Journal for Social Science Archives

Journal for Social Science Archives (JSSA)

Online ISSN: 3006-3310
Print ISSN: 3006-3302
Volume 2, Number 2, 2024, Pages 574 – 584
Journal Home Page
https://jssarchives.com/index.php/Journal/about

Role of Micro Credit in Fuel Wood Conservation and Living Standard

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ARTICLE INFO

Keywords:

Micro Credit, National Park, P value, living standard

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ABSTRACT

This study analyzed the role of micro credit on fuel wood conservation and improving household living standard in the surrounding communities of Chitral Gol National Park in Pakistan. For this purpose a sampled survey was conducted in 13 villages in which 286 respondents were interviewed, among them 143 were taken from recipients of micro credit house-holds and 143 from non-recipient households through random sampling. For analyzing the data various statistical tools were used including independent sample test, least square and multi nominal logistic model were used for analysis. The empirical analysis of the study indicates that micro credit has a positive impact on fuel wood conservation and living standard. And those who are Loan recipient households were comparatively better standard of education, housing type and health. The consumption pat-tern of loan recipient households is also better than the non-recipient households The chosen methodology may lack generasibility and further testing through impact evaluation is recommended. This paper has empirically studied the effect of micro credit pro-gram on fuel wood conservation and living standard using primary data.

Introduction

Micro credit has been an important financial tool used to alleviate poverty and empower the communities in different countries. However its role in conservation has not been empirically investigated. The 2.52 percent of land area of Pakistan was covered by forest in 2004 declined to 2.13 in 2010[1]. Development expert assert that 25 % of the land area of a country should be covered by the forest. The forest cover is shrinking because of heavy dependence on forest fuel

[1] .www.tradingeconomics.com

and livelihood. The fuel wood consumption is higher in the rural areas where no other cheap source of fuel is available to the consumers. In most of the rural areas of Pakistan there is no access to gas where people completely depend on either the forest or not forest (wild lands & farmlands) for fuel wood. In Pakistan 61% of the rural household collect fuel wood from different sources (FAO)[2] . By providing micro credit to the forest dependent population to adopt alternate livelihood or fuel may be helpful in the efforts for conservation. Therefore in regions micro credit has been provided to communities living around the forest. Micro credit plays an important role in creating livelihood options (Yeasmin 2012; Taqi et al., 2021; Asghar et al., 2024). The micro credit program in the Chitral Gol National Park can be highly beneficial if implemented in a proper way. The papers here aims that, the downtrodden people have manage their livelihood through alternative sources of income and reduce their dependence on natural resources as far as possible. It aims to analyze and enhanced the impact of micro credit on fuel wood conservation and living standard so that it could produce lessons for other protected areas.

Descriptively it was stating that, the lots of social science research scientist and scholars were contributed their empirical thoughts and analysis on the role of micro credit on conservation. The following descriptive studies have been carried out in different countries. In Thailand Hooper (2005) studied the environmental protection society micro cred-it program. The society provided loans on the term with the community that they will not poach or log illegally. The results showed that reduction of 75% poaching and illegal activities has occurred in the Khaoyi National Park and the community which was previously poorly indebted got rid of the debts. Similar study was carried out by Vincent (2012) in North east India the study supports that micro credit program plays significant role in conservation in addition to better socio economic conditions.

In India Shristi (2012) assessed the impact of ATREE project micro credit program on average daily consumption of fuel wood and annual income of the local community. The results showed that the annual income of the local population has increased at 21 % and the average daily consumption of fuel wood decreased from 1440kg to 160 Kg

In Nigeria Tajuddin (2012) investigated the impacts of Global environment facility project in Kainji Lake National park having the components of alternate livelihood and environmental protection. Author found that local communities are satisfied with the GEF strategies and a great deal of shrink has occurred in the illegal activities in the National park. In Bangladesh Jahangir (2008) examined the impact of participation in the social forestry program in Bangladesh on household forest conservation and environmental literacy of participating households using multivariate regression analysis. Author found that participation in micro credit considerably enhances the awareness of households about the household forest conservation. It also increased the environmental literacy of participating household.

Brock (2013) studied the impact of micro credit on alternative livelihood sources in Indonesia and found that the microcredit program has been unable to control fishing in the island areas. Similar study was carried out by Emmanuel (2012) in Tanzania and found that micro credit program has contributed towards biodiversity conservation and improved livelihoods.

