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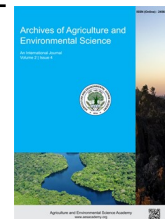


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ORIGINAL RESEARCH ARTICLE



Socioeconomic, livelihood and cultural profile of the Meghna River Hilsa Fishing Community in Chandpur, Bangladesh

A.B.M. Arman Hossain^{1*} , Gazi Muhammad Abdullah Mahdi¹, Abul Kalam Azad¹, S.M. Humayun Kabir¹, Md. Mehedi Hasan Pramanik², Md. Rahamat Ullah³, Md. Monjurul Hasan³ and Md. Akram Ullah⁴

¹Southwest Area Integrated Water Resources Planning and Management Project, Bangladesh Water Development Board, BANGLADESH

²Bangladesh Fisheries Research Institute, Floodplain Sub-Station, Santahar, Bogura, BANGLADESH

³Bangladesh Fisheries Research Institute, Riverine Sub-Station, Khepupara, Patuakhali - 8650, BANGLADESH

⁴Department of Fisheries and Marine Science, Noakhali Science and Technology University, Noakhali - 3814, BANGLADESH

*Corresponding author's E-mail: armanhossainbd13@gmail.com

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ABSTRACT

The goal of the study was to build a comprehensive portrait of the socioeconomic, livelihood, and cultural profile of the Meghna River fishing community in Chandpur, Bangladesh. Shatnol Malopara, an ecologically and economically suitable fishing community under the Matlab Uttar Upazila of Chandpur district, was selected for the in-depth investigation, where 410 fishermen relied solely on fishing for their livelihood. This community is made up of 185 households, supporting close to 1000 people. They are all Hindus, and fishing was their ancestral profession. A well-structured questionnaire was used to collect the data. The research revealed that the majority (35%) of fishermen were in the 18-30 age range. The community preferred nuclear families (98%), and the average family size was 5-8 individuals, which is predominant at 80%. About 60% of households lived in tiny tin shades and 40% in medium tin shades, while 60% did not have their own land. They (80%) rely on solar energy for illumination and for health facilities 50% of fisher households depend on the local pharmacy to take medication. Almost 100% of the residents in this community used potable drinking water, and 50% of fishers have ring slab latrines while the other 50% have pits. According to the survey, 60% of fishermen were very poor, 20% were poor, and 20% were moderately poor. Based on the survey, the majority (70%) of the fishermen earned between the ranges of 3000-5000 BDT (Bangladesh Taka) per month. During the ban period, the majority of fishers (50%) took out loans from various sources. Non-governmental organizations that operate microcredit businesses provided 70% of the loans to fishermen. According to the survey, 32% of fishermen had a boat and gear, while 68% worked as labor or engaged in catch-sharing with Mohajons' boats and gear. A range of crafts (Dingi nouka, Kosa nouka with mechanization) and fishing gear (Kona jal, Gulti jal, Dhon jal, Chap jal, Bada jal, Current jal, Chewa jal, etc.) was observed to be used in the study area. They have a plethora of traditional ecological knowledge as a result of their fishing ancestors. The study revealed that hilsa fishermen had a variety of issues. Extortion by local extortionists was the principal concern; other issues included inadequate credit and alternative income sources during the ban period. To assist the community in raising its standard of living, government agencies, nonprofits, and other relevant groups of organizations should adopt a number of steps. It is imperative to prioritize alternative income-generating options in this context.

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INTRODUCTION

Hilsa makes the highest contribution to the country's fish production, amounting to 1% of Bangladesh's GDP. The hilsa fishery is also the largest one-species fishery in Bangladesh when inland and marine harvests are combined, accounting for 12% of the total (DoF, 2022). Hilsa fishing is vital to the social and economic well-being of the locals in Bangladesh's coastal communities, which covers 12 coastal districts: Shariatpur, Chandpur, Pirozpur, Jhalakati, Barguna, Barisal, Patuakhali, Bhola, Lakshmipur, Noakhali, Chittagong, and Cox's Bazar, where a significant portion of the poor population works as fishermen (Roy and Habib, 2013). Despite putting in a lot of effort to capture hilsa from open water fisheries, which greatly benefits Bangladesh's economy, the socioeconomic growth of these communities hasn't altered much. Fishing in hilsa is estimated to be a direct and indirect profession for 2.5 million people across the hilsa value chain (Islam *et al.*, 2016). Unfortunately, for a variety of reasons, jatka fishing, which dramatically lowers hilsa productivity, could not be completely stopped. The socioeconomic situation and means of support of the local fishing community could be one of the causes. The main socioeconomic limitations facing fishermen include population pressure, low income, a lack of alternatives to fishing as a source of income, extortion by local extortionists, credit issues, etc. As a result of their substandard living conditions and ongoing struggles with their health, nutrition, and sanitation, fishermen are actually socially disadvantaged and unable to meet their fundamental needs. The majority of them lack any sort of fishing equipment or land. To increase the production of hilsa, the government and NGOs must take the necessary steps to increase awareness within the fishing community. The socioeconomic situation and nutritional status of the fishermen should also be improved.

