ASSESSMENT OF WOMEN'S PARTICIPATION IN FISH PROCESSING IN EKITI STATE, NIGERIA

Abstract

This research examined the involvement of women in various stages of fish processing in Ekiti State, Nigeria. A sampling method was used to select 90 women fish processors, and data was collected through structured interviews. The data was analyzed using descriptive statistics, such as frequencies, percentages, and means, along with charts. Additionally, probit regression analysis was conducted to identify socio-economic factors influencing women's participation in fish processing. The findings revealed that, on average, women involved in fish processing were 38.5 years old, with 57% being married and 28.4% being single. A majority (61.7%) had received formal education, and nearly all (91%) were members of cooperative societies. The study found that women were primarily engaged in scaling, gutting, and sticking (87%), with 60% using the hot smoking method. Most processing equipment was locally fabricated, with 15% using drum ovens, 25% using metal sheets, 45% using clay ovens, and 40% using kilns. The majority (85%) used firewood as a fuel source, and 89% packaged their fish in baskets and paper. The probit regression analysis indicated that age, education, access to credit, and access to markets were positively and significantly related to women's participation in fish processing. Marital status and experience in fish processing were also positively related but not significantly. The study concluded that women utilized various methods, equipment, and energy sources in fish processing. Based on the findings, recommendations were made, including assisting women in forming cooperative societies to enhance their business management skills, prioritizing women in accessing credit and loans, and stabilizing fish product prices to mitigate business risks among women processors.

***Keywords**: Assessment, Women participation, Processing, Preservation*

Introduction

Nigeria, being a maritime nation, relies significantly on fishing as a cornerstone of its national economy, with fish being a vital and widely consumed component of the diet (FAO, 2018). The country's annual fish consumption exceeds 1.5 million tons, with fish contributing roughly half of the animal protein consumed in a typical Nigerian diet. Fish is acquired from various sources, including imports, local catches, and aquaculture. Among these methods, aquaculture stands out as a prevalent practice, particularly in Nigeria's coastal regions, offering an affordable source of animal protein. Small-scale fish farming and artisanal fishing collectively constitute approximately 80% of the fishing industry, supplying around 82% of the nation's total fish output.

In the past five years, aquaculture has experienced significant growth in Nigeria, driven by various factors including easy entry into the industry, better technological access, and increased availability of technical support. Consequently, this sector fulfills both nutritional requirements and employment needs, offering opportunities for entire family units, including men, women,

and children, to engage in various roles. According to Olufayo (2012), women play diverse roles in aquaculture, particularly in fishing, processing, packaging, and marketing.

The significance of women's involvement in food production systems, including agriculture and fisheries, cannot be overstated. Women's roles in these sectors vary depending on the fishing community, country, and region. Nevertheless, within the fishing industry, the majority of women channel their efforts, talents, and skills towards the welfare of their families. Their contributions to food production, particularly in coastal fisheries, are increasingly recognized as a means to alleviate poverty and enhance food security. Studies such as Nwabueze and Erie (2017) have observed that women residing in fishing communities actively contribute to the fishing sector and significantly contribute to enhancing the well-being of their families.

The importance of developing effective methods and techniques for preserving and processing fish cannot be overstated, especially with the increasing agricultural production in Nigeria (Davies et al., 2012). Traditionally, fishing has been seen as a male-dominated occupation in various Nigerian states, with women mainly involved in post-harvest activities. However, there is now a growing recognition of women's involvement in all aspects of fisheries, including capture activities.

Fish packaging, defined as the process of enclosing fish products for distribution, storage, sale, and use, is crucial in ensuring the quality and longevity of fish products (Abolagba and Akise, 2015). Proper packaging facilitates handling during storage and distribution within the marketing chain. Negligence in packaging can result in damage and wastage, thereby affecting the storage life of smoked products regardless of the method used. Consequently, the lack of attention to packaging has contributed to the decline in the quality of fish production and marketing in Nigerian markets today.

At present, there is limited emphasis on the mechanization of fish processing, with traditional methods being prevalent. However, some of these traditional processing techniques are linked to contaminations that pose risks to consumers (George et al., 2018).

Statement of the problem

Historically, fish production has been perceived as primarily a male occupation, with women's roles in fish-related activities being supportive yet crucial (Akinrotimi et al., 2018). Tamale (2015) highlighted that the undervaluation of women's contributions in manufacturing is exacerbated by unequal resource allocation. This lack of access and control over production processes significantly hampers women's involvement in economic endeavors such as coastal fisheries (Acharya, 2013).

