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To Fish or Not To Fish: Occupational Choice in Rural Zanzibar

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Abstract

It has been established that in general, artisan fishermen enjoy a higher economic welfare compared to peasant farmers in rural Zanzibar. A plausible explanation for this is that artisan fishermen generally earn more from their trade than the peasant farmers. Since fishery in Zanzibar is a quasi-open access resource to all Zanzibaris, an intriguing question is: Why are the peasant farmers not changing their occupation from generally low paying farming to relatively higher paying fishing? This article attempts to tackle this question by investigating the factors that influence the choice of occupation in rural Zanzibar with particular focus on the choice of fishing against other occupations. The issue of occupational choice in relation to fishing is of particular policy relevance in that any attempt at reducing fishing effort to curb over-fishing in artisan fishery would compel some fishermen to choose alternative occupation. The ease with which this can be accomplished would depend on the factors that influenced fishermen to choose fishing in the first place. Understanding factors that influence occupational choice in fishery is therefore an important step in designing a workable policy for curbing over-fishing. In this article, an attempt is made to explain occupational choice in rural Zanzibar using the 1991 Zanzibar Household Budget Survey data. To this end a multinomial logit model of occupational choice for rural Zanzibar is estimated.

Key Words: Occupational Choice, Artisan Fishery, Rural Zanzibar

1.0 Motivation

It is generally accepted now that open access to commercially valuable fishery leads to an economically sub-optimal level of exploitation. A range of practical measures has been proposed and even applied to some fisheries to remedy the situation. The ultimate objective of these measures is not only to regulate the catch, but also to redirect the amount of productive resources inefficiently employed in the fishery into other sectors in the economy where better use can be put of them. In artisan fisheries, where the capital labour ratio tends to be exceedingly low, this redirecting of resources is likely to amount to the actual reduction in the number of individual fishermen in the fishery. Thus some fishermen will ultimately have to seek alternative occupations. The ease with which fishermen can be willing to give up fishing for something else will of course depend on what motivated them to take up fishing in the first place. Understanding factors that may explain occupational choice between fishing and other alternative occupations can be of

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use to policy makers. It may in particular, shed some light on what may be done in the long run to attract some of the potential fishermen away from fishing into other productive activities.

This article attempts to find out some of the determinants of occupational choice in rural Zanzibar with special focus on artisan fishery. The case of rural Zanzibar is quite intriguing. It has been established that generally the welfare of artisan fishermen in Zanzibar is higher than that of peasant farmers (Mkenda, 2000). This seems to suggest that artisan fishermen earn more from their trade than the peasant farmers. Since the fishery in Zanzibar is a quasi-open-access[1] resource to all Tanzanians in Zanzibar, one would expect even a bigger influx into the fishery from farming than one currently observes. Lack of such an influx suggests that factors other than the general returns from fishery may also significantly explain why some individuals remain peasant farmers while others take up fishing. What are these factors that influence such occupational choice?

We use household budget survey data from Zanzibar to try and explain occupational choice in rural Zanzibar. We estimate a discrete choice model for the purpose. Admittedly, not all information that one wishes to have in investigating issues of occupational choice can be found in the standard household budget survey data we employ in this study. However, it still seems like good economics to attempt to find out if we can explain, to whatever extent, occupational choice by using the data at our disposal.

The article is organized into five sections. After this brief introduction, Section 2.0 presents and discusses occupational opportunities in rural Zanzibar and an overview of artisan fisheries. Section 3.0 gives an overview of the theory of individual choice behaviour with respect to occupation, with particular focus on fisheries. Section 4.0 describes the data employed in this article and discusses the results. Section 5.0 concludes the article.

2.0 Fishery in Rural Zanzibar

Agriculture is still the mainstay of Zanzibar's economy. Peasant farming is the dominant activity involving about 75% of working adults,[2] while 11% of working adults are artisan fishermen. About 5.5% of the working adults are in some kind of self-employment that excludes farming and fishing. Formal employment takes up 8% of adults, where 6.1% are in some form of permanent tenure and 1.9% are casual employees. The main cash crop is cloves. Over time however, the price of cloves has been going down. Farmers eke out their living by tilling the soil using mainly simple hand hoes. In fact, over 90% of farmers in rural Zanzibar are categorized as subsistence farmers. The farmers who are classified as being into the cash economy are generally not better off than the subsistence farmers.

