An Analysis of Influential Elements of Microcredit Repayment in Covid 19 Crisis: Evidence from Bangladesh

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Abstract

This study investigates the status of microcredit repayment due to the COVID-19 crisis in Bangladesh. The study inspects several socioeconomic factors to discover the probability of default and to avoid delinquency regarding repayments rate. This study focuses on 194 respondents from Bangladesh and apply logistic regression model for executing the analysis. It found several influencing variables from the analysis with significant differentiation that has effects on the microcredit repayments rate. From the predictors, household yearly income in the COVID-19 pandemic was the strongest predictor that was reported as an odds ratio of 1.620. Two other independent variables that made statistically unique significant contributions to the model are difficulty of COVID-19 and number of loans taken by the credit holder. Microcredit Regulations Authority (MRA) and the government of Bangladesh need to implement several policies in order to drive the difficulty of the financial crisis as well as to boost up the repayments rate in crisis periods.
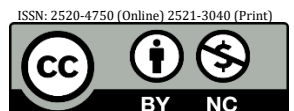
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Introduction
The well-known concept microcredit is a key factor of poverty reduction. Along with developing countries, some developed countries also adopt the models of microcredit to increase the living standard of their underdeveloped community. Microcredit lifts the economic and social position by providing financial assistance to the low-income generating people who are not able to deliver collateral for accessing formal financing (Bilau, 2018). It helps to promote the economic development of our country by enhancing social and financial inclusion in rural and urban slam areas. Total 599 microfinance institutions (MFLs) offer microcredit in Bangladesh. As the microfinance institutions are not profit-oriented the survival of these institutions is dependent on the repayment rate because a perfect level (100%) repayment rate attracts not only domestic funding but also funding from international donors.

From the beginning of 2020, due to Covid-19 crisis many people became workless and it resulting a decrease in microcredit repayment performance of the MFIs. The economy of Bangladesh along with the world was slowed down. Many microcredit borrowers in Bangladesh primarily engaged in agriculture, small business, and services experienced income losses due to lockdowns and other restrictions and the problem prolonged for more period of time. As a result, they struggled to generate sufficient income to repay their loans, leading to increased instances of default. Nearly 43% of surveyed microfinance borrowers reported difficulties in repaying loans due to reduced income during the COVID-19 crisis (Islam et al., 2021). The MFIs rescheduled their repayment frequency and redefined the loan classification for the pandemic situation.

The study tries to inspect the real conditions of the microcredit repayment due to the COVID-19 crisis and also identifies the predictors behind the default risk and determinants of repayments rate. In this research, we highlight the potential factors to analyze the impact of these on microcredit repayment whether it becomes default or full repayment. The study enclosed sixteen independent variables attributed under COVID-19 crisis, borrower characteristics, loan characteristics and external factors.

Literature Survey
Microcredit is a constructive financial issue for research work, especially for developing countries. The concept of microfinance was well-introduced about four to five decades ago and from then significant numbers of research works were done on this issue. Afroze (2014) inspected numerous loans' impact on microcredit repayment rate. The study said that microcredit repayment was hampered by multiple small loans those are taken by the respondents. Mahmud et al. (2019) examined the impact of monthly installment of microcredit on rural women's household expenditures of healthcare. The study result illustrated that monthly repayment habit is good for the borrowers because they increased both healthcare and lived consumption expenditure capacity to the household level.

As Microcredit is a widely accepted conventional lending-borrowing system in Bangladesh. This country is an affluent and reliable source of microcredit data. Many foreign researchers collected data from Bangladesh to conduct their research work. Khan and Dewan (2017) used household Level micro data of Bangladesh to explore the effect of informal loans on the repayment of microcredit. Godquin, (2004) comprehensively analyzed the repayment performance of MFIs of Bangladesh. The study concentrates on group lending to estimate the repayment performance and showed female borrowers had no significant contribution to repayment performance. The value of the productive household assets, self-employed farmers, and the number of landed relatives were positively, and the age of the group was negatively

