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Research Article

Constrains Faced by the Farmers in Shrimp Culture: An Empirical Investigation from Selected Areas of Bagerhat District

Bibekananda Hira[1], Md. Asifur Rahman[2]✉, Mohummed Shofi Ullah Mazumder[3], Md. Sekender Ali[3] and Abdullah Al Masum[4]

[1] Research, Extension and Popularization of Vegetables and Spices Cultivation on Floating Bed Project (DAE Part), Department of Agricultural Extension (DAE)

[2] Department of Agricultural Extension Education, Faculty of Agriculture, Bangladesh Agricultural University, Mymensingh-2202

[3] Department of Agricultural Extension and Information System, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka

[4] Department of Agriculture, Govt. Teachers Training College, Mymensingh, Bangladesh

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Correspondence
Md. Asifur Rahman
✉: asifur.agext@bau.edu.bd

ABSTRACT

Shrimp cultivation is having a significant impact on the economy and socio-economic status of the coastal regions in Bangladesh. Here, we investigated the constrains faced by the farmers towards shrimp culture, and to identify the influential factor affecting farmer constrains in shrimp culture. Data were collected from nine villages of Char Baniari union under Chitalmari sub-district of Bagerhat district purposefully. Yamane's (1967) technique was used to randomly choose 90 shrimp farmers for personal interviews. 'Constraints faced by the farmers in shrimp culture' was the focus variable of the study which was measured by using a 4-point rating scale. A score of 3, 2, 1, and 0 was assigned to the categories of "high," "medium," "low," and "not at all" in the responses. The data was analyzed using a combination of descriptive and inferential statistics, including multiple linear regression and stepwise regression models. The majority of farmers (68.90%) was found with facing a high level of constrains in shrimp culture. The results from multiple linear regression identified that age, education, and contact with extension media were noticed as the significant influential variables explaining 53.5% variation. Experienced farmers should be encouraged to participate in shrimp culture so that their experience can be utilized properly. The Ministry of Education and local level non-government organizations (NGOs) should collaborate to implement adult education programme. Additionally, extension workers must ensure that all farmers can access the extension service.

Introduction

Bangladesh ranks as the fifth-largest producer of aquaculture (FAO, 2022). The shrimp cultivation accounts for 71.4% of the total national production (Ray et al. 2021a). The aquaculture sector in Bangladesh has grown significantly and is now the second-largest export industry in the country after textiles (Islam, 2023). It plays an important part in the economy of Bangladesh. The commercial mode of aquaculture began to develop gradually in the mid-1970s (Akber et al. 2017) in response to the rising demand in the international market. Shrimp culture is predominantly carried out in the districts of Khulna, Satkhira, Bagerhat, and Cox's Bazar in Bangladesh (Kabir and Hossain, 2021). Without a doubt, the coastal shrimp farming communities' sustainability, resilience, and socio-economic well-being are greatly enhanced by shrimp farming in these areas (Tigchelaar et al. 2022). The fisheries sector accounted for around 2.43% of total export earnings and 22.14% of the agricultural industry (DoF, 2024).

The swiftly growing shrimp farming industry has generated several employment prospects, with 87,000 workers directly involved in farming, in addition to 5,000 to 6,000 families participating in shrimp processing and associated sectors (BBS, 2017). The most recent estimates indicate that a significant expanse of saline land is utilized for shrimp culture in Bangladesh (Karim et al. 2019a), positioning it as a

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valuable contributor to the national economy and facilitating the profitable use of otherwise uncultivable land. Shrimp farming and related industries are currently the primary sources of income for rural communities in the southern and southeastern coastal regions of Bangladesh (Haque et al. 2022). A major contributor to Bangladesh's GDP, shrimp aquaculture has been expanding rapidly in recent years (AftabUddin et al. 2021).

According to the United Nations Development Programme (UNDP) and the Food and Agriculture Organization (FAO), the amount of area devoted to shrimp farming increased significantly from 1.4 lakh hectares in 1980 to around 2.63 lakh hectares in 2021-22 (DoF, 2022a). A growing number of private individuals are taking use of modern breeding techniques to establish hatcheries specifically for the purpose of producing post-larvae of shrimps. "White gold" (sada sorno) is the Bengali term for two shrimp species-*Penaeus monodon* (black tiger shrimp), also known as Bagda, and *Macrobrachium rosenbergii* (freshwater shrimp), which are highly prized economically (Abdullah et al. 2017). In the fiscal year of 2021–2022, around 50 shrimp hatcheries and 39 shrimp hatcheries, run by both public and private entities, produced 833 crores of Bagda and 6.72 crores of Galda PL, respectively (DoF, 2022b).

