Sustainable Aquatic Research (2024) 3(2):91-106
DOI: 10.5281/zenodo.13326578
e-ISSN: 2822-4140

SUSTAINABLE AQUATIC RESEARCH
www.saquares.com

RESEARCH PAPER

Empowering Hilsa Heroines: Unveiling Gender, Socioeconomic Dynamics, and Environmental Influence in Bangladesh's Hilsa Fisherwomen Community

A.B.M. Arman Hossain [1*], Ayesha Siddiqua [2]

[1*]*Climate-Smart Agriculture and Water Management Project, Bangladesh Water Development Board, Bangladesh*
[2]*Chattogram Veterinary and Animal Science University, Bangladesh*

Citation

Hossain, A.B.M.A., Siddiqua, A. (2024). Empowering Hilsa Heroines: Unveiling Gender, Socioeconomic Dynamics, and Environmental Influence in Bangladesh's Hilsa Fisherwomen Community. *Sustainable Aquatic Research, 3*(2), 91-106.

Article History

Received: 28 May 2024
Received in revised form: 14 August 2024
Accepted: 14 August 2024
Available online: 31 August 2024

Corresponding Author

A.B.M. Arman Hossain
E-mail: armanhossainbd13@gmail.com
Tel: +0880 1717 180304

Keywords

Fisherwomen
Gender dynamics
Hilsa Fishing Community
Environment
Socioeconomic Condition

Abstract

This study provides a detailed insight into the socioeconomic challenges faced by fisherwomen households in the Shugondha riverbank Hilsa fishing community of Bangladesh. Despite their active involvement in hilsa fishery, these households grapple with various economic and social hurdles. The research methodology, employing a mix of questionnaire interviews, focus group discussions, cross-check interviews, and secondary data collection, ensures a comprehensive understanding of the subject. Conducted over 12 months in Chandkathi Jelepara, Jhalokathi Sadar Upazila, Jhalokathi district, the analysis included 42 households with 100 active fishers, sustaining 240 people. They are predominantly Hindu and illiterate (52%), socio economically poor households (57%), and lacking land ownership (90.5%) and basic amenities. Food shortages during fishing bans were managed through reduced meals and cheaper goods. Limited control over household income (2%) and low awareness of rights (95%) were observed among fisherwomen. Income generation efforts were hindered by resource scarcity and lack of skills. However, 10% recognized the need for diversifying income sources and active participation in community initiatives. Vulnerability was high, emphasizing the need for support from government, NGOs, and other organizations to improve livelihoods, particularly through alternative income options.

Introduction

Hilsa (*Tenualosa ilisha*, Hamilton 1822), revered as the "king of fishes" and Bangladesh's national fish, holds pivotal significance in the nation's economy, employment landscape, export earnings, and food supply (Haldar et al., 2004; Rahman, 2006; Roy et al., 2015). Renowned for its nutritional value, taste, and market demand, Hilsa has become a symbol of pride for Bangladesh, contributing significantly to its fish production and GDP (Gross Domestic Product) (DoF, 2015; FRSS, 2016). Despite its economic importance, the hilsa fishing community faces myriad challenges, including habitat degradation and overfishing (Mozumder et al., 2020). Government-imposed bans on juvenile and gravid hilsa fishing aim to safeguard the species' sustainability, albeit with varying impacts on the livelihoods of fishing communities, who face poverty and social neglect (Islam et al., 2016). Despite increased hilsa production, poverty

persists among fishing households, exacerbated by limited alternative livelihood options during fishing bans (Sharker et al., 2015). In Bangladesh, women, constituting half of the population, confront significant challenges including economic dependency, educational disparities, and social marginalization (Sultana et al., 2010). Despite their pivotal roles in various sectors, gender discrepancies persist across health, employment, asset control, and decision-making, thereby impeding women's empowerment and socioeconomic progress (Sultana and Hasan, 2010; Sarker and Rahman, 2007; Hoque and Itohara, 2008). Particularly in small-scale fisheries, women's substantial contributions often go unrecognized in policy formulations (Pauly, 2006; Engelman et al., 2009; Sharma, 2011). Nevertheless, their contributions in bolstering community resilience and mitigating vulnerability remain paramount (Engelman et al., 2009; Chen, 2000; Kebe, 2009). The extent of women's participation is influenced by regional disparities, societal and cultural norms, and technological factors (Clayton and Savage, 1974). Notably, women gravitate towards activities requiring minimal investment while still contributing significantly to household incomes (Francis, 1995; Ogutu, 1988; Medard and Wilson, 1996).

Despite the vulnerability of fishing communities and the pressing need for targeted interventions, comprehensive studies focusing on hilsa fisherwomen in Bangladesh are notably lacking (Nandi & Parmanik, 1994; Shankar, 2010; Saxena et al., 2014). Understanding their socioeconomic conditions is essential for effective policy formulation and program implementation (Hossain et al., 2022; Ofuoku et al., 2008). Existing research on fishing communities' status underscores the urgency of addressing their challenges to improve livelihoods and alleviate poverty. This study aims to fill this gap by examining the socioeconomic dynamics of hilsa fisherwomen, shedding light on their experiences, challenges, and contributions to the fishery sector. By elucidating their roles and constraints, this research seeks to inform policymakers and stakeholders, facilitating informed decision-making and holistic interventions to uplift the livelihoods of hilsa fisherwomen in Bangladesh.

Materials and Methods

Study Site

Chandkathi Jelepara, located at 22°38′24″N/90°12′21″E, adjacent to the Shugondha River and the Gurudham Canal, served as the study's focal point. Situated within Jhalokathi Sadar Upazila of the Jhalokathi district, the community falls under the governance of Jhalokathi Pouroshova, Ward 3 [Figure 1 (a&b)].The selection of Chandkathi Jelepara as the study's focal community is justified by several key factors. Firstly, the absence of cultural barriers enables Hindu women to actively engage in field-oriented work, facilitating comprehensive data collection and insights into their socioeconomic conditions. Additionally, the community boasts a high concentration of Hilsa fishers, aligning closely with the study's focus on hilsa fishing communities. This alignment ensures that the study objectives resonate with the community's interests and needs, enhancing the relevance and applicability of the findings. Furthermore, Chandkathi Jelepara benefits from an established communication infrastructure, facilitating efficient data collection and stakeholder engagement. Its proximity to the river's embankment further enhances accessibility and relevance to the study, considering the community's reliance on river-based livelihoods. Moreover, the predominance of professional and ancestral fishermen within the community ensures a rich and nuanced understanding of the socioeconomic dynamics at play, contributing to the depth and breadth of the study's findings.

The study spanned 12 months, from January to December 2019, to capture comprehensive insights into the socioeconomic landscape of Bangladeshi fisherwomen in the Hilsa fishing community.

Data Collection

Structured interview schedules were crafted to systematically collect data on various aspects including household demographics, literacy, health, water and sanitation, land ownership, occupation, income, economic and nutritional status, gender dynamics, women's mobility, vulnerability and resilience, as well as the

environmental impact of existing socioeconomic conditions.

