

# Correlates of Revenue among Small Scale Women Fish Processors in Coastal Ghana

Rosemond Boohene<sup>1</sup> & James Atta Peprah<sup>2</sup>

<sup>1</sup> Department of Management Studies, School of Business, University of Cape Coast, Cape Coast, Ghana

<sup>2</sup> Department of Economics, Faculty of Social Sciences, University of Cape Coast, Cape Coast, Ghana

Correspondence: Rosemond Boohene, Department of Management Studies, School of Business, University of Cape Coast, Cape Coast, Ghana. E-mail: rboohene@yahoo.com

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## Abstract

The objective of this study was to analyse the factors that influence revenue generation among women in fish processing in coastal Ghana. Primary data was collected using a well structured questionnaire administered on 746 women who process fish in selected communities in Central, Greater Accra and Western Regions. Using weekly revenue as the outcome variable, the multinomial logit regression (MLR) and ordinary least squares (OLS) were used to predict and estimate the correlates of revenue generated from fish processing. The results show that higher levels of savings are likely to influence higher levels of revenue. Fish smoking and frying produces more revenue with reference to drying and salting. Furthermore, hours spent in business are also likely to increase revenue relative to low levels of revenue. The findings also indicate that at all levels of revenue, experience matters. Moreover, formal account ownership does not significantly influence revenue at all levels. The derived policy implications are to design strategies that will increase women potential in revenue generation in the informal sector.

**Keywords:** fish processing, Ghana, revenue, small scale, women fish processors, savings

## 1. Introduction

The small scale business sector is recognized as one of the means through which accelerated economic growth and rapid industrialization can be achieved (Harris et al., 2006; Sauser, 2005). Furthermore, small scale businesses have been recognised as feeder services to large-scale industries (Fabayo, 2009). Small scale businesses are found in almost all the sectors of the Ghanaian economy, ranging from service, manufacturing to agriculture. Agriculture in Ghana is the back-bone of the economy as it ensures the sustainability of the food industry. One of the major problems in the Ghanaian agricultural sector is post harvest losses of which the fishing sector is no exception. Thus, fish processing is a very crucial activity in the sub-sector in sustaining food and income for the self-employed, especially women.

The fish industry in Ghana consists of foreign-backed companies, government-owned or sponsored companies and micro, small and medium-sized enterprises owned by indigenous operators, majority of who are women. Men are the main producers of agricultural raw materials, including fresh aquatic products such as fish, shrimps, oyster, and farm produce and staples whereas women mostly engage in their processing. The role of women in agro-processing on small scale cannot be underestimated. The Ghana Living Standard Survey report 2008 (GSS, 2008) indicates that women have a greater share of responsibility among households that process agricultural produce, irrespective of whether they live in urban or rural areas. This underscores the important role of women in the fish processing sub-sector. These activities are one of the surest ways of empowering women and also a means of livelihood. Number three of the Millennium Development Goals (MDGs), which seeks to promote gender equality and empower women, has as one of its indicators for monitoring progress the share of women in the non-agricultural sector (World Bank, 2006). Fish processing which is a major economic activity of coastal women in Ghana has the potency of increasing women's share (wage) in self-employment and also guarantee them secured revenue, thus achieving the latter. Unfortunately, revenue from fish processing in Ghana has not been given much impetus even though the activity means a lot to the Ghanaian community.

Aworh (2008) submits that small scale processing contributes to employment generation for both the rural and urban self-employed in the informal sector. According to him, small scale food processing reduces rural-urban migration because it offers secured source of revenue. Income is a significant variable in determining the standard of living of people. It is also an important parameter in determining savings behaviour as well as the ability to re-invest in one's business. When incomes are low or irregular the individual thinks more about family survival and less about savings and eventual re-investment. Consequently, the business begins to suffer and the vicious cycle of poverty becomes difficult to break. Thus, the ability of women in small scale fish processing to generate income for the household will enable them break the vicious cycle of poverty which is prevalent in most fishing communities.