Brackish water shrimp (*Penaeus monodon*) farming stands out as a significant contributor to the national economy, making it one of the most favored shrimp species currently (Waiho et al. 2024). In Southern Bangladesh, numerous farmers have converted their unproductive paddy fields into 'gher' (the local term for traditional shrimp farms) to initiate a lucrative shrimp farming practice (Ray et al. 2021b). The gher is a structure designed for shrimp culture through the alteration of rice-fields (Kabir et al. 2020a). This modification involves constructing taller dikes by digging a sufficiently deep canal within, while the outer edges of the dikes allow water to enter during the dry season (Verma & Hittinahalli, 2023).

The coastal inhabitants of Bangladesh greatly benefit economically from shrimp farming. But shrimp farming faces a various magnitude of challenges in Bangladesh. The shrimp industry faces challenges such as deteriorating production chains, social problems, limited resources, salinity intrusion and expansion into unsuitable areas (DoF, 2006). A few qualitative research were found in India and Bangladesh but none of the quantitative research were found in Bangladesh. In light of the aforementioned context, the subsequent objectives are proposed for this study:

i. To investigate the constrains faced by the farmers towards shrimp culture, and
ii. To identify the influential factor affecting farmer constrains faced in shrimp culture.

Materials and Methods

Locale of the study

The area of southwest Bangladesh known as Bagerhat, a coastal district, was the chosen location of this research. The area is situated between 21◦49'-22◦59' N and 89◦32'-89◦98' E, encompassing a total of 3959.11 km^2. The study was specifically conducted at nine villages of Char baniari union under Chitalmari sub-district of Bagerhat district. Bagerhat district was selected as one of the major shrimp farming areas in Bangladesh (Karim et al. 2019b). A map of Bagerhat district and Chitalmari sub-district showing the study location is depicted in Figure 1.

Population and sampling

A list of shrimp farmers of the selected nine villages were prepared by taking help from Upazila Fisheries Officer (UFO) and Fisheries Extension Officer (FEO) which was considered as the population of the study and it was found that there were 866 shrimp farmers of these area. 90 shrimp farmer was selected as sample using Yamane's (1967) formula. A reserve list of 10 farmers was prepared in case of their absence for any case.

$$n = \frac{Z^2 P(1-P)N}{Z^2 P(1-P) + Ne^2}$$

Where,
n = Sample size
N = Population size
e = Precision percentage (10%)
z = At 99% confidence levels, the standard normal variable has a value of 2.57.
p = The proportion or degree of variability (50%)

A simple random sampling technique was employed to select a sample from nine villages within the study area. Data were collected from each village of Charbaniari union in the Chitalmari upazila of Bagerhat district, ensuring the appropriate proportion of sample size. The distribution of whole sample under the study was expressed in Table 1.

