

Empowerment of Women in Aquaculture

Ashis Kumar Panigrahi¹, Surajit Sur²

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Abstract

Aquaculture has emerged as a significant global industry, with both men and women participating in various roles. Despite of their substantial contribution, women often remain vulnerable to lack of opportunities due to various socio-cultural bars including gender biases, limited financial share, restricted access to resources, and non-involvement in decision-making processes where men hold the dominant part. These challenges hinder their full participation and ability to maximize benefits from the industry. Involving women more actively in aquaculture can enhance sustainable production, economic growth, and food security. Moreover, it can also elevate their social and financial status and attract marginalized women to the workforce, thereby contributing to broader women's empowerment goals. However, achieving this requires not only financial and technical support but also awareness-raising and capacity-building initiatives at the community, national, and global levels. In this paper, as a whole the empowerment of women in aquaculture or fishery has been thoroughly discussed.

Keywords: Aquaculture; Women power; Development; Outcomes

INTRODUCTION

Aquaculture refers to the farming and cultivation of aquatic organisms, including fish, shellfish, and plants, in controlled environments such as ponds, tanks, or ocean enclosures. It involves the controlled breeding, rearing, and harvesting

of these organisms for commercial, scientific, or recreational purposes (FAO, 1997). It encompasses various techniques and practices including fish farming, shrimp cultivation, mollusk culture, and seaweed farming. Aquaculture not only provides a source of food and income but also contributes to environmental conservation and the development of coastal communities.

Aquaculture currently serves various purposes, including food security, employment generation, economic prosperity, efficient resource utilization, and socio-economic upliftment of those involved in fish exploitation, production, and processing. With its tremendous potential, aquaculture not only ensures livelihood security but also addresses the nutritional needs of a burgeoning global population (Ninawe and Diwan, 2005).

Women in aquaculture are integral participants who contribute to various aspects of the

Author's Affiliation: ¹Provice Chancellor, University of Burdwan, Burdwan Rajbati, Raiganj, Kolkata 713104, West Bengal, India, ²Assistant Professor, Department of Zoology, Muralidhar Girls' College, Kolkata 700019, West Bengal, India.

Corresponding Author: Ashis Kumar Panigrahi, Provice Chancellor, University of Burdwan, Burdwan Rajbati, Raiganj, Kolkata 713104, West Bengal, India.

E-mail: panigrahi.ashis@gmail.com

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aquaculture production and value chain activities including breeding, rearing, harvesting, processing and marketing of aquatic organisms, playing a vital role in food production, economic empowerment and sustainable development but they often find themselves primarily engaged in lower value roles. As a result, aquaculture has the potential to make a substantial contribution towards empowering women (FAO, 2015).

Objectives of the study

1. To recognize contribution of women in aquaculture industry.
2. To understand positive and negative impacts of women engagement in aquaculture.
3. To identify barriers and challenges faced by women workers in aquaculture.
4. To analyze gender bias and socio-economic disparities.
5. To highlight mitigating policies and supportive measures.

Observations

In India, the fishery sector employs a significant number of people, with 3.8 million fishermen and 1.6 million fisher women out of a total of 5.4 million active fishers. While women have traditionally been involved in fish processing and marketing, their participation in aquaculture, research, development and education is increasing. However, despite being equally capable, women in the industry earn significantly less than their male counterparts. Several obstacles hinder women's empowerment in aquaculture in India, including illiteracy, ignorance, conservatism, superstitions, poverty and lack of organizational support. Illiteracy and lack of education contribute to women's poverty, malnutrition, unhygienic conditions, and illness. Poor education also hampers women's utilization of government programs and access to information on welfare programs, scientific innovations, and technology advancements. The conservative nature of society and insecurity for women restrict their mobility beyond the home in many parts of India. Development efforts in the fisheries sector often focus on technical aspects while neglecting social considerations. In India, attempts have been made to integrate research, development, and financial organizations with a specific focus on gender. The National Bank for Agriculture and Rural Development (NABARD), the primary financial institution for agriculture and rural development,

