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DETERMINANTS OF SUSTAINABLE INCOME GENERATION AMONG FISH PROCESSORS IN ABEOKUTA METROPOLIS, OGUN STATE, NIGERIA

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ABSTRACT

This study was carried out to assess determinants of sustainable income generation among fish processors in Abeokuta Metropolis, Ogun State, Nigeria. Eighty fish processors were randomly selected from five communities. Data collected were analyzed using both descriptive and inferential statistics. The results showed that majority (71.3%) used traditional kiln for processing their fish while 23.7% fried fish in hot vegetable oil. Respondents sourced credit from personal savings (48.8%), cooperatives (27.5%), and friends and family (17.5%) for fish processing activities. Respondents generated an average monthly income (gross profit) of ₦28,000.00 from roasted fish, ₦14,000.00 from dried fish, and ₦20,800.00 from fried fish. However, inadequate processing equipment (95.0%) affected fish processing in the study area. Results of regression showed that personal characteristics of the respondents, processing methods and constraints have influence on income generated at $p < 0.05$ level of significance. The study therefore recommends that fish processors should adopt modern method of fish processing while subsidized equipment should be made available by the government to the fish processors in the study area.

Keywords: determinants, sustainable, income, fish processors, Abeokuta

INTRODUCTION

The fisheries sector is significant in providing means of livelihood for millions of people around the world. It represents a major food source, which is invaluable for the protein they provide and the industrial products they produce. Fish is economically, socially and culturally important as a global dietary aspect of sustainable food security. It is relatively cheaper than beef, chicken, mutton and turkey (Omoare *et al*., 2013). Economically fish provides an important source of food and income for both men and women especially many households in the developing world and fishing has an important social and cultural position in river -rine communities (Yemaye, 2010). Globally, women of fishing communities play central role in fisheries and also contribute to the up keep of their households and communities

(Nwabeze *et al*., 2009). It has been reported that about 35millon people worldwide are directly engaged in fishing (ICSF, 2009). Despite the abundant fisheries resources and the relatively high consumption of fish in Nigeria (Federal Department of Fisheries (FDF), 2008), its domestic output of 0.85 million metric tonnes in 2010 still falls short of demand of 3.02 million metric tonnes (Central Bank of Nigeria, 2007; FDF, 2010). A deficit of 2.17 million metric tonnes is required to meet the ever increasing demand for fish in Nigeria. This large deficit between the demand and supply of fish is augmented by massive importation of frozen fish which is a rigorous drain on the exchange earnings of the nation (Oyediran, 2017). Nigeria import about 0.7 million metric tonnes of fish valued at $500 million annually to augment the shortfall (Federal Ministry of Agriculture and Rural Development (FMARD), 2011). In Nigeria, fishery production industries can be either commercial fishing or artisanal fishing. The commercial and industrial fishing compose of coastal trawling and fauna fishing. The artisanal is divided into coastal canoe fishery, brackish water fishery, fresh water fishery and fish farming or aquaculture. Generally, artisanal productions from coastal and brackish, inter-rivers and lakes dominate the activities in Nigeria fishery industries (Ukpabio, 2010).

Fish is highly susceptible to deterioration without any preservation or processing measures (Okonta and Ekelemu 2005). Immediately fish dies a number of physiological and microbial deterioration sets in which invariably degrades the quality of fish (Eyo, 2001). It will become unfit for human consumption within about one day of capture, unless it is subjected to some form of processing or preservation. Even after the fish has been processed, particularly if traditional methods have been used, the fish is still subjected to many forms of losses and spoilage. Hence, fish being a highly perishable substance needs to be processed and transported to the consumer or final user in time to avoid post-harvest spoilage through better processing methods and efficient marketing. Thus, fish processing is a very crucial activity in the sub-sector in sustaining food and income for the self-employed, especially women. Aworh (2008) submits that fish processing contributes to employment generation for both the rural and urban self-employed in the informal sector. In Nigeria, a negligible proportion of the fish caught are marketed fresh, while greater quantity is preserved through ice, smoking and sun-drying by mainly women at artisanal level. The preservation of fish helps to increase utilization in the diet, reduced wastes of bulk catches and increased protein availability for the people (Ukpabuo, 2010). Agbabiaka *et al*. (2010) noted that iced fish processing had been variously and widely investigated and could be hampered especially by fish farmers residing in rural areas where there is non-existence or incessant power outrage coupled by high cost of fuel. Also, traditional smoking causes burns on the skin, catarrh, and eyes defects to the fish processors (Oyediran, 2017).