In rural Ekiti province, women actively participate in the traditional fishing sector, either alongside men or in complementary roles to sustain their families. Traditionally, women have been pivotal in the post-harvest phase of the fish value chain. Their contribution following men's fishing activities is substantial, often taking sole responsibility for processing the fish caught by their husbands or purchased from other fishermen (Tonye and Francis, 2018).

The processing and preservation of fish are essential due to their susceptibility to spoilage immediately after being harvested, which can result in significant economic losses (Okonta and Ekelemu, 2015). When fish cannot be sold fresh, various storage methods are employed to prolong their shelf life, including freezing, smoking, drying, and heat treatment. Inadequate fish

handling, processing techniques, and storage facilities are primary factors contributing to the limited supply of fish to impoverished rural areas. The need for multiple processing and storage steps arises from the long distances and distribution channels involved, and insufficient authority allocation hampers the feasibility of low-level preservation methods such as refrigeration (Agbon et al., 2012). Efficient fish preservation is crucial for achieving optimal quality, yield, and profitability (Davies and Davies, 2009). Given the aforementioned challenges associated with fish processing, the study aims to address the following research questions:

Research Questions

(1) What are the socio-economic characteristics of women fish processors in the study area?
(2) What are the various fish processing methods used by the respondents?
(3) What are the equipment types and fuel sources adopted by the women fish processors?
(4) What are the materials used in the packaging processed fish in the study area?

Objectives of the Study

The main objective of the study is to assess women's participation in fish processing in Ekiti state Nigeria. Specifically, this study aims at:
i. describing the socio-economic characteristics of the respondents;
ii. identifying the various fish processing methods used by the respondents in the study area;
iii. identifying the equipment types and fuel sources adopted by the women processors;
iv. identifying the materials used in fish packaging process in the study area.

Hypothesis testing

There is no significant relationship between participation of women in fish processing and their socio-economic characteristics in the study area.

Methodology

This research was conducted in Ekiti State, located in Southwest Nigeria, utilizing a multistage sampling method to determine the sample size. Initially, three Senatorial districts were chosen, followed by the selection of 2 Local Government Areas from each district. Subsequently, fifteen (15) women fish processors were purposively chosen from the Agricultural Development Program (ADP) in each LGA, specifically targeting those actively engaged in various activities within the fish value chain. The total sample size comprised ninety (90) women fish processors from the study area. Primary data was gathered through a meticulously structured questionnaire and interview schedule. Analysis of the data employed descriptive statistics, including mean, frequency, percentages, tables, and charts, while the Probit regression model was utilized to test the hypothesis.

The specification of the model is as follows:

$$Y * i = \beta 0 + \beta ijXij + ei \quad (1)$$

Y = Dependent variable (participation in fish processing) if participated 1, otherwise 0
X1 = Age (years)
X2 = Marital status (married = 1, otherwise = 0)
X3 = Education (years)
X4 = Household size (number)
X5 = Fish processing experience (years)
X6 = Income (Naira)

X7 = Access to credit (yes = 1, no = 0)
X8 = Access to market (yes = 1, no = 0)
a = Constant or intercept term
b1, b2, b3, b4, b5, b6, b7, b8, are coefficients of the respective independent variable to be estimated and ui=error term

Results and Discussion

Socio-economic Characteristics of Respondents

Table 1 presents the age distribution of women participating in fish processing and packaging within the study area. It indicates that approximately 36.1% of the women involved in these activities fell within the age range of 45 to 54 years. This finding closely aligns with the research conducted by Omoruyi et al., which similarly highlighted that a significant proportion of fish processors were aged 40 and above. Notably, women aged above 54 years accounted for only 3.3% and were not actively engaged in these activities. The average age of the fish processors was determined to be 38.5 years, suggesting the involvement of younger women in processing and preserving fish products. This observation is consistent with the conclusions drawn by Oyinbo and Reknot (2013) as well as Esiobu et al. (2014), who noted that individuals in this age group constitute the primary productive workforce. Additionally, younger individuals are better equipped to handle the stress, risks, and physical demands associated with fish marketing tasks.

Figure 1 illustrates that approximately 57% of the women were married, 23.4% were single, and 19.4% were either widowed or separated in the study area. This demographic breakdown likely reflects the age distribution of women involved in fishery activities. These findings are in line with the research conducted by Abolagba and Chukwu (2018), which similarly found that the majority of fish processors were married. The high percentage of married women can be attributed to the fact that many of them have husbands who are fishermen. Due to their familial responsibilities and roles, these women often assist their husbands in order to improve their household livelihoods.

