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Reeling in Hope: Can Fishery Credit Really Improve Food Expenditure Status for Poor Fish Farming Communities in Rural Bangladesh?

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Abstract

The fish farming communities in Bangladesh often find themselves trapped in poverty due to limited resources and low living standards. Many of these communities face financial constraints, struggling to secure credit from formal financial institutions. This compels them to turn to informal lending sources with unfavorable terms and conditions. To address this challenge, Non-Governmental Organizations (NGOs) have taken the initiative to provide credit facilities to these fish farming communities. In this study, we employed the Simple Random Sampling (SRS) technique to select 385 fish farmers from the Khulna district who had received credit support from NGOs. The Propensity Score Matching (PSM) technique was then applied to evaluate the impact of fishery credit on the household food expenditure of the sampled fish farmers. Contrary to existing literature suggesting that access to fisheries credit improves food security, our empirical findings present a different perspective. The Binary Logistic Regression (BLR) study identified two factors influencing the food purchasing capacity of fish farmers: the value of non-land assets and the proximity of NGOs' branch offices to the fish farmers' dwellings. To enhance the food security status of underprivileged fish farming communities, it is recommended to focus on transferring assets and establishing NGO offices in close proximity to villages. These measures can significantly contribute to improving the food expenditure capacity of these communities.

Keywords: credit impact, food expenditure, opinion, Bangladesh

Un espoir sous le choc : le crédit à la pêche peut-il réellement améliorer la situation des dépenses alimentaires des communautés piscicoles pauvres dans les zones rurales du Bangladesh ?

Résumé

Les communautés piscicoles du Bangladesh se retrouvent souvent piégées dans la pauvreté en raison de ressources limitées et d'un faible niveau de vie. Beaucoup de ces communautés sont confrontées à des contraintes financières et peinent à obtenir du crédit auprès des institutions financières formelles. Cela les oblige à se tourner vers des sources de prêt informelles aux conditions défavorables. Pour relever ce défi, des organisations non gouvernementales (ONG) ont pris l'initiative d'offrir des facilités de crédit à ces communautés piscicoles. Dans cette étude, nous avons utilisé la technique d'échantillonnage aléatoire simple (EAS) pour sélectionner 385 pisciculteurs du district de Khulna qui avaient reçu de soutien en crédit d'ONG. La technique d'appariement des coefficients de propension (ACP) a ensuite été appliquée pour évaluer l'impact du crédit à la pêche sur les dépenses alimentaires des ménages des pisciculteurs échantillonnés. Contrairement à la littérature existante suggérant que l'accès au crédit à la pêche améliore la sécurité alimentaire, nos résultats empiriques présentent une perspective différente. L'étude de régression logistique binaire (RLB) a dentifié deux facteurs influençant la capacité d'achat alimentaire des pisciculteurs : la valeur des actifs non fonciers et la proximité des succursales des ONG par rapport aux habitations des pisciculteurs. Pour améliorer la sécurité alimentaire des communautés piscicoles défavorisées, il est recommandé de se concentrer sur le transfert d'actifs et d'établir des bureaux d'ONG à proximité des villages. Ces mesures peuvent contribuer de manière significative à améliorer la capacité de dépenses alimentaires de ces communautés.

Mots-clés : Impact du crédit, dépense alimentaire, opinion, Bangladesh

1.0 Introduction

The right to food, a fundamental human need, is explicitly recognized in the Constitution of the People's Republic of Bangladesh. The Constitution of Bangladesh stipulates that the fundamental requirements for life, encompassing essentials like food, clothing, shelter, education, and medical care, are guaranteed (Laws of Bangladesh, n.d.). Unfortunately, this essential right is often denied to underprivileged individuals in Bangladesh due to poverty, as underscored in research conducted by Mahmud et al. (2022a), Al-Zabir et al. (2020), and Hossain et al. (2019). To combat this pressing issue, the Government of Bangladesh (GoB) has prioritized the challenge of poverty and hunger, aligning with the objectives outlined in Goal 1 and Goal 2 of the Sustainable Development Goals (SDGs) (Mahmud et al., 2022a; Ministry of Finance, 2023). Despite these efforts, Bangladesh continues to grapple with ensuring food security for all its citizens (Ghosh et al., 2021; Mishra & Khanal, 2017; Hossain et al., 2019; Al-Zabir et al., 2020). Several significant hurdles impede the achievement of national food security in Bangladesh, including high food prices, unemployment, low wage rates, and gender disparity, as highlighted by Ali and Vallianatos (2017), Al-Zabir et al.

(2020), and Ghosh et al. (2021). Addressing these challenges is crucial for advancing the nation's commitment to providing food security for its populace.