In Ghana, most women engage in non-farm income generating activities because they are not engaged in formal wage employment. For example, the report of the fifth round of the Ghana Living Standard Survey (GLSS) shows that approximately 3.2 million, representing about 46.4% of all households in Ghana, operate non-farm enterprises of which 72% are women (Ghana Statistical Service, 2008). Thus, improving the revenue generation capacity of women in the informal sector is likely to have a greater growth potential and impact on productivity in the economy of Ghana. Again, the GLSS 4 reports that the level of ownership of assets by women is much higher in urban areas than it is in rural areas. It is higher in Accra than in other urban areas, and higher in the rural coastal and rural forest than it is in the rural savannah. It is, therefore, obvious that revenue generated from informal activities will contribute to savings and investment capacity of those found in the sector.

The fishery sector in Ghana principally encompasses marine fishery, inland (fresh water) fishery and aquaculture fishery as well as related activities in fish preservation, storage, marketing and distribution. Marine fish serves as a source of employment for those who live along the coast. Inland fishing in Ghana is basically for home consumption in most communities. Aquaculture fish is cultivated on a small scale in Ghana thus making marine fishing one of the most important sources of income generation activity in the country. Due to the important nature of fish and fish products, demand for fish consumption in Ghana continues to increase against supply. The demand for fish products is projected to increase by 14.2% annually from 2007 to 2023 (GIPC, 2008). In the same direction, it is projected that a negative gap between demand and supply of fish will continue to exist from 2007 to 2023 (Table 1). This calls for policies that will increase fish production and preservation to meet the dietary needs of the Ghanaian populace.

Table 1. Projected fish supply and demand for Ghana, 2007 to 2023

Year	Supply in tonnes	Demand in tonnes
2007	511,836	913,992
2012	584,767	1,044,226
2017	668,090	1,193,017
2022	763,286	1,363,010
2023	783,894	1,399,811

GIPC, 2008.

Fisheries constitute an important sector in national economic development. The sector is estimated to contribute 3 percent of the total GDP and 5 percent of the GDP in agriculture. About 10 percent of the country's population is engaged in various aspects of the fishing industry (GIPC, 2008). The fishing sector is also a major source of foreign exchange in Ghana. For example in January-December 2007, total export value from the fisheries sector amounted to US\$ 86,535,520 (GIPC, 2008) (Table 2). As regards foreign exchange earnings, fish exports have remained among the top three most important non-traditional exports (FAO, 2004). Most of this fish catch is from the marine source, making marine fishing a very important economic activity in Ghana.

Table 2. Export of fish and seafood, January-December, 2007

Product	Weight (kgs)	Value (US\$)
Fresh or chilled Tuna	45,118,628	52,753,454 (61.0%)
Fresh or chilled fish	18,169,337	27,965,401 (32.0%)
Cuttle fish and Squid	528,897	1,791,226 (2.1%)
Octopus	367,564	1,729,607 (2.0%)
Shrimps and prawns	201,053	1,078,676 (1.9%)
Frozen or fresh lobster	101,708	614,904 (0.01%)
Crabs	183,910	479,942†
Dried, smoked and salted fish	223,231	111,965†
Snails	6,426	9,345†
Oysters	7,000	97†
Live ornamental fish	232	900†
Total	64,907,985	86,535,520

GIPC, 2008. † Insignificant.

Even though several studies have discussed the role of women in economic growth and development, a gap exists on the specific economic contribution of women fish processors, and the factors that affect their revenue generation from fish processing in Ghana. The main thrust of this paper, therefore, was to analyze the correlates of revenue that women generate from fish processing. The contribution of this paper is its newness in the literature, since no such study has been conducted elsewhere in Ghana. In this regard, this paper will contribute to thought provoking issues in the literature on women in small scale businesses.

The rest of the paper is organized into five sections. Section two reviews the literature on the income, saving and investment, and their relationships in the fisheries sector. The third section explains the methodology for the study, whilst the fourth and fifth sections discuss the results and findings, and conclusions and recommendations respectively.

## 2. Literature Review

### 2.1 Income, Savings and Productivity

Savings in its simplest form is defined as the difference between disposable income and consumption, according to the Keynesian economics. At the macro level, a country's level of savings is influenced by its level of national income, interest rate, government policies and availability of financial institutions among others. At micro level household expenditure goes to other households as revenue and for that matter what is spent is received as income (revenue). Savings create wealth and accumulate capital for further investment. The link is thus direct: higher income levels, higher savings and higher productivity all other things being equal. Savings can be in the form of cash deposits at financial institutions or real assets kept by savers (Levy et al., 2008). In standard neoclassical theories savings-investment is the engine of growth. In these models there are no capital market frictions and thus financial intermediation is not explicitly modelled. However, these models assume that savings translate directly to investment and thus one could argue that finance affects productivity primarily through capital deepening (investment). In this regard, women's ability to save more is a necessary condition for increased productivity.