Fishing is an activity that is open to all Tanzanians in Zanzibar. One only needs to obtain a government licence with a token amount of fee and obey government regulations as may be stipulated from time to time. The regulation typically consists of rules against catching juvenile fish and the use of destructive fishing techniques such as dynamite fishing. Artisan fishermen typically use simple boats for fishing; they may also simply lay traps in inshore waters to catch fish. It is also not necessary that a fisherman should own a boat to be able to fish by boat. A boat typically needs more than one crew. One of the crew may be an employee who gets paid by collecting a certain percentage of the catch. Studies have also shown that there are absentee owners of fishing boats in Zanzibar (Hoekstra, 1990). This means that whoever wants to be a fisherman may not necessarily need to buy a boat. One can lease a boat from some of the absentee owners, or team up with another fisherman who owns a boat, or can fish by using traps.

There are signs that the inshore fishery in Zanzibar, which is the fishery artisan fishermen rely on, is over-fished (see for example, FAO, 1997; Mkenda, 2001, 2003; Mkenda and Folmer, 2001). However, there seems to be reluctance on the part of the government to acknowledge that the fishery is over-done. In fact, fishery is still considered as one of the avenues for expanding employment opportunities to the youth. It is difficult therefore to envisage a policy that will cut down fishing effort in Zanzibar in the near future. This attitude may not be unique to Zanzibar. The regulation of fishery exploitation tends to be politically difficult to carry out because of the possibility of engendering unemployment. For example, Bell (1972) calculated the rent maximising level of catch in the U.S. Northern Lobster fishery, but fell short of recommending the implementation of rent maximising regulation for fear of causing unemployment. In developing countries, a proposal has been put forward that fishery management be undertaken in the context of an integrated rural development programme (see for example, Emmarson, 1980). Such a development programme may increase the opportunity cost of fishing effort and thus reduce the level of fishery exploitation. But the success of such a programme is crucially contingent on the variables that influence occupational choice and the extent that such variables can be altered by policy makers.

3.0 Occupational Choice: A Brief Review of Theory

We can use neo-classical theory to outline the basics of occupational choice. Suppose that individuals in rural Zanzibar could, in principle, take up any of the following occupations: artisan fishing (y_0), peasant farming (y_1), self-employment that is neither fishing nor farming (y_2), tenured employment in the government or private sector (y_3), or casual employment (y_4). Individuals are likely to have different comparative advantage over different occupations. If an individual earns more per hour in occupation y_j than in occupation y_i, we will expect this individual to choose occupation y_j over y_i. If we analyze this along the utility maximization

framework, we say that an individual chooses an occupation that maximizes his utility. The theory of choice behaviour has been developed into econometric models of discrete choice.

The utility an individual i derives from choosing occupation m is presented stochastically as follows (see Long, 1997).

$$u_{im} = \mu_{im} + \varepsilon_{im}$$

Where u_{im} is the utility of individual i derived out of choosing occupation m, μ_{im} is the average utility of the individual and ε_{im} is the random error. Now that utility derived from choosing an occupation is expressed as a stochastic variable, we can derive the probability of individual i choosing occupation m against all other occupations as:

$$\text{Prob}(y = m) = \text{Prob}(u_m > u_j \quad for \quad all \quad j \neq m)$$

If the vector of covariates x with parameters β is assumed to influence the probability and the error terms are independent and identically distributed with Weibull distribution (see MacFadden, 1973) then,

$$(1) \qquad \text{Prob}(y_i = m \mid x_i) = \frac{\exp(x_i \beta_m)}{\sum_{j=0}^{J} \exp(x_i \beta_j)}$$

This implies that we can compute a series of log-odds ratios from equation (1) to obtain a linear relationship between log odds and the vector of covariates (see equation (2) below).

The pioneering application of discrete choice models in occupational choice was by Schmidt and Strauss (1975). They grouped occupations into six categories: menial, blue collar, craft, white collar and professional. The explanatory variables they used are educational level, experience, race and sex. In East Africa, Knight and Sabot (1990) also employed the multinomial logit model in investigating occupational attainment in Kenya and Tanzania. The explanatory variables they used are educational level, family background, experience and race.

