

A Desk Research Report

Expanding the Horizon for Women in Fishing and Aquaculture



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About the project

Africa Centre for Energy Policy supported funding to implement our project titled Women Empowerment in Coastal Fisheries in Nigeria: Increasing Resilience to Climate Change Adaptation through Films and Dialogues (2023 – 2024). The project aims to empower women in coastal fisheries through targeted interventions that can help enhance their resilience and promote sustainable adaptation to climate change. Also, providing training for alternative income-generating activities, such as eco-tourism, aquaculture, or value-added fish processing, so they can diversify their livelihoods and reduce their dependence on climate-sensitive fishing activities and provide the women fishers with opportunities that will help them challenge gender norms and stereotypes, gain recognition for their contributions, and participate in decision-making processes in innovative solutions considered in climate change adaptation strategies, policy development, and resource management.

This project's objectives:

1. To empower women in coastal fisheries through targeted interventions that can help enhance their resilience and promote sustainable adaptation to climate change.
2. To diversify their livelihoods and reduce their dependence on climate-sensitive fishing activities, such as eco-tourism, aquaculture, or value-added fish processing, to train women for alternative income-generating activities, such as eco-tourism, aquaculture, or value-added fish processing.
3. To provide women in coastal fishing with opportunities that will help them challenge gender norms and stereotypes, gain recognition for their contributions, and participate in decision-making processes in innovative solutions considered in climate change adaptation strategies, policy development, and resource management.

Additionally, the initiative offers significant opportunities for women fishers to challenge gender norms, gain recognition for their contributions, and participate in decision-making processes related to climate change adaptation strategies, policy development, and resource management.

This research report explores women's challenges in Nigeria's coastal fisheries and aquaculture value chains, highlighting the impact of patriarchal norms, lack of technical and financial support, and other socio-economic barriers. Through comprehensive analysis and evidence, the report offers policy-driven solutions to empower women and enhance their roles within the sector.

The findings and recommendations presented here are not just important; they are significant. We believe they will contribute to more inclusive and effective policy decisions, nurturing a more equitable and resilient future for women in coastal fisheries and aquaculture.

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Executive Summary

As a unique platform, aquaculture and coastal fishing practices are crucial in enhancing global sustainable growth and development. They address food security concerns, improve health outcomes, and reduce poverty while maintaining ecological stability and environmental resilience. However, despite their significant role, gender inequality persists in the value-chain activities within the industry. Women face substantial challenges that hinder their active contributions in the sector. This research critically expands on the existing knowledge in enhancing female participation in coastal fishing and aquaculture in Nigeria. The review reveals a lack of gender-disaggregated data on female participation in aquaculture value chains. The findings also highlight the suppressed opportunities women fishers face due to patriarchal norms in land ownership and invisibility in aquaculture governance and management. They also have limited involvement in the technical value-enhancing extension fishing activities like feed production, fish culture, wholesale, and importation. Poor youth representation, inadequate technical exposure, financial illiteracy, and inefficient managerial skills are critical issues affecting them. Among other challenges, lack of support, insecurity, harassment, and intimate partner violence were pointed out in the study. The study proposes policy-driven initiatives to enhance their participation, including government involvement in land issuance, increased inclusiveness in aquaculture governance and policy decisions, deliberate expansion of fishery tertiary institutions, and introduction incentives to increase the girl-child admission quota. Lastly, a triple helix approach to inclusive town, gown, and government should be instituted through research-led, practical, and lived experiences of females for informed policy decisions in aquaculture development.

1. Introduction

The emergence of the blue economy has increasingly exposed the potential of marine resources and its activities in achieving the outlined United Nation's sustainable development goals by 2030 (Kruijssen et al., 2018; Njogu et al., 2024). This is evident in its capability to improve food security, promote health outcomes, and eradicate poverty (Gustavsson, 2024). More importantly, the blue economy promotes a decent work culture, climate change resilience, and partnerships for international collaborations and peace-building across the globe (Adam & Njogu, 2023). The United Nations defines the blue economy as the “sustainable use of ocean resources for economic growth, improved livelihoods and jobs while preserving the health of the ocean ecosystem.” By this definition, the blue economy encompasses exploring marine resources for survival, its utilization for economic opportunities, equality and growth, and its capability for self-regeneration for the future (Elias et al., 2024). The activities in the blue economy are complex, comprehensive, and interwoven. It includes coastal fishing and aquaculture, marine security, shipping, coastal tourism, biotechnology, renewable energy, and other extractive activities (Zakayo & Mbilinyi, 2023). Of these activities, coastal fishing and aquaculture take center stage.

Existing arguments on the participation of women in aquaculture development are linked to overall agricultural sustainability. Scholars opined that the productive engagement of women in coastal fishing and aquaculture is viewed from two primary lenses. The first strands of thought opined that women's engagement in aquaculture advanced the ongoing discussions on power dynamics and social justice, thus leading to equitable representation and equal access to heritage rights and cultural practices (Bosma et al., 2019; Jolly et al., 2023; Kruijssen et al., 2018; Troell et al., 2023). This line of argument implies that health outcomes, family activities, and child-rearing would be improved through informed knowledge, voices, and equitable social interaction with women within the aquaculture ecosystem (Adam & Njogu, 2023).

The second argument lies in the ability of women to contribute to the agenda of reducing poverty and inequality through enhanced participation in aquaculture. Global statistics pointed to the positive implications of women's development in reducing poverty incidences across the globe (Elias et al., 2024; Omitoyin et al., 2020; Rice et al., 2024), thus showing that economies where gender empowerment, education, and exposure are given greater priority, will attain economic growth and desirable social changes faster. In another instance, including women in active labor participation reduced inefficiency in businesses, trade, and creative innovativeness (Ain et al., 2021; Olohunlana et al., 2022; Oparinde, 2021). Women's involvement in aquaculture businesses increases their survival rate and promotes inclusiveness, diversity, and effective utilization of human capital resources (Rice et al., 2024). It is, therefore, pertinent that a gendered perspective and analysis of aquaculture development would promote the growth and sustainable development of countries across the globe.

Despite the theoretical arguments for the unquantifiable potentials of women's participation in coastal fishing and aquaculture, there are enormous challenges inhibiting their sustainable participation (Ayanlade et al., 2023; Mangubhai et al., 2023; Rice et al., 2024). Moreover, empirical evidence on the factor-country-specific challenges affecting female participation in aquaculture is best described as nascent. Studies highlighting these challenges have observed the issues on a global scale, thereby undermining the country-specific challenges inhibiting aquaculture development. Again, these challenges are discussed from the global perspective, concentrating more on developed economies, leaving more to be done in a developing country like Nigeria. To this end, this research aims to identify the specific challenges affecting women in aquaculture in Nigeria and how they could be mitigated to achieve and enhance women's participation within the ecosystem.