For example, buffer stock of savings is critical to enable risk-averse households facing liquidity constraints to cope with unexpected shocks. A save-less household that is constrained in its access to credit may not be able to survive a negative shock. In practice, many such households do survive, but at the cost of adopting an extremely risk averse coping strategies. Income levels in most developing countries are less than that of advanced countries. In most countries savings for investment is higher among men than women. For example according to the GLSS 5 report (GSS, 2008) men savings for start-up capital is higher than women in all sectors of the industrial classification. To illustrate, self-financing for men in the manufacturing sector is 61.3% as compared to women 56.0%; in the trading sector men self-financing is 63.7% as compared to women 60.5% and in all other sectors

men self-financing is 62.0% as compared with women 61.7% (GSS, 2008). There is, therefore, the need to promote savings among women for self-financing.

Women have the potential for generating income and savings for productive resources. Walker (2002) provides an insight into this assertion by recording that wealthy fish traders were able to acquire spare parts of outboard motors and fishing gears and, therefore, were able to cause a shortage of such items on the market. Hernæs (1991), Odotei (1991) and Overå (1992) all acknowledge the important role played by women fish traders by way of extending credit to the fishermen. Such credit that goes into investment in canoes, outboard motors and fishing nets is a clear indication of women ability to generate income, transform the income into savings, investment and, finally, into productive ventures for further production. Savings, investment and productivity levels all depend on current levels of income which is derived from sales revenue. Thus, the ability to generate more revenue under existing economic conditions is very important.

## *2.2 The Role of Women in Processing*

Fish processing is basically non-farm activity. Some writers contend that non-farm income contribute to income inequality. Even though non-farm earnings contribute to rising inequality as contended by some researchers, the lower income groups also benefit due to strong overall growth from such earnings. The inequality-inducing effect is driven by self-employment income; wage income, on the other hand, reduces inequality. The tendency of non-farm income to contribute to inequality is greater among female-headed households for whom self-employment is important and non-farm opportunities more constrained (Canagarajah et al., 2002). Determinants of non-farm income are estimated and appear to be strongly related to household characteristics such as location, education, age, experience, household size and distance to market. Non-farm activity also contributes in sustaining the growing population.

In Ghana, the high population growth of about 3% which far exceeds food production of about 2% has made the role of women in fish processing more important in ensuring that people in the country are not underfed and do not suffer from malnutrition. The two main sources of quality protein available in Ghana and many African countries are livestock and fish (Okorley et al., n.d) The productivity of the livestock industry in Ghana is woefully inadequate. This is attributed to inconsistent government policies concerning the industry, high cost and sometimes unavailability of livestock feed, poor management practices, and disease outbreak among others. In Ghana, like in many African countries, the popular option is fish. The general consensus is that consumption of fish products reduces the risk of some illnesses and diseases such as cancer, hypertension and kidney-related infections. This has led to many people shifting to fish consumption as against meat and meat products. Fish is relatively available throughout the year and its varying cost falls within the economic means of most family budgets. In the industrial sector, fish products are used for manufacturing medicinal products such as cod liver oil. Fish is also used to formulate livestock and poultry feed in the agro-processing industry. At the household level marine fishing provides a means of livelihood for most families. This has thus made traditional fish processing a viable small scale economic activity along the coastal zones.

A study by Ogunbile, Olukosi and Ahmed (1991) discovered that about 90% of women are engaged in different forms of income earning activities, including food processing, trading, weaving and other small scale activities. This confirms that with changes in economic situation and in the direction of opportunities, women are less able to meet their responsibilities through subsistence alone. For some fish processing households, immediate availability of food depends on fish catches, and on cash earned through fish sales enabling food purchase in local markets. In most cases supplementary livelihood activities that provide cash and in-kind outputs also depend on the success of the main household activity (fish processing).