The fish farming communities in Bangladesh face severe challenges related to malnutrition and food insecurity (Mahmud et al., 2022a; Mahmud & Hilton, 2020; Mozumder et al., 2018). Regrettably, these impoverished fishing communities also encounter significant economic and social disadvantages, including limited access to revenue and productive resources (Rahman & Schmidlin, 2019; Mitra et al., 2019; Islam et al., 2021; Mozumder et al., 2018; Tikadar et al., 2022; Rashid et al., 2023). Research indicates that members of these fish farming communities typically experience low income and savings, possess a meager educational background, and fall victim to multi-dimensional poverty (Islam et al., 2021; Mahmud & Hilton, 2020; Tikadar et al., 2022; Rashid et al., 2023). Moreover, they lack access to education, training, sanitation facilities, and frequently suffer from waterborne diseases (Tikadar et al., 2022; Rashid et al., 2023). These communities encounter formidable challenges in their fisheries-related activities, attributed to financial barriers, health hazards, and inaccessibility to technological support (Rahman & Schmidlin, 2019; Mitra et al., 2019; Alam & Guttormsen, 2019; Islam et al., 2021; Tikadar et al., 2022; Mahmud et al., 2021; Rashid et al., 2023). Major barriers include fish diseases, natural calamities (e.g., floods, cyclones, drought, salinity), fluctuating fish prices, high input costs, lack of marketing facilities, and health hazards (Syed, 2020; Alam & Guttormsen, 2019; Mitra et al., 2019; Rahman & Schmidlin, 2019; Anik et al., 2018; Mahmud et al., 2021; Islam et al., 2021; Rashid et al., 2023). In Bangladesh, credit-constrained fish farming communities often lack access to institutional financial facilities, hindering their engagement in effective Income-Generating Activities (IGAs). This limitation results in reduced productivity, revenue, and expenditure on both food and non-food goods (Mitra et al., 2019; Rahman et al., 2023; Rashid et al., 2023).

Traditional banking systems, demanding collateral, have failed to meet the credit needs of the poor (Rahman et al., 2023; Mozumder et al., 2018; Dowla, 2018; Mitra et al., 2019), leading these communities to rely on informal sources of loans with unfavorable terms and conditions (Mozumder et al., 2018; Alam & Guttormsen, 2019; Mitra et al., 2019). In Bangladesh, credit plays a crucial role for disadvantaged farming communities, directly impacting their ability to purchase inputs, manage risks, and carry out agricultural production operations (Mitra et al., 2019; Moahid et al., 2023; Mehedi et al., 2020; Mahmud et al., 2021; Roy et al., 2021). Agricultural credit support is vital in enabling these communities to invest effectively in IGAs, leading to an enhanced standard of living in terms of both income and expenditure (Mahmud et al., 2022b Mahmud & Hilton, 2020; Moahid et al., 2023; Mehedi et al., 2020; Roy et al., 2021). For instance, Peprah and Ayayi (2016) discovered that households with access to credit spent more on food items compared to those without such credit facilities. Microcredit support has been observed to play a crucial role in improving the nutritional status, calorie intake, and food expenditure capacity of poor households in Bangladesh, ultimately increasing their income (Bidisha et al., 2018; Islam et al., 2016; Mahmud & Hilton, 2020). Similarly, Iftikhar and Mahmood (2017) found that agricultural credit programs in Pakistan contributed to improving the food security status of farming communities. Credit support has also been reported to enhance the spending capacity on food items for poor households in Ethiopia and Ghana (Bocher et al., 2017; Annim & Frempong, 2018).

