent and 8.5 per cent, respectively. Determinants of the income diversification of rural households were family size, caste, operational assets and the working-population ratio. Households were mainly engaged in less-remunerative activities because of their low economic condition, lower education and poor skill base.

The above studies show that different 'factor sets' in various regions induced occupational diversification. Diversification was causing disruptions in some areas, such as the proportion of the poor, the industry's small size, the higher rate of joblessness, and low agricultural productivity. The 'crowd' factors such as infrastructure growth, schooling and

urbanization have been identified in the advanced regions to draw employees into diversified non-farm operation. The common determinants for diversification are infrastructure, employment, the size of the operating holding and caste.

2.3 Impact of household income diversification on income distribution

To assess income diversification's usefulness and draw conclusions about promoting RNF employment, it is necessary to estimate the possible impact of income diversification on income distribution. Many studies have been reviewed in this section to throw light on the implications of income diversification on income distribution and poverty.

Based on 27 studies of RNF employment in Sub-Saharan Africa, Reardon (1997) argued that income diversification is often considered the shift from farming to non-farming activities. He concluded that the majority of households avoided prolonging their reliance on just one or two income sources. Failure of the credit market caused rural families to diversify their livelihoods. The household's size and composition influenced the involvement in RNF activities. For households and villages with electricity, non-farm income shares were also greater because this lowered the costs for other forms of non-farming activities. The net impact of development in road transport was possibly greater because non-farm income production was also positively linked to the density and proximity to urban markets. The study concluded that the share of RNF income was greater among higher-income rural households, presumably due to capital and skill requirements of many forms of non-farm occupations.

Saleth (1997) analyses the diversification strategy for landless and small farmers with primary data of 218 households in Tiruchirapalli district of Tamil Nadu. Agriculture was the largest employer of the rural population, followed by non-farm activities, wage labour and animal husbandry. The proportion of active farmers increased, and wage labour decreased with an increase in the farm size. The participation of landless and small-scale farmers was relatively higher in the non-farm sector. The occupational diversification trend revealed that the non-farm sector accounted for the largest share of the total number of man-days (39 per cent), followed by wage labour (35 per cent) and the livestock sector (17 per cent). Agricultural income steadily grew to 4 acres, while wage labour fell sharply and the non-farm sector slowly declined as far as farm volume was concerned. The wage work and non-farm activities were more important for the rural poor, while farming and livestock activities were more important for the non-poor farmers. There was an inverse relationship between income diversification and farm size. The study showed that landless and smallholder farmers had a relatively greater employment/income diversification potential than larger farm size categories.

Hussein and Nelson (1998) classified the diversification triggers into push and pull factors, including environmental risks, declining income, changing terms of trade and expectations of improved opportunities. The constraints to diversification were classified into macro-economic and policy constraints (low populations, poor market access, trade restrictions, inadequate infrastructure and taxation policy), physical conditions (natural resources insufficient), seasonal conditions (climate restrictions, poor harvest), skills (limited access, and access to education), time, institutions (class-oriented norms, polygamy and monogamy), access to common property resources (exclusion from land ownership), membership of organization (the exclusion of the poorest) and no access to credit. In addition, there were fewer diversification opportunities among the most vulnerable having poor access to education and health, living far from the market and living in a small household.

Abdulai and CroleRees (2001) pointed demand-pull diversification to be more common in Sub-Saharan Africa. The study in southern Mali revealed that poorer households had less potential for non-cultivation operations, such as livestock rearing and non-farming and thus had less diversified incomes. Their relative lack of capitals appeared to reflect their difficulties in diversifying themselves from subsistence farming.

Barrett *et al* (2001) studied the dynamics of non-farm incomes and household subsistence strategies in rural Africa. The findings of a series of case studies were collected using extensive primary data from all over Africa. African farm households depended extensively on non-farm sources of income. The non-farm income share and total household income had a strongly positive relationship. For most of rural Africa, there was a strong relationship between household income and household indicators. There was a need to create clear institutional ownership over rural non-farm issues, invest in sustainable and inclusive rural financial systems, step up efforts in rural education and health, and increase investment in the physical and institutional infrastructure needed to make markets accessible to all. The study highlighted the urgency of reducing rural poverty in Africa effectively without wasting the ability of non-farming industries.

In the Post-Green Revolution periods in 1985 and 1998 in the rural Philippines, Estudillo *et al* (2001) investigated shifts in household income sources and their impacts on income distribution. There was a generational shift away from the farm to non-farm income sources, which triggered a rise in disparities in household income. The increase in non-farm labour was due to rapid growth in the non-farm sector. It increased rural integration with urban and overseas labour markets, increasing rural population job opportunities. The concentration of non-farm income among the more educated showed a remarkable increase in inequality. Nevertheless, both the household wealth and distribution disparity had

substantially declined over time. The study concluded that policies aimed at encouraging fairer and greater human capital investments contributed towards equitable rural growth.

Sundaram (2001) examined changes in labour force size, composition, unemployment rates and under-employment in rural and urban India. Workforce growth was slowed compared to population growth, and the number of rural women workers in India decreased dramatically. The share of the farm sector fell to less than 60 per cent and slightly reduced the total number of farm employees. However, in two of the three largest employing sectors outside of agriculture, labour productivity had improved, except for the buildings industry. This increased productivity labour resulted in significant growth in the daily average salaries of casual male and female wage workers. Real wage income growth was sufficient to increase the average wage income per person by more than 2.5 per cent annually for 1993-94 and 1999-2000. Such findings mirrored the resulting decrease in rural and urban poverty rates in India.

Ersado (2003) analyzed changes in Zimbabwe's income diversification and its health consequences due to the early 1990s macro-economic policy changes and droughts. There were two national production, consumption and expenditure comparable data showing a significant rise in the percentage of households receiving revenues from private and unofficial sources. In general, rural households tended to have a more diverse income portfolio than their urban counterparts, and with the pace of urbanization, the pace of diversification declined. However, the level of diversification in rural and urban areas differed significantly depending on wealth. While the rural households were comparatively better off with a more diverse income base, the poor sought numerous sources of revenue in urban areas. A decomposition of welfare changes showed that the overall contribution of income diversification was high and increased between the years 1990-91 and 1995-96. On the other hand, the return on human and physical capital assets declined significantly during the same period. As comparatively prosperous households had a diversified income base after the shocks, the poor were more vulnerable to economic changes without well-designed safety nets.

Jaganathan and Kumar (2003) used the data collected from Kurumba tribes to decompose income disparity between tribal households in Tamil Nadu. The study found skewed income distribution in the area. Permanent revenue sources, such as land and public sector jobs, led to higher incomes among tribal households. An average household obtained about 20 per cent of income from land, 15 per cent from livestock, seven per cent from the organized sector and over 10 per cent from the unorganized sector. The Gini coefficient for income from organized and unorganized sectors was 0.85 and 0.92, respectively. The relative

income inequality was the highest for income from the organized sector and the least for farm employment income. The study established a link between technological, socio-economic and institutional frameworks for tribal development to enhance their income and reduce income inequality. The study recommended skill development and promotion of education amongst lower-income groups to increase their access to non-farm income sources.

Lanjouw and Shariff (2004) used the data collected by the National Council for Applied Economic Research (NCAER) in 1993-94 from 32,000 households in 1,765 villages to assess the contribution of the non-farm sector to household incomes and its effects on poverty. In the states of India and other population quintiles, non-farm income sections varied significantly. While the poor earned a significant share of their household income from informal, non-farm jobs, the rich primarily received incomes from salary work. The non-farm sector provided relatively few real opportunities for rural women. They were more likely to get jobs as low-paid agricultural labour than in other non-farm activities. In regions where the non-farm sector was more competitive, growth in agricultural productivity was associated positively with the probabilities of non-farm jobs. The relationship between possibilities of non-farm jobs and earnings and the density of the village population differed across regions. Education, wealth, caste, agricultural productivity at the village level, population densities, and other regional conditions significantly influenced the access to non-farm occupations.

Ghuman (2005) examined the Census data of 2001 to study district and state-level composition of population and workforce in Punjab. The data from three villages, namely Chand Baja in Faridkot district, Gill in Ferozepur district and Mahla Khurd in Moga district, were used to study the nature and extent of rural non-farm employment scenario in Punjab. The Census data recorded a rise in the proportion of rural non-agricultural workers. However, the author ascribed such trends mainly to the "push effect" rather than the "pull effect", which resulted from stagnating crop yields, declining land-man ratio, falling labour absorption capacity of agriculture, high-cost capitalist agriculture, and diminishing returns from agriculture. As a result, the non-farm sector could not generate more remunerative employment compared to even the marginal and small farmers. The study emphasized the need to integrate agricultural trade reform with other policy measures to develop a more competitive and productive non-farm rural sector and to avoid significant job losses on the rural labour market.

Kijima and Lanjouw (2005) explored the relationship between income diversification and poverty using the NSS data from 1987-88, 1993-94 and 1999-00. Poverty declined significantly between 1987-88 and 1993-94. Despite a rise in agricultural labour, there was a decline in real salaries in 1993-94 and 1990-94 compared with 1987-88 and 1993-94. Agricultural workers included primarily those without experience and with low social status.

Average non-farm workers were closely linked to high consumer spending rates, but those with a low level of education, low social status and low income were present here. Self-employment in the non-farm sector seemed heterogeneous, comprising both the last resort and productive activities. The rate of poverty decline or diversification out of agriculture at the national level did not accelerate. Reducing poverty was more specifically related to increases in agricultural wages and the welfare of agricultural workers. However, expansion of non-farm work (especially casual non-farm work) was strongly linked to increased farm wages and employed the poor indirectly.

