

Understanding the Challenges of the Hilsa Fishing Community in Bangladesh: The River of Life

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Abstract: This study examines the economic, livelihood, and social-environmental conditions of the Meghna Riverbank Hilsa fishermen in the Chandpur region of Bangladesh. The research methods encompassed household surveys, surveys conducted during fishing activities, individual interviews, focus group discussions (FGD), key informant interviews (KII), direct observation, and problem analysis with priority ranking. To gather comprehensive information about the socio-economic conditions and livelihood strategies of the Meghna Riverbank hilsa fishermen, a semi-structured interview schedule was conducted. The findings reveal that these fishermen face exploitation, financial instability, and extreme poverty, relying solely on the river for their income. They lack access to fishing equipment and land due to river erosion, and basic necessities such as family planning, health and sanitation facilities, and education are inadequate. The overall situation is further exacerbated by social and economic constraints, including a growing number of fishermen, low incomes, limited alternative sources of income, loan repayment difficulties, piracy, rising prices, and resource disputes among stakeholders. To improve their standard of living, the study recommends effective interventions, cooperation between government and non-government organizations, and meticulous execution of strategies.

Keywords: Economic, Hilsa fishing community, Livelihood, Meghna riverbank, Social-environment

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1. Introduction

The iconic hilsa fish (*Tenualosa ilisha*, Hamilton 1822) is Bangladesh's national fish and a geographical indicator (GI) product. It contributes around 12.22% of the country's annual fish production and approximately 1% of its gross domestic product (GDP) (DoF 2022). Bangladesh dominates the global hilsa catch, accounting for 86% of the world's total, while India and Myanmar follow with 8% and 4% respectively (Rahman et al. 2018). Hilsa plays a significant role in the national economy, job creation, export earnings, and food supply due to its nutritional value and delicacy (Haldar et al., 2004; Rahman, 2006; Roy et al., 2015). The hilsa value chain supports around 2.5 million people directly or indirectly in Bangladesh, including an estimated 0.50 million fishermen (Hossain et al. 2022). However, the distribution of hilsa has declined

over the years, and it is now found in 82 upazilas across 16 districts, with the main catchment concentrated in the coastal districts (Hossain et al. 2022).

Bangladesh is known as the "country of a hundred rivers," with approximately 800 rivers flowing through it, totaling about 24,140 km in length (CEGIS, 2003). The Meghna River is one of the major rivers for hilsa migration in Bangladesh, renowned for its vast estuary formed by the Ganges-Padma, Brahmaputra-Jamuna, and Meghna itself (Banglapedia 2021). The Meghna Basin covers a surface area of 35,000 km² (FAO, 2017). The Meghna River is divided into upper and lower reaches, with the lower reach being one of the world's largest rivers due to its broad estuary mouth (Chowdhury, 2012). This river plays a crucial role in poverty eradication, social upliftment, and nutrition for the fishing communities along its banks. Changes in hilsa catch can have a significant impact on the national economy and the

livelihoods of those dependent on hilsa (Roy and Habib, 2013). The Chandpur district in the Meghna River basin contributes significantly to the country's hilsa production, making it an ideal area for studying the livelihood status of hilsa fishermen and informing policy and private sector interventions.

Hilsa fishermen in Bangladesh face extreme poverty, with their conditions worsening over time, making them the most disadvantaged group (Rahman et al. 2016). Their annual per capita income is BDT 2,442, which is approximately 70% lower than the national average (Alam and Bashar 1995). These fishermen encounter multiple challenges, including fishing bans, natural disasters, and seasonality, which prevent them from earning sufficient income to meet their basic needs (Mohammed et al. 2016; Porras et al. 2017). Consequently, many fishermen resort to unsustainable exploitation of natural resources and engage in violent activities. A significant portion of hilsa fishermen work as "labor fishermen" and are exploited by powerful players in the hilsa value chain who control access to resources through credit arrangements (Hossain et al. 2022).

Hilsa fishermen are among the most vulnerable and marginalized communities in Bangladesh, living below the poverty line (Sharker et al., 2015). Their remote locations and lack of access to modern communication hinder their socioeconomic development. With limited land available for cultivation, the rivers and hilsa become their primary resources (Hossain et al. 2022). During fishing bans and off-seasons, they have no alternative sources of income or employment opportunities.

Understanding the socioeconomic conditions of hilsa fishing communities along the Meghna Riverbank is crucial for their development. However, there have been limited detailed studies on this topic. Therefore, this study aims to evaluate the socioeconomic status and major challenges faced by hilsa fishermen and provide recommendations to improve their living standards in Bangladesh.

2. Materials and methods

The study was conducted over a one-year period, from January to December 2019, focusing on three hilsa-prone fisher communities along the Meghna Riverbank in the Chandpur district of Bangladesh. These communities were selected from three upazilas: Matlab Uttar, Chandpur Sadar, and Haimchor. A total of 150 hilsa fishermen were randomly chosen for the study, with 50 fishermen selected from each community. The selection of these study sites aimed to provide a representative sample of the hilsa fishing community along the Meghna Riverbank.

