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Socioeconomic dynamics and technological integration in Punjab's farming communities: Insights from a rural survey

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Abstract

This study investigates the socioeconomic conditions of farmers in five villages in Rupnagar district, Punjab, by assessing their agricultural practices and educational levels in order to uncover factors influencing agricultural output. The survey, based on a sample of 120 farmers, showed a primarily experienced agricultural community, with 44% aged 36 to 55. Educational attainment varies, with 45% completing metric education and only 1.7% receiving a degree, highlighting the need for further educational outreach. Farming experience varies greatly, ranging from less than ten years to more than fifty, indicating a diversified skill set. Landholding patterns reflect a predominance of small landowners (45.8%), indicating that agriculture is small-scale. The majority of farmers choose nuclear families (76.75%), with the General category accounting for 80% of respondents, while the OBC and SC categories make up 16.7% and 2.5%, respectively. Technological adoption is significant, with 92.5% of farmers holding cell phones and 75.8% having internet access. However, the reliance on rented farm machinery (13%), as well as the uneven distribution of agricultural equipment, reveal resource availability gaps. Input dealers (64.1%) are the most common providers of information, with extension services providing less participation. The findings highlight the need of expanding educational opportunities and technological access in order to increase agricultural output and maintain rural communities' socioeconomic stability. Addressing these concerns with focused interventions has the potential to greatly enhance farming practices and overall rural development.

Keywords: Agricultural productivity, socioeconomic status, technological adoption, educational attainment, farm machinery, extension services

Introduction

India has the world's largest net cultivated land, but as the global economy increases, agriculture's part is shrinking. Since 2008-2009, the global economic slump has had an influence on all sectors of the Indian economy, with agricultural production falling behind that of developed countries. As of 2018, it employs over 50% of the workforce and accounts for 17-18% of GDP in growing nations like as India, making it a major economic stabilizer ^[1]. The study of socioeconomic status looks at both social and economic aspects to better understand how they interact to affect an object. The socioeconomic attributes related to population density, wealth distribution, and spending habits of residents in a given area have a significant impact on how they adapt to technological advancements and engage in development initiatives. In order to comprehend the current state of a certain area, socioeconomic analysis aims to promote socioeconomic ^[2]. The primary goal of socioeconomic studies of villages is to comprehend the current state of these communities with regard to their way of life, level of education, health, reliance on forests, water risks, lack of food, and general rural development. Given the current state of Indian agriculture, public extension is unable to reach millions of farmers with sufficient numbers of skilled workers to meet their complicated needs ^[3]. The expertise needed to meet the increasingly varied demands of farmers in beyond the scope of work for extension workers at the local level. The education of farmers is crucial in acquiring and applying knowledge of contemporary agricultural technologies to better effectively tackle difficulties unique to their area ^[4]. Thus, it is essential to India's economic and social development to guarantee that

everyone has access to high-quality education, especially the impoverished and rural population. Punjab is a region in northwest India that is referred to as the “country of rivers”. Punjab, also known as the “land of the five rivers”, is one of the most fertile areas on earth Punjab State, which contributes 40% of rice and 50% to 70% of wheat, has been dubbed the “Food Basket of the Country” and the “Granary of India” for the past 20 years [5]. Socioeconomic status is the aggregate measure of an entity’s social and economic standing relative to others in society. It impacts a variety of factors, including food and nutritional security, lifestyle, and resource accessibility. People’s socioeconomic characteristics, demography, modes of production and investment, incomes, and spending patterns all have a significant impact on how they respond to technological progress and participate in development activities [6]. However, the lack of more trustworthy data about the socioeconomic status of the target group is one of the main barriers to the successful implementation of developmental projects. The socioeconomic status of an individual can provide insight into their health and well-being as well as their level of social integration [7]. This is accomplished by accounting for factors including basic utilities, property ownership, income, and education. Studies examining the socioeconomic status of farmers can shed light on significant concerns. Farmers must receive education in order to use modern agricultural technologies to tackle local problems. This emphasizes how important a top notch education is, especially for the rural and underprivileged populations [8]. Advancement in information and communication technology are facilitating the integration of Indian farmers, extension services, and research. Through the Rural Agricultural Interact Experience (RAWE), agricultural students interact with farmer families to discover their issues, experience a natural village setting, and learn how to use various extension techniques to convey the newest agricultural technologies. The practical approach to teaching agriculture holds great potential for producing highly skilled agricultural professionals with modern perspectives and managerial capabilities [9]. Using learner centered methods like RAWE has been proven to significantly enhance the competence and confidence of agriculture graduates, contributing to the development of human resources in the agricultural education, research, and extension sectors of the nation. A survey conducted in 5 villages with a total of 120 farmers clearly indicates the significance of agriculture in sustaining these communities. According to the survey, there is a necessity for better educating the farming community about government initiatives, which can lead to improved utilization of software

and enhanced farming practices. It’s crucial to recognize that a lifetime of farming experience can offer valuable skills and knowledge that can be applied to modern techniques and technology [10].

