



Research Article

Situation Analysis of Food Security and Access to Advisory Services for Small Scale Rural Households Under AKIS Model in the Punjab Pakistan

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Abstract | This research study explored the food security situation among small-scale rural households and the role of access to rural advisory services in the Punjab province of Pakistan under Agricultural Knowledge and Information System (AKIS). Agriculture is critical in alleviating poverty in developing nations, particularly in Pakistan, where it meets nutritional needs and generates significant employment. Farmers are pivotal in this system, contributing to food production and economic growth through knowledge the export of agricultural products. The study highlights the essential role of extension consulting services in enhancing farmers' productivity and economic viability. These services provide the necessary knowledge, skills, and innovations for modern agricultural practices, which are crucial for addressing challenges and improving livelihoods. Supporting farmers through extension services is vital for ensuring food security, economic growth, and poverty alleviation in agricultural-dependent economies. Global food security remains a challenge, with a significant portion of the population in developing countries still undernourished. Simple random sampling method was used to collect data from 180 households from one tehsil Kotmomin of District Sargodha. Out of 22 union councils, 6 union councils were selected randomly and from each union council 30 respondents were randomly selected. The interview schedule covers various aspects of household demographics, land ownership, education levels, and food security status. The results reveal that household-level food insecurity is significant, with 37.8% of sampled households being food insecure, whereas, only 16.1% households feel secured regarding food security. Majority of respondents (86.1%) agreed that the "non-availability of food in local markets" is most hindering factor for access to food security. Moreover, results also revealed that EFS sometimes provided advisory services for crops, marketing and transportation, poultry, home economics and food processing and preservation. The government should strengthen agricultural knowledge and information system to provide farm-based advisory services to rural communities for sustainable food security.

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Introduction

Agriculture holds a crucial position in mitigating poverty across developing nations, with a notable emphasis on Pakistan (Azam and Shafique, 2017). This sector is fundamental not only for fulfilling the nutritional requirements of the populace but also for creating employment opportunities that sustain a significant proportion of the population (Mengal *et al.*, 2017; Muhammad *et al.*, 2020). The facilitation and support provided to farmers are critical for maximizing the benefits derived from agriculture. In this regard, farmers exhibit a continuous need for extension consulting services, which are instrumental in enhancing their productivity and economic viability (Hayat *et al.*, 2019). These services provide farmers with essential knowledge, skills, and innovations necessary for modern agricultural practices, thereby enabling them to address challenges and improve their livelihoods.

Pakistan, a developing nation with a low per capita income, heavily relies on agricultural production to assess food availability. In response, the Government of Pakistan has significantly progressed in improving food supply, notably in cereals. Particularly, the provision of pulses and cereals has increased by over 3.5 times since the early 1960s (Ahmad and Farooq, 2010). Despite Pakistan's status as the largest producer of numerous agricultural commodities globally and its achievement of food self-sufficiency, approximately 26% of the population was undernourished in 2005–07 (FAO, 2010). Food security encompasses a complex and multi-dimensional phenomenon. Researchers (Carletto *et al.*, 2013) conducted an extensive review of the household food security literature, acknowledging its influence on developments in related fields. Health and caregiving are also key factors. Lastly, the study of food security must consider the SDC-SDPI-WPF (2009) report highlights Punjab, Pakistan, as the leading province in terms of agricultural output. Out of its 34 districts, approximately 14 are known to produce a surplus of food, indicating a significant contribution to the nation's food supply.

Furthermore, the literature presents compelling evidence that food security is also influenced by the gender of the household head. Kassie *et al.* (2012) argue that households headed by females are more susceptible to food insecurity. The intersection of these factors such as household composition, land

ownership, and gender of the household head, provides a nuanced understanding of the dynamics that influence food security. The studies by Asogwa and Umeh (2012), Kyaw (2009) and Kassie *et al.* (2012) collectively illustrate that improving food security requires a multifaceted approach that addresses economic activity within households, equitable land distribution, and the empowerment of female household heads. Addressing these interconnected issues is essential for developing effective policies and interventions aimed at reducing food insecurity and promoting sustainable livelihoods in diverse contexts.

