Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

Enhancing Modern Fishing Practices and Sustainable Livelihoods in Southern Ijaw, Nigeria: Correlating Operational Strategies and Experiences

Agoro Taiwo Olatunbosun,
Ofunama Preye,
Oguntade Stephen Kayode
Department of Oceanography and Fisheries Science
Federal Polytechnic Ekowe, Bayelsa State Nigeria.

ABSTRACT

This study aims to explore the relationship between fishers' operational strategies and their level of fishing experience, with a focus on identifying ways to enhance modern fishing practices and promote sustainable livelihoods. Small-scale artisanal fishing remains one of the primary means of livelihood in the Southern Ijaw Local Government Area, due to the abundant supply of water bodies. Though this area is largely dominated by artisanal fishers, it has seen slow expansion and limited access to modern technologies. This may be due to income instability and unsustainable practices. A quantitative research approach was employed, utilising structured interviews and questionnaires administered to 120 artisanal fishers selected from various communities in the Southern Ijaw Local Government Area. Data were analysed using descriptive statistics, Pearson correlation, and multiple linear regression via Google Sheets and XLMiner tools. Descriptive analysis showed that most fishers rely on canoes with paddles, and own about five fishing gears. Correlation results indicated that longer fishing experience is modestly associated with greater asset ownership (e.g., boats and nets), but not with higher income. Regression analysis revealed that the availability of fishing gear had a significant positive effect on income, while owning more fishing crafts had a significant negative impact. The modern strategies, such as efficient gear use, were more effective in improving income than traditional scale expansion. The findings suggest that integrating local, experience-based knowledge with modern operational strategies is essential for achieving long-term sustainability in artisanal fisheries. Policy interventions should prioritise access to equipment, cooperative systems, and training in resource-efficient practices.

Keywords*: Operational Strategies, Fishing Experience, Sustainable Livelihood, Modern Fishing Practice, Southern Ijaw*

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

INTRODUCTION

Nigeria is richly endowed with natural aquatic resources, including rivers, lakes, creeks, and ponds, which provide vital support for rural livelihoods through various forms of fishing. Fishing, the process of harvesting fish from natural water bodies, constitutes a major economic activity, particularly in riverine and coastal communities. According to Arikawei and Nzeneri (2013), fishing in Nigeria can broadly be categorised into artisanal (small-scale) and industrial (large-scale) practices. Artisanal fishers typically operate as individual households or small groups using limited capital, simple tools and mechanised or semi-mechanised crafts such as dugout canoes. These small-scale fisheries play a crucial role in local economies, offering employment, ensuring food security, and contributing significantly to poverty reduction (Ngodigha et al., 2018; Ojo et al., 2025). Despite their modest means, artisanal fishers are responsible for a substantial portion of the domestic fish supply and are deeply embedded in the social and economic fabric of many Nigerian communities (Bamigboye & Koledoye, 2022). Compared to industrial fishing, artisanal practices are generally regarded as more environmentally sustainable and resilient to climate change impacts, owing to their adaptability and lower ecological footprint (Belhabib et al., 2017; López-Angarita et al., 2018; Prosperi et al., 2019). These fisheries are primarily concentrated along Nigeria's coastal and riverine areas, such as the Southern Ijaw Local Government Area in Bayelsa State, where fishing is not just an economic activity but a cultural heritage passed down through generations. Although both men and women participate in fishing, men dominate the more physically demanding aspects, such as gear preparation and boat operation.

The success of artisanal fishing is influenced by various factors, including the type of fishing gear used, the fisher's knowledge and experience, the nature of fishing strategies, and the compatibility of techniques with target fish species and ecosystems. Mastery of fishing methods and adaptive strategies is essential for maximising productivity and ensuring the long-term viability of fishing livelihoods. Livelihood, in this context, refers to how individuals or households secure the necessities of life (Kuta, 2020). According to Masud et al. (2016), livelihoods are shaped by access to capital (natural, human, social, physical, and financial), as well as the institutions and relationships that mediate resource use. The Sustainable Livelihood Framework (SLF) highlights how these assets interact to determine the vulnerability or resilience of communities. Within this framework, improvements in fishing practices, particularly through strategy selection and technological adaptation, can enhance income generation and reduce poverty (Shah *et al*., 2022). Despite the importance of artisanal fishing to rural livelihoods in Southern Ijaw, many fisherfolk continue to operate under inefficient traditional systems, with limited access to modern techniques or resources. While fishing experience plays a role in shaping operational decisions, the relationship between experience, strategic choices, and livelihood outcomes remains poorly understood.