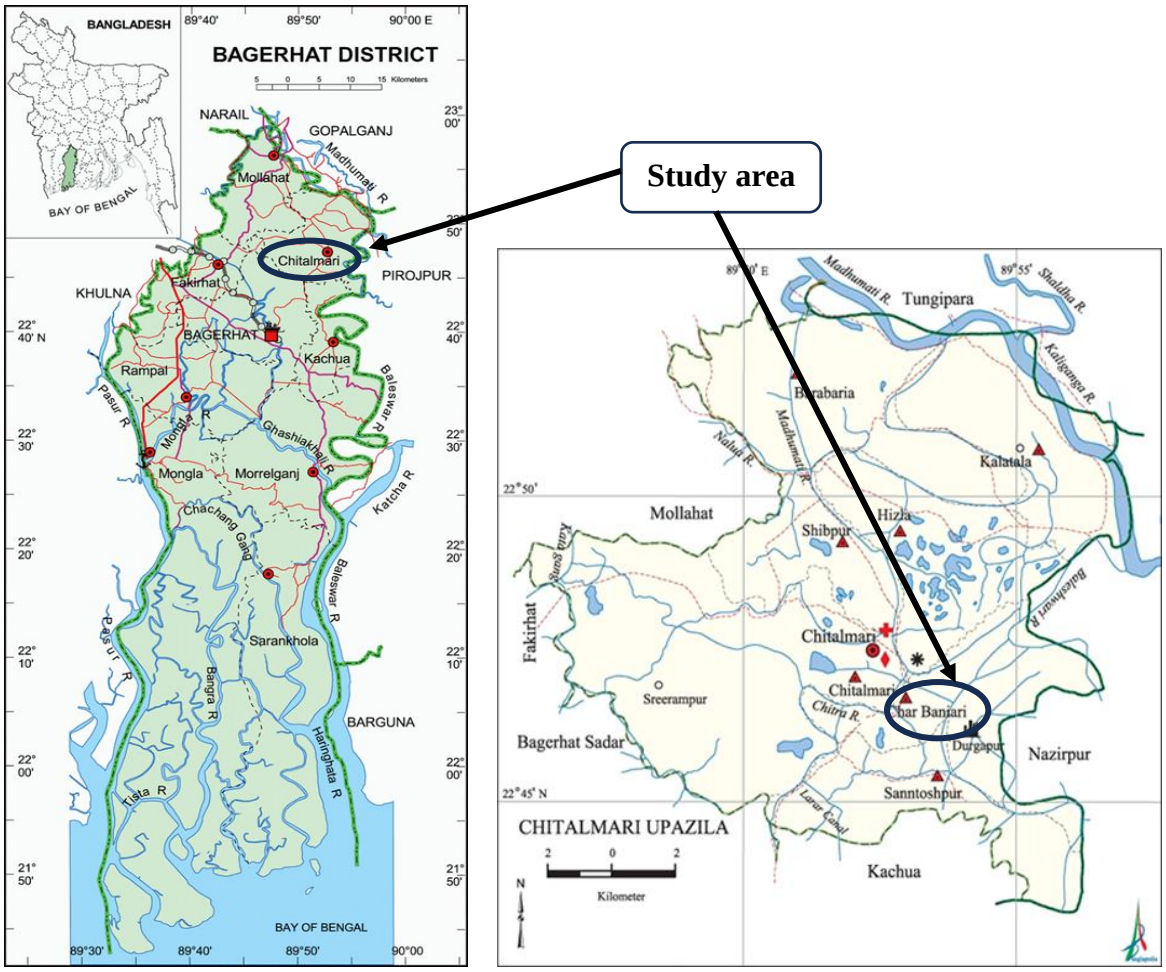

Figure 1. A map of Bagerhat district and Chitalmari sub-district showing the study area.

Table 1. Distribution of the sample of shrimp farmers in the study area

Study area (villages)	Population size	Sample size	No. of respondents in reserve list
Dakatia	97	10	1
Garibpur	133	14	2
Pachpara	103	11	1
Khaserhat	85	9	1
Krisnanagar	86	9	1
Kharamkhali	88	9	1
Boyalia	98	10	1
Asoknagar	72	7	1
Khalisakhal	104	11	1
Total	**866**	**90**	**10**

Data collecting instrument

An interview schedule was drafted for data collection from the shrimp culture dependent people. A pre-test was done with ten farmers reside in the study area. The data gathered using a pre-tested structured interview schedule in a face-to-face setting. The schedule had simple and clear questions organized in a logical order. The interviews, lasting about one hour each. The information from the schedule was coded and put into the SPSS programme (version-25) for analysis.

Collection of data

The study collected data from a representative sample of shrimp farmers, using quantitative methods. Quantitative data was collected through interviews. Benchmark surveys were also conducted to understand the farmers' current situation. Data was collected using a structured interview schedule in a face-to-face setting.

Measurement of the variables of the study

The primary focus of this study was the 'Constrains' faced by the farmers in shrimp culture', which was regarded as the dependent variable. A 4-point rating scale was utilized for measuring the constraints confrontation score. The farmers were requested to provide their feedback regarding 15 specific constrains they faced in shrimp culture. Each response was given a weight ranging from 0 (no constrains) to 3 (high constrains), 2 (medium constrains), and 1 (low constrains) (Sheheli et al. 2024). The constrains facing score was calculated by summing the weighted responses of the constrains, resulting in a score that ranges from 0 to 45. A score of 0 signifies 'no constrains', while a score of 45 indicates 'highest constrains'. The Constrains Facing Index (CFI) was calculated to establish the rank order (Uddin et al. 2022). The computation of the CFI was carried out using the subsequent formula:

$$CFI = C_h \times 3 + C_m \times 2 + C_l \times 1 + C_n \times 0$$

Where,

CFI = Constrains Facing Index

C_h = A number of respondents indicated that their constrains were rated as "high"

C_m = A number of respondents indicated that their constrains were rated as "medium"

C_l = A number of respondents indicated that their constrains were rated as "low"

C_n = A number of respondents indicated that their constrains were rated as "not at all"

Thus, the CFI of individual constrain could range from 0 to 270, where 0 indicating 'no' constrain faced and 270 indicating 'high' constrain faced.

Explanatory variables incorporated in the study comprised of the following: age, education, family member, gher size, annual income, experience in training, contact with extension media, farmers knowledge on shrimp culture, and attitude towards shrimp culture. The variables stated above were evaluated using appropriate scales and a scoring methodology.

Table 2. Assessment of the explanatory variable in the research

Traits	Unit
Age	Years
Education	For each year of schooling=1; no schooling=0
Family member	Number
Gher size	Hectare
Annual income	'000' Tk
Experience in training	Days
Contact with extension media	Scale score
Farmers knowledge on shrimp culture	Scale score
Attitude towards shrimp culture	Scale score

Analysis of data

The data were analyzed in line with the study's objectives. The chosen explanatory and focus variables were characterized using statistical measures such as frequency distribution, mean, percentage (%), standard deviation (SD), and rank order, if necessary. Descriptive statistics provide an account of the traits and vital statistics of the people who took part in the study.