The Meghna is one of the most significant rivers for hilsa migration in Bangladesh because of its broad estuary mouth (Chowdhury, 2012), and Bangladesh covers an area of 35,000 square kilometers in the Meghna Basin (FAO, 2017). The Meghna provides the largest catch of hilsa, where a large population depends on fishing for their livelihood (Roy and Habib, 2013), which plays a critical role in reducing poverty and providing nutrition to the underprivileged fishing community. However, the majority of hilsa fishermen live in poverty, and their living conditions are getting worse every day. Due to their income being below the marginal threshold, they are regarded as one of the most vulnerable and impoverished populations in Bangladesh (Sharker *et al.*, 2015). The only resources available to the people are the rivers and hilsa because they lack any land suitable for crop cultivation. Due to this, it was expected that the study would be able to determine how the Meghna River hilsa fishing communities were currently faring.

The fishing community is seen as being vulnerable in many ways; hence, several studies on their socioeconomic situation have been carried out in various regions of the world with the goal of improving their livelihood status by identifying issues and limitations. Lack of information on the socioeconomic circum-

stances of hilsa fishing communities is a major barrier to effective planning and implementation for their improvement (Saxena *et al.*, 2014). To find pertinent and affordable remedies, it is necessary to research the socioeconomic situation of the hilsa fishing community. A relatively small amount of their socioeconomic growth is impacted by the fact that most hilsa fisher communities are located in isolated areas without access to modern communications. The fact that Bangladesh's fishermen are the nation's poorest and most marginalized people cannot be denied (Hossain *et al.*, 1997). They have no other means of support other than fishing, which cannot be done throughout the year, and no other employment opportunities during the fishing ban and lean period. Their economic development has been rather constrained. For an economically underdeveloped sector to improve, knowledge about fishermen in a particular area is essential (Ofuoku *et al.*, 2008). Therefore, it is crucial for us to understand the means of subsistence and socioeconomic status of hilsa fishermen. One of the major obstacles to the effective execution of a developmental program is the lack of appropriate and reliable information about the socioeconomic situation of the target population. On the socioeconomic status of the Meghna River in Bangladesh's hilsa fishing community, however, very few studies have been conducted so far, despite their significant involvement in the fishery sectors of the state. Therefore, it is essential to have a thorough understanding of the socio-economic, livelihood, and cultural profiles of the connected people in order to plan, develop, and implement the fisheries sector as a whole. As a result, the current study was carried out with the following goals in mind as it is vital to choose an appropriate fishing community in the Chandpur district that is typical of the sanctuary region in order to conduct an in-depth study. The fishing community that has been the most affected and is the poorest must be studied in order to learn more about the real fishermen who are struggling until they die. In addition to being heavily involved in hilsa fishing and marketing, the community must have a tight relationship with the river and a way of life that is almost wholly dependent on river flow and to investigate the hilsa fishing community's social, economic, and livelihood patterns as well as its cultural profile.

MATERIALS AND METHODS

Study duration

The study was conducted for a period of 12 months, from January to December 2018, to get an ideal picture of the basic profile of the Meghna River hilsa fishing community.

Study area

The Shatnol Malopara fishing community, located on the bank of the Lower Meghna River in the Matlab Uttar Upazila of Chandpur district, was chosen for the in-depth study (Figure 1). This area is lease-free and has open access for the fishermen. However, this area is protected with jatka conservation; jatka fishing ban from November to June + sanctuary management; fishing ban for 2 months, March to April + 22 days ban for brood hilsa catching in peak spawning season.