In the North Uplands of Vietnam, Minot *et al* (2006) explored income diversification and poverty by using various data sets and found that decisions about livelihoods were heavily influenced by household land and jobs. Many member households, but small farms, were more likely to have multiple sources of income, a greater share of their non-farm revenue, higher crop value per hectare, but a less marketable surplus. More extensive exposure to the market promoted increased inventory surpluses and greater specialization. Households tended to diversify into non-agricultural practices through electricity. All income sources increased roughly proportionally, but trends differed between income classes. For instance, growth in crop incomes accounted for 45 per cent of income growth in all rural households, but 69 per cent of the poorest. Poor farmers gained more, while affluent families increased their cultivated field. Strong growth in household incomes confirmed the positive impact of economic reforms, although the gap between rich and poor was expected to widen.

Hoyos (2007) measured the extent of the disparities in household income and their attribution to sectoral asymmetries and skill endowment differences in Mexico. At least half of Mexico's total household inequality was attributable to revenues derived from business activities. Education (skills) endowments were distributed unevenly, with favourable market return shifts associated with increased inequality in schooling. Asymmetries in education allocation explained about 20 per cent of total disparities in household income during the 1990s. Besides, the proportion of inequality attributable to educational endowments rose during stable periods and declined during the crisis. It was primarily explained d by shifts in return for schooling rather than changes in the skills distribution. The skill endowments accounted for almost 25 per cent of the inequality in earnings.

Haggablade *et al* (2009) used empirical data worldwide to analyze critical factors influencing development and equity in the rural non-farm economy. The non-farm sector was thought to efficiently absorb many farmworkers and small farmers, who are typically forced out of farming by highly commercialized and capital-intensive farming methods. Agricultural households relied mainly on non-farm earnings to diversify risk, moderate seasonal income

fluctuations, and finance agricultural inputs. In contrast, landless and near-farm fewer households were heavily dependent on non-farm income for their survival. Also, RNF operations had a wide range of competitiveness and profitability, with the poor leading low-return activities and the rich allocating more remunerative work opportunities because of their stronger schooling, expertise and asset base. Owing to the varying equity effect of its various components and the diverse composition of non-farm activities across the globe, the overall influence of non-farm earnings on the distribution of rural income was mixed, and no clear trend existed.

From the above studies, it becomes clear that non-farm income has become a significant source of income for the poor. In some regions, it had a positive effect on household welfare indicators. A positive impact on poverty reduction occurred through its effect on the poor's wage earnings. At the same time, some studies show that the diversification of sources of income benefits even better-off households. Thus, the effect of diversification can be said to vary across various regions and to have mixed impact on poverty reduction.

A review of the previous work done makes it clear that there has been a change in the job structure in the form of a shift away from agricultural operations to various secondary and tertiary sector activities over the years. In the case of male workers, such change was more pronounced. Also, female workers have shown diversification into new forms of producing profits. Diversification has been found to have been caused by various factors in different regions of the world. These factors could be generally classified as related to distress and factors that led to development. The supremacy of these factors was discovered in determining the form of diversification. In general urbanization, the level of income diversification was affected by employment, landholding size and infrastructure.

CHAPTER-III

MATERIAL AND METHODS

This chapter describes the nature and source of data, terms and concepts and analytical tools and techniques to achieve the objectives of this study.

3.1 Nature and source of data

This study used unit-level data from two rounds of National Sample Survey Office (NSSO), Ministry of Statistics and Programme Implementation, Government of India on Situation Assessment. The first survey, named Situation Assessment Survey of Farmer Households in India, pertained to 2002-03. The second survey, called Situation Assessment Survey of Agricultural Households in India, pertained to 2012-13. The study used only the Punjab state data from the entire unit-level survey database during both rounds.

The 59th survey in 2002-03 included 1279 farmer households from 164 villages of Punjab, and the 70th survey in 2012-13 included 725 rural households from 94 Punjab villages. There were some comparability issues during the two years of NSS surveys as the definition of sampling unit changed from 2002-03 to 2012-13. The 59th round defined a farmer as a person owning land and engaged in agricultural activities during the last 365 days. A household with at least one farmer member was classified as a "farmer household". The 70th round defined an agricultural household as having received some value from agricultural activities during the last 365 days. At least one member of the agricultural household was self-employed in agriculture and with a total value of the produce of more than Rs 3000. The study noted these differences in definitions of sampling units and undertook appropriate transformations to ensure comparability of data.

Additionally, the dataset was examined for errors and outliers. For example, some households had no access to land, either owned or leased-in, but had registered farm incomes. Also, some households reported unusually low or high farm income that was not related to their farm size. Such observations were omitted for the study.

Four primary income sources were identified, viz., crop farming, livestock, wages and salaries and non-farm business. Income from crop farming was from the cultivation of various seasonal and annual crops such as pulses, cereals, oilseeds, fibres, fruits, sugarcane, vegetables, spices, floriculture, medicinal, plantation crops and aromatic plants. Income from livestock comprised the income from milk, eggs and live animals, including poultry, dairy, sheep and goat, etc. Wages and salaries are derived by various household members employed in labour outside their household – either in other's fields or in non-farm enterprises. Income from wholesale and retail trade, manufacturing, transportation and storage, accommodation

and food service, construction and other services contributed to non-farm business income.

3.2 Terms and concepts used

The following section contains a detailed description of various concepts and terms used in the NSS Surveys used for this study and throughout this study.

3.2.1 House: Regardless of its purpose, every structure, tent, shelter, and so on was a house. It could be utilized for residential, non-residential, or both purposes or even unoccupied.

3.2.2 Household: A household was defined as a community of people who lived and ate from a shared kitchen for a large part of the reference period of 365 days. The adverb generally indicates that transient guests were removed, but temporary stays were still included.

3.2.3 Household size: The size of a household indicated the number of people that lived there. The sample household's size, i.e., the total number of people who regularly live together (i.e., under the same roof) and eat from the same kitchen (including temporary stays away but ignoring temporary visitors), was recorded against this item.

3.2.4 Land possessed: Land possessed meant, owned land (including land having "owner like possession") + land leased in + land held by the household but not owned or leased in - land leased out.

3.2.5 Land irrigated: The net irrigated area was the amount of land that was irrigated. Irrigated land can come from "owned" land, "leased in" land, or "land otherwise possessed (neither owned nor leased in) land."

3.2.6 Caste: The caste of the head of the household is the caste of all the household members, regardless of their class community. The data collection covered three castes, e.g., Scheduled Caste (SC), Backward Caste (BC), and the rest classified as 'Upper Caste.'

3.2.7 Workers (or employed): Individuals engaging in some commercial practice or who abstained from work for the sake of sickness, including their dedication to economic activities. Jobs constituted by accident or physical impairment, bad weather, festivals, social or religious activities or other structural adjustments that include temporary work absences. Unpaid helpers who assisted in the operations of economic activity in the farm or non-farm activities were also considered workers.

3.2.8 Principal source of Income: The source that provided the most income was the principal source of income among the several sources from which agricultural households got any income during the 365 days before the survey.

3.2.9 Agricultural income: Agricultural income accrued either due to own farming,

including dairying and other allied activities or working as agricultural labour on a regular/casual wage basis. Income from farming was calculated as the difference between gross revenues and the paid-out costs by the farmers. The gross revenue was calculated by multiplying the output by its price. The use of paid out costs was more appropriate in calculating the farm income as it better reflected the disposable income than the variable costs. Agricultural income was further classified as income from crops, fruits and vegetables, dairy, poultry, bee-keeping, goats, sheep, other income accruing from share-cropping etc. Agricultural labour income was the total wage income accruing due to working on the farm as agricultural labour.

3.2.10 Non-farm income: In the case of non-farm self-employment activity, the income was the difference in gross revenue and the paid-out costs during the year, including the expenses on hired labour, if any. Non-farm wage income was the total wages received by the worker during the year for his work. Different sources of non-farm casual income were casual skilled work and casual unskilled work. Non-farm regular wage income was further classified into regular income from a private and regular income from some government/semi-government source. The total non-farm income of a household was the sum of income from casual, regular and self-employed non-farm activities of an individual. It did not include the years spent in nursery schooling and the number of unsuccessful academic years if any.

3.2.11 Human capital: The variables on human capital are age, sex, religion, the caste of the household head, including the occupation of the household head's parent. It also includes family size, dependency ratio, and the number of working-age members (15-65), the average education of the household members in the working-age group excluding the household head and principal income source.

The household head is the primary decision-maker within the household. The decision to participate in non-farm activities depends on the age of the head. Of all the human capital variables, education is perhaps more significant than others as a determinant of income diversification. The supply of labour within the household depends on family size, dependency ratio, and working-age (15-65 years) persons.

3.2.12 Natural Capital: Land being the natural resource, is the source of livelihood for the rural people. Rural households are attached to land to generate means of survival. The demand for farm labour within the household is measured by the land size (Micevska and Rahut 2008). Irrigated land also a determinant of income diversification.

3.2.13 Physical capital: The variables on physical capital are structure and participation in the agricultural training. Based on the materials used in construction, structures have been divided into various categories like pucca, semi-pucca, and kaccha.