Women engage in fish processing for several reasons. According to Ibrahim, Kigbu and Mohammed (2010), in Nigeria women engage in fish processing in order to pay their wards school fees, procure household assets, generate savings, and purchase goods and services. Britwum (n.d) has documented that women fish processors perform an important food security function, because poor food preservation and storage facilities generally deplete food harvests. Not only do women perform the latter function, but also they are responsible for finding markets outside their locality.

In the formal sector, men earn more than women. The reasons are numerous. For example, men usually engage in laborious work than women, thus offering them higher wages or revenue than women (13.7% for men and 5.3% for women) (GSS, 2008). Men also earn more than women because they have attained higher education than women and as a result are paid higher. In simple terms, those who engage in more laborious work are supposed to earn higher than those who do not, but this might not always be the case. The level of education is also supposed to affect one's ability to generate revenue. For example Ilmakunnas and Maliranta (2005) find that

higher education has, in general, a positive influence on productivity and hence higher revenue. Bank account ownership is a requisite for assessing bank loans for investment, thus affecting productivity and revenue. Fletschner (2009) reports that in Paraguay women in farm households typically receive loans only from credit co-operatives as opposed to the state banks because probably they do not own bank accounts. Thus, women are more likely to be credit-constrained than men under equivalent socio-economic conditions when they do not have banks accounts.

The ability to produce more or otherwise is affected by age. Thus, even though women perform tremendous role in fish processing, their productivity may be affected by age advancement. In general, theory suggests that productivity tend to follow an inverted U-shaped profile, where significant decreases take place from around 50 years of age (Skirbekk, 2003). It stands to argue that women ability to generate revenue is likely to be constrained by age advancement.

### 3. Methodology

#### 3.1 Population, Sample and Data

In Ghana, there are four regions that are situated along the Gulf of Guinea. These regions include Western, Central, Greater Accra and Volta. The study focused on the first three regions for the sake of proximity. Population of women fish processors in these regions is unknown because most data collected do not focus on women fish processing activities. Fish processing is one of the major occupations for women living along the coasts of Ghana. The study, therefore, concentrated on a sample of 746 of women fish processors using the snowball sampling technique. This technique seemed appropriate because fish processors know themselves and could help the field assistants locate their colleagues without any difficulty. Women fish processors include those who smoke, fry or salt fresh fish not for direct consumption in their homes but for sale on the market. In this study the focus was on marine fish processing, since the sample was drawn from women living along the coast. Again for the sake of ensuring that similar characteristics are brought to bear, the study did not include inland fishing and aquaculture fish producers. Another reason for concentrating on marine fishing is that in Ghana marine fish products constitute more than 50% of fish harvested and processed in Ghana. This is because it is estimated that in 2003 the total marine fish catch was 315,756 tons, and the freshwater catch was about 75,938 tons (<http://www.encyclopedia.com/topic/Ghana.aspx>).

Data for the study was collected in March 2011 using structured questionnaires after the instruments have been pre-tested in Duakor (near the University of Cape Coast), a small fishing community in the Cape Coast Metropolis of Central Region of Ghana. The pre-testing became relevant in order to ensure validity of the instruments and reliability of results. In rigorous econometric analysis, it is important to make data checks to ensure that the data is free from inconsistencies. For example, the data was tested for normality and multicollinearity. The null hypothesis is that there is no normality and multicollinearity. The test-statistics indicate that the data is normally distributed and there is no multicollinearity. The robustness of the estimates correct for any heteroscedasticity in the cross-sectional data. The study attempts to test the hypothesis that there is no relationship between revenue from fish processing and age, age squared, education, hours spent in business, bank account ownership, saving amount, and type of fish processing of respondents.

#### 3.2 Analytical Framework

The study used the multinomial logit (ML) and the ordinary least squares (OLS) estimation techniques to examine the likely impacts of the covariates on the outcome variable. Multinomial logit models are used to model relationships between a polytomous response variable and a set of regressors. The term “multinomial logit model” includes, in a broad sense, a variety of models. Multinomial logit models are generalization of logit models for binary responses, and fitting the generalized logit model requires simultaneously satisfying the  $j-1$  equations that specify the model.

