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Full Length Research Paper

Socio-economic determinants of consumer fish purchase in Windhoek, Namibia

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Based on data collected from 120 shoppers, in the City of Windhoek, capital of Namibia, this study used the logit model to analyze the influence household characteristics have on consumers' decision to purchase horse mackerel, hake, and snoek. Specific factors considered in the model were gender, age, education, household size and income. The results revealed, firstly that education, income and household size have negative significant effect on consumers' decision to purchase mackerel. Secondly, it was found that age and income have positive significant effect on the probability to purchase hake. Thirdly, household size and income have positive significant effect on the probability to purchase snoek but marital status had a significant negative effect on the decision to purchase snoek. In brief, the results confirmed strong income, age and household size effects on the purchase of fish species. The implication of the findings is that fish marketers and processors should consider these factors in the formulation of marketing strategies aimed at promoting fish consumption in the study area.

Key words: Socio-economic characteristics, fish, hake, mackerel, purchase, snoek, logit regression.

INTRODUCTION

The fisheries sector in Namibia plays an important role in the economy; it contributes about 7% to GDP and 15% of total export earnings (FAO, 2007). The fishing industry also provides 13,700 jobs in the fish processing and related industries (FAO, 2007). The country exports more than 90% of its fisheries production, leaving about 10% for domestic consumption. Although Namibia has abundance of marine fisheries, domestic fish consumption is limited by the small population of 2 million and by the fact that fish has not been part of the traditional diet for most Namibians. Normally, the diet for most Namibian is meat (beef and mutton) based (FAO, 2007). In comparison to the World average per capita fish consumption of 16 kg, the per capita fish consumption for Sub-Saharan Africa of about 8 kg indicates that Africa has the lowest per capita fish consumption in the world (Earthtrends, 2003; Tacon et al., 2009) . Namibia with aper capita fish consumption of 13.3 kg is also among the lowest in Africa (FAO, 2007).

In cognizance of the health benefits from consuming fish and in the hope of expanding the domestic fish market, the Government of Namibia since the early 1990s has been concerned with promoting fish consumption among Namibians. In this regard, the Ministry of Fisheries and Marine resources in 1992 established the Fish Consumption Trust. The Trust has opened about ten fish retail outlets in selected urban centers including Windhoek and has been distributing information on how to prepare various kinds of fish cuisine. Despite these efforts, fish consumption in Namibia remains low as indicated by a small share of 4% for fish in the annual average household food expenditure (CBS, 2006).

The most popular fish in the local market include baby hake, angel fish, snoek, jacopiva, alfonsino and horse mackerel. Since individual consumers exhibit strong preferences, understanding of factors, which influence

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consumers' fish purchasing decisions is important. Previous studies especially from the USA have indicated that economic, demographic and sociological factors and lifestyle changes are among the factors that affect purchases and consumption of fish and related seafood products. These factors include income, sex, age, household size, urbanization, race, region, education and employment (Cheng and Capps, 1988; Dellenbarger et al., 1992; Nayga and Capps, 1995). Purchases of seafood and aquaculture products are also affected by experience with seafood, perception of taste, ease of preparation, adding variety to diet, health and nutrition (Gempesaw et al., 1995). In addition, the presence of children in the household (Dellenberger et al., 1992), price, distance, taste, quality and season are significant determinants of seafood purchases (Bose and Brown, 2000). It is also known that as income rises, consumers tend to spend more per unit weight of seafood products they purchase (Hermann et al., 1994; Wellman, 1992).

Understanding of key socio-economic determinants of fish purchasing and consumption will help producers, processors and marketers to target marketing and promotion campaigns at individuals with a higher propensity to consume fish. It will also help public policy makers who are concerned with improving household food security through fish distribution, to target the incentives at the most needy consumer groups. Although knowledge of the various factors which influence fish consumption is important, there is scanty information on fish consumption, buyers of fish and the socio-economic factors which affect fish consumption in Namibia. Therefore the objective of this survey was to investigate the socio- economic and demographic factors that influence a consumer's decision regarding the purchase of frozen fish in Namibia. The study focused on three types of fish, namely horse mackerel, hake and snoek which are commonly available in various processed frozen forms at several local markets in Windhoek.