3.3 Analytical tools and techniques

A variety of analytical techniques were used to test the hypotheses of the study statistically. The details of all such methods, along with the reasons for their preference over the other existing techniques, have been presented below.

3.3.1 Simpson Index of Diversity

There are different indicators and indices for measuring income diversification, such as the Herfindahl index, Ogive index, Simpson diversification index, Modified Entropy index, Composite Entropy index (Shiyani and Pandya 1998), Entropy index, etc.

Simple statistical methods such as tables, frequencies, percentages, averages, means, standard deviation, and pie and bar diagrams were vital tools to analyze the data. We used the Simpson Index of Diversity (SID) to measure income diversity as the number of revenue sources and their balance. Simpson index was applied in this work due to its computational simplicity, robustness, and broad applicability. The SID is defined as

$$SID=1-\sum_{i=1}^{n} p_i^2 \quad (1)$$

where n is the total number of sources of income and p_i is the income proportion of the i^{th} source of income. Its value ranges from 0 to 1. When there is total specialization, the index value is 0, and it approaches one as the level of diversification rises.

3.3.2 Tobit regression model

Tobit regression was used to investigate the determinants that influence income diversification. Hansen is responsible for the mathematical explanation of the Tobit model (2012). Tobin created the censored regression model in 1958. The SID has a censored distribution, and it ranges between 0 to 1, which means that some observations above or below a threshold are reported incorrectly at the threshold. The Tobit model (Greene 2004) is written as:

$$Y_t^* = X_t \beta + \varepsilon_t \quad (2)$$

$$Y_t = 0 \text{ if } Y_t^* \leq 0$$

$$Y_t = Y_t^* \text{ if } Y_t^* \geq 0$$

Where ε_t is normally distributed with constant variance and zero means. Y_t^* is the Simpson diversification index. The explanatory variables used in the analysis are age, dependency ratio, education, landholding, irrigated land, non-farm income, and participation in agricultural training and agro-climatic zones.

Determination of income diversification (SID)

SID= β_0+ β_1 Age + β_2 Dependency ratio + β_3 Education + β_4 Landholding + β_5 Irrigated land+ β_6 Non-farm income + β_7 Participation in agricultural training + β_8 Year + β_9 Sub-mountainous zone + β_{10} Central zone + ε

3.3.3 Gini coefficient and vertical decomposition of inequality:

Income inequality can be measured using a variety of methods. We used two metrics in this study: the Gini coefficient and the Theil index. (Charles-Coll 2011). Inequality can be decomposed both vertically (*i.e.,* between individuals and households) and horizontally (*i.e*., between groups). Vertical decomposition is estimated using Lorenz curves and the Gini coefficient, while the Theil index overcomes the disadvantage of ignoring horizontal decomposition.

Total income (I) consists of income from *k* various sources. Hence, total income (I) for each household and also for the sample as a whole is given below:

$$I = \sum_{k=1}^{k} I_k \tag{3}$$

The Gini coefficient, which ranges from 0 to 1, measures how much a group's wealth distribution, deviates from a perfectly equal distribution. Its benefits include being widely used and relatively simple to measure, visual representation, and the ability to compare populations of various sizes. The Gini coefficient can be calculated using a Lorenz curve representation that plots cumulative income vs cumulative population. It can also be measured mathematically as:

$$G = cov\,(y, F(y)\frac{2}{\bar{y}}) \tag{4}$$

Cov denotes the covariance between income levels *y* and the cumulative distribution of the same income *F(y)*, and $\bar{y}$ represents average income.

As an extension of earlier income decomposition theories, Lerman and Yitzhaki (1985) developed a method to decompose the Gini coefficient as the sum of the inequality contributions of all income sources. (Shorrocks 1982).

$$G = \sum_{k=1}^{k} S_k\, G_k\, R_k \tag{5}$$

G_k denotes the Gini coefficient of income from source k, and R_k represents the correlation coefficient between income from source k and total income I. S_k is the share of

income source k in total income. G_kR_k denotes the pseudo-Gini coefficient of income source k (Shorrocks 1983).

With an increase in the product of these three elements, the contribution of income from source k to overall income inequality rises. R_k can fall anywhere on the interval (–1,1), while S_k and G_k are always positive and less than one. (Leibbrandt *et al* 2000).

The partial derivatives of the Gini coefficient for a percentage change e in income source k (ek) are derived using this Gini coefficient decomposition for total income to estimate the percentage change in overall inequality induced by a modest percentage change in income source k:

$$\frac{\delta G}{\delta e_k} = S_k(R_k G_k - G) \tag{6}$$

Then, the marginal effect of the income source relative to the overall Gini is obtained by dividing eq. (6) by the overall Gini coefficient (G):

$$\frac{\delta G/\delta e_k}{G} = \frac{S_k R_k G_k}{G} - S_k \tag{7}$$

The marginal effect property is helpful in determining whether each income source has an equalizing or unequalizing effect on total inequality (López-Feldman 2006). Suppose the source of inequality favours the rich (R_k is positive and large). In that case, an increasing or unequalizing effect may occur, while if inequality favours the poor, a decreasing or equalizing impact may occur. Bootstrapping methods would be used to measure the marginal effect's robustness. (Choudhary and Singh 2019). However, the Gini coefficient does not meet the aggregative and additive decomposability requirements (Bourguignon 1979). Theil index overcomes this limitation by allowing it to measure discrimination within and within-population subgroups. (Allison 1978).

Theil index and horizontal decomposition of inequality:

Theil (1967) suggested a decomposable metric based on the Lorenz curve that could be used to compare the disparity between groups and within groups. The Theil is a type of entropy indices that is a subset of generalized entropy indices. (Bellù and Liberati, 2006). T has no upper limit and has a lower value of 0 (perfect equality). The index is defined as:

$$T = \frac{1}{n}\sum_i \frac{y_i}{\bar{y}} \ln \frac{y_i}{\bar{y}} \tag{8}$$

where y_i is the i^{th} observation and $\bar{y}$ is the average income.

Further, assuming *m* groups, the Theil index is decomposed as:

$$T = \sum_{k=1}^{m} \left(\frac{n_k}{n} \frac{\bar{y}_k}{\bar{y}}\right) T_k + \sum_{k=1}^{m} \frac{n_k}{n} \left(\frac{\bar{y}_k}{\bar{y}}\right) \ln\left(\frac{\bar{y}_k}{\bar{y}}\right) \quad (9)$$

The within-group and between-group components are described by the first and second terms, respectively. Similarly, the Theil index can be decomposed by the source of income using the following formula for m sources:

$$T = \sum_{k=1}^{m} \frac{1}{n} \sum_{i=1}^{n} \left(\frac{y^k{}_i}{\bar{y}}\right) \ln\left(\frac{y_i}{\bar{y}}\right) \quad (10)$$

In our study, the Theil index was used to decompose inequality into within and between landholding categories.

Negative income

Another drawback of the Gini coefficient is the inclusion of incomes with negative values. The 'modified' Gini coefficient is no longer confined between 0 and 1, rendering comparisons across populations or time misleading. Since $x \leq 0$, ln(x) is undefined, the Theil index does not accept non-positive values. The exclusion of negative income was accepted by several researchers (Mussini, 2013). However, excluding households with negative or zero income from the current sample is not feasible since it would leave out many people or households. The constraint of negative or zero values can be solved, according to Bellù and Liberati (2006) by replacing zeros and negative income values with a very small value $\varepsilon > 0$. It was taken to be equivalent to 10^{-10} in this research.

CHAPTER-IV

RESULTS AND DISCUSSION

This chapter includes discussion of the analytical results of the research and consists of five sections. Each sections provides and detected account of the results of the study. The sections are follows:

4.1 Basic characteristics of the rural households

Features such as family size, level of education, size of the operational holding etc., may be significant factors of access to diverse sources of income and diversity of household incomes. Therefore, this section tends to shed light on the condition of various rural households regarding these variables. Moreover, such an attempt will form a basis for testing important hypotheses set forth for this study.

4.1.1 Categorisation of households

In Table 4.1, households are classified into marginal (below or equal 1 ha), small (more than 1-2 ha), medium (more than 2-4 ha), semi-medium (more than 4-10 ha) and large (more than 10 ha) based on the total land possessed. There was a considerable decline in the proportion of marginal households from 62.35 per cent to 36.88 per cent during 2002-03 to 2012-13. However, the ratio increased from 9.37 per cent to 20.30 per cent, 15.16 per cent to 23.34 per cent, 10.76 per cent to 16.58 per cent in the small, semi-medium, medium households, respectively. A marginal increase was noticed for large households from 2.36 per cent to 2.90 per cent during this period. The marginal, small and semi medium households constituted almost 87 per cent in 2002-03, and 80 per cent in 2012-13, whereas the medium and large landholders, together constituted 13 per cent and 20 per cent in 2002-03 and 2012-13 respectively in the study area.

