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Effectiveness of Micro-Credit Programs in Socio-Economic Development: A Study on Selected NGOs in Bangladesh

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Effectiveness of Micro-Credit Programs in Socio-Economic Development: A Study on Selected NGOs in Bangladesh

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Abstract- Non-governmental Organizations (NGOs) evolved in Bangladesh with the commitment of bringing positive social change and attaining balanced socio-economic development through the disbursement of micro-credit among the marginal people in society. The main intention of the study is to assess the impact of micro-credit on the overall socio-economic development of micro-credit receivers. The Chi-square ($\chi 2$) and Multinomial Logistic Regression techniques have applied on primary data collected from 260 beneficiaries of micro-credit of ASA and BRAC NGOs in the Mymensingh district of Bangladesh. The χ^2 analysis shows that the amount of micro-credit taken has a significant positive impact on respondents' type of home, sanitation facilities, ownership of other household assets, health service received, yearly income, expenditure, and savings, and participation in family's decision making, whereas an insignificant relationship is observed for occupational status, children education, ownership of land and livestock, sources of drinking water, economic solvency, and social status of the respondents. The results of multinomial logistic regression revealed that the micro-credit programs of NGOs played a significant role in marginal socio-economic development than the adequate and safe socio-economic development of micro-credit receivers in the study area. In this respect, to ascertaining desired socio-economic development in the rural area of Bangladesh, NGOs should be given priority on creating jobs or self-employment, monitoring proper use of micro-credit, women empowerment, arranging training and awareness programs on different social issues including education and health among the micro-credit receivers through establishing appropriate coordination among the various NGOs working in a locality regarding their programs, policies and service delivery mechanism.

Keywords: micro credit, socio-economic development, NGOs, and Bangladesh.

I. Introduction

NGOs are those organizations, which are involved in the development or welfare-oriented activities (Begum, Zaman and Khan, 2004). NGOs are engaged with the different development projects at the grass-root level. It is an association organized voluntarily through the initiative of dedicated persons committed to well being of the society. NGOs, although work outside the government structure but are within the legal framework of the country (Rahman, 1993 cited by Begum, Zaman and Khan, 2004). As third sector at present NGOs have come forward to provide social services to people of this country. It has achieved greater success in the case of developing the socio-economic condition in remote rural areas. The main aim of NGOs is to flourish the socio-economic situation, becoming very close to the government, and working as a service provider besides the government. Sometimes, many government departments hire NGOs to deliver their services (Islam, 2016). This sector in Bangladesh is an inseparable part of society. NGOs universally recognized for their exceptional ability to reach the grassroots. (Haider, 2013)

Bangladesh is an agricultural country where agriculture sector plays a vital role in augmenting economic growth. According to Food and Agriculture Organization (FAO), per capita arable land was 11.90 decimals in the year 2015 which is decreasing gradually with the increase of population and other use of agricultural land for different purposes like industrialization, urbanization, development works of government, etc. With this increased population, the country has also been facing massive challenges of feeding them or even to support their livelihood sustainably (Hassan and Forhad, 2013). On the other hand, this rural agro-based country, unfortunately, has failed to create rewarding employment opportunities for its vast population. Considering these overall situations, the NGOs are working on poverty eradication by directly involving the poverty-stricken inhabitants (Roy, Raquib and Sarker, 2017).

NGOs are evolved in Bangladesh with the commitment of positive social change through the implementation of their effective micro-credit program among the poor and marginal people of the society. NGOs work with those people who are mostly hardcore poor and who have hardly access and opportunities for improving their living status and standards (Hassan and Forhad, 2013). It sometimes, as a part of civil society, almost capable of meeting the needs of poor people strengthening social development, and keeping a role to make a bridge between local people and government about their rights and claims (Hassan, 2015). Moreover,

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(Views and analyses expressed here are the authors' own and do not necessarily reflect the views of the authors' institutions.)

NGOs usually create employment in two ways. First of all, they employ their organization since they also need human resources to operate. Secondly, through providing loans and management assistance to the individuals, it creates new employment opportunity (Begum, Zaman and Khan, 2004). Nowadays, NGOs are the main channel for catching the attention of both national and international donor agencies for Bangladesh. Additionally, international donors and agencies have been recognized NGOs as a fertile place for their development program (Islam, 2016).

The NGOs are involved with different functions like micro-credit/ micro-finance (Haider, 2013; Begum, Zaman, and Khan, 2004; Islam, Khatun, Hossain, and Alom, 2012; Hassan, 2015; Islam, 2016; Ramakrishna, 2013), healthcare (Haider, 2013; Begum, Zaman, and Khan, 2004; Hassan, 2015; and Islam, 2016), family planning (Haider, 2013), legal aid (Haider, 2013; Islam, Khatun, Hossain, and Alom, 2012), non-formal education (Haider, 2013; Islam, Khatun, Hossain, and Alom, 2012; Begum, Zaman, and Khan, 2004; Hassan, 2015, Kumari, 2013), nursery development (Islam, Khatun, Hossain, and Alom, 2012; Begum, Zaman, and Khan, 2004), entrepreneurship development (Islam, Khatun, Hossain, and Alom, 2012; Ramakrishna, 2013), handicraft (Begum, Zaman, and Khan, 2004), agricultural extension (Islam, 2016), human rights (Islam, 2016), mobilize of resources (Kumari, 2013), fisheries, livestock and poultry (Hossain and Mijan, 2018), etc. Among them, micro-credit is the important one, and it also boosts up other functions because of smooth operations of many of these functions directly linked with funding. Micro-credit can play an important role in positive changes in socio-economic development by creating the facility of funding. So the present study is an attempt to assess the role of micro-credit for the socio-economic development of rural people in Bangladesh.