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

Without clear insights into how these elements work together or separately, interventions to support sustainable fishing remain generic or misdirected. There is, therefore, a need to examine how fishing experience influences the adoption of operational strategies, and how this, in turn, affects income and sustainability in artisanal fishing communities.

Existing studies emphasise the importance of integrating traditional knowledge with modern fishing practices to enhance livelihoods. For instance, Ojo et al. (2025) conducted a comprehensive assessment of sustainable fishing practices in artisanal fisheries in Nigeria and discovered a range of challenges that affect the sector's sustainability, including overfishing, socio-economic challenges, and regulatory gaps. The study recommended co-management systems and capacity-building initiatives to preserve biodiversity and promote socio-economic resilience in Nigeria. Similarly, an empirical study by Hossain et al. (2023) using data from 100 artisanal fishers found that fishing can contribute to the improvement of annual income and enhance the economic livelihood of families dependent on it. Obirikorang et al. (2021) revealed that the adoption of technology could improve the productivity of small-scale fishers, contribute to food security, and inform evidence-based policymaking. These findings suggest that a nuanced understanding of strategy-experience alignment is essential for improving artisanal fishers' livelihoods.

Objectives of the Study

(1) To identify and analyse the existing operational fishing strategies used by artisanal and small-scale fishers in Southern Ijaw.
(2) To assess the level and nature of fishing experience (years of practice, indigenous knowledge and skill acquisition) among fishers in the study area.
(3) To determine the relationship between fishing experience and the choice/adoption of operational strategies (gear type, fishing methods, timing).
(4) To evaluate the extent of adoption of modern fishing technologies and practices among fishers in Southern Ijaw.

METHOD

Description of Study Area

The study was conducted in the Southern Ijaw Local Government Area (SILGA), one of the eight local government areas in Bayelsa State, with a geographical position of 4 ° 48' 17N and 6 ° 04' 44E. It has approximately 2,682 sq. km surface area and a coastline of 60 km on the Bight of Benin (Iyama, Waribo & Okpara, 2016), with a population of over 300,000 people (NPC, 2015). The major communities in the LGA are Igbomotoru, Peremabiri, Opuama, Eniwari, Angiama, Diebu, Ondewari, and Azia (Ijaw (IZON) World Studies, n.d.). Other communities are Amassoma and Ekowe, where the State University and Federal Polytechnic are situated, respectively (Federal Polytechnic

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

Ekowe, 2025). The major water body in the study area is called the Nun River, which is part of the larger Niger Delta water network and flows into creeks, forming a complex interwoven network (Egai et al., 2013). Fishing, water transportation, and commerce are the major occupations in the study area, as most of the communities are surrounded by water (Akintoye et al., 2016).