Data collection involved a multifaceted approach to capture comprehensive insights into the socioeconomic dynamics of hilsa fisherwomen. Firstly, comprehensive surveys were conducted through questionnaire interviews (QI) in all 42 fisherwomen households within the study area, providing detailed information on various socioeconomic indicators. Additionally, Focus Group Discussions (FGD) were conducted using Participatory Rural Appraisal (PRA) techniques, engaging both fishermen and fisherwomen to delve into topics such as gender roles, alternative income sources, and the impact of fishing bans on household nutrition and resilience. Cross-check interviews (CI) with key stakeholders, including the Upazila Fisheries Officer (UFO), NGO representatives, and local government officials, were conducted to validate and complement the findings from household surveys and FGDs. Furthermore, supplementary data were gathered through secondary sources such as literature reviews, online sources, research papers, and publications, enriching the analysis with additional insights and perspectives. This comprehensive approach ensured a holistic understanding of the socioeconomic conditions and challenges faced by hilsa fisherwomen in the study area.

Data Processing, Analysis, and Presentation

Collected data underwent meticulous scrutiny and tabulation, with MS Excel 2010 employed for processing and analysis. Results were presented through categorized tables and figures, with a percentage analysis facilitating clear insights. The study report underwent drafting and finalization phases to ensure accuracy and clarity.

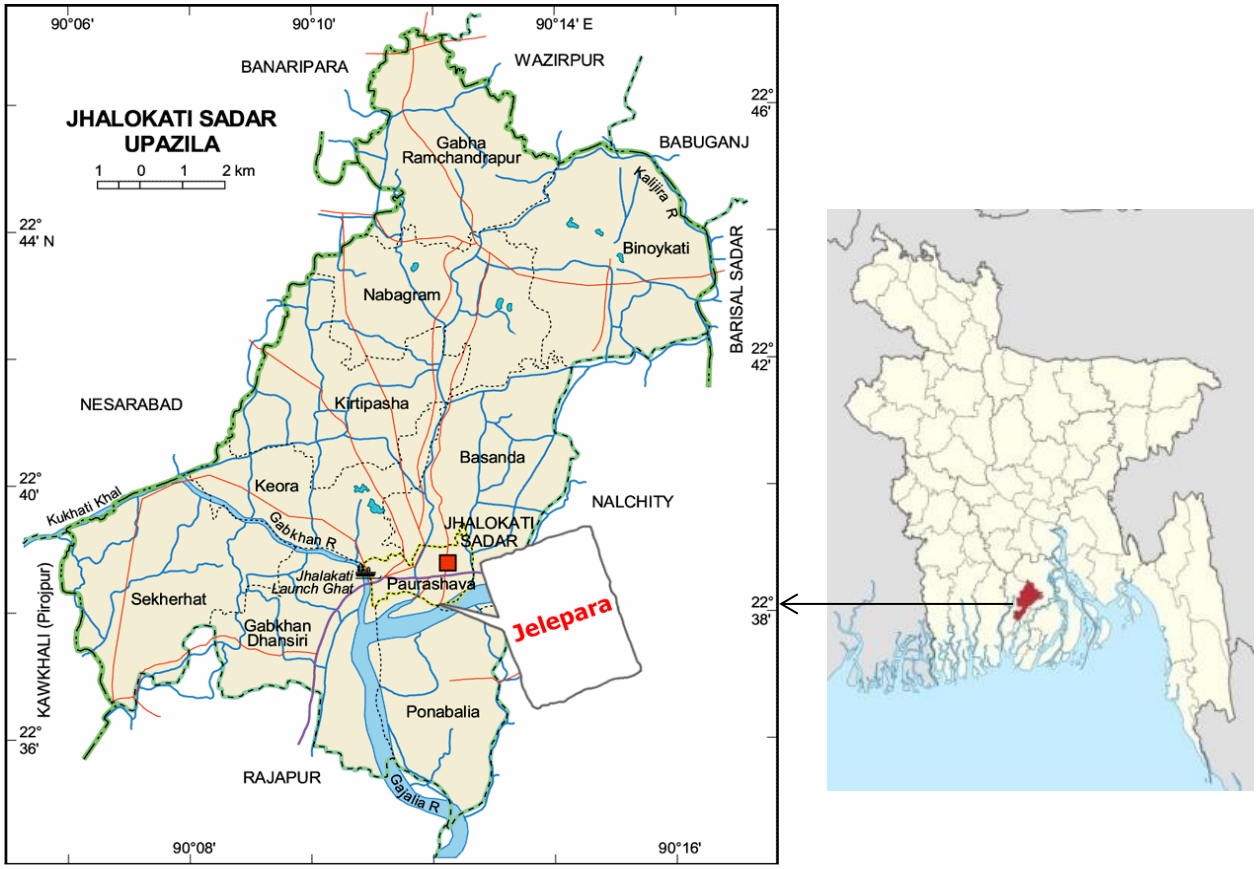

Figure 1(a): Map showing the location of Chandkathi Jelepara fishing community within the Jhalokathi district of Bangladesh

Figure 1(b). Map displaying the study location with precise GPS coordinates.

Results and Discussions

History of the Community

Three and a half decades ago, seven fishermen households initially settled in that location after losing their homes to Shugondha River's erosion. Over the years, more families joined them, forming a community of traditional fishermen, all from the same caste. Now comprising 42 households, their livelihood depends solely on hilsa fishing. Despite their daily struggles, they continue to reside on temple property, lacking their own homes and paying rent by constructing small sheds.

Social profile of the community

Chandkathi Jelepara, a pivotal hilsa fishing enclave, comprises 42 households housing 100 active male fishers, supporting approximately 240 individuals. The male-to-female ratio stands at 60:40, with the community exclusively depending on fishing for sustenance. Notably, owing to religious customs, no female fishers are present, and the practice of river fishing entails labor-intensive efforts. All households share a Hindu identity and belong to the same caste, with fishing serving as the exclusive and enduring source of income for successive generations. This underscores the community's distinct social and economic reliance on hilsa fishing.

Age structure of fisherwomen

The study revealed that 36% of the fisherwomen were under 20 years old, 40% were in the 20–40 age range, 17% were between 40–60 years old, and only 7% were over 60 years old (Figure 2). Age distribution among fisherwomen varies significantly across different studies and regions. Bhargav et al. (2020) observed a predominance of middle-aged women (31–56 years) in fisher communities, while Mary et al. (2015) found that most mussel fishers in Kanyakumari District were aged 40–60 years. Kalita et al. (2015) noted a significant number of fishermen aged 31–50 years in Barpeta, Assam, whereas Hossain et al. (2022) highlighted a shift towards younger demographics, with many in the 18–30 age group. Other studies, such as Rana et al. (2018), Minar et al. (2012), and Ali et al. (2009), consistently reported a prevalence of fishers aged 31–40 years. Ahmed et al. (2021) also emphasized a large proportion aged 26–30 years. In the Sundarbans, Bhaumik and Saha (1994) documented a broader age range (20–70 years), while Sheikh and Goswami (2013) reported that most respondents in the Chandakhola wetland of Dhubri, Assam, were aged 31–50 years.