has paid special attention to gender issues in credit and support services since 1992. NABARD has identified fisheries technologies that can empower women to become entrepreneurs and increase their incomes. The bank has provided financial support to female entrepreneurs engaged in important fisheries activities. Financing institutions, including NABARD, have emphasized gender issues and encouraged bankers to support women entrepreneurs. However, there is still a significant gap between these efforts and the actual needs at the grassroots level. To facilitate women's empowerment in the commercial aquaculture sector, several measures are needed. These include providing basic education, offering liberal financial support, implementing favorable credit policies, introducing policies to lease smaller bodies of water to fisherwomen, providing selective and needs based training, strengthening self-help groups, voluntary agencies, and social welfare organizations, conducting extension programs such as workshops and seminars, and establishing a common platform for developmental agencies, financial institutions, and research organizations to achieve an integrated approach in promoting women entrepreneurs. Overall, addressing the barriers faced by women in aquaculture requires a comprehensive approach that combines education, financial support, policy reforms, capacity building, and collaboration among various stakeholders. By empowering women in aquaculture, India can unlock their potential and contribute to gender equality, poverty reduction, and sustainable development in the sector (Samantray and Pathak, 1998).

Research conducted in India and other regions confirms that aquaculture has the potential to empower women, particularly those at the bottom of the socio-economic ladder. Women are actively involved in various aspects of aquaculture, including seed production, carp culture, and value addition, leading to significant socio-economic improvements in their lives. Encouraging more women to participate in aquaculture requires immediate attention to policies that reduce gender discrimination and provide better access to technology, resources, and markets. It is crucial to appoint more women trainers, document and share success stories of women in the field. Aquaculture interventions have demonstrated a remarkable improvement in the income (247%) and household expenditure on food and clothing (321%) for women in self-help groups in coastal Odisha. This positive change in livelihood and empowerment can be attributed to their active

involvement throughout the intervention process. These findings highlight the importance of creating a supportive environment and implementing scientific aquaculture interventions as critical factors in promoting gender mainstreaming (Jayasankar *et al.*, 2022).

A study conducted in Manipur has acknowledged the active involvement of women in various stages of aquaculture. However, decision making responsibilities related to fish species, purchasing, netting, and harvesting are predominantly controlled by men. Women primarily contribute to labor intensive tasks such as preparing feed, daily fish feeding, and marketing. Consistent with findings from other studies, women identified several constraints hindering their empowerment through fisheries activities. These include limited access and control over resources, insufficient access to credit, lack of confidence in technical matters, a shortage of women friendly aquaculture technology, particularly in fish harvesting, and restricted opportunities for training and extension services. Interestingly, unlike many other regions in India, social restrictions, cultural taboos, and limited mobility were not significant barriers to women's participation in aquaculture (Meetei *et al.*, 2016b). Participation in fisheries activities positively impacts the decision-making ability, spending capacity, cosmopolitanism, social involvement, and access to assets and resources of women in farming. Factors such as education, aquaculture involvement, fisheries experience, information management behavior, management orientation, and egalitarianism are strongly associated with the empowerment of rural women (Meetei *et al.*, 2016a).

The growing demand and expansion of the export market have brought increased attention to the ornamental fish sector. In India, both the central and state governments, along with various non-governmental organizations, actively promote women's participation in ornamental fish rearing. Several institutes offer training programs covering different aspects of ornamental fish culture, including breeding, larval rearing, feed management, live feed culture, pond/tank maintenance, fabrication and upkeep of glass aquariums, and disease management. These programs also include exposure visits to successful women entrepreneurs. Ornamental fish culture presents a lucrative opportunity for women, as it is an easily adaptable technology requiring minimal investment. Additionally, it offers attractive prices, higher profitability, and a growing demand for aquarium fish in both domestic and international

markets (Jacob *et al.*, 2021). Sinha *et al.* (2019) conducted a study highlighting the potential of ornamental fish farming as a promising livelihood option for rural women in West Bengal, which is renowned for its ornamental fish industry. Many women in this region, despite lacking formal training or advanced education, actively engage in breeding, rearing, and marketing ornamental fish. They participate either for their family businesses, self-owned ventures, or as members of self-help groups. However, the industry's growth prospects are hindered by several challenges. These include the absence of effective communication channels between small scale women farmers and established exporters, limited knowledge about foreign market preferences, lack of awareness regarding available financial schemes, and inadequate training opportunities in ornamental fish culture to enhance their businesses. To address these issues, the ICAR-Central Inland Fisheries Research Institute in Barrackpore has taken initiatives to promote and popularize ornamental fish farming among women in the Sundarban region. The aim is to boost the household economy of rural women and enable them to play a significant role in the Indian export market, as well as meet the growing demand in the domestic market. These efforts align with the vision set forth by the Hon'ble Prime Minister of India and are prioritized under national schemes such as the Pradhan Mantri Matsya Sampada Yojana (<https://icar.org.in/content/ornamental-fisheries-village-boost-women-livelihood-sundarbans>). Overall, ornamental fish farming offers a promising avenue for rural women in West Bengal to improve their livelihoods. By providing adequate support, including improved communication, market information, access to financial schemes, and training opportunities, the potential of this industry can be fully realized, contributing to the economic empowerment of rural women and the growth of the ornamental fish sector in India.