METHODOLOGY

The model

The effects of various factors on the decision to purchase fish and seafood were investigated using qualitative choice models namely, the linear probability model, the logit model and the probit model as described by Dellenberger et al. (1992) and Gemesaw et al. (1995). Since the logit and probit models usually yield nearly identical results and are thus difficult to distinguish from one another statistically (Amemiya, 1981; Capps and Kramer, 1985), the logit specification was arbitrary chosen for the empirical analyses undertaken in this paper.

The logit model for a representative household *i* can be expressed as follows:

$$P_i = 1/(1+ e^{-Zi}) \quad (1)$$

where *e* denotes the base of the natural logarithm, Z_i is an index determined by an independent variable, X_i and P_i is the probability that the household will make a certain choice. Equation 1 is estimated as:

$$\text{Log}\,[P_i/(1-P_i)] = Z_i = {}_0 + {}_jX_{ij} + u_i \quad (2)$$

The expression on the left hand side of (2) indicates the logarithm of probability of representative household of purchasing fish to the odds of non-purchasing. u_i is the error term. The parameter estimates $({}_i)$ of the logit model were estimated by the maximum likelihood estimation technique.

The coefficients of logit models do not provide any useful measure of the relationship between dependent variable and explanatory variables except for the sign and significance of the coefficients of the explanatory variables. Given this, the change in the probability of purchasing fish with respect to a unit change in the explanatory variable was estimated as:

$$P_i = {}_k P_i (1 - P_i) \quad (3)$$

where P_i is the probability of an individual purchasing fish evaluated at the mean and ${}_k$ is the estimated coefficient of the 'kth variable'. The change in probability (P_i) is a function of the probability, and when multiplied by 100 gives the percentage change in the probability of an event occurring given a change in the variable, all things being constant.

Specification of model

The dependent variable was binary with an assigned value of 1 for a purchaser of fish specie and 0 for a non-purchaser. A separate purchase logit model was estimated for each of the three fish species namely, horse mackerel, hake and snoek. The statistical model used to evaluate a consumer's fish purchase decision was specified as:

$$P\ (z) = {}_0 + {}_1\text{GENDER} + {}_2\text{AGE} + {}_3\text{MARRIED} + {}_4\text{EDUC} + {}_5\text{HSIZE} + {}_6\text{INCOME} + \quad (4)$$

where the dependent variable in the model is a discrete variable 1 – 0, with 1 if the household purchased fish and 0 otherwise, and where $Z=XB$, and the explanatory variables are as defined in Table 1. The purchase of fish was hypothesized to depend upon a number of socio-economic factors, namely age, gender, marital status, household size, education, and income. A brief definition of each of these factors and the hypothesized effect are given as:

'Age' was the actual age of respondent in years, and it was hypothesized to have a positive sign. This is so because older consumers tend to exhibit strong preferences for consumption of some fish species due to cultural influences.

'Gender' was a dummy variable with female respondent =1, and male respondent = 0, it was hypothesized to have a positive sign. Because of traditional sociological norms, female consumers may possess a greater knowledge of the nutritional characteristics of fish species as well as greater expertise in the preparation of such specialty products.

'Married' a dummy for marital status, assigned 1 if respondent was married, and 0 = otherwise. The effect for married was hypothesized to be uncertain. When married the spouse's preferences will influence the purchaser either positively or negatively in their fish purchase decision.

'Education' was a continuous variable and was expected to have a positive sign. Education was coded as 1 for primary school, 2 for secondary school and 3 for tertiary education. A consumer's educational level might influence the likelihood of purchasing fish. Higher levels of education might imply more nutritional and healthy consciousness and receptiveness to variety of foods by consumers.

