

Subsistence farmers' access to agricultural credit and its adequacy

Some empirical evidences from Pakistan

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Abstract

Purpose – The Government of Pakistan has allocated a substantial proportion of agricultural credit to subsistence farmers. The purpose of this paper is to analyze farmers' access to credit and its adequacy in the light of current agricultural credit policy of Pakistan.

Design/methodology/approach – The study has used both secondary and primary data for analysis. Secondary data were collected from the annual reports of Pakistan Economic Survey and State Bank of Pakistan. Primary data were collected from 168 subsistence farmers through households' survey. Farmers' credit access and credit adequacy were measured using credit access ratio and credit adequacy ratio, respectively. The Student's *t*-test and analysis of variance were used to assess the differences in credit access and adequacy among farmers' groups (i.e. upper, medium and lower subsistence farmers). Tobit regression model was employed to determine the factors influencing credit adequacy among farmers.

Findings – The empirical results revealed that the amount of credit provided to subsistence farmers was less than stated in the national agricultural credit policy. Upper subsistence farmers had more access to credit than lower and medium subsistence farmers. Lower subsistence farmers had above average access to informal sources of credit, and had below average access to formal sources. The findings also revealed that lower subsistence and medium subsistence farmers had the highest credit inadequacy of funds for investment in agriculture. The results of the Tobit regression revealed that age, education, experience, household size, total landholding of farmer and proportion of own land influenced the agricultural credit adequacy.

Practical implications – Most of the credit was distributed among the upper subsistence farmers. Lower subsistence farmers were still largely dependent on informal credit for farm production activities. The Government of Pakistan performed poor in the implementation of agricultural credit policy, and has failed to help subsistence farmers in their access to formal credit. It is needed to revamp the agricultural credit policy and facilitate credit acquisition by subsistence farmers, particularly for tenant farmers. It is important that the Government may classify the subsistence farmers into subgroups, and reallocate the funds accordingly. This study has lessons and implications for agricultural finance initiatives in developing countries.

Originality/value – Previous studies have focused primarily on access to agricultural credit. However, this study has adopted a holistic approach by using secondary and primary data to assess the farmers' access to credit and adequacy. In addition, limited literature is available to explore the farmers' accessibility and adequacy of agricultural credit. Furthermore, this study has focused exclusively on the farmers who are living in the flood-prone areas of Pakistan.

Keywords Pakistan, Access to credit, Credit adequacy, Subsistence farmers

Paper type Research paper



1. Introduction

The agriculture sector is the most important component of Pakistan's economy. It plays a key role in catalyzing overall economic growth, ensuring food security, structural changes in the economy toward industrialization and eradication of poverty. It is one of the largest sectors which contribute 21 percent to the total national income of Pakistan, while its share has declined with time. However, it still employs 45 percent of the labor force (Rahman *et al.*, 2014). Majority of population (70 percent) in Pakistan live in rural areas, and are dependent on the agricultural sector (Saqib, Ahmad, Panezai, Ullah and Khattak, 2016; Saqib, Ahmad and Panezai, 2016; Saqib, Ahmad, Panezai and Ali, 2016; Saqib, Ahmad, Panezai and Rana, 2016). The share of agriculture in GDP was 21.4 percent in 2013, compared to 24.5 percent in 1990s, 32 percent in 1977-1978, 53 percent in 1959-1960 and 64 percent in 1947-1948 (Rahman *et al.*, 2014). Agriculture contributed to 20.9 percent of the GDP in 2014-2015, and was a source of livelihood for 43.5 percent of the rural population (Pakistan Economic Survey, 2014-2015). Three quarters of Pakistan's total export earnings came from agricultural products, agricultural processed products and raw material supply to major industries around the world and total industrial goods consumption in Pakistan was 33 percent (Pakistan Economic Survey, 2012-2013). Thus, it can be inferred that agriculture is the backbone of Pakistan's economy.

The agriculture sector is primarily dependent on credit. This is due to the seasonal variations in the farmers' returns, and a changing trend from subsistence to commercial farming. Credit facilities play a vital role in agricultural and rural development (Saqib, Ahmad and Panezai, 2016). The main purpose of agricultural credit is to improve farm productivity through necessary investment in water channels, land preparation, pumps and procurement of essential inputs like seeds, fertilizers, fuel, insecticides and pesticides (Hussain and Thapa, 2012). Timely availability of formal credit can enhance the adoption of modern and new technology, which can help in reducing the influence of private money lenders, and make small farmers efficient in credit markets (Ellis, 1992). In short, agricultural credit plays an essential role in boosting agricultural modernization and economic development but only if it is easily, timely, extensively available and invested in agriculture without fungibility.