De and Pandey (2014) have proposed various measures to address the constraints faced by women in small-scale aquaculture in India. Their study highlighted socio-economic barriers, policy-related issues, and infrastructural limitations that hinder women's involvement in the sector. These challenges encompass factors such as low literacy rates, limited access to resources, technology, and markets, lack of government strategies, insufficient representation of women as extension workers, and inadequate access to credit. The researchers highlighted the importance of spreading education among rural women to empower them and enable

informed decision-making. They recommended the implementation of location-specific and need-based training programs that cater to the specific requirements of women in different regions. Developing women-friendly aquaculture technologies was suggested to address the unique needs and circumstances of women in the industry. Increasing the number of women trainers and extension workers was deemed essential to facilitate the participation and empowerment of women in aquaculture. Furthermore, the researchers stressed the significance of documenting success stories of women in aquaculture to inspire and motivate other women to pursue opportunities in the field. By implementing these measures, the researchers believe that the constraints faced by women in small-scale aquaculture can be mitigated, promoting their active involvement and fostering their empowerment within the industry.

DISCUSSIONS

• How aquaculture contributes to women empowerment?

The cases examined demonstrate that women's financial contributions to the household increase the recognition of their work and their voice in financial decision-making, particularly in urban areas. However, rural women do not receive similar recognition for their workload, and work on the pond does not exempt them from fulfilling their household responsibilities. Men are only willing to assist when women are absent or ill, but societal gender norms minimize these circumstances. The direct income generated from aquaculture plays a crucial role in enhancing the respect given to women, contributing to their life choices being acknowledged and providing them with increased economic freedom. Women's involvement in aquaculture also leads to greater control over resources, improved ability to plan and make choices regarding food consumption, and increased confidence to express their opinions and, in some cases, act independently. However, women still face limitations such as low pay, limited job opportunities, double burdens, and the persistence of gender hierarchies in households and the workforce. While aquaculture has made important contributions to women's empowerment, it has not yet fundamentally transformed their strategic freedoms or challenged gender norms that restrict their economic, aspirational, and status returns. Opportunities for women to hold leadership positions and higher-paying roles in

aquaculture remain extremely limited. To promote women's empowerment in aquaculture, policies and initiatives should not only focus on technical advancements and scaling but also address gender norms and practices (Choudhury *et al.*, 2017).

• Mitigation Strategies

Mitigation strategies for women's empowerment in aquaculture involve addressing the barriers and challenges that limit their participation and promoting their inclusion and advancement in the sector. Some key strategies include:

1. **Capacity Building:** Providing targeted training and skill development programs for women in aquaculture to enhance their knowledge, technical skills, and confidence. This can empower them to actively engage in various aspects of the industry.
2. **Access to Resources:** Ensuring equal access to resources such as land, credit, technology, and inputs. Providing support in obtaining these resources and creating opportunities for women to own and control productive assets can strengthen their participation and economic empowerment.
3. **Gender Responsive Policies:** Implementing policies and regulations that promote gender equality and address the specific needs and challenges faced by women in aquaculture. This includes measures to address discriminatory practices, facilitate women's access to markets and financial services, and support their entrepreneurship and leadership roles.
4. **Supportive Infrastructure:** Developing gender friendly aquaculture infrastructure that considers the needs of women, such as providing safe and convenient access to water sources, storage facilities, and processing units. This can alleviate the physical burdens faced by women and enable their active involvement in the sector.
5. **Networking and Collaboration:** Encouraging networking and collaboration among women in aquaculture, as well as with industry stakeholders, to facilitate knowledge sharing, mentoring, and collective advocacy. Creating platforms for women's voices to be heard and promoting their representation in decision-making processes can contribute to their empowerment.