II. Literature Review

Some of the vital studies that have reviewed under different perspectives of NGOs are presented below by placing the most recent at first.

Debnath, Rahman, Acharjee, Latif, and Wang (2019) tried to identify the determinants of microcredit accessibility by rural women households and its impact on rural women empowerment in Bangladesh by applying descriptive statistics and binary logistic regression techniques on collected primary data. The study observed an inverse relationship between annual income and accessibility to the microcredit program. In contrast, a significant positive relationship observed between family size and accessibility to the microcredit program. The study also found a positive and significant impact of microcredit on augmenting women empowerment. It recommended to review loan products by putting more emphasis on higher income group women by the micro-credit providers in Bangladesh.

Huque (2017) critically explored the effectiveness of micro-credit programs for urban women in Bangladesh based on the qualitative approach. The study observed that economic empowerment and involvement in the decision-making process tremendously brought some positive transformation in the urban lives of the women with the help of the micro-credit program of NGOs in Dhaka city.

Roy, Raquib, and Sarker (2017) claimed that NGOs played a crucial role in attaining sustainable economic growth and socio-economic development in Bangladesh through the disbursement of microcredit among the poor segment of the society. It also creates awareness, organizes marginal people in society, and makes them development-oriented.

Khan and Rahman (2016) using the logistic regression techniques found that the factors like age, marital status, number of children living in the household, place of residence, geographical location, education, partner's education, and the wealth index are leading to women for involvement in economic activities in Bangladesh. The study claimed that women's participation in economic activities and NGO activities have a positive impact on family, community, and country levels.

Gamage, Kuruppuge, and Nedelea (2016) made an effort to find out the socio-economic determinants of the well-being of urban households in Sri-Lanka using descriptive statistics and logistic regression techniques. The study explored that the savings with the formal financial sector, participation in the community activities, and network with the outside community have a positive and significant effect on the well-being of households.

Roy and Biswas (2016) explored the role of microcredit on education in Bangladesh by applying the chi-square test and binary logistic regression analysis on collected primary data. The finding of the study was that microfinance positively creates an impact on the education of Bangladesh through the reduction of drop-out possibility.

Alam, Hamid, and Roy (2015) tried to investigate the role of microcredit in enhancing women empowerment in the south-west region of Bangladesh by using the Cumulative Empowerment Index (CEI) and multiple linear regression model on collected data from 80 microcredit takers and 80 non-microcredit takers. Based on CEI, the study found that the microcredit taker women are economically more empowered than the non-microcredit taker women and based on multiple linear regression model, the study explored that, contribution to household income, monthly investment, and the new addition to asset ownership of the respondents have a statistically significant effect on women empowerment. Though women empowerment

status regarding microcredit taking produced a statistically insignificant result, the study identified positive impact on the economic empowerment of women in the study area.

Islam, Ahmed, and Alam (2014) examined the impact of micro-credit on the empowerment of rural women in Bangladesh by applying OLS (Ordinary Least Square) regression analysis on collected primary data and found that microcredit program positively associated with women's economic decision making, household decision making, freedom of physical movement, ownership of property, and political and social awareness.

Slathia, Nain, Sharma, Ali, Chahal, and Kumar (2014) claimed that the micro-credit programs of NGOs for small farmers, education and health services, rural women empowerment, etc. have contributed to enhancing the socio-economic status of micro-credit receivers in India.

Haidar (2013) studied to examine the impact of NGOs on the socio-economic situation of the poor in Bangladesh and by employing Chi-square technique on primary data observed that the socio-economic circumstance of the poor in both urban and rural area has developed through the implementation of different types of socio-economic programs by the NGOs.

Khatun, Islam, and Majumder (2012) examined the impact of micro-credit on poverty alleviation in Bangladesh using binary logistic regression and multinomial logistic regression analysis. The study found that the micro-credit receivers were able to alleviate their poverty through the proper use of loan of NGOs.

Islam, Khatun, and Alom (2012) tried to evaluate the micro-credit programs of BRAC, Grameen Bank, PROSHIKA, ASA, SSS, and TMSS by applying logistic regression model on collected primary data from micro-credit receivers and found that NGO membership, amount of loan taken and experience of poverty alleviation are the three significant determinants of micro-credit programs for reducing poverty in the study area.

Ahsan (2005) evaluated the impact of micro-credit of ASA, BRAC, and Grameen Bank to reduce poverty in Bangladesh. The study explored that NGOs have contributed a positive and significant role in reducing poverty by providing micro-credit among poor people. The study claimed that by receiving micro-credit, creditors have been able to engage with income-generating activities that help to increase rural employment and rapidly reduce rural poverty in the study area.

Rahman (2005) tried to find the dynamics of NGOs in Pakistan and observed that NGOs are growing in both number and size as the third sector of society through the contribution in poverty alleviation, rural development, and policy advocacy in the field of the environment through the implementation of microcredit programs. The author mentioned those socio-economic indicators of Pakistan are little appreciable and require NGOs' involvement in social welfare and development.

Bennett (1998) explored the role of NGOs in rural development of Pakistan. The study mentioned that NGOs are playing a crucial role, especially for agricultural development, through successful cooperation with local communities and government.

