

## LOGIT ANALYSIS OF SOCIO-ECONOMIC FACTORS INFLUENCING PEOPLE TO BECOME FISHERMEN IN THE CENTRAL REGION OF GHANA

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**Abstract:** This study analyzes the socio-economic factors that influence people's decision to become fishermen in the central region of Ghana. Using a well structured interview schedule, a random sample of 98 people from Elmina in the central region of Ghana was selected for the study. Results from the descriptive statistics analysis of respondents identified fishing as a family business, minimum skills requirement and ready market for fish demand as factors that motivated majority of the people into fishing. Lack of storage facilities, access to credit, lack of government assistance and unpredictable changes in weather conditions on sea were the main constraints to fishing activities. Results from the logistic regression model indicated that household size and access to credit were significant factors that positively influenced people's decision to become fishermen. The regression analysis further revealed that engaging in other income generating activity and being educated significantly reduces the probability to start fishing business.

**Key words:** fishing, socio-economic determinants, logistic model, income generating activities.

### Introduction

Fishing is an old and important human activity in many countries, where it contributes to the culture, economy, employment and food supply of coastal communities (Gabriel et al., 2005; World Bank, 2009). Currently, about two-thirds of the world population is within 60 kilometres of the coastal shoreline (Small and Nicholls, 2003). In Ghana, the fisheries sector employs about 10 per cent of the population; contributes about 3 per cent to Gross Domestic Product (GDP) and 5 per cent of agricultural GDP.

Despite the economic and social importance of coastal resources to the vast majority of people living along the coast, recent years have witnessed an increase

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of threats upon these resources. These threats result from increasing human pressure on the use of coastal resources in most developing countries. Economic recess and lack of employment which characterize developing countries have contributed to this rising number of people participating in this sector as a means of earning income for their families. Consequently, this leads to fisheries resource overexploitation and coastal degradation which are likely to cause a fall in fish output despite increasing participation of fishers. For instance, in Ghana, the influx of people and overexploitation of fisheries resources led to a significant decline in total marine landing from 448,004.5 metric tons in 1996 to 290,008.1 metric tons in 2002 (World Bank, 2004).

Fisheries resource overexploitation and coastal environmental degradation must be seen as vital issues in the long-run management and sustainability agenda of many developing countries like Ghana if the contributions of the sector to real GDP and the welfare condition of the people in the coastal areas are to be maintained.

An understanding of the reasons influencing high participation in fishing is a vital ingredient to reducing depletion of the fisheries resources and consequently the threats to the livelihoods of people involved in the fisheries sector and the country at large. Several reasons have been given to contribute to why many people decide to go into fishing activities. FAO (1990) observed that, in developing countries, many people engage into fishing activities because the job does not require training and capital in the form of land. This is worsened by the fact that fish resources are public goods and as a result the rents they may yield are not capable of being appropriated by one individual. This consequently leads to competition which results in the overexploitation and depletion of most fisheries resources.

A few works have investigated the factors that motivate people to participate or go into some economic activities. Matiya et al. (2005) analyzed the socio-economic factors that motivate people to become fishermen around Lake Malombe in Malawi. Results from a logit analysis revealed sex, large household size, access to credit and land holding sizes as the main factors that influence people to join the fishing industries. However, the existence of other income generating activities reduces the number of fishermen.

Sesabo and Tol (2005) analyzed the factors affecting income strategies among households in Tanzania Coastal Villages. Empirical results from a tobit regression estimation revealed that asset endowments, households' structure, local institutions and location-specific characteristics explain households' decision-making on whether or not to participate in various activities. However, fishing access entitlements and access influence were the main determinants for variations in total household income.

Within the Ghanaian context, although some research works have been done on coastal resources and fishermen, little attention has been given to explain why coastal households choose to participate in fishing. This study therefore investigates the socio-economic factors that influence people's decision to become fishermen in the central region of Ghana. Specifically, the study seeks to (1) identify the socio-economic profiles of fishermen in the central region; (2) identify the factors that motivate them into fishing; (3) analyze the constraints they face in their fishing activities; (4) analyze the socio-economic determinants of factors that motivate people into fishing using a logit regression analysis.

## Materials and Methods

### Study area description

Komenda-Edina-Eguafo-Abirem (KEEA) municipal district is one of the 13 districts in the central region of Ghana as illustrated in Figure 1. The municipal is bounded on the south by the Atlantic Ocean (Gulf of Guinea), on the east by the Cape Coast Metropolis, on the north by the Twifo Hemang-Lower Denkyira District and on the west by the Mphor-Wassa East District. The KEEA District is located between longitudes 1°20' west and 1°40' west and latitudes 5°05' north and 5°15' north. The district covers an area of 1,372.45 km<sup>2</sup> (919.95 square miles).