Punjab is the breadbasket of Pakistan, contributing significantly to the country's agricultural production. Enhancing agricultural productivity and efficiency in Punjab is crucial for ensuring food security and economic growth. Punjab is highly vulnerable to climate-related disasters, such as floods, droughts, and heatwaves. An effective Agricultural Knowledge and Information System (AKIS) can help farmers adapt to these changing weather patterns.

An effective Agricultural Knowledge and Information System (AKIS) is a farmer-centric, multichannel platform that provides relevant, accurate, and timely information on agricultural practices, markets, and climate. It facilitates two-way communication between farmers, extension agents, and other stakeholders, and offers capacity-building programs to enhance knowledge and skills. By leveraging technology, such as mobile phones and radios, an effective AKIS improves agricultural productivity, enhances food security, increases income, and promotes climate resilience among small-scale farmers and rural communities (Abdurahman *et al.*, 2016; Boyaci and Yildiz, 2017; Blaetter *et al.*, 2023).

The urgency of the Agricultural Knowledge and Information System (AKIS) for small-scale rural households in Punjab, Pakistan, is paramount due to the pressing issues of food insecurity, limited access to advisory services, and climate change impacts. With a significant portion of the population relying on agriculture for their livelihood, the lack of timely and relevant agricultural information and advisory services exacerbates poverty and food insecurity. Therefore, a comprehensive situation analysis of food security and access to advisory services under the AKIS model is crucial to inform policymakers, extension services, and other stakeholders to develop

effective strategies for improving food security and agricultural productivity among small-scale rural households in Punjab, Pakistan.

The purpose of this study is to evaluate the food security status in rural households of district Sargodha in Punjab. The assessment of food security extends beyond the availability and accessibility of food, incorporating a multitude of variables that potentially influence the food security status of households. Among these variables, gender emerges as a critical factor, shaping not only the division of labor within households but also impacting access to and control over resources. Furthermore, the stability of household income is a crucial aspect of food security. Households with stable and predictable income streams are better positioned to plan and secure their food needs, whereas those with irregular or seasonal incomes may struggle during off-peak periods. The study also considers other relevant aspects such as access to social safety nets, government policies, and community support systems that can either mitigate or intensify food security challenges. By comprehensively examining these factors, the study aims to provide a holistic understanding of the determinants of food security in rural households, offering insights that can inform policy interventions and targeted support programs (Diamond-Smith *et al.*, 2020).

Following are the objectives of current study:

- To measure the status of food security among rural households in the research area.
- To identify factors hindering access to food security to rural households of the research area
- To identify the advisory services being provided by different agricultural extension service providers in the research area under AKIS model
- To measure the level of access to rural advisory services by the small-scale farmers of the research area under AKIS model

Materials and Methods

The methodology section of a research study serves as a foundational framework that delineates various facets of the problem under investigation, ultimately leading to a robust generalization of the phenomena being examined. According to Wahane (2009), a well-defined methodology is instrumental in ensuring that the research process is systematic and coherent, facilitating the derivation

of meaningful insights. Furthermore, the research plan is an essential component that significantly aids researchers in navigating the complexities and challenges encountered during the research process. Carletto *et al.* (2013) emphasizes that a meticulously crafted research plan is pivotal in guiding researchers toward concrete solutions to the problems they face. This plan serves as a roadmap, detailing the steps and measures necessary to tackle the various issues that may arise.

Research population and sampling

The term population is a statistical term that encompasses a collection of individuals, groups, events, or objects that we aim to generalize about (Rahi, 2017), the population can be defined as the universe from which the sample is drawn. In this study, the universe includes all rural households in the entire district of Sargodha. Therefore, the population for this study consisted of all rural households.

Sampling is the process of selecting a subset from a larger aggregation to represent it in a miniature form, thereby allowing researchers to make inferences about the whole population based on the characteristics of the sample (Rahi, 2017). The present study aimed to explore specific issues in rural areas of the Sargodha district, particularly in the tehsil Kotmomin (randomly selected), which comprises 22 union councils. For this study, six union councils (UC-33, UC-34, UC-35, UC-36, UC-37, and UC-38) were selected randomly. From each union council 20 respondents were selected randomly and total aggregate sample was 180 respondents.