In the multinomial logit regression, given a vector of independent variables ( $X$ ), a set of coefficients  $\hat{\alpha}_1$ ,  $\hat{\alpha}_2$  and  $\hat{\alpha}_3$ , which correspond to each outcome category ( $Y$ ), is estimated as follows:

$$\log\left(\frac{\pi_{ij}}{\pi_{i1}}\right) = X_i \beta_j \text{ for } j = 2, i = 1 \dots N \quad (1)$$

Where  $\pi_{ij}$  is  $P(Y = j | X)$  and  $\pi_{i1}$  is  $P(Y = 1 | X)$  (2)

The outcome variables weekly revenue are categorised into four-point scale from one (lowest level revenue) to four (highest revenue range):

$$Y_i = \begin{cases} 1 = \text{up to GHS 250} \\ 2 = \text{GHS 251-GHS 500} \\ 3 = \text{GHS 501-GHS 750} \\ 4 = \text{More than GHS 750} \end{cases}$$

The probabilities or the likelihood of earning a certain amount of weekly revenue is of the form:

$$\pi_{ij} = \frac{\exp X_i \beta_j}{\sum_{j=1}^J \exp(X_i \beta_j)} \quad (3)$$

The empirical model that was estimated is of the form:

$$\ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 \text{Account} + \beta_2 \text{Saveamt} + \beta_3 \text{Hrspent} + \beta_4 \text{YrsBus} + \beta_5 \text{Age} + \beta_6 \text{Educ} + \beta_7 \text{Age}^2 + u \quad (4)$$

Where:

Account = Ownership of formal account (Yes=1, No=0)

Saveamt = Amount of savings (in Ghana cedis (GHS))

Hrspent = Hours spent in business in a day

YrsBus = Years in business (measuring experience)

Age = Age of respondents

Age<sup>2</sup> = the square of respondents' age

Educ = education of respondents (years of schooling)

Type of fish processing (smoking=1, frying=2, salting and drying=3)

U = the error term (captures random effects)

The ordinary least squares (OLS) was also employed to estimate the impact of the covariates on the outcome (revenue) in Ghana cedis (GHC). The main reason for using the OLS is that the dependent variable, revenue, is a continuous variable. Again the use of the OLS will enable us compare the result of different amounts of revenues with the categories of revenue on the four-scale point. In modelling the OLS, assume a two-input linear production function of the form:

$$Q = f(K, L) \quad (5)$$

Where K is units of capital and L is labour inputs. Assuming revenue is the output of women processors and the covariates are the input, then we can write a similar revenue generation function like the linear production function as:

$$\text{Revenue} = f(\text{women processors' characteristics}) \quad (6)$$

Thus empirically, we can estimate Equation (7) using OLS:

$$\text{Revenue} = \beta_0 + \beta_1 \text{Account} + \beta_2 \text{Saveamt} + \beta_3 \text{Hrspent} + \beta_4 \text{YrsBus} + \beta_5 \text{Age} + \beta_6 \text{Educ} + \beta_7 \text{Age}^2 + u \quad (7)$$

Where the variables are as before and  $u, \beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$  are the parameters of interest.

## 4. Results and Discussion

### 4.1 Descriptive Statistics

Tables 3 and 4 give the summary of age and marital status of women fish processors in the study areas.

Table 3. Age and marital status of WFP

Age in years	Marital status					Total
	Single	Married	Divorced	Widow	Separated	
18-30	23	80	7	3	5	115
31-40	20	228	19	11	13	291
41-50	9	144	29	32	5	219
51 or more	6	63	19	46	6	140
<b>Total</b>	<b>58</b>	<b>515</b>	<b>74</b>	<b>92</b>	<b>29</b>	<b>768</b>

Source: Field survey, 2010.

Table 4. WFP who live with or without their husbands

Living with husband	single	Married	divorced	widow	separated	Total
Yes	0	463	8	0	1	500
No	36	49	26	55	20	158
No response	7	4	5	11	2	29
<b>Total</b>	<b>43</b>	<b>516</b>	<b>39</b>	<b>66</b>	<b>23</b>	<b>678</b>

Source: Field survey, 2010.