However, with increasing global market for fish and fishery product particularly in developing countries, where more than 40% animal protein consumption is through fish there is an urgent need for robust processing and marketing system (Amaefula *et al*., 2010). Availability of fish to the consumers at the right time, good form, and at the lowest possible cost is a necessity (Shamsuddoha, 2007). It becomes imperative to examine the factors that affect fish processing and mar-

keting to enhance better understanding of how best to make fish processing and marketing more effective, profitable and sustainable in the study area. In fisheries, women have traditionally been occupied in pre and post-harvest processing of fish products and marketing the catches to generate income for sustainable livelihood (Obetta *et al*., 2007). The potential of generating high income and profit by the women engaged in fish processing is however determined by series of factors ranging from socio-economic and production factors to degree of severity of challenges confronting the fish processing sector. Researches have not critically looked into these factors altogether as most studies often focused on one of the factors or the other. Several researches have been carried out on production factors and technical efficiency of inputs using scholastic approach in Nigeria (Ibrahim *et al*., 2006, Mohammed *et al*., 2011; Sulumbe *et al*., 2014). In addition Oyediran *et al*. (2016) have looked into constraints limiting the effective utilization of low-cost fish processing technologies among women in selected fishing communities of Lagos State, Nigeria. So, there is a research gap that this study intends to fill by looking at determinants of income generation from fish processing using holistic approach, which is, to consider both socio-economic factors, processing methods and constraints in a single model. Therefore, this study assessed determinants of sustainable income generation among fish processors in Abeokuta Metropolis, Ogun State, Nigeria.

Specific Objectives are to:

i. describe the personal characteristics of the fish processors in the study area
ii. identify sources of credit facilities to the fish processors in the study area
iii. assess prevailing processing methods used by the fish processors in the study area
iv. estimate the incomes generated by the fish processors in the study area
identify constraints to income generation through fish processing in the study area

Hypothesis of the study

H_{01}: Personal characteristics, fish processing methods and constraints have no significant influence on income generated by the fish processors.

MATERIALS AND METHOD

The study was carried out in Abeokuta metropolis of Ogun State, Nigeria. Abeokuta is the largest city and state capital of Ogun State in southwest Nigeria. It is situated on the east bank of the Ogun River, near a group of rocky outcrops in a wooded savanna 77 Kilometres North of Lagos by railway and 130 Kilometres by water (Hoiberg, 2010). Abeokuta metropolis has a total population of 593.143 people as at 2006 (NPC, 2006). Abeokuta metropolis has only two Local Government Areas namely Abeokuta South Local Government Area having its headquarters at Ake with 15 wards and Abeokuta North Local Government Area having its own headquarters at Akomoje with 17 wards. The agro-industrial potential of the Ogun State makes Abeokuta an important trading center for rice, maize, cassava, yam, banana, cocoa, palm-oil and palm kernel, and the largest producer and exporter of kola nuts in Nigeria. Cottage industries in Abeokuta include pottery at Ijaiye, tie and dye with locally grown indigo at Itoku, wood carving, blacksmiths, etc. The Ogun State also produces timber and rubber in abundance and is rich in mineral resources. Modern industrial produce in Ogun State include high quality beer and clay bricks, bicycle tyres, ceramic goods, carpets and clothing materials. There are fishing ac-

1, no formal education = 0)
X3= Experience in fish processing (years);
X4 = Marital status (married =1, not married = 0)
X5 = Fish processing methods (modern = 1, traditional = 0)
X6 = Constraints (constraint = 1, Not constraint = 0)
α = Constant; and
ei = error term