Lack of credit is one of the most important problems hindering efficient agricultural production, ultimately lowering the income of farm households. Numerous studies revealed that farmers have limited access to formal credit (e.g. Saqib, Ahmad, Panezai, Ullah and Khattak, 2016; Zeller, 1994; Kuwornu *et al.*, 2012; Porgo *et al.*, 2017). Lack of access to credit from formal sources compelled the small-scale farmers to seek financial services from informal channels (Zeller, 1994). The rich and large-scale farmers usually have more access to formal credit than small-scale farmers, whereas the small-scale farmers mostly depend on informal money lenders (Nouman *et al.*, 2013; Saqib, Ahmad and Panezai, 2016). Large-scale farmers have more access than small-scale farmers due to large landholding sizes (Saqib, Ahmad and Panezai, 2016), have comparatively high social status (Virmani, 1982), ability to bribe the officials and personal connection inside financial institutions (Ladman and Tinnermeier, 1981). The underlying security and collaterals procedure is seen to be more complex and costly to most of borrowers (Jehan and Muhammed, 2008). Small-scale farmers are mostly affected by these collaterals and guarantee issues. Most of the small-scale farmers (90 percent) acquire credit from informal sources (Amjad and Hasnu, 2007). However, the repayment ability of the small-scale farmers is observed to be better than the large-scale farmers (Jehan and Muhammed, 2008).

In Pakistan, formal credit is provided by Zarai Taraqati Bank Limited (ZTBL), cooperative banks and other commercial banks such as Khushali Bank, Bank of Khyber, Bank of Punjab, Allied Bank Limited, United Bank Limited, Muslim Commercial Bank, etc.

Some financial institutions like National Rural Support Program and Sarhad Rural Support Program also are prominent sources of formal credit. These institutions/organizations are working under the guidance and supervision of State Bank of Pakistan (SBP) (Amjad and Hasnu, 2007). In 2014-2015, as per the government priority to enhance the agricultural sector, the SBP allocated PKR500 billion to seven microfinance banks, 20 commercial banks, four Islamic banks and two specialized banks. These banks were responsible to provide loans to farmers for agricultural activities. This set target for agriculture sector was 31.5 percent higher than the previous year's (2013-2014), which was target of PKR380 billion, and 28 percent higher than the actual credit provided (PKR391.4 billion) for the year 2013-2014. Out of total amount, PKR90.0 billion was allocated to ZTBL, PKR252.5 billion was allocated to five major banks, PKR11.5 billion to Punjab Provincial Cooperative Bank, PKR115.5 billion to 15 domestic private banks, PKR2.3 billion to four Islamic banks and PKR28.2 billion to seven microfinance banks.

Informal sources of credit play a vital role in the rural development of Pakistan. Informal sources of credit have better advantage over formal sources by providing better and faster services at lower costs. Farmers having timely and easy access to credit could dramatically increase their productivity, and produce good quality products for both domestic use and whole rural population in the presence of efficient supply chain (Hussain and Thapa, 2012). Major informal sources of credit in Pakistan include: private money lenders, rotating saving credit associations, traders, fellow farmers, merchants, local dealers, village heads and relatives. Easy access to credit provides an opportunity to farmers to diversify the agriculture sector by undertaking new investment in crops, income sources and contributes in adoption of new technologies (Ayaz and Hussain, 2011).

In Pakistan, farmers are categorized into three different groups on the basis of their landholdings: subsistence, economic and above economic landholdings (State Bank of Pakistan, 2003). Subsistence landholders have landholding up to 12.5 acres[1], economic landholders have above 12.5-50 acres, while above economic landholders have landholding above 50 acres. In order to assist the subsistence farmers, the SBP has allocated 70 percent of the credit to this group; whereas, 20 percent is allocated to economic landholders, and 10 percent is allocated to above economic landholders (State Bank of Pakistan, 2003). Farmers in the same group (subsistence farmers) may have different water needs, fertilizers, farm machineries, land use and access to agricultural credit. According to the State Bank of Pakistan (2010), subsistence farmers are eligible for 70 percent of the formal credit. However, in the same group, farmers having different landholding sizes are treated under the same credit policy. The small-scale farmers having landholding size greater than one acre are the beneficiaries of the credit policy while farmers less than one acre are completely ignored (Hussain and Thapa, 2012).

Increase in agricultural production and high yield of crops are essential for food security. Therefore, agricultural credit is considered very important for sustainable farmers' livelihood, agricultural production, food security and to mitigate the risk of heavy rains, pests and diseases, and other catastrophic hazards such as floods. In addition to having limited landholding of farmers, many are living in hazard-prone areas in Pakistan. Farmers living under severe threat of climate change and natural hazards are more vulnerable than their counterparts with same landholdings in other areas of the country. Farmers need credit for their farm management and in risk management whenever disaster happens (Saqib, Ahmad, Panezai and Ali, 2016; Ullah *et al.*, 2016). It is important that the government-supported programs such as agricultural financing should be extended to hazard-prone areas (Saqib, Ahmad, Panezai and Rana, 2016). Previous studies have focused on access to agricultural credit in general. However, in the hazard-prone areas, limited literature is available to explore the farmers' accessibility and adequacy of agricultural credit. This study focuses on farmers living in the flood-risk prone areas. Using both secondary and primary

data, this study provides a holistic approach to assess the farmers' access to credit and their credit adequacy. The objectives of the study are threefold:

- (1) first, to analyze the credit delivered to farmers in the light of the current agricultural credit policy from secondary sources;
- (2) second, to evaluate the farmers' access to credit, adequacy and differences among the three groups of farmers; and
- (3) third, to determine the factors influencing credit adequacy among the farmers.

2. Conceptual framework

This research study is conceptualized from the previous literature and concepts regarding agricultural credit. Two types of agricultural credit sources were considered in this study: formal sources of credit such as state-owned banks and private financial institutions and informal sources informal credit sources such as money lenders, friends, relatives and commission agents (Saqib, Ahmad and Panezai, 2016).

