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# An Empirical Study on Agricultural information and livelihoods sources of family farmers in the Punjab, Pakistan

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## Abstract

Family farmers require up-to-date agricultural information to transition from traditional to modern practices and succeed in the evolving agricultural landscape. This study, conducted in Nankana Sahib, with its largest tehsil selected as the focus area, utilized a multistage sampling technique. Data were collected from 360 respondents through snowball sampling and analyzed using SPSS. Correlation analysis was performed to assess relationships between variables. The study revealed that fellow farmers (score = 1711, mean = 3.25) were the primary source of agricultural information for family farmers. Other significant sources included the public agriculture sector (score = 890, mean = 2.5), veterinary assistants (score = 825, mean = 2.3), and the private sector (score = 730, mean = 2.0). All respondents engaged in farming for both family and commercial purposes. The study highlighted the importance of fellow farmers as the primary source of agricultural knowledge, while public and private sectors, particularly extension services, also played a significant role. A strong positive correlation (r = 0.663) was identified between income and owned land. These findings are critical for policymakers and extension agents to improve communication channels and promote sustainable agricultural practices.

***Keywords:***

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## Introduction

Current and effective agricultural knowledge must be shared with the farming community to promote sustainable growth. This knowledge enhances the efficiency and effectiveness of agricultural practices and products. Such information is disseminated within the agricultural community through various organizations, including universities, research institutions, media outlets, and extension workers, in a systematic manner (Pallangyo & Rees, 2010).

The private sector plays a vital role in disseminating agricultural information at a critical level, assisting low-income individuals both in markets and in the field. However, the public sector's effectiveness in delivering agricultural information with optimal resource use is comparatively lower (Khemani et al., 2014). Nonetheless, the public sector strives to provide a wealth of information without compromising quality (Kose & Wantchekon, 2020). It is widely believed that selecting highly valuable and superior information is key to the public (extension) sector's success, enabling it to educate learners more efficiently and effectively (Greiling & Spraul, 2010).

Adequate, well-prepared, and effectively delivered agricultural information has the potential to enhance the efficiency of programs focused on sustainable rural development. Agricultural information is considered a fundamental component of rural development. Conversely, the lack of modern agricultural information is a major limitation to rural development in developing countries (Oladele, 2011). Agricultural information supports family farmers in various aspects, such as decision-making related to land, labor, livestock, poultry, and resource management. It is also a significant source of income for farmers (Opara, 2008). Cost-effective agricultural information is often accessed through methods employed by extension agents in both the public and private sectors (Vidanapathirana, 2012).

Innovations in agriculture, such as the efficient use of land, have significantly increased yields and income. These contributions are particularly notable among small-holding farmers. Innovation in family farming reduces farmers' dependency on fellow farmers and relatives while enhancing their social interactions and overall quality of life (Oliveria et al., 2013). Income derived from various sources is collectively referred to as livelihood sources (Kibreab, 2003). The search for livelihood opportunities is a key driver of migration (Carr, 2020). Continuous livelihood sources are crucial for poverty reduction (Piya et al., 2019). Alternative livelihood sources, such as wages, play an essential role in supporting farmers (Slater, 2002). Multiple factors contribute to the diversification of livelihood sources (Zafar et al., 2024).

This study aims to identify the various sources of agricultural information available to family farmers, evaluate their role and extent of usage, and assess the livelihood means employed by these farmers.

## Materials and Methods

Nankana Sahib was selected as the study district for this research, with all family farmers in the district forming the study population. A multistage sampling technique was employed to select the research sample. The largest tehsil, Nankana Sahib, which consists of 45 rural union councils (UCs), was chosen as the focus area. From these, 20 UCs were randomly selected. Subsequently, three villages were randomly chosen from each selected UC, and three farming families from each village were identified using the snowball sampling technique.

Two adult members from each selected farming family were interviewed: one being the head of the family, and the other an adult member with sufficient knowledge of the relevant information. This process resulted in a total sample size of 360 respondents. Data were gathered using a well-structured interview schedule, which was a reliable and validated research instrument. The interview schedule encompassed various aspects, including "Unpaid and invisible labor force supporting family farming in District Nankana Sahib, Punjab, Pakistan." The tool was pretested to refine its design, and the formulation of questions was informed by a review of relevant literature and expert input.