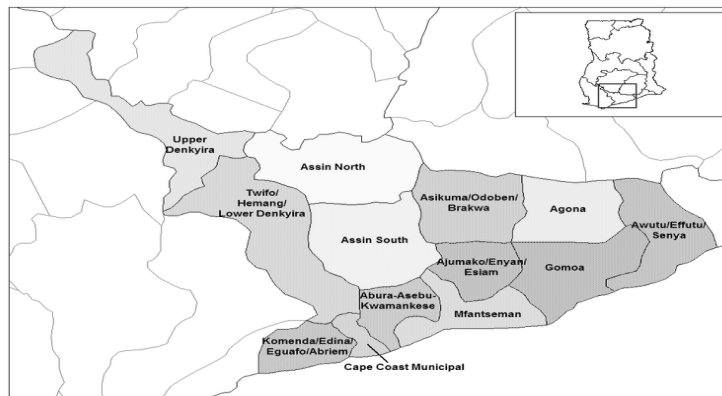


Figure 1. The map of central region of Ghana.

Elmina is a 700-year-old town located on the coast of the central region of Ghana in West Africa. It is the capital of four distinct traditional areas or states, which have been put together to constitute a political district called KEEA District. Its geographical coordinates are 5°5'0" North, 1°21'0" West and has a population of about 20,000 people. Fishing is the main industry in the area.

### Sampling and sample size

The sample for the study consisted of 98 people from Elmina in the central region of Ghana. Random sampling technique was used to select the sample.

### Data analysis

An interview schedule was the main tool of data collection while descriptive statistics and logistic regression analysis were the main analytical techniques. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 15.0 and the R Statistical Programming Language version 2.12.0 while frequency, percentages and means were used to discuss the research findings. The standard model of the logit estimation is specified in equations 1, 2 and 3.

$$P_i = \text{Pr ob}(Y_i = 1) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki})}} = \frac{e^{(\beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki})}}{1 + e^{-(\beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki})}} \quad (1)$$

Similarly,

$$P_i = \text{Pr ob}(Y_i = 0) = 1 - \text{Pr ob}(Y_i = 1) = \frac{1}{1 + e^{(\beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki})}} \quad (2)$$

Dividing (1) by (2) we get,

$$\frac{\text{Pr ob}(Y_i = 1)}{\text{Pr ob}(Y_i = 0)} = \frac{P_i}{1 - P_i} = e^{(\beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki})} \quad (3)$$

Where  $P_i$  is the probability that  $Y$  takes the value 1 and then  $(1-P_i)$  is the probability that  $Y$  is 0 and  $e$  the exponential constant.

This research uses information theoretic selection criteria as technique for providing the basis for model selection. The Akaike Information Criterion (AIC) which has been widely used in empirical research is employed in this study. The idea of AIC (Akaike, 1973) is to select the model that minimizes the negative likelihood penalized by the number of parameters as specified in the equation (4).

$$A I C = - 2 \log ( L ) + 2 p \quad (4)$$

Where  $L$  refers to the likelihood under the fitted model and  $p$  is the number of parameters in the model. Specifically, AIC is aimed at finding the best

approximating model to the unknown true data generating process and the applications it draws from (Akaike, 1973; Bozdogan, 1987; Zucchini, 2000).

## Results and Discussion

### Socio-economic characteristics of fishermen

In an attempt to investigate the socio-economic characteristics of respondents, the fishermen were asked the questions relating to that. The distribution of the ages of the fishermen revealed that 33.7% were between 41-50 years; 27.6% were between 31-40 years; 23.5% were between 19-30 years; 9.2% were between 51-60 years and 6% were between 61-70 years. The average age of the fishermen was 39.95 years. Results from the age distribution revealed that majority (84.8%) fall within the productive age range of 19-50 years.

Results showed average years of formal education of 5.2 years with 36.7% of the respondents obtaining basic level of education; 25.5% had obtained junior high school level of education and 9.2% had obtained senior high school level of education. However, 28.6% had no formal education.

The majority of the respondents representing 77.6% of the fishermen interviewed were married while 22.4% were not married. However, the distribution of the household size revealed an average of 6.26 persons with the majority (49.0%) having a household size between 6-10 persons; 44.9% had household size between 1-5 persons; 5.1% had household size between 11-15 persons. Only 1% of the fishermen had household size between 16-20 persons.

