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Microcredit's effects on household's Bangladeshi perspective on fish producers' earnings and expenses

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Abstract

Purpose: The primary objective of this research is to conduct an assessment of how access to microcredit facilities influences household expenses and income patterns among fish farmers in Bangladesh.

Design/methodology/approach: Using data collected from long panel surveys over a period of two years, this research explores how access to microcredit facilities influences household expenses and income patterns among fish farmers in Bangladesh. Statistical analysis was then conducted through statistical analysis models, an aspect that detailed the use of regression analysis and paired t-tests in the evaluation of the changes in the fish producer's expenses and earnings.

Findings: The findings of the research revealed that fish producers in Bangladesh with microcredit privileges experienced a significant increase in their average monthly incomes citing a mean increase of close to 28%, $p < 0.01$, with notable changes in their expense's patterns primarily in feeds and investments in fishing equipment. Outcomes of the control group further revealed minimal changes in costs and earnings.

Originality / value: Microcredit facilities as revealed in this research enhance the economic stability and sustainability of fish producers in different regions in Bangladesh, increasing earnings or income and more strategic use of expenditures. The findings detail the essence of microcredit facilities in fostering and establishing sustainable livelihoods within the Bangladeshi fishing community.

Keywords: Microcredit Facilities; Fish Producers; Fish Producers Earnings; Poverty Alleviation; Fish Producers Expenses

JEL codes: G15, A12

1. Introduction

The fisheries industry plays a vital role in Bangladesh's economy, a factor that is evident in its contribution to employment, food security, and export income and earnings. Reports from the Ministry of Fisheries and Livestock reveal that in 2024, the fisheries sector accounted for close to 3.5% of the nation's GDP, thus providing livelihoods to over 16 million people in the country. As provided, the role of the fisheries industry is critical in the rural regions where fishing serves as a source of income for several households (al., 2023). However, despite its importance within the economy, the fisheries sector faces several challenges that span from overfishing, climate change, and limited access to an array of financial resources and privileges. Microcredit facilities in Bangladesh have over the recent years emerged as a solution and alternative to addressing financial constraints that small-scale fish farmers and producers face. Designed

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to promote economic growth and development among low-income populations, microcredit initiatives allow small loan disbursements to populations that lack access to other traditional financial services. As specified by Senseco, Thomas, et al (Soseco, 2024) in the Hatiya District of Bangladesh, microcredit institutions (MFIs) are revealed to have increased since the early 80s, playing a fundamental role in the alleviation of poverty. Further, recent data collected from the renowned Bangladeshi Microfinance Regulatory Authority established that microcredit facilities and sectors in the country have widely expanded, currently serving close to 7 million fish borrowers. As small and marginal fish producers have little to no access to different sources of credit, evidence shows that microcredit facilities provide them with access-to-access inputs such as feeds at the required time.

Studies further reveal that access to varied microcredit facilities can enhance the economic sustainability and conditions of fish producers. This is evident in the fact that microcredit facilities facilitate investments that are essential inputs in accessing boats, fishing gears, feeds, and other gears that increase profitability and production. Pati, Sunita, et al. (Pati, 2023) further establishes that microcredit equally helps fishing households to diversify their individual income resources, a factor that reduces their vulnerability to different shocks that include market fluctuations, and poor catch seasons. As detailed in a report by the Fisheries Ministries earlier in 2023, households that engage and interact with microcredit facilities and products experience over 36% increase in their overall household income, an aspect that allows the fish producers to reinvest their profits back to fishing operations (Molla, 2023). However, the evidence provides that the impacts of varied microcredit products and facilities on the fish producer's expenses and earnings remain a widely unexplored factor, with precision to a household's perspective. Given this, an understanding of the manner in which microcredit facilities and programs widely influence expenditures and income patterns remains critical in the evaluation of the long-term effects of these sustainability initiatives. This research therefore seeks to bridge this gap by underpinning the effects of microcredit on the expenses and the earnings of fish producers in the Hadiya District of Bangladesh. The findings of the research therefore provide empirical evidence that may guide policy developers and stakeholders within the industry to optimize micro-financial investments within the fishing industry (Mohammad Ataur Rahman, 2024). Through an analysis of the interplay that exists between economic outcomes and microcredit access, the research will contribute to the broader view and discourse on microcredit facilities in the reduction of poverty among fish producers in Bangladesh.