A five-point Likert scale was used to assess respondents' perceptions (Rehman, 2011). The data collected were analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics, including mean, standard deviation, weighted scores, and rank orders, were calculated to summarize the data. Additionally, graphs were generated using computer software called "Origin" to visually represent the findings. Correlation analysis was conducted to examine the relationships between various variables.

## Results and Discussion

The results and discussion of the present study, along with the relevant data, are presented in the following sections.

Various means by which farmers access modern agricultural information were included in the research instrument, and the corresponding data were collected. Access to reliable sources of information is essential for updating family farmers with modern agricultural innovations (Mogues, 2015). The findings related to these sources of information are illustrated in Figure 1.

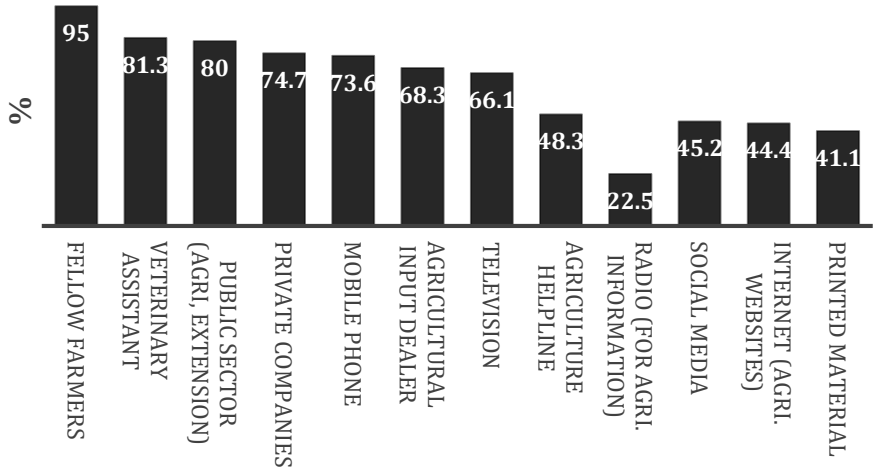


**Figure 1.** Distribution of respondents according to major sources of information being used by the family farmers (n=360)

The data displayed in Figure 1 show that an overwhelming majority (95.0%) of respondents obtained agricultural information from fellow farmers. A vast majority

(80.0%) of respondents accessed agricultural information through the public sector (Agricultural Extension), while 81.3% received livestock-related information from veterinary assistants. Additionally, 74.7% of respondents relied on private companies for agricultural information, and 73.6% used mobile phones to acquire farm-related information, primarily by calling field assistants.

The findings in Figure 1 also reveal that 68.3% of respondents received useful agricultural information from agricultural input dealers, and 66.1% accessed information through television. The agricultural helpline was another source, utilized by less than half (43.3%) of respondents. In contrast, over one-fifth (22.5%) of respondents relied on the radio for agricultural information. This lower percentage may be attributed to a lack of interest or the outdated practice of listening to the radio.

These results contradict the findings of Salau et al. (2013), who reported that a majority (59%) of respondents relied on input dealers and extension agents for agricultural information.

*Extent of Use of Information Sources*

Sources through which farmers access useful agricultural information are referred to as agricultural information sources. These sources play a vital role in transferring modern agricultural technology to the farming community (Hilbert & López, 2011). Considering their importance, data on the extent of use of these information sources were collected and are presented in Table 2.