The distribution of the monthly income of respondents revealed an average of US\$ 369.77 with 73.5% of the fishermen earning a monthly income less than US\$ 331.17; 18.4% earning between US\$ 331.17-662.23; 7.1% earning greater than US\$ 662.23 but less than US\$ 3311.15, with only 1% of the fishermen interviewed earning more than US\$ 3311.15 a month. Distribution of other income generating activity of fishermen revealed that 66.3% of respondents did not have alternative sources of income; however, 33.7% had other sources of income. Access to credit was low with only 35.7% of the fishermen having access to credit.

### Factors that motivate people into fishing

In an attempt to investigate the factors that motivate people to become fishermen, relevant questions were asked. The fishermen were asked whether fishing as a family business, access to credit, minimum skills requirement and readily available market for fish motivated them to become fishermen. Of the fishermen interviewed, 87.8% had fishing as a family business and that motivated them to become fishermen. Only 18.3% were motivated by easy access to credit in the fishery subsector; however, 63.4% were motivated by the fact that fishing does not require

specialized skills. Ready market for fish motivated about 75.6% of the fishermen interviewed. None of the fishermen interviewed was motivated by low startup capital, emphasizing that fishing activity involves a huge amount of initial capital.

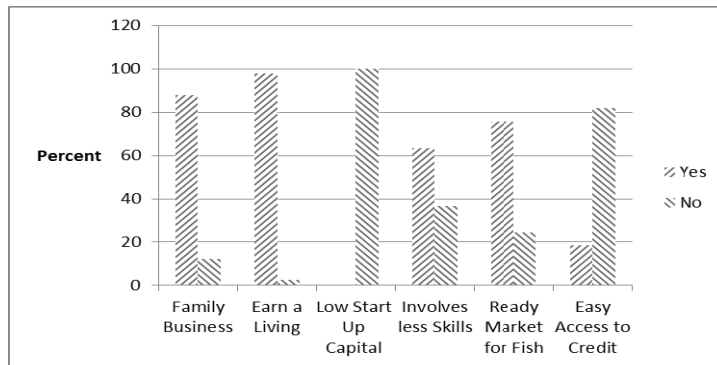


Figure 2. Factors that motivate people to become fishermen.

#### Constraints faced in the fishing industry

Numerous problems have been identified to be inherent in the fisheries subsector. Consequently, attempts were made to investigate the constraints in the fishing industry in central Ghana. Results displayed in Figure 3 revealed that 41.5% of the fishermen identify high transportation cost as a problem; however, 58.5% do not see transportation cost to be a problem. This may be attributed to the fact that most of the fishermen live closer to their sources of livelihoods.

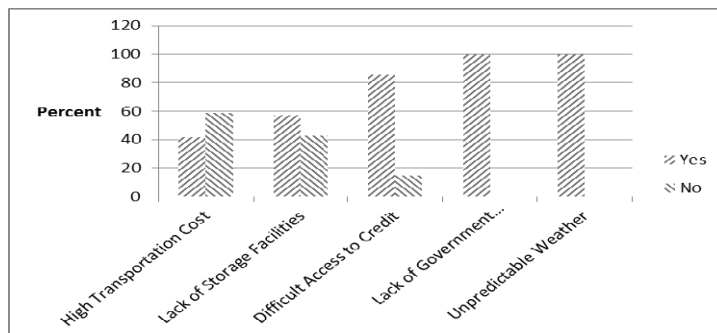


Figure 3. Constraints faced by fishermen.

Lack of storage facilities was also identified by 57.3% of the fishermen as a problem stressing that the situation always leads to spoilage and wastage of output.

Of them, 85.4% emphasized access to credit as a constraint stressing that where loans are available the strings and requirements attached always disqualify many fishermen. Lack of government assistance and unpredictable changes in the weather patterns were identified by all the fishermen as major constraints, emphasizing that these lead to low catch and thus exacerbate the poor living standards of most people in the fishing communities.

#### Socio-economic determinant of people's decision to become fishermen

A logistic regression analysis was employed to analyze the socio-economic factors that influence people's decision to become fishermen. The Akaike Information Criterion (Akaike, 1973) provided the basis for selecting the model that provided the best fit to the decision to become a fisherman. The model specification with the decision to become a fisherman as the dependent variable and age, years of education, marital status, household size, monthly income, other income and access to credit as the covariates provided the best fit with AIC of 49.16.