Table 4.1: Percentage of total households according to different landholding categories in Punjab

Household Category	Percentage of total household	
	2002-03	2012-13
Marginal	62.35	36.88
Small	9.37	20.30
Semi-medium	15.16	23.34
Medium	10.76	16.58
Large	2.36	2.90

4.1.2 Distribution of land holdings among rural households

The details of operational land holdings across different size categories are given in Table 4.2. The average size of operational holding was 1.45 ha 2002-03, which slightly decreased to 1.25 ha in 2012-13. There have been incidences of both the leasing-in and leasing-out of land. While the marginal and small farming households were leasing out a large chunk of their land, medium and large farming households were leasing-in to increase their operational holdings. The average operational holding was 0.16 ha, 1.47 ha, 2.68 ha, 5.87 ha and 13.19 ha for marginal, small, semi-medium, medium and large farming households, respectively, during 2002-03. It was 0.03 ha, 1 ha, 2.42 ha, 5.2 ha and 14.22, respectively, during 2012-13. The marginal farming households were leasing-out 0.1 ha and leased-in just 0.02 ha in 2002-03, whereas in 2012-13 they leased-out 0.06 ha but no leased-in land. Likewise, the small farming households were leasing out 0 ha and 0.09 ha in the 59th and 70th NSSO survey, respectively, against an average leasing-in of 0.1 ha and 0.06 ha in the 59th and 70th NSSO survey. The medium and large farming households were leasing in 1.15 ha and 4.25 ha of land in 2002-03 and in 2012-13 they were leasing in 1.49 ha and 4.88 ha of land. The practice of leasing out of land amongst marginal and small landholders seems to emanate from the compulsion of their economically unviable agricultural holdings and their effort to diversify their income portfolio, favouring the non-farm sector. However, leasing-in amongst medium and large farmers may result from their efforts to achieve economies of scale in agriculture, leading to the concentration of their household income favouring the farm sector. Variations in the size of land holdings may be an essential factor responsible for the differences in household income and its diversity, which is analysed in the later section of this chapter.

Table 4.2: Landholding distribution among different categories of agricultural households in Punjab (ha)

Household Category	2002-03					2012-13				
	Owned	Leased-in	Neither leased in nor leased out	Leased-out	Total operated land	Owned	Leased-in	Neither leased in nor leased out	Leased-out	Total operated land
Marginal	0.24	0.02	0.001	0.10	0.16	0.09	-	-	0.06	0.03
Small	1.37	0.10	0.001	-	1.47	0.86	0.06	0.003	0.09	1.00
Semi-medium	2.25	0.43	0.01	0.01	2.68	1.98	0.37	0.22	0.09	2.42
Medium	4.72	1.15	0.02	0.02	5.87	3.48	1.49	0.02	0.04	5.20
Large	8.94	4.25	0.001	-	13.19	8.78	4.88	0.88	0.37	14.22
Overall	1.26	0.27	0.004	0.07	1.45	0.95	0.30	0.01	0.70	1.25

4.1.3. Details of household size

There were variations in the household size, with the marginal farming households having the least size of 5.6 and 5.1 in 2002-03 and 2012-13 respectively, while the large farming households had a size of 8.7 and 7.7 in 2002-03 and 2012-13 respectively. In addition, there was a difference in the average number of male and female members in the households: the number of males exceeding that of females in all the household categories except small farming households in 2012-13. The possible cause of the decline in average household size from 5.9 to 5.2 between 2002-03 and 2012-13 may be the shift from joint family to nuclear family structure.

Table 4.3: Average household size among different categories of agricultural households in Punjab

Household Category	2002-03			2012-13		
	Male	Female	Overall	Male	Female	Overall
Marginal	6.0	5.2	5.6	2.6	2.5	5.1
Small	5.8	5.0	5.4	2.4	2.5	5.0
Semi-medium	6.6	5.7	6.2	2.8	2.4	5.2
Medium	7.3	6.4	7.3	3.2	2.7	5.9
Large	10.1	6.9	8.7	4.2	3.4	7.7
Overall	6.2	5.4	5.9	2.7	2.5	5.2

4.1.4. Level of education

The data presented in Table 4.4 presented the education levels of the heads of the households varied from illiterate to post graduation and above. Data revealed that more than half of the households' heads were illiterate in the year 2002-03 whereas the illiteracy percentage decreased to 36.3 per cent in the year 2012-13. The data provided information that the literacy levels had improved over time. In 2002-03, only 2.5 percent of household heads had finished higher secondary school, and only 1.9 percent had graduated from college. In the year 2012-13 this percentage grew. In 2012-13, 5.9 percent of household heads completed higher secondary education, while 4.4 percent graduated from college. In 2002-03 and 2012-13, only 0.5 and 0.7 per cent of households' heads had completed postgraduation or above.

Table 4.4: Level of education of agricultural households in Punjab

Education level	2002-03	2012-13
Illiterate	634 (51.7)	263 (36.3)
Literate without formal schooling	14 (1.1)	-
Below primary	71 (5.8)	52 (7.2)
Primary	175 (14.3)	120 (16.5)
Middle	139 (11.3)	86 (11.8)
Secondary	134 (10.9)	123 (16.9)
Higher secondary	31 (2.5)	43 (5.9)
Graduate	23 (1.9)	32 (4.4)
Post graduate and above	6 (0.5)	5 (0.7)
Total	1227 (100)	724 (100)

Figures in parentheses indicate percentage of total number of households

4.2. Diversity of income sources and temporal changes

This section analyses the extent of income diversity among rural households. The distribution pattern of rural workers and the proportion of income accruing from various sources has been explained in detail. The section also discusses the temporal changes in income distribution.

4.2.1 Distribution of households in terms of source of income

Table 4.5 depicts the number of households engaged in various sources of income in the study area. The largest numbers of households (more than 90%) derive some income from livestock. Almost every household in the rural area owns livestock assets like cow, goat, pig, hen, duck, etc. About 50 per cent and 77 per cent of households derive income from crop cultivation in 2002-03 and 2012-13, respectively. Even wages and salary constitute an important source of income. Around half of the households engaged in this activity in 2002-03, and the proportion was one-third in 2012-13. The most revealing fact indicated by the data is that non-agricultural businesses engaged the least per cent of the rural households.

Although rural households derive income from multiple sources, it may be largely dependent on a particular source of income, which is its principal income source (Vatta and Garg, 2008). Table 4.6 shows the distribution of households by a major source of income. It gives a clearer picture of the importance of a particular source of income.

In 2002-03, around 42 per cent and 31 per cent of households had crop production and wages and salary as the major income source, respectively. On the other hand, in 2012-13, 64 per cent and 20 per cent of households derive income from crop production and wages and salary, respectively. A small proportion of households, i.e., 3 per cent and 7.5 per cent had livestock as the major source of income in the year 2002-03 and 2012-13 respectively. It reflects the growing number of broiler and piggery farms as a source of livelihood in the study area. The table further reveals that in the case of nonfarm business, around 12 per cent of households in 2002-03 and 3 per cent in 2012-13 derive a larger proportion of income. Other incomes included pensions, remittances, interests and dividends etc.

Table 4.5: Income sources of agricultural households in Punjab

Income Source	2002-03	2012-13
	Number	Number
Crops	624 (50.85)	557 (76.93)
Livestock	1211 (98.69)	687 (94.88)
Non-agricultural business	219 (17.84)	63 (8.70)
Wages and salary	625 (50.93)	232 (32.04)

Figures in parentheses indicate percentage of total households

Table 4.6: Distribution of agricultural households in terms of the principal source of income in Punjab

Income Source	2002-03	2012-13
	Number	Number
Crops	517 (42.13)	460 (63.53)
Livestock	38 (3.09)	55 (7.59)
Non-agricultural business	146 (11.9)	25 (3.46)
Wages and salary	386 (31.46)	146 (20.17)
Others	140 (11.42)	38 (5.25)

Figures in parentheses indicate percentage of total households

4.2.2 Composition of rural household incomes

The average nominal income of a rural household was estimated at Rs 81246 in 2002-03 and Rs 209735 in 2012-13 (Table 4.7). Crop income was the principal constituent of

household income and its share in total income increased from 59.72 per cent in 2002-03 to 62.80 per cent in 2012-13 (Table 4.7). The percentage of nonfarm income decreased from 13.21 per cent to 4.39 per cent during this period. The contribution of livestock income to total income increased from 5.10 per cent to 9.65 per cent, and wages and salaries came from 21.95 per cent to 23.14 per cent over the same period. Table 4.8 presents the growth in income by source. The annual household income grew at 1.92 per cent per annum, from INR 81246 to INR 98282, from 2002–03 to 2012–13 (at 2002–03 prices). However, the growth was not uniform; the income from animal husbandry increased at 8.62 per cent per annum, followed by agricultural wages (2.46%) and crop farming (2.43%). Nonfarm business income declined by 8.7% a year.

Table 4.7: Nominal incomes of agricultural households and share of income sources of agricultural households in Punjab (Rs/household/annum)

Income Sources	2002-03	2012-13
Crops	48521 (59.72)	131716 (62.80)
Livestock	4149 (5.10)	20248 (9.65)
Non-agricultural business	10736 (13.21)	9220 (4.39)
Wages and salary	17839 (21.95)	48550 (23.14)
Total Income	81246 (100.00)	209735 (100.00)

Figures in parentheses indicate percentage to the total income

Table 4.8 Real incomes of agricultural households and the annual growth rates in Punjab (Rs/household/annum)

Income Sources	2002-03	2012-13	2002-13
Crops	48521	61722	2.435
Livestock	4149	9488	8.621
Non-agricultural business	10736	4320	-8.700
Wages and salary	17839	22750	2.461
Total Income	81246	98282	1.921

Note: The unit of incomes is measured by the Indian Rupee at 2002-03 prices.

