

QARD-E-HASANAH FINANCING AND FARM PRODUCTION EFFICIENCY: EVIDENCE FROM RURAL BANGLADESH

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ABSTRACT

The main objective of this study is to examine the impact of Qard e Hasana on farm production efficiency of rural households in Jhenidah district of Bangladesh. In this case study a multistage sampling approach was adopted for selecting 160 households farm in rural area from Jhenidah district. Regression (probit) model, and an analysis of the stochastic frontier production were used to assess the data that had been gathered. The bulk of the heads of rural agricultural households are in their active years, the research showed. It was also shown that the majority of farm household heads possess a medium level of farming expertise and technical proficiency. According to probit regression result, age of the microcredit borrower (Value of $P < 0.05$), size of the farm (Value of $P < 0.01$), size of household (Value of $P < 0.01$), experience in farming (Value of $P < 0.01$), and educational status (Value of $P < 0.05$) are the important variables that affect rural farm in accessing Qard e Hasana. According to results output of the farm rises with size of the farm (Value of P is less than 0.05), family labor (Value of P is less than 0.05), and hired labor (Value of Value of P is less than 0.05), but falls with an expansion of intermediate materials (Value of P is less than 0.10). According to inefficiency model, Qard e Hasana (Value of $P < 0.05$), age of the borrower (Value of $P < 0.05$), experience in farming (Value of $P < 0.01$), educational status (Value of $P < 0.05$), size of household (Value of $P < 0.10$), and education (Value of $P < 0.05$) all contribute to a farmer's technical efficiency. The average technical efficiency of 0.79 suggests that there is opportunity for a 21 percent increase in technological efficacy of households' farm. Farm production rises with the addition of land, family, and hired labor, whereas intermediate inputs diminish efficiency. For a sustainable policy option to promote production capability among households' farm in the research area, it is necessary to improve farmer education and raise knowledge of the benefits of Qard e Hasana.

KEYWORDS: Qard e Hasana, Technical Efficiency, Rural Farm Households, Probit Regression, Stochastic Frontier Production Function.

1.1 INTRODUCTION

The rural economy of Bangladesh is still dependent predominantly on agriculture, which offers employment to a major part of the working population and serves as one of the key sources for earning income and ensuring food security at the national level (Billah 2022). However, rural farming households experience a wide range of financial, technological and infrastructure challenges that undermine their productivity. Stringent collateral requirements, high interest rates and bureaucratic borrowing processes continue to make access to formal credit difficult. These obstacles prohibit the smallholder farmers to invest in hybrid seeds, fertilizer, irrigation and other modern technologies of production (Khan & Haneef, 2019). These constraints then impair technical efficiency which is the capacity to produce maximum output level from a given amount of inputs (Billah, 2022). Improving technical efficiency is therefore imperative for improving agricultural productivity, generating sustainable incomes and alleviating poverty among rural people. In this setup, Qard al-Hasanah (kindly loan) is introduced as a Shariah-compatible substitute of such

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alternate funding to strengthen financially weaker sections of society. Qard al-Hasanah is essentially an interest-free loan, mainly meant for welfare as well as productive activities that are based on trust, social obligations and mutual assistance (Muneer & Khan 2022).

Qard al-Hasanah are also free from an interest payment burden, and, as such, more value-added agricultural projects can be enabled through more efficient use of financial means. The provision of timely and convenient credit can help the farmer to adopt better technologies, input use efficiencies and more optimal production decisions—all with contribute to increase in farm level technical efficiency (Billah 2022). It also addresses the issues of financial exclusion, social cohesion, and empowerment of vulnerable groups such as women-headed households which are typically excluded from formal financial systems (Muneer & Khan, 2022). Yet, despite the theoretical potential of Qard al-Hasanah in theory, empirical studies on the effect of this mechanism on agricultural productivity and technical efficiency are scarce. The majority of studies conducted on rural finance in Bangladesh has focused more on interest-based microcredit allocation, thus creating a research void with respect to the efficiency of profit loss sharing Islamic financing (Khan & Haneef, 2019).