Farmers' access to credit is influenced by their socio-economic factors such as age, experience, landholding size, family size, education and income level. Kosgey (2013) and Saqib *et al.* (2017) revealed that farmers' age, education level, family size, household size were the significant factors influencing access to agricultural credit. A similar study found that access to credit sources is significantly influenced by age, sex, household size, farm size, education and group membership of farmers (Hananu *et al.*, 2015). Likewise, socio-economic characteristics of farmers such as age, experience, landholding size, land ownership, family size and income play a key role to get adequate credit from both formal and informal sources. It is not only important that farmers have access to credit but also adequacy of the credit is crucial (Saqib, Ahmad, Panezai, Ullah and Khattak, 2016). A study conducted by Hussain and Thapa (2012) revealed that the credit to small-scale farmers were inadequate. Agricultural credit programs for the poor farmers are directly linked to access to credit and adequacy. Credit is used for buying seeds, fertilizers, land preparation and other agricultural inputs to increase the productivity and income for farmers (Figure 1).

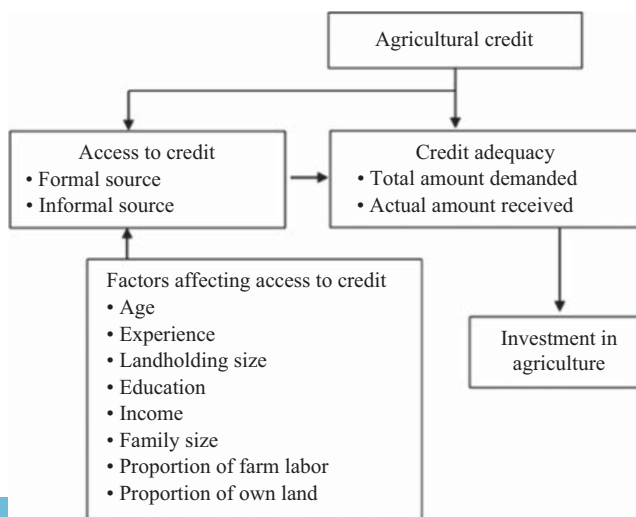


Figure 1. Conceptual framework of agricultural credit and adequacy

3. Research methods

3.1 Study area

The Mardan district was purposely selected as the study area due its high vulnerability to floods and heavy rainfall (Provincial Disaster Management Authority, 2013). It is the second largest city of the Khyber Pakhtunkhwa province, with a total area of 1,632 sq. km. The total population of Mardan is about 1.46 million, containing 0.75 million males and 0.71 million females. The population density in Mardan is 888.5/sq. km. There are 75 union councils (lowest tier of the elected representatives), with total villages of 175 and two town committees (Federal Bureau of Statistics, 1998). The district is selected from among 25 districts of the province for two main reasons. First, among the five central districts of Khyber Pakhtunkhwa: Peshawar, Nowshera, Swabi, Charsadda and Mardan has the highest total credit disbursed (PKR10,980.0 million) during the last five years' average amount by different formal institutions. Second, Mardan is considered as one of the vulnerable districts to climate-induced disasters such as floods. Depending on the farmers' access to credit sources and the amount of credit they received, agricultural credit is of high importance to the farming community in the post-disaster situation. This credit can be used to mitigate the impacts of these climate-induced disasters (Saqib, Ahmad, Panezai and Ali, 2016).

Mardan is a fertile district of the province, and majority of the people are engaged in farming. The total farming families were 69,851, and average landholding size ranges from 2 to 2.5 acres (Agriculture Census Organization, 2010). According to the land use statistics, most of the land (76 percent) was used for cultivation, while 22 percent was uncultivated, and 2 percent of the land was forests (District Agriculture Extension Office, 2015). The district has a good irrigation system with two major canals, tube wells and ahart[2] system. Out of total cultivated land, most of the area (75 percent) was irrigated, while 24.6 percent was barani[3] and up to 0.4 percent was cultural waste. Main crops cultivated in the Mardan district were wheat, maize, sugarcane, sugar beet, mustered, barley and tobacco. The highest cultivated area was used for wheat (36.6 percent), followed by sugarcane and maize and other crops. In terms of productivity, sugarcane was the highest with 19,800 kg/acre followed by sugar beet and other crops (District Agriculture Extension Office, 2015).

3.2 Sampling and data collection

Secondary data were collected from Pakistan Economic Survey reports for three fiscal years: 2012-2013, 2013-2014 and 2014-2015, and from the SBP reports spanning 2011-2014. Primary data were collected using semi-structured questionnaires. The sample size of farming households in the study area was calculated from the household data obtained from Provincial Disaster Management Authority (2013) report. A total of 970 households were identified vulnerable in the district. From this population, a sample of 168 farming households were randomly selected by using Yamane (1967) with 95 percent confidence level, and ± 7 percent margin of error. The sampled households were selected through multistage sampling. In the first stage, Khyber Pakhtunkhwa was selected from among four provinces of Pakistan. In the second stage, among 24 flood-hit districts, Mardan was purposively selected as mentioned previously. In the third stage, eight villages in the upstream and downstream of the river Kalpani were selected. In the fourth stage, only subsistence farmers were selected, as in Mardan about 97 percent of the farming population have subsistence landholdings (Agriculture Census Organization, 2010). The data were collected in the month of June and July 2015. Other related information was collected from the District Agriculture Extension and Agriculture Statistics Office, Mardan.