4.2.3 Distribution of rural household incomes

In 2002-03, households at the bottom 25 per cent of the income distribution had deficit net income from livestock rearing activities. The bottom 25, 50 and 75 per cent of agricultural households did not earn income from crop activities, wages and salary and non-agricultural business, respectively. As a result, the average real income of the bottom 50 per cent of agricultural households was less than the average real income of agricultural households, i.e., Rs. 81246. In the case of total income, the bottom 1 per cent of agricultural households registered a negative value. On the other hand, the upper 25 per cent of agricultural households earned more income than the average real income.

In 2012-013, households at the bottom 25 per cent of the income distribution had deficit net income from livestock rearing activities. The bottom 25, 50 and 90 per cent of agricultural households did not earn income from crop activities, wages and salary and non-agricultural business, respectively. As a result, the average real income of the bottom 50 per cent of agricultural households was less than the average real income of agricultural households, i.e., Rs. 98282. In the case of total income, the bottom 1 per cent of agricultural households registered a negative value. On the other hand, the upper 25 per cent of agricultural households earned more income than the average real income.

It is worth noting that only the upper 25 per cent were able to earn more than the overall average income of a rural household in both the year. While, bottom 1 per cent of the agricultural households run the deficit for total income, for the upper 25 per cent of households, it was more than three times. It shows a widespread income inequality among various categories of rural households.

In real terms, the crop income and total household income declined for the bottom one and five per cent agricultural households from 2002-03 to 2012-13 respectively. In addition, nonfarm business income declined in every percentile. But in all percentiles, income in the four sources had increased in 10 years.

Table 4.9 Distribution of real incomes of agricultural households in Punjab during 2002-03 (Rs/household/annum)

	Crops	Livestock	Non-agricultural business	Wages and salary	Total Income
Mean	48521	4149	10736	17838	81246
S. E	90562	28242	33183	31947	103126
1%	-	-46860	-	-	-10849
5%	-	-23700	-	-	1920
10%	-	-14460	-	-	9740
25%	-	-5100	-	-	23400
50%	7955	1800	-	-	52750
75%	58580	9300	-	25480	101390
90%	138940	22800	44736	52728	179025
95%	233529	35700	69456	78000	274310
99%	442850	66900	146880	130000	519970

Table 4.10 Distribution of real incomes of agricultural households in Punjab during 2012-13 (Rs/household/annum)

	Crops	Livestock	Non-agricultural business	Wages and salary	Total Income
Mean	61722	9488	4320	22750	98282
S.E	117117	41535	22499	45315	138697
1%	-2399	-35145	-	-	-25590
5%	-	-13214	-	-	468
10%	-	-8641	-	-	9864
25%	-	-1077	-	-	25906
50%	10777	4404	-	-	56405
75%	83762	15613	-	29053	117584
90%	177769	28608	-	58106	250592
95%	261471	39597	36082	117150	327553
99%	486644	75890	81068	253045	520351

Table 4.11 Changes in real incomes of agricultural households in Punjab during 2002-03 to 2012-13 (Rs/household/annum)

	Crops	Livestock	Non-agricultural business	Wages and salary	Total Income
Mean	13201	5338	-6415	4912	17036
1%	-2399	11714	-	-	-14741
5%	-	10485	-	-	-1451
10%	-	5818	-	-	124
25%	-	4022	-	-	2506
50%	2822	2604	-	-	3655
75%	25182	6313	-	3573	16194
90%	38829	5808	-44736	5378	71567
95%	27942	3897	-33373	39150	53243
99%	43794	8990	-65811	123045	381

4.2.4 Distribution of real income of agricultural households

The share of crop income increased with an increase in the size of operational holding due to an apparent positive relationship between the farm income and farm size. In contrast, the share of nonfarm income is negative correlated with farm size. The percentage of crop income decreased from 79.89 per cent to 78.35 per cent for the semi medium households and from 88.78 per cent to 82.56 per cent for the medium farming households, respectively. The share of non-farm income declined from 27.65 per cent to 8.68 per cent for marginal households, from 11.65 per cent to 4.98 per cent for small households, from 5.4 per cent to 2.28 per cent for semi-medium households and from 1.98 per cent to 1.48 per cent for the medium farming households. In contrast, the share increased for large farming households. The large farm households derived no income from the non-farm sources in 2002-03. The percentage of non-farm income was the highest for marginal households among all categories of households. It explains the fact that marginal households were driving into nonfarm activities to supplement their meagre farm income. There appeared a negative relationship between the ownership/size of the landholding and the share of wage and salary in total household income, which implied that larger farming households relied less on these income sources.

The share of crop income rose from 12.06 per cent to 25.16 per cent, that of livestock

income increased from 10.96 to 14.65 per cent, and non-farm business income came down from 27.65 per cent to 8.68 per cent for marginal households during the period 2002-03 to 2012-13. In comparison, there was no significant change in the proportion of income from wages for the marginal farming households during this period. The proportion of income from crop production increased from 63.4 per cent to 71.9 per cent and 79.71 per cent to 84.08 per cent for the small and large farming households, respectively, during this period. In contrast, the share of livestock income fell from 12.19 per cent to 7.64 per cent for the small farming households. There was a decline from 11.58 per cent to 7.05 per cent for semi medium and a slight increase from 6.25 per cent to 6.49 per cent for the medium and from 11.71 per cent to 11.75 per cent for the large farming households respectively during 2002-03 to 2012-13. No household other than the marginal farming households derived a major portion of the income from wages and salary. In a nutshell, the analysis of income distribution revealed diversified income portfolios, which emerged from different reasons for different categories of rural households. Such differentiation of reasons might be due to differential access to land and education and skills among rural households.

Table 4.12 Distribution of real income of agricultural households in Punjab

(Rs/household/annum)

Household Category	2002-03					2012-13				
	Crops	Livestock	Non-agricultural business	Wages and salary	Total income	Crops	Livestock	Non-agricultural business	Wages and salary	Total income
Marginal	5940 (12.06)	5396 (10.96)	13617 (27.65)	24282 (49.31)	49236	12400 (25.16)	7224 (14.65)	4278 (8.68)	25377 (51.49)	49280
Small	45528 (63.4)	8744 (12.19)	8360 (11.65)	9069 (12.64)	71702	68201 (71.9)	7250 (7.64)	4730 (4.98)	14664 (15.46)	94846
Semi-medium	90433 (79.89)	13115 (11.58)	6189 (5.4)	3449 (3.04)	113187	121245 (78.35)	10916 (7.05)	3536 (2.28)	19042 (12.03)	154739
Medium	203118 (88.78)	14299 (6.25)	4546 (1.98)	6818 (2.98)	228782	203697 (82.56)	16036 (6.49)	3663 (1.48)	23326 (9.45)	246724
Large	371252 (79.71)	54668 (11.71)	-	39528 (8.4)	465449	426318 (84.08)	59609 (11.75)	15682 (3.09)	5425 (1.06)	507033
Overall	48542 (56.59)	8660 (10.09)	10736 (12.5)	17838 (20.79)	85776	61722 (62.8)	9488 (9.65)	4320 (4.39)	22750 (23.14)	98282

Note: For the sake of comparability, the 2003 income was adjusted to 2013 prices using CPI-AL. So, the comparison is in real terms and not nominal terms.

Figures in parentheses indicate percentage to total income

4.3 Extent of rural income diversification

4.3.1 Multiplicity of income sources

Table 4.13 presents the number of income sources for each landholding holding category for the two periods into consideration. The majority of households (73-74%) had two sources of income during both 2002-03 and 2012-13, followed by those having three income sources, around 21 per cent and 18 per cent in 2002-03 and 2012-13, respectively. The most negligible proportion of households (about 1-2%) had more than three income sources. During the ten-year interval, **t**he proportion of households having access to only one income source increased from 4.56 per cent to 7.59 per cent. In contrast, the proportion of households having access to two income sources marginally declined. The proportion of households having three income sources decreased from 20.62 per cent to 17.95 per cent, and for more than three, income sources marginally increased from 1.14 per cent to 1.93 per cent.

The proportion of marginal and small farming households having access to two income sources declined from 72.81 per cent to 67.29 per cent and 68.7 per cent to 64.62 per cent respectively, over the period 2002-03 to 2012-13. Such proportion increased from 81.72 per cent to 83.43 per cent, 76.52 per cent to 80 per cent and 51.72 per cent to 76.19 per cent for the semi-medium, medium and large farming households. Further, the proportion of marginal, small, semi-medium, medium and large households derived their income from three income sources decreased in 2012-13 compared to 2002-03. The proportion of large farming households with three income sources also decreased from 48.28 per cent to 23.8 per cent during this period. There was a slight change in such proportion of marginal and medium farming households; however, the proportion of small farming households with three income sources declined from 30.43 per cent to 25.85 per cent. The ratio increased from 1.05 per cent to 2.62 per cent, 0.86 per cent to 2.72 and 1.51 per cent to 1.66 per cent in marginal, small and medium farming households with more than three income sources. Further, large households had at least two income sources during both periods. The average number of income sources increased with landholding size in both the reference period. While the diversity of income sources for the large farming households resulted from their superior assets, education and skills and added to their already higher incomes, the poor households diversified their income portfolio to supplement their meagre income to escape poverty. Similar results were reported by Pavithra and Vatta (2013) in Punjab.