This study contributes to the literature in the following ways: First, the study scans existing literature and reports to harmonize the key challenges affecting women's participation in fishing and aquaculture. Some of the identified challenges are the patriarchal society and land ownership system; invisible top echelon representation; disproportionate representation in fishing value-enhancing chain activities; inadequate technical exposure, financial literacy, and managerial skills; unequal participation across age groups and insecurity, harassment, and intimate partner violence amongst others. Second, the study proposes practical adoptable policy recommendations that could inform the enhanced participation and sustainability of women in aquaculture. Some of these recommendations are establishing more fisheries colleges and universities, encouraging girls to enroll in aquaculture education in tertiary institutions, encouraging women's participation in aquaculture governance, government control of land ownership, and creating a safe, mentorship and supportive system for women against abuse, harassment, and insecurity, especially in the aquaculture ecosystem.

The remaining part of this report is structured as follows: The second section presents the contributions of aquaculture development to sustainable growth. In contrast, the third section provides a historical overview of coastal fishing and aquaculture in Nigeria. The fourth section gave insights into Nigeria's sector's performance using stylized facts. The following section succinctly reviewed national policies on gender empowerment and its significance to aquaculture development in Nigeria. The following two sections discussed the comparative gender roles of women in aquaculture in selected countries and the challenges confronting Nigerian women in the subsector. Lastly, the study concludes with policy recommendations and pathways for enhancing women's participation in aquaculture.

2. Contributions of Aquaculture Development to Sustainable Development Goals

Aquaculture, as one of the strategic sectors of the blue economy, contributes to the attainment of the UN sustainable development goals. Literature suggests direct and indirect pathways to which aquaculture could contribute to achieving these goals. For its direct impact on sustainable goals, aquaculture significantly ends hunger and promotes health and well-being (SDGs 2 and 3). Aquaculture provides food for the country by exploring aquatic organisms in the coastlines, seas, and deep oceans (Troell et al., 2023). It produces diversified and complementary food sources for the masses. Findings suggest that fish provide over 40% of the animal protein required for daily upkeep (Henriksson et al., 2021). The increase in global fish production would increase the accessibility to sufficient protein for human consumption (Farmery et al., 2021). Consequently, the intake of the essential micro-nutrient obtained from fish consumption would reduce vitamin-deficient-associated diseases, malnutrition, stunted growth, and child mortality (Hicks et al., 2019).

This will further reduce the prevalence of maternal and adult mortality. It was further observed that countries with the highest fish production record the best performance in reducing child mortality. Likely, the performances of countries such as China and Vietnam in fish production may be linked to their progress in attaining record below the global average in child and infant mortality.

Maximizing the potentials of coastal fishing and aquaculture indirectly contributes to the attainment of the sustainable development goals of living below and above water, improving resilience to climatic issues through responsible fish production, consumption of clean water, and proper sanitation. (SDGs 15, 14, 13, 12, and 6). In achieving environmental resilience and sustainability, aquaculture catch-net, ponds, and freshwaters provide a cost-effective approach to water management through reuse and recycling (Kruijssen et al., 2018; Njogu et al., 2024). It further enhances water management literacy amongst consumers and producers, thereby contributing to regenerative and environmental biodiversity restoration and sustainability (Stetkiewicz et al., 2022).

The sustainable practices of using modern feed production techniques, fish culture, and other linkages strengthen the circular economy by recapturing finite nutrients for restorative purposes (Béné et al., 2016). This would further present an avenue for improving water quality and buffering coastal erosion while providing adaptable habitats for aquatic organisms. Investing in coastal aquaculture development would indirectly promote living below and above water and increase productive activities while providing resilience mechanisms for combating climate change disasters (Troell et al., 2023).

By effectively managing coastal fisheries and aquaculture, the sector provides associated benefits of alleviating poverty by promoting decent

work and economically empowering masses across genders, thus increasing health promotions and healthy behavior and choices (SDGs 1, 5, 8, and 10). In actualizing this, aquaculture practices provide job opportunities across countries for low-skilled, semi-skilled, and highly-skilled persons. The ripple effect of the activities in the subsector influences socio-economic and culturally diversified economic systems where trade expansion and international business relations promote decent work and economic prosperity (Filipski & Belton, 2018; Gephart et al., 2021).

Furthermore, the increasing production of aquatic organisms provides a cushion on the nutritional requirements for healthy living; through various human empowerment training, and campaigns of the use of aquatic nutrients for achieving dietary requirements, the masses would be informed of health promotion strategies, thereby improving their health behavior and choices (Hicks et al., 2019). A well-functioning aquaculture subsector may reduce maternal, infant, and child mortality. It could also improve individuals' ability to tackle nutrient-deficient diseases in developing countries (Filipski & Belton, 2018).

Despite aquaculture's direct and indirect contributions to economic growth and sustainable development, its progress across countries is disproportionate. Some countries in the developed region have harnessed its opportunity for improvement while developing countries like Nigeria have yet to fully tap its benefits for survival and sustenance (Nwosu et al., 2021a; Oloko et al., 2022). It is, therefore, of immense importance to identify the various value chains and value-enhancing capabilities of aquaculture and coastal fishing development for economic prosperity and growth.

3. Historical overview of Coastal Fishing and Aquaculture in Nigeria

Nigeria, richly endowed in land and water resources, is located along the coastline of the Gulf of Guinea. It occupies about 0.69% of the world's water and surface land area, with 853 km of coastal length, indicating about 0.11% across the globe (FAO, 2020, 2024). Furthermore, Nigeria occupied 46,000km² of the marine region, 210,900km² exclusive economic zone from the 256,0000km² of the global continental shelf (Ogunji & Wuertz, 2023). Statistics revealed that approximately 1.06% of the total surface area in Nigeria is occupied by water, with more than 800 billion cubic meters of water resources located along the coastal lines of the ocean. In addition, the country is blessed with two significant rivers along Benue and Niger basins stretching across 2,597 miles long (FAO, 2022). Nigeria is also endowed with 14 million hectares of rivers, lakes, ponds, and reservoirs, thus making it a country with great potential in harnessing the gains of coastal fishing and aquaculture for survival, growth, and sustainability (Adewale et al., 2017; Benson et al., 2017a; Nmeregini et al., 2021).