RESULTS AND DISCUSSION

Personal characteristics of respondents

The result in Table 1 showed that the mean age of the respondents was 31.8 years. More than half (57.5%) of the respondents were below 30 years while 25% were within 31 - 40 years. This implies that majority of the fish processors are economically active and therefore constitute a good labour force for fish processing. However, 17.5% of the respondents were above 40 years of age. This finding is in consonance with that of Wara *et al*. (2007) who stated that young women are involved in fish processing in Kainji Lake Basin, Niger State, Nigeria. Many (47.5%) of the respondents had primary education while 32.5% had secondary education. Only very few (7.5%) had tertiary education. This shows that the fish processors are literates. Meanwhile, 12.5% did not have any form of formal education. These findings disagree with report of Williams (2006) who depicted women from fisher households as illiterates. The mean household size was 4 people as majority (68.8%) of the respondents had 1-4 persons in their households while 20% had 5-8 people. Moreover, the result showed that 58.8% of the respondents had spent less than 5 years in fish processing. This may not be unconnected with the fact that the respondents are still very young and active. Few (26.2%) of the respondents had spent 6-10 years while 15% of the respondents have been in this fish processing for more than 11 years. The mean year of fish processing experience was 5.30 years. Also, majority (86.3%) of the respondents were married while 11.2% of the respondents were single mothers. High proportion (91.2%) of the respondents was Yorubas while 8.8% belonged to Igbo ethnics group.

Sources of credit facilities

Results in Figure 1 reveal that 48.8% of the respondents got their capital from personal savings while 27.5% sourced the capital from their co-operative groups and 17.5% from their friends and relatives. However, very few (6.2%) obtained loans from microfinance banks. This implies that fish processors do not utilize credit facilities from microfinance banks and this may not be unconnected with the collateral and other long procedures that constitute burden to accessing such facilities in the Nigeria banking system. Accessing bank loans is difficulty for rural women since most of them do not own or have access to land due to cultural limitation. These results corroborate the findings of Omoare *et al*. (2013) that cooperatives and personal savings constitute major source of credit to the rural women in fish marketing.

Fish processing methods

Fish processing activities lie in the domains of rural women in the coastal areas of Nigeria. Majority (71.3%) of the respondents used traditional kiln for processing their fish while 23.7% fried fish in hot vegetable oil and only very few (5.0%) sun dried their fish. In Nigeria, smoking, drying and salting are the commonest methods of fish preservation (Idris and Omojowo, 2013). Meanwhile, none (0.0%) of the respondents used modern

tivities in the coastal areas while women are involved in the processing of fish across the state. To further boost the growth and development of the agricultural sector and its major contributions to the Nigerian economy, institutional supports and programmes have been designed by the state government.

The study population was all women fish processors in Abeokuta metropolis, Ogun State, Nigeria. Two-stage sampling technique was used in the selection of respondents for this study. In the first stage, five communities were randomly selected from 32 wards in Abeokuta metropolis namely: Elega, Sodeke/Isale Ijeun, Adatan, Lafenwa, and Iberekodo. In the second stage, 16 fish processors were randomly selected from each of the selected communities through the association list of the fish processors, making a sample size of 80 respondents for this study. Data were collected with the use of interview guide which were administered face to face. Prior to the data collection the instrument was subjected to face validity through the effort of experts in the field of Agricultural Extension and Rural Development. Items found ambiguous were expunged. Test re-test was used to ascertain the reliability of the instrument at interval of two weeks with twenty fish processors who were not part of this study. Age was measured in years, household size as number of people under the same room, and fish processing experience as number of years spent in the fish processing activities. Educational level was categorized into four as no formal education, primary education and secondary education and tertiary education. Marital status was operationalized as single parent, married and widow while ethnicity was Yoruba and Igbo and measured at nominal level. Sources of capital were measured as Yes (2) or No (1) for personal savings, friends and family, cooperative/association and microfinance banks. Processing methods were also measured at nominal level for smoke kiln, electric oven, sun drying and frying. Gross income from processed fish was estimated as actual sales made per month in naira while sustainable income (gross profit) was estimated as average sales per month minus expenses for a period of 2 consecutive years (from 2015 upward). Constraints to fish processing were measured on a 3-point rating scale of very serious, serious and less serious with corresponding scores of 3, 2 and 1 respectively; mean was estimated and constraints were later ranked based on the mean distribution. Simple descriptive statistics such as percentage, mean, frequency distribution and standard deviation were used to analyze the objectives. Simple linear regression was used to test the hypothesis.

Analytical framework

This study used linear regression. It is in line with Oyediran *et al*. (2014) who used regression model in determinants of the melon production in Iseyin Local Government Area of Oyo State, Nigeria. Regression analysis is used to determine the various factors which cause variations of the dependent variable (Koutsoyiannis 2001 cited in Oyediran *et al*., 2014). It is assumed that Income (I), is a function of age, educational level, years of experience in fishing, marital status, fish processing methods and constraints. Thus the explicit model is:

Linear regression: $I = \alpha + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + b6X6 \ldots\ldots + bnXn + ei$

Where;

I = Income (₦)

X1 = Age (years);

X2 = educational level (formal education =

oven. This could be adduced to the fact that the women are peasant and could not afford the modern oven. According to Olaoye and Odebiyi, (2011) the role of women is predominant in the postharvest sector, and this starts from landing to processing and marketing.