The findings regarding educational attainment revealed that 38.3% of the respondents had not received any formal education, while 32.2% and 19.0% had completed primary and secondary education, respectively. Only around 11.0% had tertiary education (Figure 2). This outcome differs from the findings reported by Abolagba and Chukwu (2018), who asserted that the majority of processors in the study area had primary education. This discrepancy can be attributed to the early marriage of many individuals, which limits their educational opportunities. Additionally, educated youth often prioritize white-collar employment over remaining in their communities for agricultural pursuits.

Figure 3 illustrates that a significant portion of respondents had been engaged in the business for 6-8 years (47%), followed by 10-12 years (33%), and 2-4 years (20%). Furthermore, Figure 4 indicates that 91% of respondents were affiliated with a cooperative society, while the remaining 9% were not. According to the respondents, cooperative societies have shielded them from exploitation by middlemen and have contributed to the advancement of their enterprise.

In Figure 5, it is evident that all respondents were involved in preparatory processing operations such as sorting and grading of fish, while 87.0% participated in scaling, gutting, and sticking. Half (50%) of the women were engaged in cutting and sticking, and 55% adopted scaling. These

preparatory processing tasks, including washing, cutting, degutting, descaling, and salting, were predominantly carried out manually. The salting method was applied to selected fish species, while others, such as catfish and tilapia, were exempt due to their naturally high salt content. Cutting and sticking were commonly employed methods due to their effectiveness in facilitating heat penetration and rapid removal of water content from the fish

The findings depicted in Figure 6 outline the fish processing methods employed by the women in the study area. Approximately 30% of the respondents utilized air drying, 60% opted for hot smoking, and 10% used salting. According to George et al. (2018), both smoking and drying are commonly employed techniques for fish preservation, as they help extract moisture from the fish through heating, thereby inhibiting the growth of microorganisms and extending shelf life. However, these findings differ from those of Adeyeye et al. (2005), who noted that a majority of fish processors utilized full drums for drying their fish.Figure 7 presents the various processing equipment utilized by women in the fishing communities. Most of these equipment were locally fabricated, with some even constructed by the processors themselves. Notably, 15% of respondents used drum ovens, 25% employed iron sheets, 45% utilized clay ovens, and 40% employed kilns. This finding aligns with the observations made by Akinrotimi et al. (2018), who also noted the diversity of equipment used by fish processors in drying their fish.

The sources of energy utilized by women in smoking fish in the study area are detailed in Figure 8. The majority of respondents (85%) relied on firewood as their primary fuel source, while 13% used charcoal, and 2% adopted alternative sources such as gas and electricity. According to the respondents, fish dried using firewood exhibited superior quality, taste, flavor, and appearance. This finding corresponds with the research of Davies et al. (2018), which highlighted the prevalent use of firewood among fish processors, likely due to the abundance of wood and the high level of jerking activities in the region.

The findings presented in Figure 9 reveal that 89% of the respondents utilized a combination of baskets and paper for packaging their fish, while 60% employed rope to tie stacks of fish. Additionally, 45% used baskets alone, 45% utilized jute bags, 35% utilized paper, and 30% employed a combination of baskets and dry leaves. These results contrast with those reported by Acharya (2013), who stated that the majority of fish processors primarily utilized baskets for packaging fish to ensure protection and preservation. This assertion is supported by King (2011), who emphasized the prevalence of baskets as the primary container used by fish processors. The high percentage of processors using baskets can be attributed to their ease of transportation and lightweight nature. Additionally, respondents noted the importance of jute bags for protecting their fish against rainfall. The use of palm rope to tie stacks of fish was favored due to its accessibility, cost-effectiveness, ease of handling, and minimal risk of causing fish fragmentation, as per the perspectives of the processors.

The results of the probit regression analysis concerning the socio-economic factors influencing women's participation in fish processing and packaging are presented in Table 2. The model exhibits a good fit, with an R2 value of 0.65, and a highly significant likelihood ratio (LR) test ($P<0.01$), indicating that all explanatory variables collectively have a significant impact on the likelihood of women processors participating in fish processing and packaging.

Age (0.003***) was found to have a positive and significant effect on women's participation in fish processing and packaging. This effect is attributed to the accumulated knowledge and experience of older women, as noted by Toye and Francis (2018). This finding aligns with the research of Nkamleu and Manyong (2015), who observed that elderly individuals are more inclined to adopt new technologies due to their extensive processing experience.