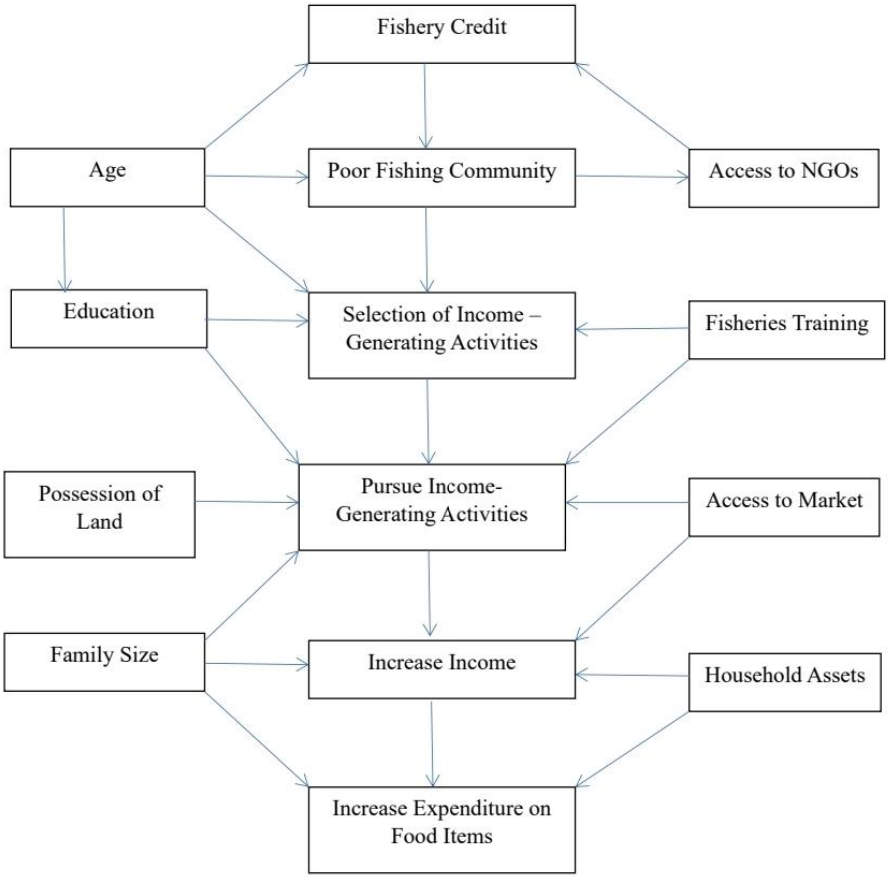
To address the living conditions of impoverished fish farming communities, NGOs in Bangladesh have extended credit support to them. The expectation is that with credit intervention, the household income of these fish farming communities will increase, leading to a subsequent rise in food consumption. However, it is noteworthy that several studies have indicated that credit programs in developing nations may not always yield the intended effects on economic indicators (Seng, 2018; Ali et al., 2017; Mahmud et al., 2022a; Mahmud & Hilton, 2020; Banerjee & Jackson, 2017). For instance, a study conducted by Seng (2018) in Cambodia found that credit intervention did not significantly improve the food consumption status of poor households. Some researchers have noted that credit programs in Bangladesh have fallen short of improving the living standards of poor rural borrowers, leading to their over-indebtedness due to stringent repayment schedules (Mahmud et al., 2019; Ali et al., 2017). A study conducted by Mahmud et al. (2022a) in Bangladesh further illustrated that credit programs failed to achieve the desired outcomes in the economic indicators of poor borrowers. Additionally, another study in Bangladesh found that providing credit support had no significant impact on increasing the household healthcare expenditure of impoverished fish farming communities (Mahmud & Hilton, 2020). Consequently, the following question arises: "Does the fishery credit program have a significant impact on the household food expenditure of fish farmers?"

This study aims to address the aforementioned question regarding the impact of fishery credit on household food security. It is essential to clarify that, in this study, food security refers to the total annual expenditure on food products by the household. The prime objective of this study was to assess the impact of fishery credit on household food expenditure of the fish farming communities. To the best of our knowledge, only a few studies have been conducted to assess the impact of microcredit on the food security status of fish farming communities in Bangladesh (e.g., Mahmud et al., 2022a). Therefore, it is anticipated that the findings of this study could prove beneficial for policymakers in implementing similar credit programs in similar socio-economic backgrounds in the global south.

2.0 Conceptual Framework

The expenditure on food items by households is intricately connected to various economic, social, and demographic factors, forming an interlinked web (as depicted in Figure 1). Mitra et al. (2019) discovered that fish farming communities often face challenges in successfully carrying out their fish farming activities due to a lack of accessible credit facilities. Mahmud and Hilton (2020) propose that extending credit assistance to underprivileged fish farmers can empower them to make informed decisions about their IGAs and invest in them judiciously. Mahmud et al. (2022a) emphasize the pivotal role of credit in improving the quality of life for rural fish farming communities, impacting both income and expenditures.

Figure 1: Conceptual framework for improving food expenditure of the fish farming communities.



The influence of age on individuals' economic pursuits has been acknowledged by Mahmud and Hilton (2020) and Ferdousi et al. (2023). Distinct age groups exhibit varied patterns of food production, consumption, and expenditure, underscoring the importance of considering age in the design and implementation of development initiatives. Furthermore, family size can significantly affect a household's essential expenses, including those related to food, clothing, and healthcare, as highlighted by Hilton et al. (2016), Al-Zabir et al. (2020), and Mahmud et al. (2022a). The presence of additional family members who are unemployed or dependent may constrain a household's ability to allocate funds toward food (Mahmud et al., 2022a). A household with more members actively engaged in farming or other IGAs holds a more advantageous position in conducting farming activities compared to a household with fewer members involved in such activities (Mahmud et al., 2022b). According to Hilton et al. (2016), education equips individuals with the necessary skills to make informed decisions, secure formal or semi-formal employment, and manage risks effectively. Additionally, education increases awareness about the adverse effects of malnutrition (Mahmud et al., 2022a; Kabir et al., 2018). In households with more educated members, a greater proportion of resources is generally allocated to purchasing food items compared to households with fewer

educated members. Training plays a crucial role in enabling fishing communities to adopt modern fisheries technologies and enhances awareness of social and economic aspects. Consequently, the skills of these communities in pursuing fisheries-related activities can be significantly improved (Kabir et al., 2018; Mahmud & Hilton, 2020). It can be hypothesized that a member of the fish farming communities with a higher number of fisheries-related training sessions is in a more advantageous position. They are likely to make judicious decisions, effectively address risks associated with fisheries-related activities, and have better access to fishery credit compared to a member with little or no training.