The results indicate that there are more married women in fish processing than singles, divorced, widows and those who are separated. Again, in fish processing most of the women fall within the active age group that is between 18-50 years compared to those who are closer to retirement (18.2%). Those aged 50 or more years are in fish processing because they could not just stay home doing nothing and again use this activity as source of livelihood. Widows use fish processing activities as a means of livelihood to cater for household expenses. This implies that widows are also economically active and are capable of catering for themselves after the death of their husbands. Married women, from their responses, indicated that they are supported, by their husbands in diverse ways. For example, they assist them in preparing the firewood used for smoking fish. Firewood preparation is considered laborious and this cannot be done by women in most cases. This is the advantage married women have over their counterparts who are divorced, single, widowed or separated. Thus, from the results it can be concluded that married women who stay with their husbands are likely to be economically active than those who are not living with their husbands, all things being equal.

Table 5. Amount and reasons for savings

Value (GHS)	Reasons for savings					Total
	Land	Building materials	Outboard motors	Canoes	Livestock	
Up to 100	10	5	2	0	14	31
101-500	5	9	3	3	13	33
501-1000	12	6	1	4	2	25
>1000	59	14	10	24	4	111
<b>Total</b>	<b>86</b>	<b>34</b>	<b>16</b>	<b>31</b>	<b>33</b>	<b>280*</b>

Source: Field survey, 2010.

\*The figure indicates that not all respondents gave answers to reasons for saving in real assets.

Women save for various reasons. Aside savings at the bank, women also save to acquire real assets such as land, building materials (roofing sheets), outboard motors, and livestock (Table 5). Among WFP in coastal Ghana,

savings towards acquisition of land is the most popular. They do this as a risk-coping strategy in that such assets can sometimes be converted into cash in times of need. This finding collaborates with that of Ibrahim, Kigbu, and Mohammed (2010) in Nigeria. Again, it is worthy to mention that women fish processors finance fishing by acquiring canoes which are important for fishermen. In this way, they contribute not only to fish processing but also fish harvesting.

Less than 50% of the women have committed some savings to acquire real assets (Table 5). This shows that most women understand the economics of holding cash in its real form. While 35.49% (279) of women own bank accounts, 64.51% (498) of them do not have bank accounts. Saved amounts that are not sent to the bank are either kept on them (the women) or used as part payment for the full cost of the items they intend purchasing in the near future. Most women (30.7%) deposit their monies with land owners to acquire plots of land in future. The less popular form of real savings is towards outboard motors (5.7%).

Women engage in several forms of fish processing, including smoking 70.89%, salting 11.99%, frying 10.11%, and drying 7.01%. Table 6 indicates that majority of women in coastal Ghana engage in smoking of fish. This is because this method probably requires less technology. One of the most popular technologies used by women in fish smoking is the 'chorkor smoker' (Note 1).

Table 6. Type of fish processing

Type	Frequency	Percentage
Smoking	526	70.89
Salting	89	11.99
Frying	75	10.11
Drying	52	7.01
Total	742	100

Source: Field survey, 2011.

Again, fish smoking is popular probably because it does not require huge investment as compared with salting and frying. Smoked fish can also be eaten with anything at any time so marketing is always ready and any investment in fish smoking can quickly be recouped. It is the type of processed fish with largest market because it can be served with a variety of food. Dried fish is less popular probably because it has no immediate market as it can be sold a few weeks after processing.

#### 4.2 MLR and OLS Regression Results

In this section the correlates of revenue are discussed (Table 7). The diagnostics tests are first presented, followed by the results and the main findings. In the case of MLR, the regressors explain 14.33% of the variation in revenue. For a cross-section data analysis, this is fairly good. The Wald  $\chi^2 = 1800$  with  $p > 0.00$  indicates that all the co-efficients are not equal to zero. In a way this tests the joint significance as we have in the case of OLS. The OLS model has 14.50% explanatory power which is quite close to the MLR and it is of good fit. The  $F(9, 505)$  and  $p > 0.000$  indicate that there is evidence to accept that the coefficients are not equal to zero.