2. Related works

2.1. Producers Earnings and Expenses

Reports reveal that as of 2024, several of the fish producers in the Hatiya District of Bangladesh significantly contributed to the nation's GDP, accounting for close to 3.5%. Recent data collected from the Ministry of Fisheries and Livestock equally indicated and established that the reported average monthly returns and earnings of the fish producers in the Hatiya District of Bangladesh span between BDT 18,000 to BDT 28,000—a factor that depends on several variables that include market access, fish types, and production approaches (Lal, 2023). Notable, evidence equally reveals that the top fish producers, with precision to those involved in aquaculture, may earn close to BDT 30,000 on a monthly basis. It is, however, essential to establish that these earnings are widely offset by operational expenses. Averagely, the fish producers often incur other monthly expenses that range from BDT 10,000 to BDT 18,000, an aspect that covers the costs of feeds, transportation, and the maintenance of their fishing gear. Equally, evidence reveals that a larger portion of such expenses are equally allocated to the purchase of quality feeds to maintain sustainable fishing practices. To this effect, microcredit initiatives have turned out as promising, with its beneficiaries revealing up to 30% significant increase in their earnings (Kimaro, 2024). Such improvements are widely attributed to the fish producer's reinvestment in equipment and other better fishing practices. The inclusion of microcredit support therefore allows several fish producers to increase their economic stability and productivity, resulting in the alleviation of poverty in rural communities in the Hadiya District of Bangladesh

2.2. Description of Microcredit Effects Model on Fish Producers Earnings and Expenses:

The microcredit effects model designed to examine fish producer's expenses and earnings as provided in Figure 1 below illustrates the measures and the pathways through which access to microcredit facilities influences the economic growth and outcomes of the fish producers. At the very core of the model, access to microcredit serves as an input that facilitates the financial resources available for the fish producers. From the input, a section of processes is evident that include the diversification of income resources and investments in fishing assets. The access to microcredit therefore allows the fish producers to consider investing in some of the essential gears and equipment's that include boats and fishing nets, an aspect that enhances productivity (Hossain, 2024; Herath Bandara, 2024). This further opens room for diversification, an aspect that enables the households to consider other alternative income streams that include aquaculture and other related businesses.

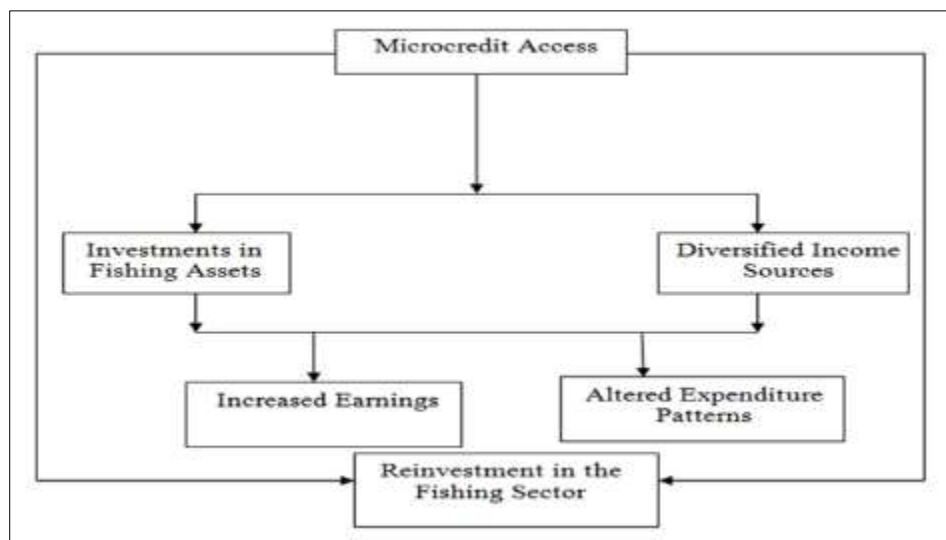


Figure 1 Microcredit access structure

These procedures result in critical outcomes that include an increase in earnings and an alteration in expenditure patterns. As the fish producers increase their earnings, they are likely to reinvest the proceeds and profits into other fishing operations, an aspect that amplifies the economic level and stability of the sector. The alteration of expense patterns serves as a reflection of a shift in sustainable practices that include improving the fishermen's living conditions and purchasing quality feeds. The model in this case incorporates varied contextual variables such as market conditions and other external aspects that influence the need for microcredit facilities (Eric Brako Dompheh, 2023). Notably, the model provides a framework that may be used in demystifying how microcredit facilities enhance the likelihoods of fishermen in Bangladesh.

