



## Original Article

## Assessing the Role of Maize Cultivation in Poverty Alleviation, Food Security and Employment Generation in Rural Areas

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## ABSTRACT

**Objectives:** This research aimed to examine the role of maize cultivation in poverty alleviation, food security, and employment generation in rural areas. **Methods:** The study was conducted in district Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan, and involved a sample of 79 farmers. Data was collected through surveys, interviews, and secondary sources. **Results:** The findings revealed that maize cultivation was perceived as a significant source of employment and income generation by the majority of participants. However, there was no significant association between maize cultivation and household food security or poverty reduction according to participants' perceptions. The study highlighted the diversification of livelihoods among farmers, with engagement in both on-farm and off-farm activities. **Conclusion:** These insights emphasize the need for integrated approaches to rural development that consider multiple dimensions, including income generation, food security, and poverty reduction. The findings of this study can inform in designing targeted interventions that harness the benefits of maize cultivation for sustainable rural development.

## INTRODUCTION

Agriculture plays a pivotal role in the economic development and well-being of rural communities, particularly in developing countries. The cultivation of staple crops such as maize has been an integral part of agricultural practices worldwide, providing sustenance and livelihoods to millions of people. In recent years, there has been growing recognition of the multifaceted benefits that maize cultivation can bring, particularly in terms of poverty alleviation, food security, and employment generation in rural areas<sup>1-3</sup>.

Maize is one of the most widely cultivated and consumed crops in the world. With its origins in Mesoamerica, maize has evolved over thousands of years and is now a staple food for billions of people across various regions and cultures<sup>4</sup>. The versatility and adaptability of maize have made it a vital component of global agriculture, contributing to food security, economic development, and cultural heritage. Maize cultivation is prevalent in both developed and developing countries, with vast expanses of farmland dedicated to its growth<sup>5</sup>. The crop exhibits remarkable adaptability, thriving in diverse climates and soils, ranging from tropical to temperate regions. This adaptability, along with advancements in agricultural practices and hybrid seed varieties, has contributed to the global expansion of maize cultivation<sup>6-7</sup>.

One of the primary reasons for the widespread cultivation of maize is its significance as a food crop. Maize serves as a staple food for millions of people, providing a reliable source of carbohydrates, dietary fiber, vitamins, and minerals<sup>8-9</sup>. In many regions, maize forms the basis of traditional diets and cultural cuisines. Its versatility allows for various culinary uses, including consumption as whole grains, processed products, and as a primary ingredient in animal feed. Moreover, maize has gained recognition as an essential crop for industrial applications<sup>10</sup>. It is used in the production of biofuels, starch, oil, and other by-products that find application in various sectors, including the food and beverage industry, animal feed production, and manufacturing. The industrial demand for maize contributes to its economic value and has a significant impact on agricultural economies<sup>11</sup>.

Maize cultivation also plays a crucial role in rural livelihoods and employment generation. Small-scale farmers, particularly in developing countries, rely on maize production as a source of income and livelihood security. The crop's market demand, coupled with appropriate farming techniques and access to

markets, can create sustainable income opportunities for rural communities<sup>12</sup>.

By comprehensively assessing the role of maize cultivation in poverty alleviation, food security, and employment generation in rural areas, this research seeks to provide valuable insights and evidence-based recommendations for policymakers, agricultural practitioners, and development agencies<sup>13</sup>. The findings of this study would contribute to the existing knowledge base and guide strategies aimed at harnessing the full potential of maize cultivation as a pathway towards sustainable rural development and poverty reduction.

## MATERIAL AND METHODS

The study was conducted in district Dera Ismail Khan, Khyber Pakhtunkhwa Pakistan in 2019, by identifying rural regions where maize cultivation was in practice and played a significant role in the local economy. Geographical diversity, socioeconomic conditions, and accessibility were considered while selecting the study areas.

A multi-stage sampling strategy was employed to select representative farmers and communities. Primary data was collected through surveys and interviews. Structured questionnaires were designed and administered to gather quantitative data. The survey questions covered farmers' socio-demographic characteristics, maize cultivation practices, income generation, household food security, and employment opportunities. Surveys were conducted face-to-face with the rural communities.