The rationale behind selecting these particular study sites was based on several factors. Firstly, the sites were chosen based on the feasibility of meeting the study objectives in these areas. Additionally, these communities had a high concentration of hilsa fishermen, making them suitable for capturing relevant data. The selected communities also had a history of dealing with soil

erosion caused by the Meghna River. Moreover, the livelihoods of these communities primarily relied on hilsa and the Meghna River, with limited alternative livelihood options available to them. Furthermore, the chosen communities represented hilsa sanctuaries located on the banks of the Meghna River.

Prior to collecting primary data, a prototype semi-structured questionnaire was prepared. This questionnaire was pilot tested with a small sample of respondents, and the feedback received during the pilot testing phase was used to update, reorganize, and modify the final questionnaire. The final questionnaire included questions related to the socio-economic conditions and livelihood constraints of hilsa fishermen along the Meghna Riverbank.

Data collection for the study involved various techniques. These included household surveys, surveys conducted while fishing, individual interviews, focus group discussions (FGD), key informant interviews (KII), direct observation, and problem analysis with priority ranking. A semi-structured interview schedule was developed and used to gather additional information on the socio-economic circumstances and means of subsistence of the Meghna Riverbank hilsa fishermen.

During surveys conducted while fishing, FGDs, and KIIs, commercially significant fish species in the Meghna River were identified. The scientific names of these identified fish species were verified by referring to reliable sources such as the Freshwater Fishes of Bangladesh (DoF, 2014) and the Catalog of Fishes (Fricke et al. 2022).

Constraints on livelihood were collected from various sources, including fishermen, local community leaders, mohajons, aratdars, local Department of Fisheries (DoF) and NGO personnel, and available literature. These constraints were then prioritized based on the responses gathered during FGDs. The study also formulated specific recommendations for management policies to address the identified constraints and improve the socioeconomic conditions of hilsa fishermen.

To ensure the reliability of the data, cross-check interviews (CI) were conducted with relevant individuals such as the Upazila Fisheries Officer (UFO), NGO personnel, and local government representatives. Additionally, secondary data collection methods were employed to complement the primary data. Secondary data were gathered from sources such as reports and publications from the Department of Fisheries, government organizations, and non-government organizations.

Once all the data were collected, they were compiled and analyzed using MS-Excel. The findings were then presented in textual and tabular formats to provide a comprehensive understanding of the current socioeconomic conditions, livelihood status, and constraints faced by hilsa fishermen in the study areas.

To validate the findings, ten household interviews and one focus group discussion (FGD) were conducted in each of the fishing communities within the study sites. This validation at the community level ensured the accuracy and reliability of the study's findings.

Table 1: Selected sites (riverbank hilsa fisher community) under 3 hilsa prone upazilas of Chandpur district

Name of the District	Site	Name of the Upazila	Name of the Fisher community	No. of Respondents
Chandpur	Site-1	Matlab Uttor	Shatnol Malupara	50
	Site-2	Chandpur sadar	Anondobazar	50
	Site-3	Haimchor	Uttor Bogula	50

3. Results and discussion

3.1. General characteristics of riverbank fishermen in Chandpur, Bangladesh

Riverbank fishermen in the Chandpur region of Bangladesh face significant vulnerability in terms of their livelihoods and income. They have a long history of losing everything to river erosion, which has driven them to rely on fishing in the river as their primary means of subsistence. This reliance on fishing is due to the lack of viable alternatives available to them. Since childhood, these fishermen have grown accustomed to a life centered around fishing, and they have not explored other options for earning a living. Livestock ownership is relatively low among riverbank fishermen, with only 9.33% of them having livestock, primarily due to the lack of rearing facilities and technical knowledge. The majority (90.67%) do not own any livestock, leading to significant mortality rates among the few that do. The similarity in lifestyle among riverbank fishermen makes it challenging to categorize them.

Many hilsa fishermen in the region are so underprivileged that they cannot afford to purchase boats and fishing gear for fishing in the Meghna River. According to the survey, only 18.33% of fishermen own boats and equipment, while the remaining 81.67% do not. As a result, many fishermen resort to renting boats and equipment from wealthier individuals known as "Mahajon" to engage in fishing activities. A parallel study by Mozumder et al. (2018) found that the majority of respondents did not own boats or fishing equipment. Instead, 37% worked as laborers on other people's boats, and 43% were independent fishermen who rented boats and equipment.

Riverbank fishermen face various natural disasters each year, which further exacerbate their vulnerabilities. After losing their homes to river erosion, many fishermen are forced to live on rented land or rely on the goodwill of wealthier individuals. The study found that 56.67% of fishermen were landless due to river soil erosion, while 40.00% had only homestead land, and a mere 3.33% owned both homestead and agricultural land. Another study by Ahmed et al. (2021) revealed that 57% of fishermen had no land at all, while 33% had land ranging

from 5 to 10 decimals, and 10% had more than 10 decimals of land.