Thus, these all of the above the rich material supports a positive relation between micro credit and conservation initiatives. The provision of Micro credit has played a significant role in

[2] Food and agriculture organization is an agency of United Nations.

conservation of natural resources in these areas. However in Pakistan the impacts of micro credit on conservation efforts have not been investigated.

Panjaitan (1999) conducted study on micro credit initiatives, gender and self-employment in Indonesia. The research revealed that micro credit increases women participation in decision making, lessens fertility, improves household food intake and raises ambition for children's education. Similarly Bhuiyan (2013) emphasis on the impact of micro credit on the borrower's literacy of children and empowerment, author found significant increases in the literacy of borrower's children and empowerment. Similarly Mahindra (2005) stated that the impact of micro credit on the health of poor women. The study found that Micro credit improved the health conditions of poor women and engaged them in productive activities. Tilakaratna (2006) refers the impact of micro credit on household welfare characteristics. The study reveals that micro credit impact on the asset building housing and income of higher and middle income people was significant while it was almost non-significant in case of poor people. Similarly Schroeder (2009) in Bangladesh estimated the impact of micro credit on household consumption, author found a positive and significant effect on per capita household consumption. Jamal (2006) stated the impact of micro credit on the income of farmers and their wheat production in the barren areas of Khyber Pakhtunkhwa. The study revealed that 23% in-crease in wheat yield had occurred in addition to increase of 24% on the income of farmers. Yeasmin (2012) refers the role of micro credit in livelihood creation and women empowerment in Bangladesh which found that the creation of more livelihood options reduces the vulnerability of the rural communities. Here the author found the role of micro credit program on environmental sustainability haven't been assessed then. Similarly, Al-Hasan in Ghana found that micro credit helped to improve the income generating capacity of women. In Pakistan the impact of micro credit on income generating activities was conducted by Mansoor (2010) in District Kotli which was found 33 % increase has occurred on the income of loan recipients. Chawan (2002) asserted less impact of micro credit on employment and income creation of the rural poor.

Abdullah (2011) examined the effect of micro credit on the employment in Peninsular Malaysia. The findings reveal that micro credit program increased income generating opportunities at household and community level. Similarly Kennedy (2010) studied the impact of micro credit in eliminating economic hardships of woman in Srilanka. The study emphasis on that a strong positive relationship exists between micro credit program and elimination of economic hardships of woman. Similarly in Punjab Pakistan, Waheed (2009) analyzed a significant impact of micro credit on income.

Alam (2014) studied the impact of micro credit on the socio economic status of farmers in Pakistan. He found a positive impact on the socio economic conditions of farmers after getting loan. In a similar study Sivchouteng (2011) found a positive impact of micro credit on the living standards of loan takers from micro credit program in Cambodia.

Methodology

A semi structured questionnaire was developed to collect primary data from treatment group (Loan recipient) and control group (non-recipient). The area of the study is custodian villages of Chitral Gol National Park situated in district Chitral of Khyber Pakthunkhwa Province Pakistan. The Micro credit program is working in these villages. A total of 286 households around Chitral Gol National Park were interviewed through semi structured questionnaire. 143 households each were selected from the treatment and control group employing simple random sampling. The

study assessed the role of micro credit on conservation and living standard of communities living around Chitral Gol National Park. The quantity of fuel wood collected weekly (in KG) is the indicator of the level of fuel wood conservation in the national park. While micro credit effectiveness in raising the living standard will lead to conservation through household participation in the program.

A household decision to participate in micro credit program is likely to be related to the outcome of interest which is collection of fuel wood from national park. We estimate the given equation.

$Q_f = \beta x_i + \lambda MP_i + U_i$ 1

Where Q_f is wood collection by households, X is a vector of some control variables related to households characteristics and assumed to be exogenous (for example education of the household head, household size, land size etc.), and MP is participation in micro credit Program, whereas Ui is the error term.

The impact of micro credit on living standard was estimated by using the following econometric model.

$Y_i = ß_0 + ß_1 MP_i + ß_3 X_i + \varepsilon$ ----------2

Where

Y= measure of household living standard

The independent variable on the right side of the equation indicates MPi has been defined in equation 1.