By implementing these mitigation strategies, women can overcome the barriers they face in aquaculture and actively participate in the sector,

leading to improved livelihoods, increased income generation, and greater gender equality. It is essential to recognize the unique challenges faced by women in aquaculture and take proactive measures to create an enabling environment that supports their empowerment and fosters their meaningful contribution to the industry (Choudhury *et al.*, 2017).

The inclusion of women in aquaculture alone may not effectively address household food security and nutrition unless considerations are given to the species being cultivated, women's empowerment and control over production, and their nutritional knowledge. Limited availability of sex-disaggregated data hinders the visibility of women's presence, influence, and interests in aquaculture policies, reinforcing gender inequality and impeding the sector's social and economic progress. Without accurate data and gender-sensitive policies, women face limitations in workplace protection and entrepreneurial opportunities in this growing industry. Women's aquaculture enterprises tend to be small-scale and often combined with other income-generating activities or carried out within household farm enterprises. While some women have succeeded as aquaculture entrepreneurs, further research is necessary to understand the factors contributing to their success. Although the number of women in government fisheries and aquaculture positions is increasing, gender disparities persist in terms of pay, status, and career advancement. Addressing these issues and conducting more comprehensive studies can pave the way for greater gender equality and opportunities for women in aquaculture (Brugere and Williams, 2017).

The Women's Empowerment in Fisheries and Aquaculture Index (WEFI) is a collaborative effort between World Fish, KIT Royal Tropical Institute, and index experts. It assesses the empowerment, agency, and inclusion of women in fisheries and aquaculture, aiming to identify barriers and find solutions. The index focuses specifically on empowerment in aquaculture and fisheries, excluding factors such as economic status and education. It can serve as an international survey tool that allows for local adaptation, enabling a comprehensive analysis of the determinants of empowerment in these sectors (McDougall *et al.*, 2016).

To ensure the empowerment of women in the post-harvest subsector, it is crucial to involve them in decision-making processes and provide them with access to physical and capital resources

to support their industry and fulfill their needs. Training and formal education should be offered to enhance the efficiency, profitability, and sustainability of their activities. Adequate infrastructure, equipment, technologies, and market access are also essential for supporting women's enterprises, increasing their income potential, and reducing their marginalization. However, there is a risk of elite capture by men, where new income-generating opportunities for women are taken over. This was evident in the mussel culture industry in India, where men started engaging in the activity once it became profitable, resulting in the exclusion of women (Ramchandran and Fisheries, 2011). Women often face low-status, low-skilled, and lowpaid jobs, along with informal and temporary contracts that deprive them of social benefits and formal recognition. This lack of recognition hampers their access to resources, information, training, credit, welfare measures, and social protection. Efforts should be made to include women in profitable markets and enterprises and provide them with employment opportunities in fish processing factories. Gender-sensitive social protection initiatives should be implemented, and the strengthening of women's self-help groups and micro-enterprises is crucial (Jennifer, 2016). Factors such as education, extension contact, and training exposure can enhance women's technical knowledge, leading to increased participation in aquaculture. As aquaculture is a profitable income-generating activity, women's involvement in it allows them to gain control over economic and social returns, leading to self-reliance and empowerment within their families and society (Rahman and Naoroze, 2007).

- **Outcomes and controlling factors of engagement of women in aquaculture**

Women's opportunities in aquaculture are influenced by socio-economic factors and gender norms, limiting their access to higher-return roles. Social constraints and perceptions restrict women's participation outside the home, and their roles in aquaculture often align with traditional notions of "women's work." Men typically take on lead roles, while women engage in supportive activities. Challenging these gendered dynamics requires addressing social norms and constraints, promoting gender equality, and empowering women in aquaculture. By doing so, barriers can be overcome, and women can fully participate in and benefit from the sector (FAO, 2015). According to a research conducted by Shirajee *et al.* (2010) at Mymensingh in Bangladesh, it was found that a

significant number of women actively participated in small-scale aquaculture. Their involvement included tasks such as preparing fish feed, feeding the fish, fertilization, and providing support to men in supervising and managing the ponds. Women took on leading roles in the day-to-day operations of the aquaculture activities. On the other hand, the harvesting of fish for marketing purposes primarily involved men and commercial harvesters. However, women played a crucial role in post-harvest activities, including sorting, grading, and washing of the fish.