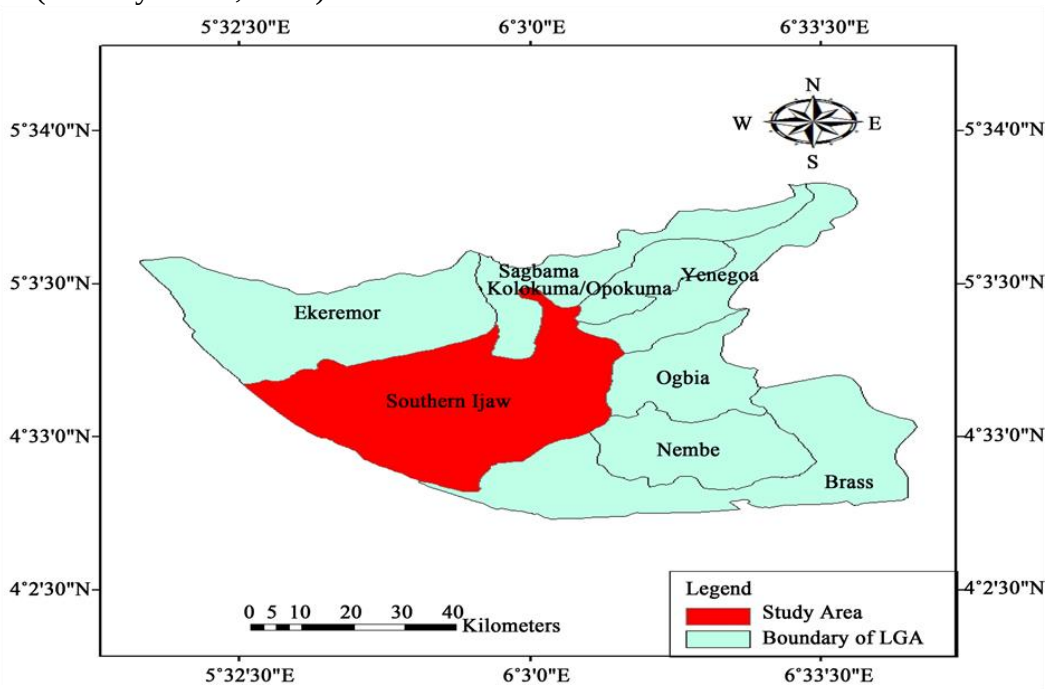

Figure 1: Map of Bayelsa State showing the study area (Southern Ijaw LGA). Source: (Akintoye et al., 2016).

The study employed a quantitative research design, utilising primary data collected through structured questionnaires and interview schedules to gather information from artisanal fishers in various communities within Southern Ijaw. A total of 120 respondents were successfully surveyed from Amassoma, Angiama, Ayama, Ekowe, Ikoromogbene, Ipirigbene, Nangiama, Ofinigbene, Ogilagbene, Okongbene, Onyoma, Oporoma, and Opuama. Given the informal and decentralised nature of artisanal fishing communities, the study employed the snowball sampling technique. Initial participants were identified with the help of local informants and community leaders. These initial respondents then referred the researcher to other eligible fishers, allowing the sample to grow progressively through existing social networks. This method was particularly effective in reaching fishers who may not be formally registered or who are not easily accessible through conventional sampling frames. Data were collected on the demographic characteristics (age, household size, and years of fishing experience), operational

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

strategies (type and number of fishing crafts, duration of trips, fishing frequency), asset availability (access to fishing gear and number of nets owned) and livelihood outcomes (self-reported average monthly income).

Data analysis methods

The collected data were coded and analysed using Google Sheets, with the aid of the XLMiner Analysis ToolPak.The analysis carried out includes: Frequency distributions, percentages, and means to describe respondents' socio-demographic and fishing characteristics. Pearson correlation coefficients were used to examine the strength and direction of relationships between fishing experience, operational strategies, and income. A regression model was developed to evaluate the combined effect of operational strategies on income, using average monthly income as the dependent variable and key operational indicators (e.g., gear availability, craft ownership, fishing frequency) as predictors. The results provided insights into which strategies were most effective in promoting sustainable livelihood outcomes and how fishing experience influenced operational decisions.

RESULTS AND DISCUSSION

The socio-economic characteristics of the fisher folks in the study area are summarised in Table 1. Most respondents are within the ages of 40-50 years (39.17%), and the mean age is 40 years, indicating that the fisher folks in the study area are within the economically active age range (18-55 years) and are physically able to paddle the canoes. This finding was in agreement with Aminu *et al.* (2017) who found out that the most of the fisherfolks in Lower Ogun River Basin areas of Lagos State are below the age of 46 (61.7%), Igejongbo (2021) who reported that most of the respondents (39%) in Igbokoda, Ondo state are within the economically active ages of 31-40 years, and Anyanwu *et al.* (2022) whose findings reveal that majority of the fisherfolks (45%) in Andoni LGA of Rivers state were within the ages bracket of 41-50 years, which significantly affects their productivity and rate of adoption of innovations. Additionally, studies outside Nigeria also confirm this finding. For example, Magego *et al.* (2021) reported that most respondents (59.5%) in the fishing community around Lake Victoria were between 36 and 60 years, which enables them to conduct strenuous physical activities and challenging tasks for survival.