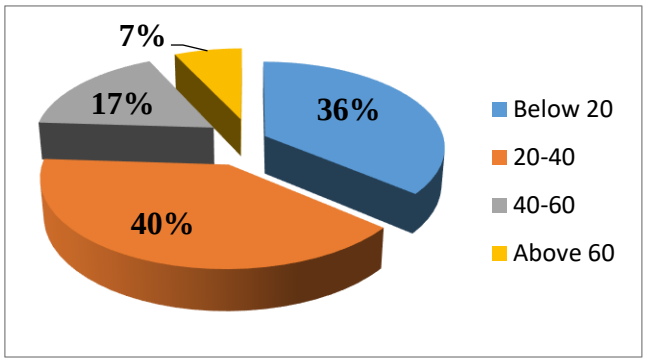

Figure 2. Age Structure of Fisherwomen in Chandkathi Jelepara fishing community (Percentage)

Family size and Type

In this study, 48% of households had ≤5 family members, 28% had 6-8 members, and 24% had more than 8 members (Figure 3). The study findings on the family size of fisherwoman households reveal a diverse range across various research efforts. Similarly, Bhargav et al. (2020) reported that 48.7% of respondents had ≤5 family members, while Ali et al. (2009) found a majority of families with less than 5 members. Shankar (2010) and Anon (2005) reported varying percentages of families with 5 members, while Mary et al. (2015) noted a distribution of fishermen families across different size categories, with the majority having 2-4 members. These findings highlight the diversity in family size among fishing communities, influenced by regional, socioeconomic, and cultural factors. In contrast, Hossain et al. (2022) observed that 80% of fishermen had 5-8 family members. Comparisons with national averages (4.0 people per family), as highlighted by the Population & Housing Census 2022, reveal that hilsa fishing communities tend to have larger family sizes.

The study also revealed that nearly all households within the fishing community were joint families, a situation attributed to landlessness leading to shared housing arrangements despite distinct living setups and economic activities. This contrasts sharply with recent findings by Hossain et al. (2023), where a significant majority of fishermen were found to belong to nuclear families. The discrepancy is notable, especially when compared to earlier research by Hossain et al. (2022), which reported a predominant prevalence of single-family households among fishermen. Similarly, Ahmed et al. (2021) identified a preference for nuclear family structures among Hilsa fishers in the Meghna River Estuary, diverging from the joint family dynamics observed in this study. However, our results closely resemble those of Rana et al. (2018) and Minar et al. (2012), who also documented a high prevalence of joint family setups among fishermen, highlighting the complexity and variability in household structures within fishing communities.

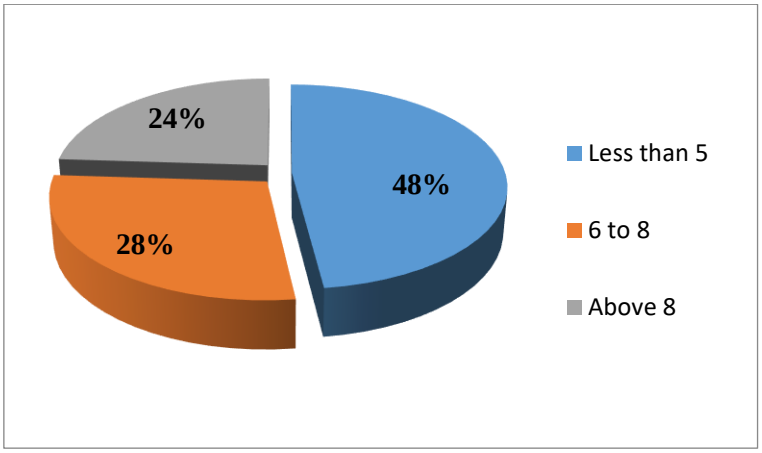

Figure 3. Percentage of Family Size (Members) in Fisherwomen Households in Chandkathi Jelepara fishing community

Literacy rate of fisherwomen

The majority (52%) of the fisherwoman households were illiterate, followed by 41% were able to sign only, and the remaining 7% had the primary level of education (Figure 4). It is due to the lack of awareness about education as they were born into professional fishing families as well as the poor economic status of their parents. The study findings underscore a significant disparity between the literacy rate among fishing communities and the national average of 75.2% (Bangladesh Economic Review, 2020), with a notably lower literacy rate observed among fisherwomen. In a similar study by Bhargav et al. (2020), it was revealed that the majority of fisherwomen (88.1%) were illiterate. This pattern aligns with earlier research by Mohinigadhia et al. (1999), Shahjahan et al. (2001), Sheikh and Goswami (2013), Kalita et al. (2015), Saxena (2014), Bhuyan and Islam (2016), and Mary et al. (2015), which reported varying degrees of illiteracy among fishermen, ranging from 55% to 80%, across different regions in Bangladesh and India.

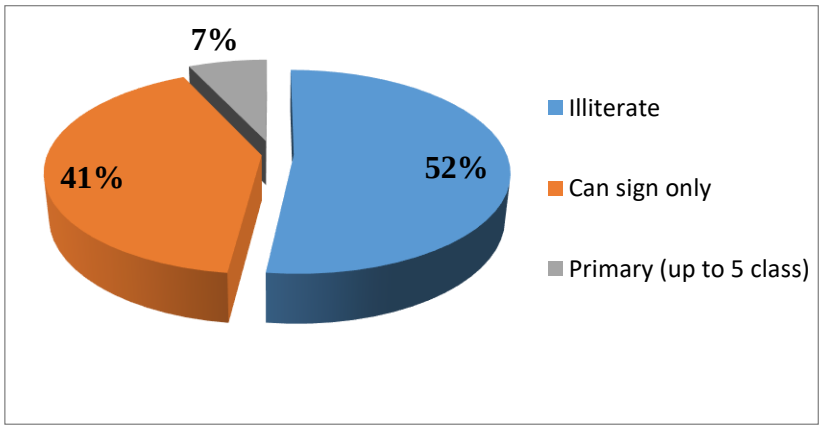

Figure 4. Percentage of Literacy rate of fisherwomen in Chandkathi Jelepara fishing community

Health facility

The study found that all fisherwoman households had access to healthcare through the nearby Upazila Sadar hospital. However, broader healthcare access challenges were evident, with the Bangladesh Economic Review 2020 indicating a low ratio of one registered physician for every 1724 people. Hossain et al. (2023) also noted significant limitations in healthcare access in Meghna riverbank fishing communities, where the number of people per doctor might exceed several thousand, highlighting the need for improved healthcare infrastructure in such areas.

Water, sanitation and hygiene status

In this study, the fishing community relied on four shallow tube-wells for drinking water, while river water served other purposes, although interruptions sometimes necessitated using river water for drinking. This contrasts with the national analysis reported in the Bangladesh Economic Review 2020, where 98.3% of the population has access to clean water. According to the investigation, it was revealed that sanitation facilities in this community were limited, with only four brick sanitary latrines provided by the government, leading community members to share facilities with neighbors for health purposes, posing significant challenges and ultimately resulting in them having no choice but to use the river bank as a toilet. Moreover, just 10% of households had ring slab latrines, highlighting significant disparities compared to the national average of 81.5% access to improved sanitation facilities, as mentioned in the Bangladesh Economic Review 2020. These disparities reflect the specific challenges faced by the fishing community, particularly due to their landless status and economic constraints.