ß0is intercept,**ß1**, **ß2**, **ß3**are the corresponding parameters of the independent variables is a vector of other relevant household characteristics. Household characteristics (X) include educational level of the household, land size owned by the household and amount of loan.ε is stochastic error. Stochastic terms ε are assumed to be normally and independently distributed with variance σi. However, it is highly likely that there is cross-equation correlation. Equation 1 was be estimated by ordinary least square with heteroscedasticity consistent standard errors. While equation 2 will estimated by least square for continuous variables (consumption, assets and education) and by multinomial logit model for the categorical variable (housing status).

Results and Discussion

In this section primary data collected from field has been analyzed. Various statistical techniques like independent samples t test, ordinary least square regression and multi nominal regression.

Fuel wood collection

The table presents comparison of fuel wood collection pattern among the recipients of micro credit program and the non-recipients households.

Table 1: Fuel wood collection: Comparison of loan recipient and non-recipient households

Variable		Loan Recipient.	Non-Recipient	Mean Difference	P-value
Quantity of wood collected per week (in KG)	Mean	4	18	14	0.000
	SD	33	18		

The average of fuel wood collection for non-recipients is very much higher for non-recipient households than the loan recipient households. The table shows that fuel wood collection for loan recipient households is less than one fourth of that of the non- recipient households. The difference is statistically significant with p value .000 which means the loan recipients are less dependent on fuel wood for fuel purposes and use other sources of fuel like liquefied Petroleum Gas (LPG) and solar energy which is available in their local market area. On the other hand high average value of fuel wood collection by non-recipients shows greater dependency on fuel wood of Chitral Gol National Park which is a threat to forest conservation. This observation indicates that micro credit program has been successful in achieving its prime objective i.e. the conservation of the national park forest. This finding support to the study of Shristi (2002) in which author found a decrease in fuelwood consumption after participation in the micro credit program.

Demographic indicator

This table compares the demographic indicators of loan recipients and non-recipients households.

Table 2: Demographic indicator

Variable		Loan Recipient	Non-Recipient	Mean Difference	P-value
Household size	Mean	6.78	5.8		
	SD	1.61	1.32	-.923	.000

The above table shows that average household size of Non recipient households is 5.86 whereas it is 6.78 for the loan recipient households. It means the loan taker households have more number of household members as compare to non-loan taker households. This is due to higher consumption pattern of loan recipients household where there are more family members.

Land holding

Table 3 indicates comparison of loan recipients and non-recipients on the basis of land size of the households.

Table 3: Comparison between loan recipients and non-recipients on land holding size

Variable		Loan Recipient.	Non-Recipient	Mean Difference	P-value
Landholding size (Kanals)	Mean	0.4	0.8	0.4	0.008
	SD	1.1	1.6		

The table 3 shows the land holding size of the both loan recipients and non-loan recipients. The mean for non-loan taker households is .8 and for the loan recipient household is 0.4. It means non loan recipients have more land holdings than the loan recipients. Average land holding is less than 1 Kanal per family because of the land lords in this area. The lands were owned by the land lords which are only few in number and the remaining people have very small land holding. People have very less private land for agricultural purpose however they can do agricultural activities on the land owned by government and land lords.

Consumption/expenditure

The consumption/expenditure indicator tells us about household expenditures on non-durables.

Table 4: Consumption on non-durables of loan-recipients and non-recipients

Variable		Loan Recipient.	Non-Recipient	Mean Difference	P-value
Food	Mean	14411.2	12545.5	-1865.7	0.000
	SD	3299.2	3105.5		
Education	Mean	1601.4	958.0	-643.4	0.000
	SD	1042.5	505.5		
Health	Mean	749.7	445.7	-303.9	0.000
	SD	536.0	262.4		
Clothing	Mean	642.7	610.5	-32.2	0.400
	SD	349.1	294.0		

The above table shows consumption and expenditure patterns on non-durables of the loan recipients and non-loan taker households. The Mean average consumption on food for the non-recipient households is 12545 whereas for loan recipient it is 14411. Similarly in case education the Mean average consumption of loan recipients is also higher than the non-recipient households and both are also statistically significant. The average consumption on health for loan recipient households is 749 in comparison to 445 of the non-recipient households, which may be is due to availing better health facilities by the recipients group. Same way in the expenditures on clothing where loan recipients on Mean average consume 642 and non-recipients consume 610. Thus, the results clearly depicts that loan recipient households were able to more expend on non-durable goods than the non-recipients.