Years of formal education (0.054**) also exhibited a positive and significant relationship with the decision to participate. Individuals who have received more formal education are more likely to engage in fish processing and packaging compared to those with lower levels of education. Education broadens one's perspectives and enhances rational decision-making. This result echoes the findings of Davies et al. (2018).Household size showed a positive and significant association with women's participation in fish processing and packaging. Women from larger households are more likely to be involved in these activities compared to those from smaller households. This is because larger households provide a greater labor force for processing and packaging tasks. The availability of adults in the household serves as an incentive for participation, as many fish processing operations require significant human effort. This finding is consistent with the research of Abolagba and Chukwu (2018) and corroborates the works of Davies and Davies (2009), Amsalu and De Graaff (2017), and Damsa and Yohanna (2017).

Income also displayed a positive and significant relationship with women's participation in fish processing and packaging. Processors with higher incomes are more likely to adopt innovations and bear associated risks. According to Tamale (2015), households with greater socio-economic status and more capital are better equipped to accept the risk of adopting new technologies. Access to credit was likewise found to be positively and significantly related to participation. Individuals with access to loans have a higher likelihood of participating compared to those without easy access to credit. However, it is worth noting that fisheries are often regarded as unfavorable by most financial institutions in Nigeria, as confirmed by Okonta and Ekelemu (2015).Table 2 also highlights that low literacy levels among women and lack of government assistance have consistently hindered fish processing and the preservation of fish products, particularly in accessing funds from formal sources. Consequently, women often rely on credit from friends and savings groups to purchase fish inputs such as nets, boats, fertilizers, and feed at subsidized rates. Other significant constraints faced by processors include price fluctuations, inconsistent government policies, and inadequate processing and packaging facilities. Bureaucratic obstacles like collateral requirements further exacerbate the situation, underscoring the importance of training women in financial management. Previous studies have shown that women are often better at managing funds than their male counterparts, as evidenced by their faster loan repayment rates, contrasting with the tendency of some male borrowers to divert loans to non-essential expenses, as noted by Nwabueze and Erie (2017).

Conclusion and Recommendations

The research delved into the involvement of women in fish processing and packaging within Ekiti State, Nigeria. The findings revealed active participation among women, employing traditional methods such as hot smoking, air drying, and salting. Notably, smoking emerged as the most prevalent method, adopted by 60% of processors. Various packaging techniques were utilized, with basket and paper being the most common (89%), followed by rope tying (60%), basket only (45%), jute bags (45%), paper (35%), and a combination of basket and dry leaves (30%).

The probit regression analysis examining the socio-economic factors influencing women's participation in fish processing and packaging indicated significant positive relationships with age, education, income, access to credit, and household size. However, marital status and fish processing experience showed positive associations but lacked statistical significance.

Drawing from the study's findings, several recommendations are proposed:

1. Support should be provided to women in forming cooperative societies, coupled with capacity-building initiatives focused on business management and enterprise development. Organizing training workshops would facilitate information sharing and enhance access.
2. Stakeholders in the fishery sector should address the constraints faced by women promptly, recognizing the urgency of the matter.
3. Government entities at all levels are urged to prioritize women in granting access to credit and loans for their businesses, thereby boosting productivity.
4. To ensure price stability and mitigate business losses or risks among women, the Federal government should consider implementing guaranteed minimum pricing for fish products.

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Table 1: Age Distribution of Women

Age (years)	Frequency	Percentage	mean
<35	31	34.4	
35-44	23	26.1	38.5
45-54	33	36.1	
>54	3	3.3	
Total	90	100.0	

Source: Field Survey, 2023

Table 2: Distribution of the respondents based on the constraints encountered

Constraints	VS	S	M	NS	MEAN	RANK
Poor access to capital	40	24	18	8	2.1	7th
The cost of processing the fish is high	50	26	14	0	2.4	2nd
No processing\ packaging facilities	42	38	8	2	2.3	3rd
Poor patronage (low demand)	26	12	6	46	1.2	8th
Inadequate transport means	48	23	12	7	2.3	3rd
No Government assistance	62	19	6	3	2.5	1st
Inconsistence/Inadequate Government policy	47	24	18	1	2.3	3rd
Frequent fluctuation in price	48	25	14	3	2.3	3rd
Low literacy level	56	21	11	2	2.5	1st

