

Farm Households' Perceptions and Their Willingness to Apply for Formal Agricultural Credit in District Mardan, Pakistan

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Abstract

Agriculture is a key sector of Pakistan's economy, contributing significantly to income, employment, food security, and rural development. Agricultural credit enables farmers to purchase inputs, adopt modern technologies, and improve productivity. However, despite the availability of financing through commercial banks, microfinance institutions, Islamic banks, and Zarai Taraqati Bank Limited (ZTBL), many farmers face difficulties in accessing formal credit. This study examined farmers' perceptions of agricultural credit and the factors influencing their willingness to apply for formal agricultural loans in District Mardan, Pakistan. Primary data were collected from 101 farmers selected through multistage random sampling technique. Data were analyzed using descriptive statistics and Binary Logistic Regression. Respondents were on average 47.6 years old, had 7.3 years of education, and owned a farm of 2.16 acres; 85% were landowners. High interest rates, lengthy loan procedures, and religious concerns were identified as major barriers to formal credit access. Regression results showed that education, farm size, income, credit history, and familiarity with banking procedures positively and significantly influenced farmers' willingness to apply for formal credit, while age and high interest rates had significant negative effects. Farmers with larger farms, higher incomes, and previous borrowing experience were more likely to express willingness to apply for formal credit. High interest rates emerged as the strongest deterrent to credit participation. The study concludes that farmers' access to formal agricultural credit is constrained by high borrowing costs, limited awareness, and procedural complexities. The study recommends simplifying loan procedures, reducing borrowing costs, expanding financial literacy programs, strengthening rural banking outreach, and promoting Islamic agricultural financing to enhance financial inclusion and agricultural development.

Keywords: Agricultural Credit, Farmers' Perception, Formal Credit, Financial Inclusion, Binary Logistic Regression, District Mardan, Pakistan

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Introduction

Agriculture remains the backbone of Pakistan's economy, contributing approximately 23–24% to the national Gross Domestic Product (GDP) and employing nearly 38% of the labor force (State Bank of Pakistan [SBP], 2022). The sector is dominated by smallholder farmers whose productivity and livelihoods depend heavily on timely access to financial resources. Formal agricultural credit enables farmers to purchase quality inputs, adopt modern production technologies, invest in irrigation and farm mechanization, and manage production risks arising from climate variability and market uncertainty (Iqbal et al., 2003). Recognizing its importance, the Government of Pakistan and financial institutions, including commercial banks, microfinance banks, Islamic banks, and Zarai Taraqati Bank Limited (ZTBL), have expanded agricultural lending programs to improve financial inclusion. Despite these initiatives, access to formal agricultural credit remains limited, particularly among smallholder farmers, indicating that expanding credit supply alone is insufficient to increase its utilization.

The low uptake of formal agricultural credit is influenced not only by supply-side constraints but also by farmers' perceptions of institutional financial services. Previous studies have shown that farmers' willingness to apply for formal credit is shaped by several institutional and socioeconomic factors, including interest rates, collateral requirements, loan processing procedures, repayment conditions, financial literacy, and previous borrowing experience (Hussain et al., 2020). Lengthy documentation, bureaucratic procedures, and collateral requirements often discourage smallholders from approaching formal financial institutions (Malik et al., 1991; Khan & Hussain, 2011). Consequently, many farmers continue to rely on informal lenders, such as traders, commission agents, relatives, and moneylenders, who provide quick and flexible financing despite charging substantially higher borrowing costs (Saqib et al., 2017). Farmers' socioeconomic characteristics, particularly education, farm size, income, and credit history, further influence their perceptions and willingness to engage with formal credit markets.

Although the contribution of agricultural credit to farm productivity, technology adoption, and rural income has been widely documented (Bashir et al., 2010; Abbasi et al., 2015; Nasir et al., 2020), empirical evidence examining farmers' perceptions and their willingness to apply for formal agricultural credit at the district level remains limited in Pakistan. Existing studies in Pakistan have predominantly focused on agricultural credit utilization, repayment performance, or productivity effects, while little empirical evidence exists on farmers' perceptions and behavioural willingness to apply for formal agricultural credit at the district level. Moreover, previous studies rarely integrate socioeconomic characteristics and institutional perceptions within a single empirical framework. Since institutional, socioeconomic, and cultural conditions differ considerably across regions, district-level evidence is essential for designing effective financial inclusion policies and improving the outreach of formal agricultural credit programs.