Multiple linear regression analysis was used to identify significant variable impacting constrains faced by shrimp farmers, while stepwise regression analysis was used to determine the specific influence of explanatory factors, removing variables not meeting statistical significance criteria (Nazif et al. 2016). The following equation is utilized in order to carry out multiple regression analysis according to the following criteria:

$$Y = \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_7X_7+\beta_8X_8+\beta_9X_9+e$$

Here,

Y= Dependent variable (Constrains faced by the farmers in shrimp culture),

ß= Regression coefficient,

e= Error term,

X= Independent variable viz.,

X_1= Age,

X_2= Education,

X_3= Family member,

X_4= Gher size,

X_5= Annual income,

X_6= Experience in training,

X_7= Contact with extension media,

X_8= Farmers knowledge on shrimp culture,

X_9= Attitude towards shrimp culture,

The data was analyzed utilizing the SPSS (Statistical Package for Social Sciences) software, version 25. Numerous charts and graphs were made with the assistance of Microsoft Excel version 16.

Findings and Discussion

Socio-demographic characteristics of the shrimp farmer

The most important characteristics of farmers are outlined in Table 3, which also highlights the most important findings. According to the data, the average age of the respondents was 47.13 years, and they had had an average of 2.86 years of education when they participated in the survey. Younger and middle-aged farmers are more likely to implement new techniques and practices (Li et al. 2020). Majority of the farmers were having a medium sized family with mean score of 6.53 which was greater than the national average (4.26) sized household with a standard deviation of 1.84 (HIES, 2022a).

Table 3. Socio-demographic characteristics of the shrimp farmer

Characteristics (Scoring system)	Possible (Observed) range	Categories	Respondents (n=90)		Mean	SD
			Number	%		
Age (Actual years)	Unknown 23-75	Young (18 to 35)	18	20	47.13	11.89
		Middle (36-55)	51	56.7		
		Old (above 55)	21	23.3		
Education (Schooling years)	Unknown 0-9	Illiterate (0)	32	35.6	2.86	2.76
		Primary (1-5)	50	55.6		
		Secondary (6-10)	8	8.9		
		Above secondary (above 10)	0	0		
Family member (No. of members)	Unknown 3-12	Small (2- 4)	12	13.3	6.53	1.84
		Medium (5-7)	56	62.2		
		Large (above 7)	22	24.4		
Gher size (Hectares)	Unknown 0.24-1.00	Small (up to 1 ha)	90	100	0.61	0.24
		Medium (1.01 ha-2 ha)	0	0		
		Large (above 2 ha)	0	0		
Annual income ('000' BDT)	Unknown 32-320	Low (less than 100)	21	23.3	156.66	68.29
		Medium (100-200)	45	50.0		
		Large (above 200)	24	26.7		
Experience in training (Days)	Unknown 0-6	No training (0)	85	94.4	0.2	0.91
		Short duration (1 to 3 days)	3	3.3		
		Medium duration (4 to 7 days)	2	2.2		
		Long duration (above 7 days)	0	0		
Contact with extension media (Score)	0-24 6-16	Low (up to 12)	84	93.3	10.12	1.85
		Medium (13-24)	6	6.7		
		High (above 24)	0	0		
Farmers knowledge on shrimp culture (Score)	0-20 3-9	Poor knowledge (up to 7)	72	80.0	5.67	1.84
		Moderate knowledge (8-15)	18	20.0		
		Fair knowledge (above 15)	0	0		
Attitude towards shrimp culture (Score)	16-80 47-70	Strongly unfavorable (16-32)	0	0	56.43	3.93
		Unfavorable (33-47)	1	1.1		
		No opinion (48)	3	3.3		
		Favorable (49-64)	86	95.6		
		Strongly favorable (above 64)	0	0		

The average gher size found in the study area was 0.61 ha which indicates that most of the farmers in were small sized shrimp farmers. This is about the same as the average size of farms across the country, which is 0.60 hectares (HIES, 2022b). In addition, the respondents' families had an average income of 156.66 thousand BDT, representing the average family income, which is equivalent to 1416 USD which is less than the average family income of 2855 USD with a standard deviation of 68.29 thousand BDT.

Farmers in the study area were engaged in 0.2 days of a training program. Inadequate training leads to a lack of knowledge among individuals regarding new methods, and technology. Additionally, it should be noted that most farmers had a mean extension contact score of 10.12 with a standard deviation of 1.85. That means

they had low communication with extension personnel in southern areas. As a result, farmers were deprived of many facilities.