Materials and Methods

The study was done in 5 communities that were strategically chosen based on their agricultural and dairy producing activities. These communities were chosen to provide a representative sample of the local farming population while accounting for differences in socioeconomic status and farming techniques. A total 120 farmers were questioned, with the sample size chosen to present a complete picture of the farming community in the selected communities. The sample included a mix of small, medium, and large scale farmers, offering a diversified viewpoint on agricultural methods and difficulties. The major data gathering method was a structured questionnaire designed to collect both qualitative and quantitative data. The questionnaire was divided into parts that addressed the following topics: age, education, family size and landholding size, farm machinery, source of information, availability of mobile phones, internet access and agricultural social groups etc. The percentage of the given data is also provided in this research paper which calculates by using the formula:

$$\text{Percentage (\%)} = n/N \times 100$$

Where, N= total number of respondents from all 5 selected villages (120 farmers), n= number of respondents from each selected village.

Results and discussion

The following data is collected from the farmers under this research conducted in 5 different villages of Rupnagar district (Punjab):

Age

The data (Table 1) show the age distribution in five villages: Dhianpura, Kakrali, Dhangrali, Khairpur, and Dhanauri, with a total population of 120 individuals. The majority, 44% (53 individuals), are between the ages of 36 and 55, with 35% (43 individuals) falling between 56 and 75. The younger population, aged 16 to 35, accounts for 13% (16 individuals), with only 5% (6 individuals) beyond the age of 76. The numbers are very well spread across the villages, with no village having extreme outliers in any one age bracket.

Table 1: Depicts the age of respondents from all villages.

| Sr. No. | Parameters | Dhianpura n=27 | Kakrali n=26 | Dhangrali n=21 | Khairpur n=26 | Dhanauri n=20 | Overall % N=120 |
|---------|------------|----------------|--------------|----------------|---------------|---------------|-----------------|
| 1 | 16-35 | 6 | 4 | 2 | 3 | 1 | 16 (13%) |
| 2 | 36-55 | 10 | 13 | 10 | 12 | 10 | 53 (44%) |
| 3 | 56-75 | 8 | 8 | 9 | 10 | 8 | 43 (35%) |
| 4 | Above 76 | 3 | 1 | 0 | 1 | 1 | 6 (5%) |

Qualification:

To increase agricultural productivity, sustainability, and rural livelihoods, farmers must receive an education. Through the acquisition of knowledge on contemporary agricultural practices, resource management, climate adaptation, and market trends, farmers may make well-informed decisions that optimize

soil health, increase crop yields and lower input costs. Table 2 represents that 45% farmers are metric passed which is the highest ratio than others. 37.5% respondents had completed their primary education and 8.3% farmers studied in higher secondary and out of 120 respondents only 1.7% found graduated.

Table 2: Represents the qualification of respondents from all villages

| Sr. No. | Parameters | Dhianpura n=27 | Kakrali n=26 | Dhangrali n=21 | Khairpur n=26 | Dhanauri n=20 | Overall % N=120 |
|---------|------------------|----------------|--------------|----------------|---------------|---------------|-----------------|
| 1 | Illiterate | 4 | 2 | 1 | 0 | 2 | 9 (7.5%) |
| 2 | Primary | 2 | 10 | 10 | 10 | 13 | 45 (37.5%) |
| 3 | Metric | 15 | 12 | 10 | 13 | 4 | 54 (45%) |
| 4 | Higher secondary | 5 | 2 | 0 | 2 | 1 | 10 (8.3%) |
| 5 | Graduate | 1 | 0 | 0 | 1 | 0 | 2 (1.7%) |

Farming experience

The statistics show the age distribution of individuals in five villages: Dhianpura, Kakrali, Dhangrali, Khairpur, and Dhanauri, with a total sample size of 120. The majority of people (24.2%) are between the ages of 40 and 50, with 20.8% being in the 30 to 40 age bracket. Approximately 19.2% are

between the ages of 20 and 30, with 17.5% above the age of 50. Smaller percentages are observed in the 10-20 (10.8%) and under 10 (7.5%) age groups, demonstrating a diversified distribution across several age brackets in the study population (Table 3).