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**Table 2.** Distribution of the respondents according to information sources being used by family farmers

| **Sources of information** | **Mean± Standard Deviation** | **Rank Order** |
|---|---|---|
| Fellow farmers | 3.25±1.144 | 1 |
| Public sector (Agri. Extension) | 2.50±0.468 | 2 |
| Veterinary assistant | 2.30±1.674 | 3 |
| Private companies | 2.00±1.513 | 4 |
| Mobile phones | 1.80±1.524 | 5 |
| Internet (Agri. Websites) | 1.40±0.863 | 6 |
| Agricultural input dealers | 1.00±1.053 | 7 |
| Television (Agri. information) | 0.90±0.852 | 8 |
| Social media (Facebook, Whats App) | 0.80±1.177 | 9 |
| Agricultural help line | 0.80±1.056 | 9 |
| Radio | 0.80±1.645 | 9 |
| Printed Material | 0.70±1.061 | 10 |

Table 2 reveals that fellow farmers (mean = 3.25 ± 1.144) were ranked in the first position, with their mean value falling between medium and high levels, though tending towards a medium level. This suggests that fellow farmers were the primary source of agricultural information in the research area. The public sector (agricultural extension) was ranked second (mean = 2.50 ± 0.468), with its mean value falling between the medium and low categories of response.

Veterinary assistants and private companies occupied the third and fourth positions, with mean values of 2.30 ± 1.674 and 2.00 ± 1.513, respectively. These mean values tended towards the low category. Mobile phones (mean = 1.80 ± 1.524), the internet (mean = 1.40 ± 0.863), agricultural input dealers (mean = 1.00 ± 1.053), television (mean = 0.90 ± 0.852), social media (mean = 0.80 ± 1.177), the agricultural helpline (mean = 0.80 ± 1.056), radio (mean = 0.80 ± 1.645), and printed material (mean = 0.70 ± 1.061) were ranked in the fifth through tenth positions, respectively.

The mean value for mobile phones falls between the very low and low categories but leans towards the low category. The mean values for other sources—occupying the sixth through tenth positions—indicate a very low level of use. These findings suggest that fellow farmers were the major source of agricultural information for family farmers, whereas the radio ranked the lowest in terms of usage for agricultural purposes.

These results align with the findings of Tarnoczi and Berkes (2010), who reported that fellow and neighboring farmers were the primary sources of information for family farmers. Similarly, Benard et al. (2014) found that a majority (62%) of family farmers obtained useful agricultural information from fellow farmers..

*Sources of Household Income*

Household income sources encompass all means through which individuals earn income. This study focuses on family farming, and a review of the literature reveals that family farmers generate income through the sale of crops, agricultural products, vegetables, and livestock. In rural households, farmers are increasingly shifting their focus from subsistence farming to income sources that provide immediate cash (Amir et al., 2013). These trends are critical in shaping the household income dynamics of family farmers. Given the importance of household income sources, the relevant data are presented in Table 3.

**Table 3.** Distribution of the respondents according to their sources of household income

| **Sources of household income** | ***f*** | ***%*** |
|---|---|---|
| Crops only | 27 | 7.5 |
| Crops and livestock | 149 | 41.3 |
| Crop, livestock and vegetables | 184 | 51.2 |
| Total | **360** | **100** |

The data presented in Table 3 indicate that slightly more than half (51.2%) of the respondents relied on crop, livestock, and vegetable farming as their primary source of income. A significant proportion (41.3%) of respondents derived their household income from crop and livestock farming. A small percentage (7.5%) of respondents relied solely on crop farming for their household income.

The findings of this study differ from those of Olayemi (2012), who reported that half (50%) of the respondents earned their income from pensions and other public sector jobs.

*Livestock*

Livestock farming refers to the rearing of farm animals and serves as a valuable asset to the farming community. It provides an additional source of income and contributes significantly to the livelihoods of farmers. Livestock supplies essential products such as milk, meat, and wool, benefiting both farming and non-farming communities (Clark et al., 2012). The data related to this crucial aspect were collected and are presented in Table 4.