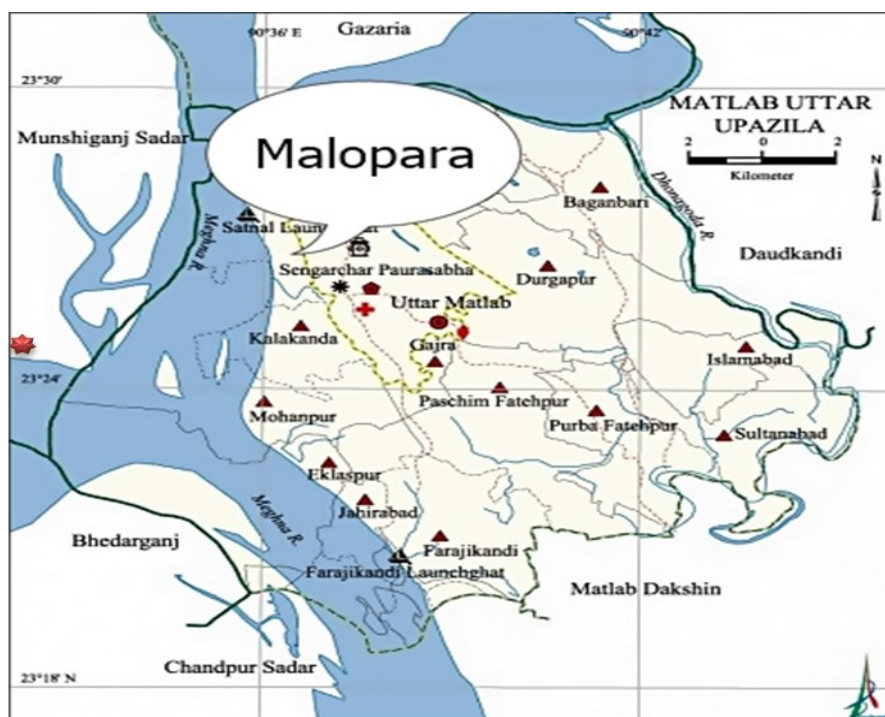


Figure 1. Map showing the location of the study area.

Justification for this community selection

Different villages in the Chandpur district of Bangladesh were visited. Among different villages, Shatnol Malopara is situated on the bank of Meghna and is an ecologically and economically suitable fishing community, which is relevant to our study. The justification for selecting Shatnol Malopara village is given below:

- The fishing community is situated on the bank of the Lower Meghna River, where the hilsa sanctuary region starts.
- All the fishers are professional and involved in hilsa catches.
- There is a relatively large landing center (maach ghat) present, and a large number of hilsa fishers are gathered to sell their catches.
- Most of them have no land, fishing assets, etc.; they live in other people's areas by rent and all suffer from river erosion every year.
- The arottdars are extremely powerful people who force poor fishermen to engage in jatka fishing.
- There are currently 14 arot in Shatnol maach ghat, a large landing center. The river is very well connected to the Dhaka market in terms of transportation facilities. Speed-boats can navigate the river way more rapidly and get to the market in Dhaka.
- Active fishers' representatives were present, and they have a close relationship with DoF at the district and upazila levels.
- The existence of young people (18-30 years) is high which indicates there are huge possibilities to implement any income-generating activity.
- People are aware and concerned about hilsa conservation and management.
- Hindu women do not have a cultural barrier to carrying out

field-oriented work; they are willing to work in cooperatives.

Data collection

The study relied on primary data gathered through a variety of methods. For data gathering, household surveys, surveys conducted while fishing, as well as individual interviews and focus group discussions, a key informant interview, and ideas gleaned from direct observation. A draft semi-structured questionnaire was created prior to gathering the primary data. A limited sample of respondents participated in a pilot test of the questionnaires. The final questionnaire was updated, restructured, and adjusted based on the pilot-testing experience. The final questionnaire includes questions about the fishing community's social profile, economic and livelihood profile, cultural profile, and so on. Community people were interviewed on the boat, bank of the river, fishers' houses, fish markets, tea stalls, and where participants could sit and feel comfortable. Secondary data were collected from various sources including Department of Fisheries (DoF), government organization (GO) and non-government organization (NGO) reports and publications.

Data analysis

The acquired data was organized into a classified table in accordance with the goals and objectives of the study, which was then transferred to a different master sheet. In Microsoft Excel version 2010, the tabular data were evaluated and reduced using the arithmetic mean and percentage. The general socioeconomic level was divided into several categories using different types of fishermen that participated in hilsa fishing and marketing. After analyzing all the data, results were verified by ten household interviews and one focus group discussion (FGD) in the fishing community of the study area.

RESULTS AND DISCUSSION

Social profile characteristics of the fishermen

Social profile of the village: The Shatnol Malopara fishing community has 185 households (HHs), supporting close to 1000 people, with 45% men and 55% women (Table 1). Every single one of the 185 HHs relied solely on fishing to support their daily lives. According to the survey, there were 410 fishermen, including 350 labor fishermen (known locally as Vaagi) and 60 boat and net owners (locally known as Mahajon). Among the 410 fishermen, 190 had government-issued fisher ID cards, 60 were in the process of doing so, and the remaining 160 did not. It has been observed that all of the fishermen in this community are Hindu (Table 1) which was similar to Faruque and Ahsan (2014) who reported that 100% of fishermen were Hindu in Horisonkorpor village beside the Padma River under Rajshahi district. There are no other religious people found in fishing. It should be highlighted that they are mainly professional fishermen from generation to generation, and fishing was their ancestral profession (Table 1) which was mostly similar to Rana et al. (2018) reported that 91% of hilsa fishermen were professional under Ramgati upazila of Lakshmipur district. There are women who own boats and nets, but no female fisherman can be found which was also similar to Faruque and Ahsan (2014); and Rana et al. (2018) and very related to Ahmed et al. (2021) who stated

that 96% were male in the Meghna River Estuary of Chandpur. The fact that fishing in a river is labor-intensive may be the reason why there are only male fishermen. There is no gender discrimination in this fishing community, and men and women are treated equally in terms of their rights. For managing their household and livelihood activities, they evenly divided their roles and responsibilities.