Preparation of interview schedule and pre-testing

A well-structured interview schedule was prepared with consultation of supervisory committee and departmental faculty to collect data from respondents related to study objectives. The researcher pre-tested the instrument which involved conducting a preliminary test with a sample of twenty (20) rural household heads who were randomly selected but not included in the main study sample. The purpose of pre-testing was to identify any potential issues with the instrument, such as ambiguous questions, logical inconsistencies, or any other aspects that could affect the quality of the data collected. The pre-testing process provided an opportunity to gather feedback from the respondents and observe their reactions to the questions. Based on the insights gained from

this pre-testing phase, necessary amendments were made to the interview schedule to improve its clarity, relevance, and overall effectiveness.

Data collection

The interview schedule for this study was meticulously constructed in English to ensure clarity and precision in the questions posed to respondents. Despite the initial construction in English, the questions were administered to interviewees in Urdu. This approach was strategically adopted to enhance the accuracy and comprehensibility of the responses, as Urdu was the native language of the respondents. The researcher personally conducted the interviews, visiting the respondents at their homes and farms. This personal approach facilitated direct interaction and allowed for a deeper understanding of the respondents' contexts and environments, which was crucial for obtaining genuine and insightful data.

Analysis of data

The collected data were subjected to a thorough analysis using the Statistical Package for Social Sciences (SPSS), a powerful tool for statistical analysis in social science research. The use of SPSS enabled the researcher to perform a variety of statistical procedures with precision and efficiency. Descriptive analysis techniques, including the calculation of frequencies, percentages, standard deviations, and means, were employed to interpret the data. These statistical measures provided a comprehensive overview of the data, highlighting key trends and patterns that emerged from the respondents answers (Field, 2013).

Results and Discussion

Demographic characters of the respondents

The socio-economic characteristics of respondents encompass a range of ecological, economic, social, and industrial patterns, as well as their interconnectedness, which together shape the development context. Social and economic patterns at various levels of social systems form a complex environment where individuals interact through diverse roles and relationships. These interactions are influenced by a myriad of factors, including political and economic climates, as well as socio-cultural habits, norms, and rules, as described by Frear, 2007.

Age

Keeping in view this aspect, researcher asked the respondents about their age and the data collected in this regard are given in Table 1.

Table 1: Distribution of respondents according to age.

Age of respondents	Frequency	Percentage
25 to 35	79	43.9
36 to 45	95	52.8
46 to 55	6	3.3
Total	180	100.0

The data presented in Table 1 show that the 43.9% respondents who were lying in age categories of 25 to 35 and the majority (52.8%) of the respondents fell under the age categories of 36 to 45. And only 3.3% of the respondents who were lying in age categories of 46 to 55, respectively. This data indicates that majority of the respondents belongs to adult age group and they should be targeted for advisory services to improve food security situations at household level. Getaneh *et al.* (2022) concluded from in-depth literature review and found from their research findings that household age was negatively associated to food security at household level. According to them as the age of household increases the household food security conditions declines.

Education

Education involves all the processes that lead to positive changes in human behavior (Frear, 2007). It can also be viewed as the nurturing of knowledge, insight, and other valuable traits that influence rural communities' attitudes towards technology and different facets of agricultural and rural development. Understanding the educational background of the respondents in this context provides valuable insights into the dynamics of rural development and technological adoption, as detailed in Table 2.

Table 2: Distribution of respondent according to their education.

Education	Frequency	Percentage
Below primary	61	33.9
Middle to matric	101	56.1
Intermediate and graduate	18	10
Total	180	100.0

Three categories of education were chosen and termed as below primary 33.9%, the most common education level is middle to metric, representing 56.1 % of

total sample. Only a small fraction of the population has achieved Intermediate and Graduate levels of education, just 10%. As the primary education in Pakistan is 5 years of schooling, middle education is considered for 8 years of schooling and matric is considered as 10 years of schooling. Therefore, majority of respondent (56.1%) for this research possessed 8-10 years of schooling. According to the results of Yaseen *et al.* (2022) majority of respondents (41.7) possessed education of 8-10 years of schooling. These results are to some extent inline to findings of current research.