Traditional knowledge

It was observed that women were engaged in domestic activities and were not allowed to go out fishing due to social and security problems. They have traditional knowledge of net mending and different types of fishing trap making. And they can catch fish by hook and line (Chip borshi, Chara borshi) and using the cast net. Hossain (2021) and Hossain et al. (2022) uncovered a wealth of traditional knowledge within fishing

communities pertaining to fish catching techniques, including chai fishing, zag fishing, and others. When the fish catch was abundant, they used to conduct several methods of fish processing, such as fish drying and lona ilish (salted hilsa). The findings of this study coincide with those of Hossain et al. (2019), and Hossain et al. (2022), who observed that nona ilish (salted hilsa) and fish drying were prevalent practices within the hilsa fishing community. Additionally, Jeyaram et al. (2009) found, in their examination of traditional fermented foods in Manipur, that salting, drying, and smoking fish were the primary methods of preservation in this region of India.

Livestock status

This investigation discovered that livestock ownership among fisherwoman households is minimal, with only 16.5% keeping animals on a small scale, primarily chickens, ducks, pigeons, and goats, while the majority (84.5%) were not engaged (Figure 5) due to constraints such as lack of rearing facilities, high mortality rates, and insufficient technical knowledge. This echoes recent findings by Hossain et al. (2023), where only 9.33% of riverbank fishermen own livestock, primarily due to similar challenges. Additionally, an earlier study by Hossain et al. (2022) reported that just 3% of families in the fishing community of Bangladesh's Chandpur region had animals, highlighting the need for improved access to rearing facilities and technical knowledge through collaboration with local service providers.

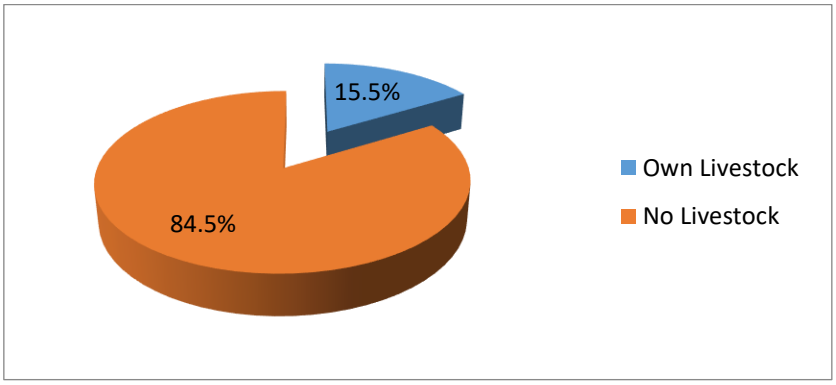

Figure 5. Percentage Livestock Status in Fisherwomen Household in Chandkathi Jelepara fishing community

Land holding, Housing and infrastructure

The study findings revealed that the vast majority (90.5%) of fisherwomen households were landless (Figure 6), residing in makeshift tin shed houses on temple land for a monthly fee of 150–200 BDT (Bangladesh Taka), while only 9.5% owned medium tin shed houses on their own land, primarily due to the community's vulnerable location on the river embankment. No households owned agricultural land. In a recent study by Hossain et al. (2023), it was found that 56.67% of fishermen were landless due to river soil erosion, with 40.00% having only homestead land and 3.33% owning both homestead and agricultural land, highlighting their vulnerability to natural disasters. Ahmed et al. (2021) observed that 57% of fishermen had no land, while 33% had 5 to 10 decimals and 10% had more than 10 decimals, with the majority residing in tin and wood houses (53%) and the rest in dwellings with straw roofs and bamboo fences (24%), semi-pacca (18%), and pacca (5%). Additionally, Hossain et al. (2022) noted that 60% of households lived in tiny tin-shed homes and 40% in medium tin-shed homes, with only 40% owning their own homesteads and the rest relying on rented land or homes. Minar et al. (2012) reported that 66% of fishermen's households had bamboo and tin-shed houses, while 24% had tin-shed walls. Furthermore, studies by Faruque and Ahsan (2014) and Alam and Bashar (1995) noted that the majority of fishermen's households had kacha housing structures.

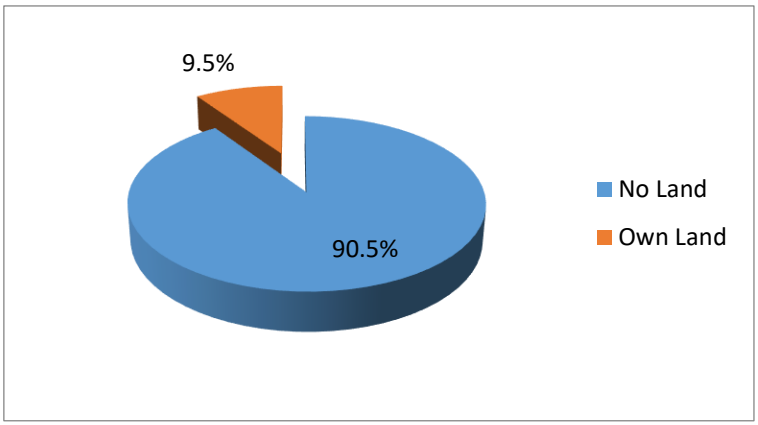

Figure 6. Percentage of Land Holding Status of Fisherwomen Household in Chandkathi Jelepara fishing community

Another discovery made during the investigation is that the road communication was excellent due to the community's urban location, with most roads being paved. These well-maintained roads were easily accessible to rickshaws, vans, and motorized vehicles, facilitating the transportation of input supplies to local and distant markets for product marketing within a reasonable distance. Consequently, fishers enjoyed convenient access to these facilities.

Economic status of Fisherwomen Household

The majority of households in the studied community live in poverty, experiencing societal marginalization and lacking access to land. The study revealed that 57% of households were extremely poor, followed by 34% classified as poor, and an additional 9% categorized as moderately poor (Figure 7). This study derives its poverty estimation from tangible assets, income, and expenditure. According to the FGDs, the average monthly income of households was lower than their average monthly expenditure. This finding indicates significantly lower income levels compared to those reported in the Bangladesh Economic Review (2020), which estimated the average monthly income for an individual at 14,574 BDT. In contrast to Hossain et al. (2023), where 56.67% of fishermen were extremely poor, 23.33% poor, and 20.00% moderately poor. Another earlier study by Hossain et al. (2022) found 60% extremely poor, 20% destitute and 20% moderately poor, with inadequate incomes to cover expenses.