Fishers' age structure: The study showed that the majority (35%) of the fishers belonged to the age group of 18-30 years, followed by 25% of the fishers aged 30-45 years, and another 25% of the fishers aged over 45 years. And the lowest percentage was that 15% of the fishers were under 18 years old (Table 1) because most children under the age of 18 were likely pursuing their education and would like to change their line of work. This may be due to a drop in catch; difficulties fishermen experienced accessing the resource during the ban period, a lack of alternate sources of income, etc. In a similar study, Rana et al. (2018) and Minar et al. (2012) and Ali et al. (2009) found the majority (33%, 56%, and 50%) of the fishermen belong to the age group of 31-40 years which was not similar to this study and more or less related to Ahmed et al. (2021) who stated that 41% of the fishers were in the 26-30 age group. This finding is in line with that of Rubel et al. (2022), who revealed in a similar study that young individuals under the age of 35 are becoming more involved in fishing activities. According to Bhaumik and Saha (1994), the age range of fishermen in the Sundarbans ranged from 20 to 70 years.

Table 1. Summary of the social profile characteristics of the hilsa fishers.

Characteristics	Categories	Percentage (%)
Fishermen type	Professional fishermen	100
	Occasional fishermen	0
Sex	Male	45
	Female	55
Religion	Hindu	100
	Others	0
Fishers' age structure (Years)	Below 18 years	15
	18-30years	35
	30-45years	25
	Above 45years	25
Family size	Less than 5 members	18
	5-8 member	80
	Above 8 members	2
Family type	Single-family households	98
	Joint households	2
Literacy rate	Illiterate	35
	Can only sign	50
	Primary level	12
	Secondary level	3
Housing condition	Tiny tin-shed	60
	Medium-sized tin-shed	40
Land holding	Own homestead	40
	Rented homestead in other's land or home	60
Electricity facilities	Yes (Solar energy)	80
	No	20
Health facilities	Upazila health complex	40
	Kabiraj	10
	Village pharmacy	50
Drinking water facility	Tube-well	100
	River water	0
Sanitation facilities	Ring slab latrine	50
	Pit without ring slab	50
Communication assets	Mobile Phone	70
	Television with VCD player	55

Family size and type: Family size is a significant socioeconomic indicator since it has an impact on household income, food consumption, and socioeconomic well-being. In addition to being correlated with occupation and income, family size and consumption are more likely to have a significant impact on fishing behavior. According to research, 80% of fishermen have 5-8 family members, 18% have less than 5 family members, and 2% have more than 8 family members (Table 1). Very similar findings were reported by Rana *et al.* (2018) and Minar *et al.* (2012) and not similar to Ali *et al.* (2009) who reported that most of the families belonged to less than 5 members. In comparison to the national average (4.0 people per family), the study finding revealed that hilsa fishing communities had more family members living with them, according to the Population & Housing Census 2022. The study also revealed that 98% of fishermen are single-family households, while 2% are joint households (Table 1). Family arrangements are shifting from joint to nuclear, and this generation is more aware of family planning than previous ones. Traditional wedding ceremonies are giving way to more contemporary ones. The findings of this study were very similar to those of Ahmed *et al.* (2021), who stated that Hilsa fishers in the Meghna River Estuary of Chandpur prefer nuclear families, and completely opposite to those of Rana *et al.* (2018) and Minar *et al.* (2012), who reported that 91% and 86% of fishermen, respectively, were joint families.

Literacy rate: According to the study, fishermen can be divided into 4 groups based on their educational attainment. On average, 35% of fishermen had no education (illiterate). It is feasible that non-governmental organizations' efforts have led to 50% of fishermen being able to sign given that just 12% of fishers in the research area have primary education and only 3% have secondary education (Table 1). The study findings were very similar to Faruque and Ahsan (2014); and Rana *et al.* (2018) who reported that the majority of the fishermen can only sign; however, Minar *et al.* (2012) reported that most of the fishermen are illiterate and only small portion can sign only. Compared to the national literacy rate of 72.3% (Bangladesh Economic Review, 2020), the study findings were much lower than that of the mainstream population.

Housing condition: In this village, there were two different types of tin-shed homes: tiny tin-shed homes and medium-sized tin-shed homes. This is due to the fact that most fishermen are poor and have no land. The village's tin-shed homes may be moved with ease because they are located on a river embankment. The study revealed that the majority (60%) of households were found to live in tiny tin-shad and 40% in medium tin-shad homes and that only 40% of fishermen owned their own homesteads, while 60% did not own any land and instead lived on land or in homes that they rented from others (Table 1). In a similar study, Minar *et al.* (2012) reported 66% of fishermen's households were tin-shed with bamboo and 24% were tin-shed with the tin wall. Besides, Faruque and Ahsan (2014); and Alam and Bashar (1995) reported that the majority of the fishermen households were kacha in their studies.