Exploitation by powerful and wealthy individuals, known as "Mohajans" and "Aratdars," is a common occurrence among riverbank fishermen. These individuals control access to resources and exploit the fishermen by providing credit in the name of "dadan." In addition to fishing, fishermen also engage in selling fish and repairing boats and gear. The economic structure of these communities is entirely dependent on river fishing and the subsequent sale of fish in specific markets, whether legally or illegally. However, due to the unpredictable nature of the Meghna River, which can be turbulent throughout the year, fishermen often struggle to engage in fishing activities successfully. Consequently, they live in constant debt and earn meager incomes.

Age structure of riverbank fishermen

Understanding the age structure of fishermen is crucial for estimating the potential productivity of their human resources. The majority (51.67%) of fishermen surveyed were between the ages of 18 and 30, with 18.33% being younger than 18, 17.67% between the ages of 31 and 45, and 12.33% older than 45. This age structure can be attributed to the fact that fishermen are compelled to engage in fishing activities as they have limited options after losing everything to river erosion. This finding aligns with a related study by Rubel et al. (2022), which observed that young people under the age of 35 are increasingly active in fishing activities. In another study conducted in Bangladesh's Chalan Beel region, Kostori (2012) found that the majority (56%) of fishermen were between the ages of 20 and 30.

Family size and type

The study categorized families into nuclear families and joint families. The majority (72.67%) of fishermen belonged to nuclear families, while the remaining 27.33% lived in joint families. Of those surveyed, 73.33% had 5-8 family members, 14.00% had more than 8 members, and 12.67% had fewer than 5 members. These findings indicate that the average family size in the study areas is relatively large. The fishing communities along the Meghna River had more family members residing with them compared to the national average of 4.0 individuals per household, as reported by the Population & Housing Census 2022.

Literacy rate

Education is a crucial socioeconomic factor, and the study revealed a low literacy rate among riverbank fishermen. Approximately 21.67% of fishermen were estimated to be illiterate. Efforts by several non-governmental organizations (NGOs) to improve the educational level of fishermen in the study areas have resulted in 22.33% having only primary education and roughly 2.67% having secondary education. As a result,

53.33% of fishermen were able to sign their names on papers. Initiatives led by the government in Bangladesh to make women's education compulsory, free, and supported by stipends have resulted in an increase in the percentage of female students in primary schools, as found in the survey. However, difficult financial situations have often forced male youngsters to assist their parents with fishing instead of attending school. The literacy rate among Meghna riverbank fishing communities is significantly lower than the national literacy rate of 75.2% reported in the Bangladesh Economic Review 2020.

Housing condition

The type of housing reflects the socioeconomic status of the inhabitants. The most common type of housing among riverbank fishermen was tin-walled tin sheds (53.33%), followed by kacha (a tin shed with bamboo surroundings) at 30.00% and brick-walled tin sheds at 16.67%. A recent comparable study by Ahmed et al. (2021) observed that more than half (53%) of the fishermen's houses were made of tin and wood, while the remaining fishermen's dwellings had straw roofs and bamboo fences (24%), semi-pacca (18%), and pacca (5%).

Health facilities

Fishermen in the study area had limited access to healthcare facilities. The majority (46.67%) relied on unlicensed village doctors who lack medical science knowledge. Only 16.67% of fishermen relied on kabiraz (traditional healers), while 40.00% relied on the Upazila health complex for standardized healthcare. According to the Bangladesh Economic Review 2020, there is only one registered physician for every 1724 people. However, in the case of the Meghna riverbank fishing community, the number of people per doctor might exceed several thousand.

Sanitation facilities

The study revealed unsatisfactory sanitary conditions among the fishermen in the study region. The persistent issue of soil erosion has led to extremely unhygienic living conditions in riverbank fishing communities. The majority (53.33%) of fishermen used ring slab latrines, while 33.33% used pits without ring slabs, 3.33% had paka toilets (permanent toilets), and 10% had no toilet facilities at all. According to the Bangladesh Economic Review 2020, 81.5% of the country's population has access to improved sanitation facilities. However, the study's findings significantly differ from the national average, as several participants mentioned being unable to afford building hygienic toilets while being landless.

Drinking water facility

Access to clean and safe drinking water is crucial for any community. The highest percentage (70.00%) of fishermen used tube well water for drinking purposes,

either from their own tube wells or those of their neighbors. The remaining 30.00% relied on river water for drinking and other purposes due to the scarcity of tube wells and their accustomedness to drinking river water. According to the Bangladesh Economic Review 2020, 98.3% of the population has access to clean water for drinking and other domestic needs. However, the study's findings differ from the national analysis due to the specific circumstances of the fishing community.