The highest proportion of farmers were found with a poor level of knowledge with a mean of 5.67 with a standard deviation of 1.84. Farmers in the southern region of Bangladesh often have poor knowledge about shrimp culture due to limited access to education and training, reliance on traditional practices, and inadequate extension services (Kabir et al. 2020b). The lion share of the respondents was found with favorable attitude towards shrimp culture with an average score of 56.43 with a standard deviation of 3.93. This is due to its high economic potential and suitability for the region's environmental conditions.

Constrains faced by the farmers in shrimp culture

The constrains faced by farmers was categorized into three categories according to the constrains score: high (above 30), medium (16-30), and low (up to 15) constrains faced. The farmers obtained problem scores ranging from 29 to 38. The average score, measured on a scale of 0 to 45, was 31.95, with a standard deviation of 2.20. The standard deviation and mean of scores were both relatively low. This indicates that nearly all of the participants encountered comparable constrains to an equivalent degree. This may be attributable to the respondents' equivalent socio-economic backgrounds. Figure 2 displays the distribution of responders according to the constrains they encountered.

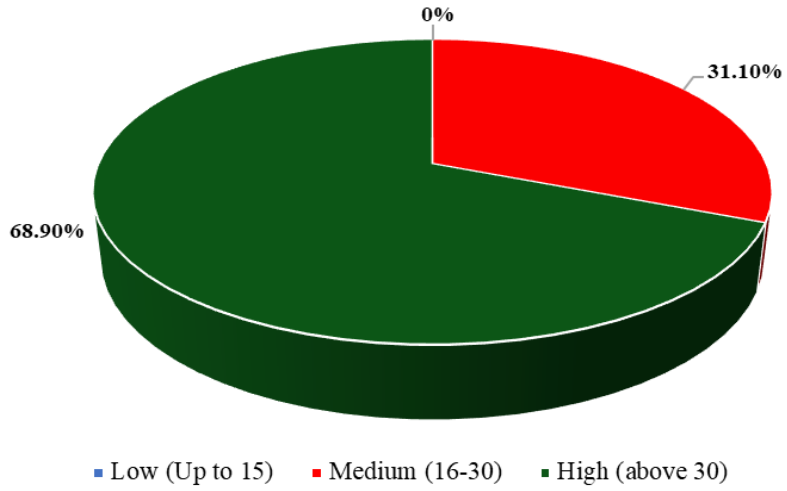

Figure 2. Distribution of farmers based on constrains faced in shrimp culture.

According to the information that is displayed in Figure 2, the vast majority of farmers (68.90%) had faced high constrains, while 31.10% had faced medium constrains. None of the respondents had faced low constrains. The study reveals that farmers in the study area face significant constrains in shrimp culture due to environmental issues, limited access to quality inputs, and inadequate technical knowledge and financial support (Joffre et al. 2018). Market-related issues, such as price volatility and lack of bargaining power, also contribute to their struggles. Institutional gaps, such as weak extension services and limited infrastructure, further hinder their ability to optimize shrimp farming. Didar-Ul Islam and Bhuiyan, (2016) conducted a study in the coastal region in Bangladesh and found had faced high problems in shrimp farming.

Farmers may encounter a multitude of constrains when it comes to shrimp culture. However, the issues should be investigated in light of their varying magnitudes or extents. Regarding this, the magnitude of the issues perceived by farmers was evaluated. The sum of all statement scores was used to get the constrains score for each statement. The constrain scores were then ranked in order of severity. Table 4 provides the hierarchical arrangement of constrains encountered by farmers in shrimp culture.

'Salinity fluctuation and intrusion' received the highest index score of 264 out of a potential 270 index scores. This task was consequently ranked first. Salinity variation and intrusion pose significant challenges to shrimp aquaculture in southern Bangladesh, affecting growth, reproduction, and survival rates. Excessive saline intrusion, such as sea-level rise, can cause disease outbreaks, while reduced salinity during monsoon can negatively impact shrimp health, compromising sustainability. Akter et al. (2023) did research in the South-West Region of Bangladesh and identified salinity variation and incursion as significant concerns for the livelihoods of local farmers.