Surprisingly, the study reveals that the number of women (52.50%) engaging in fishing activities in the study area is more than that of the males (47.50%). This implies that the females in the study area are greatly involved in fishing activities, which may include processing the fish and selling. It may also imply that female fish in smaller water bodies such as lakes, rivers, or ponds, rather than in the oceans or seas, as it may be too dangerous (Kusakabe & Thongprasert, 2022). Table 1 also shows that the majority of

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

respondents (49.17%) were married, while the rest were single (8.33%), widowed (6.67%), or separated from their partners (5.83%). This implies that most of the fisherfolk in the study area will be responsible for a lot of people in their families. This is evidenced by the household size as the study reveals that the majority of respondents (49.17%) had 6-10 people living in their household, followed by 34.17% who had 1-5 people, 10.83% who had 11-15, and only 5.83% had the highest household size. The average household size was 7 people, indicating that fisherfolk in the study area have the advantage of using family labour, as opined by Aminu et al. (2017).

The respondents have experienced formal education; the majority (41.67%) attained secondary education, 34.17% completed primary education, 4.17% went on to complete tertiary education, while only 20% had no form of formal education at all. The level of education implies that the respondents will be open to adopting technologies and opportunities that can improve their careers. The level of education is also a significant factor in the jobs one can get and the quality of life that one will have. Low levels of education are disadvantageous as they limit an individual's ability to diversify into other higher-income activities (Magego *et al.,* 2021).

Christians dominated the study area (94.17%), followed by Muslims (2.50%), traditional worshippers (1.67%), and 1.67% did not identify with any religion. According to the study's findings in Table 1, respondents in the study area obtain their major source of income and employment from fishing-related activities (78.30%), while 21.7% of them treated fishing as a part-time business. This is in contrast to the findings of Aminu *et al.* (2017), who indicate that only 30% of the respondents engaged in fishing as the majority source of employment and income. However, the major occupation of the majority of respondents is fishery-related; they do not solely depend on the income from it. This is evidenced as 75.83% of them obtained an alternative source of income from other agricultural ventures, 1.67% work for the government, 7.50% engage in non-agricultural ventures, and some engage in boat riding (2.50%). This implies that fishing activities were not enough to meet their family needs. However, some do not have an alternative source of income (12.50%).

The study revealed that the majority (30.83%) of fisherfolk in the study area had between 11 and 20 years of experience, followed by 29.17% who had 21-30 years, 25.83% who had 1-10 years and 14.17% who had more than 30 years of experience. The average years of experience is 19 years, which indicates that respondents were well-experienced. The fishing experience indicates how well the fisherfolk know the fishing areas where they can get the most catch, the optimal fishing seasons, and prices of different species caught, directly influencing how profitable they can be (Saleh & Ogunremi, 2024).

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

Table 1: Demographics of respondents

Characteristics	Frequency	Percentage	Mean
Age			
20-30yrs	24	20.00%	
30-40yrs	29	24.17%	
40-50yrs	47	39.17%	
50-60yrs	20	16.67%	40.25
Gender			
Male	57	47.50%	
Female	63	52.50%	
Marital status			
Divorced/Separated	7	5.83%	
Single	10	8.33%	
Widow/Widower	8	6.67%	
Married	95	49.17%	
Household size			
1-5	41	34.17%	
6-10	59	49.17%	
11-15	13	10.83%	
15-20	7	5.83%	7.42
Level of education			
No education	24	20.00%	
Primary / Standard 6	41	34.17%	
SSCE	50	41.67%	
Tertiary	5	4.17%	
Religion			
Christianity	113	94.17%	
Muslim	3	2.50%	
Traditional	2	1.67%	
None	2	1.67%	
Full-time or part-time			
Full-time	94	78.30%	
Part-time	26	21.70%	
Alternative source of income			
Boat riding	3	2.50%	
civil servant	2	1.67%	
No other source of income	15	12.50%	
Other Agric ventures	91	75.83%	
Other Non-agric ventures	9	7.50%	
Fishing Experience			
1-10yrs	31	25.83%	
11-20yrs	37	30.83%	
21-30yrs	35	29.17%	
Above 30yrs	17	14.17%	18.67

Source: Field Survey, 2025

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

Table 2: Operational strategies of fisherfolk in SILGA

Operational Strategies	Frequency	Percentage (N=120)
Type of craft		
Canoe with paddles	117	97.50%
Motorized canoe	3	2.50%
Duration of fishing trip		
1-5hrs	14	11.67%
6-10hrs	63	52.50%
All Day	19	15.83%
All Night	7	5.83%
Day and night	17	14.17%
Fishing frequency		
2-3times a week	30	25.00%
4-5times a week	26	21.67%
Everyday	61	50.83%
Occasionally	3	2.50%
Number of crafts owned		
1	86	71.67%
2	22	18.33%
3	12	10.00%
Availability of gear		
Active gears	34	28.33%
Both passive and active	34	28.33%
Passive gears	52	43.33%
Number of gears owned		
1-2	36	30.00%
2-3	10	8.33%
3-4	33	27.50%
5	41	34.17%