Electricity facilities

The majority (90.33%) of hilsa fishermen in the survey had access to electricity. Among them, 60.00% used solar energy, 33.33% used Palli Bidyut (rural electricity), and 6.67% had no access to electricity. The Population and Housing Census 2022 reported that a total of 99.25% of people in Bangladesh have access to electricity, whether it is generated by solar energy, the national grid, or other means. The study's findings significantly differ from the national situation.

Meghna river dependency as occupation

The study found that the occupation of the majority (94.33%) of fishermen was entirely dependent on the Meghna River. Fishing for hilsa was their primary activity, but they also caught other species depending on the season throughout the year. The Meghna River was the sole source of income for the riverbank fishing community, and they engaged in fishing activities in other areas as well. The Meghna River is home to a wide variety of fish species, and the fishermen's livelihoods depend on it. A total of 107 fish species were found, accounting for 40% of the freshwater fish species in Bangladesh (Pramanik et al. 2017). During the fishing ban period, some fishermen (5.67%) took on additional occupations unrelated to fishing to make ends meet. According to Ahmed et al. (2021), 79% of fishermen were entirely dependent on Meghna fisheries, 14% were moderately dependent, and only 7% were not dependent on fisheries at all.

Categories of fishermen based on wealth

Most fishermen from riverbank fishing communities live in poverty, facing marginalization by society and lacking access to land. It is challenging to categorize fishermen precisely because their living styles and way of life are very similar. The study revealed that the majority (56.67%) of fishermen were extremely poor, followed by 23.33% who were poor and 20.00% who were moderately poor. In contrast to a recent similar study by Hossain et al. (2022), which reported that 60% of fishermen were extremely poor, 20% were destitute, and 20% were moderately poor.

Monthly income level (BDT)

Based on the survey, 61.67% of fishermen earned between 3000-5000 BDT per month, 30.00% earned between 5000-7000 BDT, and 8.33% earned between 7000-10000 BDT. The study revealed that the fishermen's income fell short of covering their expenses. In

comparison to the Bangladesh Economic Review (2020), which estimated the average monthly income for an individual at 14574 BDT, the study showed significantly lower income levels (approximately three to four times less).

Table 2: Socioeconomic and livelihood characteristics of the Meghna Riverbank hilsa fishers

Characteristics	Categories	Site-1	Site-2	Site-3	Average (%)
		Shatnol Malupara, Matlab Uttor (%)	Anondobazar, Chandpur sadar (%)	Uttor Bogula, Haimchor (%)	
Age Structure	below 18 years	15	10	30	18.33
	18-30years	35	85	35	51.67
	31-45years	25	3	25	17.67
	above 45years	25	2	10	12.33
Family Size	Less than 5 member	18	10	10	12.67
	5-8 member	80	80	60	73.33
	Above 8 member	2	10	30	14.00
Family Type	Single-family households	98	30	90	72.67
	Joint households	2	70	10	27.33
Literacy Rate	Illiterate	35	10	20	21.67
	Can only sign	50	60	50	53.33
	Primary level	12	30	25	22.33
	Secondary level	3	0	5	2.67
Housing Condition	Kacha	0	0	90	30.00
	Tin wall tin-shed	60	95	5	53.33
	Brick wall tin-shed	40	5	5	16.67
Health Facilities	Upazila health complex	40	50	30	40.00
	Kabiraj	10	10	30	16.67
Drinking Water Facility	Village doctor	60	40	40	46.67
	Tube-well	100	80	30	70.00
Sanitation Facilities	River water	0	20	70	30.00
	Structured (paka) toilet	0	0	10	3.33
	Ring slab latrine	50	80	30	53.33
Electricity Facilities	Pit without ring slab	50	20	30	33.33
	No toilet	0	0	30	10.00
	Solar energy	80	0	100	60.00
	Polli bidhut (rural electricity)	0	100	0	33.33
Land Holding	No	20	0	0	6.67
	No Land	60	50	60	56.67
	Only Homestead Land	40	50	30	40.00
	Homestead with Agriculture Land	0	0	10	3.33
Livestock Status	Own livestock	3	5	20	9.33
	No livestock	97	95	80	90.67
Fishing Equipment	Own boat and gear	32	13	10	18.33
	No boat and gear	68	87	90	81.67
Categories based on wealth	Extremely poor	60	60	50	56.67
	Poor	20	20	30	23.33
	Moderately poor	20	20	20	20.00
Monthly Income Level (BDT)	3000-5000	70	60	55	61.67
	5000-7000	25	30	35	30.00

	7000-10000			5	10	10	8.33
Dependency on Meghna River Fisheries as Occupation	Fishing activity	with	related	98	95	90	94.33
	Fishing business	with	others	2	5	10	5.67
Livelihood Strategies during ban period/seasonally	Loan			65	63	65	64.33
	Dadon			14	30	28	24.00
	Fishing activities	related	other	20	4	5	9.67
	Day labor			1	3	2	2.00