related to repayment performance. Shahriar, (2016) studied on recently married women and explored that the women who experienced violence from their husbands did not repay their credit. Again, Shahriar (2020) found that women were more trustworthy than men and whatever the situation, they gave their best effort to repay the credit. Another study examined the impact of ownership of assets on microcredit repayment. The study employed data from repeat borrowers of BRAC, Bangladesh. The study got a positive relationship where unproductive assets reduce the probability of repayment and productive assets enhance the probability of repayment (White & Alam, 2013). Ravi (2014) analyzed the impact of cash patterns on repayment of Kerala and Uttar Pradesh in India. The result showed that repayment frequency was increased as income frequency increases and increasing repayment rate reduces savings capacity. Bilal and St-Pierre (2018) showed determinants of microcredit repayment performance are different for small borrowers of developing countries to small borrowers of European developed country. Another study gathered data only from women borrowers to find out the sources and determinants of microloan repayment in Tanzania. It demonstrated that interest rate, loan size, and duration of membership cannot explain microcredit repayment. Influencing factors were business skills, household size, number of incomes generating household members, Uses of loans, limited growth of the business (Tundui, 2013). Previous pieces of literature identify many variables affecting repayment performance. This study employed the best influential factors used by the researchers along with difficulty of Covid 19 to examine the impact of these variables on repayment in the Covit-19 crisis. Although the study is based on Covid 19 pandemic but from this research we can understand the impact of other unforeseen situations.

Methodology
Data comes from small borrowers who took microcredit from any MFIs in last three years. Before administering surveys, we ensure that survey instruments are well-designed, pilot-tested, and culturally appropriate for the target population. Data were assembled through face-to-face interviews with the respondents. No telephone interviews or online surveys were done for collecting data. Data were collected from four districts of the northern area of Bangladesh which are located in Rangpur division. Data enumerators visited the rural, semi-urban, and urban areas people who were keeping the microcredit of different MFIs. Before the interview, enumerators obtain consent from participants, explaining the purpose of the study, the voluntary nature of participation, and any potential risks or benefits involved. They provide examples or clarifications for complex questions to ensure respondent better understanding. Total 225 credit holders of different financial institutions were interviewed. The respondents were from various professions such as farmers, small businessman, day labor, mason, carpenter, and others. One respondent was taken from one household considered as a distinct family. Some respondents refused to answer all questions and finally 194 respondents' provided information was used for final analysis. A pilot survey was made for the experimental analysis of this research after preparing a primary questionnaire. The experimental analysis was done through various error corrections in the questionnaire and a final questionnaire was destined for the study. We write clear, concise, and unambiguous survey questions to minimize respondent confusion. There were three parts to the questionnaire; the first part was attributed by fundamental information and background of respondents which was covered by the demographic and socio-economic information regarding the respondents, the second part was enclosed by information regarding loans and repayment during the COVID-19 crisis which was covered by loan characteristics- loan size, repayment period, number of loans, interest rate, the purpose of the loan, and so on. The third part was encompassed by the influential factors in terms of repayment during the COVID-19 crisis.

Logistic regression is a versatile and powerful tool for modeling binary outcomes, making it a popular choice in various fields. The measurement of our dependent variable loan repayment status is whether the loan taker repay the full loan (without any delinquency) or not (partial repayment). Here loan repayment status is a categorical variable. This makes it ideal to use logistic regression for binary outcomes as the response variable has two categories. The binary logistic regression model for this study is-

$$Log (Y/1-Y) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \beta_{12}X_{12} + \beta_{13}X_{13} + \beta_{14}X_{14} + \beta_{15}X_{15} + \beta_{16}X_{16} + \varepsilon$$

The dependent variable Y is loan repayment status (LRS). If the credit holders repaid their full loan, the repayment status was denoted as 'full repayment'. And if the borrowers didn't repay the loan fully, the repayment status considered as 'default'. The binary number 1 was used for 'full repayment' and 0 for 'default'. Independent variables are X_1= Difficulty of Covid-19 (DCOV), X_2= Borrower's age (BA), X_3= Borrower's gender (BG), X_4= Level of education (LE), X_5= Marital status (MS), X_6= Household members (HM), X_7= Income generating member (IGM), X_8= Borrower's region (BR), X_9= Borrower's profession (BP), X_{10}= Borrower's socio-economic condition (BSC), X_{11}= Household yearly income (HYI-Average income of 2021 and 2022), X_{12}= Purpose of the loan (PL), X_{13}= Borrower's loan size (BLS), X_{14}= Interest rate (IR), X_{15}= Repayment cycle (RC), X_{16}= Number of loan (NL).

