

Assessing the role of wheat production in improving rural livelihood and social well-being in Southern Punjab, Pakistan

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Abstract

The study was aimed to assess the role of wheat production on the socio-economic and cultural events of rural masses and to evaluate its effect on health, education and livelihood of wheat growers in tehsil Shujaabad, Punjab, Pakistan. A survey was conducted among wheat growers (n = 250) using a multistage sampling technique. The findings showed that all respondents (100%) were growing wheat, while 28% reported that wheat production met their economic needs to a great extent, 45.2% to some extent, and 26.8% not at all. Wheat production reduced food insecurity to a great extent for 53.6% of respondents, was helpful for household income for 52.8%, and improved the social status of the family for 54.4%. Regarding sources of agricultural information, 64.8% of respondents sometimes and 29.6% often relied on fellow farmers, while 66.4% never used television and 13.2% often used it as a source of information. Wheat production had a considerable effect on livelihood, particularly well-furnished houses (mean = 2.69±0.69) and constructed toilets (mean = 2.62±0.74),

while its contribution to children's education was also reported (mean = 2.02±0.77). Furthermore, 39.6% of farmers always arranged marriage ceremonies due to good wheat production, while 53.6% always invited relatives and friends to family functions. Only 10% of respondents owned a car, whereas 90% did not. Wheat production was significantly associated with sources of information ($\chi^2 = 12.77$, $p = .012$), adoption of wheat sowing recommendations ($\chi^2 = 81.29$, $p = .000$), and socio-economic development ($\chi^2 = 19.84$, $p = .001$). It is concluded that wheat production makes an important contribution to the socio-economic and cultural well-being of rural households and is positively associated with socio-economic development. It is recommended that agricultural extension services should strengthen farmers' access to reliable information, promote recommended wheat production technologies, and enhance farmers' capacity to improve the socio-economic benefits derived from wheat production. © 2026 The Author(s)

Keywords: Cultural activities, Impact assessment, Socio-economic, Shujaabad, Wheat production

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Introduction

Wheat (*Triticum aestivum* L.), a member of the family Poaceae, is one of the most important cereal crops cultivated in Pakistan. It is a staple food in Pakistan. It contributes approximately 7.7% to the value added in the agricultural sector and accounts for 1.8% of the national Gross Domestic Product (GDP) (Government of Pakistan [GoP], 2026). During the 2025–2026 cropping season, wheat was cultivated on 9.48 million hectares, producing 29.61 million tonnes with an average yield of 3123 kg ha⁻¹ (Government of Pakistan [GoP], 2026). The crop is widely grown throughout the country both to meet household food requirements and as a source of farm income. Wheat and wheat flour constitute a major share of household food expenditure, representing 11.74% of total monthly expenditure on major food items in Pakistan, while the annual per capita consumption is estimated to 79.1 kg

(Pakistan Bureau of Statistics, 2026). Wheat productivity and grain yield are widely recognized as the primary indicators influencing the economic returns of wheat cultivation (Ali, 2018). Pakistan is the eighth-largest wheat-producing country in the world, with annual production exceeding 25 million tonnes, reflecting the combined contributions of farmers, researchers, and agricultural policymakers (Shahzad et al., 2022). Despite this achievement, the wheat sector continues to face several economic challenges. Large government-held wheat stocks, combined with their slow annual release, have placed a substantial financial burden on the national economy. Furthermore, recent increases in total wheat production have been driven largely by the expansion of cultivated area at the expense of other crops, whereas improvements in per-hectare productivity have remained relatively modest despite increases in the minimum support price. Farmers also continue to experience economic pressure because of escalating production costs resulting from taxes on agricultural inputs, energy

shortages, and currency depreciation, all of which reduce the profitability of wheat cultivation (Ali, 2018).