Type of land

The respondents were asked about the land ownerships types. The responses are presented in below Table 3.

Table 3: *Distribution of respondent according to their type of land.*

Type of land	Frequency	Percentage
Owner	108	60.0
Tenant	48	26.7
Share cropper	24	13.3
Total	180	100.0

The results in Table 3 depict that the majority of the respondents (60%) are owner of their landholding. The results are almost similar to findings of Nugraha and Martha (2020) who concluded that almost 69% of respondents own the lands for rice crops. A landowner owns and cultivates their own land. They have full control over the decisions about land utilization and its produce. Whereas, 26.7% of the respondents are tenants and cultivating land on rental basis. A person who utilizes land from a landowner and cultivates it on rental basis. They pay rent or a share of the crops to the landowner. Moreover, the results indicate that 13.3% of the respondents are share cropper. A person who works on a landowner's land and receives a share of the crops as payment or produce. Sharecroppers do not own the land and typically provide labor and some resources, while the landowner provides the land and other resources. Sharecroppers don't have decisions powers to utilize land for cropping and produce from that land.

Land size

Land size refers to the physical area or a piece of land, typically measured in square units such as square feet's, acres, or hectares. In agriculture, land size is

commonly measured in acres. An acre is a unit of area equal to 43,560 square feet. It's often used to quantify the size of farms, fields, or plots of land used for cultivation, or other agricultural purposes, land size presented in Table 3.

Table 4: *Distribution of respondents according to land size.*

Land size	Frequency	Percentage
1 to 3 acre	165	91.7
4 to 6 acre	15	8.3
Total	180	100.0

According to results in Table 4, majority of the respondents (91.7%) possess land up to 3 acres. While 8.3% of the respondents possess above 3 to 6 acres of land. These results indicate that this fragmented land is causing risks of food insecurity in rural areas and rural households particularly in research areas. Researchers (Saqib *et al.*, 2016) found that 65.5% of the respondents possessed land holding up to 5 acres. This segment of community is most disadvantaged and lacking access to various agricultural advisory services for food security. In another research study researchers (Farah *et al.*, 2016) investigated that 82.8% of respondents possessed landholding of up to 5 acres.

How would you rate your household's current food security situation?

Food security situation of households refers to the stability and adequacy of food availability, access, and utilization within a household. It indicates whether households consistently have enough nutritious food to meet their dietary needs, covering the concepts of food availability, economic and physical access, proper utilization, and stability over time.

Table 5: *Distribution of respondents according to food security situation?*

Food situation	Frequency	Percentage
Insecure	68	37.8
Neutral	83	46.1
Secure	29	16.1
Total	180	100.0

The results in Table 5 indicate that majority of respondents (46.1%) consider themselves at neutral level stance on food security, neither feeling secure nor insecure. They manage to get by but do not

have a robust or stable sense of food security. A notable number of respondents (37.8%) considered themselves in-secured about their food security. Households face difficulties in obtaining adequate food. This can result from economic constraints, lack of access to food sources, or other barriers, leading to hunger or malnutrition. Only a small fraction of respondents (16.1%) feels secure about their food security situation, indicating that food security is a challenging issue for many. Households have consistent access to sufficient, safe, and nutritious food that meets their dietary needs for a healthy life. They do not face significant barriers to obtaining food. Researchers (Hussain and Routray, 2012) concluded that almost 35% of available food un-accessed because of various socio-economic factors.

Household food accessibility and affordability

Household food security refers to the availability and access to sufficient, safe, and nutritious food that meets the dietary needs and food preferences for an active and healthy life. Food security is a critical aspect of overall well-being and economic stability. It includes various dimensions such as food availability, food access, food

utilization, and the stability of these three over time.