The reviewed literature in the study provides a idea that all over the world NGOs involve with different developmental activities, and there are thousands number of researches have conducted on distinct topics of NGOs like poverty alleviation, women empowerment, education, micro-credit, etc. As micro-credit works as a backup of all other socio-economic development functions so in this paper, the researchers deal with the role of micro-credit in the socio-economic development of the loan receivers. Since several NGOs are conducting micro-credit activities in the Mymensingh district of Bangladesh, researchers of the study are interested in exploring the role of microcredit in the socio-economic development of loan receivers in the study area.

III. Rationale of the Study

Poverty in Bangladesh has declined remarkably, and the international institutions recognized the progress in poverty alleviation. For poverty eradication in Bangladesh, it is necessary for the expansion of loan amount and loan activities, and in many cases, NGOs (micro-credit programs) are more successful in some aspects of development where the government is playing a secondary role (Begum, Zaman and Khan, 2004). NGOs are evolved in Bangladesh with the commitment of positive social change through the implementation of their effective micro-credit program among the poor and marginal people of the society. The micro-credit programs have played a crucial role in creating self-employment among the rural unemployed men and women by providing a small amount of capital to invest in cultivation, fisheries, poultry business, handicrafts, cottage industry, etc. The study evaluates the impact of micro-credit programs in the socio-economic progress of the loan receivers in the Mymensingh district of Bangladesh through the comparison of their development of before and after involving with NGOs. The endeavor of the study is to identify the real scenario of the role of micro-credit in the balanced socio-economic development in the study area. The study will add value in the field of NGO and micro-credit with the contemporary literature. Moreover, from the findings of the study, policy planners also will get guidelines about the amount of loan amount which facilitates the loan receivers.

IV. The Objective of the Study

The core objective of the study is to explore the role of micro-credit in the socio-economic development of Bangladesh. To attain the main goal following specific objectives are set out-

i. to explore the role of micro-credit in the socio-economic development of the micro-credit receivers in Bangladesh, and
ii. to give some potential recommendations for increasing the effectiveness of micro-credit for socio-economic development.

V. The Methodology of the Study

The study deals with the role of micro-credit in the socio-economic development of the loan receivers. In this regard, the study mainly based on primary data. A total of 260 repondents were selected from ASA and BRAC by simple random sampling technique. A survey conducted on the 260 (130 from ASA and 130 from BRAC) loan receivers from 13 Upazila of Mymensingh district of Bangladesh trough structured interview. Collected data have processed through SPSS (Statistical Packages for the Social Sciences), Version-20.0. The study employed statistical tools like Chi-square (χ^2) test and Multinomial Logistic Regression Model for examining the role of micro-credit in the socio-economic development of the Mymensingh district of Bangladesh.

a) Chi-square (χ^2) test

The χ^2 test is one of the simplest nonparametric tests in statistics that applies to compare more than two variables for a randomly selected data. The expected frequencies are calculated based on the conditions of the null hypothesis. The rejection of the null hypothesis depends on the differences in actual value and expected value. The formula for computing χ^2 is-

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

with (r-1)(c-1) degrees of freedom.

Where, O is the observed frequency, E is the expected frequency, r is the number of rows, and c is the number of columns. The greater the value of χ^2, the larger would be the discrepancy between observed and expected frequencies. If the calculated value of χ^2 is greater than the table value, the difference between the theory and observation is considered to be significant. On the other hand, if the calculated value of χ^2 is less than the table value, the difference between the theory and observation is not considered significant or, p-value is ≤ 0.05, null hypothesis rejected, otherwise accepted. (Gupta and Gupta, 2008-2009). In this study, the χ^2 has applied on the data of after joining NGOs, to identify and analyze the association of independent variable (amount of loan taken) and the selected socio-economic development indicator variables.

b) Multinomial Logistic Regression Model

The study has made an effort to find out the role of micro-credit in the socio-economic development of the loan receivers by considering socio-economic development as a dependent variable and name of the NGOs, amount of loan taken, involvement period with NGOs and number of earning family members as the predictors. The socio-economic development has measured by constructing a socio-economic development index (SEDI) by combining the development of the respondents' socio-economic variables after involving with NGOs, like- the occupation of respondents, the role of NGOs on respondents' children education, ownership of land, type of home, sanitation facilities, sources of drinking water, ownership of livestock, ownership of other household assets, health service received, yearly income, yearly expenditure, yearly savings, participation in family's decision making, economic solvency, social status of the respondents. The SEDI has coded into three categories, viz marginal socio-economic development (1), adequate socio-economic development (2), and safe socio-economic development (3). The respondents who got SEDI$\leq$5, 5$<$ SEDI$\leq$10, and SEDI$>$10 are marked as marginal socio-economic development, adequate socio-economic development, and safe socio-economic development, respectively. Since the dependent variable (Socio-economic Development) has divided into three categories, the study has employed a multinomial logistic regression model. The multinomial logistic regression model for a dependent variable with *J* categories suggests estimating *J-1* logit equations, where each equation is a linear function that models the logarithm of the probability of having a response *j* to a predetermined baseline category *J*. Hence, the study has developed the following two logit equations of the multinomial logistic regression model by considering safe socio-economic development (3) as the reference category.

The logit equation for marginal socio-economic development (1):

$$logit\ (Y_1) = \ln\left[\frac{P(Y=1|X)}{P(Y=3|X)}\right] = \beta_{13} + \sum_{k=1}^{K} \beta_{1k} X_k \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The logit equation for adequate socio-economic development (2):

$$logit\ (Y_2) = \ln\left[\frac{P(Y=2|X)}{P(Y=3|X)}\right] = \beta_{23} + \sum_{k=1}^{K} \beta_{2k} X_k \ \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where Y represents the dependent variable, X_k are the independent variables (predictors) with $k = 1, 2, \cdots$, K and β_k are the logit coefficients. In the study, the results of the multinomial logistic regression model has interpreted in terms of predicted probability computing from the corresponding estimated coefficients.