Historically, fishing culture in Nigeria was crude, traditional, and merely artisanal. It involves using hand-dug canoes, rods, fishing arrows, nets, and basket traps. These are mainly for survival and small-scale commercial fish farming. Modern fish farming gained increasing attention during the Second World War between 1939 and 1945 when the colonial masters evaluated the potential of the aquatic resources in the country. The findings led to establishing a fishery organization in Lagos in 1941. Four years after its establishment, the British colony merged it with the Department of Commerce and Industries and changed its name to the Federal Fisheries Services in 1950. After that, efforts were made to improve the production of aquatic organisms, introducing more fish species.

4. Performance of Aquaculture in Nigeria: Some stylized facts.

Figure 1 presents Nigeria's coastal fishing and aquaculture production trends between 1960 and 2023. The figure reveals that the two practices have gradually increased production since independence. Coastal and capture fisheries increased from 56505 metric tons production in 1960 to 441377 metric tons in 1980 and 916283 metric tons in 2017. Since then, there has been a decline in the production of coastal fish. Similarly, aquaculture production gradually grew from a near non-significant production of an average of 4547 metric tons between 1960 and 2006. Production increased marginally in 2007 to 81000 tons and 316277 in 2015. The trend has witnessed a decline from 2016 until the present.

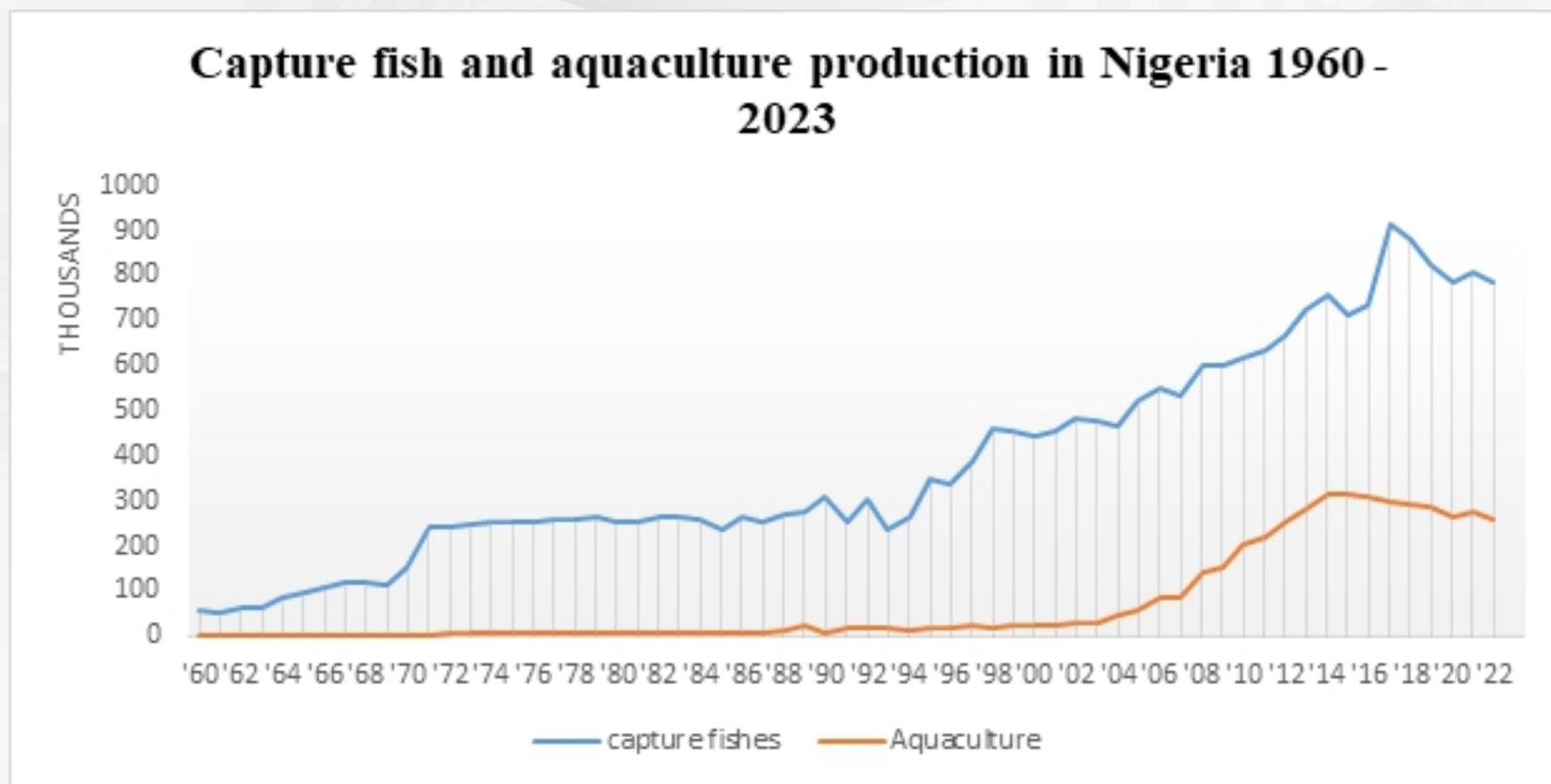


Figure 1: Capture fish and aquaculture production in Nigeria 1960 – 2023

Source: World Bank Development Indicators, 2024.

Cumulatively, Nigeria's share of global aquaculture production increased from 0.07% in 1995 to about 0.21% in 2022, making the country the second-largest aquaculture producer in Africa. Although production in the subsector is one of the largest growing businesses in Nigeria, it is still at a very sub-optimal level based on the country's aquatic potential.

Figure 2 presents the volume of importation and exportation of frozen fish in Nigeria between 2012 and 2023. The statistics showed that the exportation of frozen fish from Nigeria is insignificant and nearly non-existent in the years reviewed. The data showed that Nigeria exported 856 million metric tons of frozen fish in 2012 and 6.41 million in 2015. In the same period, Nigeria imported an average of 1.2 billion metric tons in 2012, with a decline of 24% to 908 million in 2015. The value of imports further declined to 468 million in 2016. The decline may result from governments' efforts to increase domestic fish production to meet local demands for fishing outputs.