Table 3: Commercially significant fish species in the Chandpur region of Meghna River

Bengali/ Local Name	English/ Common Name	Scientific Name
Hilsa/ Ilish	Hilsa shad	<i>Tenualosa ilisha</i> (Hamilton, 1822)
Poa	Pama Croaker, Pama	<i>Otolithoides pama</i> (Hamilton, 1822)
Tular dandi	Gangetic Sillago	<i>Sillaginopsis panijus</i> (Hamilton, 1822)
Toposi	Paradise threadfin	<i>Polynemus toposui</i> (Hamilton, 1822)
Tengra	Tengara mystus	<i>Mystus tengara</i> (Hamilton, 1822)
Gulsha	Bleeker's Mystus	<i>Mystus bleekeri</i> (Day, 1865)
Chapila	Indian River Shad	<i>Gudusia chapra</i> (Hamilton, 1822)
Kajoli	Jamuna ailia	<i>Ailiichthys punctata</i> (Day, 1872)
Bashpata	Gangetic ailia	<i>Ailia coila</i> (Hamilton, 1822)
Bata	<i>Bata labeo</i>	<i>Labeo bata</i> (Hamilton, 1822)
Faisa/ Phassa	Gangetic hairfin anchovy	<i>Setipinna phasa</i> (Hamilton, 1822)
Bacha	Batchwa Vacha	<i>Eutropiichthys vacha</i> (Hamilton, 1822)
Air/ Ayre	Long-Whiskered Catfish	<i>Sperata aor</i> (Hamilton, 1822)
Pangus	<i>Yellowtail catfish</i>	<i>Pangasius pangasius</i> (Hamilton, 1822)
Boal	Freshwater Shark	<i>Wallago attu</i> (Bloch & Schneider 1801)
Rita	Rita (<i>bagrid catfish</i>)	<i>Rita rita</i> (Hamilton, 1822)
Chewa	Pointed-tailed Goby	<i>Pseudapocryptes elongatus</i> (Cuvier, 1816)
Lal Chewa	Rubicundus Eel Goby	<i>Odontamblyopus rubicundus</i> (Hamilton 1822)
Dorgi	Bearded worm goby	<i>Taenioides cirratus</i> (Blyth, 1860)
Bele/ Bailla	Tank goby	<i>Glossogobius Giuris</i> (Hamilton-Buchanan, 1822)
Shillong	Silond catfish	<i>Silonia silondia</i> (Hamilton, 1822)
Ghaura	Garua Bachcha	<i>Clupisoma garua</i> (Hamilton, 1822)
Kuchia	Gangetic mud eel	<i>Monopterus kuchia</i> (Hamilton, 1822)
Koral/ Vetki	Barramundi/Seabass	<i>Lates calcarifer</i> (Bloch, 1790)
Koi	Climbing perch	<i>Anabas testudineus</i> (Bloch, 1792)
Baim	Tire-track Spinyeel	<i>Mastacembalus armatus</i> (Lacepede, 1800)
Catla/ Katol	Catla	<i>Gibelion catla</i> (Hamilton, 1822)
Chep chela	Silver hatchet chela	<i>Chela cachius</i> (Hamilton, 1822)
Taki	<i>Spotted snakehead</i>	<i>Channa punctata</i> (Bloch, 1793)
Gojar	Giant Snakehead	<i>Channa marulius</i> (Hamilton, 1822)
Shol	Snakehead Murrel	<i>Channa striatas</i> (Bloch, 1793)
Shing	Stinging Catfish	<i>Heteropneustes fossilis</i> (Bloch, 1794)
Shorputi	Olive barb	<i>Systemus sarana</i> (Hamilton, 1822)
Rui	Ruhu	<i>Labeo rohita</i> (Hamilton, 1822)
Chital	Humped Featherback	<i>Chitala chitala</i> (Hamilton, 1822)
Golda Chingri	Giant river prawn	<i>Macrobrachium rosenbergii</i> (De Man, 1879)
Motka/ Chotka Chingri	Monsoon river prawn	<i>Macrobrachium malcolmsonii</i> (H. Milne Edwards, 1844)
Dhanua Chingri	Riceland prawn/ Glass shrimp	<i>Macrobrachium lanchesteri</i> (De Man, 1911)

Goda Chingri	Goda river prawn	<i>Macrobrachium dolichodactylus</i> (Hilgendorf, 1879)
Harina Chingri	Speckled/ Ginger shrimp	<i>Metapenaeus monoceros</i> (Fabricius, 1798)

Source: FGD, 2019; validated with local officers at Department of Fisheries (DoF)