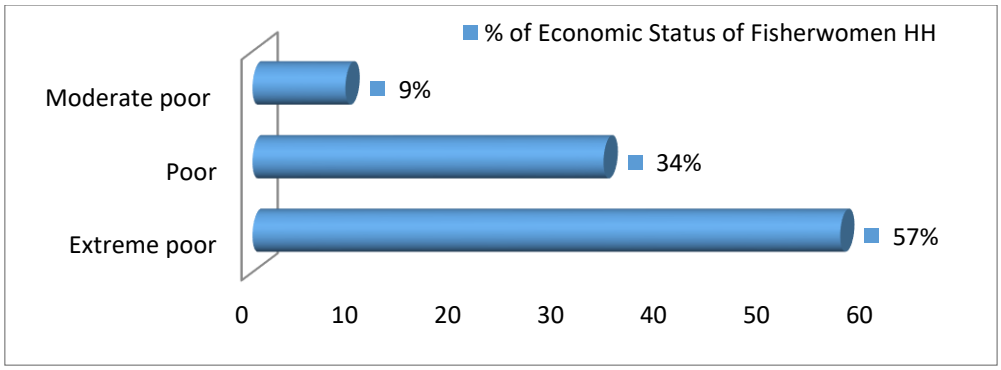

Figure 7. Economic status of Fisherwomen Household in Percentage

Nutritional Status:

Fisherwomen households endure significant hardship throughout the year to meet their basic needs, particularly during fishing bans when food shortages are prevalent. While some manage by reducing meal frequency and opting for cheaper alternatives, many struggle to make ends meet. Despite being involved in fishing, households often lack access to fish due to selling it for cash, relying instead on vegetables for sustenance. Occasional access to eggs or meat is considered fortunate. Dietary differences between fishing and ban seasons are highlighted in Table 1.

Table 1. Diets of Fisherwomen Households during Fishing and Ban Seasons

Food Items	**Fishing Season**	**Ban Season**
Rice	Daily	Daily
Fish	5-6 days/week	1-2 days/week
Vegetables	4-5 days/week	6-7 days/week
Meat/Egg/Milk	Once or twice/month	Rarely

Amidst fishing bans, fisherwomen within households experience a dire scarcity of protein intake, partaking in such nourishment exceedingly rarely due to prevailing food shortages. The nutritional challenges faced by fisherwomen stem not only from poverty but also from socio-cultural biases against women, perpetuating misconceptions and taboos surrounding food habits. Gender discrimination, especially prevalent in regions like Sundarban, exacerbates these issues, as observed by various studies (Anonymous, 1997; Roy et al., 2013; Basu, 2011).

Gender dynamics of the fishing community

In the study area, gender dynamics exhibit a significant imbalance, with women facing under-representation in cooperatives, limiting their access to economic power and support. Traditional gender roles persist, relegating women to household duties without recognition for their workload. Fisherwomen encounter a lack of decision-making power, with only 2% able to make independent decisions. This extends to financial matters, as women have nominal control over household income, resources, and loan utilization (Table 2).

Table 2. Gender dynamics in the fishing community

Issue	**Current Situation**
Workloads and gender division of labour	Women in the community conform to traditional gender roles, with responsibilities primarily centered around family care, household work, and child-rearing.
Decision Making power in HH and community level	Decision-making power predominantly lies with males in the family, with 70% of decisions made solely by men. Only 2% of women can take decisions independently.
Access to Income and expenditure	Husbands primarily influence spending decisions, although expenditures are mutually discussed. The earning member, usually the husband, plays a significant role.
Access to Loan (Micro-credit)	Women secure loans from NGOs but face limitations in independent spending due to male control over loan reimbursement.
Control over Income	Men control about 95% of the household income.
Control over Household Asset	Approximately 90% of household assets are under male control, influencing decisions regarding asset buying or selling.
Legal rights & Status (e.g., ownership of Land)	Women in the community are largely unaware of legal rights over assets, with 95% having limited knowledge in this regard.
Access to Education of female children	Joint decision-making on female children's education is prevalent, with girls receiving preference due to government-sponsored education up to class eight.
Family Planning	Collaborative decision-making on family planning, with men having a greater influence.
Health Care	Women can access health care with the permission of a male family member.
Gender-based Constraints	Social prejudice, lack of education, and social negligence towards women, hindering higher education.
Gender-based Opportunities	Efforts to create opportunities for women, including involvement in alternative income-generating activities, skill development, and leadership training.

Mobility of fisherwomen

The study revealed that fisherwomen in the community have limited mobility outside their homes, typically covering distances ranging from 0.25 to 2.0 kilometers. Their outings are often brief, with family members or relatives accompanying them when necessary. The survey identified 14 distinct destinations frequented by fisherwomen, as outlined in Table 3.

Their movements are typically sanctioned by their husbands, particularly as the men engage in daily fishing activities. Interestingly, even routine trips, such as visiting neighbors, often require approval from their husbands to maintain familial harmony. Notably, only 10% of comparatively younger fisherwomen display frequent mobility beyond the community, while 50% move occasionally, and 40%—comparatively older individuals—rarely venture beyond attending religious festivals or visiting close relatives.

Table 3. Fisherwomen Mobility of Chandkathi Jelepara

SL	Destination	Purpose	Accompanied by	Distance (km)	Permission Required
1	Primary School	School admissions, book collection, stipends	Children, neighbors	0.25	Yes
2	Social Welfare Office	Old age allowance, benefits for children	Children, neighbors	1.0	Yes
3	NGO/MFI	Loans, payments, installments	Husband	0.5	Yes
4	Upazila Parishad	Healthcare, family planning, VGF	Husband, neighbors	1.0	Yes
5	Pouroshova	Sewing training, birth certificates	Neighbor	0.5	Yes
6	Sadar Hospital	Medical treatment	Husband, neighbor	0.5	Yes
7	Pharmacy	Medication purchases	Children	0.25	Yes
8	Temple	Worship	Family, neighbor	Within community	Yes
9	Religious Festival	Observance of religious festivals	Family, neighbor	2.0	Yes
10	Boro Bazar (Big Market)	Tailoring training, shopping	Alone, neighbor	1.0	Yes
11	Riverbank Park	Recreation	Kin	0.25	Yes
12	Kheya Ghat	Cross-river travel	Family	0.25	Yes
13	Market	Shopping	Family, neighbor	1.0	Yes
14	Father's House	Visits	Family, children		Yes

Occupation and Income of Fisherwomen

In the examined fishing community, traditional gender roles dictate that fisherwomen primarily engage in domestic tasks, while men are the primary breadwinners through fishing activities. However, environmental challenges such as declining fish stocks and the impact of climate change are compelling hilsa fisherwomen to seek alternative income sources. Studies by Haque and Itohara (2009), Haque and Yamao (2009), Mondal et al. (2009), and Panda (2009) emphasize the importance of tailored interventions for gender-inclusive economic growth in coastal communities.