The prevalence of rural poverty in Pakistan increased during the late 1990s after having declined during the 1980 and early 1990s. Various structural components have been recognized as adding to rural poverty in Pakistan. Among them are low dimensions of well-being and education spending and the unequal distribution of farmland. The expansion in rural poverty is the consequence of an unfriendly pattern in world network costs, especially wheat a noteworthy yield (Orden et al., 2006). At present, it appears that poverty in Pakistan has been observed for the most part in rural areas as 66%. The official information demonstrates that there is more change in rural poverty when contrasted with urban poverty (Asghar et al., 2012).

In developing nations like Pakistan, community investment is one of the most improved instruments through which the administration can accomplish its improvement objectives. Among various investments, structure endeavor both social (health and education) and physical (market development, road, electrification and irrigation) assumes a fundamental job in upgrading farming efficiency and poverty alleviation in a nation wherein dominant part of the population directly or indirectly relies upon agriculture. In Pakistan, where structural transformation process is in progress, agriculture sector is still the single largest sector of the economy with deep influence on socio-economic set up (Nadeem et al., 2011). Agriculture has a cultural and social tradition particularly when or where it is a major part of the food, reasonably eaten at maximum meals and often exceeding fifty percent of the calories of the daily eating required. Its charge, preparation, taste and aroma are daily themes for discussion and have become key parts of culture. Wheat has a long history, while its role as a leading local staple has been reduced in the previous fifty years, its part as a global staple has increased (Khoury et al., 2014).

Wheat production plays an important role in the rural economy of Punjab, particularly in areas where farming constitutes a major source of household income and employment (Khan & Idrees, 2024). Beyond its contribution to agricultural production and food security, wheat cultivation can influence several dimensions of rural well-being by generating farm income and supporting households' ability to meet expenditures related to education, health, housing, and other necessities (Shahzad et al., 2022). For farming households, the economic returns from wheat production may also contribute to participation in social and cultural activities and strengthen their capacity to manage routine household and agricultural expenses (Khan et al., 2021). However, the extent to which wheat production contributes to improved rural livelihoods and social well-being may vary according to farmers' production resources, farm size, access to agricultural inputs and services, and local socio-economic conditions. Southern Punjab is an important agricultural region where

rural households depend substantially on crop production for their livelihoods (Hussain et al., 2024). Despite the importance of wheat in the farming systems of the region, there is a need to examine its contribution beyond crop yield and farm income by considering its broader effects on the social and economic well-being of farming households. Assessing these effects can provide useful evidence for understanding the role of wheat production in rural livelihood improvement and for developing agricultural interventions that address the wider socio-economic needs of farming communities. Therefore, the present study was undertaken to assess the role of wheat production on the social & cultural events of rural masses of tehsil Shujaabad, Multan, Punjab Pakistan and to evaluate the effect of wheat crop on the health, education and livelihood of the wheat growers of the study area.

Materials and Methods

Population of the study

The group of people to whom we wanted our research results to apply is called population (Jennifer, 2016). The population of present study was all the wheat growers of tehsil Shujaabad, Multan, Pakistan. The study was conducted in five main union councils (UCs) of tehsil Shujaabad because of its fertility of land, availability of water and wheat as a major crop. Study was limited to tehsil Shujaabad due to limited resources, time and finances of the researcher. The list of large-scale wheat production UCs was taken from concerned agriculture department. Following UCs were selected for research:

1. Maahra; 2. Dhundoon; 3. Agar Khwani; 4. Naseer Pur; 5. Bumb

Research method

Considering the nature of the current research, quantitative research method was applied.

Research design

Research design involves the planning, organization, collection and analysis of data so as to provide answers to questions such as: what techniques will be used to gather data? What sampling strategies and tools will be used? And how will time and cost constraints be dealt with? (Leedy, 1993). A survey method of research was adopted to generate primary data for the purpose of analysis. Survey was conducted because the population was not hidden rather available on massive scale and the objectives of the study were not complex enough, indicating the need for a quantitative research approach rather than qualitative.