Results and Discussion

This study highlights the potential factors to present the impact of those variables on microcredit repayment. The model enclosed sixteen independent variables (difficulty of COVID-19, borrower's age, gender, level of education, marital status, household members, income generating member, region, profession, socio-economic condition, household yearly income, purpose of the loan, loan size, interest rate, repayment cycle, number of loan,) and the dependent variable is loan repayment status. From 194 credit holders 120 is defaulter and 74 fully repaid their loans.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Borrower's age	194	20	60	35.18	9.183
Level of education	194	0	13	9.08	2.112
Household members	194	1	5	1.86	.752
Income generating member	194	1	3	1.28	.483
Borrower's region	194	1	3	2.41	.830
Borrower's profession	194	0	4	3.05	1.201
Borrower's socio-economic condition	194	1	5	3.37	.806
Household income yearly	194	100000	400000	167567.01	66950.977
Purpose of the loan	194	1	4	2.57	1.067
Borrower's loan size	194	10000	150000	57664.95	31893.055
Interest rate	194	5	15	12.52	1.731
Repayment cycle	194	1	3	1.49	.853
Current loan number	194	1	4	1.53	.714
Valid N (list wise)	194				

The mean value of the borrower's age is 35.18 which are very high while the standard deviation of the age is 9.183. The mean and standard deviation of level of education are 9.08 and 2.112 respectively. Household members have mean value of 1.86 which is not very high and standard deviation of .752. The mean value of the income-generating member in the households is 1.28 which is very high while its standard deviation is .483. Borrower's region with 2.41 means most of the respondents live in semi urban areas. The mean and standard deviation of borrower's profession are 9.08 and 2.112 respectively. The mean value of the household yearly income in the households is 5.1942 or 510 percent which is very high while its standard deviation is .15765 or 15.77 percent. The mean of loan size is 4.6899. This value denotes the percentage of

loan size is 473 which are very high while its standard deviation is .25715 or 25.72 percent. The mean of interest rate is 12.52 percent which is very high while the standard deviation of the interest rate is 1.73 percent. The mean of the number of loans is 1.53 which is also very high while its standard deviation is 0.714.

Table 2: Model-fit Statistics

Omnibus Tests of Model Coefficients				
		chi-square	df	sig.
Step 1	Step	82.737	16	.000
	Block	82.737	16	.000
	Model	82.737	16	.000

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	8.489	8	.387

The omnibus tests of model coefficients x^2 (16, N = 194) = 82.737, P<.001, indicated that the model was significant and capable perfectly to differentiate the respondents who became defaulters and became fully repayment performers. From the Hosmer and Lemeshow test, x^2 (16, N = 194) is 8.8489. As the p value is .387 more than .05, it means the model is adequately fit the data. The model summary described 34.7% between Cox & Snell R Square and 47.2% at Nagelkerke R Square in the variance of loan repayment status and 82.5% cases categorized properly.