Source: Field Survey, 2025

Table 2 describes the operational strategies employed by fisherfolk in SILGA. From this table, only a few respondents (2.50%) could afford the cost of motorised canoes, while the majority (97.50%) use canoes with paddles. The type of craft used can affect the catch level and productivity of fisherfolk. The result also revealed that the majority (52.50%) spend between 6 and 10 hours on every fishing trip, 14.17% fish both day and night, 15.83% fish all day, 5.83% fish all night, while 11.67% spend 1-5 hours on every fishing trip. The length of time spent on each fishing trip could significantly affect the catch.

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

Additionally, fishermen plan when to fish, as environmental factors also affect the catch amount. The study revealed that the majority of respondents fish every day (50.83%), followed by those who fish 2-3 times a week (25.00%), then those who fish 4-5 times a week (21.67%), and only a small number (2.50%) fish occasionally. This indicates the intensity with which fishing activities are carried out in the area.

Additionally, most respondents (71.67%) owned just one craft; this indicates that the scale of fishing activities is low and that most fisherfolk do not have the financial capacity to expand their business. Accordingly, 43.33% of the respondents use passive gears, that is, they leave the gears in highly populated fishing grounds and wait for fish to be caught. 28.33% use both active and passive gears, while 28.33% use just active gears. The majority (34.17%) owned 5 fishing gears, 30% owned 1-2, 27.50% owned 3-4, and 8.33% owned 2-3 gears. This indicates that fisherfolk in the study area are equipped with tools and can conduct intensive fishing activities.

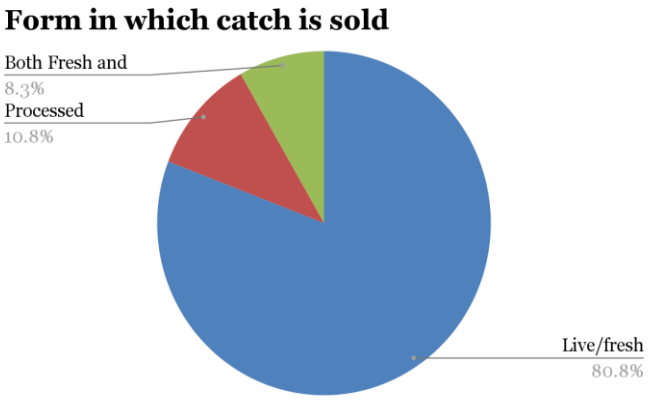

Figure 1: The form in which the catch is sold

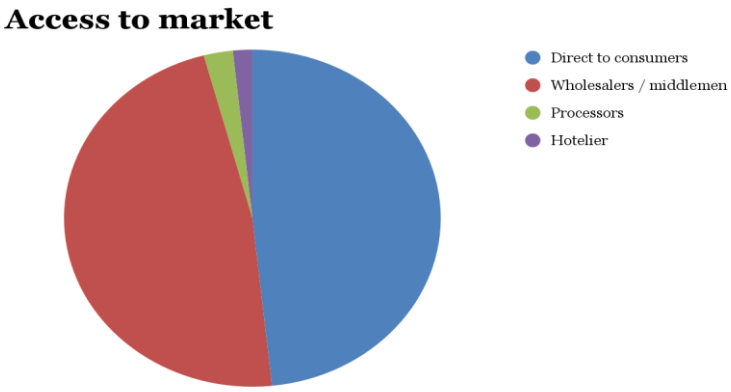

Figure 2: Location where the catch is sold

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

Table 3: Correlation between fishing experience, operational strategies, and average monthly income (N=120)

	Fishing experience	Average monthly income	Type of craft	Duration of fishing trip	Fishing frequency	Number of crafts owned	Availability of gear	Number of gears owned
Fishing experience	1							
Average monthly income	-0.127	1						
Type of craft	0.056	-0.112	1					
Duration of fishing trip	0.205	0.015	0.011	1				
Fishing frequency	0.182	0.138	-0.057	0.257	1			
Number of crafts owned	0.268	-0.247	0.067	0.065	-0.075	1		
Availability of gear	-0.086	0.245	-0.093	0.029	0.120	-0.089	1	
Number of gears owned	0.260	-0.008	0.183	0.195	-0.095	0.318	0.051	1