The rural population in Bangladesh encounters a scarcity of productive resources, limiting their capacity to invest, negotiate, and manage effectively—a circumstance mirrored in the fish farming households examined in this study. The possession of non-land assets, encompassing livestock, poultry, agricultural equipment, furniture, electronic devices, jewelry, etc., can undoubtedly play a pivotal role in enhancing an individual's living standards (Mahmud & Hilton, 2020). Moreover, individuals often leverage these assets as collateral when seeking loan assistance (Mitra et al., 2019). To uplift the living conditions of impoverished households, both government agencies and NGOs should proactively work towards increasing non-land assets through the provision of technological and financial support. It is plausible to assume that fish farming households with a greater number of assets are better positioned to invest in IGAs, embrace modern technologies, access information, and wield greater food purchasing power compared to those with fewer assets. Furthermore, Hilton et al. (2016) observed that individuals owning land generally enjoy better production and income outcomes than those without land ownership. The linkage between land ownership and food production is emphasized by Agarwal (2018). Land ownership exerts a positive influence on agricultural productivity, subsequently contributing to the improvement of food security among impoverished individuals (Al-Zabir et al., 2020). To ensure food security, providing access to physical capital for impoverished individuals is crucial. However, Mozumder et al. (2018) and Kabir et al. (2018) observed insufficient infrastructural facilities in rural areas of Bangladesh, hindering the participation of rural individuals in economic activities. This limitation results in reduced income and expenditures on both food and non-food items. The establishment of access to rural markets can be instrumental in aiding poor fishing communities. It enables them to secure fair prices for fishery products, obtain necessary inputs, and diversify their fisheries activities.

NGOs play a vital role in enhancing the financial capabilities of disadvantaged farming communities (Mahmud & Hilton, 2020; Mahmud et al., 2022a). NGOs not only support their clients in adopting modern technologies but also assist in building networks with various stakeholders and acquiring the necessary knowledge to pursue IGAs (Mahmud et al., 2022a; Hilton et al., 2016; Mahmud & Hilton, 2020). A logical hypothesis is that a member of fish farming communities maintaining frequent contact with NGO Branch Offices (NBOs) is better positioned to access fishery credit and training facilities. As a result, their food purchasing capacity will increase. Additionally, they may have a higher level of networking and risk management capacity. Therefore, it is imperative to establish effective collaborations between NGOs, donors, and the government to develop rural infrastructures such as roads, banks, marketplaces, and schools (Mahmud & Hilton, 2020; Kabir et al., 2018; Mahmud et al., 2022a). It is important to note that this conceptual framework and Figure 1 have been adopted and modified from Mahmud & Hilton (2020) and Mahmud et al. (2022a).

3.0 Methods

3.1 Time and Location of the Study

A survey was conducted on fish farming communities in Bangladesh to investigate the impact of credit support on their economic activities. The study took place from April to August 2022, covering five sub-districts (Upazilas) of Khulna district: Dakope, Dumuria, Batiaghatal, Rupsha, and Koyra. It is essential to note that during this period, a survey was also conducted among fish farming communities in the Rupsha Upazila and Koyra Upazila to form the Non-Credit Recipient Group (NCRG) or control group for comparison with the Credit Recipient Group (CRG) or target group. NCRG has not received any credit support for agricultural activities from government agencies or NGOs in the last seven years. In rural Bangladesh, an informal credit market persists, and it is common for members of fish farming communities to rely on informal sources such as relatives, neighbors, friends, and local money lenders to meet their financial needs (Alam & Guttormsen, 2019; Mitra et al., 2019).

3.2 Sampling Technique

In this study, selected NGOs have been implementing agriculture programs, encompassing crop cultivation, fisheries, and livestock farming in the study areas (i.e., Dakope, Dumuria, and Batiaghatal) since 2018. They provide financial and technical assistance to their borrowers. A comprehensive list of fishing communities that received loans for fish farming activities was compiled from the selected NGOs' branch offices. From this list, a sample of 385 fish farmers, both male and female, was randomly selected using the Simple Random Sampling (SRS) technique from a total population of 1,273 for this study. As mentioned above, these 385 fish farmers who received fishery credit support were considered the Credit Recipient Group (CRG). The percentage of male and female fish farmers in the CRG was 67.27% and 32.73%, respectively. The sample size was determined using an online sample survey calculator called the Survey System, considering a 5% margin of error at a 95% confidence level. Similar tools are also utilized by other researchers in social surveys (Mahmud & Hilton, 2020; Kabir et al., 2018; Ferdousi et al., 2023). The sampling frame was established based on the following criteria:

- The inclusion of marginalized, landless, and small male and female fish farmers.
- The fish farmers must be regular residents of the villages.
- Fish farmers who have not received loans from other financial institutions within the past five years.
- Fish farmers who obtained their first loan in 2019.
- Fish farmers who received loans ranging from $100 to $300 between 2019 and 2021.
- Fish farmers must be the principal income earner of the household.