VI. Analyses and Interpretation of the Estimated Results

a) Chi-square (χ^2) test

A Chi-square test is applied to find out the impact of micro-credit in terms of the loan amount on socio-economic development indicators. Among the 260 respondents, 44.20 percent, 45.80 percent, and 10.00 percent have taken loans from NGOs within the range of below 1 lakh, 1 lakh to 5 lakhs, and ≥ 5 lakhs, respectively. The results of the χ^2 test are interpeted as follows-

Table No. 1: Respondents Occupational Status by Amount of Loan Taken

		Occupational Status						Total
	Category	Job	Business	Cultivator	Housewife	Day laborer	Others	
Amount of Loan Taken	Below 1 Lakh	4 (3.50) (40.00)	7 (6.10) (36.80)	3 (2.60) (37.50)	87 (75.70) (45.30)	5 (4.3) (45.5)	9 (7.80) (45.00)	115 (100) (44.20)
	1-5 Lakhs	5 (4.20) (50.00)	9 (7.60) (47.40)	5 (4.20) (62.50)	86 (72.30) (44.80)	4 (3.40) (36.40)	10 (8.40) (50.00)	119 (100) (45.80)
	≥ 5 Lakhs	1 (3.80) (10.00)	3 (11.50) (15.80)	0 (0.00) (0.00)	19 (73.10) (9.90)	2 (7.70) (18.20)	1(3.80) (5.00)	26 (100) (10)
	Total	10 (3.80) (100)	19 (7.30) (100)	8 (3.10) (100)	192 (73.80) (100)	11 (4.20) (100)	20 (7.70) (100)	260 (100) (100)
$\chi^2 = 4.0$					df = 10		Significance = 0.94	

Source: Authors' calculation from survey data

Note: Figures in the parentheses denote percentage to the total

Table No. 1 shows the occupational status of the respondents by the total amount of loan taken. Among the 260 respondents, 3.80 percent are job holders, 7.30 percent businessman, 3.10 percent Cultivator, 73.80 percent housewife, 4.20 percent day laborer, and 7.70 percent engaged with other professions. From the analysis insignificant relationship found between occupational status and total amount of loan taken, i.e., χ^2 (df = 10, N = 260) = 4.0, p = 0.94. It indicates the total amount of loan taken has no significant positive impact on respondents' occupational status.

Table No. 2: Role of NGO on Child Education by Amount of Loan Taken

		Role of NGO on Child Education		Total
	Category	No	Yes	
Amount of Loan Taken	Below 1 lakh	29 (25.20) (46.80)	86 (74.80) (43.40)	115 (100) (44.20)
	1-5 lakhs	28 (23.50) (45.20)	91 (76.50) (46.00)	119 (100) (45.80)
	≥ 5 lakhs	5 (19.20) (8.10)	21 (80.80) (10.60)	26 (100) (10.0)
	Total	62 (23.80) (100)	198 (76.20) (100)	260 (100) (100)
$\chi^2 = 0.43$		df = 2		Significance = 0.80

Source: Authors' calculation from survey data

Note: Figures in the parentheses denote percentage to the total

Table No. 2 depicts the role of NGOs on child education by the total amount of loan taken. Among the 260 respondents, 76.20 percent agreed that NGOs have a positive role in child education, where 23.80 percent not agreed regarding the issue. From the analysis insignificant relationship found between role of NGOs on child education and amount of loan taken, i.e., χ^2 (df= 2, N = 260) = 0.43, p = 0.80.

Table No. 3: Ownership of Land by Amount of Loan Taken

		Ownership of Land			Total
	Category	0-10 Decimal	10-20 Decimal	≥20 Decimal	
Amount of Loan Taken	Below 1 lakh	57 (49.60) (51.60)	31 (27.00) (39.70)	27 (23.50) (60.00)	115 (100) (44.20)
	1-5 lakhs	64 (53.80) (46.70)	39 (32.80) (50.00)	16 (13.40) (35.60)	119 (100) (45.80)
	≥ 5 lakhs	15 (61.50) (11.70)	8 (30.80) (10.30)	2 (7.70) (4.40)	26 (100) (10.00)
	Total	137 (52.70) (100)	78 (30.00) (100)	45 (17.30) (100)	260 (100) (100)
$\chi^2 = 6.24$			df = 4	Significance = 0.18	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 3 discloses the ownership of land by the amount of loan taken. Among the 260 respondents, 52.70 percent, 30.00 percent, and 17.30 percent hold land ownership within 0-10 decimal, 10-20 decimal, and ≥20 decimal, respectively. The analysis reve aled insignificant relationship between ownership of land and amount of loan taken, i.e., χ^2 (df = 4, N = 260) = 6.24, p = 0.18.

Table No. 4: Type of Home by Amount of Loan Taken

		Type of Home			Total
	Category	Kacha	Adha Pacca	Pacca	
Amount of Loan Taken	Below 1 lakh	66 (57.40) (49.30)	26 (22.60) (33.30)	23 (20.00) (47.90)	115 (100) (44.20)
	1-5 lakhs	64 (53.80) (47.8)	38 (31.90) (48.70)	17 (14.30) (35.40)	119 (100) (45.80)
	≥ 5 lakhs	4 (15.40) (3.00)	14 (53.80) (17.90)	8 (30.80) (16.70)	26 (100) (10.0)
	Total	134 (51.5) (100)	78 (30.00) (100)	48 (18.50) (100)	260 (100) (100)
$\chi^2 = 18.05$			df = 4	Significance = 0.00	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 4 shows the type of home by the amount of loan taken. Among the 260 respondents, 51.50 percent, 30.00 percent, and 18.50 percent were lived in *kacha, adhapacca,* and *pacca* house, respectively. The analysis revealed highly significant relationship between type of home and amount of loan taken, i.e., χ^2 (df = 4, N = 260) = 18.05, p = 0.00.