Positive Outcomes

Women empowerment in aquaculture brings about several positive outcomes that have wide-ranging impacts. Here are some of the positive outcomes of women's empowerment in aquaculture:

1. **Economic growth and poverty reduction:** Women's empowerment in aquaculture leads to increased income generation and economic opportunities. This contributes to overall economic growth, poverty reduction, and improved livelihoods for women and their households.
2. **Food security and nutrition:** Women's empowerment in aquaculture enhances food security by increasing fish production and availability. With improved access to resources and knowledge, women can contribute to meeting the nutritional needs of their families and communities.
3. **Sustainable resource management:** Empowered women play a critical role in sustainable resource management in aquaculture. Their participation and decision-making help ensure responsible practices, conservation of aquatic ecosystems, and long-term viability of the sector.
4. **Gender equality and social inclusion:** Empowering women in aquaculture promotes gender equality by challenging traditional gender roles and norms. It creates opportunities for women to participate in decision-making processes, have equal access to resources, and be recognized as equal partners in the sector.
5. **Community development:** Women's empowerment in aquaculture fosters community development by strengthening social cohesion and co-operation. It leads to the formation of women's groups, cooperatives,

and networks, which promote collective decision-making, knowledge sharing, and mutual support.

6. **Enhanced resilience and adaptation:** Empowered women in aquaculture are better equipped to cope with challenges such as climate change, market fluctuations, and environmental risks. Their knowledge, skills, and agency contribute to the sector's resilience and capacity to adapt to changing circumstances.
7. **Improved well-being and self-esteem:** Women's empowerment in aquaculture enhances their overall well-being and self-esteem. It provides them with a sense of accomplishment, agency, and recognition, leading to improved mental and emotional health.

Overall, women's empowerment in aquaculture brings about positive changes at the individual, community, and sectoral levels. It contributes to economic growth, food security, sustainable resource management, gender equality, and community development, ultimately creating a more inclusive and resilient aquaculture sector (Choudhury *et al.*, 2017).

Negative Outcomes

While women's engagement in aquaculture can have numerous positive outcomes, there are also potential challenges and negative impacts that they may face. It is important to recognize and address these issues to ensure inclusive and sustainable development. Here are some ways in which women's engagement in aquaculture can have negative effects:

1. **Gender based division of labor:** Women's engagement in aquaculture may reinforce existing gender roles and responsibilities, leading to an increased workload and time constraints. They may face the burden of balancing household chores, childcare, and aquaculture activities, which can limit their ability to fully participate or benefit from their involvement.
2. **Limited access to resources and opportunities:** Women often face barriers to accessing crucial resources and opportunities in aquaculture. This includes limited access to land, credit, technology, training, and markets. Unequal access to these resources can hinder their productivity, competitiveness, and overall success in the sector.

3. **Lack of decision-making power:** Women may have limited influence and decision-making power in aquaculture related matters. Traditional gender norms and patriarchal structures can undermine their ability to participate in key decision-making processes, both within their households and at the community or industry level.
4. **Inadequate representation and leadership:** Women may face challenges in attaining leadership positions and representation in aquaculture organizations, cooperatives, or policy-making bodies. This lack of representation can perpetuate gender imbalances and hinder their ability to shape policies, programs, and strategies that address their specific needs and concerns.
5. **Socio-cultural barriers and discrimination:** Women's engagement in aquaculture can be hindered by socio-cultural norms, discriminatory practices, and gender biases. These barriers may limit their access to training, networking opportunities, and participation in public forums. Discrimination and marginalization can negatively impact their self-esteem, confidence, and overall well-being.
6. **Vulnerability to climate change and environmental risks:** Women engaged in aquaculture may be disproportionately affected by climate change and environmental risks. They may face challenges such as changing weather patterns, water pollution, disease outbreaks, and natural disasters, which can disrupt their livelihoods and income-generating activities.

Addressing these negative impacts requires concerted efforts to promote gender equality and women's empowerment in aquaculture. It involves creating an enabling environment that ensures equitable access to resources, opportunities, and decision making power. Additionally, supportive policies, capacity building initiatives, and social awareness programs can help overcome these challenges and create a more inclusive and sustainable aquaculture sector for all (Choudhury *et al.*, 2017).