The data in Table 7 shows the frequency and percentage of households experiencing different levels of food security over the past 12 months. A significant number of respondents (55.6%) often had enough of the kinds of food they wanted to eat, while 31.1% never had food that lasted, leading to periods without money for more. Affordability of balanced meals was an issue for 36.1% who never could afford it, and 40.6% often cut or reduced meal sizes due to food shortages. The fear of running out of money or food caused 43.9% to eat less, and 48.3% couldn't afford balanced meals for their children. Arshad and Shafqat (2012) concluded and recommended that the government should ensure effective mechanism for food production, processing, storage, and transportation targeting food accessibility for all segments of society in Pakistan. Moreover, household size, education of household heads, family income (annual), and farming incomes are most influencing factors and causing food insecurity in rural Pakistan (Qasim and Tariq, 2020).

Table 6: *Distribution of respondents according to household food accessibility and affordability.*

Household food security	Never		Sometimes		Often		Always	
	F	%	F	%	F	%	F	%
In the last 12 months, our household had enough of the types of food we wanted to eat.	15	31.1	45	25.0	100	55.6	18	10.0
The food we bought didn't last, and we didn't have enough money to buy more.	56	31.1	67	37.2	57	31.7	0	0
We couldn't afford to provide balanced meals for ourself and our family?	65	36.1	61	33.9	48	26.7	6	3.3
In the past year, have you or any family members ever had to cut down on the size of your meals?	73	40.6	64	35.6	37	20.6	6	3.3
In the past year, have you or your family ever eaten less because you were worried about running out of money or food?	79	43.9	55	30.6	46	25.6	0	0
Due to running out of money to buy food, you depended on only a few kinds of low-cost food to feed your children.	65	36.1	57	31.7	52	28.9	6	3.3
You were unable to afford balanced meals for your children?	87	48.3	33	18.3	60	33.3	0	0

Table 7: *Distribution of respondents according to household food security.*

Household food security	Yes		No	
	F	%	F	%
Do you and your family members typically consume fresh fruit at home?	36	20	144	80
Can you afford to buy all the fruits you need for yourself and your family?	30	16	150	84
Can you afford to buy the necessary amount of chicken and meat for you and your family?	73	40.6	107	59.4
Are you able to access and purchase a wide variety of vegetables throughout the year, to meet your family's needs?	116	64.4	64	35.6
Do you and your family consume dry fruits during the winter season as a way to boost your energy levels?	72	40	108	60
Do you and your loved ones have convenient access to consume fish as a source of white meat?	27	15	153	85
Are you able to purchase the quantity of milk that you and your household require?	144	80	36	20

Household food security

Household food security refers to the condition in which all members of a household have consistent, reliable access to enough nutritious food for an active, healthy life. This means that food is available, accessible, and can be utilized effectively by all household members, ensuring they do not live-in hunger or fear of starvation. It encompasses factors like food availability, economic and physical access to food, food utilization, and the stability of these factors over time.

The above Table 7 depicts that 80% of respondents are able to purchase the quantity of milk that their household require to fill their need. Whereas, 85%, 84% and 80% of the respondents are unable to access and consume fish as a source of white meat, unable to buy fruits for them and their families and unable to consume fresh fruits at home. Similarly, 59.4% struggle to buy enough chicken or meat, and 64.4% can buy all needed vegetables. Access to other food items like dry fruits, white meat, and milk varies, with 85% not having easy access to white meat but 80% being able to buy enough milk. Bashir *et al.* (2012) recommended government to provide income generation opportunities for rural community to boost up family income and to fulfill nutritional intake from various food items. Yousaf *et al.* (2018) concluded that the government should launch policies for raising livestock by the rural community to generate more income and to minimize dependency ratio for food security.

Factors hindering access to food security

Factors hindering access to food security are

conditions or circumstances that prevent individuals or households from reliably obtaining sufficient, nutritious food to meet their dietary needs. These factors can include economic constraints (such as poverty or unemployment), lack of physical access to markets or food distribution networks, environmental challenges (such as drought or natural disasters affecting food production), social inequalities, conflict or political instability, and inadequate infrastructure for storage and transportation of food. These barriers collectively contribute to food insecurity, where individuals or communities experience uncertain or inadequate access to nutritious food on a regular basis.