Despite facing challenges like limited resources and skills, fisherwomen are resiliently participating in Additional Income Generating Activities (AIGAs), including small-scale livestock rearing (e.g., poultry, pigeon, duck, and goat rearing) and income-generating tasks such as net mending, Katha stitching, and tailoring. However, obstacles such as technical knowledge gaps and high livestock mortality rates hinder their effectiveness. Younger fisherwomen actively seek training to enhance their tailoring abilities, reflecting a proactive stance toward economic empowerment. Nevertheless, it is essential to address challenges such as the high cost of sewing machines and the need for ongoing technical support to ensure the sustainability of this income source. Studies by Hasan et al. (2015) highlight rural women's engagement in various agricultural and non-agricultural activities to support their households.

Moving forward, the community is exploring various potential Additional Income Generating Activities (AIGAs) to further diversify income streams and enhance household resilience.

Initiatives such as paper packet making, grocery shopping bag production, and handicraft production are being considered due to their environmental sustainability and market demand. Similarly, ventures like breeding buck rearing and high-quality pigeon rearing show promise for sustainable income generation, although initial support and technical knowledge are necessary. Furthermore, endeavors like mushroom cultivation and cage culture in canals offer secure income sources, while dry food processing and small-scale trade provide avenues for regular income. These efforts underscore the community's dedication to exploring diverse income opportunities for long-term economic stability and growth, aligning with studies conducted by Hoque and Itohara (2009), Haque and Yamao (2009), Mondal et al. (2009), and Panda (2009).

Vulnerability and Resilience

The vulnerabilities faced by fisherwoman households within this community are multifaceted, encompassing social, economic, and climatic factors, each posing significant threats to their livelihoods. Social vulnerabilities, such as dowry demands during marriages, early marriages resulting in increased workload and health risks for young brides, and the stigma of financial insolvency, contribute to immense pressure on these households. Additionally, economic vulnerabilities manifest during fishing bans, leading to insufficient income, reduced access to education and healthcare, and heightened household tensions. The lack of Alternative Income Generating Activities (AIGAs) exacerbates economic instability, prompting seasonal migration and even illegal activities to cope with financial constraints. Climatic vulnerabilities, including cyclones and land erosion, disrupt fishing activities, result in loss of income and property, and exacerbate health risks due to unsafe drinking water and waterborne diseases.

In response to these challenges, fisherwoman households employ various coping strategies to mitigate the impacts of vulnerabilities. Financial coping mechanisms involve borrowing loans from NGOs, local lenders, or relatives, selling fishing gear, and reducing meal frequencies to manage expenses. Social coping strategies include raising awareness against dowry and early marriage, enforcing regulations to prevent child marriage, and advocating for suitable AIGAs to alleviate economic stress. Moreover, efforts are made to adapt to climatic vulnerabilities by investing in safe drinking water facilities, implementing protective measures against land erosion, and seeking refuge on embankments or migrating to safer locations.

Despite these coping mechanisms, vulnerabilities persist and continue to undermine the resilience of fisherwoman households. Sustainable solutions necessitate comprehensive approaches that address the root causes of vulnerabilities, including gender-based discrimination, economic disparities, and environmental degradation. Empowering fisherwomen through education, skill development, and access to resources can enhance their capacity to withstand shocks and build resilience within their communities. Additionally, collaborative efforts involving government agencies, NGOs, and community stakeholders are essential to implement effective interventions that promote sustainable livelihoods and enhance the overall well-being of fisherwoman households.

Vulnerabilities faced by fisherwoman households in a community, supported by scientific references from relevant studies. Studies by Islam et al. (2016) and Porras et al. (2017a) identify challenges such as improper implementation of bans and limited access to resources. Market disruptions are a prominent shock, affecting small-scale fishers' economic survival (Bennett et al., 2020). Diversifying income sources is a key resilience strategy, though some households struggle due to low income and limited access to credit (Islam et al., 2014). Challenges also arise from the informal money lending system, affecting community cohesion (Choudhury et al., 2021). Limited participation in formal institutions hampers community resilience (Berkes and Ross, 2013). Government initiatives offer limited relief, with exclusion from compensation packages exacerbating social divisions (Mozumder et al., 2020). Inclusive policies are needed to enhance resilience without perpetuating social stratification (Dewhurst-Richman et al., 2016). Household resilience varies, with a need to address negative interactions at the community

level (Islam et al., 2020a). While fishing remains a primary occupation, adaptation strategies are evolving, with potential for transformation in the future (Islam et al., 2021a).

Effect on environment of existing socioeconomic condition

The impoverished socioeconomic conditions among fishermen have significant environmental repercussions, manifesting in unsustainable fishing practices, habitat degradation, and depleted fish stocks. Economic hardships often force fishermen into practices that harm the environment, such as overfishing and using illegal gear. Without sufficient financial resources, they struggle to adopt sustainable practices, and the lack of education exacerbates this issue by limiting awareness of the long-term benefits of conservation. These challenges lead to severe environmental consequences. Continuous exploitation of natural resources degrades fish habitats, including rivers, canals, and floodplains, reducing biodiversity and threatening the viability of the fishing industry. Overfishing, driven by the need to meet immediate economic needs, has led to a significant decline in fish stocks, jeopardizing food security and livelihoods. Additionally, inadequate sanitation practices contribute to water contamination and the spread of infectious diseases. The discharge of night soil into water bodies fosters vector-borne diseases, posing public health risks and further straining the community.

To address these issues, several potential solutions and community-driven initiatives can be implemented. Education and awareness programs focused on sustainable fishing and environmental conservation can empower fishermen to make informed decisions. Financial support through microloans or subsidies can help them transition to sustainable practices, such as using environmentally friendly fishing gear. Community empowerment programs can foster local leadership in conservation efforts, while targeted interventions to improve sanitation infrastructure, such as providing low-cost latrine pans, can reduce water contamination and disease spread. Encouraging sustainable fishing practices, such as seasonal fishing bans and the establishment of fish sanctuaries, can help restore fish stocks and protect habitats. Local conservation efforts, like reforesting riverbanks and protecting breeding grounds, are crucial for ecosystem restoration, with community involvement ensuring long-term investment in environmental health.

By addressing these socioeconomic challenges and promoting sustainable practices, fishing communities can build resilience and protect their environmental resources. These initiatives not only safeguard livelihoods but also ensure the health and sustainability of the ecosystem for future generations.

Conclusion

The socioeconomic and livelihood characteristics of hilsa fisherwomen reveal significant challenges, with 57% living in extreme poverty and 52% being illiterate. These factors hinder their economic advancement, perpetuating a cycle of poverty that also affects their families and communities, particularly as male children often enter the fishing profession early, exacerbating intergenerational poverty. Despite some support from governmental and non-governmental organizations, fisherwomen continue to struggle with high-interest loans and a lack of technical knowledge. To empower these women and improve their socioeconomic status, the study recommends several key actions: providing alternative income sources during fishing bans, facilitating access to microfinance, offering tailored technical training and ongoing support, improving access to education, enhancing interagency collaboration, and conducting further research to address specific gaps and challenges. These measures aim to integrate fisherwomen into relevant policy frameworks and ensure their long-term empowerment and well-being.

Ethical approval

The author declares that this study complies with research and publication ethics.

Informed consent

Not available.

Conflicts of interest

There is no conflict of interests for publishing of this study.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

Funding organizations

No funding was received for this research.