It is essential to note that the above criteria were specified by the NGO branch offices within the Khulna district to conduct their fishery credit programs.

To select members of the NCRG for this study, 1382 individuals were purposively selected, all of whom initiated their fisheries-related activities in 2019 without the

help of any institutional credit support. Afterward, out of 1382 fish farmers, a sample of 300 fish farmers was selected using the SRS technique based on the same criteria used to form the CRG. In the NCRG (comprising 300 fish farmers), the percentage of male and female fish farmers was 82.34% and 17.67%, respectively. It is important to note that members of both CRG and NCRG were mainly engaged in six types of fisheries-related activities, including: (1) fish culture in the pond, (2) rice-fish culture, (3) crab farming, (4) fish processing, (5) selling of fish, and (6) selling of inputs (e.g., nets, fish feed, fingerlings, and fisheries equipment, etc.) for fish farming.

3.3 Data Collection

Before initiating the data-gathering process, a structured questionnaire was developed and pilot-tested in the study areas. Necessary modifications and adjustments were made based on feedback received from the pilot test, and the questionnaire was finalized for the survey.

In this study, primary data were collected through face-to-face interviews using the structured questionnaire. The data primarily focused on the following factors: (i) demographic characteristics of the fish farmers, (ii) resource base, (iii) household income and expenditures, (iv) fishery credit maintenance, (v) rural infrastructure facilities, (vi) household food security, (vii) opinions about the fishery credit program, and (viii) challenges faced by program participants.

To collect data, five experienced enumerators were assigned to the research locations. Each enumerator had a minimum of three years of experience conducting socioeconomic surveys. Before data collection commenced, all enumerators underwent three days of training on data collection methodologies and the questionnaire. During data collection, if any issues or ambiguities arose, the study team provided assistance to the enumerators to ensure accurate data collection.

3.4 Ethical Consideration

Prior to conducting the survey, participants were presented with a clear explanation of the study's objectives. They were assured that any data collected from them would be kept confidential and used solely for research purposes. Additionally, participants were required to sign a consent form indicating their willingness to participate in the survey.

3.5 Analytical Technique

In this study, we employed the Propensity Score Matching (PSM) technique to assess the impact of fishery credit on household food expenditures, encompassing expenses on cereals, meat, and fish. The annual food expenditure of each household was calculated by summing the food costs of all family members, denominated in Taka, the currency of Bangladesh. PSM has been utilized by other researchers to examine the effects of loan and zakat programs on economic conditions in Bangladesh and other countries (Mahmud et al., 2022a; Mahmud & Hilton, 2020; Sohag et al., 2015; Weber & Ahmad, 2014). Notably, zakat refers to a small amount of income that eligible Muslims are obligated to donate to disadvantaged members of society (Sohag et al., 2015). In PSM, it is crucial for the socioeconomic factors of the treatment (CRG) and control (NCRG) groups to be similar (Sohag et al., 2015; Ferdousi et al., 2023). To achieve this, three matching techniques were employed in

this study: Nearest Neighbor Matching (NNM), Kernel Matching (KM), and Radius Matching (RM), as outlined in Table 2. These matching techniques were also used in other studies (Mahmud et al., 2022a; Mahmud & Hilton, 2020; Ferdousi et al., 2023; Sohag et al., 2015). For matching purposes, three factors related to respondents' demographic characteristics (such as age and family size) and rural infrastructure facilities (such as the distance of the rural market from the respondent's home) were considered in this study. It is worth noting that these three factors have been used as matching factors in the PSM method by other researchers (Mahmud et al., 2019; Mahmud & Hilton, 2020; Ferdousi et al., 2023). Ensuring the fulfillment of balancing properties is crucial to maintaining the integrity of PSM (Haque & Dey, 2016; Ferdousi et al., 2023).

In this study, we utilized the Binary Logistic Regression (BLR) technique to explore the perspectives of fish farmers regarding their food expenditure capacity within the fishery credit program. Researchers in Bangladesh have previously employed BLR to gauge program participants' opinions on economic welfare (Ferdousi et al., 2023; Mahmud & Hilton, 2020). It is crucial to note that BLR is suitable when the dependent variable is dichotomous, as emphasized by researchers (Kabir et al., 2018; Ferdousi et al., 2023; Mahmud & Hilton, 2020). In our study, the dependent variable was "Food Expenditure Capacity of the Fish Farmer," which had two distinct categories. If a fish farmer perceived an increase in their food expenditure capacity due to participation in the fishery credit program, they were assigned a code of "one." Conversely, those who did not observe such an increase were coded as "zero." The model can be specified as:

$$\text{Ln}\,[Pi/1\text{-}Pi] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \mu \quad \ldots(1)$$

Pi = Probability that the food expenditure of fish farmers on food items would increase

1-Pi = Probability that food expenditure of the fish farmer on food items would not increase