Table No. 5: Sanitation Facilities by Amount of Loan Taken

		Sanitation Facilities		Total
	Category	Kacha	Pacca	
Amount of Loan Taken	Below 1 lakh	48 (41.70) (42.10)	67 (58.30) (45.90)	115 (100) (44.20)
	1-5 lakhs	59 (49.60) (51.80)	60 (50.40) (41.90)	119 (100) (45.80)
	≥ 5 lakhs	7 (26.90) (6.10)	19 (73.10) (13.00)	26 (100) (10.0)
	Total	114 (43.80) (100)	146 (56.20) (100)	260 (100) (100)
$\chi^2 = 4.82$			df = 2	Significance = 0.09

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 5 shows the sanitation facilities by the amount of loan taken. Among the 260 respondents, 43.80 percent, and 56.20 percent used *kacha, and pacca* sanitation facilities. The analysis revealed significant relationship between sanitation facilities and amount of loan taken, i.e., χ^2 (df = 2, N = 260) = 4.82, p = 0.09 at 10 percent level of significance.

Table No. 6: Sources of Drinking Water by Amount of Loan Taken

		Sources of Drinking Water		Total
	Category	Others	Tube-well	
Amount of Loan Taken	Below 1 lakh	3 (2.60) (100)	112 (97.40) (43.60)	115 (100) (44.20)
	1-5 lakhs	0 (0.00) (0.00)	119 (100) (27.60)	119 (100) (45.80)
	≥ 5 lakhs	0 (0.00) (0.00)	26 (100) (10.10)	26 (100) (10.0)
	Total	3 (1.2) (100)	257 (98.80) (100)	260 (100) (100)
$\chi^2 = 2.83$		df = 2	Significance = 0.15	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 6 depicts the sources of drinking water by the amount of loan taken. Among the 260 respondents, 98.8 percent and 1.20 percent used drinking water from tube-well and other sources, respectively. The analysis identified the insignificant relationship between sources of drinking water and amount of loan taken, i.e., χ^2 (df = 2, N = 260) = 2.83, p = 0.15.

Table No. 7: Ownership of Livestock by Amount of Loan Taken

		Ownership of Livestock			Total
	Category	0-20 Thousand	20-40 Thousand	≥40 Thousand	
Amount of Loan Taken	Below 1 lakh	54 (47.00) (40.30)	24 (20.90) (41.40)	26 (32.20) (54.40)	115 (100) (44.20)
	1-5 lakhs	67 (56.30) (50.00)	27 (27.70) (46.60)	25 (21.00) (36.80)	119 (100) (45.80)
	≥ 5 lakhs	13 (50.00) (9.70)	7 (26.90) (12.10)	6 (23.10) (8.80)	26 (100) (10.0)
	Total	134 (51.50) (100)	58 (22.30) (100)	68 (26.20) (100)	260 (100) (100)
$\chi^2 = 4.26$			df = 4	Significance = 0.37	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 7 shows the ownership of livestock by the amount of loan taken. Among the 260 respondents, 51.50 percent, 22.30 percent, and 26.20 percent retained the ownership of livestock within 0-20 thousand, 20-40 thousand and 20≥40 thousand, respectively. The analysis found insignificant relationship between ownership of livestock and amount of loan taken, i.e., χ^2 (df = 4, N = 260) = 4.26, p = 0.37.

Table No. 8: Other Household Assets by Amount of Loan Taken

		Other Household Assets			Total
	Category	0-20 Thousand	20-40 Thousand	≥40 Thousand	
Amount of Loan Taken	Below 1 lakh	48 (41.70) (52.20)	32(27.80) (37.70)	35 (30.40) (42.20)	115 (100) (44.20)
	1-5 lakhs	40 (33.60) (43.50)	43 (36.10) (50.60)	36 (30.30) (43.40)	119 (100) (45.80)
	≥ 5 lakhs	4 (15.40) (5.30)	10 (38.50) (11.80)	12 (46.20) (14.50)	26 (100) (10.0)
	Total	92 (35.40) (100)	85 (32.70) (100)	83 (31.90) (100)	260 (100) (100)
$\chi^2 = 7.72$			df = 4	Significance = 0.10	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 8 shows the other household assets by the amount of loan taken. Among the 260 respondents, 35.5 percent, 32.70 percent, and 31.90 percent kept up other household assets within 0-20 thousand, 20 - 40 thousand and ≥40 thousand, respectively. The analysis found significant relationship between other household assets and amount of loan taken i.e., χ^2 (df = 4, N = 260) = 7.72, p = 0.10. It indicates the amount of loan taken has a significant positive impact on other household assets of the respondents at a 10 percent level of significance.