Health

Among the different indicators of health we have chosen two indicators i.e. average of family members falling ill in the last month and total number of visits to hospital in the last month. Table 5 compares health indicators for loan recipient and non-recipient households.

Table 5: Comparison of loan recipients and non-recipients on health

Variable		Loan Recipient.	Non-Recipient	Mean Difference	P-value
Average of family members falling ill in the last month	Mean	0.2	0.5	0.3	0.000
	SD	0.4	0.5		

Number of visits to hospital in the last month	Mean	0.3	0.8	0.5	0.000
	SD	0.7	1.0		

The results show in table 5 the average illness and number of visits to hospital for treatment of the household members of both groups (Loan recipients & non loan recipients). The mean for non-loan recipients is greater in both the cases and statistically significant at .000 level . It means that more members of non-recipient households fall ill as a result they had to visit hos-pital more time than the member of the loan recipient households. It also shows that health conditions of loan recipient households is healthier than non- recipients. These results are in consistent with the findings of Mahindra (2005) in which micro credit has positive impact on the health conditions of poor women.

Loan recipient's distribution by gender

Table 6: Gender Analysis of Loan – recipients

S.No	Gender	No.	%
1.	Male	133	93
2.	Female	10	7

This shows that females are either less interested or very few loans have been disbursed from micro credit program. Females should be encouraged to participate in the program. Female population in the rural areas have less job opportunities but female can initiate indoor enterprises by obtaining loans from micro credit program. This will generate income for female population to lessen the burden of house expenses.

Modelling effects of Micro Credit Program

Impact of micro credit program on fuel wood collection and living standard was estimated using equation 1 &2 described earlier.

Model for Fuel wood collection

Table 7 presents results of regression for fuelwood collection .The regression of fuel wood collection as dependent variable and amount of loan taken, household head education, number of total living rooms and house size as independent variables.

Table 7: Regression estimates of model for fuel wood collection

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	22.70	3.11		7.2	.000
Amount of Loan taken	-.18	.05	-.20	-3.5	.000
HH head education	-.71	.29	-.14	-2.4	.014

The above estimation result shows the relationship between dependent variable (Fuel wood collection) and independent variables (Amount of Loan taken & Educational level of House-hold head).The independent variables Amount of Loan and household head education has negative and significant relation with fuel wood collection.

Impact of Micro credit program on household living standard

This section gives model for the following indicators of household living standard.

Model for consumption on non-durable goods

For statistical analysis Regression were used for selecting monthly expenditures on non-durables as dependent variable while number of employees in the household, av-erage monthly profit form micro credit loan and total land size as independent varia-bles. The results are summarized in table 8.

Table 8: Regression model estimates of model for non-durable goods consumption

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3676.838	386.455		9.514	.000
Amount of Loan taken	.002	.007	.033	.369	.713
Average Monthly Profit	.051	.028	.160	1.787	.076
Total size of land	-152.471	104.220	-.123	-1.463	.146

The results in Table 8 shows that two independent variables i.e. amount of loan taken and average monthly profit has positive and insignificant relation with consumption on non-durable goods. Whereas total land size has negative and insignificant relation with consumption on non-durable goods. It means if there is an increase in the amount of loan and average profit expenditures on non-durable goods will also increase. The results show that the amount of loan has no effect on the consumption of non-durable goods.

Model for Household Education

For data analysis Regression statistical tool were used as taking total years of education of household as dependent variable and loan amount, average monthly profit and total land size as independent variable the results of which are shown in Table 9

Table 9: Regression estimates of model for Household Education

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	33.77	2.30		14.6	.000
Amount of Loan taken	3.79	1.25	.17	3.0	.003
Average Monthly Profit	.50	.29	.10	1.7	.090

Total size of land	-1.52	.70	-.12	-2.1	.033

The results in Table 9 show that loan amount has positive and significant relationship with household education. The relation of mean average of monthly profit has also positive and significant relation with the dependent variable. It means if loan amount and average monthly profit is increased household education years also increases. Land size has a negative and significant relation with household education. The members of households possessing large land size mostly depend upon agriculture for livelihoods and often less concentration on acquisition of education which may be the reason for negative relation in this case.