X_1 = Age of the fish farmer (year)

X_2= Family size of the fish farmer (number)

X_3 = Possession of land by the household in 2021 (decimal)

X_4 = Amount of fishery credit received by the fish farmer in 2021 (Taka)

X_5 = Distance of the nearest rural market from the fish farmer’s house (kilometer)

X_6 = Distance of the nearest NGO branch office from the fish farmer’s house (kilometer)

X_7= Total value of non-land assets of the household in 2021 (Taka)

X_8= Fisheries training received by the fish farmer from 2019 to 2021 (number)

β_0 = Constant of the equation one

μ = Error term of the equation one

It is important to note that "Taka" represents the currency of Bangladesh, and the value of non-land assets refers to the value of fishery equipment, furniture, jewelry, and electronic goods (e.g., mobile, television) of the household in 2021in Taka.

Additionally, five Focus Group Discussions (FGDs) were conducted among fish farming communities in October 2022 to triangulate the findings of the quantitative results. Each FGD group comprised 7–8 members, providing valuable qualitative insights.

4.0 Results and Discussion

4.1 Socioeconomic Profile of Fish Farmers

The study delved into the socioeconomic characteristics of fish farmers, focusing on borrowers from both the CRG and the NCRG. The analysis revealed that borrowers from both groups shared a middle-aged demographic, with no significant difference in their age distribution (see Table 1). This alignment is attributed to the credit providers' strategy of supporting middle-aged people in initiating IGAs through loans. Similar observations by other researchers highlight the tendency of well-known NGOs in Bangladesh to extend microcredit primarily to middle-aged individuals rather than older ones (Mahmud et al., 2022b). The study also examined the educational background of borrowers, revealing no significant difference in the number of years of schooling between the CRG and NCRG (see Table 1). This finding aligns with the common trend observed in credit scenarios where borrowers typically have lower levels of education, often less than five years (Mahmud et al., 2022b). Family size, a crucial factor in understanding household dynamics, exhibited no significant difference between the two groups (see Table 1). Other studies conducted in Bangladesh also support this, reporting an average family size ranging from 4 to 5 members among microcredit borrowers (Mahmud et al., 2022b). Notably, the study highlighted a higher percentage of households headed by men in the NCRG compared to the CRG (see Table 1). This observation reflects the persistent influence of patriarchal norms in rural Bangladesh, corroborated by various researchers (Orso & Fabrizi, 2016; Zafarullah & Nawaz, 2019; Mahmud et al., 2023; Mahmud et al., 2019).

Regarding land ownership, the CRG exhibited a slightly higher average agricultural land possession compared to the NCRG, although both groups held relatively small plots (see Table 1). This aligns with the broader context in Bangladesh, where agricultural land is a limited and valuable asset, typically owned in small plots by rural farming communities (Mahmud et al., 2023; Hilton et al., 2016). Analysis of household food expenditure in both groups revealed no significant variance (see Table 1), indicating a similar financial commitment to food items. Moreover, distances from the nearest rural market and NGO branch offices did not significantly differ between the CRG and NCRG (see Table 1). However, the average distance from the nearest Agricultural Extension Office (AEO) showed a significant distinction between the two groups (see Table 1). This discrepancy suggests varying accessibility to agricultural support services. Lastly, the study noted limited participation in fisheries training programs for both the CRG and NCRG (see Table 1).

Table 1: *Profile of the Members of the CRG and NCRG*

Characteristics of Fish Farmers	**CRG (N=385)**	**NCRG (N=300)**	**t-value**	**p-value**
Average age of the respondent (years)	39.34	38.67	0.11	0.91
Average years of schooling of the respondent (number)	3.8	3.2	1.27	0.21
Average family size of the respondents in 2022	4.5	4.7	1.31	0.19
Percentage of male-headed households in 2022	86.34	92.67	-	-
Average land size of the household (decimal)	107.23	119.62	2.15	0.03**
Average household food expenditure in 2021 (Taka)	91213.41	87,724.68	1.52	0.13
Distance of market from respondent's house (km)	0.58	0.53	0.64	0.52
Distance of Agricultural Extension Office (AEO) from the respondent's house (km)	3.41	4.19	1.98	0.05**
Distance of the NGO from respondent's house (km)	1.24	1.31	1.63	0.11
Fishery training received by the respondent (%)	24.16	15.67	-	-

Source: Survey, 2022

Note 1: CRG= Credit Recipient Group; NCRG= Non-Credit Recipient Group

Note 2: Taka indicates the currency of Bangladesh

Note 3: 1 USD 86.30 Taka in 2022 (Ministry of Finance, 2023)

Note 4: ** indicates 5% level of significance

4.2 Impact of Fishery Credit on Household Income and Food Expenditures

Income stands as a crucial economic factor intricately tied to an individual's living standard. The logical assumption would be that providing fishery credit support contributes to increasing the income of fish farming communities, enabling them to allocate more resources to food items. However, contrary to this expectation, the study disclosed that fishery credit had no significant impact on the household income of fish farmers (see Table 2). A plausible explanation for this lack of impact could be the inadequacy of the small-sized fishery credit provided, coupled with the absence of sufficient training facilities. The study highlighted an average loan size of USD 112.87, which, according to the sentiments echoed in the Focus Group

Discussions (FGDs), was deemed insufficient for proper fisheries-related business operations. A fish farmer expressed:

> The amount of loan I received from the NGO was not at all sufficient to pursue my fisheries-related business properly. As a result, I had no other options than taking loans from money lenders with unfavorable terms and conditions.