Table 4. Constrains faced by the farmers in shrimp culture

Constrains	Farmers (n=90)				CFI	Rank order
	H (%)	M (%)	L (%)	N (%)		
Insufficient support services	2	3	46	39	58	15
High price rate of chemicals and medicine	7	23	60	20	127	12
Viral and bacterial diseases	2	13	57	18	89	13
Salinity fluctuation and intrusion	86	2	2	0	264	1
Initial high investment	64	17	7	2	233	4
Lack of financial support	53	24	3	10	210	8
Lack of skilled manpower	56	21	4	9	214	7
Lack of technical guidance	33	27	27	3	180	10
Scarcity of the hired labor	14	45	31	0	163	11
High rate of hatchery seed failure owing to low quality	57	7	21	5	206	9
High rate of supplementary feed	67	14	1	8	230	5
Lack of information regarding advanced shrimp culture technology	76	12	2	0	254	2
Dependence on middlemen	4	21	17	48	71	14
High rate of seed	64	14	6	6	226	6
Lack of regular training program	72	12	4	2	244	3

Notes: CFI = Constrains Facing Index, H = High, M = Medium, L = Low, N = Not at all

The constraint 'Lack of information regarding advanced shrimp culture technology' received the second highest index score (254) relative to the total index score, indicating it is the second most significant constraint in the study area, hindering the industry's growth and sustainability. Farmers rely on traditional methods, causing reduced efficiency and increased susceptibility to diseases. Lack of knowledge about sustainable techniques hinders implementation, limiting the shrimp farming industry's potential and increasing costs. Tank et al. (2019) did a study on the limits of shrimp farming in Saurashtra, Gujarat, India, identifying the absence of technological information as a significant issue.

The constraint 'Lack of regular training program' received the third highest index score (244), indicating its significance as the third most important constraint based on the total index score. The lack of consistent training programs in shrimp culture is a major issue, affecting farmers' ability to adopt best practices, manage diseases, control water quality, practice sustainable agriculture, and use resources efficiently. This leads to reduced productivity, increased susceptibility to disease outbreaks, and environmental harm. Chittem & Kunda, (2017) conducted a study entitled Constrains of *Litopenaeus vannamei* culture in India and identified the lack of training programs as a significant constraint, which aligns with our findings.

Factors influencing farmers constrains in shrimp culture

Table 5 presents the outcomes of the linear regression analysis. The evaluation of multicollinearity among the variables of the regression model was conducted using the Variance Inflation Factor (VIF) before executing the model. The highest VIF value recorded was 1.800, indicating that multicollinearity was absent; the variables demonstrated excellent tolerance. The F-test statistic value for the model was 12.065 at $p<0.01$, suggesting a statistically significant result. The adjusted R-squared value of 0.528 indicates a good fit for the suggested model; all parameters demonstrated a statistically significant impact, with none showing a zero effect. Out of the nine factors examined, three emerged as significant. The influential factors encompass age, education, and contact with extension media.

Table 5. Summary of multiple linear regression that elucidates the focus variable

Focus variables	Unstandardized coefficients		Standardized coefficients Beta	t-value	Sig.	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
(Constant)	35.983	3.046		11.813	0		
Age (X_1)	**-.034**	**.015**	**-.183**	**-2.224**	**.029**	**.787**	**1.271**
Education (X_2)	**-.278**	**.060**	**-.350**	**-4.669**	**.000**	**.944**	**1.059**
Family member (X_3)	.000	.090	.000	-.003	.998	.932	1.073
Gher Size (X_4)	.924	.850	.104	1.087	.280	.578	1.729
Annual Income (X_5)	-.004	.003	-.138	-1.484	.142	.615	1.626
Experience in training (X_6)	.078	.177	.033	.444	.658	.985	1.016
Contact with extension media (X_7)	**-.667**	**.092**	**-.561**	**-7.212**	**.000**	**.876**	**1.142**
Farmers knowledge on shrimp culture (X_8)	-.111	.094	-.093	-1.192	.237	.867	1.153
Attitude towards shrimp culture (X_9)	.065	.055	.115	1.180	.242	.556	1.800

n=90, R=0.759, R^2=0.576, Adjusted R^2=0.528, F-value=12.065

According to Table 5's findings, farmers' age significantly correlated negatively with their constrains in shrimp culture, with a value of (-0.034). The regression coefficient suggests that a one-unit change in age of the respondents results in a 0.034-units change in their constrains. Young farmers encounter more constrains than their elder counterparts. This may result from the greater experience in shrimp farming, which aids in mitigating several challenges.

According to Table 5's findings, farmers' education significantly correlated negatively with their constrains in shrimp culture, with a value of (-0.278). The regression coefficient suggests that a one-unit change in education of the respondents results in a 0.278-units change in their constrains. Education expands the mind and enhances the ability to observe, comprehend, and make decisions regarding agricultural practices. It means that higher education improves farmer knowledge and lowers shrimp culture related constrains. Rahman et al. (2021a) reported similar findings in case of level of education and crop growers' problem with DAE's agricultural extension programs.

According to Table 5's findings, farmers' contact with extension media significantly correlated negatively with their constrains in shrimp culture, with a value of (-0.667). The regression coefficient suggests that a one-unit change in contact with extension media of the respondents results in a 0.667-units change in their constrains. That implies that farmers who have regular exposure to extension media have access to essential knowledge regarding the management of various issues related to shrimp culture. Rahman et al. (2021b) reported similar findings in case of experience of participating in extension activities and their problems crop growers have with DAE's agricultural extension programs.