With respect to fisheries, it is worth noting that some scholars have alluded to the possibility that fishermen are motivated by non-economic forces such as gambling spirit (Gordon, 1954), economy of affection, and the like. For lack of detailed data, this article will not directly tackle this issue. The explanatory variables employed in this article are discussed in Section 4.0 below.

4.0 Data and the Variables

The data used are from the 1991 Zanzibar Household Budget Survey. This is a huge survey covering 1.74% of all households in Zanzibar. For the purpose of this article, we only use rural household data. This is because the main interest is to investigate factors that influence the choice of occupations between artisan fishing and peasant farming. Farming takes place in rural areas and hence our focus. Also, fishermen in rural Zanzibar are artisan and fairly homogeneous in terms of fishing technology. In many regards, artisan fishermen and peasant farmers are similar in terms of socio-economic conditions. The same cannot be said of urban fishermen. The descriptive statistics of the data used is presented in Table 1. Apart from artisan fishing and peasant farming, other occupations in rural Zanzibar include some type of self-employment that is neither fishing nor farming, formal employment in government or private sector and casual employment.

In this article, we look at the factors that may influence individual choice of a particular occupation rather than others among the five occupations mentioned. Several possible explanatory variables were explored. The choice of explanatory variable was based on theoretical plausibility and availability of data.

The explanatory variables that are used in the estimation are of three types: demographic, locational, and both human and physical capital. The demographic variables are gender (0 for female and 1 for male), age of the individual and the square of the age, and the size of the household from which the individual belongs. Gender has always been important in occupational choice in that women tend to be discriminated against, either directly by employees favouring men over women, or indirectly through fewer opportunities for women to develop their income-earning potentials. The age of an individual may also have a bearing on occupational choice. For example, fishing is likely to be a job that demands a lot of physical energy that youths can manage more than older individuals. Thus at the prime age, one may engage in fishing but as the age advances, one may shift to less physically demanding jobs, such as part-time employment etc. Also, accumulation of wealth over one's lifetime may engender changes in occupation, for example, from farming into a retail business. We also hypothesize that the size of a household, has direct bearing on the amount of productive capital in the household that individual members can use. For example, a bigger household means less amount of land can be distributed to individual members for farming. This may encourage individual members to diversify their occupations, including venturing into occupations that are not traditional to the household.

Table 1: Variable Description and Descriptive Statistics

Variable Names and Description	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Gender (male=1, female=0)	2508	0.501594	0.500097	0	1
Age	2508	36.76834	15.96192	15	99
Age_2 (square of age)	2508	1606.592	1418.068	225	9801
Size (household size)	2508	6.259171	3.013964	1	23
Coral (if in the coral zone, coral=1, else Coral=0)	2508	0.422647	0.494078	0	1
Non-coral (if in a non-coral zone, non-coral=1, else non-coral=0)	2508	0.577352	0.494078	0	1
Dtrans (Distance to public transport facility; dtrans=1 if 1 km or less, 0 otherwise)	2508	0.456937	0.498241	0	1
Durban (Distance to the urban centre, 1 if 10 km or less, 0 otherwise)	2508	0.408692	0.491690	0	1
Basic (Education attained, 1 if with formal education but not more basic school, 0 otherwise)	2508	0.154704	0.361695	0	1
Higher (Education attained, 1 if with formal education and above basic level, 0 otherwise)	2508	0.005183	0.071823	0	1
Ownboat (Ownership of fishing boat, 1 if owns one, 0 otherwise)	2508	0.027113	0.162445	0	1
Ownfarm1 (Ownership of a farming field, 1 if owns one but worth less than 100,000 TSh., 0 otherwise)	2508	0.437400	0.496164	0	1
Ownfarm2 (Ownership of farming field, 1 if owns one worth 100,000 TShs. or above, 0 otherwise)	2508	0.109649	0.312514	0	1
Cattle (Ownership of cattle, 1 if owns some, 0 otherwise)	2508	0.151913	0.359009	0	1

The locational variables cover ecological zones, vicinity to public transport and to the urban centre. Zanzibar is divided into two major soil types – coral and non-coral. The coral zone runs along the eastern side of the island and is less fertile for agriculture than the non-coral zone that dominates the Western parts. These ecological zones are likely to influence the choice of occupation, particularly between fishing and farming. The proximity to the means of public transport and to the urban centre is hypothesised to have an influence on occupational choice. This is because of the fact that they provide outlets to markets for the produce (e.g. fish and crops) as well as allowing easy accessibility to other forms of occupations particularly formal employment (either part time or full time) in the urban centres.