**Table 4.** Distribution of respondents according to their ownership of livestock

| Livestock animals/Ownership of livestock animals | **Nature of response** | ***f*** | ***%*** |
|---|---|---|---|
| Buffalos | **Yes** | 333 | 92.5 |
| | **No** | 27 | 7.5 |
| Cows | **Yes** | 171 | 47.5 |
| | **No** | 189 | 52.5 |
| Goats | **Yes** | 117 | 32.5 |
| | **No** | 243 | 67.5 |
| Sheep | **Yes** | 89 | 24.7 |
| | **No** | 271 | 75.2 |
| Camel | **Yes** | 1 | 0.3 |
| | **No** | 359 | 99.7 |
| Bull | **Yes** | 68 | 18.9 |
| | **No** | 292 | 81.1 |
| Donkey | **Yes** | 54 | 15 |
| | **No** | 306 | 85 |
| Horses | **Yes** | 6 | 1.7 |
| | **No** | 354 | 98.3 |
| Rabbit | **Yes** | 16 | 4.4 |
| | **No** | 344 | 95.6 |

**n=360**

**Table 4** exhibit an overwhelming majority (92.5%) of sample (respondents) had buffalos. Respondents reported benefiting from buffaloes primarily for household milk consumption and income from selling milk. Upon further inquiry, they explained their preference for rearing buffaloes due to the popularity of buffalo milk among consumers and the ease of providing feed and water to these animals. Less than half (47.5%) of the respondents owned cows, which provided financial benefits, including higher milk yields compared to buffaloes.

Approximately one-third (32.5%) of respondents raised goats. They noted that providing adequate grazing facilities for goats and sheep was challenging, which discouraged farmers from maintaining larger herds. About one-fourth (24.7%) of respondents owned sheep, primarily for income and religious purposes, such as sacrifices during Eid-ul-Azha, a significant Islamic festival.

A very small proportion of respondents owned camels (0.3%) and horses (1.7%). Less than one-fifth (18.5%) of respondents had bulls, which were valued for pulling carts and local-level agricultural transportation. A small percentage (15%) of respondents reared donkeys, mainly for pulling carts and transporting agricultural products and inputs locally. However, the majority (85%) noted that donkeys have largely been replaced by bulls and motorbike rickshaws, which are commonly used for agricultural transport in the study area. These findings differ from the results reported by Haque et al. (2005), who found that the majority (84%) of their sample focused on sheep farming.

**5: Poultry**

Poultry farming involves the rearing of domestic fowl, such as hens, ducks, and geese, primarily for eggs, meat, and income generation. It serves as both a business and a supplementary source of income for the farming community, helping farmers save money (Storey et al., 2019). Relevant data were collected and are presented in Table 5.

**Table 5.** Respondents; distribution with reference to ownership of poultry

| Name of the fowl owned by the respondents | Response | *f* | % |
|---|---|---|---|
| Ducks | Yes | 7 | 1.9 |
| | No | 353 | 98.0 |
| Hens | Yes | 117 | 32.5 |
| | No | 243 | 67.5 |

**n=360**

The data presented in Table 5 indicate that a small percentage (1.9%) of respondents reared ducks, while about one-third (32.5%) reared hens for meat, eggs, and fundraising purposes, thereby gaining financial benefits. These findings differ from those of Adebayo and Adeola (2005), who reported that a large majority (62%) of respondents agreed that poultry farming has the potential to improve the living standards of poor farmers through the sale of eggs and birds.

The results highlight that poultry farming holds significant potential to enhance the living standards of family farmers. However, achieving this potential requires proper planning and a focused approach. Objective-driven poultry farming should be encouraged to maximize its benefits.

**Table 6.** Respondents' purpose of farming

| Farming Purpose | *f* | % |
|---|---|---|
| Only for family use | - | - |
| For family and commercial use | 360 | 100 |
| **Total** | **360** | **100** |

The data presented in Table 6 confirm that all (100%) family farmers were engaged in farming both for family and commercial purposes. They utilized milk and other agricultural products for household consumption and sold surplus agricultural products to generate income. It can be concluded that family farming served as their primary livelihood source.

These findings align with those of Vliet et al. (2015), who reported that an overwhelming majority (93%) of farmers engaged in farming to meet family needs and for commercial purposes, deriving income from family-based farming.

**Correlation between various selected variables**

Correlation refers to the association between two or more variables (Adler & Parmryd, 2010). In the present study, bivariate Pearson's correlation was utilized, following the methodology of Brown et al. (2009), to examine the relationship between two variables. Pearson's correlation is a widely used statistical method in which the value of one variable can predict the value of another. Its correlation coefficient ranges from -1 to 1 (Benesty et al., 2008).