It is therefore important to assess the potential of Qard al-Hasanah as an ethical and inclusive instrument for financing, for policy makers, development agencies and Islamic financial institutions who are interested in increasing rural productivity and welfare. The current study therefore attempts to fill the gap by focusing on the effects of Qard-e-Hasanah based financing programs on farm level production efficiency of small-scale farmers in Jhenidah district, Bangladesh.

The study aims to ascertain the variables that affect rural farmers' access to Qard-e-Hasanah loans, the impact of these loans on agricultural productivity and efficiency, the demographic and socioeconomic factors influencing beneficiaries' technical efficiency, and the extent to which Qard-e-Hasanah loans promote sustainable agriculture and enhance rural welfare. The study examines the correlation between access to interest-free loans and agricultural performance, offering empirical data on the potential of Islamic financial principles to enhance sustainability, economic inclusion, and rural livelihoods in agriculture.

1.2 Research Issue

Rural Bangladeshi smallholder farmers who struggle to secure loans that are both reasonable and fair are the primary subjects of this research. This prevents businesses from maximizing the utilization of their resources, utilizing contemporary technology, and improving the efficiency of their industrial processes. Islamic microfinance is often touted as a novel approach to alleviating poverty, although data on its impact on agricultural output in Bangladesh is scant. To make up for that shortcoming, this research looks at how the Jhenidah district's agricultural production efficiency has changed as a result of Qard-e-Hasanah support.

1.3 Research Questions

- How are the socio-economic traits of rural farm households in the Jhenidah district impacted by their capacity to secure Qard-e-Hasanah financing?
- What is the impact of Qard-e-Hasanah finance on the production efficiency of farms held by farmers in rural areas?
- What is the impact on the farm's productivity and efficiency of the interactions between household traits, agricultural inputs, and access to Qard-e-Hasanah?
- Which elements related to policies could enhance the efficiency and productivity of farms through focused interventions under Qard-e-Hasanah?

1.4 Objectives of the Study

This study aims to evaluate the effect of Qard-e-Hasanah financing on the technical efficiency and productivity of farm households in the Jhenidah district of Bangladesh. The specific objectives of the study are as follows:

- To examine the relationship between the socio-economic characteristics of rural farm households and their access to Qard-e-Hasanah financing.
- To determine the effect of Qard-e-Hasanah financing on farm-level production efficiency.
- To investigate the relationship among farm inputs, household characteristics, and farm output under conditions of access to Qard-e-Hasanah financing.
- To identify relevant policy measures through which targeted financial assistance programs, such as Qard-e-Hasanah, can enhance agricultural productivity and technical efficiency.

1.5 Literature Review

There is a dearth of data on how Qard-e-Hasanah (QH) financing affects agricultural output in Bangladesh, even though Islamic microfinance is rapidly replacing traditional loans. A charity loan, or QH, cannot accrue interest in accordance with Islamic law. People who are economically disadvantaged or have low incomes will mostly receive financial aid. Multiple case studies have shown that QH improves household well-being, boosts income production, and diversifies livelihoods in rural Bangladesh. Nonetheless, the evidence linking QH to the technological efficiency of farms is insufficient. The two primary microcredit initiatives in Bangladesh, BRAC and Grameen Bank, have shown mixed outcomes in their attempts to increase crop yields. The Bangladesh Rural Assistance Corporation is abbreviated