Table 4: Fishing gear used by the fishermen in the Chandpur region

Types of fishing gear		Names of gear (Locally)	Mainly Capture species
Gill Net	Drift	Current Jal	Hilsa (Jatka, medium & large), Poa, Topsis, Tengra, Faisha, Bata, Air, Pangus, and Bacha etc.
		Chandi Jal	Mainly Hilsa
		Kona Jal	Mainly Hilsa
		Gulti Jal	Mainly Hilsa
		Poa Jal	Poa, Tular dandi, Topsis, Tengra, Chapila, Kajoli, Faisha, Bata etc.
	Fixed	Chap Jal	Air, Gojar, Pangus, Boal, Rita, Catla etc.
		Dhora Jal	Mainly Hilsa
		Baua Jal	Chewa, Bele, Poa etc.
		Guchi Jal	Chewa, Bele, Poa, Bata, Shillong, Gaura etc.
		Gata Jal	Chewa
Mosquito Net/ Set bag Net/ Fixed Purse Net	Bottom Fixed	Badha Jal/ Behundi Jal	Mainly Bata, Kuchia, Koral, Koi, Chewa, Bashpata, Poa, Chingri (prawn) etc.
		Tune Jal	Fry/ fingerling of all fish available in river.
	Surface Fixed	Katchki Jal	Chringri, Bele, Shol, Taki, Shing etc.
		Chor Ghera Jal	Fry/ fingerling of all fish available in river Mainly Chingri (prawn), Poa, Bata, Toposi, Dorgi, Bele, Tengra etc.
Seine Net	Janggu Jal	Mainly Air, Gojar, Boal, Pangus, Catla etc.	
Drag/ Push Net	Thela Jal	Gulsha, Koi, Chewa, Bashpata, Chingri (prawn), Bele, Dorgi, Tengra etc.	
	Moia Jal	Mainly Chingri (various types of Prawn)	
Cast Net	Jhaki Jal/ Khepla Jal	Chingri (prawn), Bele, Dorgi, Bata, Chela, Topsis, Baim, Koi, Koral, Kuchia etc.	
	Dharma Jal	Bele, Taki, Shoal, Punt, Koi, Gulsha, Baim etc.	
Lift net	Chai	Pangas, Air, Rita, Chingri (prawn) etc.	
Fishing trap	Jhak	Rui, Calta, Boal, Chital, Air, Gojar, Baim, Koral, Chingri (prawn) etc.	
Fish Aggregating Device (FAD)			

3.2. Livelihood strategies with seasonality and ban period

Fishermen primarily rely on fishing in the Meghna Rivers throughout the year to earn a living. They target hilsa fish, particularly in remote areas of the Meghna, far from their neighboring regions. Additionally, they catch various fish species depending on availability. During the ban period, fishermen also engage in jatka fishing, with a significant portion of jatka captures occurring in the Haimchar upazila of Chandpur. They utilize different fishing gear, such as drift gill nets, fixed gill nets, and surrounding gill nets, in the Chandpur region. Fishermen employ a range of fishing techniques, including Chandi Jal, Kona Jal, Gulti Jal, Chawa Jal, Gata Jal, Guchi Jal, Dhora Jal, and Moshuri Jal. Some also collect freshwater prawns, known as Golda Chingri, using Net Jal or Moia

Jal. Fishing trap techniques like chai fishing and jhak fishing are employed depending on the season. These findings align with previous studies that emphasize the use of specific fishing techniques based on fish behavior and migratory patterns.

During the ban period, fishermen adopted various strategies to support their families. According to the study, the majority (64.33%) of fishermen rely on loans from NGOs, banks, cooperatives, and relatives; 24.00% acquire dadon from mohajon and aratdar; 9.67% are directly involved in fishing-related jobs, such as trading farmed fish, mending nets, and fixing boats; and 2.00% take on additional work as day laborers in agriculture or other fields. A few also utilize their savings, while the extremely poor reduce their expenses and food consumption. In a similar study by Hossain et al. (2022), coping mechanisms during the ban period or on a seasonal

basis include taking loans (50%), reducing calorie intake or purchasing cheaper food (20%), selling cultured fish (10%), repairing nets (10%), taking dadon (4%), netting ponds for fish harvesting (4%), and using personal savings or working as day laborers in other agricultural fields (1% each). They also added that poor fishermen often face difficulties obtaining bank loans due to a lack of mortgage assets. Instead, the majority (70%) rely on loans from NGOs, with 5% from banks (such as Grameen Bank), 15% from mohajon, aratdar, and relatives, and 10% from locally established cooperatives with high interest rates. Another study by Ahmed et al. (2021) reported that 60% of the hilsa fishermen receive loans from NGOs, 20% from money lenders, 16% from relatives and neighbors, and only 4% from banks.

In conclusion, fishermen employ similar strategies to sustain their livelihoods, focusing on fishing in the Meghna Rivers. They employ various fishing techniques and gear depending on the availability of fish. During the ban period, they rely on alternative sources of income and adopt coping mechanisms, including obtaining loans, reducing expenses, and engaging in additional work. Access to loans is often facilitated by NGOs and cooperatives, while banks have limited involvement. These findings highlight the challenges faced by fishermen, particularly in obtaining financial support during the ban period, and the importance of alternative livelihood options for their sustenance.