Table 7. Regression results (dependent variable: revenue from fish processing)

Base outcome GHC 251-500 for MRL model

Covariates	Coefficient	MLR		Coefficients	OLS	
		SEs	Z-values		SEs	Z-values
<b>Up to GHC 250</b>						
Account	1.010038	0.2199422	4.59*			
YrsBus	0.009191	0.1049774	0.09			
Hrspent	0.198273	0.1384737	1.43			
Age	0.282014	0.1210286	2.33**			
Age <sup>2</sup>	-0.40061	0.1346554	-2.98			
Saveamt	0.246489	0.1088738	2.26**			
Educ	0.142548	0.0950423	1.50			
Fish smoking	0.808246	0.3032634	2.67**			
Fish frying	1.038069	0.4655062	2.23**			
<b>GHC 501-750</b>						
Account	1.573097	0.9260865	1.70***	0.247041	0.049198	5.02*
YrsBus	0.399011	0.4926086	0.81	0.021395	0.022369	0.96
Saveamt	0.586535	0.5865351	1.53	0.083957	0.027705	3.03*
Hrspent	0.540575	0.6032499	0.90	0.048500	0.032408	1.50
Age	0.230563	0.4296762	0.54	0.059488	0.025913	2.30**
Age <sup>2</sup>	-0.95053	.5489406	-1.73***	-0.04188	.0259858	-1.6***
Educ	0.034158	0.3126008	0.11	0.029341	0.020832	1.41
Fish smoking	0.490210	1.1567720	0.42	0.222703	0.068382	3.26*
Fish frying	0.489910	0.9610660	0.51	0.389233	0.092164	4.22*
<b>&gt;GHC 750</b>						
Account	19.99515	5.059216	3.95*	F (9,505)	10.28	
YrsBus	13.83539	2.680882	5.16*	Prob > F	0.000	
Hrspent	0.0457108	0.585571	0.08	R-squared	0.145	
Age	0.9843601	1.317584	0.75	Root MSE	0.51644	
Age <sup>2</sup>	.9229881	0.701706	1.32			
Saveamt	1.684496	0.680381	2.48**	N	515	
Educ	.1296963	0.572927	0.23			
Fish smoking	14.26175	1.673499	8.52*			
Fish frying	-.2910096	0.954926	0.30			
Log likelihood	317.37162					
Wald (Chi2) 27	1800.23					
Prob > chi2	0.000					
Pseudo R2	0.1433					

Computed from field survey, 2011.

\*Significant at 1%, \*\*significant at 5%, \*\*\*significant at 10%.

The two models indicate that ownership of formal account is significant in influencing revenue at all levels. The MLR reports  $t=4.59$ ,  $p > 0.000$  (1% level of significance) for up to GHC 250;  $t=1.70$ ,  $p > 0.089$  (10% level of significance) for GHC 501-750 and  $t=3.95$ ,  $p > 0.000$  (1% level of significance) for more than GHC 750. The OLS model also reports account ownership influencing revenue amount at 1% significant level ( $t=5.02$ ,  $p > 0.000$ ). Comparing the coefficients, however, shows that controlling for other factors, opening additional account is likely to increase revenue by 19.99 or 1999% using the MLR model while the OLS yields 24% increase in revenue generation. The result is quite interesting and conforms to normal practice where account holders usually have the opportunity of obtaining bank loans to invest or expand their businesses. Thus, if all credit goes to investment then account holders will be able to access loans, invest the loans, produce more, and hence increase their revenue assuming all other factors remain constant. Account ownership is, therefore, a *prima facie* for generating more revenue.

Age is positively related to the ability to generate revenue but Age<sup>2</sup> is otherwise (negative). Assuming age is an uncontrolled input, then older women are likely to generate more revenue than younger women (MLR model), and older women are able to generate higher revenues as compared with younger women (OLS model). However, as one advances in age, she becomes less productive and revenue decreases. The plausible reason is that fish processing requires some level of strength. This argument makes sense because the activity is more labour intensive. Skirbekk (2003) in a study concludes that job performance decreases as workers advance in age.

In addition, the fish processors were asked to indicate the amount of money they have saved for the past 12 months. The amount of money saved positively correlates with all levels of revenue except GHC 501-750. The amount of money saved thus predicts 24.6489% and 168.4496% increase in revenue at revenue levels of <GHC 250 and >GHC 750 respectively with reference to GHC 251-250. The OLS model also shows that savings increases revenue by 8.3957% with 1% increase in savings, all other factors held constant. This clearly demonstrates the role of savings in generating higher levels of revenue. The argument is that savings go into investment and productivity increases, thereby increasing revenue. It is striking to note that savings predict higher levels of revenue in MLR than the OLS. This issue is left for methodological investigation which is not the scope of this paper.