3.3 Data analysis

3.3.1 Access to credit sources. This study employed relative access to credit methodology instead of absolute access to credit. The method is used because of two reasons. First, it

calculates the relative access of the group (who took the loans) as compared to the absolute access. Second, it also incorporates the landholding size that measures the credit obtained per unit of land. Several studies suggested this method to be used for access to credit (Hussain and Thapa, 2012; Saqib *et al.*, 2017):

$$AC_i = \frac{c_i/C}{l_i/L} \quad (1)$$

where AC_i denotes access to credit of the i th household; C denotes the total distributed credit to all sampled households; L denotes the total landholding size of all sampled households; c_i denotes the total credit given to the i th household; l_i denotes the landholding size of the i th household.

The computed AC_i are interpreted as:

$AC_i = 1$ implies the farmer's group access to credit is equal to average access to credit.

$AC_i > 1$ implies the farmer's group access to credit is greater than average access to credit.

$AC_i < 1$ implies the farmer's group access to credit is less than average access to credit.

3.3.2 Adequacy of credit. Farmers' adequacy of credit was calculated by the method suggested by Hussain and Thapa (2012), Saqib, Ahmad, Panezai, Hidayatullah and Khattak (2016). The credit gap was calculated, and the credit adequacy ratio was obtained using the following formula:

$$CAR = \frac{\bar{x}}{\bar{y}} \times 100 \quad (2)$$

where CAR denotes the group's credit adequacy ratio; \bar{x} denotes the annual average amount of credit received by group z ; \bar{y} denotes the annual average amount of credit demanded by group z .

3.3.3 Tobit model of the factors influencing credit adequacy. The Tobit regression model was employed to examine the factors influencing credit adequacy as follows:

$$CAR_i^* = \alpha + \beta X_i' + \varepsilon_i \quad (3)$$

$$CAR_i = CAR_i^* \text{ if } CAR_i^* > 0 \quad (4)$$

$$CAR_i = 0 \text{ if } CAR_i^* \leq 0 \quad (5)$$

where CAR_i^* is the group's unobserved credit adequacy; CAR_i is the group's actual credit adequacy which is ratio and censored at 0; X_i' is vector of explanatory variables; β is the vector of unknown true coefficients; α is the intercept; and ε_i is the disturbance term, which is assumed to be normally independently distributed, i.e. NID $(0, \sigma^2)$ and independent of x_i . Given that the censoring point is 0, the dependent variable (credit adequacy) in the Tobit regression model is a continuous variable. The credit adequacy variable is not fully observed and assumes 0 values for a substantial part of the sample. In this case, the ordinary least squares estimator cannot be applied (e.g. Kuwornu *et al.*, 2017). Consequently, the censored Tobit regression model was employed to show the relationship between the credit adequacy and explanatory variables.

The independent variables were used in the model are: age, education, experience, health status, family size, monthly income, landholding size, distance, the proportion of own land and proportion of labor employed in field. As mentioned previously, the literature revealed that these variables influenced credit access and adequacy (e.g. Kuwornu *et al.*, 2012; Porgo *et al.*, 2017).

4. Results

4.1 Access to credit

According to the definition by the SBP, farmers are divided into three groups: subsistence farmers which accounted for 97.1 percent of the whole farmers' community, economic landholding farmers which are known as medium farmers were 2.7 percent and above economic landholding representing 0.2 percent of the total farmers' population in the district (Table I).

4.1.1 *Institutional credit provided to farmers.* Loans provided to farm and non-farm sector by banks are presented in Table II. Sector-wise distribution revealed that the share of non-farm sector in the overall agriculture credit delivery had continued to increase by PKR156 billion which was 47.9 percent of the total in 2014-2015, from PKR116.7 billion (45.6 percent) in 2013-2014, and from PKR99.7 billion (43.2 percent) in 2012-2013. The share of credit to the farm sector in the total payment decreased from 56.8 percent in 2014-2013, to 54.4 percent in 2012-2013 as shown in Table II. Out of the total credit (PKR326.0 billion) delivered in 2014-2015, the farm sector received PKR170.0 billion. The share of credit to farm sector reduced from 54.4 to 52.1 percent and the share of non-farm sector increased from 45.6 to 47.9 percent in 2014-2015. The continuous increase in non-farm lending might be due the SBP pilot projects in particular districts across the country, which encourages banks to disburse agriculture credit portfolios. Data showed that total credit delivery to the farming sector, and share of subsistence farmers decreased from 32.5 percent in the year 2012-2013 to 28.9 percent in 2014-2015. Likewise, credit delivered to economic landholding farmers also decreased in these years from 15.3 to 12.9 percent. However, credit delivered to above

Table I.
Land distribution by
type of farmers in
Mardan district

Type of farmers	Landholding size (acres)	No of households	%
Subsistence farmers	< 5	53,385	76.4
	5-7.5	9,161	13.1
	7.6-12.5	5,282	7.6
Economic landholding	12.6-50	1,861	2.7
	Above economic landholding	> 50	420
Total	69,851	100.0	

Source: Agriculture Census Organization (2010)