Empirical results from the logistic regression analysis in Table 1 reveals that age, years of education and other income generating activity negatively influence decision to become a fisherman whilst marital status, household size, monthly fishing income and access to credit positively influenced the decision to become a fisherman. The regression analysis finds the years of education, household size, other income generating activity and access to credit as significant predictors of the probability to go into fishing.

Table 1. Parameter estimates of the logistic model.

Variables	Estimates	Std. Error	T value	Pr (> z )
Intercept	3.262	2.651	1.230	0.219
Age of respondent	-0.020	0.067	-0.298	0.765
Years of education of respondent	-0.397	0.190	-2.090	0.037*
Marital Status	0.286	1.204	0.238	0.812
Household Size	0.546	0.300	1.817	0.069.
Monthly Income	0.002	0.001	1.277	0.202
Other Income	-3.475	1.351	-2.571	0.010*
Access to Credit	3.134	1.595	1.965	0.050*

\*Significant at 5 %; . Significant at 10%.

The parameters of years of education, other income and access to credit were significant at 5% level while household size was significant at 10%. It should be

emphasized that a negative sign of a parameter indicates that high values of the variables tend to decrease the probability of becoming a fisherman. A positive sign implies that high values of the variables will increase the probability of becoming a fisherman.

It must be emphasized that the results from the regression analysis were consistent with the results obtained by Matiya et al. (2005) who analyzed the socio-economic factors influencing people to become fisherman in Malawi and found that household size and access to credit were among the factors that influenced people to become fishermen around Lake Malombe. Other income generating activities having a negative influence on fishing participation were also consistent with the results of Matiya et al. (2005).

### **Conclusion**

Overexploitation of fisheries resources and coastal degradation are crucial if the contributions of the fisheries subsector to GDP and welfare of people in the coastal areas of Ghana are to be maintained. An understanding of the reasons influencing high participation in fishing is a vital ingredient to reducing the depletion of the fisheries resources and consequently the threats to the livelihoods of people involved in fishing sector and the country at large. The objective of this study was to examine the socio-economic factors that influence people to become fishermen in the central region of Ghana.

A random sample of 98 people from Elmina in the central region of Ghana was conducted for the study. A well structured interview schedule was the main tool for data collection while descriptive statistics and logistic regression analysis were the main analytical techniques.

Results from the descriptive statistics of respondents revealed that the fishermen were characterized by active labour force and large household size. However, the level of education, income, access to credit and possibility of other income generating activity were low. Similarly, results revealed that fishing as a family business, minimum skills requirement, and ready market for fish demand motivated the majority of the people into fishing. Lack of storage facilities, access to credit, lack of government assistance and unpredictable changes in weather conditions on sea were the major constraints faced by fishermen.

Empirical results from the logistic regression analysis reveal that age, years of education, other income generating activities negatively influenced decision to become a fisherman whilst marital status, household size, monthly fishing income and access to credit positively influenced the decision to become a fisherman. The regression analysis finds the years of education, household size, other income generating activity and access to credit as significant predictors of the probability to go fishing. It is recommended that viable income activity should be explored to reduce overfishing.



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LOGIT ANALIZA DRUŠTVENO-EKONOMSKIH FAKTORA KOJI UTIČU  
NA LJUDE DA POSTANU RIBARI U CENTRALNOM REGIONU GANE

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R e z i m e

Ovaj rad analizira društveno-ekonomske faktore koji utiče na odluke ljudi da postanu ribari u centralnom regionu Gane. Koristeći dobro strukturirani raspored intervjua, slučajni uzorak od 98 ljudi iz Elmina u centralnom regionu Gane je bio odabran za ovu studiju. Rezultati deskriptivne statističke analize ispitanika identifikovali su ribarstvo kao porodično poslovanje, koje zahteva manje veštine i dostupno tržište za potražnju ribe kao faktore koji motivišu većinu ljudi da se bave ribarstvom. Nedostatak objekata za skladištenje, pristup kreditima, nedostatak pomoći vlade i nepredvidive promene vremenskih uslova na moru su glavne prepreke ribarskim aktivnostima. Rezultati logističkog modela regresije ukazuju da su veličina domaćinstava i pristup kreditima značajni faktori koji pozitivno utiču na odluke ljudi da postanu ribari. Regresiona analiza dalje otkriva da upošljavanje u nekoj drugoj aktivnosti koja donosi prihode kao i obrazovanje značajno smanjuje verovatnoću da se započne ribarsko poslovanje.

**Ključne reči:** ribarstvo, društveno-ekonomske determinante, logistički model, aktivnosti koje donose prihod.

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