as BRAC. By facilitating the acquisition of both materials and labor, microcredit enables a greater degree of agricultural production. The success of these initiatives is susceptible to a variety of influences (Wadud, 2013; Wadud, 2014). The size of the loan, the period of the loan, and whether the funds are used for agricultural or non-agricultural purposes are some of these aspects. According to recent research, Islamic microfinance is playing a crucial role in rural development. A new level of complication has been introduced to the current situation by this finding. Bangladesh, Malaysia, and Turkey have all seen increases in employment, incomes, and the number of people with access to formal financial services as a result of Shariah-compliant microfinance enterprises. Research on the effect of such programs on crop yields is severely lacking (RSIS International, 2023). Islamic microfinance and cash waqf products could pave the way for the long-term distribution of money to small businesses and farms in rural Bangladesh. Findings from the Journal of Islamic Economics (2022) indicate that the country's rapidly growing Islamic microfinance institutions (IMFIs) face difficulties in the legal and operational domains when it comes to offering individualized loans for farming. Data Envelopment Analysis and Stochastic Frontier Analysis (SFA) have been employed in multiple studies to assess Bangladesh's agricultural production. Findings from studies conducted by Islam, Beckman, and Sumelius (2011) and Rahman (2011) indicate that results vary greatly based on geographical location and crop variety. In addition, other factors impact the results, including farm size, farmer education, funding availability, and market conditions. Evaluations of SFA's technical efficiency ranged from 0.82 to 0.92 in the most recent case, which involved rice, beans, and animals. Access to finance, education, and farming experience are important factors that affect efficiency (BanglaJOL, 2023; Satkhira Study, 2024). Moreover, access to credit has consistently been shown to improve production efficiency, while a lack of liquidity and high-interest burdens decrease it. This suggests that Qard-e-Hasanah, which is a cost-free credit mechanism, could help with these inefficiencies. However, the current literature has not empirically investigated whether interest-free Islamic microfinance models, such as Qard-e-Hasanah, can enhance agricultural technical efficiency by alleviating financial constraints without the obligation of interest payments. This research gap necessitates empirical examination of the potential of Qard-e-Hasanah financing to improve resource allocation, input utilization, and overall productivity among smallholder farmers in rural Bangladesh.

1.6 Research Gap

Although much research is being conducted on funding for the Qard-e-Hasanah and agricultural productivity in Bangladesh, there are still significant shortcomings:

- Limited empirical data on the Qard-e-Hasanah: Most studies focus on traditional microfinancing programmes, which involve interest, overlooking the unique impact of interest-free loans on improving agricultural efficiency.
- Analysis of technical efficiency under charitable loans: Only a few studies quantitatively studied how access to free credit affects technical efficiency at the farm level using stochastic boundary analysis.
- Combining socio-economic factors with access to loans: Current literature often neglects the impact of household characteristics (age, education, agricultural size, experience) on the ability to obtain Qard-e-Hasanah loans and its impact on improving efficiency.
- The absence of local insight into Jhenidah: Most of the research is conducted at national or regional level, which lacks specific evidence for Khulna Division, especially the Jhenidah region, which is essential to the formulation of targeted policy measures.

The aim of this study is to fill these gaps by integrating social and economic analysis, access to funding from Qard-e-Hasanah and the statistical boundary estimate of agricultural technical efficiency, particularly in the Jhenidah district. Thus, it provides strong empirical evidence on whether interest-free loans contribute to improving agricultural productivity and on how they do so. The findings will help policy makers, non-governmental organizations and microfinance organizations assess the effectiveness of the Qard-e-Hasanah programmes and develop specific strategies to improve agricultural efficiency, promote financial inclusion and support sustainable rural development in Bangladesh.

1.7 Methodology of the Study

Study Area

The study was conducted in Jhenaidah district of the Khulna division. Initially, two out of the six upazilas in the district were randomly selected: Kaligonj and Sailokupa. Under these upazilas, there are six unions in Sailokupa and eleven in Kaligonj. At the second stage, two unions from each upazila were randomly chosen: Nittanondopur and Abaipur from Sailokupa, and Triechandpur and Rakhalgachi from Kaligonj. Finally, two villages from each selected union were chosen using a random selection technique.

Technique of sampling

Respondents for the study were selected using a stratified sampling approach and interviewed with a standardized questionnaire. **First stage:** Two blocks were purposively selected from the six blocks in Jhenaidah district. **Second stage:** Two cells were randomly selected from each of the chosen blocks. **Third stage:** Three rural farming societies were randomly selected from each of the selected cells, resulting in a total of twelve rural farming societies. **Final**

stage: Fourteen heads of rural farm households were randomly selected and interviewed from each community, giving a total of 168 respondents. After accounting for incomplete responses, 160 valid questionnaires were used for analysis.