Table II.
Access to farm and
non-farm credit
(Billion PKR)

Sector	2012-13		2013-14		2014-15	
	Credit amount	Share (%)	Credit amount	Share (%)	Credit amount	Share (%)
A						
Farm credit	131.3	56.8	139.0	54.4	170.0	52.1
Subsistence farmers	75.7	32.8	80.6	31.5	94.1	28.9
Economic landholding	35.4	15.3	35.5	13.9	41.0	12.6
Above economic landholding	20.3	8.8	23.0	9.0	34.9	10.7
B						
Non-farm credit	99.7	43.2	116.7	45.6	156.0	47.9
Small farms	31.7	31.8	39.4	33.7	53.9	16.5
Large-scale farms	68.0	68.2	77.4	66.3	102.0	31.6
Total (A + B)	231.0	100.0	255.7	100.0	326.0	100.0

Source: Pakistan Economic Survey Reports (2012-2013, 2013-2014, 2014-2015)

economic landholding (large-scale farmers) increased from 8.8 to 12.6 percent, as shown in Table II. It implies that the small-scale farmers had less access than large-scale farmers to the formal sources of credit due to the lack of collateral security.

4.1.2 *Credit provided by institutions in central zone of the province.* Subsistence farmers have a maximum landholding size of 12.5 acres as per the central bank criteria. Mardan is the leading district in provision of agricultural credit. For example, PKR10,980 million (55 percent) of total credit per annum on average was disbursed to farmers, followed by Swabi with PKR3,889.4 million shown in Figure 2. In Mardan, there were more subsistence farmers than other districts. In Charsada, the credit received by farmers was PKR3,145.21 million, while in Nowshera, it was PKR1,149.8 million, and in Peshawar, the capital of province had the lowest share (PKR810.0 million). It implies that in Peshawar, above economic landholders (large-scale farmers) are more than other districts. Second, small-scale farmers were more engaged in non-agricultural activities. In Mardan, 80 percent of people were in rural areas and dependent on farming for their livelihoods. Thus, Mardan has received more agricultural credit as compared to other districts.

4.1.3 *Access to agricultural credit.* 4.1.3.1 *Comparison of farmers' groups in terms of access to credit.* In the study area, ZTBL and Khushali Bank were providing formal credit to farmers. Farmers relied more on the informal sources such as fellow farmers, friends, relatives, merchants and traders as sources of credit. The amount of credit accessed is divided into three categories: formal sources, informal sources and combined total credit. The lower subsistence farmers received PKR7,017.5 on average per annum/household, medium subsistence farmers received PKR35,512.8, whereas upper subsistence farmers received PKR110,210.5 from formal sources. From informal sources, lower subsistence farmers received PKR38,654.5, middle subsistence farmers received PKR42,871.8 and upper subsistence farmers had received PKR70,000. In case of formal sources, the lower subsistence farmers received less amount. Lower subsistence farmers had limited access due to their small landholding size to use as a collateral. Upper subsistence farmers received more credit as compared to informal sources. They had more landholding and provided it as collateral security. Moreover, they needed more funds not only for production purposes but also for developmental purposes which could not be fulfilled from informal sources. ANOVA results revealed that there were significant differences in the average amounts received by farmers from formal, informal and total credit ($p < 0.01$), Table III. Upper subsistence farmers had more access than medium and lower subsistence farmers. Likewise, medium subsistence farmers had more access than lower subsistence farmers.

4.1.3.2 *Relative access to credit.* The results obtained by applying Equation (1) are shown in Table IV. Lower subsistence farmers had 11.59 percent share in total credit. Medium subsistence farmers accessed 30.10 percent, and upper subsistence farmers

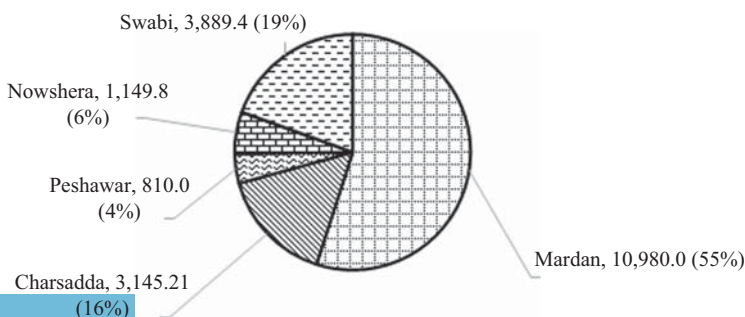


Figure 2. Distribution of credit in the central districts

Table III.
Average amount of credit received from different sources by type of farmers

Credit	Farmers' group	n	Average (PKR.)	SD	F-test
Formal sources	Lower subsistence farmers	110	5,727.3	18,694.016	43.9***
	Medium subsistence farmers	39	35,512.8	60,205.731	
	Upper subsistence farmers	19	110,210.5	119,500.62	
	Total	168	24,458.3	60,731.751	
Informal sources	Lower subsistence farmers	110	38,654.5	37,100.764	4.9***
	Medium subsistence farmers	39	42,871.8	37,972.413	
	Upper subsistence farmers	19	70,000.0	59,535.237	
	Total	168	43,178.6	41,278.276	
Total credit	Lower subsistence farmers	110	44,381.8	42,335.701	39.1***
	Medium subsistence farmers	39	78,384.6	67,281.27	
	Upper subsistence farmers	19	180,210.5	123,613.91	
	Total	168	67,636.9	75,311.841	