Electricity facility: It has been observed that 60% of fishermen

live in modest homes, and 80% rely on solar energy for illumination (Table 1). This might be because those tiny sheds on the river's banks have a hard time getting an electricity hookup. In a similar study, Minar *et al.* (2012) reported no electricity facility was observed for fishermen of the Kirtonkhola River in Barishal. According to the Population and Housing Census 2022, 99.25% of the population has access to electricity, whether it comes from the national grid, solar power, or other sources. This finding differs greatly from what is observed nationally.

Health facilities: The state of one's livelihood is reflected in their state of health. The fishing communities' access to healthcare is utterly inadequate. Fishermen typically receive moderate medical care from inexperienced, amateur local doctors. According to research, 40% of fisher households experience major issues and migrate to the upazila health complex, 10% rely on kabiraj, and 50% of fisher households depend on untrained/ unlicensed village doctors in drug houses whose owners lack knowledge of current medical science (Table 1). The fact that the majority of fishermen bring their kids to the local upazila health complex's polio vaccination camp is encouraging. The study findings were more or less similar to the Kabir *et al.* (2014) and Ali *et al.* (2009). Very similarities were also found in the study of Faruque and Ahsan (2014); and Minar *et al.* (2012) who reported that majority (68% and 60%) of the fishermen households were dependent on village doctors. According to the Bangladesh Economic Review, 2020, there is only one doctor for every 1724 people. But in the case of the study area, the number of people per doctor might exceed several thousands.

Drinking water facility: The provision of clean, safe drinking water is regarded as one of society's most valuable commodities. The analysis revealed the presence of two deep tube wells built by the BRAC NGO in the vicinity of the study region. Deep tube wells provide the majority of fishermen with clean drinking water, while shallow tube wells and river water are used for other purposes (cooking, bathing, etc.); the community also contains 32 shallow tube wells. It was very inspiring that almost 100% people of in this community used safe drinking water, which was very similar to the study of Minar *et al.* (2012) and Rana *et al.* (2018) but totally opposite to findings reported by Faruque and Ahsan (2014) in Godagari upazila of Padma River fishermen.

Sanitary facility: It has been noted that the fishermen's living circumstances are quite unhygienic. Because the study site is located on a river embankment and experiences soil erosion issues every year, it has been discovered that roughly 50% of fishers have ring slab latrines and another 50% have pits (without ring slab). In a similar study, Faruque and Ahsan (2014); Minar *et al.* (2012) and Rana *et al.* (2018) reported that majority of fishermen's toilets were kacha while very small portions were semi-paka. According to the Bangladesh Economic Review 2020, 76.8% of the country's population used sanitary latrines. In this regard, the result of the study deviates significantly from the national reality, with many adding that they could never afford to install a hygienic toilet while also being landless.

Communication assets: The survey revealed that 70% of fishermen owned mobile phones, while 55% owned televisions with VCD players. It's advantageous to be able to learn about new technology and weather forecast quickly.

Economic and livelihood profile characteristics of the fishermen

Economic status of the fishers: Fishers are typically poor, landless, and socially marginalized. They are educationally backward and economically disadvantaged. In terms of access to resources, they are exploited by the elite and influential stakeholders in the hilsa fishing chain known as Mohajan and Aratdars by supplying loans in the name of Dadan at higher rates. The study revealed that 60% of fishers are very poor, followed by 20% who are poor and 20% who are moderately poor. This study bases its estimation of poverty on tangible assets, income, and spending. According to the FGDs, the average monthly income of the fishers in the study village was less than the average monthly expenditure. Based on the survey, 70% of fishermen earned between 3000-5000 BDT per month, 25% earned between 5000-7000 BDT, and 5% earned between 7000-10000 BDT (Table 2). More or less similar findings were reported by Alam *et al.* (2009), Kabir *et al.* (2012), Minar *et al.* (2014), Faruque and Ahsan (2014); and Rana *et al.* (2018). Additionally,

according to Mozumder *et al.* (2018), 37% of fishermen made less than 5000 BDT per month, while just 20% of them made more than the statutory poverty limit of 10,000 BDT per month. In a similar study, Ahmed *et al.* (2021) reported that most households (47%) monthly income was 5000 to 10,000 BDT while 24% of fishers' income was less than 5000 BDT per month. In compared to the Bangladesh Economic Review (2020), which estimated the average monthly income for an individual at 14574 BDT, the study revealed a substantially low income.

Source of income: As professional fishermen, 90% of the households were usually strict about their fishing occupation. A few household members work in occupations other than fishing, such as cultured fish hawking (3%), net mending (3%), netting in commercial fish culture ponds for harvesting (2%), livestock rearing (1%) and so on. However, only a small percentage (1%) work in other occupations such as hairdressing or grocery stores (Table 2) which was more or similar to the findings of Alam *et al.* (2009), Minar *et al.* (2014), Faruque and Ahsan (2014); and Rana *et al.* (2018). According to a related study by Ahmed *et al.* (2021), 79% of fishers were totally dependent on Meghna River fisheries, 14% were just moderately dependent, and only 7% were not dependent at all.