Semi-structured interviews were conducted with selected farmers, community leaders, agricultural extension officers, and relevant stakeholders. Open-ended questions were used to collect qualitative data on the experiences, challenges, and perceptions related to maize cultivation's impact on poverty, food security, and employment. Interviews were conducted in person, recorded and transcribed for further analysis.

Secondary data was gathered from published literature, reports, and government databases. Data on poverty rates, agricultural policies, maize production statistics, food security indicators, and employment data in the study area were collected. Only credible and up-to-date sources were used to ensure the accuracy and reliability of the information.

The collected data was then analyzed using both quantitative and qualitative analysis techniques. The survey data was cleaned and organized, and statistical software SPSS was used for analysis. Descriptive analysis was conducted to summarize the data and calculate

relevant statistics. The quantitative findings were interpreted and related to the research objectives.

Ethical considerations were addressed throughout the research process. Informed consent was obtained from all participants before conducting surveys or interviews. The purpose of the research, the voluntary nature of participation, and the confidentiality of the data were clearly explained. Participants were given the opportunity to ask questions and make informed decisions about their involvement. Research ethics approval was sought from Agriculture (Extension) Department, Khyber Pakhtunkhwa.

## RESULTS

The study included a total of 79 farmers, representing 100% of the sample population. Regarding age distribution, the farmers were grouped into three categories: 18-30, 31-50, and >50 years. The frequencies and percentages were as follows: 8 farmers (10.12%) were in the 18-30 age group, 31 farmers (39.24%) were in the 31-50 age group, and 40 farmers (50.63%) were above 50 years ( $p < 0.05$ ). In terms of gender, the majority of the farmers were male, accounting for 72 individuals (91.13%), while only 7 farmers (8.86%) were female ( $p < 0.05$ ). The education level of the farmers was categorized as educated and uneducated. Out of the total sample, 23 farmers (29.11%) were educated, while 56 farmers (70.88%) were uneducated ( $p < 0.05$ ) (Table 1).

The distribution of participants based on the number of individuals involved in each household is presented in Table 1. Out of the total participants, 7 individuals (8.86%) reported having fewer than 5 members in their household. The majority of participants, 26 individuals (32.91%), had household sizes ranging from 6 to 10 members. The highest frequency was observed in households with more than 10 members, accounting for 46 participants (58.22%). These findings indicate that a significant portion of the participants had larger household sizes, with more than 10 members. This could have implications for factors such as resource allocation, income distribution, and food security within these households. The distribution of participants across different household sizes highlights the importance of considering household dynamics and their potential influence on poverty alleviation, food security, and employment generation in rural areas (Figure 1).

Out of the total sample, 37 participants reported having on-farm jobs, while 42 participants reported having off-farm jobs. These findings imply that there is no

significant difference in the distribution of on-farm and off-farm jobs among the participants. It suggests that individuals who are engaged in on-farm jobs are also likely to be involved in off-farm employment, and vice versa. This could indicate the diversification of livelihoods among the participants, as they may be pursuing various income-generating activities both on and off the farm. The non-significant association between the number of on-farm and off-farm jobs highlights the need to consider multiple sources of employment when assessing the role of maize cultivation in generating employment opportunities. It suggests that promoting both on-farm and off-farm activities could contribute to a more comprehensive approach to rural development and poverty alleviation strategies (Table 2).