District Mardan is one of the major agricultural districts of Khyber Pakhtunkhwa, where farming constitutes the principal livelihood for a large proportion of rural households. Despite the presence of commercial banks, microfinance institutions, and specialized agricultural lending agencies, many farmers continue to face barriers in accessing formal credit because of perceived high interest rates, complex lending procedures, limited awareness, and religious concerns

regarding conventional interest-based financing. Against this background, the present study examines farmers' credit history, perceptions of formal agricultural credit, and their willingness to apply for formal agricultural financing in District Mardan. Specifically, it investigates how socioeconomic and institutional factors influence farmers' willingness to apply for formal agricultural credit. The findings are expected to provide evidence-based recommendations for policymakers and financial institutions to improve agricultural credit delivery, enhance financial inclusion, and promote sustainable agricultural development in Pakistan.

Review of Literature

Agricultural credit has long been recognized as a fundamental instrument for improving agricultural productivity, rural livelihoods, and economic development in developing countries. Early studies demonstrated that institutional credit enables farmers to invest in improved seed, fertilizers, irrigation facilities, mechanization, and other productivity-enhancing technologies, thereby increasing farm output and household income (Carter, 1989; Iqbal et al., 2003; Petrick, 2004). Similarly, Bashir et al. (2010), Abbasi et al. (2015), Anjum and Farooq (2024), Rasheed et al. (2024), and Salam et al. (2026) consistently reported that timely access to formal agricultural credit enhances agricultural productivity, facilitates technology adoption, promotes crop diversification, improves household welfare, and contributes to sustainable rural development. These findings collectively establish agricultural credit as an essential catalyst for agricultural transformation in developing economies.

Despite these benefits, access to formal agricultural credit remains constrained by numerous institutional and structural barriers. Several studies have identified excessive documentation requirements, collateral obligations, bureaucratic procedures, lengthy loan processing, and high transaction costs as major impediments preventing farmers from accessing institutional finance (Malik et al., 1991; Olomola, 1999; Petrick, 2004; Khan & Hussain, 2011). High lending rates further discourage borrowing, particularly among smallholder farmers whose incomes are vulnerable to climatic and market risks (Javed & Munir, 2017; Hussain et al., 2020; Amjad et al., 2023). Consequently, many farmers continue to depend on informal credit obtained from traders, commission agents, relatives, friends, and moneylenders because these sources provide faster loan disbursement, flexible repayment schedules, and fewer documentation requirements despite charging substantially higher borrowing costs (Saqib et al., 2017; Ullah et al., 2024). These institutional constraints limit the effectiveness of formal agricultural finance programs and reduce farmers' participation in formal credit markets.

The literature also demonstrates that farmers' socioeconomic characteristics play an important role in determining access to and utilization of formal agricultural credit. Education consistently emerges as one of the strongest determinants because educated farmers possess greater financial literacy and better understand banking procedures and loan requirements (Faridi et al., 2011; Hussain et al., 2020). Likewise, farm size, land ownership, household income, previous borrowing experience, and extension services significantly increase farmers' likelihood of obtaining institutional credit (Kumar et al., 2020; Moahid & Maharjan, 2020; Yaseen & Hayat, 2021; Chaiya et al., 2023). In contrast, small landholdings, inadequate collateral, limited education, and poor financial awareness substantially reduce farmers' access to formal credit (Faridi et al., 2011; Hussain et al., 2020; Ali & Gillani, 2023). Furthermore, risk perceptions and

fear of loan default discourage many farmers from voluntarily seeking formal credit, while some other researchers emphasized that improved financial inclusion and digital financial services can substantially enhance farmers' access to institutional finance.

Beyond socioeconomic characteristics, recent studies increasingly recognize that farmers' perceptions of formal financial institutions significantly influence their borrowing decisions. Perceived high interest rates, cumbersome loan procedures, inflexible repayment schedules, lack of transparency, religious concerns regarding interest-based lending, and limited trust in financial institutions reduce farmers' willingness to apply for formal agricultural credit (Hussain et al., 2020; Amjad et al., 2023). Conversely, improving financial literacy, simplifying lending procedures, introducing farmer-friendly products, strengthening institutional outreach, and expanding Islamic agricultural financing have been recommended as effective strategies for increasing farmers' participation in formal credit markets (Faridi et al., 2011; Rasheed et al., 2024). These findings suggest that both institutional reforms and farmers' perceptions jointly determine the effectiveness of agricultural credit programs.