The results in Table 8 depict that majority of respondents (86.1%) agree the “non-availability of food in local markets” is key factor hindering food security. Similarly, 82.8% of the respondents also agree that climate change-related factors (e.g., droughts, floods) affect our ability to produce food/ buy food as second most factor towards attainment of food security in rural areas of Sargodha. Moreover, difficulty in obtaining affordable and nutritious food was also considered as hindering factor for food security by the 81.1% of the respondents. Ahmad *et al.* (2017) found that food prices, health expenses, loans, and market accessibility are hindering factors to access food security. Similarly, Sultana and Kiani (2011) found educational level of household head as significant factor for attaining food security, higher the education level of household head, higher will be status of food security.

Table 8: Factors hindering access to food security.

Factors hindering access to food security	Strongly disagree		Disagree		Agree		Strongly agree	
	F	%	F	%	F	%	F	%
Limited income	6	3.3	14	7.8	133	73.9	27	15
High food prices	6	3.3	4	2.2	144	80	26	14.4
Non-availability of food in local markets	3	1.7	16	8.9	155	86.1	6	3.3
lack of access to agricultural resources (land, seeds, fertilizers)	4	2.2	4	2.2	127	70.6	45	25
Seasonal variations in food availability pose a significant challenge to my household's food security	0	0	38	21.1	97	53.9	45	25.0
Difficulty in affordable and nutritious food	0	0	13	7.2	146	81.1	21	11.7
Limited access to credit or financial resources	0	0	10	5.6	138	76.7	32	17.8
Lack of infrastructure (roads, storage facilities)	3	1.7	12	6.7	138	76.7	27	15.0
Social factors (e.g., caste, social status) affect your household's access to food security	0	0	32	17.8	129	71.7	19	10.6
Limited employment opportunities in our area	6	3.3	6	3.3	138	76.7	30	16.7
Lack of Government policies and programs supporting household's access to food security:	0	0	24	13.3	114	63.3	42	23.3
Climate change-related factors (e.g., droughts, floods) affect our ability to produce food/ buy food	0	0	16	8.9	149	82.8	15	8.3

Table 9: Existing agricultural knowledge and information sources.

Information sources	Very low		Low		Average		High		Very high	
	F	%	F	%	F	%	F	%	F	%
Extension field staff	0	0	9	5	64	35.6	101	56.1	6	3.3
NGO's	9	5	123	68.3	48	26.7	0	0	0	0
Private sector	0	0	9	5	0	0	98	54.4	73	40.6
Print media	10	5.6	92	51.1	63	35	15	8.3	0	0
TV	0	0	40	22.2	73	40.6	67	37.2	0	0
Radio	12	6.7	105	58.3	51	28.3	12	6.7	0	0
Fellow farmers	0	0	6	3.3	12	6.7	30	16.7	132	73.3
Mobile /Internet	0	0	35	19.4	60	33.3	75	41.7	10	5.6
Social media	0	0	25	13.9	25	13.9	114	63.3	16	8.9

Table 10: Access to advisory services for food security.

Advisory service	Never		Rarely		Sometimes		Often		Always	
	F	%	F	%	F	%	F	%	F	%
Crop	0	0	28	15.6	129	71.7	19	10.6	4	2.2
Livestock	0	0	76	42.2	76	42.2	28	15.6	0	0
Poultry	0	0	70	38.9	98	54.4	12	6.7	0	0
Kitchen gardening	6	3.3	70	38.9	88	48.9	16	8.9	0	0
Food processing and preservation	6	3.3	73	40.6	95	52.8	6	3.3	0	0
Home economics	12	6.7	58	32.2	97	53.9	13	7.2	0	0
Marketing and transportation	12	6.7	60	33.3	102	56.7	6	3.3	0	0

The data in Table 9 depicts the various agricultural information sources for respondents to get information related to agriculture for improvements in production and living standards of farming community. The majority of the respondents (73.3%) are very highly depending upon information from fellow farmers. Similarly, the 63.3%, 56.1%, 54.4% and 41.7% of the respondents indicated that they are highly depending upon the information from social media, extension field staff, private sector, and mobile/internet respectively. Moreover, 40.6% of respondents indicated that TV is their average source of information. In the same way 68.3%, 58.3% and 51.1% of respondents indicated low level dependency on information sources; NGOs, Radio and Print media respectively. Research findings from Sadaf *et al.* (2006) show that agricultural information from extension field staff are very useful for agriculture productivity.