Table 3: Represents the data regarding farming experience (yrs)

| Sr no | Parameters (Years) | Dhianpura n=27 | Kakrali n=26 | Dhangrali n=21 | Khairpur n=26 | Dhanauri n=20 | Overall % N=120 |
|-------|--------------------|----------------|--------------|----------------|---------------|---------------|-----------------|
| 1 | <10 | 2 | 1 | 2 | 3 | 1 | 9 (7.5%) |
| 2 | 10-20 | 3 | 1 | 3 | 2 | 4 | 13 (10.8%) |
| 3 | 20-30 | 4 | 6 | 2 | 5 | 6 | 23 (19.2%) |
| 4 | 30-40 | 6 | 8 | 4 | 2 | 5 | 25 (20.8%) |
| 5 | 40-50 | 6 | 9 | 5 | 5 | 4 | 29 (24.2%) |
| 6 | 50< | 6 | 1 | 5 | 9 | 0 | 21 (17.5%) |

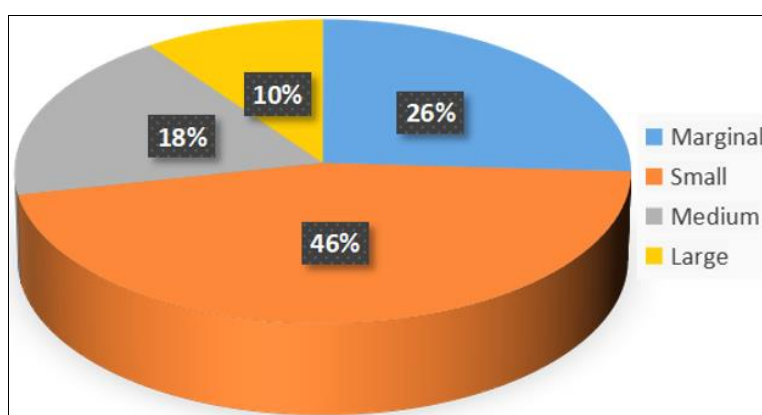
Land holding in hectares

Table 4, show the distribution of landholding sizes in five villages: Dhianpura (n=27), Kakrali (n=26), Dhangrali (n=21), Khairpur (n=26), and Dhanauri (n=20), totaling 120 families. Marginal landowners account for 25.9% of the total, with the largest share in Dhanauri (9 households) and the lowest in Khairpur (4 households). Small landholders make up the largest

group at 45.8%, with Khairpur having the most (15 households) and Dhanauri having ten. Medium landholders account for 18.3%, with Kakrali having the highest (6 households), while Dhanauri has only one. Finally, major landholders account for only 10%, with the highest concentration in Dhianpura (7 households) and none in Dhanauri.

Table 4: Demonstrates the farmer categorization on the basis of land holdings

| Sr no | Parameters | Dhianpura n=27 | Kakrali n=26 | Dhangrali n=21 | Khairpur n=26 | Dhanauri n=20 | Overall % N=120 |
|-------|------------|----------------|--------------|----------------|---------------|---------------|-----------------|
| 1 | Marginal | 5 | 8 | 5 | 4 | 9 | 31 (25.9%) |
| 2 | Small | 10 | 10 | 10 | 15 | 10 | 55 (45.8%) |
| 3 | Medium | 5 | 6 | 4 | 6 | 1 | 22 (18.3%) |
| 4 | Large | 7 | 2 | 2 | 1 | 0 | 12 (10%) |

**Fig 1:** Depicts the farmer categorization on the basis of land holdings

Type of family

Nuclear families predominate in the farming community, making up 76.75% of all families, whereas joint families make up 23.3%. This shows that most farmers prefer smaller families,

with parents and kids living together in the immediate family. Joint families, which usually consist of extended family members living together, make up a smaller number of households (Table 5).

Table 6: Determine the category of respondents of different village

| Sr. No. | Parameters | Dhianpura n=27 | Kakrali n=26 | Dhangrali n=21 | Khairpur n=26 | Dhanauri n=20 | Overall % N=120 |
|---------|------------|----------------|--------------|----------------|---------------|---------------|-----------------|
| 1 | Nuclear | 20 | 19 | 20 | 18 | 15 | 92 (76.75) |
| 2 | Joint | 7 | 7 | 1 | 8 | 5 | 28 (23.3%) |

Category

Among the 120 farmers, the General category comprises 80%, the OBC group 16.7%, and the SC category 2.5%. Accordingly, about 97 farmers fall under the General group, 20 fall under the