Sampling procedure and sample size

A sample is a group of individuals selected from a target population to represent the population under study. Sampling is generally used when studying the entire population is

impractical because of limitations of time, resources, and accessibility (Gay, 2002). Multistage sampling is an appropriate approach when the target population is geographically dispersed and can be divided into different administrative or geographical units (Barreiro & Albandoz, 2001). In the present study, a multistage cluster sampling technique was employed to select wheat-growing farmers from tehsil Shujaabad. At the first stage, five union councils were purposively selected based on the predominance of wheat-growing farmers in the respective communities. At the second stage, five villages were randomly selected from each selected union council, resulting in a total of 25 villages. At the final stage, 10 wheat-growing farmers were selected randomly from each village, resulting in a total sample of 250 respondents. The equal allocation of 10 farmers per village was adopted deliberately to ensure uniform representation of all selected villages and to prevent villages with larger farmer populations from disproportionately influencing the overall findings. Equal allocation also facilitated balanced comparison among the sampled villages and maintained consistency in the field data-collection process. The respondents within each selected village were chosen through simple random sampling from the available list of wheat-growing farmers. Thus, the final sample comprised 250 wheat growers from 25 villages across five union councils.

Data collection tool

Keeping in view the nature of present research, characteristics of the rural population and the objective of the study, an interview schedule was developed as a tool for data collection.

Data analysis

Data analysis is the process of bringing meaning to raw data collected (Mugenda & Mugenda, 2003). Data was cleaned and transferred to SPSS Version 16 (SPSS Inc. 2007) for statistical analysis. For the analysis of quantitative data descriptive statistics and bivariate analysis were applied.

Results

Sources of information provided to farmers regarding wheat production

Agricultural specialists ought to equip themselves with the most recent knowledge in regard to innovative farming systems and advancements (Bala & Sharma, 2008). Farmers obtain agricultural information from a variety of sources to support their production and management decisions. The effectiveness of technology adoption largely depends on the accessibility and use of reliable information

channels by different individuals (Riesenberg & Gor, 1989). According to Iqbal (1993), the most frequently used sources of agricultural information include family members, friends, neighbors, printed publications, and farmers' organizations. In the present study, respondents were asked to indicate the extent to which they utilized different sources of agricultural information. Their responses regarding the use of these information channels are presented in Table 1.

The data given in Table 1 illustrates the frequency of use of the sources of information concerning wheat production by the respondents. It was revealed that about 66.4 percent of farmers never watched TV, 20.4 percent sometime watched TV, and 13.2 percent often watched TV to keep themselves aware from modern wheat production technologies. Similarly, it was also depicted from data that approximately 91.6 percent of respondents said that they never used radio, only 5.2% of the respondents reported that they sometimes used radio as a source of agricultural information, whereas 3.2% indicated that they frequently relied on radio to remain informed about modern wheat production technologies. Similar, information was disseminated through internet on wheat production technology. The data showed that about 88 percent of respondents said that they never used internet and a total of 7.2% of the respondents reported that they occasionally used the internet as a source of agricultural information, while 4.8% indicated that they frequently relied on the internet to remain updated with modern wheat production technologies. On the other hand, print media also played vital role in dissemination of wheat production technology. Approximately 67.2 percent of wheat growers said that they never used mobile phones. Approximately 24% of the respondents reported that they occasionally used mobile phones to obtain agricultural information, whereas 8.8% indicated that they frequently relied on mobile phones to stay informed about modern wheat production technologies. Similarly, newspaper print media involved in disseminating production technologies depict that about 84.4 percent of respondents never used newspapers, 13.2% of the respondents indicated that they occasionally used newspapers as a source of agricultural information, whereas only 2.4% reported that they frequently relied on newspapers to remain informed about improved wheat production technologies.