- **Factors facilitating engagement of women in aquaculture**

Several factors can facilitate the engagement of women in aquaculture and promote their active participation in the sector. Here are some key factors that can enable and support women's engagement

in aquaculture:

1. **Access to resources:** Ensuring women's access to essential resources such as land, credit, technology, inputs, and training is crucial. Access to these resources enables women to initiate and sustain aquaculture activities effectively.
2. **Education and skills development:** Providing education and training opportunities specific to aquaculture equips women with the necessary knowledge and skills to engage in various aspects of the sector. This includes technical skills related to farming practices, business management, marketing, and value addition.
3. **Supportive policies and institutions:** The presence of supportive policies and institutions that promote gender equality and women's empowerment in aquaculture is essential. This includes policy frameworks that address gender disparities, provide incentives for women's participation, and create an enabling environment for their engagement.
4. **Gender responsive extension services:** Extension services that specifically target women, address their specific needs, and take into account their roles and responsibilities can facilitate their engagement in aquaculture. Gender responsive extension services provide tailored information, training, and advisory support, recognizing the diverse roles women play in the sector.
5. **Access to markets and value chains:** Facilitating women's access to markets, value chains, and market information is critical. This includes creating linkages with buyers, processors, and exporters, promoting market based approaches, and providing market information and market intelligence to women farmers and entrepreneurs.
6. **Awareness and capacity building:** Raising awareness about the benefits and opportunities in aquaculture and providing capacity building programs can empower women to explore and engage in the sector. This includes awareness campaigns, training on gender issues, entrepreneurship, financial literacy, and leadership development.
7. **Social support and networking:** Building social support networks, both formal and informal, allows women to share experiences, knowledge, and best practices. It also provides a platform for collaboration, collective action,

and mutual assistance among women engaged in aquaculture.

By addressing these factors and creating an enabling environment, women's engagement in aquaculture can be facilitated and strengthened, leading to their empowerment and the realization of the sector's full potential (Choudhury *et al.*, 2017)

- **Factors limiting engagement of women in aquaculture**

Several factors can limit the engagement of women in aquaculture and hinder their active participation in the sector. These factors vary across different contexts but can include the following:

1. **Gender norms and stereotypes:** Deep-rooted gender norms and stereotypes dictate societal expectations of women's roles and responsibilities. Traditional views often associate women with domestic tasks and care giving, which can restrict their opportunities to engage in aquaculture and other economic activities outside the home.
2. **Limited access to resources:** Women often face challenges in accessing crucial resources for aquaculture, such as land, capital, credit, technology, and inputs. Unequal access to these resources restricts their ability to establish and expand aquaculture enterprises and limits their productivity and competitiveness.
3. **Lack of training and technical skills:** Insufficient access to training and technical skills development programs hinders women's ability to acquire the knowledge and expertise needed for successful engagement in aquaculture. Limited training opportunities prevent women from gaining confidence, improving productivity, and adopting innovative practices. In a study conducted by Morgan *et al.* (2015), it was emphasized that conventional training programs fail to adequately address the complex gender-related constraints faced by women. Consequently, these programs may not lead to sustainable and positive empowerment outcomes for women engaged in aquaculture. To overcome these challenges and ensure that women truly benefit from their participation in aquaculture, it is necessary to adopt more gender-transformative approaches. These approaches involve engaging men and other family members, employing participatory action research, and employing social messaging that focuses on challenging and transforming gender norms and dynamics. By implementing

these strategies, aquaculture programs can create more inclusive and empowering environments that promote gender equality and the holistic empowerment of women.

4. **Inadequate representation and decision-making power:** Women are often underrepresented in aquaculture related decision making processes and leadership roles. Limited representation and influence in organizations, cooperatives, and policy-making bodies restrict their ability to shape the sector's agenda and address their specific needs and concerns.
5. **Time and labor constraints:** Women's engagement in aquaculture can be impeded by time and labor constraints resulting from their multiple roles and responsibilities, including household chores, childcare, and other family obligations. Balancing these responsibilities with aquaculture activities becomes a significant challenge.
6. **Lack of access to markets and value chains:** Limited access to markets and value chains prevents women from fully benefiting from their aquaculture production. Challenges include inadequate market information, limited market linkages, and discriminatory practices that exclude or marginalize women in market transactions.
7. **Sociocultural barriers and discrimination:** Sociocultural barriers, discriminatory practices, and gender biases can limit women's engagement in aquaculture. These barriers may include limited mobility, restricted access to public spaces, cultural norms that discourage women's participation in economic activities, and discriminatory attitudes towards women's capabilities.