Author Contribution: Both authors contributed equally to this work. Contributions include Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing-original draft, Review and editing.

References

Alam, M. F., & Bashar, M. A. (1995). Structure of cost and profitability of small-scale riverine fishing in Bangladesh. Journal of Research Progress, 9, 235-241.

Ali, H., Azad, M. A. K., Anisuzzaman, M., Chowdhury, M. M. R., Hoque, M., & Sharful, M. I. (2009). Livelihood status of the fish farmers in some selected areas of Tarakanda upazila of Mymensingh district. Journal of Agroforestry and Environment, 3(2), 85-89.

Anonymous. (1997). Harmful traditional practices affecting the health of women and children: A report from DESA. United Nations High Commissioners for Human Rights.

Anon. (2005). Report on the socio-economic analysis of Nuvvulrevu village in Srikakulam district of Andhra Pradesh. Central Marine Fisheries Research Institute.

Basu, S. (2011). A socio-economic study on women's scientific temper in Bengal with special reference to nutritional concept. Science and Culture, 77(7-8), 313-317.

Bennett, N. J., Finkbeiner, E. M., Ban, N. C., Belhabib, D., Jupiter, S. D., Kittinger, J. N., et al. (2020). The COVID-19 pandemic, small-scale fisheries and coastal fishing communities. Coastal Management, 48, 336–347. https://doi.org/10.1080/08920753.2020.1766937

Berkes, F., & Ross, H. (2013). Community resilience: Toward an integrated approach. Society & Natural Resources, 26(1), 5-20. https://doi.org/10.1080/08941920.2012.736605

Bhargavi, K., Chirwatkar, B. B., Das, A., Behera, S., & Bhakta, D. (2020). Socio-economic status of fisherwomen community in coastal Vizianagaram district of Andhra Pradesh, India. Journal of Fisheries, 8(1), 741–745.

Bhuyan, S., & Islam, S. (2016). Present status of socio-economic conditions of the fishing community of the Meghna River adjacent to Narsingdi district, Bangladesh. Journal of Fisheries and Livestock Production, 4, 192.

Choudhury, M. U. I., Haque, C. E., & Hostetler, G. (2021). Transformative learning and community resilience to cyclones and storm surges: The case of coastal communities in Bangladesh. International Journal of Disaster Risk Reduction, 55, 102063. https://doi.org/10.1016/j.ijdrr.2021.102063

Clayton, A., & Savage, D. C. (1974). Government and labour in Kenya, 1895-1963. Canadian Journal of African Studies, 10, 168-170.

Dewhurst-Richman, N., Mohammed, E. Y., Ali, M. L., Hassan, K., Wahab, M. A., Ahmed, Z. F., et al. (2016). Balancing carrots and sticks: Incentives for sustainable Hilsa fishery management in Bangladesh. Retrieved from https://pubs.iied.org/16619iied

DoF. (2014). Freshwater fishes of Bangladesh. Department of Fisheries (DoF), Bangladesh. Retrieved from http://www.fisheries.gov.bd

Engelman, R., Macharia, J., Zahedi, K., Jallow, B., & Boncour, P. (2009). Facing a changing world: Women, population and climate. In R. Engelman & J. Macharia (Eds.), The state of world population 2009 (pp. 1-91). UNFPA.

Faruque, M. D. H., & Ahsan, D. A. (2014). Socio-economic status of the Hilsa (Tenualosa ilisha) fishermen of Padma River, Bangladesh. World Applied Sciences Journal, 32(5), 857-864.

Francis, E. (1995). Migration and changing divisions of labour: Gender relations and economic change in Koguta, Western Kenya. Africa, 65, 197-216.

FRSS. (2016). Fisheries statistical report of Bangladesh. Fisheries Resources Survey System (FRSS), Department of Fisheries, Bangladesh.

Haldar, G. C., Islam, M. R., & Akanda, M. S. I. (2004). Implementation strategies of hilsa fisheries conservation and management. Fourth Fisheries Project. Department of Fisheries, Dhaka, Bangladesh. Pp 39.

Hasan, S. S., Hossain, M., Sultana, S., & Ghosh, M. K. (2015). Women's involvement in income generating activities and their opinion about its contribution: A study of Gazipur District, Bangladesh. Science Innovation, 3(6), 72-80. https://doi.org/10.11648/j.si.20150306.13

Hoque, M. S., & Yamao, M. (2009). Can microcredit alleviate rural poverty? A case study of Bangladesh. World Academy Science, Engineering and Technology, 46, 648-656.

Hoque, M., & Itohara, Y. (2008). Participation and decision making role of rural women in economic activities: A comparative study for members and non-members of the micro-credit organizations in Bangladesh. Journal of Social Science, 4, 229-236. http://doi.org/10.3844/jssp.2008.229.236

Hossain, A. B. M. A., Mahdi, G. M. A., & Azad, A. K. (2022). Socioeconomic, livelihood and cultural profile of the Meghna River Hilsa Fishing Community in Chandpur, Bangladesh. Archives of Agriculture and Environmental Science, 7(4), 549-558. https://dx.doi.org/10.26832/24566632.2022.0704011

Hossain, A. B. M. A., Mahdi, G. M. A., & Azad, A. K. (2022). Zag fishing (Fish aggregating device-FAD): Threating activities against indigenous fish species in the Meghna River estuary. EC Veterinary Science, 7(7), 19-20.

Hossain, A. B. M. A., Bisshas, S., Pramanik, M. M. H., & Hasan, M. M. (2019). Supply chain analysis of salted Tenualosa ilisha (Nona ilish) in Bangladesh. Journal of FisheriesSciences.com, 13(4), 021-025.

Hossain, A. B. M. A. (2021). Chai Fishing in the Meghna River of Bangladesh: Now Arising the Question of Threatening of Yellowtail Catfish (Pangasius pangasius; Hamilton, 1822) in Nature. EC Veterinary Science, 6(12), 35-36.

Hossain, A. B. M. A., Mahdi, G. M. A. M., Pramanik, M. M. H., & Hasan, M. M. (2023). Understanding the challenges of the Hilsa fishing community in Bangladesh: The river of life. Journal of Sustainability and Environmental Management, 2(2), 115-125. Retrieved from https://www.nepjol.info/index.php/josem

Islam, M. M., Islam, F., Akter, M. S., Kundu, G. K., Barman, A., & Khan, M. I. (2020). Transformative Adaptations to Climate Change: Cases from the Jamuna River Fishing Communities of Bangladesh. Journal of Fishery and Environment, 44, 1-18.