During FGDs, another fish farmer said:

> I took loans from the NGO in my locality for fish culture. Alas! Sudden fish diseases caused severe damage to fish production and also my income. I do not have any agricultural insurance coverage to cover such damages. Despite this, I have to repay the loans on a weekly basis—I am more indebted now.

The majority of fish farmers (83.16%) in the study were classified as poor, a significant factor contributing to their limited spending on both food and non-food items. As discussed earlier, providing loans to impoverished fish farmers was envisioned to bolster investments in IGAs, elevating fish production, income, and subsequently, food expenditures. However, the reality depicted a different scenario, with fish farmers lacking the advantageous position envisioned for those with credit access. Notably, NGOs aimed to enhance the living conditions of fish farmers by increasing their food expenditures through credit facilities. Yet, the study unveiled that the credit support provided fell short of producing a significant impact on the targeted fish farmers (see Table 2). A parallel study in Uganda mirrored these findings, displaying no significant disparities in food diversity scores and food expenditures between existing and new loan borrowers (Namayengo et al., 2018). A plausible explanation for the study's findings could be the provision of credit without a thorough examination of the specific needs of fish farmers. This oversight may have resulted in an inability to utilize the credit effectively for IGAs, thus impeding the desired positive impact on fish farmers. Insights gleaned from the FGDs with members of the fish farming communities participating in this study revealed additional factors contributing to the decrease in food expenditures. Participants highlighted the escalating costs of food items, the obligation to repay previous debts, and a lack of knowledge concerning food and nutrition as significant influences. The sentiments expressed during the FGDs resonated with the multifaceted challenges faced by these communities. A female fish farmer shared her concerns, saying:

> We are a poor family of five, with only my elder daughter and me earning. The rising prices of food items pose a significant challenge. With our limited income, sustaining ourselves is becoming increasingly difficult. We are left with no option but to cut down on our food budget.

Similarly, a middle-aged male fish farmer disclosed his financial struggles, narrating:

> Two years ago, I borrowed money from relatives and friends to support my son's education at the college in Khulna City. The monthly burden of repaying these loans, coupled with ongoing educational expenses, poses a substantial financial strain. I am not affluent, and meeting these expenses with my current income is quite challenging. I am diligently working to save money from my tight budget, and the most practical approach is to cut down on both our grocery and non-essential expenses.

These firsthand accounts underscore the intricate web of challenges faced by fish farmers, encompassing economic constraints, educational expenses, and the relentless impact of rising food prices. The narratives provide a poignant snapshot of the daily struggles and adaptive measures undertaken by individuals striving to navigate financial difficulties within the constraints of their income and resources.

Table 2: *Estimated Results of the Propensity Score Matching (PSM)*

Variable	**ATT**	**t-value**	**p-value**	**Matching Method**
Household income in 2021 (Taka)	6294.41	0.53	0.59	NNM
Household income in 2021 (Taka)	7275.42	0.61	0.54	KM
Household income in 2021 (Taka)	6143.25	0.72	0.47	RM
Household food expenditure in 2021 (Taka)	3172.37	1.32	0.19	NNM
Household food expenditure in 2021 (Taka)	2847.92	1.17	0.24	KM
Household food expenditure in 2021 (Taka)	3319.53	1.08	0.28	RM

Source: Survey, 2022.

Note 5: ATT indicates the Average Treatment Effect on the Treated

Note 6: NNM= Nearest Neighbor Matching; KM= Kernel Matching; RM= Radius Matching

4.3 Key Factors Influencing Food Expenditures

The study identified several key factors influencing the food expenditure capacity of fish farmers, shedding light on pivotal considerations for enhancing their economic well-being (see Table 3). The following two factors had a significant impact on the dependent variable "Food Expenditure Capacity of the Fish Farmers."

4.3.1 Distance to NGO branch offices. The research highlighted a noteworthy relationship between the distance from a borrower's home to the NGO branch office and their food expenditure patterns (see Table 3). Specifically, when this distance exceeded one kilometer, there was a 12.84% chance of a decrease in food expenditure. This underscores the significance of maintaining close proximity

between NGO branch offices and fish farmers' residences. A greater distance could impede farmers' frequent access to essential support, hindering their ability to receive crucial technological, legal, and financial assistance. This, in turn, can lead to reduced income, constraining their capacity to spend on both food and non-food items. Therefore, advocating for the establishment of NGO branch offices near villages becomes paramount, fostering a positive working relationship between field-level NGO staff and fish farming communities.