The present study sought to explore the relationships between various selected variables, as detailed in Table 7.

**Table 7.** Relationship between various selected variables regarding sources of information and livelihoods

| Variables | Owner of cultivated area | Owner +Tenant | Farming Experience | Education of respondents |
|---|---|---|---|---|
| Income of the respondents | 0.663 | 0.577 | 0.772 | 0.231 |
| Public sector as source of agri. information | 0.754 | 0.407 | 0.343 | 0.733 |
| Private sector as source of agri. information | 0.826 | 0.921 | -0.162 | 0.057 |
| Fellow farmers as source of information | 0.325 | 0.312 | 0.772 | 0.071 |
| Printed material as source of information | 0.155 | 0.014 | 0.013 | 0.450 |
| Veterinary assistant as source of information | 0.369 | 0.581 | 0.669 | 0.184 |

The data in Table 7 reveal several important correlations between income, land ownership, and various sources of agricultural information. A strong positive correlation (r = 0.663) is observed between income and land ownership, indicating that farmers who own cultivated land are better able to meet their living needs. Additionally, a strong positive correlation (r = 0.577) exists between income and farmers operating as both owners and tenants. Farmers cultivating both owned and rented land reported higher earnings, suggesting that cultivating larger land areas enables greater agricultural production and income.

A very strong positive correlation (r = 0.772) is evident between income and farming experience. This highlights that experienced farmers are better equipped to adopt effective agricultural practices, leading to higher production and income. In contrast, the correlation between income and education is weak (r = 0.231). This finding suggests that farmers can earn significant incomes even with limited formal education, emphasizing the value of practical experience over theoretical knowledge in farming success.

Public sector information sources show a strong positive correlation (r = 0.754) with landowners, suggesting that extension services are more accessible to larger farmers. However, the correlation is weaker (r = 0.407) with owner-tenant farmers and even weaker (r = 0.343) with farming experience. Interestingly, a strong positive correlation (r = 0.733) is observed between public sector information and farmers' education levels, indicating that extension services tend to focus on more educated farmers to encourage innovation adoption.

Private sector information sources also show significant associations. There is a very strong positive correlation (r = 0.826) with landowners and an even stronger correlation (r = 0.921) with farmers who are both owners and tenants. However, a weak negative correlation (r = -0.162) exists between private sector information and farming experience, suggesting that private extension agents prioritize selling products to larger farmers while

avoiding experienced smallholders. This could be because experienced farmers may resist purchasing lower-quality products from these agents.

Fellow farmers as a source of information demonstrate a strong positive correlation (r = 0.772) with farming experience. This indicates a high level of trust and understanding among experienced farmers when exchanging advice. Similarly, veterinary assistants as a source of information also show a strong positive correlation (r = 0.669) with farming experience. Experienced farmers frequently consult veterinary assistants for valuable advice on improving farming and livestock practices.

**Conclusions and Recommendations**

The study concluded that fellow farmers serve as the primary source of agricultural information for family farmers, while both public and private agricultural sectors provide guidance at a relatively limited level. Among these, the public sector takes a more prominent role than the private sector in educating family farmers, particularly regarding livestock and crop farming. Public veterinary assistants were identified as crucial contributors to delivering practical information on livestock and poultry farming.

Conversely, sources like mobile phones, television, social media, agricultural helplines, radio, and printed materials were found to play only a minimal role in keeping family farmers updated. The study also highlighted that family farmers rely predominantly on farming as their primary income source. Their livelihoods are mainly sustained through crop farming, with additional support from livestock and poultry farming.

To enhance the well-being and productivity of family farmers, it is recommended that both public and private agricultural sectors intensify their efforts to provide accessible and effective agricultural information. By doing so, family farmers will be better equipped to adopt modern farming techniques, improve crop production, and achieve a sustainable and reasonable income.

**Competing Interests**

The authors declare that the research was conducted without any commercial or financial relationships that could be perceived as a potential conflict of interest.

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