Table 3: Performance of the variables

		B	S.E.	Wald	Sig.	Odds Ratios (0R)	95% C.I. Odds Ratios	
							Lower	Upper
Step 1ᵃ	Difficulty of COVID-19	-2.584	.581	19.814	.000*	1.575	.024	.235
	Borrower's age	.005	.029	.033	.855	1.005	.950	1.064
	Borrower's gender	-.553	.546	1.024	.312	.575	.197	1.679
	Level of education	-.158	.103	2.340	.126	.854	.697	1.045
	Marital status	.476	1.131	.177	.674	.610	.175	14.780
	Household members	-.233	.304	.590	.442	.792	.437	1.436
	Income generating members	.259	.410	.398	.528	1.295	.580	2.891
	Borrower's region.	-.365	.245	2.219	.136	.694	.430	1.122
	Borrower's profession	-.167	.184	.823	.364	.846	.591	1.213
	Borrower's socio economic condition	.214	.337	.405	.525	1.239	.640	2.399
	Household yearly income	.000	.000	18.444	.000*	1.620	1.000	1.000
	Purpose of the loan	.033	.207	.026	.872	1.034	.689	1.552
	Borrower's loan size	.000	.000	.544	.461	1.000	1.000	1.000
	Interest rate	.103	.121	.719	.396	1.108	.874	1.405
	Repayment cycle	.259	.267	.942	.332	1.296	.768	2.188
	Number of loan	-.224	.299	.562	.045*	1.470	.445	1.436
	Constant	-1.187	2.819	.177	.674	.305		

a. Variable(s) entered on step 1: Difficulty of COVID-19, Borrower's age, Borrower's gender, Level of education, Marital status, Household members, Income generating member, Borrower's region., Borrower's profession, Borrower's socio economic condition, Household yearly income, Purpose of the loan, Borrower's loan size, Interest rate, Repayment cycle, Number of loan.

Table 3 shows the how important the predictor variables in predicting the outcome. There are three independent variables that made statistically unique significant contributions to the model (household yearly income, difficulty of COVID-19 and number of loan). Among the predictors, household yearly income after the COVID-19 pandemic was the strongest predictor that was reported as an odds ratio of 1.620. Odds ratio is greater than 1 specifies a positive association between household yearly income and the microcredit repayment. This highest-value 1.620 odd ratio indicated the respondents whose household income was lower in the COVID-19 pandemic than before, was 1.620 times more chance to become defaulters.

Households with higher yearly incomes experienced a more robust economic recovery in post-pandemic compared to lower-income households. Higher-income households may have had greater financial resources, job stability, and access to support networks, enabling them to bounce back more quickly from the economic impacts of the pandemic. The second-highest odds ratio of 1.575 appeared the difficulty due to COVID-19. This odd ratio showed that respondents who faced the difficulty of the COVID-19 during the pandemic were 1.575 times more likely to become loan defaulters. Individuals or households with underlying health conditions, limited access to healthcare, or inadequate health insurance coverage may experience greater difficulty in managing COVID-19-related financial concerns. The value of the odds ratio is 1.470 for the number of loans which indicated the borrower taking several loans had the likelihood of 1.470 times more for being a defaulter. Taking out multiple loans indicate a higher level of indebtedness where borrowers have borrowed beyond their means or capacity to repay. This could make them more vulnerable to adverse financial outcomes. Over time, servicing multiple loans can become challenging, leading to financial stress and an increased risk of default.

In our analysis, the dependent variable is a binary variable. Among the sixteen independent variables some are categorical and some are continuous. So we analyze correlation to get more insight into the relationships among the variables.

Table 4: Correlation Analysis

	LRS	DCOV	BA	BG	LE	MS	HM	IGM	BR	BP	BSC	HYI	PL	BLS	IR	RC	NL
LRS	1	-.402**	.184*	.300**	-.101	.105	.075	.075	-.066	-.225**	.033	.463**	-.129	.151*	.134	.105	-.019
DCOV		1	-.157*	-.337**	-.043	.011	-.020	.117	-.126	.117	-.282**	-.145*	.185**	-.069	-.045	-.026	-.043
BA			1	.238**	-.371**	-.143*	.509**	.271**	-.105	-.225**	.125	.218**	-.145*	.225**	.038	.022	.133
BG				1	-.167*	.183*	.048	-.015	.088	-.453**	.312**	.393**	-.102	.069	.241**	.087	-.039
LE					1	.035	-.276**	-.109	.034	.203**	-.298**	.003	.161*	.064	-.039	.271**	.036
MS						1	.033	.144*	.020	-.156*	.103	.098	.101	-.080	.171*	.106	-.050
HM							1	.236**	-.149*	-.130	.017	.145*	-.030	.124	.035	-.126	-.074
IGM								1	-.026	-.121	-.014	.153*	-.067	.016	.026	-.059	.080
BR									1	-.040	.052	-.070	.142*	.025	.026	-.023	-.183*
BP										1	-.082	-.288**	.036	-.011	-.081	.104	-.083
BSC											1	-.318**	-.222**	-.324**	.118	-.246**	.151*
HYI												1	-.082	.435**	.146*	.173*	-.019
PL													1	.238**	-.016	.123	.059
BLS														1	.015	.279**	-.016
IR															1	.111	-.034
RC																1	-.034