Table 3: *Estimated Results of the Binary Logistic Regression (BLR)*

Variables	**Coefficient**	**Level of Significance (p-value)**	**Odd Ratio**
Age of the respondent (year)	0.114748	0.83	1.12159
Family size of the respondent (number)	0.517817	0.59	1.67836
Possession of land by the respondent's household (decimal)	0.283786	0.61	1.32815
Amount of fishery credit received by the respondent (Taka)	0.353716	0.14	1.42435
Distance of rural market from the respondent's house (kilometer)	-0.134812	0.11	0.87388
Distance of NGO office from respondent's house (kilometer)	-2.03202**	-0.02	0.13107
Value of non-land asset of the household (Taka)	3.752119**	0.03	42.61128
Fishery training received by the respondent (number)	0.147221	0.28	1.15861
Pseudo R-Square: 42.37			
Hosmer-Lame show Chi-Square: 0.73 (p-value: 0.84) (Insignificant)			

Source: Survey, 2022.

Note 7: Probability = Odd / [1+Odd]

Note 8: ** indicates 5% level of significance

Note 9: Non-land assets refer to fishery equipment, furniture, jewelry, and electronic goods.

4.3.2. Value of non-land assets: The study uncovered a positive and statistically significant association between the value of non-land assets and the food expenditure capacity of fish farmers (see Table 3). For every unit increase in non-land assets, there was a substantial 97.71% likelihood of a rise in household food expenditures. This finding aligns with Mahmud et al.'s (2017) observations in a Bangladesh study, emphasizing the positive impact of asset value on the economic

well-being of underprivileged women borrowers. The correlation between education, wealth, and improved household food security, as highlighted by Szabo et al. (2016), further underscores the significance of non-land assets in shaping economic outcomes.

These findings underscore the importance of strategic proximity to NGO resources and the value of non-land assets in shaping the economic landscape for fish farmers, providing actionable insights for policymakers and stakeholders aiming to enhance the well-being of these communities.

5.0 Limitations of the Study

This study sought to assess the influence of fishery credit on the food expenditure of fish farming communities. However, certain limitations must be acknowledged to provide a comprehensive understanding of the study's scope.

5.1 Narrow Focus

The study exclusively aimed at exploring the impact of fisheries credit on food expenditure, overlooking other influential factors. Crucial aspects such as fisheries training and access to physical capital (like banks and fishery extension offices) were not considered. These factors could significantly contribute to the food expenditure capacity of fish farmers.

5.2 Lack of Comprehensive Investigation

Regrettably, the study faced constraints in investigating the credit-plus approach's impact on the food security status of poor fish farmers. The credit-plus approach integrates credit support with additional services like skill-building training, non-formal primary education, healthcare, and social development. The design of development programs implemented by NGOs in the study areas restricted our ability to draw conclusions regarding the holistic impact of the credit-plus approach on food security.

5.3 Scope for Future Research

Considering the identified limitations, it is imperative that future research endeavors focus specifically on the credit-plus approach. Investigating the comprehensive impact of credit-plus, particularly on the food security status of impoverished fish farmers, would provide valuable insights. This entails delving into the synergies between credit support and various complementary services to formulate more nuanced conclusions.

While this study sheds light on the specific nexus between fisheries credit and food expenditure, recognizing these limitations underscores the need for future research endeavors to broaden the scope and explore the multifaceted dynamics influencing the well-being of fish farming communities.

6.0 Conclusion

This study aimed to assess the impact of providing credit support to fisheries on the food expenditure status of marginalized fish farming communities in Bangladesh. However, the study's findings indicate that credit initiatives alone have not significantly improved the food expenditure of households within the fish farming

community in Bangladesh. This underscores the necessity for a more holistic approach to development initiatives, as advocated by Garcia et al. (2021), where credit assistance is integrated with other measures. The study underscores the critical influence of asset value and the proximity of NGO branch offices on the purchasing capacity of fishing households.

7.0 Policy Implications

For both the public and private sectors, prioritizing the transfer of assets, such as nets and fish farming equipment, to underprivileged fish farming communities is crucial. This approach empowers them to effectively manage existing IGAs and launch new ones, leveraging these assets efficiently and consequently increasing funds available for food expenditure. To further bolster the food security of underprivileged fishing communities, a recommended strategy is providing financial assistance to NGOs through government agencies. This would enable NGOs to extend loans to farming communities at lower interest rates, thereby enhancing the purchasing power of impoverished fish farmers for both food and non-food items.

To enhance the food security of these communities, strict enforcement of existing rules and regulations is essential to curb price fluctuations in essential food items. Such fluctuations can disproportionately impact the food security of the impoverished. Additionally, tailoring training programs to the specific needs of fish farming communities is vital. This approach can contribute to increasing their income levels, consequently elevating the expenditure capacity on food items.

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