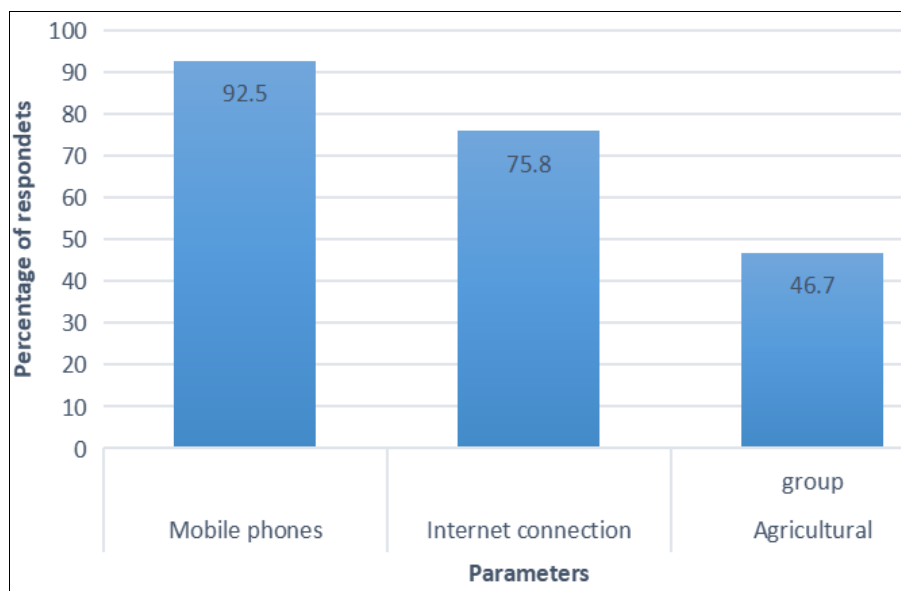
OBC category, and 15 fall under the SC category. The bulk of farmers are classified as General, with a smaller percentage of OBC and SC farmers falling into the same group.

Table 6: Determine the category of respondents of different village

| Sr. No. | Parameters | Dhianpura n=27 | Kakrali n=26 | Dhangrali n=21 | Khairpur n=26 | Dhanauri n=20 | Overall % N=120 |
|---------|------------|----------------|--------------|----------------|---------------|---------------|-----------------|
| 1 | General | 20 | 19 | 21 | 19 | 18 | 97 (80%) |
| 2 | OBC | 6 | 7 | 0 | 5 | 2 | 20 (16.7%) |
| 3 | SC | 1 | 0 | 0 | 2 | 0 | 3 (2.5%) |

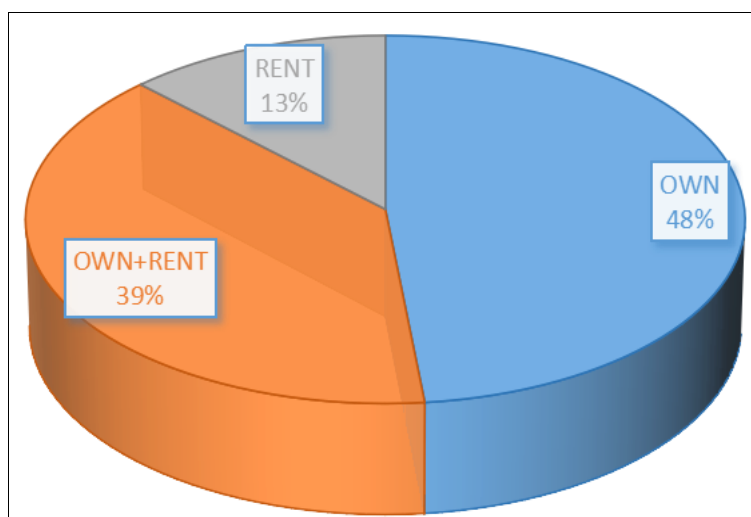
Mobile phones, Internet connectivity and Agricultural groups: In 5 selected villages, 92.5% farmers have access to cell phones, 75.8% have internet access. Additionally, 46.7%

respondents are members of agricultural associations, indicating a high interest in both digital connectivity and collaborative agricultural initiatives (Fig 2).

**Fig 2:** Represents the technical connectivity of the farmers**Farm machinery status of respondents**

According to fig 3, 48% of farmers own their machinery, while 39% own some equipment but some respondents relied on rental machinery like combines, Rotavator, threshers etc. Furthermore,

13% of farmers only use rented farm equipment for their farming operations. This indicates that most of the respondents prefer to buy own farm machinery and a significant portion depends on the rental machinery.