Note: ***Significant at 1 percent level of significance

Source: Field Survey (2015)

Table IV.
Access to agricultural credit

Farmer's group	Share of group's formal credit to total formal credit (%)	Share of group's informal credit to total informal credit (%)	Share of land owned by formal borrower to total land of all farmers (%)	Share of land owned by informal borrower to total land of all informal borrowers (%)	Credit access ratio	
					Formal credit access ratio	Informal credit access ratio
Lower subsistence farmers	11.59	60.85	18.28	33.49	0.63	1.81
Medium subsistence farmers	30.10	21.45	32.0	28.61	1.05	0.75
Upper subsistence farmers	58.31	17.70	49.71	37.90	1.17	0.5

Source: Field Survey (2015)

accessed 58.31 percent of the total credit from formal sources. Regarding the farmers' landholding size, lower subsistence farmers had 18.28 percent, medium subsistence farmers had 32.01 percent and upper subsistence farmers 49.71 percent of the total landholding. The credit access ratio of lower subsistence farmers was 0.63, which was less than average access to credit (1.0). The medium subsistence farmers' credit access ratio was 1.05, and 1.17 of upper subsistence which were above the average credit access. Regarding informal credit sources, the share of group's informal credit to total informal credit is 60.85 percent for the lower subsistence farmers, 21.45 percent of medium and 17.70 percent of upper subsistence farmers. The land share of lower subsistence farmers was 33.49 percent of total informal borrowers. This percentage for medium subsistence farmers was 28.61 percent, and 37.90 percent of upper subsistence farmers. The informal credit access ratio was 1.18 of lower subsistence farmers which was above the average. Medium subsistence and upper subsistence farmers had 0.75 and 0.5. respectively. It can be inferred that upper subsistence farmers had more access to formal sources of credit, while lower subsistence had more access to informal sources of credit.

4.2 Credit adequacy

The credit data from the farmers were collected in the form of in-kind loans and services, which were converted into amount as per the market value during June-July 2015

(data collection period). Moreover, farmers were asked about the value of those services and in-kind credit included seeds, fertilizers, pesticides and other farm machinery. Services included the ploughing of the field and other field preparations which were usually provided to the farmers for a period of one crop season.

Lower subsistence farmers ($n = 110$) demanded PKR77,709.09 per annum/household. Medium subsistence farmers demanded PKR133,589.8 per annum/household, and upper subsistence demanded PKR196,315.8. Lower subsistence farmers received PKR5,727.27 per annum per household from banks. Medium and upper subsistence farmers received on average PKR35,512.82, and 110,210.5 per annum per household, respectively. Upper subsistence farmers received more than other farmers from banks due to their larger landholding size. Lower subsistence farmers had received PKR38,654 from informal sources whereas, medium and upper subsistence received PKR542,871.8 and 70,000.0, respectively.

Lower subsistence farmers received only 7.3 percent, medium subsistence 26.6 percent and upper subsistence 35.7 percent of their total credit demand from formal sources (Table V). Upper subsistence farmers had fulfilled their credit demand from formal sources due to larger landholding sizes that they possess and more access to formal credit as pointed out previously. Informal sources played a significant role in fulfilling the credit demand of farmers. Lower subsistence farmers were meeting 49.8 percent of their total credit demand from informal sources with 42.9 percent inadequacy. Medium subsistence farmers had fulfilled 32.1 percent of their credit demand from informal sources. Likewise, 56.1 percent of upper subsistence farmers' demand was met from informal sources with only 8.2 percent of credit inadequacy.

The most adequate source of credit was formal. However, only two banks were providing credit to farmers in the study area. Banks were providing credit against collaterals and securities, although, Khushali Bank was providing credit on group basis without collaterals. However, this amount was not adequate and ranged from PKR15,000 to maximum 50,000 at 25 percent interest rate for a period of 3-12 months (Khushali Bank, 2015). Lower subsistence holders were more in shortage of funds to run their daily farm activities.

4.3 Results of the Tobit regression model of the factors influencing credit adequacy[4]

4.3.1 Study variables. Table VI shows the variables used in the regression model. Dependent variable is credit adequacy and independent variables that are included the study are age, education, experience, health status, family size, monthly income, landholding

Farmer's group	Credit demanded by Z_i group Y	Credit received from formal sources X_f	Credit received from informal sources X_m	PKR/household/year		Adequacy of total credit (%) A_2	Gap filled by informal credit (%) $A_2 - A_1$	Credit inadequacy (%) $100 - A_2$
				Credit received from both formal and informal X_t	Adequacy of formal credit (%) A_1			
Lower subsistence farmers ($n = 110$)	77,709.09	5,727.27	38,654.55	44,381.81	7.3	57.1	49.8	42.9
Medium subsistence farmers ($n = 39$)	133,589.8	35,512.82	42,871.79	78,384.6	26.6	58.7	32.1	41.3
Upper subsistence farmers ($n = 19$)	196,315.8	110,210.5	70,000.0	180,210.5	35.7	91.8	56.1	8.2

Source: Field Survey (2015)