The data also showed reasonable contributions of Zarai Digest in modern wheat production technologies. The data depicts 81.2 percent of respondents never used Zarai Digest. A total of 14.8% of the respondents reported that they occasionally used Zarai Digest as a source of agricultural information, while 4% indicated that they frequently consulted it to remain informed about improved wheat production technologies. Regarding agricultural pamphlets, 89.2% of the respondents stated that they never used them, whereas 9.2% reported occasional use and only 1.6% indicated that they frequently referred to agricultural pamphlets for information on wheat production technologies. Similarly, 84.8% of the respondents never consulted agricultural leaflets, while 10.4% used them occasionally and 4.8% reported frequent use to

obtain information on recommended wheat production practices.

Fellow farmers emerged as one of the most commonly used interpersonal sources of information. Only 5.6% of the respondents reported never consulting fellow farmers, whereas 64.8% did so occasionally and 29.6% frequently relied on them to stay updated with modern wheat production technologies. With respect to private company dealers dealing in fertilizers and pesticides, 45.6% of the respondents never sought information from them, 39.2% consulted them occasionally, and 15.2% reported frequent consultation regarding wheat production technologies. The Department of Agriculture's Field Assistants and

Agricultural Officers were used less frequently as information sources. About 64.0% of the respondents never consulted these extension personnel, while 28.4% reported occasional consultation and only 7.6% indicated frequent interaction for information on wheat production technologies. Regarding Burjij (wall chalking), approximately 56.8% of the respondents never used this information source, whereas 33.6% consulted it occasionally and 9.6% reported frequent use to remain informed about improved wheat production technologies. These findings are consistent with those reported by Khan et al. (2012), who observed that television and mobile phones were among the principal sources of agricultural information utilized by the farming community.

Table 1 Distribution of the respondents according to their sources of information about wheat production

SOI		Never		Sometimes		Often	
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Electronic media	TV	166	66.4	51	20.4	33	13.2
	Radio	229	91.6	13	5.2	8	3.2
	Internet	220	88.0	18	7.2	12	4.8
	Mobile Phone	168	67.2	60	24.0	22	8.8
Print media	Newspapers	211	84.4	33	13.2	6	2.4
	Zari Digest/Zirat Nama	203	81.2	37	14.8	10	4.0
	Agri. Pamphlet	223	89.2	23	9.2	4	1.6
	Agri. Leaflet	212	84.8	26	10.4	12	4.8
*Other sources	Fellow Farmers	14	5.6	162	64.8	74	29.6
	Private Company Dealer (Fertilizer & Pesticides)	114	45.6	98	39.2	38	15.2
	Field Assistant/Agricultural Officer	160	64.0	71	28.4	19	7.6
	Burjij/Wall Chalking	142	56.8	84	33.6	24	9.6

SOI = Sources of information; *Other sources of information; *f* = frequency; % = percentage

Effect of wheat production on the Socio-economic of the rural masses

Table 2 indicates that there was 28 percent population considered that wheat production is enough to meet their economic needs, whereas 45.2 percent population stated that wheat production is up some extent enough to meet their economic needs and 26.8 percent reported that their wheat production is not enough to meet their economic requirement. Approximately forty percent population considered that wheat production is positively affected the livestock production, whereas 32.4 percent population stated that wheat production is some extent affected livestock production and 28.0 percent reported that their wheat production had no impact on livestock production. More than half (53.6%) farmers had viewed to a large extent, and 25.6 percent had viewed little extent that wheat production reduces the food insecurity, whereas only 20.8 percent never agreed with this observation. Thirty-six percent of population considered that wheat production can meet the health expenses, whereas 38 percent population stated that wheat production is some extent able to meet the health expenses, whereas 26.0 percent were replied negatively. A substantial part (52.8%) of selected farmers

agreed to large extent and 27.2 percent agreed to somewhat extent that wheat production is helpful for household income, whereas 20.0 percent population were replied negatively about this view. A majority (54.4%) of selected farmers agreed to large extent and 26 percent agreed to somewhat extent that wheat production is helpful for social status of family, whereas 19.6 percent population were replied negatively about this view. Almost forty-one percent of selected farmers agreed to large extent and 30.4 percent agreed to somewhat extent that wheat production is enough to meet the marriages and ceremonial expenses of children, whereas 28.4 percent population were replied negatively about this benefit.