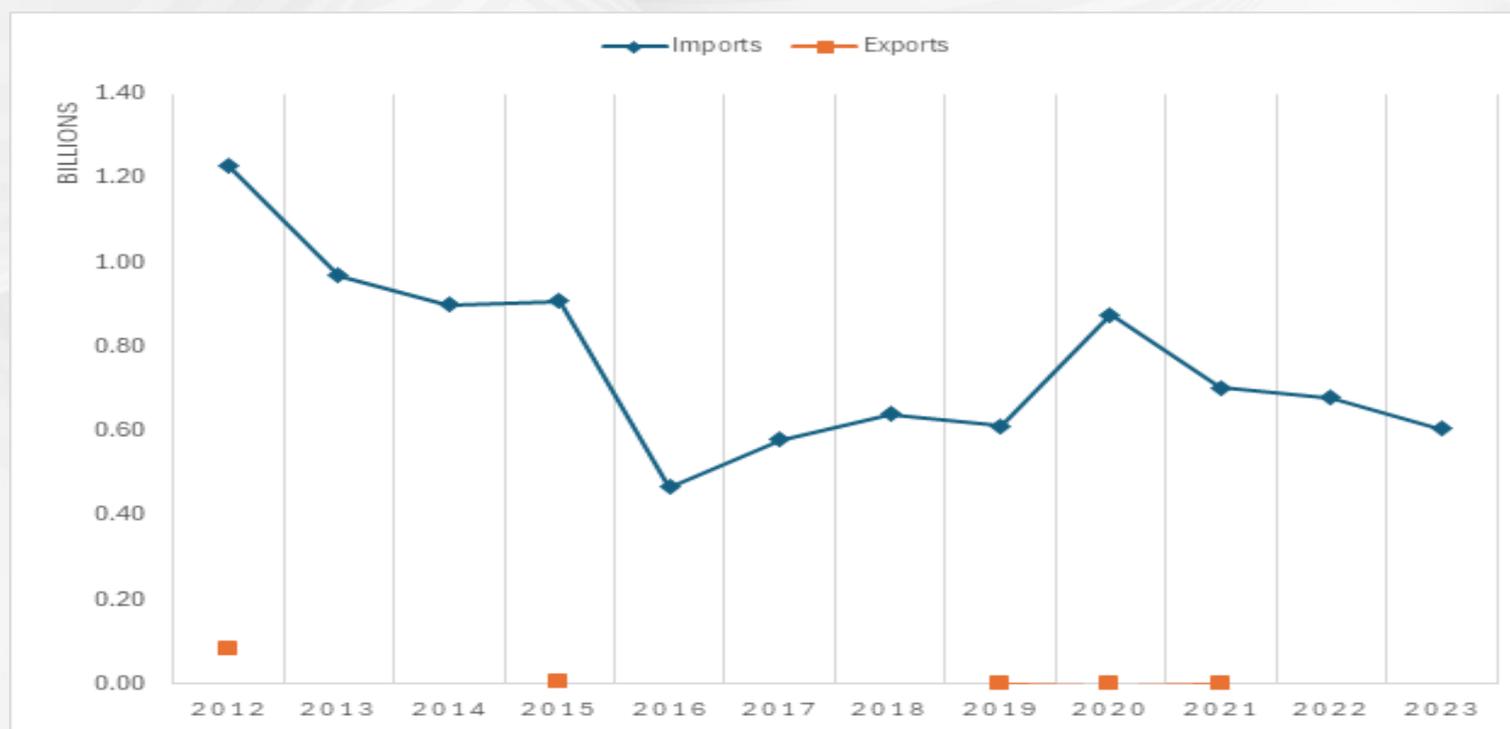


Figure 2: Export and import values of frozen fish between 2012 and 2023
Source: Trend-economy, 2024 (<https://trendeconomy.com/data/h2/Nigeria/0303>)

However, the improper implementation of the policies further aggravated the demand, leading to increased fish demand and importation trends between 2017 and 2019. Amidst the increasing volume of fish imports, some insignificant export activities exist between 2019 and 2021. The country's ratio of export to import within the period stood at 1:10 within the period under review. Interestingly, the importation trend between 2019 and 2021 witnessed haphazard behavior as imports spiked to 876 million metric tons in 2020. This may be associated with the consequences of the global health pandemic and economic instability resulting from the Covid-19 pandemic. After that, the government's increasing effort to galvanize and reverberate the blue economy in Nigeria may be responsible for the reduction in the volume of importation between 2021 and 2023.

In a related snapshot, Figure 3 presents the year-on-year (YoY) growth in the volume of fish imports between 2012 and 2023. The figure illustrates that the volume of fish imports declined consistently between 2012 and 2023 except in 2017, 2018, and 2020, when there was an increase.



Figure 3: Year-on-year growth rate of fish import value between 2012 and 2023

Source: Trend-economy, 2024 (<https://trendeconomy.com/data/h2/Nigeria/0303>)

The increase in the past few years may be attributed to the policy implementation pressures associated with the Nigerian pre-general elections during the period. Although a significant decline was witnessed in 2019, the gains were eroded during the 2020 Coronavirus health pandemic. The country further experienced a reduction in fish imports to about 19.65 percent in 2021, which fell further to 10.79% in 2023. The global contribution of the Nigerian economy to the imports of frozen fish suggests a massive gap in coastal fishing and aquaculture despite the increasing initiatives and investments in the sector, such as having an independent ministry of fisheries to address the challenges inhibiting the potential of the blue sector in the nation.

Examining the contributions of the aquaculture subsector to the total employment in the industry, Figure 4 shows an increasing trend of employment generated in the fishery subsector of the agricultural sector in Nigeria. Regarding employment, available statistics pertain only to the share of employment in capture fishing, with data paucity on the volume of employment generated within the aquaculture space. The capture fishing subsector generated about 469,000 between 1980 and 1990.