Table 1. Descriptive statistics of variables used in the logit analysis.

Variable	Mean	Std. dev	Expected sign
Dependent			
Buy horse mackerel	0.68	0.47	N/A
Buy hake	0.35	0.48	N/A
Buy snoek	0.23	0.42	N/A
Independent			
Age	35.8	9.05	+
Gender	0.78	0.41	-
Education	1.92	0.70	+
Household size	4.59	1.80	+
Married	0.54	0.50	±
Income	2.53	0.86	+

'Household size' is a continuous variable indicating number of persons in a household, and it was hypothesized to be positive. Household size may influence fish purchase decisions of a consumer due to greater financial burden of feeding larger families. In this regard, larger households would prefer to purchase less expensive fish forms. Larger households may also have an advantage in that it has a greater supply of family labour to undertake the time intensive nature of preparation of some fish species in particular those bought undressed.

Income was a continuous variable for monthly family income and was expected to have a positive sign. Income was coded as 1 for zero income, 2 for income under N$1,000, 3 for income between N$1,000 and N$4,999, and 4 for income of N$5,000 or more. Income levels may influence fish purchase decisions of consumers. In particular, low income households are more likely to purchase less expensive fish species (e.g. Horse Mackerel) on per kilogram basis than high priced fish species such as hake and snoek. Conversely, higher incomes households may prefer high priced fish and more convenient fish alternatives because of the higher opportunity costs associated with preparing undressed fish which is low priced.

'Children' were a dummy variable for presence of children in household, assigned 1 to households with children and 0 otherwise. This variable was expected to have a negative sign. However, due to non significance of this variable in all the models, it was dropped from the analysis.

Sources and method of data collection

The data used in this study were collected through a fish consumption survey of a random sample of 120 shoppers in the suburb of Katutura in Windhoek, Namibia. The 120 shoppers were interviewed at four retail outlets in the suburb of Katutura in the City of Windhoek. The sample included 25 shoppers interviewed at Shoprite™ supermarket (Monte Cristo Street), 27 at Shoprite™ supermarket (Independence), 26 at Katutura Pick n Pay™ supermarket, and 41 at Novadia™ Fish retail outlet. Pretested and structured questionnaires were used during the interview to capture information on types of fish products purchased in the month (June, 2008) preceding the survey (July, 2008). In addition, information on personal and household characteristics including age, gender, marital status, household size, income and education level of respondents was collected.

RESULTS AND DISCUSSION

Socio-economic characteristics of surveyed households

Majority of the surveyed respondents were female (78%). The average age of the respondent was 35.8 years with a standard deviation of 9.05 years. Most respondents (57%) had secondary education, 26% with primary and 13% with tertiary education. Most respondents (83%) were employed. Almost 37% of the respondents earned less than N$1,000 per month, 42% earned between N$1,000 and 5,000, and 13% earned between N$5,000 and 10,000. The average household size had 6.7 persons. The average number of children per household was 1.9 persons.

The three main types of frozen finfish species commonly purchased by the respondents in the study area were horse mackerel (68%), hake (35%), and snoek (23%). The reasons for purchasing fish were that it was less expensive (46%) relative to meat (mutton and beef) and it was healthy and nutritious (41%).

Logit regression results

Information on the descriptive statistics of the variables used in the logit analysis are presented in Table 1, while the results of the logit regression analysis for mackerel, hake and snoek are presented in Tables 2, 3 and 4, respectively. The low R^2 in all the three logit models are acceptable (Hosmer and Lemeshow, 2000). The likelihood ratio test which measures the significance of the model was significant for all the three models suggesting that there was some relationship between the variables included in the model and the dependent variables. The mackerel model had a pseudo R^2 = 0.19 and model Chi-square of 28.17 ($p<0.001$). For hake the

Table 2. Maximum likelihood results for Mackerel purchases.