Effect of wheat production on the cultural events of rural masses

Table 3 represents the impact of wheat production on cultural activities of the farmers. It was found that around 30 percent farmers always participated in political events, whereas 38.4 percent had often participation and 24 percent farmers had sometime participation in political events, however only 8.0 percent of farmers had no participation in political events. It was observed that only 12 percent farmers always participated in *Bisakhi mela*, whereas 21.2 percent had often participation

and 46 percent of farmers had sometime participation in *Bisakhi mela*, however 20.8 percent farmers had no participation in *Bisakhi mela*. A majority of farmers (53.6%) always participated in family/relative functions, whereas 30.8 percent had often participation and 12.8 percent of farmers had sometime participation in family functions, however only 2.8 percent of farmers had no

participation in family functions. About forty percent of farmers always arrange marriage ceremonies i.e., *Mehndi barat, walima* etc. due to good production of wheat, whereas 18.0 percent often arranged and 14 percent of farmers sometime arranged such type of activities, however 28.4 percent of farmers reported that wheat production had no impact on arranging marriage ceremonies of their children.

Table 2 Distribution of the respondents according to their response regarding socio-economic impact of wheat production

Impact	Not at all		To some extent		To a great extent	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Economic needs are met with the wheat production	67	26.8	113	45.2	70	28.0
Wheat production increases the livestock production	70	28.0	81	32.4	99	39.6
Wheat production reduces the food insecurity	52	20.8	64	25.6	134	53.6
Wheat production is able to meet the health expenses	65	26.0	95	38.0	90	36.0
Wheat production is helpful for household income	50	20.0	68	27.2	132	52.8
Wheat production is helpful for social status of family	49	19.6	65	26.0	136	54.4
Wheat production is enough to meet the marriages and ceremonial expenses of children	71	28.4	76	30.4	103	41.2

f denotes frequency and % denotes percentage

Table 3 Distribution of the respondents according to their response regarding cultural impact of wheat production

Impact	Never		Sometimes		Often		Always	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Participation in political events	20	8.0	60	24.0	96	38.4	74	29.6
Participation in <i>bisakhi mela</i>	52	20.8	115	46.0	53	21.2	30	12.0
Invite to relatives/ friends in family function	7	2.8	32	12.8	77	30.8	134	53.6
Arranging marriage ceremonies (<i>mehndi, barat, walima</i> etc.)	71	28.4	35	14.0	45	18.0	99	39.6

f denotes frequency and % denotes percentage

Impact of wheat crop production on the health, education and livelihood of the wheat growers

Table 4 depicts that wheat production had more impact on livelihood such as well-furnished house (mean = 2.69±.69) and constructed toilet (mean = 2.62±.7). It was noted that wheat production is helpful for education of children (mean = 2.02±.77) and enough to meet the educational

needs of the family (mean = 1.94±.90). Din et al. (2018) also reported that livelihood directly or indirectly depends on agriculture production. However, wheat production had also impact on access to clean drinking water (mean = 1.89±.65), farmers are able to afford the expenses of children's education up to university level (mean = 1.74±.84), visit MBBS or specialist doctor in case of health problem (mean = 1.69±.55) and they had regular visit of hospitals (mean = 1.42±.60).