Participants' perceptions on various aspects related to maize cultivation were recorded on the approved questionnaire during face to face interviews. The first perception assessed was whether maize cultivation generates employment opportunities. Out of the total participants, 61 individuals responded positively, indicating that they believed maize cultivation generates employment, while 18 participants responded negatively ( $p < 0.05$ ). The majority of the participants expressed a positive perception, indicating that they perceive maize cultivation to be an important source of employment generation in their communities. Regarding household food security, 45 participants responded positively, indicating that they believed maize cultivation contributes to household food security, while 34 participants responded negatively. When it comes to income generation, 70 participants responded positively, indicating that they believed maize cultivation generates income, while 9 participants responded negatively. Lastly, participants were asked whether they believed maize cultivation reduces poverty. The responses were evenly divided, with 40 participants responding affirmatively and 39 participants responding negatively. The non-significant p-value suggests that there is no significant association between participants' perceptions of maize cultivation's impact on poverty reduction. Overall, the findings indicate that the majority of participants perceive maize cultivation to generate employment and income. However, there is no significant association between participants' perceptions and the belief that maize cultivation directly contributes to household food security or poverty reduction. These perceptions provide valuable insights into how maize cultivation is perceived in relation to different aspects of rural livelihoods, and they

can inform strategies aimed at maximizing the positive impacts of maize cultivation on employment and income generation (Table 3).

Table 1: Demographic Characteristics of Participating Farmers

S. No	Demographic characteristics	No. of farmers (n)	Frequency (%)	p-value
1	No. of farmers	79	100	1.00
2	Age			<b>0.00001*</b>
	18-30	08	10.12	
	31-50	31	39.24	
	>50	40	50.63	
3	Gender			<b>0.00001*</b>
	Male	72	91.13	
	Female	07	8.86	
4	Education level			<b>0.00001*</b>
	Educated	23	29.11	
	Uneducated	56	70.88	

\*indicated that the value is significant at  $p < 0.05$

Figure 1: Household size of the participating farmers

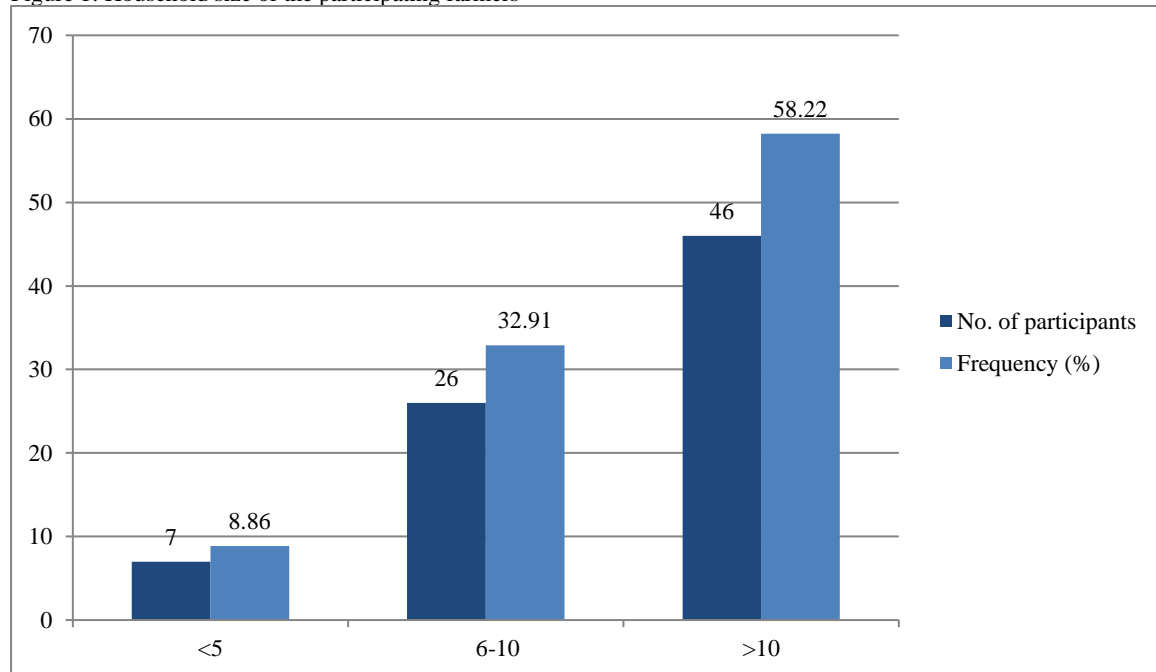


Table 2: Employment Opportunities Created by Maize Cultivation

S. No	No. of on-farm jobs	No. of off-farm jobs	Chi-square value	p-value
1	37	42	0.1034	0.7477

Table 3: Farmers perception for maize cultivation

Perceptions	Yes (n)	No (n)	Chi-square value	p-value
Generates employment	61	18	15.02	<b>0.00010*</b>
Household food security	45	34	0.7632	0.3823
Income generation	70	09	31.990	<b>0.00001*</b>
Reduce poverty	40	39	0.0021	0.9633