The sample size of the respondents was determined by using the formula (Guilford and Fruchter, 1978): $N = \frac{Z^2 pq}{d^2}$

Where:

- N = minimum sample size
- Z=1.96 (95% confidence level)
- p=0.5(assumed prevalence)
- q=1-p=0.5
- d = 0.0756 (precision of 7.56%)

$$N = \frac{1.96^2 \times 0.5 \times 0.5}{0.0756^2} \approx 168$$

After adjusting for a **10% non-response rate**:

$$N_{adjusted} = \frac{168}{1 - 0.10} \approx 187$$

Thus, 187 questionnaires were initially distributed to ensure at least 168 valid responses, of which 160 complete questionnaires were returned and used for analysis.

Data Analysis

The collected questionnaire responses were coded, summarized, and analyzed using SPSS (Windows version 20) and Microsoft Excel 2007. Descriptive statistics, including frequency counts and percentages, were used to present the data. Additionally, regression analysis and other relevant statistical techniques were employed for in-depth analysis.

1.8 Regression Analysis

The probit regression model is used because the outcome variable (technical efficiency status) is binary, and the main research interest is in estimating how access to Qard e Hasanah influences the probability of being technically efficient, while controlling for other household/farm characteristics.

Probit Model Specification:

The model can be written as:

$$P(TE_i = 1) = \Phi\beta_0 + \beta_1 QH_i + \beta_2 AGE_i + \beta_3 EDUCATION_i + \beta_4 FARM SIZE_i + \beta_5 LABOR_i + \beta_6 EXPERIENCE_i + \beta_7 OTHER CREDIT_i + \beta_8 EXTENSION_i + \beta_9 LIVESTOCK_i + \beta_{10} HOUSEHOLDS INCOME_i + \epsilon_i$$

TE_i can be derived from a stochastic frontier analysis (SFA) to measure technical efficiency.

Since we want to use a probit model, our dependent variable should be binary:

$$TE_i = \begin{cases} 1 & \text{if household } i \text{ is technically efficient} \\ 0 & \text{if household } i \text{ is technically inefficient} \end{cases}$$

And independent variable

$$QH_i = \begin{cases} 1 & \text{if household } i \text{ received Qard e Hasanah} \\ 0 & \text{otherwise} \end{cases}$$

- Φ is the cumulative distribution function of the standard normal distribution;
- β_1 measures the impact of Qard e Hasana on the probability of being technically efficient.

This model estimates how different socio-economic and farm-related characteristics influence the likelihood that a household operates efficiently.

• **Positive coefficients ($\beta > 0$)** indicate that an increase in the variable raises the probability of technical efficiency. For example, more years of education or larger farm size may enhance efficiency.

• **Negative coefficients ($\beta < 0$)** imply that higher values of the variable reduce the likelihood of efficiency. For instance, poor access to extension services might hinder efficiency.

Stochastic Frontier Analysis (SFA) Specification for Jhenidah Case:

$$Y_i = f(X_i; \beta) \cdot e^{(v_i - u_i)}$$

where:

- ❖ Y_i = farm output (e.g., rice yield, total farm income)
- ❖ X_i = input vector (land, labor, fertilizer, capital, etc.)

- ❖ v_i = random noise $\sim N(0, \alpha_v^2)$
- ❖ u_i = inefficiency term (≥ 0), modeled as:

$$u_i = \partial_0 + \partial_1 QH_i + \partial_2 Z_i + w_i$$

Where,

QH_i = dummy or amount of Qard-e-Hasana received.

Z_i = household characteristics (education, age, farm size, experience, other credit, livestock, household income, access to extension services).