Table 2. Summary of the economic and livelihood profile characteristics of the hilsa fishers.

Characteristics	Categories	Percentage (%)
Economic status of the fisher households (HHs)	Extreme poor	60
	Poor	20
	Moderate poor	20
Monthly income level (BDT) of fisher households (HHs)	3000-5000	70
	5000-7000	25
	7000-10000	5
Fisher's households' income by source of income	Fishing	90
	Fish trading/ hawker	3
	Net mending	3
	Netting pond	2
	Business (grocery shop, salon, tailoring, etc.)	1
	Livestock rearing	1
Coping strategies adopted by fishers HHs during ban period/ seasonally	Loan from different sources	50
	Fish trading/ hawker	10
	Taking Dadon	4
	Net mending	10
	Netting pond for fish harvesting	4
	Day labor	1
	Reduce expenditure/ take less food	20
	Spending from savings	1
Land holding	No Land	60
	Only Homestead Land	40
	Agriculture Land	0
Fishing equipment	Own boat and gear	32
	No boat and gear	68
Livestock status	Own livestock	3
	No livestock	97
Loan and credits	NGO	70
	Mohajon, Aratodar, relatives	15
	Bank	5
	Locally established Cooperative Societies	10

Coping strategies adopted by fishers HHs during ban period/seasonally

It has been observed that fishermen toil hard all day to manage their daily food. Despite putting in such hard work, they remain the poorest group and struggle with a lack of daily bread. It has been discovered that the majority of professional fishers in the study area sell all of their catch from the Meghna River, with the exception of a few low-value fish, and that most of the time when they want to consume animal protein; they purchase some inexpensive cultured fish from the nearby market. They have a very limited supply of fish as a result. Vegetables were essential to them. During the ban period, food shortages affected poor fisher households. To cope, 50% of them took loans from various sources, followed by 20% cutting back on meals or purchasing less expensive foods, 10% selling cultured fish, 10% mending nets, 4% taking dadon, 4% netting ponds for fish harvesting, and only 1% being able to spend from savings and 1% working as day laborers in other people's agricultural fields (Table 2) which was more or similar to the findings of Faruque and Ahsan (2014). This study corresponds well with the findings of Ahmed *et al.* (2021) who claimed that 28% of fishermen were forced to eat two meals a day and buy less expensive food during the period of the fishing prohibition. Furthermore, Mozumder *et al.* (2018) reported a negative coping strategy for 75% of fishermen who use illegal monofilament gillnets.

Land holding: Sixty percent (60%) of households that depend on fishing have no land at all, 40% have only homestead land, and no one has any agricultural land. A landless family rented other homes and pieces of land to live on. In a similar study, Ahmed *et al.* (2021) revealed that 57% of the fishers had no land, 33% owned 5-10 decimals, and 10% had more than 10 decimals.

Fishing equipment: According to the survey, 32% of the 185 households have their own boat and gear, and the remaining 68% either work as labor or engage in catch-sharing with Mohajons' boat and net. According to Mozumder *et al.* (2018), the majority of respondents did not own a boat or fishing gear, 37% were employed as laborers on other people's boats, and 43%

were independent fishermen who rented boats and gear.

Livestock status: Due to a lack of facilities for livestock rearing and a lack of technical knowledge that resulted in significant mortality, just 3% of the 185 families in the study area had animals, and 97% of them did not. This issue ought to be improved by forging ties with local service providers of different private companies.

Resources (pond, canal, Meghna River, lands etc.): Resources, both natural and man-made, are few in this community. There is the main canal, a small pond unfit for fish farming, and five borrow pits close to the village that is already under the control of the wealthiest. The Meghna River, however, has a wide diversity of fish species, which is their sole source of income. A total of 107 fish species were discovered, accounting for 40% of Bangladesh's freshwater fish species (Pramanik *et al.*, 2017).

Loan and credits: Fishers are victimized because they are disorganized and incapable of negotiating. Mohajon/Aratdar/Middlemen interfere with fishermen's access to fishing resources. Most fishing households take out loans from a variety of sources to finance the acquisition of fishing gear as well as to sustain their families during times when fishing is prohibited. The majority (70%) of loans to fishermen are provided by non-governmental organizations (NGOs), with the remainder (5%) coming from a bank (Grameen bank), 15% from Mohajon, Aratdar, and relatives, as well as 10% from locally established Bohumukhi Somobay Somittee (cooperatives) with a high interest rate (Table 2). Because they cannot provide collateral for institutional credit, the fishermen must rely on private money lenders or NGOs. The following NGOs (Table 3) were identified during the study period as actively involved with the hilsa fishing communities, which is largely consistent with the findings of Ahmed *et al.* (2021), who claimed that 60% of the hilsa fishers obtained loans from NGOs, 20% from money lenders, 16% from relatives and neighbors, and only 4% from banks. Additionally, the results of Kabir *et al.* (2012) and Alam *et al.* (1995) and this one agreed well. Poor fish farmers were reportedly unable to get bank loans because they lacked mortgage assets.