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Pearson correlation between loan repayment status and difficulty of Covid-19 was found moderately negative and statistically significant (r=-.402, p<.001). As individuals or households perceive the pandemic as more challenging, they are less likely to meet their loan repayment obligations. The correlation value between borrower's loan repayment status and borrower's age is 0.184. Here the correlation value of 18.4 percent indicates a positive very weak relationship. Age alone does not capture the diverse financial situations of individuals. While older individuals generally have more stable income and financial resources, they also have additional responsibilities in Covid-19 crisis, such as supporting dependents and funding

healthcare expenses. Balancing these financial priorities with loan repayments may pose challenges and result in varied repayment behaviors across different age groups. The correlation between borrower's loan repayment status and borrower's gender is 0.300 which indicates a positive and weak relationship. The correlation value between loan repayment status and borrower's profession is -0.225 conclude that there is a weak negative correlation between loan repayment status and the borrower's profession. As the p value was 0.002, the correlation between loan repayment and profession is statistically significant. The correlation between loan repayment status and household yearly income denotes a significant moderate positive relationship (r=0.463, p<.001). This means that as household yearly income increases, loan repayment status tends to improve, and vice versa. The result highlights the central role of income levels in determining individuals' or households' ability to manage debt effectively. Loan repayment is positively associated with marital status, household members, income generating members, borrowers' socio-economic condition, loan size, interest rate and repayment cycle but the correlations are not statistically significant. In other hand loan repayment status was negatively correlated with education, borrowers' region, purpose of loan and current number of loan. These negative relations are not statistically significant.

From the categorical variables, difficulty of Covid-19, borrowers' gender and marital status have only two categories. These variables' frequencies and chi square statistics are discussed and presented below

Table 5: Frequencies and Chi-Square results of borrower's difficulty of COVID-19 and loan repayment status

			Loan repayment status		Total	x^2
			Default	Fully repayment		
Difficulty of COVID-19	No	Count	8	29	37	
		Expected Count	22.9	14.1	37.0	
	Yes	Count	112	45	157	31.368*
		Expected Count	97.1	59.9	157.0	
Total		Count	120	74	194	
		Expected Count	120.0	74.0	194.0	

*** P=.0001

A chi-square test for independence with α= .05 was used to assess whether the borrower's difficulty of the Covid-19 was related to loan repayment status or not. The chi-square test was statistically significant, x^2 (1, N = 194) =31.368, P=0.0001 with Phi (φ) coefficient of -0.402, which indicated a medium to large effect. It means borrowers were more likely to have default than the borrowers with no difficulty due to pandemic situation.

Table 6: Frequencies and Chi-Square results of borrower's gender and loan repayment status

			Loan repayment status		Total	x^2
			Default	Fully repayment		
Borrower's gender	Female	Count	92	35	127	
		Expected Count	78.6	48.4	127.0	
	Male	Count	28	39	67	17.463*
		Expected Count	41.4	25.6	67.0	
Total		Count	120	74	194	
		Expected Count	120.0	74.0	194.0	

*** P=.0001

A chi-square test for independence with α = .05 was used to assess whether the borrower's gender was related to loan repayment status or not. The chi-square test was statistically significant, x^2 (1, N = 194) =17.463, P = 0.0001 with Phi (φ) coefficient of 0.300, which indicated a medium effect indicating the female borrowers were more likely to have default than the male borrowers.