Although the literature provides substantial evidence regarding the impact of agricultural credit on productivity and the determinants of credit access, comparatively limited attention has been given to farmers' perceptions and their willingness for formal agricultural credit, particularly at the district level in Pakistan. Most previous studies have focused on credit utilization, repayment performance, or productivity effects, while relatively few have simultaneously examined farmers' socioeconomic characteristics, previous credit experience, institutional perceptions, and willingness to apply for formal agricultural finance within a single analytical framework. Moreover, regional disparities in financial outreach, institutional performance, and socioeconomic conditions suggest that findings from national or provincial studies may not adequately capture local realities. District Mardan, one of the major agricultural districts of Khyber Pakhtunkhwa, represents an important case where farmers continue to rely heavily on informal credit despite the presence of commercial banks, microfinance institutions, Islamic banks, and Zarai Taraqati Bank Limited (ZTBL). Therefore, this study fills an important empirical gap by examining farmers' perceptions of formal agricultural credit and identifying the socioeconomic and institutional factors influencing their willingness to apply for formal agricultural credit in District Mardan using a binary logistic regression framework. The findings are expected to contribute to the agricultural finance literature and provide evidence-based recommendations for improving financial inclusion and designing more effective agricultural credit policies in Pakistan.

Methodology

This study employed a quantitative cross-sectional survey design to examine farmers' perceptions and willingness to apply for formal agricultural credit in District Mardan, Khyber Pakhtunkhwa, Pakistan. The target population comprised all farming households engaged in crop production and related agricultural activities in District Mardan, one of the major agricultural districts of Khyber Pakhtunkhwa. A multistage random sampling technique was employed to select the respondents. In the first stage, two tehsils, Katlang (34.334338, 72.067566) and Rustam (34.333204, 72.269440), were randomly selected from District Mardan (Figure-1). In the second stage, two villages were randomly selected from each tehsil, resulting in four study villages:

Katti Garhi and Gunday from Katlang Tehsil, and Bakhshali and Charguli from Rustam Tehsil. Due to financial and time constraints, the study was limited to these four villages. In the final stage, farm households were selected using simple random sampling. The required sample size was determined using Yamane's (1967) sample size determination formula, resulting in a total sample of 101 farm households. The sample was proportionately allocated across the selected villages according to the number of farming households in each village, thereby ensuring representative coverage of the study area.

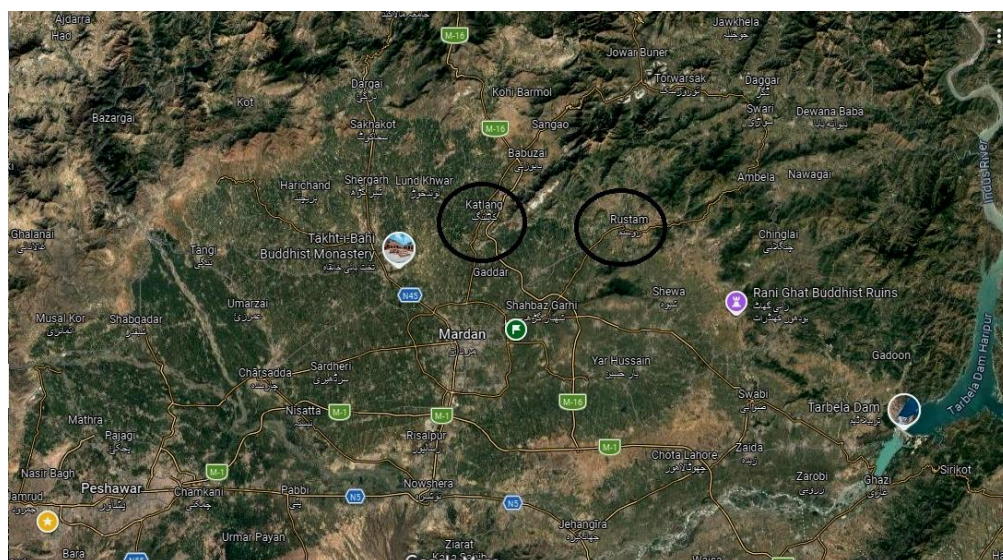


Figure-1. Mardan District

Prior to the main survey, the questionnaire was pre-tested with ten farmers from a neighboring village that was not included in the final sample to assess the clarity, relevance, and sequencing of the questions. Based on respondents' feedback, minor modifications were made to improve the wording and reliability of the survey instrument. The finalized questionnaire collected information on demographic characteristics, farm size, household income, education, previous credit experience, source of credit, perceptions regarding accessibility, affordability, loan procedures, repayment conditions, interest rates, and willingness to obtain formal agricultural credit. After data collection, descriptive statistics were employed to summarize the socioeconomic characteristics, credit history, and farmers' perceptions, while a binary logistic regression model was estimated to identify the determinants of farmers' willingness to apply for formal agricultural credit.