The human capital variable constitutes the education level of the individual. Education increases the likelihood of securing formal employment and may perhaps make an individual become aware of more opportunities for making a

living. Physical capital considered is ownership of a fishing boat, farming field and cattle by the household from which an individual belongs. The hypothesis is that the particular forms of assets that a household possesses may provide an easy ride to the household member into an occupation that needs the asset as capital. For example, a household that owns a big farm may find it easier for members in the household to be farmers. The same goes for ownership of a fishing boat and livestock. There is of course a potential endogeneity problem in that an individual may acquire a fishing boat because he/she wants to fish, rather than the other way round. This may be more so with regards to ownership of fishing boats than with farming fields because the latter is generally passed over as a bequest from one generation to another within a family, rather than acquired in the market by individuals. Even with regards to fishing boats, it has been found that some owners of fishing boats do not themselves go out fishing, but rather they lease the boats to fisherman. At any rate, we cannot figure out a good instrument for dealing with any possible endogeneity of the ownership of fishing boats.

We estimated a maximum likelihood multinomial logit model (also called polytomous model) for obtaining the odds of an individual choosing a given occupation rather than another occupation. The occupations considered are: artisan fishing, peasant farming, self-employed activities other than fishing and farming, formal employment and casual employment, donated by 0, 1, 2, 3 and 4, respectively. The probability of observing a choice m given a vector of explanatory variables $\mathbf{x}$ is given in equation (2). A linear relation can be obtained consisting of a set of log odds ratios obtained by dividing $\text{Prob}(y=m \mid x)$ by $\text{Prob}(y=0 \mid x)$ from equation (2) and taking the logarithm of both side to get:

$$(2) \qquad \log\left(\frac{\text{Prob}(y_i = m \mid x_i)}{\text{Prob}(y_i = 0 \mid x_i)}\right) = x_i[\beta_m - \beta_0] = x_i\beta_m$$

Identification requires a restriction, and we chose to impose this restriction on outcome 0, that is $\beta_0=0$. We can thus interpret β_m as follows: For a unit change in x_k, the log of the odds of outcome m relative to outcome 0 is expected to change by β_{km} units, all other variables remaining constant. Table 2 presents our estimation results along this line. The choice of fishing is used as the base of estimation, that is, we restrict the vectors of the parameters of β_0 associated with the choice of fishing to zero.

We would like first to examine the log odds of an individual being a peasant farmer rather than an artisan fisherman. This can be read off from the second row of Table 2.

Table 2: Coefficient Estimates of Log Odds

	Gender	Age	Age_2	size	Coral	dtrans	durban	basic	higher	ownboat	own-farm1	own-farm2	cattle	constant
Log (P1/P0)	-4.9507 (-11.5579)	0.0238 (0.920)	0.0002 (0.740)	-0.0261 (-0.912)	-2.1499 (-12.127)	0.1157 (0.676)	0.1819 (1.068)	0.7795 (3.688)	0.1816 (0.775)	-0.8850 (-2.239)	0.8087 (4.512)	0.9935 (2.979)	0.4362 (1.784)	5.2411 (7.635)
Log (P2/P0)	-4.3112 (-9.272)	0.1148 (2.738)	-0.0009 (-1.769)	-0.0789 (-1.913)	-2.3390 (-9.210)	1.5625 (5.586)	-0.1754 (-0.711)	1.6595 (5.462)	1.4473 (4.316)	-1.3414 (-1.671)	0.9314 (3.689)	0.7011 (1.465)	0.2496 (0.718)	-0.2392 (-0.242)
Log (P3/P0)	-2.6018 (-5.159)	0.4324 (7.228)	-0.0043 (-6.021)	-0.0232 (-0.577)	-2.0856 (-8.317)	0.1704 (0.710)	0.4505 (1.905)	1.4809 (4.608)	2.9309 (8.880)	-1.3026 (-1.636)	0.9866 (3.943)	1.0092 (2.261)	0.0475 (0.136)	-8.2200 (-6.099)
Log (P4/P0)	-3.2886 (-5.809)	0.1677 (2.747)	-0.0012 (-1.759)	0.0293 (0.585)	-2.2580 (-6.173)	0.5071 (1.419)	1.3486 (3.753)	1.2298 (2.732)	1.8508 (3.878)	-0.3370 (-0.410)	1.2948 (3.410)	2.1005 (3.839)	-0.0347 (-0.068)	-4.5341 (-3.049)

Notes: (Outcome 0 (fishing) is the comparison group); Number of obs = 2508; LR $chi^2(52) = 1216.89$; Prob > $chi^2 = 0.0000$; Log likelihood = -1563.2714; Pseudo $R^2 = 0.2802$.