3. Material and methods

The data utilized in this research was collected from past panel surveys spanning 3 years (2023-2024). The first round of cross-sectional surveys was conducted from 2019-2021 and was focused on determining the impact of microcredit facilities on social and economic advancement of the poor fishing producers in Bangladesh. The survey, conducted jointly with the Ministry of Fisheries and Livestock and the World Bank. The survey primarily covered a total of 2,650 fishing households who were randomly selected from the districts. The second round of surveys were on the other hand conducted earlier in 2022/23. However, close to 150 fishing producers and households could not be retraced, resulting in the survey of 2,500, a factor that implied an attrition rate of close to 6.8%. Further, the 2024 survey included other new fishing households from some of the new and old districts in Bangladesh, and in total, 2,800 fishing populations and households were surveyed. Given this, the analysis of this study was therefore based on the recent survey 2023/24 as indicated in Table 1 below:

Table 1 Microcredit Initiative Participation Level Among Fishing Households 2019-2024; The sample is restricted only to 2,800 fishing households from 2022/23 surveys

Year of Survey	BRAC	ASA	BURO	SSS	Others	Non-Participants
2023-24 (n=2650)	6.8 (7.6)	12.4 (8.5)	6.2 (5.1)	0 (0)	0 (0)	68.2
Early 2024 (n=2500)	18.6 (12.6)	14.8 (9.6)	9.8 (5.8)	6.9 (4.5)	56.9 (26.3)	62.1
Mid 2024 (n=2800)	29.5 (26.2)	28.7 (24.2)	6.2 (2.6)	38.6 (22.5)	76.4 (48.5)	36.4

In 2023/24, close to 68.2 per cent of the fishing households belonged to a microcredit institution, with the borrowers primarily constituting 36% of the research population. Cumulative borrowing was evident from different microcredit initiatives offered by the financial institutions. A steady increase of borrowing was notable, with the total amount of the per household borrowed in 2023/24 standing at BDT 9,500 as compared to BDT 12,000 offered in early 2024, and BDT

15,000 provided in mid-2024 [11]. This therefore implied a significant growth rate of close to 6 percent annually on microcredit borrowing over the subsequent 3 years period.

Table 2 Microcredit Products Engagement Rate Among Fish Producers 2023-2024

Year of Survey	BRAC	ASA	BURO	SSS	Subsequent Loans from the Programs	Aggregate Savings on the Microcredit Programs
2023/24 (n=2650)	18,687.8 (1.78)	6,386.2 (0.26)	8,675.9 (0.62)	10,876.6 (0.76)	12,643.6 (0.82)	868.6 (0.06)
Early 2024 (n=2500)	24,674.8 (2.64)	8,868.8 (0.65)	9,867.2 (0.72)	12,786.0 (0.85)	16,897.09 (0.96)	987.5 (0.98)
Mid 2024 (n=2800)	16,879.9 (0.94)	12,923.9 (0.84)	14,879.2 (0.87)	18,657.0 (0.96)	19,657.2 (0.98)	996.8 (0.99)

As suggested in Table 2 and in Table 3, while the output in the access to microcredit initiatives increased overtime, a difference in the participants and the non-participants fail to show consistency in the pattern. An example is evident in the fact that while per capital levels of expenditure of the non-participants seemed to be higher than that of the participants in the year 2023/24, an opposite trend is equally observed, establishing a statistical significance in the difference.

3.1. Validating the Microcredit Effects Estimates

Data establishes that microcredit initiatives as viewed in the cross-sectional surveys collected above focused on the cumulated number of levels of borrowing over the period of 3 years as an intervening variable. Given this, the consideration of a reduced level of demand equation in determining the amount may be modeled through the consideration of the *i-th* fishing households within a *j-itc*h district in Bangladesh within a period of t as provided below:

$$C_{jift} = \varepsilon_{xjift} + x_{jift} \gamma_{xi} + \mu_{jift} + (x + a)^n \dots\dots (1)$$

As provided, x serves as the vector that determines the fishing household’s determinants such as education of the household, age, sex, and landholding while the vector ε determines the unknown parameters that are estimated within a specified time. Given this, conditional demands on the outcomes of the variables are in this case conditioned to determine the level of microcredit demand (C_{jift}) as:

$$W_{jift} = \mu_{jift} \varepsilon_x + C_{jift} \gamma_m + \gamma_{xi} + \mu_{jift} + (x + a)^n \dots\dots\dots (2)$$