Table No. 9: Respondents' Received Health Services by Amount of Loan Taken

		Health Services		Total
	Category	Unregistered Doctor	Registered Doctor	
Amount of Loan Taken	Below 1 lakh	30 (26.10) (56.60)	85 (73.90) (41.10)	115 (100) (44.20)
	1-5 lakhs	21 (17.60) (39.60)	98 (82.40) (47.30)	119 (100) (45.80)
	≥ 5 lakhs	2 (7.70) (3.80)	24 (92.30) (11.60)	26 (100) (10.0)
	Total	53 (20.40) (100)	207 (79.60) (100)	260 (100) (100)
$\chi^2 = 5.34$		df = 2	Significance = 0.07	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 9 shows the health services by the amount of loan taken. Among the 260 respondents, 79.60 percent and 20.4 percent received health services from registered and unregistered doctors, respectively. The analysis identified the significant relationship between health services and amount of loan taken, i.e., χ^2 (df = 2, N = 260) = 5.43, p = 0.07. It indicates the amount of loan taken has a significant positive impact on health services taken by the respondents at a 10 percent level of significance.

Table No. 10: Yearly Income by Amount of Loan Taken

		Yearly Income			Total
	Category	Below 50 Thousand	50-100 Thousand	≥100 Thousand	
Amount of Loan Taken	Below 1 lakh	21 (18.30) (63.60)	34 (29.60) (45.30)	60 (55.20) (39.50)	115 (100) (44.20)
	1-5 lakhs	12 (10.10) (36.40)	37 (31.10) (49.30)	10 (58.80) (46.10)	119 (100) (45.80)
	≥ 5 lakhs	0 (0.00) (0.00)	4 (15.40) (5.30)	22 (86.60) (14.50)	26 (100) (10.0)
	Total	33 (12.70) (100)	75 (28.80) (100)	152 (58.50) (100)	260 (100) (100)
$\chi^2 = 12.43$		df = 4		Significance = 0.01	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 10 discloses the yearly income of the respondents' by the amount of loan taken. Among the 260 respondents, 12.70 percent, 28.80 percent, and 58.50 percent generated yearly income within 0-50 thousand, 50-100 thousand, and ≥100 thousand, respectively. The analysis revealed significant relationship between yearly income and amount of loan taken, i.e., $\chi 2$ (df = 4, N = 260) = 12.43, p = 0.01. It indicates the amount of loan taken has a significant positive impact on the yearly income of the respondents.

Table No. 11: Yearly Expenditure by Amount of Loan Taken

		Yearly Expenditure			Total
	Category	Below 40 Thousand	40-80 Thousand	≥80 Thousand	
Amount of Loan Taken	Below 1 lakh	21 (18.30) (63.60)	35 (39.90) (41.10)	59 (47.80) (41.70)	115 (100) (44.20)
	1-5 lakhs	12 (10.10) (36.40)	48 (40.30) (50.50)	59 (49.60) (44.40)	119 (100) (45.80)
	≥ 5 lakhs	0 (0.00) (0.00)	8 (30.80) (8.40)	18 (69.20) (13.60)	26 (100) (10.0)
	Total	33 (12.70) (100)	95 (36.50) (100)	132 (50.80) (100)	260 (100) (100)
$\chi^2 = 9.65$		df = 4		Significance = 0.05	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 11 discloses yearly expenditure of the respondents' by the amount of loan taken. Among the 260 respondents, 12.70 percent, 36.50 percent, and 50.80 percent yearly expend within 0-40 thousand, 40-80 thousand, and ≥80 thousand, respectively. The analysis revealed significant relationship between yearly expenditure of the respondents' and amount of loan taken, i.e., χ^2 (df = 4, N = 260) = 9.65, p = 0.05. It indicates the amount of loan taken has a significant positive impact on the yearly expenditure of the respondents.

Table No. 12: Yearly Savings by Amount of Loan Taken

		Yearly Savings			Total
	Category	Below 10 Thousand	10-20 Thousand	≥ 20 Thousand	
Amount of Loan Taken	Below 1 lakh	42 (36.50) (56.00)	39 (39.90) (36.80)	34 (29.60) (43.00)	115 (100) (44.20)
	1-5 lakhs	31 (26.10) (41.30)	57 (47.90) (53.80)	31 (26.10) (29.20)	119 (100) (45.80)
	≥ 5 lakhs	2 (7.70) (2.70)	10 (38.50) (9.40)	14 (53.80) (17.70)	26 (100) (10.0)
	Total	75 (28.8) (100)	106 (40.80) (100)	79 (30.40) (100)	260 (100) (100)
$\chi^2 = 15.02$			df = 4	Significance = 0.00	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 12 expresses the yearly savings of the respondents by the amount of loan taken. Among the 260 respondents, 28.8 percent, 40.80 percent, and 30.40 percent yearly saved within 0-10 thousand, 10-20 thousand, and ≥20 thousand, respectively. The analysis revealed a highly significant relationship between yearly savings of the respondents and the amount of loan taken, i.e., χ^2 (df= 4, N = 260) = 15.02, p = 0.00. It indicates the amount of loan taken has a significant positive impact on the yearly savings of the respondents.

Table No. 13: Participation in Family's Decision Making by Amount of Loan Taken

		Participation in Family's Decision Making		Total
	Category	No	Yes	
Amount of Loan Taken	Below 1 lakh	4 (3.50) (28.60)	111 (96.50) (45.10)	115 (100) (44.20)
	1-5 lakhs	10 (8.40) (71.40)	109 (96.60) (44.30)	119 (100) (45.80)
	≥ 5 lakhs	0 (0.00) (0.00)	26 (100) (10.6)	26 (100) (10.0)
	Total	14 (5.40) (100)	246 (94.60) (100)	260 (100) (100)
$\chi^2 = 4.43$		df = 2	Significance = 0.10	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 13 displays respondents' participation in the family's decision making by the amount of loan taken. Among the 260 respondents, 94.6 percent agreed that they are participating in the family's decision making where 5.40 percent disagreed regarding the issue. The analysis found significant relationship between respondents' participation in the family's decision making and amount of loan taken, i.e., χ^2 (df = 2, N = 260) = 4.43, p = 0.10. It indicates the amount of loan taken has a significant positive impact on respondents' participation in family's decision making at a 10 percent level of significance.