For a unit change of gender (i.e. from female to male) the log of odds of being a peasant farmer against being an artisan fisherman decreases by 4.9. Put differently, (see Table A1), the odds of a male being a peasant farmer rather than an artisan fisherman is 0.0071, which is pretty small! This is as expected because fishing is more of a male occupation than farming is.

Other factors that are significant in negatively influencing the choice of being a peasant farmer against being an artisan fisherman are location in the coral zone (Coral) against a non-coral zone, and ownership of a fishing boat (Ownboat). The coral zone in Zanzibar is less fertile for agriculture than the non-coral zone. It is not surprising therefore that fishing has an edge in the coral zone compared to farming. It is as expected that ownership of a fishing boat reduces the log odds of being a peasant farmer against being an artisan fisherman.

An interesting result is that of education. The coefficient of formal education choice at primary level (basic) is positive and significantly different from zero for log odds of farming against fishing. Thus, for a change from no formal education to basic education, the log odds of being a farmer rather than a fisherman change by 0.7789, which translate to odds of 2.1804. This suggests that fishermen are more likely to have no formal education than farmers. If one was to rank occupations by the level of *economic* welfare enjoyed, peasant farmers rank significantly lower than artisan fishermen (see Mkenda, 2000). One would expect that artisan fishermen would therefore tend to have a higher level of education than the peasant farmers.

Ownership of a farming field (Ownfarm1 and Ownfarm2) on the other hand has a positive impact on the choice of peasant farming against artisan fishing. This is intuitive. It should be recalled here that asset ownership is with respect to the household (the head of the household) from which an individual belongs while occupational choice is with regards to the individual himself/herself. Notable also is the fact that most farming fields are a bequest from parents to children over generations, rather than an acquisition through the market. With this in mind, the positive influence of ownership of a farming field by a household on the odds of a member of that household choosing peasant farming against artisan fishing may suggest an interesting phenomenon. That is, an individual's choice of occupation between farming and fishing is influenced by what an individual's parents and grandparents have been doing for a living. Thus, the household in one generation that owns a farming field is likely to have an offspring who will own the farm and be the farmer in the next generation and so on. Likewise, an individual in rural Zanzibar who is an offspring from a household that owns no farming field is likely to be a fisherman rather than a farmer as he/she will have no farm to inherit. This also may suggest that there is indeed little room for an individual's choice of occupation between peasant farming and artisan fishing in that occupational choice is to some extent predetermined from previous generations. Admittedly,

this is simply a possible and at best, an indirect implication from our empirical study. Unfortunately, our data lacks sufficient details to extract information on the influence of parent's careers on children's occupation.

The variables that do not significantly explain the choice of occupation between artisan fishing and peasant farming are also of interest. Table 2 indicates that the demographic variables (age, age squared, household size from which an individual comes from) do not explain the choice. Also, neither the distance from the means of public transport nor the distance from the urban centre helps to explain the choice between fishing and farming. Moreover, an education level that is higher than basic does not explain the log odds of being a farmer against being a fisherman.

Table 2 also presents the results on the log odds of an individual being self-employed (but neither in fishing nor farming) against being an artisan fisherman. Similar contrast is provided for formal tenured employment against fishing, and for casual employment against fishing. For each occupation, the coefficient of gender (1 for male, 0 for female) indicates that the log odds of taking any of the occupation against artisan fishing is reduced as gender changes from female to male. This indicates that fishing, as opposed to all other occupations, is predominantly male. The age of an individual has positive influence on the log odds of any occupation against artisan fishing, suggesting that as age increases, the probability of an individual being in any other occupation other than fishing increases. With regard to education level, it seems from the results in Table 2 that higher education tends to increase the probability of an individual taking up occupations other than fishing. The exception to this is peasant farming.