Table 1: Distribution of respondents based on personal characteristics (n = 80)

Variables	Frequency	Percentage (%)	Mean	S.D.
Age				
Less than 30	46	57.5		
31-40	20	25.0	31.8	6.31
Above 40	14	17.5		
Educational status				
No formal education	10	12.5		
Primary education	38	47.5		
Secondary education	26	32.5		
Tertiary education	06	7.5		
Household size				
1-4	55	68.8	4.00	2.0
5-8	16	20.0		
More than 8	09	11.2		
Fish processing experience (yrs.)				
≤ 5	47	58.8	5.71	3.72
6-10	21	26.2		
>11	12	15.0		
Marital status				
Single parent	09	11.2		
Married	69	86.3		
Widow	02	2.5		
Ethnicity				
Yoruba	73	91.2		
Igbo	07	8.8		

Source: Field survey, 2017. S.D. – Standard Deviation

Income generated through processed fish

Result in Table 2 showed that the respondents generated an average income of ₦28,000.00, ₦14,000.00 and ₦20,800.00 per month from roasted fish, dried fish, and fried fish respectively. This indicates that substantial amount of money is generated per month by the fish processors despite the fact that they used traditional method. It means that fish processing in Nigeria is capable of generating higher income if it is well enhanced through modern technology. Ashaolu *et al*. (2006) reported that fish farming is profitable in homestead fish production in Abeokuta metropolis.

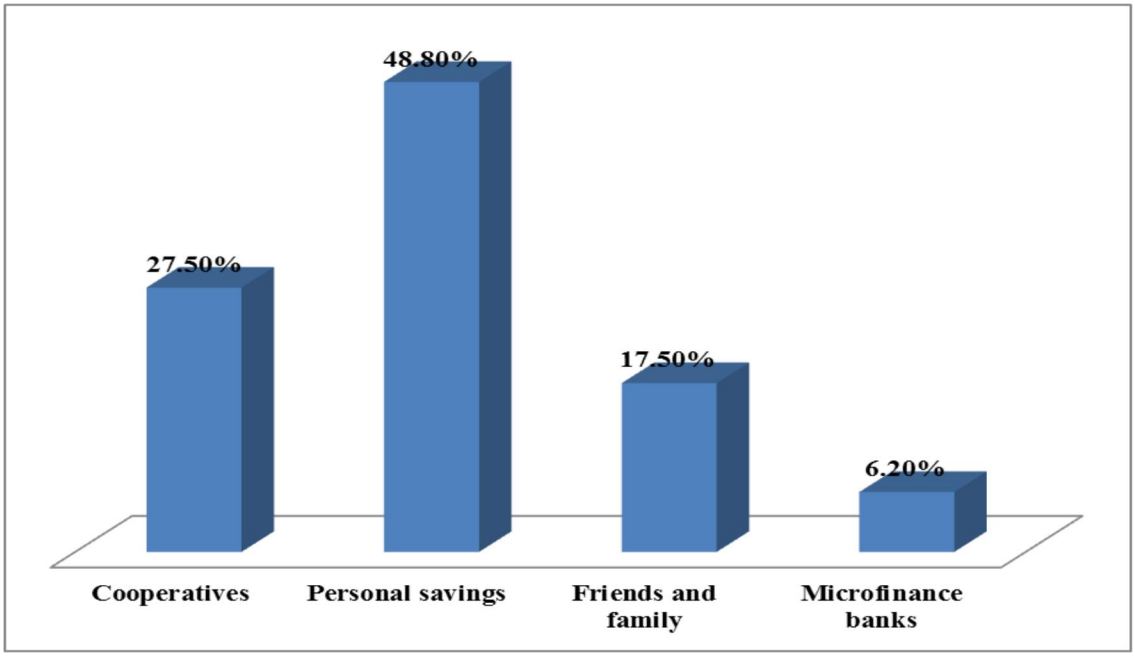

Figure 1: Distribution of respondents based on sources of credit facilities
Source: Field survey, 2017