A binary logistic regression model was employed to identify the socioeconomic and institutional factors influencing farmers' willingness to apply for formal agricultural credit. The binary logit model is appropriate when the dependent variable is dichotomous, taking a value of **1** if a farmer is willing to apply for formal agricultural credit and **0** otherwise (Gujarati & Porter, 2009). Unlike ordinary least squares regression, the logistic model estimates the probability of an event occurring while ensuring that the predicted probabilities remain within the interval of 0 and 1.

The model is specified as follows:

$$\pi_i = \pi_i(Y_i = 1/X_i) = \frac{1}{1+e^{-z_i}} \dots\dots\dots 1$$

$$1 - \pi_i = \pi_i(Y_i = 0/X_i) = \frac{1}{1+e^{z_i}} \dots\dots\dots 2$$

$$L_i = \ln\left(\frac{\pi_i}{1-\pi_i}\right) = z_i = \beta_0 + \sum_{j=1}^n \beta_j x_{ji} + \epsilon_i \dots\dots\dots 3$$

Where:

π_i is the i^{th} farmer's probability of his willingness to apply for formal agricultural credit;

$\frac{\pi_i}{1-\pi_i}$ is the odds ratio in favor of an i^{th} farmer's willingness to apply for formal credit;

Y_i is the actual status of the i^{th} farmer's willingness to apply for formal agricultural credit (1 if yes, 0 otherwise);

X is the vector of explanatory variables;

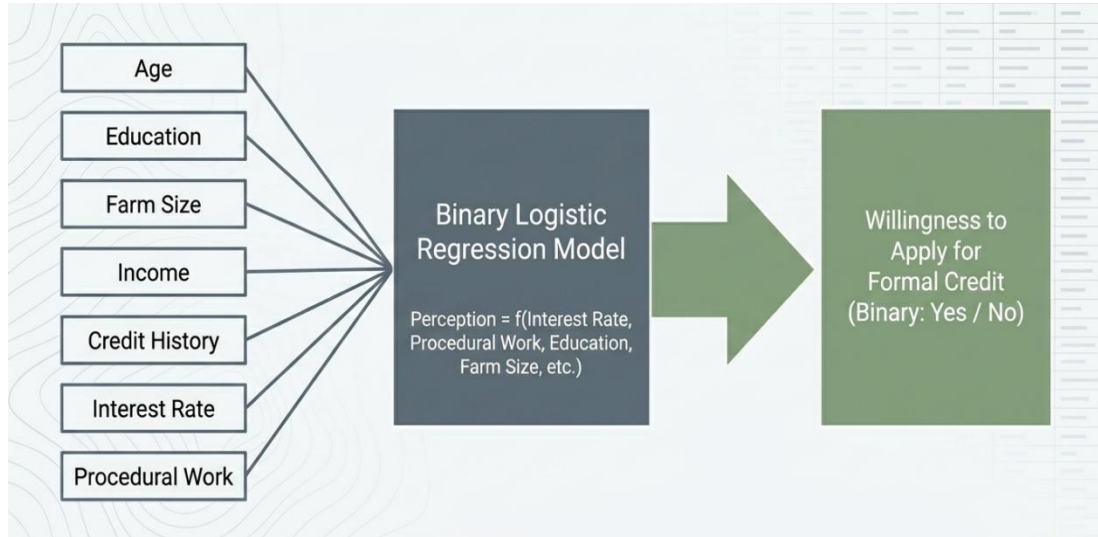
z or L is called logit and is an index ranging from $-\infty$ to ∞ ; and

β_s are the coefficients/ weights on X variables.

The dependent variable, WTA, is coded as 1 if the respondent is willing to apply for formal agricultural credit and 0 otherwise. The explanatory variables include farmers' age, education, farm size, household income, previous credit history, perception of interest rates, and perception of procedural requirements associated with obtaining formal agricultural credit. The conceptual framework underpinning the empirical model is presented in Figure 1.

The binary logistic regression model estimates the direction and magnitude of the relationship between the explanatory variables and farmers' willingness for seek formal agricultural credit. To facilitate interpretation, the estimated coefficients were transformed into odds ratios, which indicate the change in the odds of willingness associated with a one-unit increase in each explanatory variable. In addition, average marginal effects (AMEs) were computed to measure the corresponding change in the probability of willingness to apply for formal agricultural credit.