The coefficient on the variable 'coral' is negative and significant for all contrasts, suggesting that the log odds of taking any occupation other than fishing decreases as one moves from non-coral to coral zone. Another remarkable result is with respect to education. Having any formal education (basic and higher) increases the log odds of taking any occupation against fishing. The coefficient for 'higher' with respect to farming is not significant although its positive sign may be suggestive. As one would expect, higher education has a stronger positive effect on the choice of tenured employment over fishing. Of particular interest also is the fact that basic education increases significantly the odds of an individual taking up self-employment (not fishing, not farming) rather than fishing. This is interesting because unlike tenured and casual employment in the formal sector, self-employment depends on individual's private initiative rather than government effort.[3] This may suggest that expansion of education may at least check the increase in the number of fishermen.

The presentation of results in Table 2 is the most common way in the literature. The coefficient estimates here however are not necessarily the best means of

conveying the revealing meaning of the results. Long (1997) observes that "it is hard to convey a substantive meaning of a change in the log of odds" (p.155). The other approach relies on taking the antilog of equation (2) and thus giving the exponentiated value of parameter estimate in terms of the odds (rather than the log of odds) of outcome m relative to outcome 0 resulting from a unit change in x_k. The results of our estimation are presented in this format in Table A1 in the Appendix. Another way of conveying the estimation results is in terms of changes in the predicted probability of an outcome given changes in one variable while all other variables remain at a chosen level, mostly at the mean. For a discrete change in the explanatory variable, the change in the predicted probability of outcome m as a particular explanatory variable x_k changes from x_0 to x_1 while the rest of variables are maintained at **x** is given by:

$$(3) \qquad \frac{\Delta \Pr ob(y = m \mid \mathrm{x}}{\Delta x_k} = \Pr(y = m \mid \mathrm{x}, x_k = x_0) - \Pr(y = m \mid \mathrm{x}, x_k = x_1)$$

For a marginal change (if the variable is continuous) is obtained from differentiating equation (1) with respect to x_k; as the rest of variables **x** are kept constant.

$$(4) \qquad \frac{\partial \Pr ob(y = m \mid \mathrm{x})}{\partial x_k} = \Pr ob(y = m \mid \mathrm{x}) \left[\beta_{km} - \sum_{j=1}^{J} \beta_{kj} \Pr ob(y = j \mid \mathrm{x}) \right]$$

The results along the lines described in equations (3) and (4) are presented in Table 3, in which the results broadly conform to the results in Table 2.

Table 3: Changes in Predicted Probabilities

Variable	Change	0	1	2	3	4
Gender	0----->1	0.1840	-0.2604	0.0133	0.0470	0.0160
Age	Min->Max	-0.0367	-0.9560	-0.0068	0.99	-0.0006
	MargEfct	-0.0008	-0.0130	0.0035	0.0086	0.0016
Age 2	Min->Max	0.0014	0.9242	-0.0171	-0.9014	-0.0070
	MargEfct	0.0000	0.0002	0.0000	-0.0001	0.0000
Size	Min->Max	0.0139	0.0043	-0.0416	0.0015	0.0219
	MargEfct	0.0006	0.0010	-0.0024	0.0001	0.0007
Coral	0----->1	0.0596	-0.0470	-0.0109	0.0002	-0.0019
Dtrans	0----->1	-0.0038	-0.0637	0.0641	-0.0004	0.0039
Durban	0----->1	-0.0037	-0.0029	-0.0162	0.0059	0.0168
Basic	0----->1	-0.0142	-0.0555	0.0478	0.0167	0.0053
Higher	0----->1	-0.0082	-0.2355	0.0629	0.1524	0.0283
Ownboat	0----->1	0.0279	-0.0113	-0.0175	-0.0077	0.0086
Ownfarm1	0----->1	-0.0162	0.0003	0.0057	0.0039	0.0062
Ownfarm2	0----->1	-0.0144	0.0037	-0.0119	0.0004	0.0222
Cattle	0----->1	-0.0073	0.0259	-0.0069	-0.0070	-0.0047
Basic Probability		0.0205	0.8990	0.0463	0.0219	0.0123

With respect to gender, it can be seen that being a male (i.e. Gender=1) rather than female (i.e. Gender=0) decreases the probability of being a peasant farmer and increases the probability of being in all other occupations, particularly fishing. It seems that being a female is not very helpful in attaining occupations other than peasant farming. Educational achievement reduces the probability of one being either an artisan fishermen or peasant farmer and increases the probability of being into other forms of employment.