\*indicated that the value is significant at  $p < 0.05$

## DISCUSSION

The results of the study provide valuable insights into the demographic characteristics, household dynamics, employment patterns, and perceptions of

participants regarding maize cultivation in the selected rural areas.

Regarding the demographic characteristics of the participants, the study included 79 farmers, with varying age groups,

gender representation, and education levels. The majority of farmers were above 50 years old, indicating the involvement of older individuals in maize cultivation. The male-female ratio among the participants was significantly skewed, with a higher proportion of male farmers. Additionally, a significant number of farmers had an uneducated background, highlighting the need for targeted interventions to address knowledge gaps and enhance agricultural practices in the study area<sup>14</sup>.

The household dynamics revealed that a substantial number of participants belonged to larger households with more than 10 members. This finding is significant as it suggests the potential challenges related to resource allocation, income distribution, and food security within these households. Policymakers and development practitioners should consider the specific needs and vulnerabilities of larger households to design appropriate interventions for poverty alleviation and food security enhancement<sup>15</sup>.

In terms of employment patterns, the study found no significant difference in the distribution of on-farm and off-farm jobs among the participants. This suggests the diversification of livelihoods among farmers, with individuals engaging in both agricultural activities and non-farm employment. Promoting a mix of on-farm and off-farm activities can be crucial in generating sustainable employment opportunities and enhancing rural development<sup>16</sup>.

The participants' perceptions regarding maize cultivation were diverse. The majority of farmers perceived maize cultivation as a significant source of employment and income generation. This perception aligns with the potential of maize cultivation to contribute to poverty alleviation and economic empowerment in rural areas. However, participants did not associate maize cultivation directly with household food security or poverty reduction. These findings emphasize the need for comprehensive strategies that address multiple dimensions of rural livelihoods, including income generation, food security, and poverty reduction<sup>17</sup>.

Overall, the study sheds light on the importance of maize cultivation in the study area, its potential for employment and income generation, and the perceptions held by local farmers. These findings can inform policymakers, development practitioners, and agricultural extension services in designing targeted interventions that harness the benefits of maize cultivation to alleviate poverty, enhance food security, and promote

sustainable rural development.

## CONCLUSION

This study underscores the significance of maize cultivation in rural areas for poverty alleviation, employment generation, and income enhancement. The majority of participants perceived maize cultivation as a key source of employment and income, highlighting its potential as a viable livelihood option. The study also revealed the diversification of livelihoods among farmers, with individuals engaging in both on-farm and off-farm activities. However, participants did not associate maize cultivation directly with household food security or poverty reduction. These findings emphasize the need for integrated approaches that address multiple dimensions of rural development, including income generation, food security, and poverty reduction. Policymakers and development practitioners should consider the perceptions and preferences of local farmers to design targeted interventions that maximize the positive impacts of maize cultivation on rural communities.

## CONFLICT OF INTEREST

None.