As detailed in the Equation above, the variables μ_{jift} and ε_x serve as the effects of microcredit facilities and initiatives on fish producers household earning and expenses. To this effect, constant estimates on the microcredit effects as detailed in the variables μ_{jift} and ε_x are in this case obtained in the Equation below through the use of a fixed-effect model. The model has no resource to any instrumental variable and estimation, thus resulting in the assumption that error terms on the detailed credit outcomes and demands are typically not corelated (Dash, 2024). In such a circumstance, the Equations below may be rewritten through the incorporation of variations in μ and γ over a specified time as provided below:

$$\Delta C_{jift} = \Delta \varepsilon_{xjift} + \Delta x_{jift} \gamma_{xi} + \Delta \mu_{jift} + (\Delta x + \Delta a)^n \dots\dots\dots (3)$$

$$\Delta W_{jift} = \Delta \mu_{jift} \varepsilon_x + \Delta C_{jift} \gamma_m + \Delta \gamma_{xi} + \Delta \mu_{jift} + (\Delta x + \Delta a)^n \dots\dots\dots (4)$$

This therefore changes the outputs of the equation as provided below:

$$X_{jift} = W_{jift} + \Delta \mu_{jift} \varepsilon_x + \Delta \mu_{jift} \Delta \varepsilon_{xjift} + \Delta x_{jift} \gamma_{xi} + \Delta \mu_{jif} \dots\dots\dots (5)$$

Notably, the error terms may equally be related since an unobserved variable detailed in the socio-economic factors may be assumed as fixed within a household’s level and may change with time.

3.2. Estimation of the Dynamic Microcredit Effects on Households

In assessing the dynamic effects of the microcredit facilities, the research employed paneled data regression model that provided for an approach that was used in examining the individual-level and temporal variations. An Equation as provided below was established as a basis of the model:

$$W_{it} = \mu + \gamma_1 \text{Microcredit}_{it} + \gamma_2 W_{it} + \gamma_3 W_{it}^{(t-1)} + \mu_{it} \dots\dots\dots (6)$$

As detailed in the Equation above, the vectors W_{it} serve as a representation of the dependent variables that span from expenses and household earnings within a provided time t for households i . On the other hand, the variables marked as Microcredit_{it} is primarily considered as binary variables that indicate whether the established fishing households have access to different microcredit facilities within a provided time t . Given this, the models primary incorporates the past and the current values of the identified dependent variables, an aspect that provided account over the household earning and expenses inertia. An estimate of the model’s parameters therefore detailed the need for the use of a Generalized Method of Moments (GMM) estimator (Beyene, 2024). The estimator was suitable in underpinning the dynamics of the panel data that lagged as dependent variables. The use of this approach played a critical role in addressing endogeneity issues in order to provide a consistent estimate as expressed below:

$$\mu = \arg \min_{\mu} \frac{t}{(x-1)} \mu + \gamma_1 \text{Microcredit}_{it} + \gamma_2 W_{it} + \gamma_3 W_{it}^{(t-1)} + \mu_{it}^{(t-1)} \dots\dots (7)$$

Employing the dynamic panel and data approach through the use of the GMM estimator therefore provides an understanding of microcredit effects on household’s earnings and expenses. Given this, the insights establish the variables marked as microcredit_{it} is primarily considered as binary variables that indicate whether the established fishing households have access to different microcredit facilities within a provided time t .

4. Results

Before conducting a regression analysis on the data, an understanding of the baseline characteristics of each of the sample participants as viewed in the panel surveys spanning 3 years was essential. Table 3 provides a summary of the financial and the demographic characteristics of the households of fish producers as stratified by the microcredit facilities.

Table 3 Descriptive Statistics of the Panel Surveyed Population

Variable	Microcredit Population (n=1400)	Control Group (n=1400)	Total (n=2800)
Education	8.6 (±12.8)	6.6 (±16.8)	4.9 (±9.4)
Age (Years)	48.6 (±2.8)	32.6 (±3.6)	24 (±6.4)
Household Size	6.8 (±2.4)	5.6 (±3.4)	6.8 (±7.4)
Monthly Income (BDT)	35,000 (±2,600)	25,000 (±3,500)	16,500 (±2,000)
Monthly Expenditures (BDT)	24,000 (±2,200)	20,000 (±2,300)	16,500 (±2,000)