Table 3. The name of the NGOs and their functions with hilsa fisher communities.

Name of NGOs	Functions
Grameen bank	Micro-credit program
BRAC	Micro-credit program
Association for Social Advancement (ASA)	Micro-credit program
Development Initiative for Social Advancement (DISA)	Micro-credit program Child education program
Center for Natural Resource Studies (CNRS)	Micro-credit program Enhancement of livelihoods of the fishers by alternative income generating activities (AIGAs). They provide at least a three-year support to the beneficiaries to make them technically and financially self-reliant.
Locally establish Bohumukhi Somobay Somittee	Micro-credit programs comparatively with high interest

Cultural profile characteristics of the fishermen

Traditional ecological knowledge (TEK): Regarding fishing practices, fishermen hold traditional knowledge and beliefs. To forecast the fish aggregation, they used the wind direction. They additionally predicted the fish harvest using the water's color and temperature. In the case of chai and jhak fishing, they also used different traditional feeds as attractants to catch the fish (Hossain, 2021; Hossain et al., 2022). Moreover, they used to do several types of fish processing when the catch was plentiful. For example, nona ilish (salted hilsa)

and fish drying, were common practices. Jeyaram et al. (2009) discovered in their investigation of Manipur's traditional fermented foods that traditional processing of fish such as salting, drying, and smoking are the principal methods of preservation in this region. Dutta and Bhattachariya (2008) discovered in their study of an indigenous community fishing practice in the Tirap district of Arunachal Pradesh that fishing was facilitated in the pool zones of hill streams by making the stream water muddy. Fish are then caught using cast nets that are operated from an indigenous bamboo raft (4.6-6.1 m long and 1.1-1.4 m wide).

Table 4. Traditional ecological knowledge (TEK) of fishermen at a glance of the Shatnol Malopara fishing community.

Effect of tides on fish catch	Transition period between two tides yields more catch to gill net High tide results in less catch to long-lines High tide results in more catch to bag-net Low tide yields more catch to shore-seine, provides more space for operation, and facilitates hauling
Watercolor and fish availability	Muddy water fetches more catch while clear glossy water yields less or no catch; due to the availability of fish food organisms in muddy water.
Sinking char (Shoals) and fish availability	Shrinking char is found in the Meghna River's water body, and it is surrounded by a large school of hilsa seed (jatka, a fish that is about three inches long), as well as other fish. Jatka is the main catch item from those areas. For the availability of alluring natural feed due to photosynthesis as the light penetrate easily in the bottom, hilsa seeds like to subsist in freshwater completely with low depth surrounding the sinking char.
Preference time for fishing	Bag-nets are operated based on the tidal energy 2 to 4 times a day against the high or low tide Drift gill nets are operated normally from 6 pm to 4 am and Bottom gill nets are operated between 5 am to 5 pm; operated as per the availability of target fish/ fishes for each gear and marketing convenience
Fishing gear and mesh size	Drift gill net for hilsa species 6.5-8.5 cm Drift gill net for other fish species 1.0-4.5 cm Set bag Net (Bottom Fixed Purse Net) 5.0-6.5 cm and 0.5-1.5 cm Mosquito Net (Surface Fixed Purse Net) 0.2 mm
Fishing gear and depths of operation	Drift- Surface gill net for hilsa species 11.5-13.5 m Drift- Bottom gill net for fishing 4.5 m Set bag Net (Bottom Fixed Purse Net) 4.5 m
Indicator of cyclone/ storm	Intensity of water current increase Winds gust from the south direction Nearshore water turns muddy

Table 5. Availability of hilsa and other commercially important fishes in the study area.

Local Name	Scientific Name	Availability (Month/ Season)
Hilsa	<i>Tenualosa ilisha</i>	August-November
Chewa	<i>Scartelaos histophorus</i>	November-April
Poa	<i>Otolithoides pama</i>	November-April
Bele	<i>Glossogobius giuris</i>	November-April
Katchki	<i>Corica soborna</i>	November-April
Tengra	<i>Mystus vittatus</i>	December-March
Shilong	<i>Silonia silondia</i>	April-June
Bacha	<i>Eutropiichthys vacha</i>	November-February
Pangas	<i>Pangasius pangasius</i>	April-July
Air	<i>Sperata aor</i>	April-July
Rita	<i>Rita rita</i>	April-July
Rui	<i>Lebeo rohita</i>	August- September
Catla	<i>Gibelion catla</i>	August- September
Bata	<i>Lebeo ariza</i>	December-March
Boal	<i>Wallago attu</i>	August- September
Chitol	<i>Chitala chitala</i>	August- September
Topshi	<i>Polynemus paradiseus</i>	April-July
Tular dandi	<i>Sillaginopsis panijus</i>	December-May
Chela	<i>Salmostoma acinaces</i>	March-May
Kajuli	<i>Ailia punctata</i>	February-April
Kukurjib	<i>Cynoglossus cynoglossus</i>	January-March
Baim	<i>Mastacembelus armatus</i>	November-January
Phasa	<i>Setipinna phasa</i>	February-May
Various types of Chringri (freshwater prawn) like Hola, Holi, Sola, Kathali, Goda, Napta, Golda etc.		All the year round mainly March-May

Table 6. Types of gear based on fishing methods.