Figure 1. Conceptual Framework for Famers' Willingness to Apply for Formal Credit



Results and Discussion

Socioeconomic Characteristics of Sample Farmers

The socioeconomic characteristics of farmers play a significant role in shaping their perceptions, attitudes, and decisions regarding the adoption of formal agricultural credit. Table 1 presents descriptive statistics of the selected respondents in District Mardan. The average age of the sampled farmers was 47.60 years, indicating that most respondents were middle-aged and possessed considerable farming experience. The minimum age was 30 years, while the maximum age was 64 years, suggesting the presence of both relatively young and older farmers in the sample. The standard deviation of 8.53 years indicates moderate variation in the age distribution. Age is an important determinant of credit-related decisions because experienced farmers generally have a better understanding of agricultural production risks and financial management. Older farmers may rely more on traditional financing arrangements, whereas younger farmers may be more willing to explore institutional credit opportunities.

Education is another important factor influencing farmers' understanding of financial products and their willingness for formal financial institutions. The results reveal that farmers had an average of 7.29 years of schooling, indicating that most respondents possessed education up to the primary or middle school level. The educational attainment ranged from no formal education to 14 years of schooling. The relatively high standard deviation of 4.31 years suggests considerable diversity in educational backgrounds among respondents. Farmers with higher educational levels are generally more capable of understanding loan procedures, repayment conditions, and documentation requirements associated with formal credit institutions. Consequently, education is expected to positively influence the acceptance of formal agricultural credit by reducing information asymmetry and increasing financial literacy.

Table 1: Socioeconomic Characteristics of Sample Farmers

Variables	Mean	Standard Deviation	Minimum	Maximum
Age (Years)	47.60	8.53	30	64
Education (Years of Schooling)	7.29	4.31	0	14
Farm Size (Acres)	2.16	0.82	1	5
Ownership of Land (1=Owner, 0=Otherwise)	0.85	0.36	0	1
Annual Income (Hundred Thousand PKR)	2.41	0.72	1.0	4.2

Farm size, land ownership and non-agricultural income add more important information into the economic status of respondents. The average farm size was 2.16 acres, indicating that the majority of respondents were small-scale farmers. Small farm sizes are common in Khyber Pakhtunkhwa due to land fragmentation and inheritance practices. About 85 percent of respondents owned agricultural land, as indicated by the ownership mean value of 0.85. Land ownership is particularly important because formal financial institutions often require collateral before approving loans. Therefore, land-owning farmers may have greater access to formal credit compared to tenant farmers. The average annual income from non-agricultural sources was approximately PKR 240,891 (2.41 hundred thousand PKR), suggesting that many farmers supplement their agricultural earnings with off-farm activities. Such income diversification can enhance repayment capacity and reduce lenders' concerns regarding default risk. Overall, the socioeconomic profile indicates that the sampled farmers were predominantly middle-aged, moderately educated, small-scale landowners with supplementary income sources.

Farmers' Credit History and Sources of Credit

Table 2 presents the distribution of respondents according to their previous credit experience and sources of agricultural credit. The findings indicate that 52 percent of the respondents had never obtained agricultural credit from any source, while 48 percent reported having used credit in the past. This result suggests that a substantial proportion of farmers in District Mardan remain outside the formal and informal credit markets. Limited participation in credit programs may be attributed to various factors, including fear of indebtedness, lack of awareness regarding available financial services, religious concerns, complicated loan procedures, or limited access to financial institutions. The large proportion of non-borrowers reflects the need for improving financial inclusion among farming households.

Table 2: Farmers' Credit History and Sources of Credit

Credit History	Formal Sources	Informal Sources	Both Sources	No Credit	Total
No	0	0	0	52%	52%
Yes	18%	30%	0	0	48%
Total	18%	30%	0	52%	100%

Among farmers who had obtained credit, informal sources constituted the dominant source of financing. Out of 48 farmers with borrowing experience, 30 obtained loans from informal sources, while only 18 received credit from formal institutions. This indicates that approximately 62.5 percent of borrowers relied on informal credit, whereas only 37.5 percent utilized formal credit sources. Informal lenders typically include relatives, friends, commission agents, input dealers and local money lenders. Farmers often prefer these sources because they offer quick access to funds, flexible repayment schedules, minimal documentation requirements, and personal trust-based relationships. In contrast, formal institutions generally require extensive documentation, collateral, and compliance with administrative procedures, which may discourage farmers from seeking institutional credit.

The findings highlight a significant challenge for agricultural financing policies in Pakistan. Although formal financial institutions such as commercial banks, microfinance banks and specialized agricultural lending organizations have expanded their outreach, their utilization among farmers remains relatively low. The dominance of informal credit indicates that formal financial services may not adequately meet the needs and preferences of smallholder farmers.