**Fig 3:** Demonstrates Farm machinery status of respondents**Source of information**

The data (Table 7) represent multiple information sources employed in 5 distinct villages: Dhianpura (n=27), Kakrali

(n=26), Dhangrali (n=21), Khairpur (n=26), and Dhanauri (n=20), for a total sample size of 120. Input dealers were the most popular source of information, accounting for 77

respondents and 64.1%. Progressive farmers were consulted by 7 respondents (5.8%), while mass communication and field visits each had 5 respondents (4.1%). Newspapers were utilized

by 11 respondents (9.2%), group meetings by 7 (5.8%), and Kisan Melas by 8 (6.7%).

Table 7: Represents the information sources of the respondents.

| Sr. No. | Parameters | Dhianpura n=27 | Kakrali n=26 | Dhangrali n=21 | Khairpurn=26 | Dhanauri n=20 | Overall % N=120 |
|---------|--------------------|----------------|--------------|----------------|--------------|---------------|-----------------|
| 1 | Input dealer | 20 | 19 | 15 | 13 | 10 | 77 (64.1%) |
| 2 | Progressive farmer | 0 | 2 | 0 | 2 | 3 | 7 (5.8%) |
| 3 | Mass Communication | 0 | 0 | 2 | 2 | 1 | 5 (4.1%) |
| 4 | Newspaper | 3 | 3 | 0 | 2 | 3 | 11 (9.2%) |
| 5 | Group meetings | 0 | 1 | 0 | 4 | 2 | 7 (5.8%) |
| 6 | Field visits | 0 | 1 | 1 | 2 | 1 | 5 (4.1%) |
| 7 | Kisan melas | 4 | 0 | 3 | 1 | 0 | 8 (6.7%) |

Extension Contacts

In a recent survey conducted in five sites, the distribution of responses differed greatly. The Department of Agriculture received 16 replies, or 15.1% of the total. The KVK (Krishi Vigyan Kendra) had a greater engagement rate, with 22 replies,

accounting for 18.3%. The SAU (State Agricultural University) received five answers, representing 4.2%. Input dealers were the most popular source, accounting for 58 replies (48.3% of the total). Cooperative societies had 19 replies, accounting for 15.8% of the total count (Table 8).

Table 8: Summarizing the percentage of the respondents having extension contacts

| Sr. No. | Parameter | Dhianpura n=27 | Kakrali n=26 | Dhangrali n=21 | Khairpur n=26 | Dhanauri n=20 | Overall % N=120 |
|---------|---------------------------|----------------|--------------|----------------|---------------|---------------|-----------------|
| 1 | Department of agriculture | 4 | 2 | 0 | 5 | 5 | 16 (15.1%) |
| 2 | KVK | 6 | 5 | 5 | 2 | 4 | 22 (18.3%) |
| 3 | SAU | 0 | 2 | 3 | 0 | 0 | 5 (4.2%) |
| 4 | Input dealers | 15 | 15 | 10 | 13 | 5 | 58 (48.3%) |
| 5 | Co-op. society | 2 | 2 | 3 | 6 | 6 | 19 (15.8%) |

Conclusion

The statistics obtained from five villages in Rupnagar district, Punjab, provide a thorough picture of the local farming community's socioeconomic position and agricultural methods. The poll showed a primarily senior farming population, with a sizable majority aged 36 to 55 years, indicating a depth of experience within the community. Farmers' educational attainment varies, with the majority having finished secondary education but only a small minority holding a degree, emphasizing the importance of expanded educational opportunities to promote agricultural output and knowledge transmission. The farming experience data shows a wide range of experience levels, from less than ten years to over fifty, indicating a diverse skill set in the community. Landholding patterns are diversified, with a large number of small landowners, implying a largely small-scale agricultural environment. The preference for nuclear families over joint families reflects a trend toward closer family configurations. Farmers in the General category dominate socioeconomic classifications, with OBC and SC groups having smaller numbers. Technological adoption is noticeable, with high mobile phone ownership and widespread internet access, yet the quantity of farm machinery ownership and reliance on rentals indicates differing levels of resource availability among farmers. The sources of agricultural information point to a reliance on input dealers and a need for more effective outreach from extension agencies. Engagement with agricultural groups and extension services, such as KVKs and cooperative societies, indicates a keen interest in improving farming practices. Overall, the findings show a strong agricultural industry with great room for expansion through focused educational and technological interventions. Addressing these issues, particularly through specialized education and improved access to contemporary technologies, will be critical to increasing agricultural output

and maintaining the social stability of these rural communities.

Author Contributions

Simranpreet Kaur contributed to the preparation of the original draft, conceptualization and in collecting the data. Gurparneet Kaur were involved in the formal analysis and preparation of tables and figures.

Conflict of interest

The authors declare that none of the work reported in this study could have been influenced by any known competing financial interests or personal relationships.

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