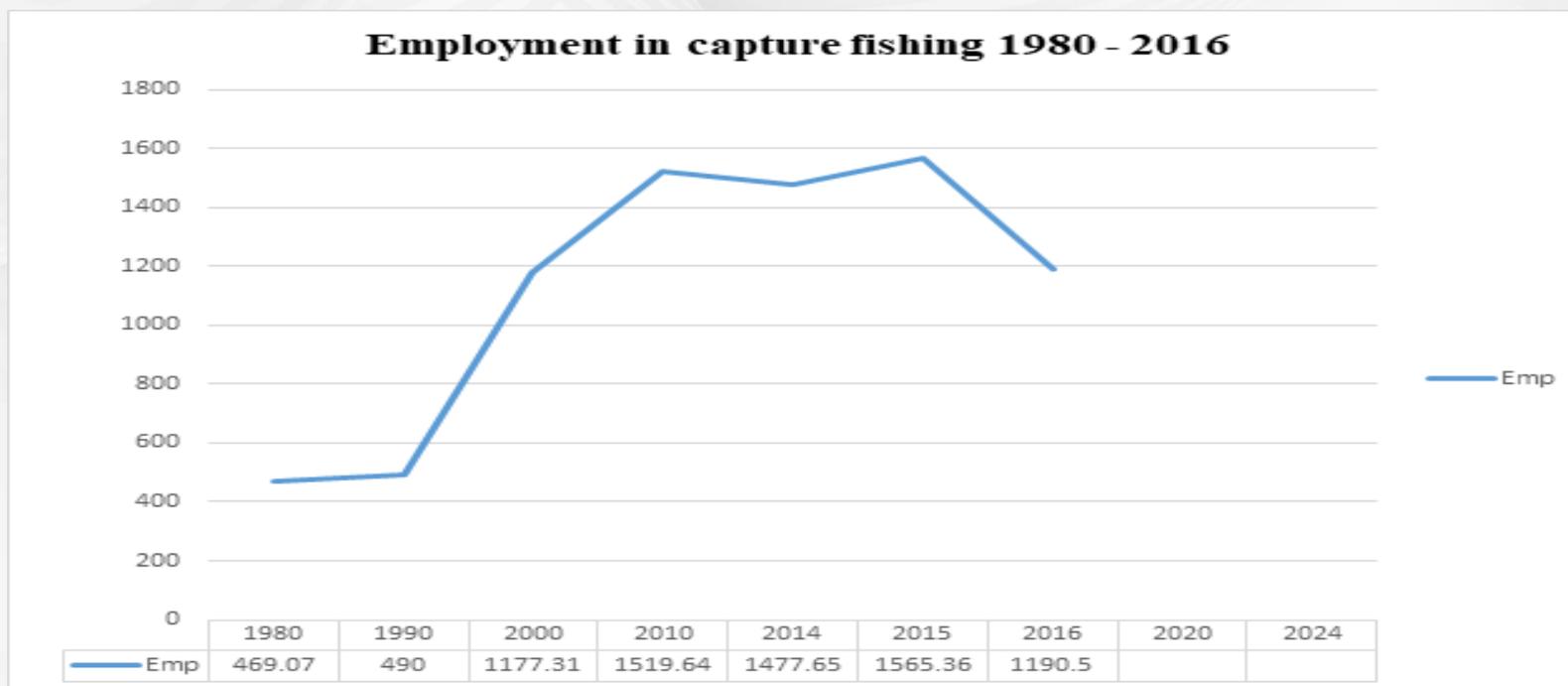


Figure 4: Employment created in capture fishing between 1980 to 2016

Source: Food and Agriculture Organization, 2024, <https://www.fao.org/fishery/en/facp/nga?lang=en#fisheriesstatistics>

The share of employment in capture fishing increased to 1.59 million in 2010, leading to about three times increase in fishing farming engagements across the country. However, the employment fell slightly to 1.47 million in 2014 and further to 1.19 million in 2016.

The Food and Agriculture Organization further disaggregated the statistics to employment generation within the inland and deep marine fishing. Figure 5 revealed that marine fishing was predominant between 1960 and 2000, thus generating an average of 450,000 jobs for Nigerians. Later, the inland fishing system gained recognition which led to the creation of additional employment opportunities for 712,000 persons in 2000.

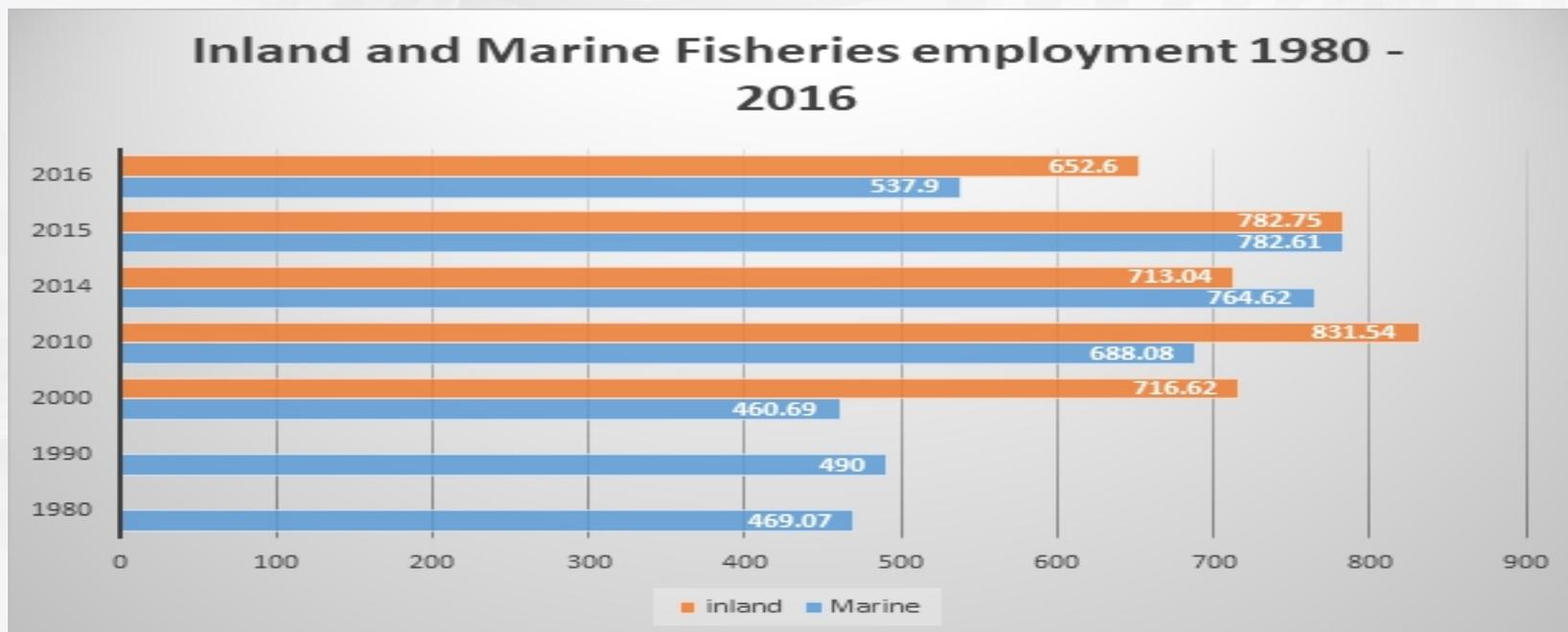


Figure 5: Inland and Marine fishing employment trend between 1980 and 2016

Source: Food and Agriculture Organization, 2024 <https://www.fao.org/fishery/en/facp/nga?lang=en#fisheriesstatistics>

The difference in the employment sought by the two fishing systems led to a significant variation of about two-thirds of employments in 2000. In 2010, more fishers were interested in inland fishing system with a total employment of 831,000 fishers compared to their marine counterparts who were about 688 persons in the same year. Moving on, it was observed that the share of employment was marginal for both the inland and marine in 2015 and 2016, respectively.