Types of gear	Names of gear (Locally)	Species caught
Drift gill net	Kona jal	Hilsa
	Gulti jal	Hilsa
	Current jal	Hilsa
	Chandi jal	Hilsa
	Moi jal	Chingri
Fixed gill net	Baua jal	Chewa, Bele, Poa
	Bada jal	Chewa, Poa, Bele
	Guchi jal	Chewa, Bele, Poa, Bata, Shilong
	Gata jal	Chewa
	Lal Chewa jal	Lal Chewa
Surrounding (seine) gill net	Net jal	Katchki
Fishing trap	Chai	Pangas, Air, Chingri
Fish Aggregating Device (FAD)	Jhak	Rui, Calta, Boal, Chitol, Air, Chingri, Gojar, Baim, Koral

Fish availability associated with fishing gear and craft: Every fisherman uses a different sort of equipment throughout the year depending on the abundance of fish in the river. According to fishermen in the questionnaire survey, Table 5 below provides information on the seasonal availability of hilsa and other species. A range of crafts (Dingi nouka, kosa nouka with mechanization) and fishing gear (Kona jal, Gulti jal, dhon jal, chap jal, bada jal, current jal, chewa jal, etc.) was observed to be used in the study area. In a related study, Ahmed *et al.* (2021) found that the current jal (Gill net), Jagat Ber Jal, Ber Jal (Seine net), Chandi Jal (Gill net), Gulti Jal (Seine net), and Dora Jal (Gill net) were the most commonly used for hilsa fishing in Meghna. Fishermen adopted specific fishing tactics based on fish behavior and migration patterns. Fishermen reported using a variety of equipment according to the time of year (Table 6). Fishers in the study region utilized fixed and drift gill nets, seine nets, and other traps such as chai and jhak.

Observance of festivals: The fishermen celebrate festivals like Durga Puja, Sorosoti Puja, Kalir Puja, and Holi. According to the study, fishermen place the greatest value on old age, with older persons being treated with greater respect and appreciation.

Conclusion and recommendations

According to the study, hilsa fishermen have experienced a variety of issues. The primary issue is extortion by local extortionists; other issues include inadequate credit and a lack of suitable preservation facilities (lack of an ice factory or no cold storage facility). The fishermen had a meager living. In addition to having lower education levels, earnings, and purchasing power than the national average, they also had fewer basic amenities. They are deprived of well sanitation, housing conditions, etc. The majority of the fishermen were poor, landless and reliant on fishing for a living. It was really bad in the alternative income facility. During the ban period, government assistance for their restoration was not sufficient for them. As a result, government subsidies should be raised. They claimed that the subsidy was unfair and that there was a cost to receiving the subsidy. The effectiveness of the jatka conservation efforts through the implementation of

'Hilsa Fisheries Management Action Plan' in 2003-2004 has led to a daily rise in hilsa production. The continuation of jatka conservation is necessary for the development of hilsa resources. The protection of jatka in their nursing ground is critical to save hilsa and to increase its annual yield. The fishermen in FGD also asserted that hilsa production might be doubled if 10% of jatka can be saved by discouraging fishermen from illegally jatka fishing in violation of the ban period, which can only be achieved by increasing government subsidies to fishermen and by ensuring proper distribution and mass awareness.

The government should make the fishing communities understand the future threat to fisheries resources and inspire them to be involved in alternative income generating activities (AIGAs) by increasing access to income from alternative sources outside of fisheries through rigorous training. When rearing animals on a small scale, women have a comparative advantage in boosting household food security and battling poverty (such as sheep, goats, poultry, koel birds, rabbits, pigs, quality pigeons, quality male goats for buck centers, etc.). Enterprises like operating sewing machines for blankets, embroidery, women's clothing, and creating handicrafts (karchupi, katha stitch, kushikata), processing dry food, vending kiosks, making vermicompost, producing paper packets, and marketing products should all be fully utilized in order to lift communities out of poverty. When they are well-designed, they generate more cash than the usually damaging activities that society takes comfort in. To lessen seasonal food insecurity, the landless fishermen might be farmed an improved variety of vegetables and cereals in jute bags. Cash for labor programs could be used in fisher households to prevent soil erosion. Supporting alternative income-generating activities entails not only choosing an activity but also boosting fishermen's capacity by giving them new knowledge and training, notably in financial management, business planning, and market research.

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