3.3. Constrains faced by the fishermen

The fishermen were interviewed using an open-ended questionnaire to identify the constraints they faced in improving their socio-economic status. The main barriers identified in enforcing fishing bans were the socio-economic and livelihood challenges faced by the fishermen. Fishermen along the Meghna Riverbank encountered various difficulties. According to the respondents (3 FGD; n=30), inadequate access to credit facilities was ranked as the primary socio-economic and

Table 5: Constrains to Socioeconomic and Livelihood development of Fishermen Community

Ranking	Socioeconomic and Livelihood constrains	Community opinions	Percentage (%)
1	Inadequate credit facilities & High interest rate	Since they do not have access to institutional loans and are unable to provide security, they are dependent on private lenders and NGOs. Their demands cannot be met by the credit facilities being supplied by the numerous non-governmental organizations (NGOs), such as BRAC, ASA, Grameen Bank, and local cooperatives, among others, that operate microcredit programs. Furthermore, they have to pay a hefty interest rate in order to get this credit.	96.67
2	Lack of employment during fishing prohibition	During the ban period, poor fishermen's households suffered from food storage and coped by reducing the number of meals eaten and purchasing less expensive foods.	90.00
3	Extortion by local extortionists	Fishermen are taken advantage of since they are unorganized and have no negotiation strength. Fishermen's access to fisheries resources is hindered by Mohajon, Aratdar, and intermediaries. Most fishing households take out loans from them in the name of dadon in order to maintain their families during fishing restrictions and to purchase fishing gear.	86.67

livelihood barrier, reported by 96.77% of the fishermen. This was followed by a lack of employment opportunities during fishing prohibition, extortion by local individuals, the burden of dadon (a form of informal debt), the shrinking of river depth due to the expansion of char land and soil erosion, poor market facilities, control of the market by middlemen (aratdar) and fish traders (bapari), decline in fish catches, industrial pollution, the construction of Jhak (Fish Aggregating Device), conflicts between chai fishermen and hilsa fishermen, insufficient capital, inadequate government subsidies, and natural disasters (Table 5). These findings align to some extent with previous studies conducted by Kabir et al. (2012), Ali et al. (2014), Afroze (2014), Kamruzzaman and Hakim (2016). The results are also consistent with Hossain (2021) and Hossain et al. (2022), who reported conflicts between general hilsa fishermen and Jhak operators, as well as chai fishermen, in the Meghna River estuary. There was a strong belief that these conflicts in river fisheries were driven by the interests of politically influential individuals.

Overall, the findings indicate that inadequate credit facilities were the primary barrier perceived by the fishermen in improving their socio-economic status. Other challenges included limited employment opportunities during fishing bans, extortion, environmental changes affecting the river, market-related issues, and conflicts within the fishing community. These constraints have been recognized in previous research, highlighting the recurring and persistent nature of these challenges. Addressing these issues will require interventions focused on providing better credit facilities, creating alternative income-generating opportunities, strengthening market infrastructure, and fostering cooperation and conflict resolution within the fishing community. Additionally, addressing environmental concerns, such as pollution and river erosion, will contribute to sustainable fishing practices and the overall well-being of the fishermen.

4	Burden of dadon	As a result of taking dadon, they are compelled to sell their catches to the particular aratdar and are unable to get the legal price.	83.33
5	Shrinkage of river depth due to increasing char land and soil erosion	The neighboring Meghna river's depth is dropping, which has a detrimental effect on hilsa availability since growing char land and soil erosion obstruct the hilsa's migration route, making the hilsa's movement in this area noticeably slower every day due to the declining river depth.	76.67
6	Poor market facilities	Due to a lack of icing or a lack of a cold storage facility in fishing boats and landing centers, there are issues with marketing and preservation.	53.33
7	Market controlled by aratdar/ fish traders	The fishing community had no control over the fish market. The lending of money as debt forces them to sell their harvest. In challenging circumstances, they also mentioned that they lacked cohesiveness and leadership.	50.00
8	Declination of fish catches	The Meghna River's fish biodiversity is at grave risk due to indiscriminate killing, overfishing, harmful fishing gear and methods, pollution, and a lack of effective management strategies.	43.33
9	Industrial pollution	Due to water pollution, the availability of hilsa in the nearby Meghna is quite low, and this polluted water comes to Shatnol from Munsiganj and Narayanganj.	40.00
10	Construction of Jhak (Fish Aggregating Device-FAD) by political/ influential person	Fishing around the structures of jhak was prohibited by jhak owners because they believed it would harm their traps and disturb the fish's safe haven, which led to conflict between jhak operators and hilsa fishermen.	36.67
11	Conflict between Chai fisher and Hilsa fisher	The conflict arose as a result of hilsa fishermen occasionally pulling their identification float when their nets were entangled with the Chai identification float.	33.33
12	Insufficient capital	The main fishing constraints for fishermen were the rising cost and scarcity of fishing equipment such as boats, nets, and ice. They couldn't always go to the river with a boat and a net due to a lack of money.	30.00
13	Inadequate Government subsidy	During the ban period, government assistance for their rehabilitation is insufficient, and occasionally they have to pay to receive the subsidy as a result of government officials' corruption.	26.67
14	Loss of fishing equipment, particularly nets and boats, while fishing	Pirates kidnapped fishermen and demanded a ransom in exchange for their release. They often looted their catch and fishing gear, and occasionally hurt or murdered the fishermen.	23.33
15	Natural catastrophes (like cyclones, storms, thunder, river erosion, and floods)	Despite the extreme heat, the lack of security and safety precautions during monsoons and tidal surges, and the fact that they frequently go without food while fishing, fishermen work hard to make a livelihood. Natural calamities frequently affect fishermen. They lacked safety precautions and were unable to access the information in time.	20.00
16	Household pressure, low income, illiteracy, low economic status etc.	They considered these to be the main obstacles to socioeconomic development. They are concerned with the following in this situation: lack of awareness, lack of initiatives among fishermen, loose social cohesion, lack of training facilities, lack of alternative employment opportunities, lack of leadership and unity, particularly in challenging situation.	16.67