Table 3 indicates that fishermen households that have an access to varied microcredit facilities widely report a significant level of high monthly income pegged at BDT 22,500 as competed to the control group that lacks access to microcredit facilities who recorded an income level of BDT 15,500. On the other hand, the households with microcredit facilities reported a higher level of educational attainment, a factor believed to inform their choice to access these financial resources (Bellemare, 2024). Efforts intended at quantifying the effects of microcredit facilities on the households earning and expenses established the need for panel data models. To this effect, the outcomes as viewed in the GMM estimator is provided in Table 4 below:

Table 4 GMM Estimation in Quantifying the Effects of Microcredit Facilities

Dependent Variable	Coefficient β	Standard Error	p-value
Age	180	60	<0.01
Household Size	-250	200	0.05
Access to Microcredit	4,500	1,800	<0.001
Educational Level	800	160	<0.01
Lagged Earnings	0.8	0.4	<0.001

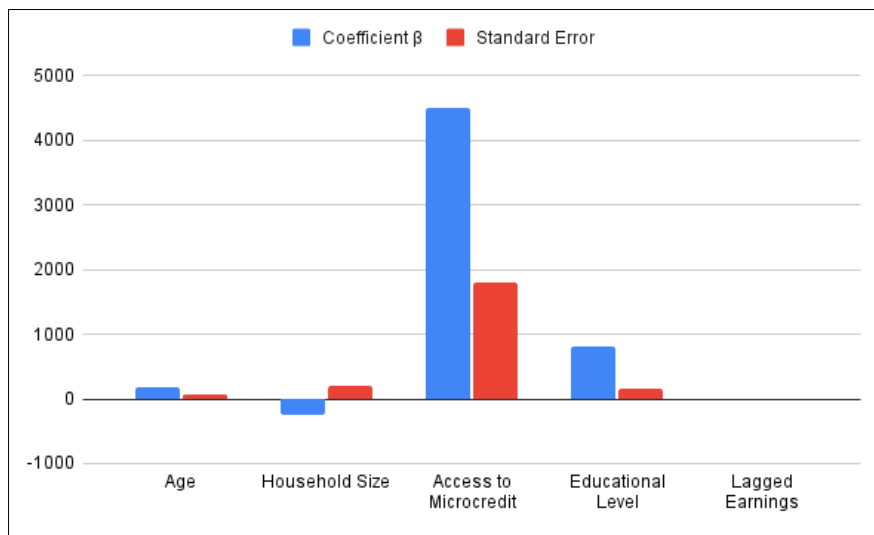


Figure 2 GMM Estimation in Quantifying the Effects of Microcredit Facilities

As provided in Table 4 and in Figure 2 above, the outcomes show that the access to varied microcredit facilities among fishing households in Bangladesh significantly increases the monthly earnings of the populations by an average of close to BDT 4,500 ($p < 0.001$). On the other hand, the educational level of the households as viewed in the findings has a positive correlation with their earnings, establishing the role of the level of education in the use and access to financial services. More interestingly, the findings equally establishes that the coefficients for the household sizes determines a negative relationship between the elements of microcredit facilities and earnings, an indicator that some of the largest households are likely to face diminished levels of earnings and returns.

The dynamic panel model was further used in the analysis of the households’ expenses provided in Table 5 below:

Table 5 GMM Estimation in Quantifying the Effects of Microcredit Facilities on Household Expenses

Dependent Variable	Coefficient β	Standard Error	P-Value
Age	250	130	0.05
Household Size	-250	200	0.05
Access to Microcredit	2,500	800	<0.01
Educational Level	400	40	<0.05
Lagged Earnings	0.2	0.1	<0.001