Table 4 Distribution of the respondents according to their response regarding impact of wheat production on health, education and livelihood

Impact	Not at all		To some extent		To a great extent		Mean	S.D.
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%		
Do you visit MBBS or specialist doctors in case of health problem?	124	49.6	80	32.0	46	18.4	1.69	0.55
Do you have regular visits of hospitals?	153	61.2	88	35.2	9	3.6	1.42	0.60
Is wheat production enough to meet the educational needs of the family?	40	16.0	186	74.4	24	9.6	1.94	0.90
Are you able to afford the expenses of children's education up to university level?	68	27.2	179	71.6	3	1.2	1.74	0.84
To what extend the wheat production is helpful for Education of children?	36	14.4	172	68.8	42	16.8	2.02	0.77
Do you have access to clean drinking water?	99	39.6	80	32.0	71	28.4	1.89	0.65
Do you have toilets constructed in your home?	20	8.0	56	22.4	174	69.6	2.62	0.74
Do you have well-furnished house?	18	7.2	42	16.8	190	76.0	2.69	0.69

f denotes frequency and % denotes percentage; S.D. denotes standard deviation

Table 5 Distribution of the respondents according to their response regarding ownership of car

Response	Frequency	Percentage
Yes	25	10.0
No	225	90.0
Total	250	100

Table 6 Distribution of the respondents according to their satisfaction with socio-economic status

Response	Frequency	Percentage
Not at all	76	30.4
To some extent	113	45.2
To a great extent	61	24.4
Total	250	100.0

Car ownership

Table 5 depicts that only ten percent of respondents had own car, whereas a huge majority (90%) farmers never having owned car.

Satisfaction with socio-economic status

Table 6 reveals that around one-fourth (24.4%) farmers are fully satisfied, and 45.2 percent are somewhat satisfied with their socio-economic status, whereas 30.4 percent of farmers are never satisfied with their socio-economic status.

Association between Sources of Information and Wheat Production

Belay et al. (2017) identified farmers' income and access to information sources as important determinants influencing the adoption of agricultural adaptation and coping strategies. The relationship between farmers' information sources and wheat production is presented in Table 7. The Chi-square analysis revealed a statistically significant association between the two variables ($\chi^2 = 12.77$, $p = .012$). Furthermore, the Gamma statistic indicated a significant and strong positive relationship, suggesting that farmers with greater access to agricultural information sources generally achieved higher wheat production than those with limited access to such information. These findings demonstrate that the availability and use of information sources play a significant role in enhancing wheat production among farmers. Consequently, the hypothesis "Information sources will be associated with wheat production" is accepted.

Table 7 Association between sources of information of farmers and wheat production

Sources of information	Wheat production			Total
	Low (Up to 35)	Medium (36-40)	High (Above 40)	
Low	49	54	59	162
	30.2%	33.3%	36.4%	100%
Medium	7	15	33	55
	12.7%	27.3%	60.0%	100%
High	5	11	17	33
	15.2%	33.3%	51.5%	100%
Total	61	80	109	250
	24.4%	32%	43.6%	100%

Chi-square = 12.77; d.f. = 4; P-value = .012*; Gamma = 0.326; P-value = .001*; * = Significant; ** = Highly significant

Association between Adoption of Wheat Sowing Recommendations and Wheat Production

Table 8 represents the association between adoption of wheat sowing recommendations and wheat production. Chi-square value ($\chi^2 = 81.29$) shows a highly significant ($p = .000$) association between adoption of wheat sowing recommendations and wheat production. The Gamma statistics indicated a statistically significant and strong positive relationship between the variables. It means, if the farmers were having adoption of wheat sowing, then they

would gain more wheat production as compared to those farmers who had less level of adoption of wheat sowing recommendation. Above table clearly indicates that majority (60.4%) of the farmers who had low level of adoption of wheat sowing recommendations had also low level of wheat production, on the other hand, majority (63.6%) the farmers who had high level adoption of wheat production technology were gaining more wheat production. Consequently, the hypothesis "Adoption of wheat sowing recommendations will be associated with wheat production" is accepted.