Cobb–Douglas Production Function:

$$\ln Y_i = \beta_0 + \beta_1 \ln \text{land} + \beta_2 \ln \text{labor} + \beta_3 \ln \text{fertilizer} + \beta_4 \ln \text{capital} + v_i - u_i$$

Inefficiency Model:

$$u_i = \partial_0 + \partial_1 QARD\ E\ HASANAH + \partial_2 AGE + \partial_3 EDUCATION + \partial_4 FARM\ SIZE + \partial_5 EXPERIENCE \\ + \partial_6 OTHER\ CREDIT + \partial_7 EXTENSION + \partial_8 LIVESTOCK \\ + \partial_9 HOUSEHOLDS\ INCOME + w_i$$

1.9 Results and Discussion

Socio-economic Characteristics of Rural Farm Households

Table 1 shows how rural farm households' socioeconomic traits are distributed. The majority of household heads (67.5%) are between the ages of 41 and 50. The farmers remain within their productive age, as reflected by the mean age of 40.3 years. The fact that men make up the majority of farm household heads (88.8%) suggests that men work in farming at a higher rate than women. Additionally, the bulk of sampled respondents (75 percent) were married. This suggests that in addition to farming, the majority of household leaders also have marriage duties. Additionally, the survey found that 46.3 percent of the heads of the tested households had only completed basic school, suggesting that the farmers have a moderate level of education. Most farmers (59.4%) reported having 23 to 32 years of farming experience, the average farming experience is 23.1 years. Furthermore, the average household size was six people, and the majority of household heads (75.6%) have four to seven members. This suggests that a majority of farmers in the rural regions of Jhenidah district in Bangladesh utilize family labor for agriculture. The results indicate that religion is unlikely to significantly affect farmers' decisions, given that 91.5% of the sampled household heads are Muslim and 8.5% are non-Muslim.

Table 1: Socio-economic Characteristics of Rural Farm Households

Variables:	Category	Freq,	%	Mean
Age level	< 20	3	1.9	
	21–30	8	5.0	
	31–40	29	18.1	
	41–50	108	67.5	40.3
	> 50	12	7.5	
Gender	Male-headed	138	86.3	
	Female-headed	22	13.7	
Marital Status	Married	130	81.25	
	Single	18	11.25	
	Widow	12	7.5	
Educational status	Self-Education	40	25.0	
	Primary Education	65	40.6	
	Secondary Education	32	20.0	
	Tertiary Education	23	14.4	

Category	Frequency	Percentage (%)
Farming Experience		

Category	Frequency	Percentage (%)
≤ 12 Years	10	6.3
13–22 Years	25	15.5
23–32 Years	95	59.4
> 32 Years	30	18.8
Household Size		
≤ 3	30	18.8
4–7	121	75.6
> 7	9	5.6
Religion		
Islam	140	87.5
Others	20	12.5
Total	160	100

Source: survey data, 2025

Influence of Socio-Economic Characteristics of Farm Households on Access to Qard e Hasanah

The results of the probit regression (Table 2) reveal that several socio-economic characteristics significantly influence farm households' access to Qard e Hasanah, Age, size of farm, size of household, farming experience, and educational status positively affect the likelihood of accessing credit, with farming experience showing the strongest effect. Specifically, a one-unit increase in age, farm size, household size, and experience increase the probability of credit access by 31%, 14%, 21%, and 56%, respectively. Educational attainment also positively affects credit access, though at a 10% significance level. In contrast, sex, religion, and marital status do not have a statistically significant impact, suggesting that these factors are less relevant in determining access to credit within the study area. The model is very important overall ($\chi^2 = 41.2$, $p < 0.01$), which means that it does a good job of explaining what makes it hard for farm families to get credit. These results show that we need to make rules that make it easier for bigger, more educated farmers with big families and big farming businesses to get loans.

Table 2: Probit Regression Analysis of Farm Household Socio-Economic Factors Influencing Qard e Hasanah financing Access

Variables:	Coeff.	Marg. effects	T-Values
Constant	-0.0425***	-0.026	-4.40
Ages of respon.	0.32**	0.31	2.10
Gender	-0.64	-0.62	0.28
Religious status	0.84	0.79	1.22
Size of farm	0.16***	0.15	4.72
Household's Size	0.24**	0.22	3.20
Marital Status	-0.25	-0.20	-0.85
Farming Experience	0.57***	0.56	4.60
Educational status	0.27*	0.23	1.91

Model Statistics

- Chi-sq: 41.2***
- Log Likeli.: -49.5

*Note: ***, *, * indicate significance at 1%, 5%, and 10% levels, respectively.