Table 7: Frequencies and Chi-Square results of borrower's marital status and loan repayment status

			Loan repayment status		Total	x^2
			Default	Fully repayment		
Marital status	Married	Count	118	70	188	2.135*
		Expected Count	116.3	71.7	188.0	
	Unmarried	Count	2	4	6	
		Expected Count	3.7	2.3	6.0	
Total		Count	120	74	194	
		Expected Count	120.0	74.0	194.0	

*** P=.144

A chi-square test for independence with α= .05 was used to assess whether the borrower's marital status was related to Loan repayment status or not. The chi-square test was statistically insignificant, Chi-square x^2 (1, N = 194) =2.135, P=0.144 with Phi (φ) coefficient of 0.105, which indicated a very small effect indicating married borrowers were more likely to have default than unmarried borrowers.
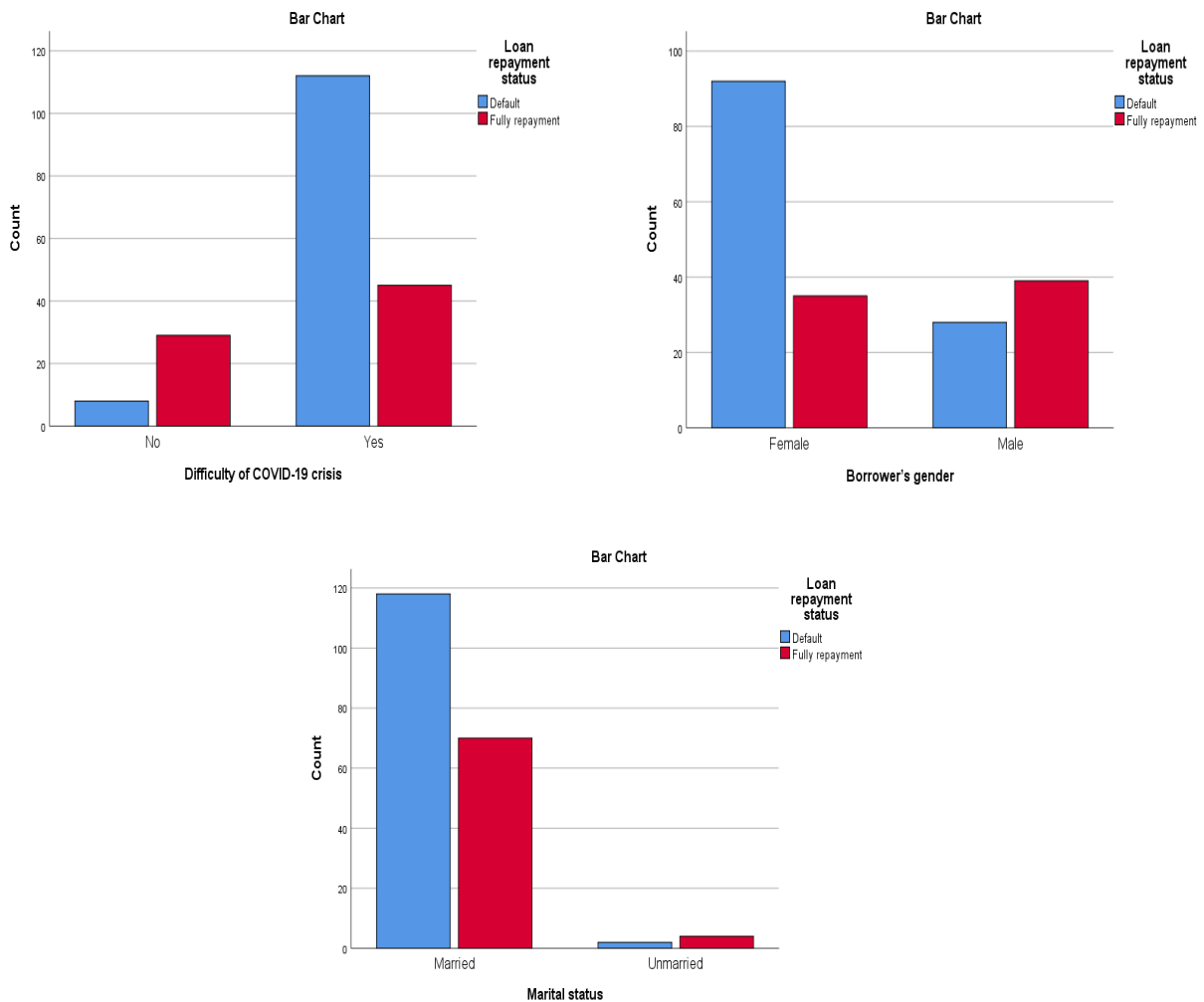