Addressing these limiting factors requires comprehensive strategies and interventions to promote gender equality and empower women in aquaculture. It involves creating an enabling environment that addresses cultural norms, improves access to resources and training, promotes women's representation and leadership, enhances market opportunities, and challenges gender stereotypes and biases (Choudhury *et al.*, 2017).

- **Coping mechanisms adopted by women**

In response to the demands of their workload, both rural and peri-urban/urban women developed various coping strategies. For instance,

peri-urban/urban women utilized labor saving options such as pressure cookers and powdered spices to facilitate faster cooking. On the other hand, rural women, who lacked access to these options, relied on the nature of homestead aquaculture itself. They took advantage of the opportunity to quickly access fish for cooking without having to rely on their husbands to bring fish or vegetables from the market. Women employed different strategies to manage their dual responsibilities and, in some cases, sought support from their spouses. As part of negotiating household responsibilities, urban women utilized their income, for instance, by providing a certain amount of money to their husbands as a form of compensation for perceived "flaws" in their household work (Choudhury *et al.*, 2017).

SUGGESTIONS

1. The above discussion clearly highlights the significant contribution of women in aquaculture despite of several constraints and gender inequalities. However, the rising trend of women engagement in aquaculture suggests their more active participation in near future, not only in the supportive roles but also in more significant and responsible positions alongside men, including entrepreneurship and large businesses.
2. Extensive research is necessary to understand the underlying causes for socioeconomic barriers including gender bias and limitations against active participation of women in aquaculture industry and the degree of their impacts.
3. Regular surveys at the ground level are needed to estimate the extent of women engagement in aquaculture and the effect of existing policies for promoting women empowerment.
4. Technological advancements through capacity building program and financial supports will invite more and more women in active participation in various positions in the industry, including rise of women-led enterprises due to improved access to education, training, and resources.
5. More gender responsive policies by Governments, NGOs and international organizations are required to address the challenges still face by women in aquaculture industry for prioritizing implementation of the mitigating measures to promote women

empowerment through aquaculture.

6. Raising awareness and advocacy for women empowerment at various levels starting from local communities to international platforms will lead to more development of enabling policies and ethical markets those will have significant roles in removing the socioeconomic and gender bias against women.

CONCLUSION

Women empowerment in aquaculture is critical for sustainable development in the sector and the achievement of global development goals. Women play a crucial role in the aquaculture value chain, from hatcheries to fish processing and marketing. Empowering women in aquaculture can lead to increased household income, improved nutrition, and enhanced social and economic status, ultimately contributing to poverty reduction and gender equality.

The key challenges women face in the aquaculture sector are limited access to resources, including credit, land, technology, and training. To address this, stakeholders must implement gender-sensitive policies and programs that recognize the role of women in the sector and address the barriers they face. This includes policies that promote equal access to resources, technology, and training and provide support for women's participation in decisionmaking processes. Additionally, policies that promote and protect the rights of women in the workplace are crucial for their empowerment and ensuring their equal participation in the sector. Educational and training programs can help empower women in the aquaculture sector by providing them with the necessary skills and knowledge to succeed in the sector.

Collaboration among stakeholders, including governments, NGOs, and the private sector, is critical for promoting women's empowerment in aquaculture for development of innovative solutions to address the challenges faced by women in the sector, as well as create opportunities for women by providing them with technical support, training, and access to credit and markets.

Monitoring and evaluation of policies and programs aimed at promoting women's empowerment in aquaculture should include gender-disaggregated data to assess the impact of policies and programs on women's participation in the sector to ensure their effectiveness and to identify areas for improvement. It is essential

to track progress towards gender equality in aquaculture and to ensure that policies and programs are targeted towards addressing the specific needs of women.

In conclusion, women's empowerment in aquaculture is a critical aspect of sustainable development in the sector and the achievement of global development goals. By addressing the barriers faced by women in aquaculture and promoting their participation, stakeholders can promote sustainable economic development, reduce poverty and hunger, and achieve gender equality. This requires the implementation of gender-sensitive policies and programs that promote equal access to resources, technology, and training, as well as support women's participation in decision-making processes. Educational and training programs that raise awareness about the importance of gender equality in aquaculture and promote women's leadership are also crucial. Collaboration among stakeholders, including the private sector, can also be beneficial for promoting women's empowerment in aquaculture. Finally, monitoring and evaluation of policies and programs aimed at promoting women's empowerment in aquaculture is critical to ensure their effectiveness and to identify areas for improvement.

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