5. Review of Policies on Gender Empowerment in Nigeria

Chief Olufunmilayo Ransome Kuti was at the forefront of fighting for gender equality in Nigeria. However, the inclusion of gender in policy analysis only gained prominence with the introduction of the National Women Policy in the year 2000, the National gender policy (2006), and the Vision 20:20 in 2009 (Federal Ministry of Agriculture and Rural Development, 2016; Federal Republic of Nigeria, 2008). Several initiatives and associations have been established to follow up on institutionalizing gender-responsive policy programs. However, the policies did not adequately address women entrepreneurs' concerns in the aquaculture ecosystem. Some of the policies on gender equality and empowerment are discussed below.

The national gender policy: This was formulated in 2006, and it recognized women's empowerment and equality as fundamental rights of women, which can propel growth and development in Nigeria. The policy calls for institutionalizing gender inclusion to reduce gender gaps in economic empowerment and participation in sustainable development. It aims to grant women access to develop their full potential while building a system free of discrimination. It seeks to create an inclusive policy atmosphere where women will be duly represented in decision-making by enforcing equal access to healthcare services, schooling, and economic opportunities. More importantly, the policy seeks to protect women and girls from all forms of gender-based violence, partner abuse, discrimination, and related issues (Okunade et al., 2023).

Despite the efforts, the policy received limited public attention due to inadequate funding, insufficient advocacy, and public awareness. These flaws led to its review aligning with the global indicators of social inclusion, gender equality, and empowerment. The revised policy builds on practical illustrations and strategic gender needs as a common objective in enhancing nationally shared values and social inclusion irrespective of social, political, or economic differences across states. Despite the review, the policy has not increased women's participation in strategic management and political positions. Due to the inadequacy of gender-disaggregated information on fishing practices, gendered economic participation in specific sectors like aquaculture has not been adequately achieved.

Another policy framework that categorizes women empowerment in agriculture was the national gender policy strategic framework embedded in the 2008-2013 plan. The framework is required to produce four outcomes, namely

- i. To change public perception of the roles of women,
- ii. protection and promotion of girl-child rights,
- iii. reducing the poverty index of women and
- iv. promoting accountable policy

However, this policy lacks adequate gender mainstreaming, which is a prerequisite to women's development. It also lacks adequate transformative approaches and integration for integrating women into public policy, especially in the agricultural sector.

More specifically, the National policy on gender in agriculture was validated in 2016 at a stakeholder workshop on agricultural development. The framework seeks to make efforts to be consistent with the actualization of the 2030 agenda of sustainable development by promoting and adopting gender-sensitive approaches to agricultural development and sustainability. It specifically seeks to develop gender competencies in partners, address gender gaps, institutionalize gender-responsive programs, and promote usage of gender-inclusiveness in data gathering and analysis while promoting gender participation in extension services in agriculture and climate change (Federal Ministry of Agriculture and Rural Development, 2016). Although the policy set up a strategy to facilitate gender improvements in agricultural participation, it fails to create a legislative backup on land ownership rights and patriarch discrimination in insurance and investment opportunities. More importantly, there was no strategic boundary demarcation in the participation of women in aquaculture and coastal fishing.

Other initiatives, such as establishing associations like the Nigerian Association of Women in Agriculture, are also part of the individualized plans to promote women's participation in the sector. Though these initiatives promote women's empowerment in rural Nigeria, most support comes from finances targeted at retail and agricultural engagements. The initiative does not have a broad spectrum, especially in aquaculture and coastal fish farming practices. A more specific fishing association for women is the African Fish Processors and Trader Network, which has representative members in 28 African countries. The association seeks to empower women by coordinating sales activities, promoting gender advocacy, and capacity building through institutional coordination. Although the association offers strategic support to females in fishing, the membership is limited to those in the processing and trading segments, leaving behind other women players in the value chain. More importantly, the initiative does not have the capability to absorb low-skilled women participants in the sector.

In effect, the government's policies, programs, and initiatives have some deficiencies in adequately accounting for the specific challenges of the women players in the Nigerian aquaculture and coastal fishing space. This may be attributed to the paucity of information and disaggregated data on gender participation in the sector, thus limiting action-targeted policies, implementation, and output. Also, some policy dialogues lack adequate female representation, leading to skewed policy enactments and bill appropriation on women's activities in the blue economy.

6. Comparative analysis of gender roles in Nigeria and selected countries

In 2019, coastal and aquaculture contributed about 55% of the national fish production in Nigeria. The country imports about 45% of its needs from the international communities to augment the deficit. On sustainability levels, aquaculture is expected to provide Nigeria with 45% of animal proteins and dietary nutrients by 2030. The animal protein demand from aquaculture is projected to increase by 4.5 times between 2020 and 2050 (Adam et al., 2021). Given the current production capability, meeting the current and future coastal and aquaculture development projections is almost impossible. It is, therefore, essential to establish diverse ways to explore its marine potential in meeting the country's current needs.

One of the crucial ways to meet the national aquaculture demands is to develop human capabilities and resources within the coastal space (Nwosu et al., 2021; Rice et al., 2024). Women are grossly suppressed in their contributions to aquaculture development. Comparative statistics showed that the number of women involved in aquaculture and coastal fishing in Nigeria is small compared to their counterparts in Australia, China, and Vietnam. Nigerian women accounted for 20% of the aquaculture workforce, while Chinese women accounted for 40% of the labor force. In the same instance, Vietnamese women comprise about 60% of the aquaculture value chain participation (FAO, 2018). The comparative analysis of women's participation in aquaculture suggests the need for more gender inclusiveness in the aquaculture value chain in Nigeria.

Also, the gender demarcation of the activities in the aquaculture ecosystem may require the inclusion of youth-led women representation in the value chain; it has proven to breed creativity, innovativeness, and sustainability in the sector's operation and contribution to economic development. Findings suggest that Nigeria has more older women between ages 40 and 60 in the aquatic and fishing profession. Compared to the leading countries in fish production and aquatic development, China and Vietnam have younger women under 40 years who are actively involved in the value chain (FAO, 2018). However, available discussions on the age distribution of female participants in the Australian aquaculture space are inconclusive. The variation in the age strata of women involved in coastal fishing and aquaculture may further contribute to the overall fish production in the sector.

Analyzing the various roles of women in the aquaculture value chain, 70% of the women fishers in Nigeria are into menial pre-fishing and post-harvest activities. They are also more prominent in the retail sector. Compared with Vietnam, women's role in the aquaculture value chain varies according to their regional distribution. Findings revealed that women in North Vietnam's aquaculture own fish farms and are involved in hatcheries. However, their counterparts in the South are forbidden to engage in hatchery services due to cultural beliefs and norms (Bosma et al., 2019). In China, women exhibited more diverse career paths in aquaculture. 75% of women in aquaculture are into research, development and training while 6% gets involved in extension services and information. 13% are into other forms of activities in the value chain. This indicated a more inclusive approach to aquaculture value-chain development in China.