Figure 1: Relationship of i) difficulty of COVID-19, ii) borrower's gender, iii) marital status with loan repayment status among borrowers

Although the number is very small, we identify that some credit holder unable to repay the loan despite not having any direct difficulty of covid 19. On the other hand, 45 from 74 credit holders fully repay their loan even after going through difficulties. The availability of social support networks, including family, friends, and community resources, can influence individuals' ability

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to cope with pandemic-related difficulties. We found female borrowers default rate is higher than male loan takers and it is more pronounced among married borrowers after the pandemic. Among the loan characteristics, interest rate is very essential factor. Borrower wants a minimum interest rate without knowing their interest bearing capacity although some risk taker borrower didn't consider interest rate as important factor for repayment. Microfinance institutions impose many terms and conditions for their products and services. Every single principles are set in accordance the guidelines provided by the authority. The borrowers should maintain these principles from start to end of the loan period. Proper use of the loan amount according to the guidance of the loan provider is also an important factor for loan repayment performance. Micro finance institutions should give emphasis to observe every single loan.

Conclusion
The study analyses the potential factors that have effects on the microcredit repayments rate due to the COVID-19 crisis. This study also tries to make a comprehensive outline to alleviate the effect of the COVID-19 crisis on loan repayments rates. Based on this analysis, micro-credit needs to have an easier way for repayments during the crisis of COVID-19. However, Microcredit Regulations Authority (MRA) and the Bangladesh government had taken initiative to reschedule their repayment frequency and redefined the loan classification in the beginning of the pandemic situation. But it was not enough for the borrowers to repay the existing loan and the situation create more delinquency thereafter. The microcredit institutions require more time to recover their economic condition. To avoid delinquencies some microcredit institutions minimizes the amount of Taka per installment and also change collection frequency according to the borrower's income.

This paper accumulates essential elements those have influence on loan recovery rate and identify which variables are more influential in the crisis period. Decreasing income is a common phenomenon after any disaster. Income reduction has affected many indicators and repayment rate is no exception. As it require more time to recover the financial condition of middle to lower-middle and poor peoples, government should focus on this point and take some measures to improve the concerned part of the society. Policymaker should implement some sustainable policies in order to drive the difficulty of the financial crisis as well as to boost up the repayments rate during the COVIT-19 crisis. MFIs should have to justify the borrower's socioeconomic and financial condition intensively before approving the loan. Taking loans from different institutions create more delinquency than taking loan from one institution that better match their income flows. Microcredit Regulations Authority should have to draw a well-structured outline for repayments during the crisis situation of a pandemic.

After Covid 19 pandemic, the number of microcredit holders decreased and this study sample is confined to a certain area may not be representative of the broader population of microcredit borrowers, leading to sample bias. We generalize the sample without considering the supply side factors such as differences in institutional environments, macroeconomic conditions and loan monitoring may influence loan repayment dynamics in ways that are not captured by the study. Those who want to further research on microcredit repayments can study the characteristics of the microcredit institutions. With the increasing adoption of digital financial services in microcredit, future research may also explore the impact of digital lending platforms, mobile banking, and fintech innovations on loan repayment behavior. This may include examining the role of digital technologies in enhancing financial inclusion, reducing transaction costs, and improving borrower monitoring and risk management.

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