Impact on Housing Status

To measure the impact of micro credit program on the housing status of the households study used the multinomial regression model. The model is used, when the dependent variable is categorical with multiple categories. The multinomial logistic regression finds the relative preferences of different categories, given the set of Independent variables. By using multinomial logistic regression the housing status of loan recipient and non-recipients households is analyzed. Multinomial logistic model was estimated to analyze the impact of micro credit program on housing the results are given in table 10

Table 10: Estimates of multinomial regression

House Type		B	Std.	Wald	Df	Sig	Exp(B)	95% Confidence Interval for EXP(B)	
								Lower Bound	Upper Bound
Paved	**Intercept**	-5.666	1.235	21.036	1	.000			
	Total living room	.910	.250	13.269	1	.000	2.485	1.523	4.054
	[lo=]	-.322	.527	.374	1	.541	.725	.258	2.034
	[lo=]	0(b)	.	.	0			.	.
Thatched	**Intercept**	2.252	.706	10.188	1	.001			
	Total living room	-.970	.184	27.800	1	.000	.379	.264	.544
	[lo=]	1.045	.313	11.167	1	.001	2.844	1.541	5.249
	[lo=]	0(b)	.	.	0			.	.

Table 11: Model Fitting Criteria

Model	Model Fitting Criteria	Likelihood Ratio Tests			Pseudo R-Square
Intercept Only	-2 Log Likelihood	Chi-Square	df	Sig.	Mchadden
Final	60.466	99.363	4	.000	.189

The reference category used in multinomial logistic regression is ‘semi paved’. Two independent variables are number of living rooms and participant in micro creditPro-gram. The participation in micro credit program is dummy taking value 1 for the households participating in the micro credit

program. The top panel of table 6.6 compares preferences of 'paved' housing with the reference category. The coeffi-cient of variable total living rooms is positive indicating that preference of paved housing increase by increasing total living rooms. On the other hand the coefficient of loan 0 which is the value of dummy for non-recipients is negative, indicating that for the person taking no loan preference of paved housing decreases compared to semi paved. The second panel of the table compares preferences of thatched housing with the reference category. The coefficient of total living room variable is negative indicating that preference is thatched building by decreasing total living rooms. On the other hand the coefficient for non-recipient is positive indicating that for the person taking no loan, preference of thatched building increases compared to semi paved.

Conclusion and Recommendations

Conclusion

The results show that micro credit program has been successful in the efforts for conservation. Those who avail micro credit consume significantly small amount of fuel wood. The reduction in fuel wood collection reduces the deforestation, soil erosion and indoor air pollution. The reduction in deforestation has also positive impacts on the wildlife and efforts for conservation of wildlife.

On the other hand, micro credit also helps the recipients to improve their living standard. The results show that loan recipients have better standard of living in terms of education, health and consumption. The approximate value of assets is also high for loan recipients while land holding size is dominated by the non-recipients.

The education of household head , over all education , amount of loan taken , aver-age monthly profit from micro credit loan have a negative relation with fuel wood collection .While household size is positively related with fuel wood collection of the household. The land size possessed by the household has negative relation with fuel wood collection. However very few number of women have availed loan from the micro credit program which shows that the program has less contribution to-wards women employment of the area. Loans have been disbursed to on job people which could have been forwarded to local entrepreneurs seeking capital to start up a business.

Recommendations

Since the micro credit program is successful in conservation it is recommended that outreach and average disbursement should be increased. Increasing the outreach will mobilize more people to participate in the efforts for conservation. Women should also be encouraged like men to participate in the program. The program should focus on loan disbursement to unemployed youth planning to start a business.

Secondly, during the survey it was observed that many of the loans are consumed in the activities not related to income generation, which is declared purpose of taking loan. Therefore it is recommended that the monitoring of the loans should be made more stringent and it should be insured that loan is consumed for the declared purpose only.

Thirdly, the study finds that by declaring the area to be protected, the population of wildlife increased significantly therefore the areas where rare species are found could be protected to save wildlife and micro credit could be provided than as al-ternate livelihood option.

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