Table V.
Credit adequacy

Variables	Description	Level of measurement	Mean	SD
<i>Dependent variable</i>				
Credit Adequacy	Difference between credit demand and actual credit obtained	In percentage	69.9	3.1
<i>Independent variables</i>				
Age	Farmers' age	In years	46.8	13.8
Education	Farmers' education	Year of schooling	5.6	5.5
Farming experience	Farmers' farming experience	In years	23.9	14.6
Total landholding	Landholding size	In acres	4.4	4.2
Monthly income	Average monthly income	In PKR	31,047.6	17,413.5
Family size	Family members	Number	9.1	3.3
Farming labor	Proportion of family members working as labor in the field out of total family members	Ratio in number	0.31	0.42
Proportion of land	Proportion of own land out of total landholding in acres	Ratio in number	0.41	0.42

Table VI.
Descriptive statistics
of study variables

Note: PKR stands for Pakistani Rupee: The National Currency of Pakistan
Source: Field Survey (2015)

size, distance, the proportion of own land and proportion of labor employed in field. The descriptive statistics are shown in Table VI.

4.3.2 Regression results. The results of Tobit regression are shown in Table VII. The model has a good fit as indicated by χ^2 value of 123.61 ($p < 0.01$). The age of the farmers negatively influenced credit adequacy ($p < 0.05$). This implies that increases in age of the farmers makes agricultural credit less adequate for farming activities. It implies that older farmers are investing more in agriculture. They need more funds for expansion in farming activities. Empirical results showed that increases in family size make agricultural credit less adequate for the farmer ($p < 0.01$). The education variable influences credit adequacy positively ($p < 0.01$). Thus, increases in the number of years of education make agricultural credit more adequate to the farmer. This could be due to the fact that educated farmers are more aware of the procedures, and fulfilled the requirements for specific amounts of the credit needed for the farm operation.

Variables	Description	Coefficient	SE	p-value
Age	Age in years	-0.4389	0.1919	0.0222**
Education	Years of schooling	1.6661	0.4927	0.0007***
Experience	Farming experience in years	0.4797	0.2251	0.0331**
Total landholding	Acres	3.6502	0.5544	0.000**
Total income	Monthly income in PKR	-4.69×10^{-6}	5.09×10^{-6}	0.3569
Household size	Household members	-1.1200	0.4319	0.0095**
Farming labor	Ratio of family members working as laborers in the field out of total family members	2.2803	1.5189	0.1333
Proportion of land	Ratio of own land to total landholding	1.567	0.378	0.001**
Constant		28,0421	7.2426	0.0103**
χ^2		123.611		p -value = 0.000
Log-likelihood		-694.513		Akaike criterion 1,409.026
Schwarz criterion		1,440.265		Hannan-Quinn 1,421.704

Table VII.
Results of the Tobit
regression model of
the factors influencing
credit adequacy

Notes: *****Significant at 5 and 1 percent levels, respectively
Source: Field Survey (2015)

Similarly, the experience of the farmers influenced credit adequacy positively ($p < 0.05$). Likewise, both the total landholding and proportion of own land to total landholding significantly increased credit adequacy positively ($p < 0.01$). The land could be used as collateral security to acquire the larger amounts of credits for the farm activities.

5. Discussion

The lower subsistence farmers share in total formal credit was very low despite government interventions regarding agricultural credit policy provisions for smallholders. In total, 70 percent of the credit was supposed to be delivered to subsistence landholders who had a maximum landholding size of 12.5 acres, 20 percent to the economic holding (12.5-50 acres) and 10 percent was allocated to above economic landholding having landholding size above 50 acres. The findings of this study revealed that the lower subsistence farmers had limited access to formal credit. In Pakistan, there are about 8.3 million farm households, and only two million have access to formal sources. Agricultural credit as a percentage of total lending is 5.7 percent. Of the total agricultural credit, 39 percent was contributed by formal sources while 61 percent of the credit was from the informal sources (State Bank of Pakistan, 2015).

Land was the most important readily acceptable form of collateral. This limited many tenants and landless farmers to participate in formal credit markets. According to agricultural credit policies of ZTBL, the land ownership certificate was necessary for acquiring loans. In addition, most of the farmers had limited landholding size to enable them to access large amounts of loans. The results of this study are consistent with the findings of Hussain and Thapa (2012). They reported that upper smallholders having landholding size from 2.5 acres to 5.00 acres had above average access to formal sources of credit, and lower smallholders had below average. Access to credit depends on the value of assets they had such as building, farm land or gold which could be used as collateral. Lower subsistence farmers lack collateral security. Our findings also confirm the results of Nouman *et al.* (2013), George and Ouma (2012), Akram *et al.* (2008), Amjad and Hasnu (2007), Saqib, Ahmad, Panezai and Rana (2016) who revealed a positive relationship between access to credit and landholding size of farmers. However, Dzadze *et al.* (2012) reported insignificant association of landholding with access to credit.