Source: XLMiner Analysis Toolpak

Table 3 describes sustainable livelihood practices that the fisherfolk in the study area engage in. These include participation in fishing activities by the family members, to which the majority (71.67%) do. This enables them to efficiently carry out fishing activities and employ cheap labour. The study also reveals that the majority of respondents only catch <100kg per week, 32.50% catch <200kg, 18.33% do not know the quantity of fish they catch, 12.50% catch <300kg, and only 3.33% catch over 500kg. This indicates the amount of catch and predicts the income of the fisherfolk. The majority (31.67%) of the respondents earn between N50,000 and N100,0000 monthly, followed by those who make N1,0000 to N50,000 (29.17%), then those who make N100,000 to N150,000 (20.83%), and only 7.50% generate over N200,000. This implies that fishing may not be a very profitable venture in the study area, as the cost required for survival is on the rise (Bailey, 2023).

The form in which the catch is sold is shown in Figure 1. It showed that the majority (80.8%) sold their catch live/fresh, 10.8% waited for the fish to be processed before selling, while 8.3% sold their fish both fresh and processed. As indicated in Figure 2, the majority of respondents (48.33%) sold their output directly to consumers, 47.50% sold to middlemen or wholesalers, 2.50% sold to processors, and 1.67% sold to a hotelier.

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

None of the fishermen sold their output in a designated market; they do not have access to one, which is why wholesalers or middlemen are involved to take the product off their hands.

The correlation analysis reveals several notable relationships between operational strategies, fishing experience, and income. While fishing experience shows weak positive correlations with the number of craft owned (canoes) (r = 0.268), duration of trips (r = 0.205), and gear ownership (r = 0.260), it is negatively associated with average monthly income (r = -0.127).

Interestingly, the availability of gear is the only variable showing a relatively strong positive correlation with income (r = 0.245), suggesting that operational efficiency may outweigh traditional experience in boosting earnings. The number of boats owned correlates negatively with income (r = -0.247), potentially reflecting the inefficiencies of scaling without modernisation. Overall, the results suggest that access to gear and tools and fishing frequency have a greater influence on income than years of experience or type of craft.

Table 4: Multiple Linear Regression analysis

Predictor	Coefficient	Std. Error	t-stat	p-value
C	4.749	1.528	3.107	0.002*
Type of craft	-1.188	1.221	-0.973	0.332
Duration of fishing trip	-0.032	0.165	-0.196	0.845
Fishing frequency	0.254	0.225	1.128	0.262
Number of crafts owned	-0.780	0.299	-2.603	0.01**
Availability of gear	0.508	0.228	2.227	0.028*
Number of gears owned	0.132	0.144	0.912	0.363
Regression stats	$R^2 = 0.132$	Std. Error = 2.04	F-value = 2.865	Sig. = 0.012

Source: XLMiner Analysis Toolpak

Journal of Environmental Issues and Agriculture in Developing Countries
Volume 17, Number 3, December 2025
ISSN(p): 2141-2731 ISSN(e): 2795-2967
Published By
International Centre for Integrated Development Research, Nigeria
In collaboration with
Copperstone University, Luanshya, Zambia

The multiple linear regression model looked at how different fishing practices affect average monthly income. The results showed the model was statistically significant ($F = 2.865$, $p = 0.012$) and explained about 13.2% of the changes in income ($R^2 = 0.132$). The number of boats owned had the biggest impact, but it was negative ($\beta = -0.780$, $p = 0.01$), meaning owning more boats might actually lower income, maybe because of higher running costs or not using all the boats. On the other hand, having fishing gear had a positive effect on income ($\beta = 0.51$, $p = 0.028$), so fishers with gear tend to earn more. Other factors like the kind of boat, how long trips last, how often fishers go out, and how many pieces of gear are owned did not have a significant effect on income.