A stepwise multiple regression analysis was undertaken to determine the contribution of each important variable to the variability in the constrains faced by farmers in shrimp farming. The instrument was employed to identify the key independent variables that affect farmers' constraints in shrimp culture. Table 6 presents the stepwise multiple regression analysis.

Table 6. Step-wise multiple regression analysis

Model	Combination of the factors	Co-efficient of determination	Adjusted R^2	Percent of increase in adjusted R^2
1	Constant + Contact with extension media (X_7)	.375	.368	36.8
2	Constant + Contact with extension media (X_7) + Education (X_2)	.499	.488	12
3	Constant + Contact with extension media (X_7) + Education (X_2) + Age (X_1)	.551	.535	4.7

The step-wise multiple regression analysis revealed that contact with extension media (X_7) expresses the focus variable by 36.8%, education (X_2) expresses 12% and age (X_1) expresses 4.7% constrains in shrimp culture. Sheheli et al. (2023) conducted a study on knowledge of fish farmers on using artificial feed for catfish culture and found similar findings in their research.

Conclusion

The lion share of the farmers was facing with high level of constrains in shrimp culture. According to the farmers socio-demographic characteristics table, the major reasons for high level of problems were lower formal level education, lower annual family income, very short duration training exposure and poor level of knowledge on shrimp culture. Age, education, and contact with extension media were noticed as the significant influential variables. Experienced farmers should be encouraged to participate in shrimp culture so that their experience can be utilized properly. The Ministry of Education and local level non-government organizations (NGOs) should collaborate to implement adult education and need-based training program to increase the knowledge base of farmer and improve their skills for shrimp culture. Furthermore, it is essential for the Department of Fisheries (DoF), the extension service provider in Bangladesh, to reach out all categories of farmer with necessary extension services along with information to update them.

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References

Abdullah, A. N., Myers, B., Stacey, N., Zander, K. K., & Garnett, S. T. (2017). The impact of the expansion of shrimp aquaculture on livelihoods in coastal Bangladesh. *Environment, Development and Sustainability*, *19*, 2093-2114.

AftabUddin, S., Hussain, M. G., Abdullah Al, M., Failler, P., & Drakeford, B. M. (2021). On the potential and constraints of mariculture development in Bangladesh. *Aquaculture International*, *29*, 575-593.

Akber, M. A., Islam, M. A., Ahmed, M., Rahman, M. M., & Rahman, M. R. (2017). Changes of shrimp farming in southwest coastal Bangladesh. *Aquaculture International*, *25*, 1883-1899.

Akter, R., Hasan, N., Reza, F., Asaduzzaman, M., Begum, K., & Shammi, M. (2023). Hydrobiology of saline agriculture ecosystem: A review of scenario change in South-West Region of Bangladesh. *Hydrobiology*, *2*(1), 162-180.

BBS, (2017). Yearbook of Agricultural Statistics - 2017, Statistics and Informatics Division (SID). Ministry of Planning, Government of the People's Republic of Bangladesh. Dhaka.

Chittem, P. B., & Kunda, S. K. (2017). Constraints analysis of Litopenaeus vannamei culture in Prakasam district, Andhra Pradesh, India. *Int. J. Res. Stud. Biosci*, *5*(10), 10-17.

DoF, (2024). Background, About Department of Fisheries, Department of Fisheries. Ministry of Livestock and Fisheries. Government of the People's Republic of Bangladesh.

DoF, (2022). Yearbook of Fisheries Statistics of Bangladesh 2022-2023. Department of Fisheries. Ministry of Livestock and Fisheries. Government of the People's Republic of Bangladesh.

DoF, (2006). Shrimp Sub-Strategy, Department of Fisheries. Ministry of Livestock and Fisheries. Government of the People's Republic of Bangladesh.

Didar-Ul Islam, S. M., & Bhuiyan, M. A. H. (2016). Impact scenarios of shrimp farming in coastal region of Bangladesh: an approach of an ecological model for sustainable management. *Aquaculture International,* 24, 1163-1190.

FAO, (2022). National Aquaculture Sector Overview in Bangladesh. Fisheries and Aquaculture. Food and Agriculture Organization of the United Nations. Rome, Italy.

FAO, (2022). The State of World Fisheries and Aquaculture 2022 Towards Blue Transformation. Food and Agriculture Organization of the United Nations, Rome, Italy.

Haque, M. M., Islam, M. S., Hossain, M. I., & Jahan, H. (2022). Conditions for participation of marginalized households in shrimp value chains of the coastal region of Bangladesh. *Aquaculture*, *555*, 738258.