Upper subsistence farmers accessed banks credit using land as collaterals and receive sufficient amounts. The lower subsistence farmers relied on informal sources, i.e. friends, relatives, fellow farmers, traders, merchants, etc. From all these sources, they received insufficient amount of loans. The results of the study are consistent with the findings of Sidhu *et al.* (1998), who revealed that production credit supplied per crop/ha covered less than 20 percent of the operational cost of cotton. Moreover, fertilizer the expenditures alone could not be met from formal sources of credit, and lead to high inadequacy of credit in the study area. However, results of this study are inconsistent with the findings of Singh and Sekhon (2005). They stated that in Punjab, the most agriculturally developed regions of India, the landholding and credit had a positive association. The credit gap for the kharif season on the small-scale farm was 2.23 percent, medium and large-scale farms was estimated as 20.36 and 23.9 percent, respectively. Likewise, a positive relationship between credit gap and farm size was observed in the rabbi season for which the credit gaps on small, medium and large-scale farms were 2.48, 21.40 and 22.85 percent, respectively.

In Pakistan, as per the agricultural credit policy and institutional framework, sufficient and adequate amount is allocated for subsistence farmers. The secondary data have also proved that more amount was delivered to this group of farmers. However, findings of this

study showed that farmers were not getting sufficient amount, and high credit inadequacy existed among the farmers. The SBP has categorized all the farmers having landholding up to 12.5 acres in one group (subsistence farmers) but still within this group the farmers had different access and adequacy of credit. Farmers who had landholding of less than five acres had limited access to formal sources. Therefore, it can be concluded that in this group of farmers, the upper subsistence farmers are benefiting more from policy incentives than the lower subsistence farmers. These findings from the secondary data are supported by the regression results that landholding size and the proportion of own land positively influenced the credit adequacy.

Several problems hindered lower subsistence farmers' access to formal sources of credit. For example, majority of the farmers faced the problem of complex procedures and delay in credit delivery. Many of the farmers during the field survey talked about high interest rate. Farmers were accessing credit from two formal banks in the study area: ZTBL and Khushali Bank. ZTBL charged interest rate of 18 percent, and Khushali Bank were providing loans at 30 percent rate of interest. The latter was providing loan on easier terms and conditions, i.e. group-based loans, however, the interest rates charged in different schemes were higher as well. The farmers reported that Khushali Bank was providing loans at 31 percent interest rate, whereas on individual loans, the interest rate was 28 percent. Livestock loans were granted at 30 percent interest rate. Loans received against the passbooks as security were granted at 25 percent rate of interest. In case of ZTBL, the loans were provided on low interest than Khushali Bank. For example, 14 percent for crops, however the documentation for ZTBL was difficult for the lower subsistence farmers. Our findings support the reports issued by SBP. According to SBP report, the average interest rate from the institutions is 39 percent, and 80 percent loans are taken from informal sources: middlemen and Aarthi[5] (State Bank of Pakistan, 2015) . In ZTBL, the collaterals and security were the main problems for farmers.

Among the factors influencing access to agricultural credit adequacy, farmers' age, farming experience and education enhanced adequacy to agricultural credit. Farmers with more experience and education have a better knowledge of the documentation and banking procedures to access institutional credit which was the main source of adequate credit. Likewise, larger landholding and proportion of own land guarantee more credit adequacy. The farmers having larger landholding sizes had no problem of collaterals to access the loans in larger amount.

Majority of the lower subsistence farmers had not only limited access to formal sources, but their access to informal sources was also restricted. Access to informal sources was not easy for lower subsistence farmers. The guarantee was the main problem as it is related to lower subsistence farmers, and even to medium and upper subsistence farmers. Farmers reported that it was not easy to get loans from traders and merchants, as they need the guarantor who will be responsible in case of default. For this purpose, farmers were in search of village heads, large-scale farmers or other family heads, who had a higher social status to get loans from these sources. Our findings are consistent with Basu (1997) and Tsai (2004), who reported that informal credit market have personalized nature of contracts. Another study by Laurence *et al.* (1999) also supports our findings that informal credit market interlinkages play a very important role in access to credit.

6. Conclusion

Access to formal agricultural credit is still a challenge for the governments in developing countries. Pakistan is also facing the same dilemma in providing formal credit to small-scale farmers. Despite the protection provided in the interest of the subsistence farmers in the agricultural credit policy, they are still getting lesser amounts than initially allocated.

Categorization of subsistence farmers in three groups has led to interesting findings. Lower subsistence farmers were the most disadvantaged group of farmers. Findings of the secondary data showed that more credit was allocated and received by the subsistence farmers. However, the primary data analysis showed that within this group of farmers, upper subsistence farmers were receiving more credit than the medium and lower subsistence farmers. In addition to this, there is a huge gap between lower subsistence farmers' credit demand and the actual amount received. Most of the credit is accessed by the upper subsistence farmers only. Lower subsistence farmers were fully dependent on informal credit. The performance of government is still poor due to its inefficient implementation of the credit policy to help the smallholders in accessing credit from formal sources. There is dire need to revamp the agricultural credit policy and implement it properly to facilitate the lower subsistence farmers' access to credit from formal sources. In this respect, special attention should be given to the tenant farmers who have no land rights. In addition, the government may re-classify subsistence farmers and reallocate funds in efficient manner.

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Notes

1. 1 acre = 0.404 ha.
2. Wells from which by the help of animal the water can be pulled.
3. Local term used for rain-fed area.
4. The Tobit regression results of the factors influencing access to credit and credit adequacy are similar, except the age variable which influenced credit adequacy but does not influence access to credit. Therefore, for ease of exposition but without loss of generality for the conclusions, this study presents results of the factors influencing credit adequacy.
5. Local term used for merchants.

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