Islam, M. M., Mohammed, E. Y., & Ali, L. (2016). Economic incentives for sustainable hilsa fishing in Bangladesh: An analysis of the legal and institutional framework. Marine Policy, 68, 8-22. https://doi.org/10.1016/j.marpol.2016.02.005

Islam, M. M., Mostafiz, M., Begum, P., Talukder, A., & Ahamed, S. (2021). Vulnerability to disaster in a multi-hazard coastal environment in Bangladesh. In M. Babel, A. Haarstrick, L. Ribbe, V. R. Shinde, & N. Dichtl (Eds.), Water Security in Asia (pp. 675-686). Springer. https://doi.org/10.1007/978-3-319-54612-4_50

Islam, M. M., Sallu, S., Hubacek, K., & Paavola, J. (2014). Limits and barriers to adaptation to climate variability and change in Bangladeshi coastal fishing communities. Marine Policy, 43, 208-216. https://doi.org/10.1016/j.marpol.2013.06.007

Jeyaram, K., Singh, T. A., Romi, W., Devi, A. R., Singh, W. M., Dayanidhi, H., Singh, N. R., & Tamang, J. P. (2009). Traditional fermented foods of Manipur. Indian Journal of Traditional Knowledge, 8(1), 151-121.

Kalita GJ, Sarma PK, Goswami P, Rout S (2015). Socioeconomic status of fishermen and different fishing gear used in Beki River, Barpeta, Assam. Journal of Entomology and Zoology Studies 3(1), 193–198.

Kebe, M. (2009). Taking the contribution of fisheries into account in development policy. In: Fisheries, sustainability and development: Fifty-two authors on coexistence and development of fisheries and aquaculture in developing countries (ed. H. Ackefors), pp.365-375. Royal Swedish Academy of Agriculture and Forestry, Stockholm.

Key finding of Population and Housing census 2022. Bangladesh Bureau of Statistics. Retrieved from www.bbs.gov.bd.

Medard, M., & Wilson, D. C. (1996). Changing economic problems for women in the Nile perch fishing communities on Lake Victoria. Anthropologica, 38, 149-172.

Minar, M. H., Rahman, A. F. M. A., & Anisuzzaman, M. (2012). Livelihood status of the fisherman of the Kirtonkhola River nearby to the Barisal town. Journal of Agroforestry and Environment, 6(2), 115-118.

Mohinigadhia B, Parimal P, Gadhia PK (1999). Socioeconomic study of fisher community and fisheries status around Kakrapar atomic station. Fishing Chimes, 19(9), 49–51.

Mondal, N. I., Khan, A. R., Chakma, J., & Hossain, G. (2009). Family structure, economic security and educational status of rural chakma in CHT of Bangladesh. Journal of Social Science, 19, 219-224.

Mozumder, M. M. H., Pyhälä, A., Wahab, M., Sarkki, S., Schneider, P., & Islam, M. M. (2020). Governance and power dynamics in a small-scale Hilsa shad (Tenualosa ilisha) fishery: A case study from Bangladesh. Sustainability, 12, 5738. https://doi.org/10.3390/su12145738

Nandi, N. C., & Parmanik, S. K. (1994). Crab and crab fisheries of Sunderban. Hindustan Publishing Corporation.

Ogutu, M. A. (1988). The role of women and cooperatives in fish marketing in Western Kenya. Artisanal Fisheries of Lake Victoria, Kenya: Options for management, production and marketing, 113-117.

Ofuoku, A. U., Emah, G. N., & Itedjere, B. E. (2008). Information utilization among rural fish farmers in the central agricultural zone of Delta state, Nigeria. World Journal of Agriculture Science, 4, 558-564.

Panda, D. K. (2009). Participation in the Group Based Microfinance and its Impact on Rural Households: A Quasi-experimental Evidence from an Indian State. Global Journal of Finance Management, 1, 171-183.

Pauly, D. (2006). Major trends in small-scale marine fisheries, with emphasis on developing countries, and some implications for the social sciences. Maritime Studies, 4, 7–22.

Porras, I., Mohammed, E. Y., Ali, L., Ali, M. S., & Hossain, M. B. (2017). Power, profits and payments for ecosystem services in Hilsa fisheries in Bangladesh: A value chain analysis. Marine Policy, 84, 60-68. https://doi.org/10.1016/j.marpol.2017.06.031

Rahman, M. J. (2006). Recent advances in biology and management of Indian shad (Tenualosa ilisha Ham.). SAARC Journal of Agriculture, 4, 67-90.

Rana, M. E. U., Salam, A., Shahriar, N. K. M., & Hasan, M. (2018). Hilsa fishers of Ramgati, Lakshmipur, Bangladesh: An overview of socio-economic and livelihood context. Aquaculture Research and Development, 9, 541. https://doi.org/10.4172/2155-9546.1000541

Roy, A., Bhaumik, U., Pandit, A., Saha, S., & Mitra, A. (2013). A study on livelihood analysis of women folk of Sundarban. Book of abstracts published on the occasion of Indian Science Congress, Animal, Veterinary and Fisheries Sciences Section, Kolkata, 140-141.

Roy, N. C., Rahman, M. A., Haque, M. M., Momi, M. A., & Zahid Habib, A. B. M. (2015). Effects of incentive-based hilsa shad (Tenualosa ilisha) management and conservation strategies in Bangladesh. Journal of Sylhet Agricultural University, 2(1), 69-77.

Roy, A., Bhaumik, U., Pandit, A., Saha, S., & Mitra, A. (2013). A study on livelihood analysis of women folk of Sundarban. In Book of abstracts published on the occasion of Indian Science Congress, Animal, Veterinary and Fisheries Sciences Section (pp. 140-141). Indian Science Congress Association.

Sarker, A. S., & Rahman, M. H. (2007). The emerging perspective of governance and poverty alleviation: A case of Bangladesh. Public Organization Review, 7, 93-112. http://DOI 10.1007/s11115-006-0023-y.

Saxena, A., Singh, R. N., & Ayatulla, C. (2014). The socio-economic status of fishermen of district Rampur, Uttar Pradesh. Trends in Fisheries Research, 3(3), 01–04.

Saxena, S. (2014). Study on socio-economic status of fisherman community of upper Lake Bhopal: Preliminary survey. International Journal of Science and Research, 3(8), 2047–2048.

Shankar, S. (2010). An analysis of the knowledge level of fisherfolk about marine fisheries management and resource conservation. MSc Thesis, Central Institute of Fisheries Education, Mumbai, India.

Sharma, C. (2011). Securing economic, social and cultural rights of small-scale and artisanal fisher workers and fishing communities. Maritime Studies, 10, 41-61.

Sheikh, S., & Goswami, M. M. (2013). Socio-economic condition of fishers of Chandakhola wetland, Dhubri, Assam, India. Bulletin of Environment, Pharmacology and Life Sciences, 3(1), 257–261.

Sharker, M. R., Mahmud, S., Siddik, M. A. B., Alam, M. J., & Alam, M. R. (2015). Livelihood status of Hilsha fishers around Mohipur fish landing site, Bangladesh. World Journal of Fish Marine Sci., 7(2), 77-81.

Sultana, B., Zaaba, Z. B., & Umemoto, K. (2010). Women's empowerment through the development of micro-entrepreneurship in rural Bangladesh. Social Science, 5, 1-9. doi: 10.3923/sscience.2010.1.9

Sultana, S., & Hasan, S. S. (2010). Impact of micro-credit on economic empowerment of rural women. The Agriculturists, 8(2), 43-49. Retrieved from http://banglajol.info/index.php/AGRIC/article/view/7576