Variable	Coeff.	Std. error	*z*	P>|z|	Change in probability
Gender	-0.565	0.596	-0.95	0.344	-0.103
Age	0.044	0.029	1.54	0.124	0.009
Married	0.209	0.517	0.40	0.686	0.041
Hsize	-0.252*	0.138	-1.82	0.069	-0.050
Edulev	-1.097***	0.366	-3.00	0.003	-0.216
Income	-0.711**	0.286	-2.48	0.013	-0.140
_Cons	4.803***	1.624	2.96	0.003	
Log likelihood = -60.453					
Pseudo R^2 = 0.189					
^{2} (9 df) = 28.17***					
N=119					

*** significant at 1%, ** significant at 5% and * significant at 10%.

Table 3. Maximum likelihood results for Hake purchases.

Variable	Coeff.	Std. error	z	P>|z|	Change in probability
Gender	0.373	0.516	0.72	0.470	0.079
Age	0.050*	0.027	1.85	0.064	0.011
Married	-0.192	0.456	-0.42	0.673	-0.043
Hsize	0.014	0.122	0.11	0.909	0.003
Edulev	-0.136	0.346	-0.39	0.695	-0.030
Income	0.852***	0.305	2.80	0.005	0.189
Constant	-4.647***	1.504	-3.09	0.002	
Log likelihood = -70.721					
Pseudo R^2 = 0.085					
^{2}(9 df) = 13.08**					
N=119					

*** significant at 1%, ** significant at 5% and * significant at 10%.

R^2 = 0.085, and model Chi-square was 13.08 at 5% significance level. In the snoek model, pseudo R^2 = 0.133 and model Chi-square was 16.95 and significant at 1% significance level. The following section presents the results of each of the three models namely, mackerel, hake and snoek.

Maximum likelihood estimates for mackerel

Results in Table 2 indicated that the probability to purchase horse mackerel was significantly and negatively influenced by household size, education and income. An increase in household size had the effect of reducing the likelihood to purchase mackerel. The change in probability showed that a unit increase in household size caused a 5% decline in the probability to purchase mackerel. Education was negatively related to the likelihood to purchase mackerel. An increase in the education variable caused the probability to purchase mackerel to decrease by 21.6%. Similarly, an increase in income resulted in a decrease of 14% in the likelihood to purchase mackerel. The implication of these results is that high- income households were less likely to purchase mackerel than low-income households. Further, the more educated purchasers were less likely to purchase mackerel than individuals with low education. The results obtained in the case of mackerel with respect to education, income and household size were in contrast with findings of many studies. In general, the literature Bose and Brown (2000) Cheng and Capps (1988), Dellenberger et al. (1992) and Hanson et al. (1940), indicates that education, income and household size are positively correlated with fish consumption. In the case of household size, the negative effect could be attributed to the increase in the preparation time since most mackerel products were sold in undressed form. The educated and the high-income groups might treat mackerel as a low

Table 4. Maximum likelihood results for Snoek purchases.

Variable	Coeff.	Std. error	*z*	P>|z|	Probability in change
Gender	0.373	0.597	0.62	0.532	0.053
Age	-0.040	0.029	-1.40	0.161	-0.006
Married	-0.989*	0.540	-1.83	0.067	-0.155
Hsize	0.249*	0.145	1.71	0.086	0.038
Edulev	0.379	0.401	0.95	0.344	0.058
Income	0.683**	0.322	2.12	0.034	0.104
_Cons	-3.376**	1.650	-2.05	0.041	
Log likelihood = -55.250					
Pseudo R^2 = 0.133					
^{2}(9 df) = 16.95**					
N=119					

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

value fish product and not convenient since it required cleaning and cutting prior to cooking.