Table 4.13 Number of income sources for different categories of agricultural households in Punjab

Number of income sources	2002-03						2012-13					
	Marginal	Small	Semi medium	Medium	Large	Overall	Marginal	Small	Semi medium	Medium	Large	Overall
Only one sources	52 (6.8)	-	2 (1.08)	2 (1.51)	-	56 (4.56)	36 (13.48)	10 (6.8)	8 (4.733)	1 (0.83)	-	55 (7.59)
Two sources	557 (72.81)	79 (68.7)	152 (81.72)	101 (76.52)	15 (51.72)	904 (73.67)	177 (67.29)	95 (64.62)	141 (83.43)	96 (80)	16 (76.19)	525 (72.51)
Three sources	148 (19.35)	35 (30.43)	29 (15.6)	27 (20.45)	14 (48.28)	253 (20.62)	47 (17.60)	38 (25.85)	19 (11.24)	21 (17.5)	5 (23.80)	130 (17.955)
More than three sources	8 (1.05)	1 (0.86)	3 (1.61)	2 (1.51)	-	14 (1.14)	7 (2.62)	4 (2.72)	1 (0.59)	2 (1.66)	-	14 (1.934)
Average number of income sources	2.15	2.32	2.18	2.22	2.48	2.18	2.05	2.24	2.08	2.2	2.23	2.13

4.3.2 Income diversification index

The Simpson diversification index value for Punjab is low in both years because of a high degree of specialisation in cropping activities. Vatta *et al* in their study (2018), classified Punjab as a high-income outlier and low-income diversification state, which is similar to this study. As the value of SID moves closer to one, the more diversified the household's income is. A mean degree of diversification of 0.210 and 0.219 was found between 2002-03 and 2012-13 by the study.

The diversification index for the marginal household category was 0.207 in 2002-03, which was increased to 0.214 in the year 2012-13. while for the large category, it is 0.217 and 0.167 for both the years respectively. Thus, the Simpson diversification index increases when the household income category was higher in 2002-03. But this index value tends to decrease with the household income category during 2012-13. These values indicated that the marginal farmers became diversified during these ten years, but the large farmers became specialized with time. But the marginal and semi marginal farmers seemed to be more diversified during this period.

The SIDs for the first three household categories were considerably higher than that

of the medium and large farmers. It is due to the reason that the first three categories were deriving their income from crops, dairying and wage labour in agriculture. Vatta and Sidhu (2007) gave the same result in their study.

The diversification index for the bottom income quantile was 0.145 in 2002-03, and it rose slightly to 0.156 in 2012-13. In comparison, the top quantile was 0.245 and 0.249 for 2002-03 and 2012-13, respectively. In both years, the Simpson diversification index continues to rise in tandem with the rise in income quantiles. This data clearly showed that the bottom, second, third, and top income quantiles became more diverse over ten years, while the fourth income quantile became more specialized.

Table 4.14 Diversification index among different categories of agricultural households in Punjab

Household category	**Simpson Diversification Index**	
	2002-03	**2012-13**
Marginal	0.207	0.214
Small	0.271	0.238
Semi-medium	0.194	0.239
Medium	0.163	0.206
Large	0.217	0.167
Overall	0.210	0.219

Table 4.15 Diversification index across income quintiles in Punjab

Income quintile	**Simpson Diversification Index**	
	2002-03	**2012-13**
Bottom	0.145	0.156
Second	0.186	0.236
Third	0.219	0.239
Fourth	0.267	0.231
Top	0.245	0.249
All	0.210	0.219

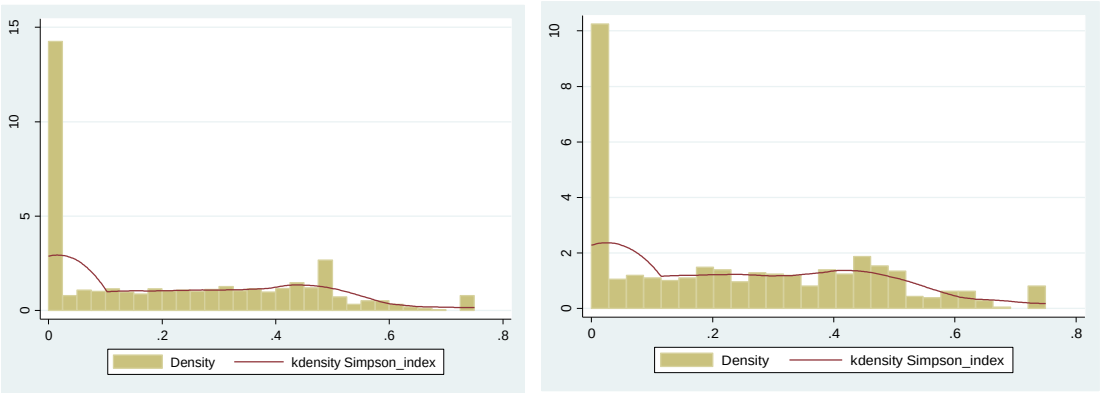

Fig 1: Kernel density estimate of SIDs for the year 2002-03 and 2012-13

4.3.3 Determinants of household income diversification

Non-farm income source, landholding size and irrigated land size significantly influenced the diversification of rural household income in both years. In addition, log of the age of the household head, participation in agricultural training, sub-mountainous zones and central zone also considerably influenced the income diversification in the year 2002-03. Overall, age, non-farm income source, landholding size, irrigated land size, sub-mountainous zones and central zone significantly impacted rural household income diversification.

The income diversity was directly and significantly correlated with the log of the age of the household head. The number of income sources increased with the age of the household head. It seems that experience and expertise accumulated over time by the head of the household is applied to gain from a greater number of income sources. Similar results were reported by Pavithra and Vatta (2013) in Punjab and Birthal *et al* in 2014.

The relationship between livelihood diversification and participation in agricultural training was found negative and statistically significant in the 59th survey. It means the number of income sources decreased with the participation in agricultural training in the year 2002-03. Agricultural training motivated households that they can earn their income from crop farming only. Thus, it seems, most of those who participate in agricultural training earn income from crop cultivation.

The tendency to diversify the income sources was significantly and directly influenced by the incidence of rural non-farm income sources during 2002-03 and 2012-13. It seems the number of income sources increased with rural non-farm income sources. Increased income from some rural nom farm sub-sectors may promote equitable distribution of income in the rural areas. Hence, the promotion of those sub-sectors, which may reduce the income gap between the rich and the poor, assumes greater significance. Vatta and Sidhu, in their study in Punjab in the year 2007, reported the same findings.

Farm characteristics such as farm size or landholdings and irrigated farmland area,

which was used as proxies for agricultural capacity, were crucial in determining the degree of income diversification at the 1% significance level. Farm households with greater irrigated farming areas were more likely to have less diverse sources of income, implying that such households were more concentrated on agricultural production. Also, Alobo in his study on Senegal and Kenya in 2012, he reported the same result. Primarily rice-wheat cropping system is used in Punjab, which is mainly water-intensive. Households with greater farm sizes or landholdings, on the other hand, were more likely to have diversified sources of income. As a measure of wealth, the greater farm size indicates that wealthier households were more likely to have higher income sources of diversification.

In comparison to the south western zone, the tendency to diversify the income sources was significantly and directly influenced by the households belonging to central and sub-mountainous zone.

Table 4.16 Determinants of income diversification among agricultural households in Punjab

Particulars	2002-03	2012-13	2002-13
log (Age)	.081*** (0.012)	0.065 (0.102)	0.071*** (0.005)
Education	0.001 (0.735)	0.0007 (0.816)	0.0006 (0.8)
Dependency ratio	-0.004 (0.903)	-0.002 (0.953)	-0.005 (0.863)
Participation in agricultural training (dummy)	-0.161** (0.054)	0.002 (0.95)	-0.056 (0.182)
Non-farm income source (dummy)	0.174*** (0.000)	0.2*** (0.000)	0.181*** (0.000)
log (Land holding)	0.036*** (0.000)	0.024*** (0.000)	0.032*** (0.000)
log (Irrigated land)	-0.064*** (0.000)	-0.062*** (0.000)	-0.06*** (0.000)
Sub-mountainous zones (dummy)	0.063*** (0.01)	-0.007 (0.81)	0.038** (0.05)
Central zones (dummy)	0.073*** (0.000)	-0.011 (0.657)	0.04** (0.013)
Year	-	-	-0.077 (0.36)
Constant	0.179 (0.387)	0.009 (0.955)	0.026 (0.835)
sigma	0.283	0.257	0.274
Number of observations	1227	724	1951

Figures in parentheses indicate standard error.

Significant level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.4 Impact of income diversification on income inequality

Though there existed many rural income sources, all of them were not contributing

likewise towards the household income inequality. While some income sources reduced the income gap between the rich and the poor by providing more employment and income opportunities to the rural poor, many other increased inequality as mostly the more affluent households with better education, better skills and asset position could have access to them. Therefore, focus on encouraging the development of those income sources which reduce the income inequality and improve access to more remunerative income sources by promoting their education and skills can go a long way to reduce the income gaps between the rich and the poor.