Table No. 14: Economic Solvency by Amount of Loan Taken

		Economic Solvency		Total
	Category	No	Yes	
Amount of Loan Taken	Below 1 lakh	1 (0.90) (25.00)	114 (99.10) (44.50)	115 (100) (44.20)
	1-5 lakhs	3 (2.50) (75.00)	116 (97.50) (45.30)	119 (100) (45.80)
	≥ 5 lakhs	0 (0.00)	26 (100)	26 (100)
		(0.00)	(10.20)	(10.0)

	Total	4 (1.50) (100)	256 (98.50) (100)	260 (100) (100)
$\chi^2 = 1.50$		df = 2	Significance = 0.47	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 14 depicts respondents' economic solvency by the amount of loan taken. Among the 260 respondents, 98.50 percent agreed that they are economically solvent after taking loans from NGOs, where only 1.50 percent disagree regarding the issue. The analysis identified insignificant relationship between respondents' economic solvency and amount of loan taken, i.e., χ^2 (df = 2, N = 260) = 1.50, p = 0.47. It indicates the amount of loan taken has no significant positive impact on respondents' economic solvency.

Table No. 15: Respondents' Social Status by Amount of Loan Taken

		Respondents' Social Status				Total
	Category	Not Increased	Increased Financial Solvency	Increased Employment Facilities	Increased Empowerment	
Amount of Loan Taken	Below 1 lakh	2 (1.70) (66.70)	96 (83.5) (44.40)	14 (12.20) (41.20)	3 (2.60) (42.90)	115 (100) (44.20)
	1-5 lakhs	1 (0.80) (33.30)	99 (83.20) (45.80)	15 (12.60) (44.10)	4 (3.40) (57.10)	119 (100) (45.80)
	≥ 5 lakhs	0 (0.00) (0.00)	21 (80.80) (9.70)	5 (19.20) (14.70)	0 (0.00) (0.00)	26 (100) (10.0)
	Total	3 (1.20) (100)	216 (83.10) (100)	34 (13.10) (100)	7 (2.70) (100)	260 (100) (100)
$\chi^2 = 2.51$				df = 6	Significance = 0.87	

Source: Authors' calculation from survey data
Note: Figures in the parentheses denote percentage to the total

Table No. 15 depicts the respondents' social by the amount of loan taken. Among the 260 respondents, 83.10%, 13.10%, and 2.70% said that increased financial solvency, increased employment facilities, and increased empowerment respectively, where only 1.20% claimed that their social status do not increase with the involvement with NGO. From the analysis insignificant relationship found between respondents' social status and amount of loan taken, i.e., $\chi 2$ (df = 6, N = 260) = 2.51, p = 0.87. It indicates the amount of loan taken has no significant positive impact on respondents' social status.

b) Multinomial Logistic Regression Analysis

This section analyses the estimated result of the Multinomial Logistic Regression Model for socio-economic development. The results are presented in table no. 16 and table no. 17.

Table No. 16: Estimated Multinomial Logistic Regression Model for Socio-economic Development

Odds	Variables	Coefficients	Standard Error	Wald Statistic	P-Value	Odds Ratio
$\frac{P(Yi = Marginal\ Socio-economic\ Development)}{P(Yi = Safe\ Socio-economic\ Development)}$	Intercept	-1.93	0.96	4.03	0.04	
	Name of NGOs:					
	ASA	-0.76	0.42	3.29	0.07	0.47
	BRAC (r)					1.00
	Amount of Loan:					
	Below 1 Lakh	2.53	0.99	6.57	0.01	12.58
	1 Lakh - 5 Lakhs	1.96	0.89	4.84	0.03	7.09
	Above 5 Lakhs (r)					1.00
	Involvement Period with NGOs:					
	Below 5 Years	0.14	0.71	0.04	0.85	1.15
	5 Years - 10 Years	0.47	0.68	0.47	0.49	1.60
	Above 10 Years (r)					1.00
	Number of Earning Members in the Respondent's Family:					

	1 - 2 Members Above 2 Members (r)	1.18	0.50	5.65	0.02	3.26 1.00
$\frac{P(Yi = Adequate\ Socio-economic\ Development)}{P(Yi = Safe\ Socio-economic\ Development)}$	Intercept	-0.30	0.67	0.20	0.66	
	Name of NGOs:					
	ASA BRAC (r)	-0.13	0.39	0.11	0.74	0.88 1.00
	Amount of Loan:					
	Below 1 Lakh 1 Lakh - 5 Lakhs Above 5 Lakhs (r)	0.54 0.17	0.70 0.58	0.60 0.09	0.44 0.77	1.71 1.19 1.00
	Involvement Period with NGOs:					
	Below 5 Years 5 Years - 10 Years Above 10 Years (r)	0.44 0.61	0.63 0.61	0.49 1.02	0.48 0.31	1.55 1.85 1.00
	Number of Earning Members in the Respondent's Family:					
	1 - 2 Members Above 2 Members (r)	1.31	0.44	8.62	0.00	3.69 1.00

Source: Authors' calculation from survey data
Note: 'r' indicates the reference category

Table no. 16 displays the estimated results of the multinomial logistic regression model and helps to identify the significant determinants of the socio-economic development of the loan receivers. The results show that the type of NGOs, amount of loan, and number of earning members in the respondents' family are significant determinant for marginal socio-economic development comparing to safe socio-economic development. But only the number of earning members in the respondents' family is the significant determinant for adequate socio-economic development comparing to safe socio-economic development. However, the study calculates predicted probability for the socio-economic development of the loan receiver corresponding to the estimated coefficients of the multinomial logistic regression model based on the reference respondents' categories. The results of the predicted probabilities in percentages are shown in the following table no. 17.