Table 10 shows the access to rural advisory services among respondents for improving food security conditions in research areas. Majority of the respondents indicated that they sometimes access to the advisory services including crop (71.7%) livestock

(42.2%), poultry (54.4%), kitchen gardening (48.9%), food processing and preservation (52.8%), home economics (53.9%), and marketing and transportation (56.7%). However, if the governments establish well-structured and articulated AKIS for provision of these advisory services then farmers will be capable to ensure agriculture productivity for maintaining food security situations in rural areas (Yaseen *et al.*, 2022).

Conclusions and Recommendations

Current research reveals significant insights into the socio-economic characteristics of respondents and their status regarding food security, the role of access to rural advisory services, and factors hindering access to food security. The findings highlight the crucial factors influencing food security and underscore the importance of targeted interventions.

The majority of respondents aged between 25 to 45 years, this group is more progressive if targeted for agricultural productivity interventions by the public and private sectors. As the age can impact the ability to engage in productive activities, with younger and older individuals facing different sets of challenges.

Young aged groups are more productive as compared to older groups. Education, on the other hand, is a critical determinant of awareness, skills, and access to information. In rural settings, education levels often correlate with the ability to adopt new agricultural practices and technologies, which in turn affect food security. More than half of the respondents from the research area possessed middle to matric level of education. Majority of the respondents are owners and almost one fourth respondents are tenants. Whereas, overwhelming majority of respondents possessed 1-3 acres of land, these results indicated that in research area majority of farming community is small land holders therefore, they have different challenges as compared to larger land owners. Almost little more than one tenth of respondents indicated that their households are food secured. The data revealed that many households struggled with the affordability and accessibility of essential food items. For instance, 36.1% of respondents could never afford balanced meals, and 40.6% had to reduce meal sizes due to financial constraints. The study identified several barriers to food security, including limited income, high food prices, and non-availability of food in local markets.

The role of rural advisory services was evaluated based on the contribution of various sources of agricultural information. Extension field staff and fellow farmers were highly rated for their effectiveness in disseminating agricultural information. However, the impact of NGOs, the private sector, and media channels such as TV, radio, and print media varied, with some sources being underutilized or perceived as less effective.

Based on the results and discussion following are some recommendations to improve the role of rural advisory services for food security:

- The government should invest in educating small holder farming community for their capacity building in advanced farming practices.
- The government, non-governmental organizations (NGOs) and private sector should ensure that farmers have adequate access to quality seeds, fertilizers, and pesticides.
- There should be a concerted effort to improve infrastructure in rural areas. This includes building and maintaining roads, improving storage facilities, and enhancing market access to facilitate smallholder farmers.

- Additionally, creating and supporting local farmer cooperatives can play a significant role in improving food security. Cooperatives can help small-scale farmers pool their resources, share knowledge, and gain better access to markets.
- The rural advisory services should be strengthened. Extension services need to be more accessible and responsive to the needs of small-scale farmers.
- The public, private sector and NGOs should ensure that these services are available and tailored to the specific needs of the smallholder farmers in rural areas.

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Novelty Statement

Current research study highlighted an application of framework for Agricultural Knowledge & Information System (AKIS) and explored that how agricultural extension & rural advisory services influence household food security among small-scale farmers in the Punjab, Pakistan. This manuscript also highlighted institutional gaps and regional disparities with reference to different stake-holders involved in AKIS.

Author's Contribution

Muhammad Luqman: Conceptualization, supervision.

Muhammad Yaseen: Investigation.

Muhammad Usman: Writing review and editing

Bilal Munir: Writing original draft.

Conflict of interest

The authors have declared no conflict of interest.

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