Gender roles in leadership positions are primarily skewed towards men in Nigeria for decision-making, policy initiation, and implementation. Available statistics point to an insignificant percentage of women's representation in policies relating to aquaculture development (Nwosu et al., 2021a). However, in Australia and Vietnam, women take about 30% of the leadership positions in the aquaculture industry (Jolly et al., 2023).

7. Challenges Confronting Women Participation in aquaculture in Nigeria

Despite the potential contributions of women to the sustainability of coastal fishing and aquaculture in Nigeria, their participation is marred with numerous challenges, and these are discussed next:

i. Patriarchy Society and Land Ownership System

Patriarchal norms have constantly suppressed women's prospects in land ownership, finance, and access to investment opportunities in Nigeria. The system where men's dominance and skewed power dynamics subject women to control, thereby leading to women's inability to decide on their opportunities for economic independence and prosperity successfully. Scanning through the participation of women in aquaculture, it can be observed that women often face challenges in obtaining credit for expanding their fishing businesses. This could be due to a lack of collateral, being denied land inheritance, and illiteracy, among other factors. This made them front their spouses and male relations or children to access loans, insurance coverage, and investment opportunities. To corroborate this position, studies by Benson et al. (2017), Lydia & Adewale (2021), and Oloko et al. (2022) submitted that the land tenure system limited women's opportunities to access loans and other credit facilities in coastal areas of Lagos and Ondo State. Furthermore, another pointed out that women's status in society hinders their ability to take on effective risk management practices, which inhibits their ability to take on insurance policies on the high-risk nature of their aquatic businesses (Oparinde, 2019).

ii. Invisible Top Echelon Representation

Policy responses to crucial challenges in aquaculture are enacted by top management consultants and policymakers across the globe. It is, however, unfortunate that women's representation at the top echelon is minimal or near non-existent. Nwosu et al. (2021) argued that women in fisheries are primarily underrepresented, thus leading to unbalanced policy decisions and recommendations regarding specific issues affecting women fishers. In the same vein, the invisible participation of women in governance inhibits the passion for bills. It protects and supports women in access to land ownership rights, voice, and agitation for equal access to finance and investment opportunities. More importantly, cultural and societal norms have suppressed women's opportunities to explore because they are mostly confined to childcare and family upkeep, thus limiting their access to skill acquisition and formal and technical training on aquaculture development. Olagunju et al. (2021) submitted that rural northern women are often restricted from formal interactions and limited from full participation in extensive fishing value chains. This could increase their invisibility in top management functions due to limited exposure, education, and technical capabilities (Rice et al., 2024).

Another critical factor contributing to the non-participation of women in management, governance, and policy decisions in the Nigerian aquaculture space is the paucity of information on the gendered disaggregated data and analysis. Most of the available statistics could not

demarcate the contributions of women to aquaculture development. This crucial factor inhibits the recognition of their roles and significance within the ecosystem. In line with this, Kruijssen et al. (2018) submitted that the unavailability of disaggregated data on gender participation in aquaculture negatively imparts policy decisions in advancing women's participation in aquaculture.

iii. Disproportionate Representation in Fishing Value-enhancing Chain Activities

Aquaculture value chain and extension services are important activities to the development and sustainability of the blue economy. The value chain is broadly classified into four stages: pre-production, harvesting, consumption, importation, and exportation. The pre-production stage entails the need for human capabilities in feed production, fish breeding, and other activities that are prerequisites to fish harvesting. In this chain, women are primarily found in net weaving and setting boats, while men are more prominent in taking on more technical tasks of feed production and fish hatching. For other fishing value chains, women are found in the retailing businesses or may support spouses in the wholesale, import, and export businesses.

Empirically, studies revealed that women are disproportionately represented in the complex and technical segments of the value chain. The division of labor across genders pointed to the visibility of women in menial activities due to their weak risk appetite and investment capacity. Omeje et al. (2021) affirmed that women in aquaculture exhibit low-risk appetite, inadequate investments in fixed assets and sophisticated equipment for hybrid fish production and fish input activities, thereby making them disproportionately represented in highly value-enhancing activities along the aquaculture value chain.

iv. Poor Female youth presence in aquaculture

More succinctly, the age range of women engaging in aquaculture may also be a crucial factor affecting their visibility in the value-enhancing activities along the chain. Studies showed that most women in the aquaculture value chain are elderly and unlettered. Nigussie et al. (2024) opined that older women are disadvantaged in the fishing space because they are less agile and unfit for rigorous activities that are more value-rewarding. Other studies also affirmed the lack of younger girls in the aquaculture chain businesses in Nigeria. For instance, Omeje et al. (2021) pointed that less than one-fifth of the sampled population in Kainji are female fisherwomen and 15% of the women population falls within the ages of 25 and 40 years. Similarly, Okon & Nsa (2012) opined that youth engagement in fishing is mainly due to business inheritance from parents. Infrastructural deficiencies, low productivity, and post-harvest losses threaten the continued sustainability of female youth participation in fishing.

v. Inadequate technical exposure, financial literacy, and managerial skills

Women in aquaculture often face inadequate exposure to technological requirements to compete favorably in value-enhancing space. Women are more susceptible to climatic changes, which negatively affect their fish farming activities due to their limited exposure to climatic information

and low awareness of resilience and adaptation strategies. Akinsemolu and Olukoya (2020) opined that Ilaje women in Ondo state are more vulnerable to sudden water temperature changes based on their lack of awareness of weather forecasts, inadequate information, and educational levels.