Table No. 17: Predicted Probabilities (Percentage) for Degree of Change in Socio-economic Development from Multinomial Logistic Regression Model

Variables	Marginal Socio-economic Development	Adequate Socio-economic Development	Safe Socio-economic Development (r)
Name of NGOs: ASA BRAC (r)	3.93 92.74	38.00 7.03	58.08 0.23
Amount of Loan: Below 1 Lakh 1 Lakh – 5 Lakhs Above 5 Lakhs (r)	 44.42 99.33 92.74	 31.15 0.40 7.03	 24.43 0.27 0.23
Involvement Period with NGOs: Below 5 Years 5 Years – 10 Years Above 10 Years (r)	 7.14 8.91 92.74	 49.78 81.64 7.03	 43.08 9.44 0.23
Number of Earning Members in the Respondent's Family: 1 – 2 Members Above 2 Members (r)	 11.19 92.74	 65.09 7.03	 23.73 0.23

Source: Authors' estimation from the result of the Multinomial Logistic Regression Model.
Note: 'r' indicates the reference category.

Respondents from BRAC, amount of loan above 5 Lakhs, involvement period with NGOs above 10 years, and more than 2 earning members in the respondent's family are considering as the reference respondents for estimating the multinomial logistic regression model in the study. The estimated probabilities in table no.17 reveal that reference respondents have an estimated 92.74 percent, 7.03 percent, and 0.23 percent probability of marginal socio-economic development, adequate socio-economic development, and safe socio-economic development, respectively. The estimated probabilities of the multinomial logistic regression model show that the different NGOs have significant impacts on socio-economic development. The study found a 3.93 percent decrease in the probabilities of respondents having marginal socio-economic development if the respondents belong to ASA. As compared to the BRAC, the respondents from ASA having adequate and safe socio-economic development have a substantial 30.97 percent and 58.57 percent point increase in the probability of adequate and safe socio-economic development, respectively.

The study found a significant impact of the loan amount on the socio-economic development of the respondents. The probability of respondents having marginal socio-economic development increases if the respondents receive loan more BDT1 Lakh to BDT5 Lakhs and decrease if the loan amount is below BDT1 Lakh. In contrast, the study observed that the probability of adequate and safe socio-economic development decreases with the increase in loan amount that indicates micro-credit play an crucial role in marginal socio-economic development than that of adequate and safe socio-economic development. The involvement period with NGOs is a key factor in understanding the impact of micro-credit on socio-economic development. The study found that the probability of marginal socio-economic development increases with the increase in involvement period with NGOs. The probability of respondents having adequate and safe socio-economic development largely increased by 74.23 percent points and 24.20 percent points if the respondents involve with NGOs 5 years to 10 years and below 5 years, respectively. The study also explored that the probability of marginal development increases with the increase in the number of earning members in the respondent's family. The respondents having adequate and safe socio-economic development have the probability of adequate and safe socio-economic development are 65.09 percent and 23.73 percent, if the number of earning members in the respondent's family is less than 2 members.

From the analysis of the estimated probabilities of the multinomial logistic regression model, the study finally observed that micro-credit program has a profound impact in marginal socio-economic development than the adequate and safe socio-economic development with the increase in the loan amount, involvement period with NGOs and increased number earning members in the micro-credit receiver's family.

VII. Conclusion and Recommendations

The main intention of the study is to diagnose the impact of micro-credit on the socio-economic development of the loan receivers involved with ASA and BRAC. Based on the χ^2 analysis the article explored that the total amount of micro-credit has a significant positive impact on respondents' type of home, sanitation facilities, ownership of other household assets, health service received, yearly income, yearly expenditure, yearly saving, and participation in family's decision making, whereas an insignificant relationship is observed on respondents' occupational status, children education, ownership of land, sources of drinking water, ownership of livestock, economic solvency, and social status. The application of multinomial logistic regression model found that the type of NGOs, amount of loan and number of earning members in the respondents' family are significant determinants for marginal socio-economic development comparing to safe socio-economic development. In contrast, the number of earning members in the respondents' family is only the significant determinants for adequate socio-economic development comparing to safe socio-economic development. From the estimated probabilities of multinomial logistic regression, the study finally detected that the micro-credit program has a greater role in marginal socio-economic development than the adequate and safe socio-economic development of the micro-credit receivers.

Based on the findings, the study outlines the following recommendations-

To attain desired socio-economic development in the rural area of Bangladesh, NGOs should be given priority on creating jobs or self-employment, monitoring proper use of micro-credit, women empowerment, arranging training and awareness programs on different social issues including education and health issues among the respondents and also their family members.

Many respondents claimed that they do not get enough time between loan received and starting repayment. So the NGOs should allow reasonable time before starting repayment installments of the loans.

Most of the respondents claimed that the interest rate of micro-credit is too high. So the interest rate should be reduced as much as possible for the betterment of the micro-credit receivers that may lead to an increase in the number of micro-credit receivers as well as increase the amount of disbursement of micro-credit.

Proper coordination should establish among various NGOs working in a locality regarding their programs, policies, and service delivery mechanism.

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