4. Conclusion

The Meghna Riverbank hilsa fisher community in the Chandpur region of Bangladesh faces significant socio-economic challenges and precarious livelihood conditions. The study revealed several key findings that indicate the

disadvantaged state of the fishermen, which were significantly lower compared to the national scenario.

Firstly, the income and financial capital of the fishermen were very low. The Meghna River, their primary source of income, yielded meager earnings for the majority of fishermen. Around 61.67% of them earned between 3000-5000 BDT per month, which fell short of

their expenses. This financial instability severely impacted their livelihoods.

Additionally, the hilsa fisher community was highly vulnerable to falling below the poverty line. A significant proportion of the fishermen, 56.67%, were classified as extremely poor. Another 23.33% were considered poor, while 20.00% were moderately poor. These high poverty rates highlight the challenges they face in meeting their basic needs and improving their socio-economic conditions.

The lack of assets further contributed to their disadvantaged situation. Many fishermen did not have access to land, fishing gear, and livestock-rearing facilities. Riverbank erosion was a major issue, resulting in 56.67% of the fishermen being landless. Financial instability also meant that 81.67% lacked necessary fishing gear, while 90.67% had no livestock due to a lack of facilities and knowledge. These asset limitations severely restricted their ability to generate income and improve their livelihoods.

Education was another area of concern for the fishermen. The majority, 67%, were illiterate, with only 53.33% able to sign their names. This perpetuated a cycle of illiteracy across generations, preventing them from actively contributing to the betterment of their community. Lack of education further limited their opportunities for employment and income generation.

Moreover, the fishermen were heavily dependent on fishing as their main source of income. This had a negative impact on education, as children from impoverished households were often forced to accompany their parents on fishing trips instead of attending school. The cycle of poverty continued as education was neglected in favor of immediate financial needs.

The living conditions of the fishermen were also substandard. Most of them lived in tin-walled huts (53.33%) or katcha houses (30.00%), lacking basic amenities. Access to electricity was limited, with 6.67% having no access at all. Sanitation facilities were also inadequate, with 33.33% using pit latrines without ring slabs, and 10% lacking toilets entirely. These poor living conditions further contributed to the overall challenges faced by the fishermen.

Based on these findings, it is evident that the fishermen require comprehensive support to improve their livelihoods and escape poverty. Several recommendations can be made to address their current issues. Firstly, providing training in various income-generating occupations through GOs and NGOs can help diversify their sources of income and improve their financial capital. Additionally, during fishing bans, seeking collateral-free credit from formal and semi-formal institutions can provide much-needed financial assistance.

Efforts should also be made to regulate informal debt (dadon) and promote access to bank loans. Creating incentives for fishermen during banned fishing seasons and facilitating direct market access can further improve their financial situation. Collaborative efforts involving fisheries management authorities, local governments, law

enforcement agencies, and research institutions are necessary to ensure sustainable resource management.

Furthermore, controlling industrial pollution in the Meghna River is crucial for the preservation of the ecosystem and the fishery. Implementing a co-management approach involving all stakeholders in the hilsa fishery value chain can help address conflicts and ensure the sustainable management of the resource. Finally, steps should be taken to improve education, healthcare, and nutrition within the community to enhance the fishermen's overall well-being and increase their potential for economic development.

By implementing these recommendations and addressing the specific challenges faced by the Meghna Riverbank hilsa fisher community, policymakers and the private sector can contribute to improving their livelihoods, reducing poverty, and creating a more sustainable and prosperous future for the fishermen and their families.

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