Farmers' Perceptions of Formal Agricultural Credit

Farmers' perceptions regarding formal agricultural credit significantly influence their willingness to apply for formal credit. Table 3 presents respondents' perceptions of formal credit based on three major concerns: high interest rates, lengthy procedures, and religious factors. The results indicate that high interest rates were the most frequently reported concern among respondents. Overall, 46 percent of farmers perceived formal agricultural credit as expensive due to the interest charged by financial institutions. Among farmers with no prior borrowing experience, 50 percent identified high interest rates as a major obstacle, compared to 42 percent among those who had previously borrowed either from formal or informal sources. This suggests that concerns regarding borrowing costs discourage many farmers from approaching formal credit providers. In an environment where agricultural incomes are uncertain and vulnerable to climatic and market risks, farmers may perceive interest obligations as an additional financial burden.

Table 3: Farmers' Perceptions of Formal Agricultural Credit

Credit History	High Interest Rate	Lengthy Procedure	Religious Factor
No (52%)	26 (50%)	19 (37%)	19 (37%)
Yes (48%)	20 (42%)	11 (23%)	11 (23%)
Overall	46%	30%	30%

The second major concern was the lengthy and complicated loan acquisition process. Approximately 30 percent of respondents considered formal credit procedures cumbersome and time-consuming. Among non-borrowers, 37 percent identified lengthy procedures as a major barrier, while only 23 percent of borrowers expressed the same concern. This difference suggests that farmers who have previously interacted with financial institutions possess greater familiarity with loan requirements and may perceive administrative procedures as less problematic. Nevertheless, the existence of procedural barriers remains an important challenge. Requirements such as documentation, collateral verification, guarantors and multiple visits to bank branches can increase transaction costs and discourage farmers, particularly those residing in remote rural areas.

Religious considerations emerged as another significant factor affecting perceptions of formal agricultural credit. Overall, 30 percent of respondents cited religious concerns as a reason for avoiding formal loans. Similar to perceptions regarding lengthy procedures, 37 percent of non-borrowers and 23 percent of borrowers reported religious objections. In Pakistan, where the majority population follows Islamic principles, interest-based financial transactions may be viewed as inconsistent with religious teachings. Consequently, some farmers avoid conventional bank loans due to concerns about interest. The findings suggest that the promotion of Islamic agricultural financing products could increase acceptance of formal credit among farmers.

Estimated Binary Logit Regression Analysis Results

The estimated Likelihood Ratio Chi-Square and associated P-value for logistic regression model are given in Table 4. The likelihood-ratio test indicates that the explanatory variables are jointly significant relative to the intercept-only model (LR $\chi^2 = 95.77$, $p < 0.001$). The McFadden pseudo- R^2 of 0.7279 indicates a substantial improvement in model fit relative to the null specification; however, it should not be interpreted as the percentage of variation explained.

Table 4: Model Fitness and Statistical Significance

Statistic	Value	Interpretation
Likelihood Ratio Chi-Square	95.77	Highly Significant
Probability > Chi-Square	0.000	Significant at 1%
Pseudo R^2	0.7279	Strong Model Fitness

Logistic Regression Results for Individual Explanatory Variables

Table 5 presents results of Binary Logistic Regression analysis. These results indicate that several socio-economic and institutional factors significantly influence farmers' willingness to apply for formal agricultural credit.

Interpretation of Estimated Coefficients

Age has a negative and statistically significant coefficient ($\beta = -0.218$, $p = 0.006$), implying that older farmers are less likely to seek formal credit, possibly due to greater risk aversion and reliance on traditional financing mechanisms. Education exhibits a positive and highly significant effect ($\beta = 0.705$, $p = 0.002$), suggesting that educated farmers are more willing to engage with formal financial institutions because of better awareness and understanding of credit

products. Farm size also has a positive and significant coefficient ($\beta = 4.174$, $p = 0.002$), indicating that larger landholders are more inclined to apply for formal credit, likely because they require greater investment capital and possess stronger collateral positions. Income positively affects willingness ($\beta = 1.653$, $p = 0.040$), demonstrating that financially better-off farmers are more confident in their repayment capacity. Credit history has a large positive and significant coefficient ($\beta = 4.519$, $p = 0.004$), revealing that previous borrowing experience substantially increases the likelihood of seeking formal credit. In contrast, the interest rate variable has a negative and highly significant coefficient ($\beta = -6.169$, $p = 0.001$), indicating that concerns about high borrowing costs strongly discourage farmers from applying for formal loans. Procedural work is positive and significant ($\beta = 2.989$, $p = 0.037$), suggesting that farmers who are familiar with credit application procedures or perceive them as manageable are more willing to seek formal credit. Overall, all explanatory variables except the intercept are statistically significant at the 5% level or better.