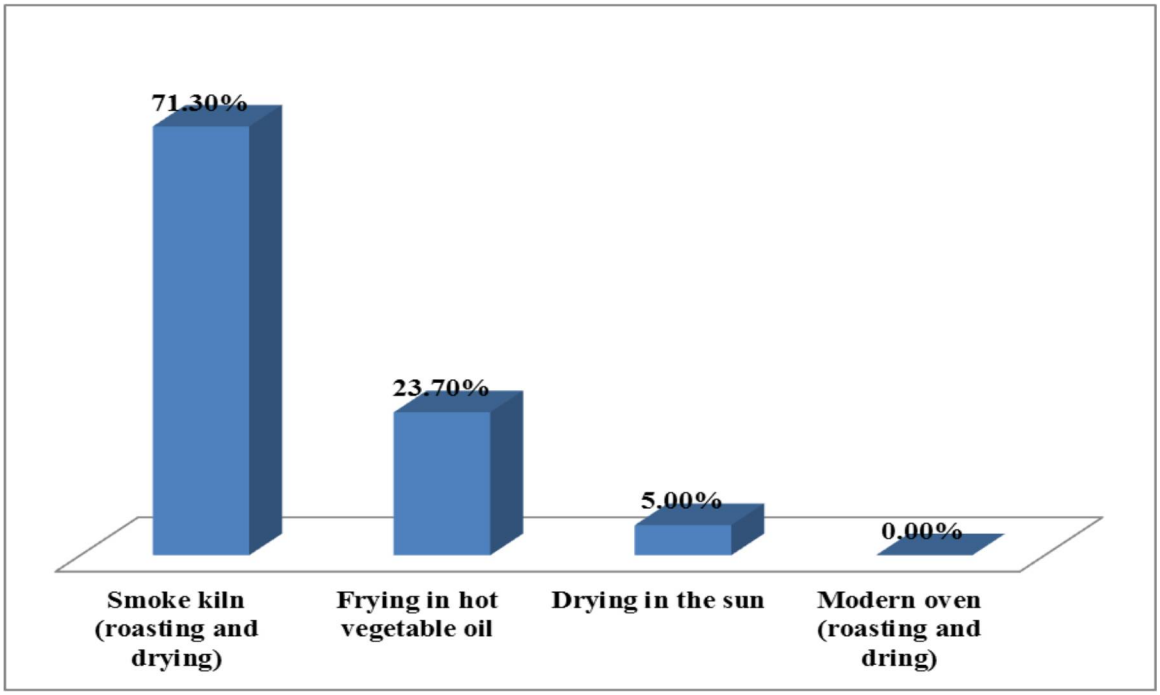

Figure 2: Distribution according to prevailing processing methods
Source: Field survey, 2017

Table 2: Distribution based on Income from processed fish (n = 80)

Processing method	Units	Unit price (₦/fish)	Average Income (₦/month)
Roasted fish	Whole fish	150 – 300	28,000.00
Dried fish	Whole fish	100 – 150	14,000.00
Fried fish	Whole fish/Pieces	50 – 100	20,800.00

Source: Field survey, 2017

Constraints to fish processing

The result in Table 3 showed that almost all of the respondents ranked inadequate processing equipment (1.96) as the most serious constraint confronting fish processing in the study area. Also, fish processing was impeded by non-availability of credit facility from banks (1.85). This finding corroborates the report of Oyediran (2013) that credit is an important input for growth and expansion of agricultural sector in Nigeria. Similarly, poor electricity supply (1.77), inadequate extension service support (1.70), and fuel scarcity (1.69) affected fish processing in the study area. In a report of FMARD (2011) lack of access to microcredit, insufficient investment and lack of information were identified among the key constraints in the aquaculture industry in Nigeria. Other major constraints to fish processing include lack of marketing linkages (1.62), high cost of fish (1.59), and inconsistency of government policies on fish (1.53). This implies that the potential of fish processing to generate appreciable and sustainable income for fish processors is being affected by highlighted constraints in the study area. These constraints will not only affect fish processing practice but it will as well discourage many women to go into fish processing which may lead to shortage in the fish supply for public consumption. Nigeria has a great potential of fish resources whose distribution and value chain needs to be strengthened and developed to bridge the gap between demand and supply of fish in Nigeria (Amao *et al.*, 2006).