CONCLUSION

This study investigated the relationship between operational strategies and fishing experience among artisanal fishers in Southern Ijaw Local Government Area, with the aim of enhancing modern fishing practices and promoting sustainable livelihoods. Findings revealed that while fishers adopted a variety of operational strategies, including the use of different crafts (both motorised and canoes with paddles), frequently went fishing for 6-10 hours daily, owned at least one craft and multiple gears, these practices were not uniformly associated with higher income levels. Fishing experience showed modest positive correlations with ownership of fishing crafts and gears, frequency and duration of each fishing trip, suggesting that more experienced fishers tend to scale their operations and spend more time conducting fishing activities. However, regression analysis indicated that the availability of fishing gear significantly contributes to increased income, while, surprisingly, the number of boats owned had a negative effect. This highlights that simply increasing the scale of operations without strategic efficiency may not lead to improved livelihoods. Overall, the study concludes that sustainable livelihood outcomes in artisanal fishing are more dependent on access to productive resources and efficient practices than on fishing experience alone. Bridging the gap between traditional methods and strategic resource use remains critical to improving the income and sustainability of fishing households.

RECOMMENDATIONS

Based on the findings of this study, the following are recommended:

- **Improve access to fishing gear and shared facilities:** Government and NGOs should prioritize the provision of subsidized or community-managed gear lending systems, as gear availability significantly enhances income potential.

- **Promote training in resource-efficient fishing practices:** Fishers should be educated on how to optimize returns using fewer but more effective resources, rather than focusing on scale (for example, owning multiple crafts).

- **Modernize traditional operations through targeted interventions:** Efforts should be made to introduce cost-effective, modern fishing technologies aligned with local realities and ecological sustainability.

- **Support cooperative structures:** Fisher cooperatives can help pool resources, reduce operational costs, and improve collective bargaining power for equipment and market access.

- **Further research:** Future studies should explore non-operational factors (e.g., market access, storage facilities, environmental change) that might better explain the remaining variance in fishers' income levels

REFERENCES

Akintoye, O., Eyong, A., Effiong, D., Agada, P. and Digha, O. (2016) Socio-Economic Implications of Recurrent Flooding on Women Development in Southern Ijaw Local Government Area, Bayelsa State, Niger Delta Area of Nigeria. Journal of Geoscience and Environment Protection, 4, 33-46. doi: 10.4236/gep.2016.48004

Aminu, F. O., Ojo, O. O. & Adekunle, F. (2017). Socio-economic analysis of artisanal fish production in Lower Ogun River Basin areas of Lagos State, Nigeria. *Ghana Jnl Agric. Sci., 51*, 63-72.

Anyanwu, S. O., Wilcox, G. I., Okafor, B. B. & Eneyo, C. (2022). Influence of socioeconomic characteristics on artisanal fishing in Andoni LGA of Rivers State, Nigeria. *African Journal of Biological, Chemical and Physical Sciences, 1*(1).

Arikawei, A. R. & Nzeneri, I. S. (2013). The Utilization Of Fishing Operational Methods On Adult Learners' Economic Livelihood For Poverty Reduction In Bayelsa State. *International Journal of Research In Social Sciences, 2*(4).

Bailey, B. (2023, February 10). Nigerians' spend on basic food items rises 17.5% - Report - Businessday NG. Businessday NG. https://businessday.ng/business-economy/article/nigerians-spend-on-basic-food-items-rise-17-5-report/

Bamigboye, E. & Koledoye, G. (2022). Value addition among youth artisanal fisher-folks: Evidence from Ilaje local government area, Ondo State, Nigeria. *Asian Journal of Research in Agriculture and Forestry*, 43-49.

Belhabib, D., Greer, K. & Pauly, D. (2017). Trends in industrial and artisanal catch per effort in West African fisheries. *Conservation Letters, 11*(1).

Egai, A. O., Imasue, O. I. & Torty, B. B. (2013). Quality Assessment of Water Potability in Aguobiri Southern Ijaw Local Government Area, Bayelsa State, Nigeria. J. Appl. Sci. Environ. Manage, 17(4), 493-500. http://dx.doi.org/10.4314/jasem.v17i4.6

Federal Polytechnic Ekowe (2025, June 25). Home - Federal Polytechnic Ekowe. Federal Polytechnic Ekowe -. https://www.federalpolyekowe.edu.ng/new/

Hossain, M. B., Lipi, J. A., Pingki, F. H., Sarker, M. M., Nur, A.-A. U., Islam, M. M., Albeshr, M. F. & Arai, T. (2023). Traditional Fish Farming Based on Indigenous Knowledge in Homestead Pond Can Uplift Socioeconomic Status of Coastal Rural People and Sustainability. *Sustainability*, *15*(18), 13583. https://doi.org/10.3390/su151813583