HIES, (2022). Household Income and Expenditure Survey. Bangladesh Bureau of Statistic. Ministry of Plannin., Government of People's Republic of Bangladesh. Dhaka. Bangladesh.

Islam, M. S. (2023). Commercial Fisheries and Aquaculture Shrimp in Bangladesh: Production, Export, and Local Supply Chain. In *Transforming Bangladesh: Geography, People, Economy and Environment* (pp. 77-84). Cham: Springer International Publishing.

Joffre, O. M., Klerkx, L., & Khoa, T. N. (2018). Aquaculture innovation system analysis of transition to sustainable intensification in shrimp farming. *Agronomy for Sustainable Development*, *38*, 1-11.

Kabir, M. H., Azad, J., & Islam, N. (2020). Exploring the determinants and constraints of smallholder vegetable farmers' adaptation capacity to climate change: A case of Bogura District, Bangladesh. *Journal of Agricultural and Crop Research*, *8*(9), 176-186.

Kabir, M. H., & Hossain, D. (2021). Environmental Impacts of Shrimp Farming In Chakaria Upazila of Cox's Bazar In Bangladesh. *Environment & Ecosystem Science (EES)*, *5*(2), 143-151.

Kabir, J., Cramb, R., Alauddin, M., Gaydon, D. S., & Roth, C. H. (2020). Farmers' perceptions and management of risk in rice/shrimp farming systems in South-West Coastal Bangladesh. *Land Use Policy*, *95*, 104577.

Karim, M. F., Zhang, X., & Li, R. (2019). Dynamics of shrimp farming in the southwestern coastal districts of Bangladesh using a shrimp yield dataset (SYD) and landsat satellite archives. *Sustainability*, *11*(17), 4635.

Li, M., Wang, J., Zhao, P., Chen, K., & Wu, L. (2020). Factors affecting the willingness of agricultural green production from the perspective of farmers' perceptions. *Science of the Total Environment*, *738*, 140289.

Nazif, A., Mohammed, N. I., Malakahmad, A., & Abualqumboz, M. S. (2016). Application of step wise regression analysis in predicting future particulate matter concentration episode. *Water, Air, & Soil Pollution*, *227*, 1-12.

Rahman, S., Hoque, M. J., & Uddin, M. N. (2021). Problems faced by the crop farmers related to extension services provided by department of agricultural extension in Bangladesh. *International Journal of Agricultural Extension*, *9*(3), 373-388.

Ray, S., Mondal, P., Paul, A. K., Iqbal, S., Atique, U., Islam, M. S., ... & Begum, S. (2021). Role of shrimp farming in socio-economic elevation and professional satisfaction in coastal communities. *Aquaculture Reports*, *20*, 100708.

Sheheli, S., Akter, M. S., Haque, M. A., & Hasan, M. M. (2024). Farmers' knowledge of using flood forecast information in fish farming: A case of rural Bangladesh. *International Journal of Agricultural Research, Innovation and Technology (IJARIT)*, *14*(2), 9-19.

Sheheli, S., Akter, S., Hasan, M. M., & Hasan, M. J. H. K. (2023). Knowledge of fish farmers on using artificial feed for catfish culture. *International Journal of Fisheries and Aquatic Studies*, *11*(5), 120-129.

Tank, K. V., Yusufzai, S. I., & Bajaniya, V. C. (2019). Constraints analysis of shrimp farming in Saurashtra, Gujarat, India. *J. Entomol. Zool. Stud*, *7*(3), 124-127.

Tigchelaar, M., Leape, J., Micheli, F., Allison, E. H., Basurto, X., Bennett, A., ... & Wabnitz, C. C. (2022). The vital roles of blue foods in the global food system. *Global Food Security*, *33*, 100637.

Uddin, M. N., Ahsan, K., Farouque, M. G., Akter, S., & Rahman, S. (2022). Determinants of training needs of the tilapia (Oreochromis sp.) fish farmers: an empirical study from a selected area in Bangladesh. *International Journal of Agricultural Extension*, *10*(3), 387-398.

Verma, A. K., & Hittinahalli, C. M. (2023). Farm Design and Layout for Aquaculture Operations in the Temperate Himalayas. In *Fisheries and Aquaculture of the Temperate Himalayas* (pp. 455-475). Singapore: Springer Nature Singapore.

Waiho, K., Ling, Y., Ikhwanuddin, M., Shu-Chien, A. C., Afiqah-Aleng, N., Wang, Y., ... & Fazhan, H. (2025). Current advances in the black tiger shrimp penaeus monodon culture: A review. *Reviews in Aquaculture*, *17*(1), e12958.

Yamane, T. (1967). *Statistics: An Introductory Analysis*, 2nd Ed., New York: Harper and Row.