Table 3: Distribution based on constraints to fish processing (n = 80)

Constraints	Mean	Rank
Inadequate processing equipment	1.96	1st
Non-availability of credit facility from banks	1.85	2nd
Poor electricity supply	1.77	3rd
Inadequate extension service support	1.70	4th
Fuel scarcity	1.69	5th
Lack of marketing linkages	1.62	6th
High cost of fish	1.59	7th
Inconsistency of government policies on fish	1.53	8th

Source: Field survey, 2017. *Multiple responses indicated

H_{01}: Personal characteristics, fish processing methods and constraints have no significant influence on income generated by the fish processors.

The R-Square showed that 97.50% of the variation in income generated in the sample was caused by the explanatory variables used in the regression model. The significant F-statistic affirmed that the null hypothesis (H_{01}) in the sample remained rejected at 1% level of significance. That is, alternate hypothesis (Ha_1) that, "Personal characteristics of the respondents, processing methods and constraints have influence on income generated" is accepted. The coefficient of age was negative and significant at 5% level of significance (t = -2.758, p = 0.007). It implies that the negative sign of age does not translate to higher level of income generation in fish processing but rather to lower income. This means that the older the women the lower their income which can be due to aging factors like weakness, inactive, lesser quantity of fish processed. That is, for every 1% increase in age the income decreases by 27.6%. Marital status was also significant at 1% level of significance and negatively signed (t = -5.278, p = 0.000). It means that marital status has an inverse relationship with the income generated. That is, marriage put some level of responsibilities on individuals involved in it which drain substantive proportion of income generated or in form of household consumption which cannot be accounted for. However, education was positive and significant at 5% level of significance (t = 2.414, p = 0.018). This shows that the more the fish processors have access to formal education the better their fish processing methods and income would be. It implies that 1% increase in access to education provides 24.1% increase in income generated. In addition, fish processing methods was positive and significant at 1% level of significance (t = 19.026, p = 0.000). Fish processors that adopt modern methods in fish processing are more likely to generate higher income than their counterparts that use traditional methods. The implication is that every 1% increase in adoption of modern methods would result in 190% higher in income generated. Similarly, constraints was negatively significant at 5% level of significance (t = -3.046, p = 0.003). It can be inferred that the more severe the constraints the lesser the income that would be generated by the fish processors. That is, 1% increment in constraints will cause 30.5% reduction in income. Meanwhile, household size (t = 1.028) and experience in fish processing (t = 0.926) were not significant to the income generated at $p < 0.05$ level of significance. It indicates that experience in fish processing, marital status have no influence on the income generated. Therefore, personal characteristics of the respondents, processing methods and constraints are the determinants of income generation through fish processing in the study area. The null hypothesis is rejected.

Table 4: Personal characteristics, fish processing methods and constraints have no significant influence on income generated by the fish processors

Variables	Unstandardized Coefficient		Standardized Coefficient	t	Significance
	β	Std. Error	Beta		
Constant	333.043	33.734		9.873	0.000
Age	-4.209	1.526	-0.162	-2.758	0.007**
Education	27.314	11.313	0.072	2.414	0.018**
Household size	2.129	2.070	0.044	1.028	0.307
Experience	3.716	4.015	0.044	0.926	0.358
Marital status	-87.114	16.505	-0.193	-5.278	0.000***
Processing methods	432.314	22.722	0.732	19.026	0.000***
Constraints	-34.821	11.431	-0.095	-3.046	0.003**
F – statistics	230.046				
R2	97.50				
Adjusted R2	95.30				
Prob(F-Statistics)	0.000				

Source: Field survey, 2017
***= Significant at 1% level, **= Significant at 5% level

CONCLUSION

This study concluded that fish processors were young, economically active, and experienced. Sources of credits to the fish processors were personal savings and cooperatives. The use of traditional kiln and frying were the predominant fish processing methods in the study area. However, fish processing were affected by inadequate processing equipment, non-availability of credit facility from banks, poor electricity supply, and inadequate extension service support. The determinants of sustainable income generation from fish processing are personal characteristics of the respondents, processing methods and constraints.

RECOMMENDATION

Based on the findings of this study it is hereby recommended that:

1. fish processors should adopt modern method of fish processing;
2. subsidized equipment should be made available by the government;
3. the women should organized a group contribution for the purpose of buying joint modern processing equipment which will be rotated among the fish processors;
4. agricultural extension service should be proactive in organizing training and workshops for the fish processors on better handling and processing practices in order to enhance fish quality and higher income for the fish processors in the study area;
5. solar energy should be provided by the stakeholders in the fisheries sectors to reduce the burden of epileptic power supply and to boost the activities of the women fish processors in the study area.

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