Association between Wheat Production and Socio-economic Development

Table 9 represents the association between socio-economic development and wheat production. Chi-square value ($\chi^2 = 19.84$) shows a highly significant ($p = .001$) association between socio-economic development and wheat

production. Gamma statistics show a significant and strong positive relation among the variables. It means, there is a strong positive relation between wheat production and socio-economic development. Consequently, the hypothesis “Wheat production will be associated socio-economic development” is accepted.

Table 8 Association between adoption of wheat sowing recommendations and wheat production

Adoption of wheat sowing recommendations	Wheat production			Total
	Low (Up to 35)	Medium (36-40)	High (Above 40)	
Low	29	11	8	48
	60.4%	22.9%	16.7%	100.0%
Medium	23	27	12	62
	37.1%	43.5%	19.4%	100.0%
High	9	42	89	140
	6.4%	30.0%	63.6%	100.0%
Total	61	80	109	250
	24.4%	32.0%	43.6%	100.0%

Table 9 Association among socio-economic development and wheat production

Socio-economic development	Wheat production			Total
	Low (Up to 35)	Medium (36-40)	High (Above 40)	
Low	30	21	20	71
	42.3%	29.6%	28.2%	100%
Medium	11	29	42	82
	13.4%	35.4%	51.2%	100%
High	20	30	47	97
	20.6%	30.9%	48.5%	100%
Total	61	80	109	250
	24.4%	32%	43.6%	100%

Discussion

The findings of the present study highlight the important contribution of wheat production to improving the socio-economic conditions and overall well-being of rural households in Southern Punjab, Pakistan. Wheat remains one of the most important staple crops in developing countries, where improvements in productivity have substantial implications for household income, employment, food security, and poverty reduction. Previous studies have consistently demonstrated that increased agricultural productivity contributes to enhanced rural livelihoods through higher farm income, improved employment opportunities, and strengthened socioeconomic resilience. Therefore, comparing the present findings with earlier research provides a deeper understanding of the contribution of wheat production to improving the livelihoods and social well-being of rural households in Southern Punjab, Pakistan (FAO, 2023; Sutton et al., 2024).

The present study revealed that wheat production positively influenced household income, food security, social status, and the ability of farmers to meet household expenditures. These findings are consistent with the study

conducted by Baksh et al. (2009), who reported that farmers adopting the improved Shatabdi wheat variety experienced higher incomes than those cultivating the traditional Kanchan variety, indicating that improved wheat production can substantially enhance the economic well-being of farming households. Similarly, the findings of the present study support the results reported by Subramanian and Qaim (2010), who demonstrated that wheat production significantly increased labour returns, particularly for hired female workers, while simultaneously improving household income among poor and vulnerable farming families. The positive association observed between wheat production and socio-economic development in the present study further confirms the important role of wheat cultivation in poverty reduction and rural development.

The present findings further revealed that wheat production contributed positively to household income, improved living conditions, education, health expenditure, and social status. These results are in line with the study conducted by Kiresur and Ichangi (2011), who concluded that wheat production increased household income, employment opportunities, educational attainment, improved living standards, and reduced health-related risks. They also emphasized that ensuring the timely availability of quality wheat seed is essential for promoting adoption and sustaining productivity, which further strengthens the socio-economic benefits of wheat cultivation.

The significant association observed between wheat production and socio-economic development in the present study is also consistent with the findings of Ali et al. (2011), who reported that the adoption of improved wheat production technologies significantly enhanced wheat yields, household income, and poverty reduction among farming households in Punjab, Pakistan. Their findings reinforce the conclusion that technological advancement in wheat production serves as an effective pathway for improving rural livelihoods through increased agricultural productivity and higher farm income.

The present study further demonstrated that access to information sources and adoption of recommended wheat production technologies was significantly associated with higher wheat production. Farmers with greater access to agricultural information and higher levels of technology adoption achieved significantly better production outcomes than those with limited information sources. These findings support the observations of Farooq et al. (2000), who emphasized that modern wheat production requires strong institutional support, effective agricultural extension services, and improved dissemination of production technologies through television, radio, newspapers, and other communication channels. Their recommendation to strengthen farmers' awareness through extension services is consistent with the significant relationship observed between information sources and wheat production in the present study.