To answer the question pertaining to the type of fish processing likely to produce higher revenue, fish drying was set as the base or reference activity. With the exception of those who earn GHC 501-750, fish smoking and frying correlate positively with revenue outcomes in both equations. Fish smoking and frying predict revenue increase of 80.8246% and 103.8069% at 5% respectively for up to GHC 250 and 1426.175% for revenue level of more than GHC 750 at 1%. This implies that those who earn this category of income need to concentrate on fish smoking in order to generate more revenue. The OLS also reports positive correlation between fish smoking and frying. A 1% increase in fish smoking and frying leads to 22.2703% and 38.9233% in revenue, assuming prices of smoked and fried fish remain the same. It is interesting to note that fish frying seems to be more profitable than smoking when the OLS is used. The plausible reasons are that smoked and fried fish are used in the Ghanaian meals regularly. Smoked fish is used for the preparation of soup and various kinds of sauce. Thus, demand for smoked fish may be higher than demand for dried or salted fish. In the case of fried fish, it is served at either breakfast, lunch or supper with various kinds of dishes at restaurants and 'chop bars' in Ghana. It is therefore not surprising that they are the major fish processing activities that produce highest levels of revenue. To maximize revenue, women in processing need to take these activities seriously and make significant investments in them.

Revenue generation is likely to be influenced by experience. Experience was measured as number of years a woman has been in fish processing. Results indicate that one more year spent in business is likely to increase revenue by 23.9% for those who earn up to GHS 250, 30.8% for those who earn between GHS 501-750 and 44.1% for those who earn more than GHS 750, all things being equal. Fish processing should be seen as apprenticeship and for that matter more experienced women in fish processing are likely to produce higher levels of revenue. The result is consistent with Ilmakunnas, Maliranta and Vainiomäki (1999) that among Finnish manufacturing employees, job experience improves job performance and translates into high levels of revenue. The rationale is that fish processing even though requires less technology, requires some amount of training in order to be efficient.

## 5. Conclusion and Recommendations

The paper examined the correlates of revenue generated by women who process marine fish in selected coastal towns in Ghana. Using structured questionnaires, 746 women fish processors aged 18-50 years or more were interviewed through the snow ball sampling technique. The findings indicate that fish processing offers women in

the coastal areas income, savings and investment opportunities, wealth creation, employment and improvement in the socio-economic conditions of their households. Women in the study areas process fish daily, hence earn some income for their household up-keep on daily basis. The descriptive statistics show that women are able to acquire real assets as alternative means of cash savings. Some of the assets are very illiquid and in times of need conversion, may be difficult. There is, therefore, the need to encourage cash savings among women in small scale business to reduce possible loss of nominal value of assets in future. This also calls for an environment conducive for savings. Again, the study revealed that the most optimizing and profitable type of fish processing is smoking and frying. There is, therefore, the need to assist women to sustain their activities in fish smoking and frying.

The results of the study also revealed that experience matters in fish processing. Apprenticeship as a way of gaining experience in fish processing is, therefore, important. New entrants into the fish processing business need to be trained before taking up fish processing as a full time job in order to maximize revenue, especially for young women. NGOs interested in women empowerment need to consider training women in fish processing, since the activity offers women savings and investment opportunities. Younger women need to be encouraged to go into fish processing since productivity decreases with age advancement. There is, therefore the need to put in place attractive packages for younger women to go into fish processing. This could be taken up by women organizations, Ministry of Women and Children Affairs, NGOs as well as the Fishing Ministry. Funds also need to be made available for young coastal women who would like to take fish processing, especially smoking and frying, as a vocation.

### 5.1 Limitations of the Study

The study sampled women fish processors from three coastal regions out of the four. Probably an inclusion of the fourth region (Volta) could have changed the results. This notwithstanding, the results offer useful policy implications that can be generalized. The focus on women only could be biased in the sense that men also engage in fish processing, no matter how small the number. It will be useful to include men fish processors in future to investigate the gender differences in fish processing. The decision to process fish is a choice variable and could also present some selection bias and endogeneity problems. More sophisticated methodology of dealing with the selection bias and endogeneity could offer very convincing estimates.

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## Note

Note 1. Chorkor smoker is a traditional technology for smoking fish. It involves the use of wire mesh and earth oven with firewood for smoking fish at less cost. It is common in the communities along the coastal Ghana.