Source: Field Survey, 2023

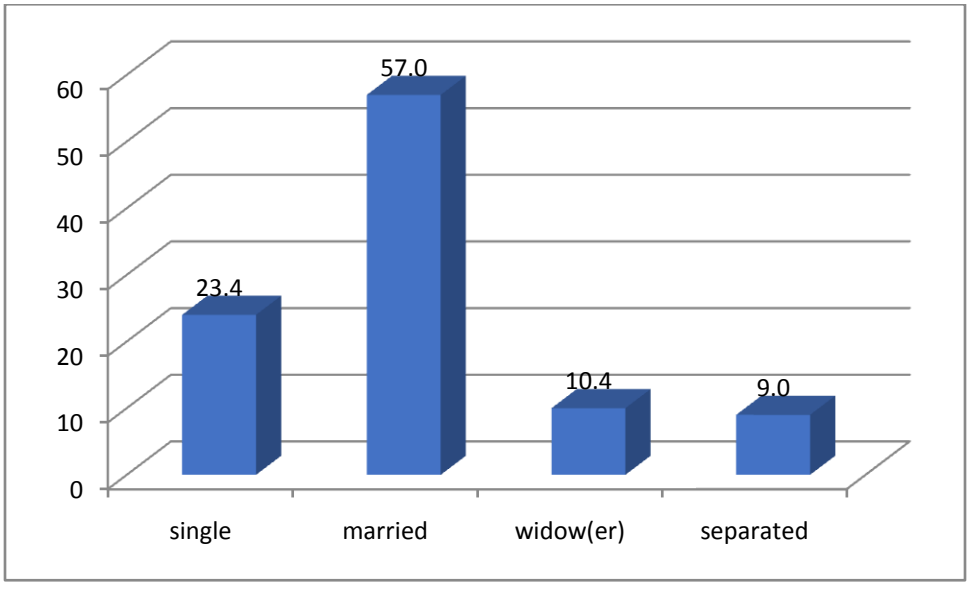

Figure 1: Marital Status of Women

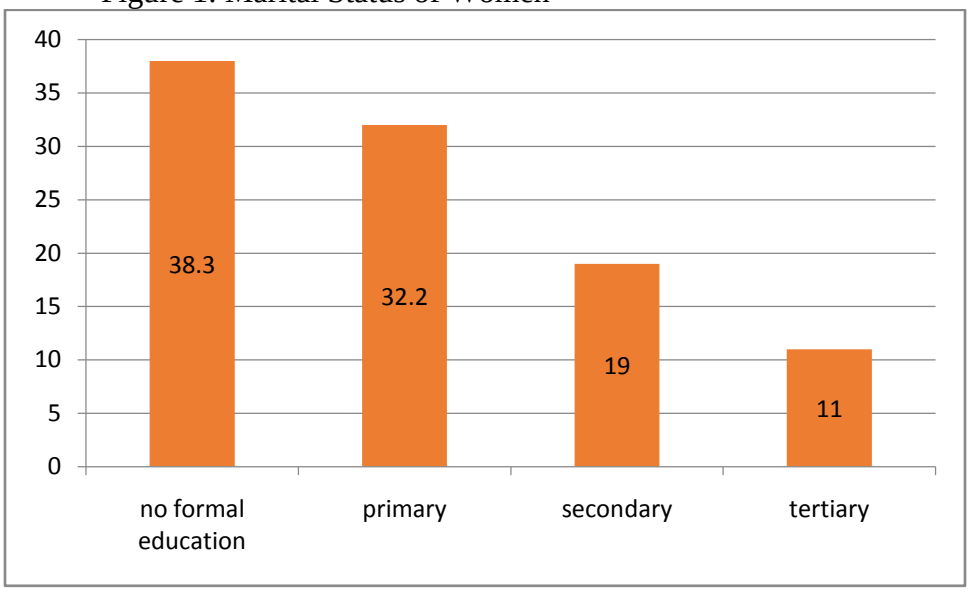

Figure 2: Marital Status of Women

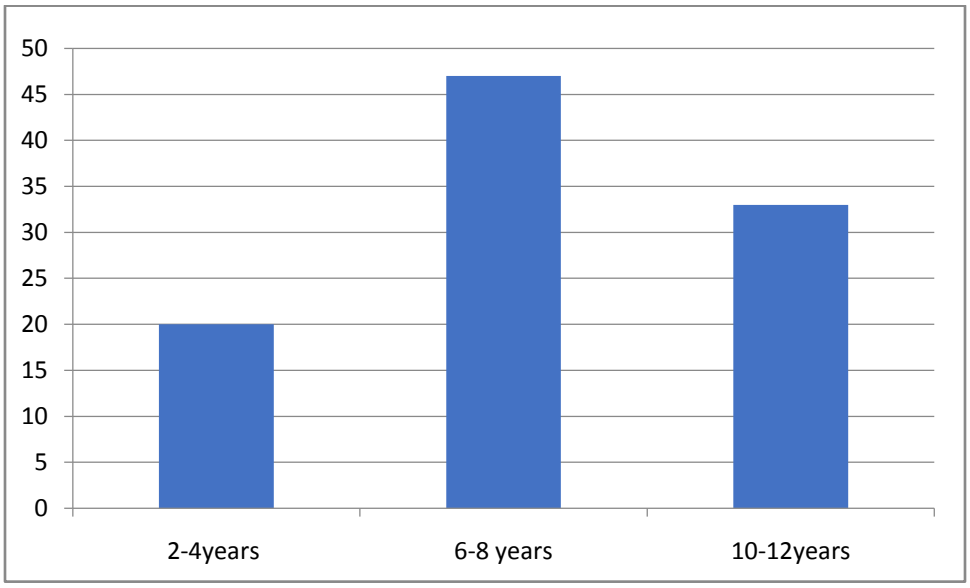

Figure 3: Farming Experience of Respondents

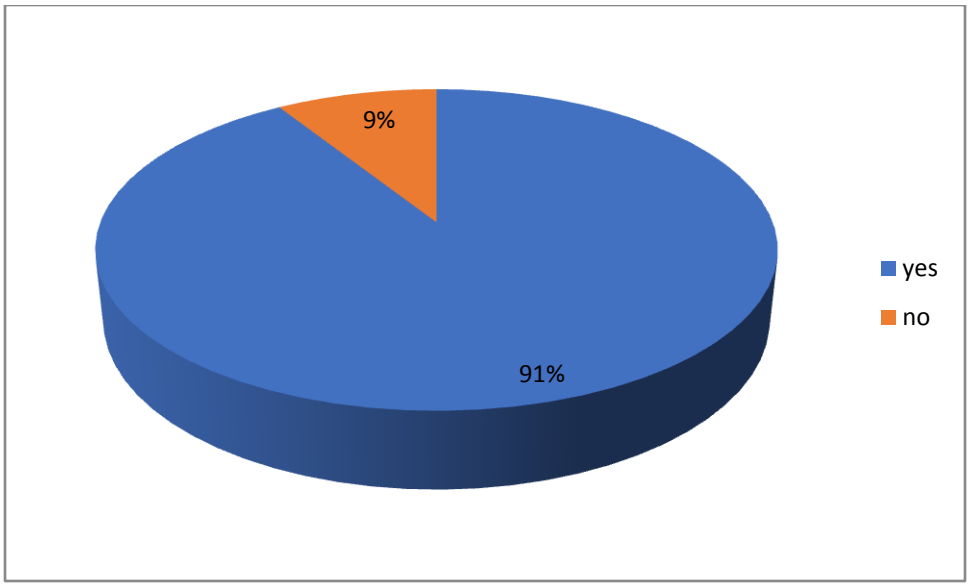

Figure 4: Cooperative Membership Status of Respondents

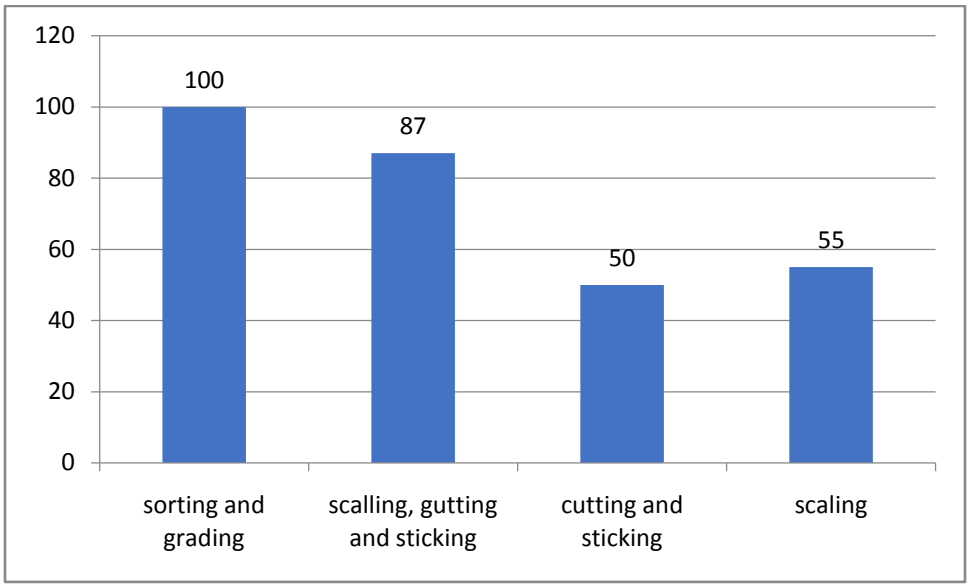