Another crucial issue limiting the visibility of women fishers is their inadequate skills and exposure to financial management and leadership skills. Oloko et al. (2022) pointed to the lack of financial management skills and inefficient leadership characteristics of Makoko fisherwomen as a challenge affecting their contributions to aquaculture growth and sustainability.

v. Insecurity, Harassment, and Intimate Partner Violence

Women in aquaculture often face insecurity, theft, and loss of valuables in fish and feedstocks. Due to their fragility and feminine structure, women often contract some of their post-harvest operations to men. In some cases, the men take advantage of their vulnerability to shortchange them in feeding stock and fish volume declared to the women fishers. Some studies reported theft as a crucial element inhibiting women's progress in aquaculture. Furthermore, some fish proceeds are lost due to their weak negotiation skills, inadequate energy infrastructures, and inefficient storage facilities (Oparinde, 2019). In a related instance, women fishers often face occupational hazards such as drowning and lower abdominal, back, and chest pains due to the associated pressures in post-harvest fish production (Gona et al., 2023)

More importantly, gender discrimination in fisheries and aquaculture may further limit women players in the industry. Counterparts may experience some forms of harassment through forceful eviction from coastal lines or displacement through inconsistent policy responses among the players in the marine economy. For instance, some women experienced emotional harassment that occurred during the dredging of seas in Lagos state, thus creating turbulent disruptions to the already constructed fish beddings. This form of emotional torture causes substantial economic losses to the women fishers playing in that space. To corroborate this position, Mangubhai et al. (2023) argued that violence and indiscriminate harassment from male counterparts to women fishers existed in the blue economy. This violence and harassment have led to the deaths of women fish farmers. Not only this, women also face some form of spousal dominance in joint fish farming operations and businesses. The women's rights were suppressed and reduced to mere support groups while emphasizing their traditional duties of child-rearing and family chores. Nmeregini et al. (2021) affirmed that women experience spousal dominance in fish production and harvest in Anambra State, leading to the suppression of voices, unequal wage allocation, and violence once the women raise the alarm on the indiscriminate treatment (Kruijssen et al., 2018a; Mangubhai et al., 2023).

8. Policy Recommendations and Pathways for Enhancing Women's Participation

The empirical literature has buttressed the practical evidence of the challenges confronting women players in coastal fishing and aquaculture. It is, therefore, imperative to suggest what can be done to mitigate the challenges faced by women fish farmers to enhance their participation in the blue economy and increase their contribution to food security. The following recommendations are advanced for continued policy discussion on enhancing women's participation in aquaculture.

- It is recommended that a policy be enacted to transform ownership rights for women. Nigerian government could adopt massive land ownership and certification programs to grant women access to lands that could be used as collateral for credit with financial institutions. More importantly, specialized development banks in coastal fishing and aquaculture should be established to ease access to loans for marine businesses, considering the peculiarity and nature of businesses in the blue economy. In addition, specialized micro-insurance schemes could be initiated for women in aquaculture. This will reduce the cost of the high-premium insurance packages associated with the high-risk nature of the business.
- It is recommended that women's marginalization in governance, decision, and policy implementation should be eliminated by forming formidable associations that reassure
- women of equality of rights in management and governance. Also, advocacy groups should be formed to raise awareness and support women vying for electoral positions in the national bodies of aquaculture practitioners. For women players in aquaculture governance, one-third of electoral positions should be for women in aquaculture.
- Intensive training and literacy support should be extended to women players in the aquaculture subsector. This could be achieved through regular seminars, conferences, and workshops. Aside from participation in aquaculture management and governance, women should be encouraged and supported to showcase their capabilities in national political terrain. Most acts and policies supporting women may be suppressed at the national governance level if women are not adequately represented. It is, therefore, germane to expedite actions to increase women's representation in politics and advocate for the inclusion of women in wage negotiation.
- Capability enhancement in technical value-enhancing activities in the aquaculture space is vital for the development of women in the space. It is, therefore, essential to conduct national-level training on extension services for women in aquaculture. The government is expected to invest in women fishers on specialized training in feed production, diet formulation, hybrid fish reproduction, hatchery, and exportation mechanisms. These activities would further enhance the capabilities and functionalities of women in coastal fishing and aquaculture.
- Since less than 10% of Nigerian universities offer fishery as a course, the government should intentionally encourage institutions to float full-fledged fishery and aquaculture faculty and increase the admission quota for girl children seeking admission into the course.
- In addition, the national orientation agency should reorient parents to support their girl child who wants to study fisheries and aquaculture. Scholarships and grants for students in fisheries and aquaculture should be available to realign the child/parents' interests

with the national goals of preserving the aquaculture space.

- In addition to investments in infrastructure, technical and human capacity development, awareness campaigns, and lead-in discussions from successful women in coastal fishing and aquaculture should be taken to higher institutions, thus creating an enabling atmosphere and hope for younger girls' participation in aquaculture.
- It is expedient to institute a triple helix collaboration between the government, industry, and academia to address the challenge of inadequate technical exposure, financial literacy, and managerial capabilities among women in aquaculture. The synergy and integration of the helix will foster theoretical and practical deliberations on the activities within the aquaculture ecosystem. Through deliberate efforts, the government would sponsor well-grounded research on the gendered disparity in marine resources technical expositions and propose actionable training on innovations and creativity. Also, the tripartite relationship between these key stakeholders would result in healthy collaborations in driving innovativeness in the subsector by ensuring a grassroots approach to policy decisions through well-informed and rigorous research activities and technological innovations while developing an entrepreneurship spirit amongst women in aquaculture. Furthermore, the linkages will foster policy decisions on enhancing women in aquaculture based on the lived experiences of the challenges encountered by the women in the blue economy.
- Lastly, it is recommended that gender-aggregated datasets detailing women's experiences with their spouses in the profession should be encouraged. The dataset will form institutional support for developing measures to ameliorate the pains of women in aquaculture with reference to insecurity, harassment, and intimate partner violence. Aqua women should be encouraged to speak up in cases of harassment, rape, or domestic violence to the right-protection institutions.

9. Conclusion

The study adopts an exploratory literature review on the challenges facing women players in coastal fishing and aquaculture. Literature established a global concern about the lack of sufficient data on women's contribution to the blue economy. More importantly, a distinct discrepancy existed in the critical factors inhibiting female participation in developed and developing countries.

Using Nigeria as a case study, the study affirmed the challenges facing women in aquaculture, including inaccessibility to landed properties due to the patriarchal societal legislations, which lead to unequal access to finance, investment opportunities, and affordable insurance schemes. The unequal representation or near invisible exposure of women to politics and governance in aquaculture thereby leads to their voice suppression and enactment of gender-inclusive policy decisions and responses.

Having identified these critical challenges, the study recommends increased women participation in national, sub-national and local politics to drive visibility to support gender-oriented policies at various levels of governance. More importantly, the study proposed a catch them young approach to increasing female participation in aquaculture. This calls for advocacy on increasing university-based institutions for fisheries and aquaculture, floating full-fledged schools, and technical and human resource development departments with special quotas and sponsorship for female admission. In the same vein, the study recommends trainings for female fish farmers. Furthermore, more advocacy groups should come up to fight for women's rights against harassment, insecurity, and intimate partner violence by instituting gender-inclusive social and psychological support systems to address the associated mental torture and post-traumatic stress disorder arising from those experiences. Lastly, the study recommends an effective triple helix model for collaborations between the government, industry, and academia for improved, informed, and innovative policy decisions.

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