## REFERENCES

1. Santpoort R. The Drivers of Maize Area Expansion in Sub-Saharan Africa. How Policies to Boost Maize Production Overlook the Interests of Smallholder Farmers. *Land*. 2020; 9(3):68.
2. Adeleke BS, Babalola OO. Oilseed crop sunflower (*Helianthus annuus*) as a source of food: Nutritional and health benefits. *Food Sci Nutr*. 2020 Jul 31;8(9):4666-4684.
3. Garg M, Sharma N, Sharma S, Kapoor P, Kumar A, Chunduri V, Arora P. Biofortified Crops Generated by Breeding, Agronomy, and Transgenic Approaches Are Improving Lives of Millions of People around the World. *Front Nutr*. 2018 Feb 14;5:12.
4. Guzzon F, Arandia Rios LW, Caviedes Cepeda GM, Céspedes Polo M, Chavez Cabrera A, Muriel Figueroa J, Medina Hoyos AE, Jara Calvo TW, Molnar TL, Narro León LA, et al. Conservation and Use of Latin American Maize Diversity: Pillar of Nutrition Security and Cultural Heritage of Humanity. *Agronomy*. 2021; 11(1):172.
5. Paulsmeyer, M.; Chatham, L.; Becker, T.; West, M.; West, L.; Juvik, J. Survey of Anthocyanin Composition and Concentration in Diverse Maize Germplasms. *J. Agric. Food Chem*. 2017, 65, 4341–4350.
6. Clements DR, Jones VL. Ten Ways That Weed Evolution Defies Human Management



- Efforts Amidst a Changing Climate. *Agronomy*. 2021; 11(2):284.
7. Pathak TB, Maskey ML, Dahlberg JA, Kearns F, Bali KM, Zaccaria D. Climate Change Trends and Impacts on California Agriculture: A Detailed Review. *Agronomy*. 2018; 8(3):25.
  8. Shewry PR, Hey SJ. The contribution of wheat to human diet and health. *Food Energy Secur*. 2015 Oct;4(3):178-202.
  9. Proietti I, Frazzoli C, Mantovani A. Exploiting Nutritional Value of Staple Foods in the World's Semi-Arid Areas: Risks, Benefits, Challenges and Opportunities of Sorghum. *Healthcare (Basel)*. 2015 Mar 30;3(2):172-93.
  10. Revilla P, Alves ML, Anđelković V, Balconi C, Dinis I, Mendes-Moreira P, Redaelli R, Ruiz de Galarreta JI, Vaz Patto MC, Žilić S, Malvar RA. Traditional Foods From Maize (*Zea mays* L.) in Europe. *Front Nutr*. 2022 Jan 7;8:683399.
  11. Popp J, Harangi-Rákos M, Gabnai Z, Balogh P, Antal G, Bai A. Biofuels and Their Co-Products as Livestock Feed: Global Economic and Environmental Implications. *Molecules*. 2016 Feb 29;21(3):285. doi: 10.3390/molecules21030285. Erratum in: *Molecules*. 2016;21(4). pii: E546.
  12. Danso-Abbeam G, Ehiakpor DS, Aidoo R. Agricultural extension and its effects on farm productivity and income: insight from Northern Ghana. *Agric Food Secur*. 2018; 7:74.
  13. Etuk EA, Ayuk JO. Agricultural commercialisation, poverty reduction and pro-poor growth: evidence from commercial agricultural development project in Nigeria. *Heliyon*. 2021 May 27;7(5):e06818.
  14. Pilgeram R, Dentzman K, Lewin P. Women, race and place in US Agriculture. *Agric Human Values*. 2022;39(4):1341-1355.
  15. Sano Y, Mammen S, Houghten M. Well-Being and Stability among Low-income Families: A 10-Year Review of Research. *J Fam Econ Issues*. 2021;42(Suppl 1):107-117.
  16. Iqbal MA, Rizwan M, Abbas A, Makhdum MSA, Kousar R, Nazam M, Samie A, Nadeem N. A Quest for Livelihood Sustainability? Patterns, Motives and Determinants of Non-Farm Income Diversification among Agricultural Households in Punjab, Pakistan. *Sustainability*. 2021; 13(16):9084.
  17. Hamazakaza P, Kabwe G, Kuntashula E, Egeru A, Asimwe R. Adoption of Sustainable Agriculture Intensification in Maize-Based Farming Systems of Katete District in Zambia. *Land*. 2022; 11(6):880.
  18. Nyirenda H, Mwangomba W, Nyirenda EM. Delving into possible missing links for attainment of food security in Central Malawi: farmers' perceptions and long term dynamics in maize (*Zea mays* L.) production. *Heliyon*. 2021 May 24;7(5):e07130.