Source: Computed from survey data, 2025.

Estimation of Stochastic Frontier Production Functions Using the Maximum Likelihood Method

Table 3 displays the outcomes of the maximum likelihood estimation for the stochastic frontier production function. The sigma-squared parameter, which is significant at the 1% level, shows that the model fits the data well. A gamma value of 0.82 means that about 82% of the differences in farmers' output are due to technical inefficiency. Land, family labor, hired labor, and intermediate inputs are all factors that affect output, with significance levels of 5%, 5%, 5%, and 10%, respectively. In particular, a 1% increase in the size of the farm, the amount of family labor, and

the amount of hired labor leads to increases in output of 0.48%, 0.11%, and 0.29%, respectively. On the other hand, a 1% increase in intermediate inputs leads to a 0.19% decrease in output. A return to scale of 0.69 shows that farmers are in the rational stage of production. Most of the variables in the inefficiency model have negative coefficients, which means that they have a positive effect on technical efficiency. Age, farming experience, education level, household size, and access to qard e hasanah are all important factors, with significance levels of 5%, 5%, 5%, 10%, and 5%, respectively. This means that the more years of farming experience, the more education, the bigger the household, and the easier it is to get qard e hasana, the more productive the farm will be. The negative coefficient (−0.14) for Access to Qard-e-Hasanah in the inefficiency model shows that households that can get Qard-e-Hasanah loans are less technically inefficient, which means they are more technically efficient. This means that interest-free, helpful loans help farmers use their resources better and get closer to the production frontier. The reported t-value is positive (2.00), but this only means that the result is statistically significant. It doesn't change the fact that the coefficient has a negative sign.

Table 3: Results of Estimation of the Stochastic Production Frontier (SPF)

Variables:	Coeff.	SE	T-values
Constant	0.61***	0.17	3.89
Farm-size	0.49**	0.20	2.40
Family-labor	0.11**	0.05	2.20
Hired-labor	0.029**	0.012	2.42
Intermediate materials	-0.19*	0.10	-1.90

Table 4: Regression Results for Determinants of the Outcome Variable

Variable	Coefficient	Std. Error	t-value
Constant	-0.167***	0.05	-3.34
Gender	0.0321	0.0249	1.29
Age level	-0.89**	0.38	-2.34
Age square	-0.12	0.69	-0.17
Off-farm Income	0.13	0.19	0.68
Farming experience	-0.34**	0.15	-2.27
Educational status	-0.23**	0.10	-2.30
Size of household	-0.19*	0.101	-1.88
Extension contact	-0.28	0.23	-1.22
Access to Qard e hasanah	-0.14**	0.07	2.00

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Parameter	Estimate	Std. Error	t-value
Sigma square	0.512***	0.140	3.66
Gamma	0.820***	0.121	6.69

Source: survey data, 2025

Efficiency Assessment of Rural Farming Households

Table 4 presents the results of the maximum likelihood estimation of the stochastic production frontier, showing the distribution of efficiency levels among the farm households. Farmers' efficiency is fairly evenly distributed, with 22.5% falling within the 0.71–0.80 range, 20.3% within 0.41–0.50, and 20% within 0.91–1.00. The average efficiency score of 0.67 indicates that, on average, there is room to improve farmers' efficiency by approximately 31%.

Table 5: Assessment of Productivity Performance of Farm Households

Group	Freq	%
< 0.40=	16=	11.0%

Group	Freq	%
0.41–0.50	34	20.3%
0.51–0.60	14	8.8%
0.61–0.70	16	10.0%
0.71–0.80	36	22.5%
0.81–0.90	12	7.5%
0.91–1.00	32	20.0%