5.0 Conclusion

This article set out to investigate occupational choice in rural Zanzibar. Special emphasis has been given to artisan fishermen. A multinomial logit model has been used for the purpose. The occupational groups investigated are artisan fishing, peasant farming, self-employment other than fishing and farming, tenured employment in the formal sector, and casual employment in the formal sector. The explanatory variables used are in three groups: demographic (gender, age, square of age and the household size from which an individual belongs), locational (coral versus non-coral zone, distance to public means of transport and distance to the urban centre). Further, capital variables (educational achievement as well as ownership of productive assets, farming land and cattle) were used as the explanatory variables.

In general, the explanatory variables significantly explain occupational choice in rural Zanzibar. One of the remarkable results is that the odds are in favour of an individual with some formal education taking up other occupations other than fishing.[4] It appears that in terms of educational achievement, artisan fishing is inferior to all other occupation. One may conjecture from this that expanding education opportunities may reduce the number of artisan fishermen. In fact, an appealing result is that educational attainment increases the likelihood of individuals taking up self-employment rather than fishery nor farming.

To conduct our empirical analysis, we relied on the 1991 household budget survey data from Zanzibar. An interesting possibility is to compare these results with what may be obtained from a more recent household budget survey data once such data becomes available. Also, a fruitful line of further research on occupational choice in rural Zanzibar is to carry out a survey that is more focused on occupations, including actual relative returns, attitude towards risks and influence of family background.

Notes:

1. An open access resource is a resource that can freely be accessed by anybody. The fishery in Zanzibar is freely accessible to any Zanzibari as long as one applies for a permit and pays a nominal fee. This very minimum restriction imposes no limitation at all to the accessibility of fishery by the Zanzibaris, but it does require a qualification of the term "open access" as applied to Zanzibar Fishery. I have chosen the term quasi-open-access to indicate that this fishery is open access with some very few nominal restrictions.
2. Quantitative information in this paragraph is due to author's calculation from the 1991 Household Budget Survey Data of Zanzibar.
3. Most of the tenured and casual employees work for the government
4. This is more remarkable because it has been established that peasant farming is inferior to artisan fishing in economic welfare in rural Zanzibar.

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APPENDIX

Table A1: Estimated Odds from the Multinomial Model

	Gender	Age	age_2	size	coral	dtrans	durban	basic	higher	ownboat	own-farm1	own- farm2	cattle
P1/P0	0.0071	1.0241	1.0002	0.9743	0.1165	1.1227	1.1995	2.1804	1.1991	0.4127	2.2450	2.7006	1.5467
	(-11.557)	(0.920)	(0.740)	(-0.912)	(-12.127)	(0.676)	(1.068)	(3.688)	(0.775)	(-2.239)	(4.512)	(2.979)	(1.784)
P2/P0													
	0.0134	1.1217	0.9991	0.9241	0.0964	4.7705	0.8392	5.2565	4.2514	0.2615	2.5381	2.0162	1.2835
	(-9.272)	(2.738)	(-1.769)	(-1.913)	(-9.210)	(5.586)	(-0.711)	(5.462)	(4.316)	(-1.671)	(3.689)	(1.465)	(0.718)
P3/P0	0.0741	1.5409	0.9957	0.9771	0.1242	1.1858	1.5691	4.3970	18.7437	0.2718	2.6822	2.7434	1.0487
	(-5.159)	(7.228)	(-6.021)	(-0.577)	(-8.317)	(0.710)	(1.905)	(4.608)	(8.880)	(-1.636)	(3.943)	(2.261)	(0.136)
P4/P0	0.0373	1.1826	0.9988	1.0297	0.1046	1.6605	3.8521	3.4205	6.3650	0.7139	3.6504	8.1706	0.9659
	(-5.809)	(2.747)	(-1.759)	(0.585)	(-6.173)	(1.419)	(3.753)	(2.732)	(3.878)	(-0.410)	(3.410)	(3.839)	(-0.068)

Notes: (Outcome =0 (fishing) is the comparison group); Number of obs = 2508; LR chi2(52) = 1216.89; Prob > chi2 = 0.0000; Log likelihood = -1563.2714; Pseudo R2 = 0.280