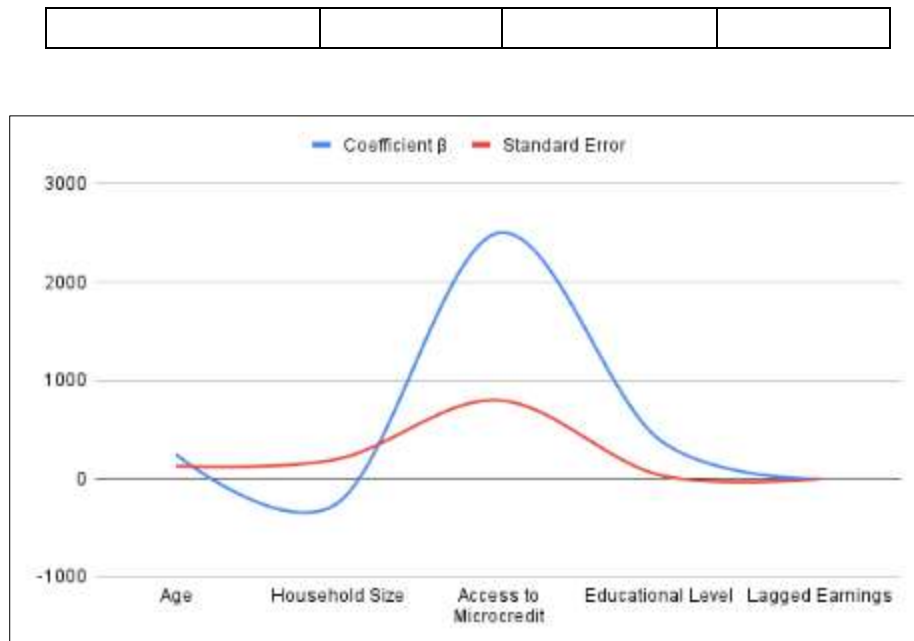


Figure 3 GMM Estimation in Quantifying the Effects of Microcredit Facilities on Household Expenses

As provided in the analysis, the access to microcredit access among fishing households remains a phenomenon that is primarily associated with a significant increase in the populations monthly expenses projected at BDT 2,500 ($p < 0.01$). As typified, it is evident that an increase in earnings may therefore reflect a higher investment in fishing feeds and high-quality fishing gears. These tools are efficient in enhancing the productivity levels of the households. In light of this, it is assumable that there is a significant or rather a positive correlation between expenses and age as suggested in Table 5, establishing that old fish producers and households widely invest in fish operations as a result of their levels of experience (Africano, 2024). The alteration of expense patterns serves as a reflection of a shift in sustainable practices that include improving the fishermen's living conditions and purchasing quality feeds. The model in this case incorporates varied contextual variables such as market conditions and other external aspects that influence the need for microcredit facilities. Notably, the model provides a framework that may be used in demystifying how microcredit facilities enhance the likelihoods of fishermen in Bangladesh.

5. Discussion

As provided in the findings of this study and from the panel data and model designed to examine the variables of the research, this research focused attention on examining the effects of microcredit initiatives on the expenses and earnings of fish producers in different locations in Bangladesh. Given this, the primary objective of this research is to conduct an assessment of how access to microcredit facilities influences household expenses and income patterns among fish farmers in Bangladesh. The research primarily relied on data collected from long panel surveys over a period of 2 years, this research explores of how access to microcredit facilities influences household expenses and income patterns among fish farmers in Bangladesh. The findings of the research revealed that fish producers in Bangladesh with microcredit privileges experienced a significant increase in their average monthly income, with notable changes in their expense's patterns primarily in feeds and investments in fishing equipment. Outcomes of the control group further revealed minimal changes in costs and earnings. households that engage and interact with microcredit facilities and products experience over 36% increase in their overall household income, an aspect that allows the fish producers to reinvest their profits back to fishing operations. However, the evidence provides that the impacts of varied microcredit products and facilities on the fish producer's expenses and earnings remain a widely unexplored factor, with precision to a household's perspective. Given this, an understanding of the manner in which microcredit facilities and programs widely influence expenditures and income patterns remains critical in the evaluation of the long-term effects of these sustainability initiatives. This research therefore seeks to bridge this gap by underpinning the effects of microcredit on the expenses and the earnings of fish producers in the Hatiya District of Bangladesh. In this, regard, it is assumable that microcredit facilities as revealed in this research enhance the economic stability and sustainability of fish producers in different regions in Bangladesh, increasing earnings or income and more strategic use of expenditures. The findings detail the essence of microcredit facilities in fostering and establishing sustainable livelihoods within the Bangladeshi fishing community.

6. Conclusion

This study examines the impact of microfinance initiatives on the income and expenditure patterns of fish producers in Bangladesh, focusing on Hatiya district. Using two-year panel data, the study reveals that fish farmers with access to microfinance experienced a significant 36% increase in household income, primarily reinvested in feed and fishing equipment. In contrast, the control group showed minimal change in income and expenditure. The results highlight the important role of microfinance in enhancing economic stability and sustainability, enabling fish producers to improve their livelihoods. However, the variation in the impact of different microfinance products on household income and expenditure remains to be explored. This study emphasizes the importance of microfinance in enhancing sustainable livelihoods among Bangladeshi fishing communities, contributing to both economic growth and strategic financial practices.

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