Igejongbo, T. (2024). Socio-economic characteristics of artisanal fisher folks in Igbokoda, Ondo State. ADAN JOURNAL OF AGRICULTURE, 2(1), 146–155. https://doi.org/10.36108/adanja/1202.20.0141

Iyama, W. A., Waribo, H. A. & Okpara, K. (2016). Assessment Of Nutrient And Biological Status Of Bassan River Water In Bayelsa State, Nigeria. Advance in Agriculture and Biology, 4(3), 76-81. DOI: 10.15192/PSCP.AAB.2016.5.3.7681

Kusakabe, K. and Thongprasert, S. 2022. Women and men in small-scale fisheries and aquaculture in Asia – Barriers, constraints and opportunities towards equality and secure livelihoods. Bangkok, FAO. https://doi.org/10.4060/cb9527en

Kuta, A. G. (2020). Fisheries and sustainable livelihoods of fishing communities in Nigeria. *World Aquaculture*, *41*(2), 61-63.

Local government Areas, clans & kingdoms, towns and villages of Ijaw Land – IJAW (IZON) World Studies. (n.d.). https://www.ijawworldstudies.com/clans-kingdoms-of-ijaw/

López-Angarita, J., Tilley, A., Díaz, J., Hawkins, J., Cagua, E. & Roberts, C. (2018). Winners and losers in area-based management of a small-scale fishery in the Colombian Pacific. *Frontiers in Marine Science, 5*.

Magego, J. L., Gor, C. O. & Kinaro, Z. (2021). Artisanal Fisheries Socio-economic characteristics on development planning strategies. *IOSR Journal of Humanities and Social Science*, *24*(4).

Masud, M. M., Kari, F., Yahaya, S. R. B. & Al-Amin, A. Q. (2016). Livelihood assets and vulnerability context of marine park community development in Malaysia. Social Indicators Research, 125(3), 771-792. https://doi.org/10.1007/s11205-015-0872-2

Ngodigha, S. A., Alagoa, J. K. & Abowei, J. F. (2018). Status and Constraints of Artisanal Fisheries in Ekperiama (Ekperikiri) Fishing Area, Niger Delta. Annals of Ecology and Environmental Science, 2(4), 24-29.

NPC Census (2015) Population Census Report. National Population Commission, Abuja.

Obirikorang, K. A., Sekey, W., Gyampoh, B. A., Ashiagbor, G. & Asante, W. (2021). Aquaponics for Improved Food Security in Africa: A review. *Frontiers in Sustainable Food Systems*, *5*. https://doi.org/10.3389/fsufs.2021.705549

Ojo, A., Akingbola, O., Gbadamosi, M., Samuel, O., Olabamiji, I., Aboderin, E. & Mustapha, A. (2025). Assessment of Sustainable Fishing Practices in Artisanal Fisheries in Nigeria. Preprints. https://doi.org/10.20944/preprints202501.1393.v1

Ojo, A., Akingbola, O., Gbadamosi, M., Samuel, O., Olabamiji, I., Aboderin, E. & Mustapha, A. (2025). Assessment of Sustainable Fishing Practices in Artisanal Fisheries in Nigeria. *Preprints.org*. https://doi.org/10.20944/preprints202501.1393.v1

Prosperi, P., Kirwan, J., Maye, D., Bartolini, F., Vergamini, D. & Brunori, G. (2019). Adaptation strategies of small-scale fisheries within changing market and regulatory conditions in the EU. *Marine Policy*, *100*, 316-323

Saleh, S. & Ogunremi, J. B. (2024). Analysis of Fishing Experience and Training Requirements among Artisanal Fishers on Nwonyo Lake, Ibi Local Government Area, Taraba State, Nigeria. Nigerian Agricultural Journal, 55(3), 420-426.

Shah, J. M., Uddin, M. S., Hussin, R., Hamdan, D. D. B. M., Ibrahim, D. & Ijuwan, N. N. B. A. (2022). Sustainable Livelihood Strategies of fishing Communities in Marine Protected Area (MPA), Sabah, Malaysia. *International Journal of Human Resource Studies*, *12*(2), 44. https://doi.org/10.5296/ijhrs.v12i2.19669