4.4.1 Contribution of income sources to inequality of income

The Gini for non-farm business (G_k) was highest (0.900 in 2002-03 and 0.965 in 2012-13), followed by G_k for animal farming income in 2003-04 and that for wage and salary in 2012-13. It was worth noting that though the non-farm sector enables the poor to enhance their incomes, the barriers for entry into productive activities lead to unequal distribution of gains. Interestingly, though income from crop farming was most equally distributed, it contributes maximum (68.4 per cent in 2002-03 and 80.5 per cent in 2012-13) in total inequality as it was a major source of income (S_k = 0.548). The high correlation of crop farming with total income (R_k = 0.881 in 2002-03 and 0.94 in 2012-13) indicates that households that are above the total income strata derive more income from the cultivation of crops its share in total inequality. The lowest value of Gini correlation in the case of wages and salaries (R_k = 0.282 in 2002-03 and 0.302 in 2012-13) indicates the biasness of the income source towards the lower-income quintile. As a result, this source has the potential to reduce overall income inequality. Choudhary and Singh reported similar results in 2019 in Punjab. It was also evident from Table 4.17 and 4.18 that crop farming was inequality increasing in its effect; other factors remaining constant, 1% increase in income from crop cultivation, increases total inequality by 0.143% in 2002-03, which decreased to 0.085% in 2012-13. Income from livestock, non-agricultural business, and wages and salaries tend to reduce income inequality in the state significantly. Income inequality in Punjab was higher during 2002-03 with Gini coefficient of 0.53 and marginally increased during 2012-13 with Gini coefficient of 0.548. The Gini income elasticity value of more than one implies that an income source was inequality increasing, the value less than one indicates that the source is inequality reducing. The Gini income elasticity is one when the source does not affect the income distribution among the households. The non-farm income showed an inequality reducing effect; it also showed a lower correlation with the total income than crop income and animal farming income. Figure 1 and 2 depicts the magnitude of the disproportionate income distribution along with 95% confidence interval from all four income sources.

Pavithra and Vatta, in their study in Punjab in the year 2013, reported the same result.

Table 4.17 Decomposition of inequality by sources of income in Punjab during 2002-03

Source	S_k	G_k	R_k	Contribution of source income to total inequality	Gini income elasticity	Share in total Gini	Marginal contribution to Gini
Crops	0.540	0.760	0.881	0.366	1.263	0.684	0.143** (0.012)
Livestock	0.109	0.781	0.616	0.053	0.901	0.090	-0.011* (0.0076)
Non-agricultural business	0.139	0.900	0.584	0.073	0.980	0.137	-0.0023* (0.008)
Wages and salary	0.208	0.716	0.282	0.042	0.37	0.078	-0.129* (0.0083)
Total income		0.530					

Notes: Bootstrapped standard error with 50 replications in parentheses

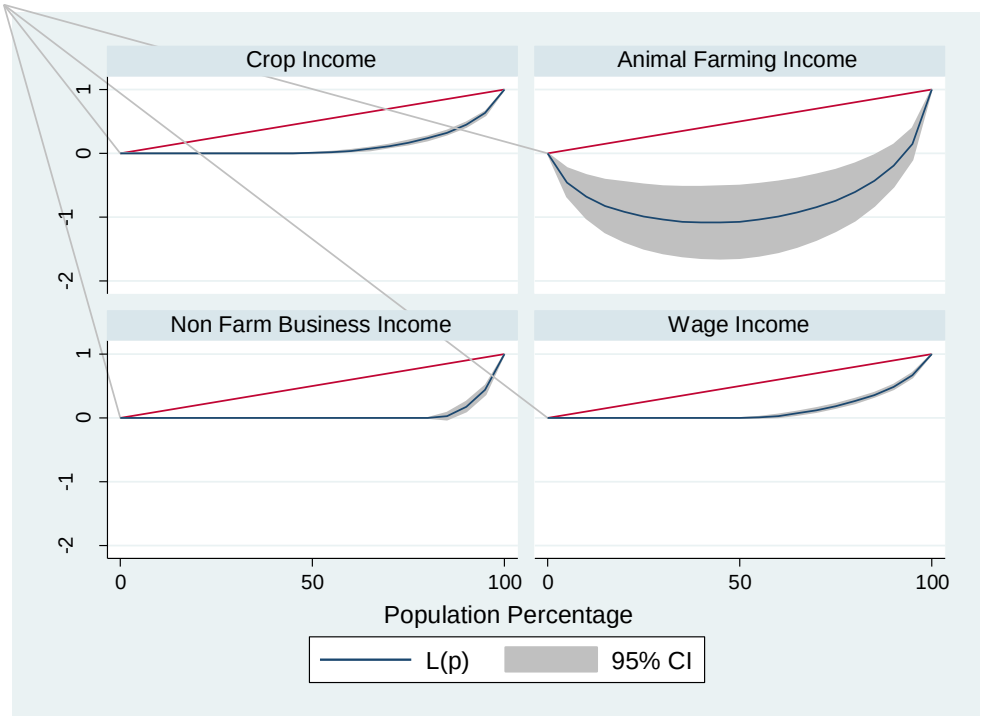

Fig 2. Lorenz curves of income sources in 2002-03

Table 4.18: Decomposition of inequality by sources of income in Punjab during 2012-13

Source	S_k	G_k	R_k	Contribution of source income to total inequality	Gini income elasticity	Share in total Gini	Marginal contribution to Gini
Crops	0.726	0.640	0.940	0.441	1.110	0.805	0.085** (0.0201)
Livestock	0.125	0.723	0.631	0.057	0.833	0.105	-0.021** (0.014)
Non-agricultural business	0.037	0.965	0.541	0.019	0.952	0.035	-0.0018* (0.005)
Wages and salary	0.115	0.836	0.302	0.029	0.460	0.053	-0.062* (0.0088)
Total income		0.548					

Notes: Bootstrapped standard error with 50 replications in parentheses

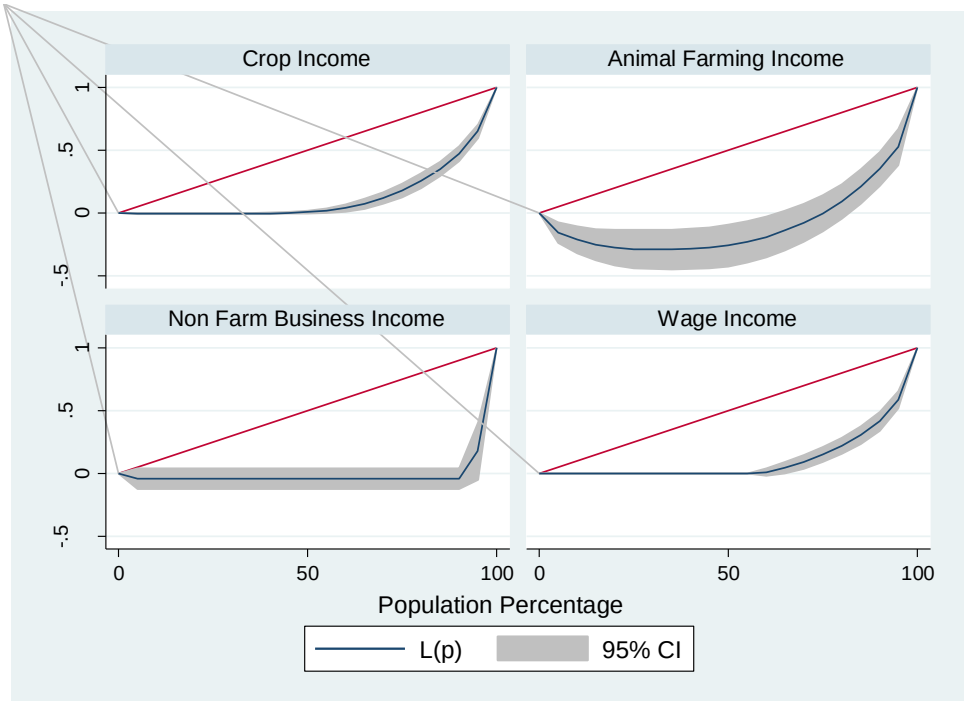

Fig 3. Lorenz curves of income sources in 2012-13

4.4.2 Decomposition of income inequality within and between landholding category

It clearly illustrates that the value of the Theil index was more for 'within' the periods than the corresponding 'between' values for animal farming, non-agricultural business and wage and salary income sources. Still, in the case of crop income, the value of Theil index was lesser for 'within' the periods than the corresponding 'between' values in both the year. The value of Theil index was more for 'within' the periods than the corresponding 'between' values for total income in the year 2002-03 but the 'between' value of total income was greater than the 'within' value in the year 2012-13. It indicates that the intra-landholding and inter-landholding inequality was the main contributor to total inequality in 2002-03 and 2012-13, respectively. So, in the year 2002-03, the orientation of efforts within the landholding would be more imperative for smoothening the income inequality of agricultural households in Punjab, but in the year 2012-13, alignment of efforts between land holdings will be more crucial for reducing income inequality among agricultural households in Punjab.

Table 4.19: Theil index of inequality by different categories of agricultural households in Punjab

Source of income	2002-03		2012-13	
	Between	**Within**	**Between**	**Within**
Crops	0.923	0.265	0.497	0.302
Livestock	0.145	1.299	0.332	1.095
Non-agricultural business	0.054	2.039	0.445	2.787
Wages and salary	0.094	0.947	0.047	1.533
Total income	0.259	0.264	0.306	0.267

CHAPTER-V

SUMMARY

Rural households depend on a variety of income sources for their survival. Though agriculture still remains to be a major source of employment and income for the rural households, they do participate in a wide range of non-agricultural activities such as wage and self-employment in commerce, manufacturing and services, alongside the traditional rural activities of farming and agricultural labour. Such multiplicity of income sources emerges out of different factors. 1t could be due to the pull factors which emanate out of the growth-led linkages which create opportunities for the diversification of income sources of the rural households or it could be due to the push factors which comprise the low risk bearing ability of the rural households and declining factor returns in agriculture. Besides the survival strategies of the rural households are dynamic and undergo continuous transformation.