The positive relationship observed between wheat production and socio-economic development is also supported by the findings of Noorivandi et al. (2009), who reported significant associations between farmers' socio-economic characteristics, including farm size, income, technological utilization, economic well-being, social status, crop yield, and access to credit, with sustainable agricultural practices. These findings suggest that improvements in wheat production are closely linked with broader socio-economic advancement among farming households. Furthermore, the positive relationship between the adoption of wheat sowing recommendations and higher wheat productivity observed in the present study is supported by the findings of Al-Feel and AL-Basheer (2012), who reported that farmers' technical efficiency played a crucial role in enhancing wheat production. They concluded that wheat output could be substantially increased through more efficient utilization of available production inputs, highlighting the importance of improving farmers' technical knowledge and management practices (Al-Feel & AL-Basheer, 2012).

The findings also indicate that although wheat production contributes significantly to rural livelihoods, farmers continue to face several production-related challenges that may limit productivity and socio-economic benefits. This observation is in agreement with the findings of Amir et al. (2013), who identified high input costs, including fertilizers and pesticides, substandard supplies of

agricultural inputs, inadequate irrigation facilities, poor-quality seed, fluctuating market prices, and limited access to agricultural credit as major constraints affecting wheat productivity. These constraints may reduce farmers' capacity to fully benefit from wheat cultivation despite its positive contribution to household welfare. Finally, although the present study demonstrated the positive contribution of wheat production to rural livelihoods and social well-being, it also indicates that continued improvements in productivity require addressing production constraints and strengthening institutional support. This conclusion agrees with Joshua et al. (2015), who reported that wheat production remained constrained by inadequate financial assistance, high input costs, diseases, and pest infestations. They recommended improved access to agricultural credit, timely provision of production inputs, and effective agricultural extension services to sustain wheat production and improve farmers' livelihoods.

Conclusion and Recommendations

This study shows that majority of the farmers were owner cultivators and all of them were growing wheat. Only one-fifth of farmers were taking agricultural credits. It was observed that fellow farmers, private companies and TV were the major sources of information. It was observed that ownership of agricultural equipment is very low and broadcast sowing method of wheat is prevalent in the study area. Furthermore, it is concluded that there was a strong positive relation between wheat production and socio-economic development. It was found that wheat production is enough to meet their economic needs and food security. However, low level of income, lack of technical knowledge, fear and suspicion, lack of tractor ownership, non-availability of quality seed were the major reasons/constraints for low production. Therefore, extension field staff should provide awareness to the farmers about usage and benefit of drilling method. Government should launch interest free credit scheme for agricultural equipment to small farmers. Extension field staff should provide awareness to the farmers about usage and benefit of drilling method.

Declarations

i. Ethics approval and consent to participate

This study did not require formal ethical approval from an institutional review board, as per the policies of the researchers' affiliated institutions. However, all ethical considerations for social research involving human participants were carefully followed. Informed consent was obtained from all participating farmers prior to data collection. Participation was entirely voluntary, and confidentiality and anonymity of responses were ensured.

ii. Consent for publication

Consent for publication is not applicable, as the study does not include any identifying information or personal data of individual participants.

iii. Data availability

All data generated or analyzed during this study are included in this article.

iv. Competing interests

Authors have declared that no competing interests exist.

v. Authors' contributions

M.S. conceptualized the study, collected the data, developed the methodology, and led the data analysis and manuscript writing. M.A. contributed to data curation, literature review, and manuscript editing. M.U.H. assisted in data analysis and interpretation of results. All authors read and approved the final manuscript.

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vii. Acknowledgement

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viii. SDGs addressed

No Poverty (SDG 1), Zero Hunger (SDG 2), Decent Work and Economic Growth (SDG 8)

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