Mean Value 0.67
Minimum V 0.15
Maximum V 0.97

Source: survey data, 2025

1.10 Findings of the Study

- ✦ The majority of household heads (67.5%) are 41 to 50 years old, indicating that they are productive.
- ✦ The majority of the head is male (86.3%) and married (81.25%), with an average of six households, providing sufficient family work for agriculture.
- ✦ The average age of agriculture is 23.1%, almost half of the respondents have primary education, suggesting that knowledge and skills in agriculture are moderate.
- ✦ Probit regression results show that the age, household and farm characteristics of participants, as well as educational attainment, have a significant impact on the access of a household to Qard-e-Hasanah.
- ✦ Older, more experienced and educated farmers with larger farms and households are more likely to receive charitable loans.
- ✦ Using stochastic boundary analysis, farm production increases significantly with farm size, family work and employed work.
- ✦ Surprisingly, the use of intermediate materials has a negative impact on production, suggesting potential inefficiencies in input management.
- ✦ The return to the scale is 0.67, which indicates that farmers are in a rational stage of production.
- ✦ The average technical efficiency is 0.67, meaning that the production of rural households could be increased by 31 per cent with the same input level.
- ✦ Important factors that have a positive impact on technical efficiency.
- ✦ Access to good loans improves efficiency by enabling investments in inputs that increase productivity.

CONCLUSION

The purpose of this study was to assess the impact of Qard-e-Hasanah, a type of charitable funding, on rural farmers in the Jhenidah district of Bangladesh. Based on what we know, the majority of household heads have advanced degrees, extensive farming experience, and secure jobs. Since family work is so important on farms, the average family consists of six people.

How easy it is to acquire Qard-e-Hasanah money and how successfully farming works are both affected by age and education level, as well as by family size and farm size, according to the probit regression model. There are no barriers to membership in Qard-e-Hasanah based on gender, marital status, or religion. Based on stochastic frontier analysis, the amount of arable land, as well as the availability of both domestic and hired labor, determines the maximum harvestable crop yield. According to the inefficiency model, obtaining Qard-e-Hasanah is a prerequisite to improving technical performance. The fact that the access to Qard-e-Hasanah has a negative coefficient of 0.14 indicates that families who obtain these loans are less inclined to spend money. Compared to farmers who did not employ Qard-e-Hasanah, those who did were approximately 14% more efficient with their instruments. If farmers were better at managing their resources and had financial and technological assistance, they might boost their output by over 31%. On average, their proficiency with technology was rated at 0.67. These findings provide strong evidence that Qard-e-Hasanah, an Islamic microfinance program, can help low-income rural Bangladeshis escape poverty. It is crucial to practice qard-e-hasanah in order to boost agricultural production. When it comes to alleviating poverty and enhancing rural communities, this policy tool is crucial.

Using panel data or longitudinal studies, researchers can find out how long Qard-e-Hasanah on agricultural productivity and household well-being in future research. Comparative analyses between traditional microcredit and Qard-e-Hasanah would facilitate the evaluation of the relative efficacy of interest-free versus interest-bearing loan mechanisms. Additionally, investigating supplementary interventions such as agricultural extension services, input supply initiatives, and enhanced market access could reveal methods to optimize efficiency gains from benevolent

loans. Conducting analogous research in additional districts and regions would enhance the generalizability of these findings and guide scalable policy initiatives to promote sustainable agricultural growth and inclusive rural development in Bangladesh.

Policy Recommendations

This study's results led to the following policy suggestions to make Qard-e-Hasanah financing work better and help rural farming families grow more food:

1. Encourage More People to Use Qard-e-Hasanah Financing: Make interest-free loan programs available to more rural farmers, especially younger and less experienced farmers. Making it easier to apply for loans and setting up local Qard-e-Hasanah centers can help more people get loans and lower the number of people who can't get loans.
2. Improve Agricultural Education and Capacity Building: Start regular training and awareness programs to help farmers learn more about modern farming methods, improve their technical skills, and become more financially literate. This will make it possible to use inputs more efficiently, borrow money more effectively, and manage resources in a way that lasts.
3. Encourage optimal input utilization: Educate farmers on the best ways to use intermediate inputs like seeds, fertilizers, irrigation, and more. Well-managed inputs can lead to both waste reduction and increased manufacturing efficiency.
4. Make sure that all families get the help they need. When making programs to help farmers, keep in mind the social and economic issues they face. We should think about the farmer's level of education, how long they have been farming, how big their farm is, and how many people live there. All of these things affect how well it works and how hard it is to get credit.

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