In order to study the diverse occupational portfolio of rural households the present study entitled "Income diversity of agricultural households in Punjab and its determinants'' was carried out on the basis of secondary data collected from two rounds of National Sample Survey Office (NSSO) on Situation Assessment. The first survey was conducted in 2002-03 and was named as Situation Assessment of Survey of Farmer Households in India and the second survey was conducted in 2012-13 and was named as Situation Assessment of Agricultural Households in India. The data pertaining to Punjab state will be retrieved from both the surveys and the necessary analysis will be conducted. Each survey contains data from approximately 700 rural households in Punjab. The data to be used from NSS surveys contains information on a large number of variables pertaining to agricultural land holdings, cropping patterns, irrigation, employment in farm and non-farm activities and income from various sources such as crop production, wages, and other non-farm sources. Apart from that, the data is also available on family composition, age, education, etc. The information on various agricultural and non-agricultural assets is also available. The present study will make use of most of such variables to draw meaningful conclusions about the rural farm and non-farm sector in Punjab and factors affecting income diversity and changes in it over time. There are some issues of comparability of households during the two years of NSS surveys as the definition of sampling unit changed from 2002-03 to 2012-13. In 2002- 03, a farmer was defined as 'a person who owned land and was engaged in agricultural activities during the last 365 days'. A household with at least one farmer member was classified as farmer household. In 2013, an agricultural household was defined as that household that received some value of produce from agricultural activities during the last 365 days. The household with at least one member self-employed in agriculture and with the total value of the produce of more than Rs

3000 was classified as an agricultural household. The study will attempt transformations in the sample and data to make the two samples comparable. Apart from that, the study will be using descriptive statistics and regression analysis for achieving the specific objectives of this study. The study was carried out with the following objectives:

i. To study the pattern and extent of income diversity among agricultural households in Punjab.

ii. To identify the determinants of spatial and temporal changes in the income diversity of agricultural households.

iii. To examine the impact of household income diversification on income distribution amongst agricultural households.

The present study made an attempt to test the following hypotheses:

1. Majority of the rural households derive their income from more than one source.

2. Age, land holding size, irrigated land, non-farm income source etc affect the extent of rural income diversification.

3. Relatively poor rural households having low level of human resources and limited assets, diversity in order to protect their already meagre incomes, while the richer households apportion most of the benefits of diversifying to more remunerative income sources.

Income sources were broadly categorized into farm income, non-farm income, livestock income and wage income. To measure income diversity as number of income sources and balance among them we use Simpson Index of Diversity (SID). To find the impact of individual income sources on inequality, Gini coefficient is decomposed by sources of income. Relative concentration coefficients were used to identify whether an income source was inequality reducing or inequality enhancing. The Theil index is one of the two most widely applied inequality measures (the other being the Gini coefficient). By Theil index, the total amount of inequality is measured which can be decomposed into two additive components of between-group and within-group inequality. Determinants of income diversification have been analysed through Tobit regressions.

The average nominal income of a rural household was estimated at Rs 81246 in 2002-03 and Rs 209735 in 2012-13. Crop income was the major constituent of household income and its share in total income increased (from 59.72 per cent in 2002-03 to 62.80 per cent in 2012-13) but the share of non-farm income decreased. The contribution of livestock income and wages and salary income to total income increased over the same period. The annual household income grew at 1.92 per cent per annum, from INR 81246 to INR 98282, from

2002–03 to 2012–13 (at 2002–03 prices). The growth was not uniform, however; the income from animal husbandry increased at 8.62 per cent per annum, followed by agricultural wages (2.46%) and crop husbandry (2.43%). Non-farm business income declined by 8.7% a year.

In the year 2002-03, households at the bottom 25 per cent of income distribution, had deficit net income from livestock rearing activities. The bottom 25, 50 and 75 per cent of agricultural households did not earn income from crop activities, wages and salary and non-agricultural business, respectively. The average real income of bottom 50 per cent of agricultural households was less than the average real income of agricultural households i.e., Rs. 81246. In case of total income, the bottom 1 per cent of agricultural households registered a negative value. The upper 25 per cent of agricultural households earned more income than the average real income. The situation pretty much the same in the year 2012-13. It is worthwhile to note that only the upper 25 per cent were able to earn more than the overall average income of a rural household in both the year. While, bottom 1 per cent of the agricultural households run the deficit for total income, for the upper 25 per cent household it was more than 3 times. It shows a widespread income inequality among various categories of rural households.

Rural household was mainly composed of agricultural income. Its share in the total household income was found to have increased from 56.59 per cent to 62.8 per cent. Share of non-farm income showed a decrease from 12.5 per cent to 4.39 per cent. Agricultural income showed a positive relation with size of landholding. Share of agricultural income showed an increase for all the households' categories. Except for the large households which showed an increase in the share of non-farm income, all the other households showed a decline in the share of non-farm income in the total household income over the years. The share of non-farm income was negative correlated with farm size.

The share of non-farm income was the highest for marginal households among all categories of households. This explains the fact that marginal households driving into nonfarm activities to supplement their meagre farm income. There appeared a negative relationship between the ownership/size of the landholding and the share of wage and salary in total household income which implied that larger farming households were relying less on these income sources. No other household than the marginal farming households were deriving a major portion of the income from wages and salary.

The SID value for Punjab is low in both years because of high degree of specialisation in cropping activities. A mean degree of diversification of 0.210 and 0.219 was found in the year 2002-03 and 2012-13 by the study. Marginal farmers and semi medium farmers became diversified with this 10 years' time span but the large farmers became

specialized with time. The SIDs for the first three household categories were considerably higher than that of the medium and large farmers. It is due to the reason that first three categories were deriving their income from crops, dairying and wage labour in agriculture.

By the use of tobit model, we can conclude that, age, non-farm income source, landholding size and irrigated land size had a significant impact on rural household income diversification. The income diversity was directly and significantly correlated with the log of the age of the household head. The relationship between livelihood diversification and participation in agricultural training was found negative and statistically significant in the 59th survey. The tendency to diversify the income sources was significantly and directly influenced by the incidence of rural non-farm income source during 2002-03 and 2012-13. Farm households with greater irrigated farming areas were more likely to have less diverse sources of income, implying that such households were more concentrated on agricultural production. Households with greater farm sizes or landholdings, on the other hand, were more likely to have diversified sources of income.

Income from crop farming is most equally distributed, yet it contributes maximum (68.4 percent in 2002-03 and 80.5 percent in 2012-13) in total inequality as it is a major source of income (S_k = 0.548). The high correlation of crop farming with total income (R_k=0.881 in 2002-03 and 0.94 in 2012-13), indicating that households which are above in the total income strata derive more income from cultivation of crops, also contributed its share in total inequality. The lowest value of Gini correlation in the case of wages and salaries (R_k=0.282 in 2002-03 and 0.302 in 2012-13) indicates the biasness of the income source towards lower income quintile. As a result, this source has the potential to reduce overall income inequality. Crop farming is inequality increasing in its effect. Income from livestock, non-agricultural business and that from wages and salaries tend to significantly reduce income inequality in the state. There was a prevalence of high-income inequality in Punjab with Gini coefficient of 0.53 in 2002-03 which is marginally increased to 0.548 in 2012-13. The non-farm income showed an inequality reducing effect; it also showed a lower correlation with the total income as compared to crop income and animal farming income.

Theil index indicates that the intra-landholding and inter-landholding inequality is the main contributor in total inequality in the year 2002-03 and 2012-13 respectively. So, in the year 2002-03, orientation of efforts within the land holding would be more imperative for smoothening the income inequality of agricultural households in Punjab but in the year 2012-13, alignment of efforts between land holdings will be more crucial for reducing income inequality among agricultural households in Punjab.

Conclusions and Policy Implications

Rural households rely on a variety of sources of income. While the poor must rely on several sources of income to make a sustainable livelihood, the wealthy do so to improve their already substantial earnings. Farm income seems to be more concentrated among the landholding household's income from agriculture and low productive non-farm activities seem to be a resort for relatively poor households. Households with a higher income have more access to more productive money-generating activities, both on and off the farm. Livelihood diversification was more pronounced among landless and marginal households than among better-off households. Non-farm income as a whole was inequality decreasing and farm income was inequality increasing.

The conclusions of this study have several significant policy consequences. Improvement in income of agricultural households, it's even distribution among them and reducing the income gaps between the rich and the poor is the fundamental objective of any policy intervention in agriculture.

- Lower levels of female education necessitate concentrating efforts to increase education among rural females, as this aids in boosting access to jobs and, as a result, income diversification.
- Improving poor households' access to non-farm jobs by supporting education and skill development is also critical.
- The non-farm industry in rural areas appears to represent a significant part of the economy. This sector must be promoted by fostering farm-to-non-farm linkages and providing the necessary infrastructure. This initiative will not only assist to create more job chances, but will also help to narrow the income gap between rich and poor people.
- Women in rural households should be encouraged to participate in more secondary occupations such as poultry, aquaculture, goat husbandry, and mushroom production. Women's self-help groups can contribute significantly to the funding of such programs. Emphasis on the development of dairying, construction, manufacturing, and trade in rural areas can boost employment opportunities and, as a result, income diversification.
- Improve access to more remunerative job options for rural households, which have traditionally been the stronghold of economically better-off households, i.e., medium and large farmers in rural areas. This can only be accomplished by policies targeted at improving the rural poor's skill formation through better education and vocational training.
- Per capita expenditure on education must be increased.

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