Table 5: Logistic Regression Results for Farmers' Willingness to Apply for Formal Agricultural Credit

Variables	Coefficient	z-value	p-value	Marginal Effect
Age	-0.218	-2.77	0.006***	-0.012
Education	0.705	3.07	0.002***	0.039
Farm Size	4.174	3.16	0.002***	0.234
Income	1.653	2.05	0.040**	0.093
Credit History	4.519	2.85	0.004***	0.253
Interest Rate	-6.169	-3.39	0.001***	-0.345
Procedural Work	2.989	2.09	0.037**	0.167
Constant	-5.166	-1.23	0.220	—

Significance Levels: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Interpretation of Marginal Effects

The marginal effects estimate the change in the probability of willingness associated with a one-unit change in each explanatory variable, holding other variables constant. Age has a marginal effect of -0.012, meaning that each additional year of age reduces the probability of willingness to apply for formal credit by approximately 1.2 percentage points. Education increases this probability by about 3.9 percentage points for each additional year of schooling. Farm size has a marginal effect of 0.234, indicating that a one-unit increase in farm size raises the probability of willingness by approximately 23.4 percentage points, making it one of the most influential determinants. Income increases the probability by about 9.3 percentage points, reflecting the importance of financial capacity in credit decisions. Farmers with previous credit experience are approximately 25.3 percentage points more likely to be willing to seek formal credit than those without such experience. Among the reported marginal effects, perceived high interest rates have the largest absolute marginal effect, the estimated marginal effect of -0.345 indicates that concerns regarding high interest rates reduce the probability of willingness to take formal credit by approximately 34.5 percentage points. Finally, procedural work increases the probability of willingness by about 16.7 percentage points, suggesting that familiarity with or acceptance of

application procedures encourages participation in formal credit markets. These marginal effects confirm that institutional factors, particularly credit history and interest rates, are among the most influential determinants of farmers' willingness to apply formal agricultural credit.

Discussion

The findings of this study provide a view of the farmers' perceptions and willingness to apply formal agricultural credit in District Mardan, Pakistan. The descriptive analysis indicates that the farming community is dominated by smallholder farmers with relatively low levels of education and a high dependence on agriculture as their primary source of livelihood. This socioeconomic profile reflects the broader structure of Pakistan's agricultural sector, where small-scale farming predominates and access to productive resources remains limited (State Bank of Pakistan [SBP], 2022). Although, nearly half of the sampled farmers had previous borrowing experience, many continued to rely on informal sources of finance despite the availability of formal lending institutions. This finding supports the observations of Khan and Hussain (2011) and Saqib et al. (2017), who argued that informal lenders remain attractive because they provide faster loan disbursement, flexible repayment arrangements, and fewer documentation requirements, despite their relatively higher borrowing costs.

The econometric analysis demonstrates that farmers' willingness to apply for formal agricultural credit is jointly determined by socioeconomic and institutional factors. Age was found to negatively influence willingness, suggesting that older farmers are generally more risk-averse and less willing to engage with formal financial institutions. Similar findings have been reported by Akram et al. (2008) and Hussain et al. (2020), who observed that younger farmers are more receptive to modern agricultural technologies and institutional financial services. In contrast, education positively influenced willingness to apply for formal credit, indicating that educated farmers possess greater financial literacy and a better understanding of banking procedures and loan documentation. This result is consistent with the findings of Faridi et al. (2011) and Zubair and Kousar (2020), who concluded that education reduces information asymmetry between farmers and financial institutions and enhances farmers' confidence in using formal financial services.

Farm size, household income, and previous credit history also exerted positive and statistically significant effects on farmers' willingness to apply for formal agricultural credit. Larger farms generally require greater investment capital while simultaneously providing stronger collateral, thereby increasing both farmers' demand for credit and lenders' willingness to extend loans. Similar conclusions were reported by Iqbal et al. (2003) and Chandio et al. (2019), who emphasized the importance of land ownership and asset endowment in improving access to institutional finance. Likewise, higher-income farmers were more willing to seek formal credit because they were perceived to have stronger repayment capacity, a finding that agrees with Bashir et al. (2010). The significant positive effect of previous credit history further suggests that successful borrowing experiences strengthen farmers' trust in financial institutions and encourage repeated participation in formal credit markets, corroborating the findings of Nasir et al. (2020).