Maximum likelihood estimates of the hake

In Table 3, the results of the logit model for hake indicated that age and income have significant and positive influence on the probability to purchase hake. This finding implied that there was an increasing affinity to consume hake as age increased. An increase in age by 10 years would result in probability to consume hake to increase by 11.0%. This result suggested that some opportunity might exist for marketers to increase sales of hake by targeting these products to the elderly. As income increased, households increased their purchase or consumption of hake. The likelihood to purchase hake was likely to be higher among high-income households than low-income households. The estimated change in probability of 0.189 for income indicated that a unit rise in the income level caused an increase of 18.9% in the likelihood to purchase hake. Out of the three significant factors in the hake logit model, income was the most significant at 1% level of significance.

Maximum likelihood estimates for snoek

Results in Table 4 for the snoek logit model indicated that probability to purchase snoek was significantly and negatively correlated with marital status. This meant that the likelihood to purchase snoek decreased by 15.5% if the purchaser was married than being unmarried. Perhaps this had to do with the culture and the traditional diet of most Namibians which is predominantly meat-cereal based. A meal of meat is more appreciated than that of fish and as such married women were less likely to purchase snoek. Further, purchases of snoek were significantly and positively correlated with household size and income. This meant that purchases of snoek increased as household size increased. The change in probability indicated that an increase in household size by one person caused the probability to purchase snoek to increase by 3.8%. While an increase in household income by one unit caused the probability to purchase snoek to increase by 10.4%. This finding, with respect to income is consistent with results of Cheng and Capps (1988) and Dellenberger et al. (1992) that, income is positively related to fish consumption.

CONCLUSION AND POLICY IMPLICATIONS

This paper has attempted to determine the socio-economic and demographic factors influencing fish purchases among consumers in Windhoek, the capital of Namibia. It applied a logit model to purchases of three fish species namely, mackerel, hake and snoek. The analysis considered six factors namely age, sex, education, marital status, household size and income level.

The results from logit regression analysis indicated that education, income and household size are significant and negatively associated with purchases of mackerel. This suggests that an increase in education, income and household size caused a decline in the probability to purchase mackerel. In other words, the likelihood to purchase mackerel was higher among consumers with low education than those with higher education. In addition consumers from high-income groups are less likely to purchase mackerel than those from low income groups (that is, the poor). Furthermore, consumers from large household sizes are less likely to purchase mackerel than those from small households. The policy implication of these findings is that those concerned with promoting fish marketing and those who intend to use fish as an instrument for poverty alleviation should consider mackerel as a strategic fish product most likely to be consumed by the poor or low income households.

In this regard, price incentives or discounts could be targeted on mackerel if the policy goal is to increase fish consumption among the poor in society.

The results of the logit model for hake indicated that age and income had significant and positive influence on the probability to purchase hake. This meant that the probability to purchase hake increased with an increase in the age of the consumer implying that an opportunity might exist for marketers to increase sales of hake by targeting these products to the elderly. In addition, the likelihood to purchase hake increased with an increase in income, suggesting that hake consumption would be higher among high-income households than low- income households. Hence, marketers could target the elderly and consumers from high income households in their marketing and promotion campaigns for increasing sales of hake.

In the case of snoek, the likelihood to purchase snoek decreased if the purchaser was married. But, the likelihood to purchase snoek tended to increase with household size and with income. This indicated that an increase in income led to an increase in the likelihood to purchase snoek, all other factors held constant. Similarly, as household size increased, the likelihood to purchase snoek increased. The implications of these findings are that fish marketers could target large households and those with high income in designing their marketing strategies for promoting consumption of snoek in the study area.

In general, the findings in this study with respect to effect of age, household size and income on the probability of consumers to purchase fish are found to be consistent with findings of previous studies. Therefore, it can be concluded that the results confirm strong income and household size effects on the purchase of fish species. Finally, in view of these findings, it is recommended that fish marketers and processors should consider income, age and household size among socio-economic factors in their formulation of marketing strategies aimed at promoting fish consumption in the study area and similar locations in Namibia.

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