Figure 5: Preparatory Processing Operation Adopted by Women

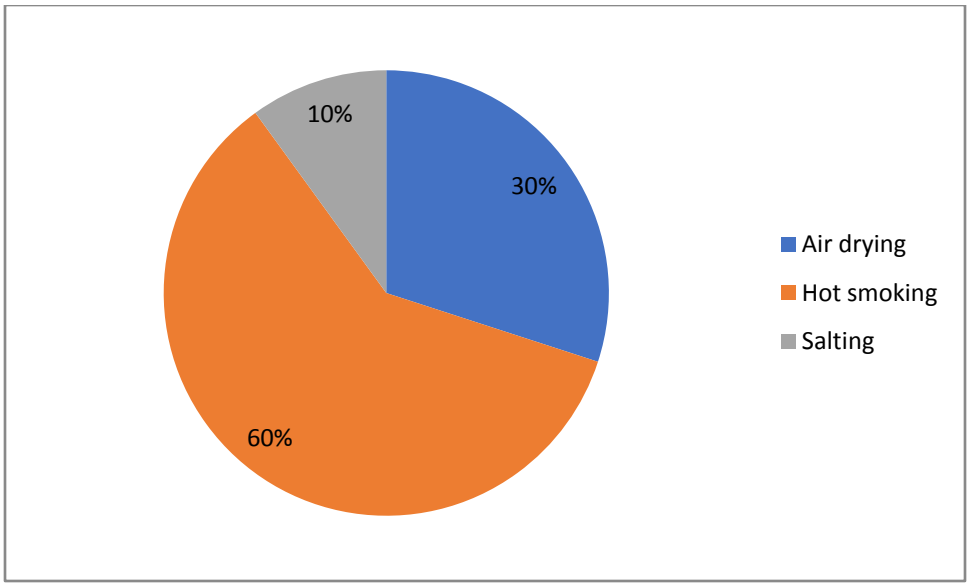

Figure 6: Fish Processing Methods Adopted by Women

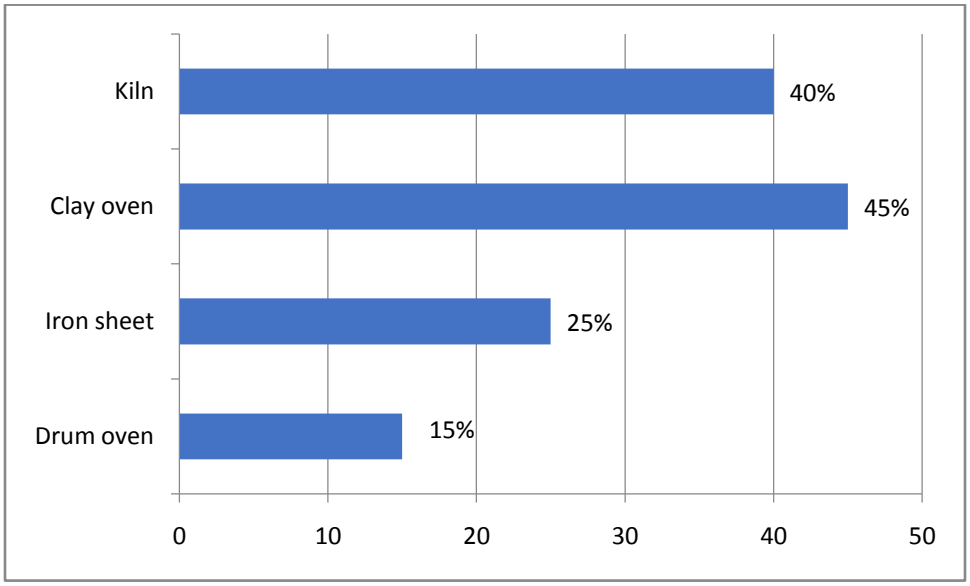

Figure 7: Fish Processing Equipment Used by Women

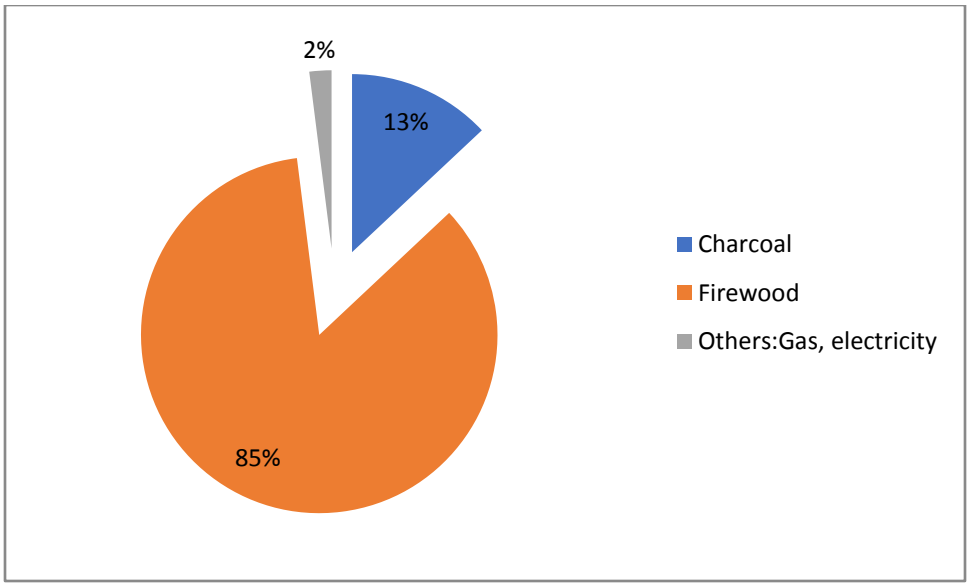

Figure 8: Sources of Energy for Processing

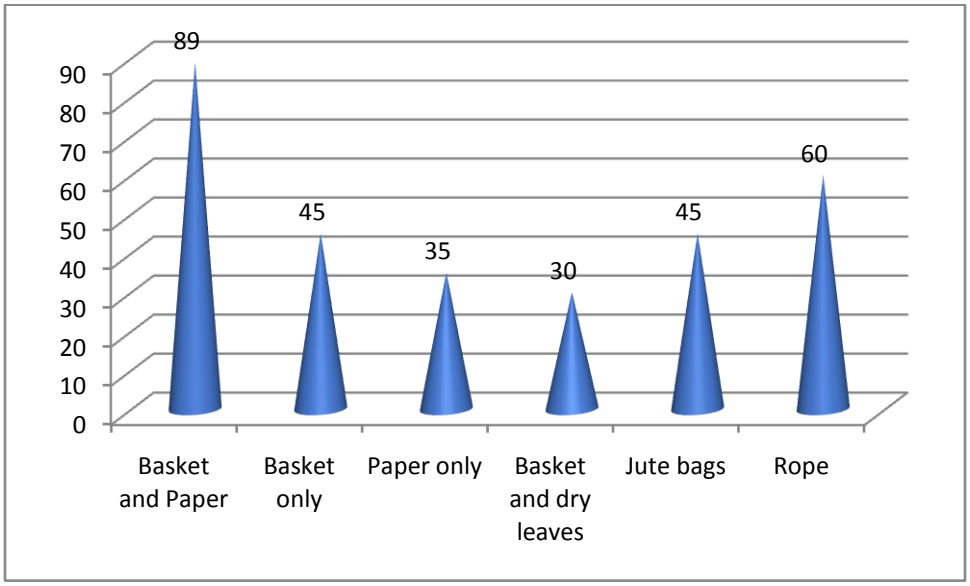

Figure 9: Packaging Methods and Materials

Table 3: Probit Regression Estimates of the socio-economic factors influencing Women participation in Fish Processing and Packaging

Variables	coef.	std. error	P-value
Constant	-4.52335	.7756	0.001
Age (X1)	-.02565	.00905	0.003***
Marital Status (X2)	.2516	.21105	0.343 (ns)

Education (X3)	.06255	.0212	0.054**
Household Size (X4)	.2239	.10335	0.223 (ns)
Fish Processing Experience (X5)	.0388	.4350	0.345 (ns)
Income (X6)	.000015	.000005	0.382 (ns)
Access to credit (X7)	.6188	.18155	0.063**
Access to market (X8)	.3716	0.17725	0.032**
No. of observations	90		
Log-likelihood	43.37		
R-Square	0.65		
Chi-Square2	19.811		
Prob>F	0.0007		

Source: Field Survey, 2023

** represent 5% level of significant

*** represents 1% level of significant