Institutional factors emerged as equally important determinants of farmers' willingness for formal agricultural credit. Perceived high interest rates significantly discouraged farmers from

applying for institutional loans, indicating that borrowing costs remain one of the major barriers to financial inclusion. This finding is consistent with Javed and Munir (2017), Hussain et al. (2020), and Saqib et al. (2017), who reported that high financing costs often compel smallholders to rely on informal credit despite its associated risks. Although the estimated coefficient for procedural requirements was positive, the descriptive evidence suggests that farmers generally perceive documentation requirements, lengthy approval procedures, and bureaucratic delays as significant obstacles to obtaining formal credit. Similar institutional constraints have been highlighted by Malik et al. (1991) and Khan and Hussain (2011), who argued that simplifying administrative procedures is essential for improving farmers' access to institutional finance. Together, these findings underscore the importance of reducing transaction costs and improving the efficiency of agricultural lending programs.

Overall, the estimated binary logistic regression model exhibited strong explanatory power, indicating that the selected socioeconomic and institutional variables effectively explain farmers' willingness to apply formal agricultural credit. The estimated marginal effects further revealed that perceptions regarding interest rates exerted the largest negative influence on farmers' willingness, whereas previous credit history and farm size generated the strongest positive effects. These findings are consistent with Petrick (2004) and Chandio et al. (2019), who emphasized that both financial constraints and institutional trust are fundamental determinants of agricultural credit participation. From a policy perspective, the results suggest that improving financial literacy, simplifying loan procedures, expanding outreach services, introducing affordable and Shariah-compliant financing products, and strengthening long-term relationships between financial institutions and farmers would substantially enhance the adoption of formal agricultural credit. Such interventions would not only improve financial inclusion but also promote agricultural investment, productivity growth, and sustainable rural development in Pakistan (World Bank, 2021).

Conclusion and Recommendations

This study examined farmers' perceptions and willingness to apply for formal agricultural credit in District Mardan, Khyber Pakhtunkhwa, Pakistan, with particular emphasis on the socioeconomic and institutional factors influencing their borrowing decisions. Primary data collected from 101 farm households were analyzed using descriptive statistics and a binary logistic regression model complemented by odds ratios and marginal effects. The findings demonstrate that despite the availability of institutional credit through commercial banks, microfinance institutions, and Zarai Taraqati Bank Limited (ZTBL), many farmers rely on informal sources of finance because of their easier accessibility, limited documentation requirements, and greater flexibility.

The empirical results reveal that farmers' willingness to apply for formal agricultural credit is jointly determined by both socioeconomic and institutional factors. Education, farm size, household income, and previous credit history significantly and positively influence farmers' willingness for institutional credit, whereas age exerts a negative effect. These findings indicate that younger, better-educated, and economically stronger farmers are more likely to participate in formal credit markets because they possess greater financial literacy, stronger repayment capacity, and better access to collateral. Previous borrowing experience also emerged as one of

the strongest determinants, highlighting the importance of trust and long-term relationships between farmers and financial institutions in encouraging repeated use of formal credit services.

Institutional characteristics were found to play an equally important role in shaping farmers' borrowing decisions. High interest rates substantially reduced farmers' willingness to apply for formal agricultural credit, confirming that the cost of borrowing remains one of the most significant barriers to financial inclusion. Similarly, although farmers familiar with banking procedures were more willing to seek formal credit, descriptive evidence suggests that lengthy documentation requirements, bureaucratic procedures, and delays in loan processing discourage many farmers, particularly smallholders with limited experience of formal financial institutions. These findings emphasize that improving institutional efficiency is as important as enhancing farmers' economic capacity.

Overall, the study concludes that formal agricultural credit has considerable potential to improve agricultural productivity and rural welfare in District Mardan; however, its effectiveness is constrained by socioeconomic inequalities and institutional inefficiencies. Expanding financial inclusion therefore requires not only increasing the availability of agricultural credit but also improving farmers' confidence in formal financial institutions through transparent, accessible, and farmer-friendly lending practices. Addressing these barriers would encourage greater participation in formal credit markets, stimulate agricultural investment, and contribute to sustainable rural development and poverty reduction in Pakistan.

Based on these findings, several policy recommendations emerge. Financial institutions should simplify loan application procedures by reducing unnecessary documentation and accelerating loan approval processes. Repayment schedules should be aligned with crop production and harvesting cycles to improve farmers' repayment capacity. The government should expand subsidized credit programs for small and medium-scale farmers while promoting collateral-free or low-collateral lending schemes for resource-constrained households. Financial literacy and awareness campaigns should be strengthened to improve farmers' understanding of available credit programs and banking procedures. Furthermore, expanding Shariah-compliant agricultural financing, improving the outreach of commercial and microfinance institutions through village-level facilitation centers, and strengthening extension services would enhance farmers' confidence in formal credit institutions and significantly improve access to institutional agricultural finance.

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