Applied Studies in Agribusiness and Commerce – APSTRACT
Center-Print Publishing House, Debrecen
DOI: 10.19041/APSTRACT/2017/1-2/13

SCIENTIFIC PAPER

SOCIOECONOMIC DETERMINANTS OF FREQUENCY OF FISH PURCHASING AMONG TRINIDAD AND TOBAGO SHOPPERS: A BINARY LOGIT ANALYSIS

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Abstract: *As the Caribbean continues to succumb to the pressure of Non-Communicable Diseases innovative strategies are being sought to rectify the problem. Increasing the purchase and consumption of fish/seafood has great potential in this regard; however, very little empirical research appears to have been undertaken on food marketing in general and for fish in particular in the Caribbean. This study analyzed the factors that affect the frequency of fish purchasing in Trinidad and Tobago. The results of the analysis indicated that 63% of the sample are occasional purchasers of fish (purchased fish less frequently than once per week). The binary logit analysis showed that of the eight socioeconomic variables analyzed, only three were statistically significant – age, educational level attained and religion. The results suggested that persons over 35 years, more educated (tertiary level trained) and non-Christians are more probable to be regular purchasers of fish than younger, primary and secondary level educated Christians. It is hoped that marketers trying to develop strategies to gain market share in the highly competitive food market, nutritionists and others attempting to reduce the health care costs of Trinidad and Tobago and other Caribbean countries through the increased consumption of fish/seafood find these results informative.*

Keywords: *Fish, frequency of purchase, socioeconomic characteristics, Trinidad and Tobago, Binary Logit analysis.*
(JEL. Code: M31, Q13, C25)

INTRODUCTION

Fish is generally considered a rich source of easily digestible protein that also provides polyunsaturated fatty acids, vitamins, and minerals for human nutrition. As many Caribbean countries continue to succumb to rising levels of non-communicable diseases (NCDs), given the beneficial effects of a sustainable level of fish protein in the diet of the Region's people the fisheries and aquaculture sectors gained increased attention in the last few decades. The World Health Organization 2014 country profile for Trinidad and Tobago (T&T) suggests that NCDs are estimated to account for 80% of total deaths. Table 1 show that cardiovascular diseases represent the highest percent. However, the diseases reported in table 1 account for over 75% of the total deaths. With the recent knowledge provided by epidemiologic investigations indicating that the regular consumption of fish is related to a lower chance of several chronic diseases, including cardiovascular disease, an increase in fish consumption is being encouraged in many Caribbean countries. However, there appears to be little research on the drivers and barriers to fish purchase and consumption in the Caribbean Region.

Table 1: The top four causes of death in Trinidad and Tobago

Disease	Percent of Total Deaths
Cardiovascular diseases	32
Cancers	16
Other NCDs	15
Diabetes	14

Source: WHO Non-communicable Diseases Country Profiles, 2014

Previous studies on fish/seafood consumption have suggested that numerous factors influence one's decision (Can et al 2015), (Verbeke and Vackier 2005) and (Olsen 2001). As (Can et al 2015) state "Fish consumption, frequency, and preferences are affected by consumers' geographic, social and cultural characteristics". However, (Olsen et al. (2007) in a study titled "Exploring the relationship between

convenience and fish consumption: A cross-cultural study" alluded to fish as being an inconvenient food. Fish was perceived as inconvenient because of a perceived need to invest large amounts of time and effort at different stages of the provisioning process. Olsen (2003) also found that the perceived convenience of fish was related to age. Hence, ones' age and cooking skills could also impact on the frequency of fish consumption. Therefore an understanding of the multiplicity of factors that can impact both positively and negatively on fish/seafood consumption is necessary if the present consumption levels are going to be altered in the near future in the Caribbean. This study provides an insight into the puzzle regarding fish purchase and consumption for T&T.

A search of the food marketing literature reveals the use of a number of different methodologies and econometric techniques to analyze the effects of various factors on the decision to purchase fish/seafood, for example, the Theory of Planned Behavior (HIGUCHI et al. 2017) , (Nguyen and Olsen 2012) and (Verbeke and Vackier 2005) and qualitative choice models. The use of qualitative choice models to analyze the effects of various factors on the decision to purchase and consume fish/seafood dates back to the early 1990s, with studies by (Dellenberger et al. 1992), (Nayga and Capps 1995) and (Gemesaw et al. 1995). As (Peng et al., 2002a) point out the use of logistic regression (discrete choice models) has increased in the social sciences since the early 1980s as the analytical procedure became routinely available in statistical packages. Today, a number of studies can be found that have assessed different aspects of fish/seafood marketing in many developed and developing countries using this methodology, for example, (Kiziloglu and Kizilaslan, 2016), (Sayin et al. 2010), (Musaba and Namukwambi, 2011), (Ahmed et al., 2011), (Redkar and Bose, 2004) and (Al-Mazrooei et al. 2003). However, the study titled "Socio-economic determinants of consumer fish purchase in Windhoek, Namibia by (Musaba and Namukwambi, 2011) is of particular relevance here.

(Musaba and Namukwambi, 2011) used a binary logit model with the following independent variables: age, gender, education, household size, marital status and income to identify the socio-economic variables that influenced the purchase of three species of fish (Mackerel, Hake and Snoek) in Namibia. They concluded that income and household size had strong effects on the purchase of fish species. The present study uses a similar binary logit methodology to (Musaba and Namukwambi, 2011) with employment status, ethnicity and religion as additional independent variables to analyze the effect on fish purchase frequency in T&T. The research problems addressed in this study are as follows:

The identification of the percentages of regular and occasional fish purchasers in T&T; and

The socioeconomic factors that influences the frequency of fish purchasing in T&T;

MATERIALS AND METHODS

To investigate if there was a relationship between the socio-economic/demographic variables and frequency of fish purchasing by Trinidadians a questionnaire was developed and pretested in March 2016. The questionnaire consisted of two sections. Section one of the questionnaire focused on the consumers' frequency of purchase, preference of fish type (wild or farmed), likeness of common fish species, ranking of selected fish attributes, value added attributes desired and willingness to pay for them. In section one, respondents were also asked to identify their primary place of purchasing fish (supermarket, public market, landing sites, roadside stands, fish vans and specialty fish outlet). Section two attempted to gather data on the demographics of respondents, such as, age, household size, if employed, ethnicity, marital status, and highest educational level attained and income of household. Also, respondents were asked to identify if they were the primary food purchaser in the home.

Data collection was conducted in both islands, Trinidad and Tobago[1]. Questionnaires were administered to prospective respondents who were willing to participate outside supermarkets, banks, public markets and other high traffic business places. A total of 515 completed (useable) questionnaires were obtained at the end of April 2016 when data collection was completed. The collected data were analyzed using STATA 12.

The data collected was in many cases categorical; as such the analytical approach used was primarily descriptive in the first stage of the analysis. In marketing research the use of descriptive statistics is very common, and the present study used this approach to address the first research problem, that is to find the percentage of regular and occasional fish purchasers.

To identify the factors influencing the frequency of purchase (the second problem) the following binary logit model was developed:

$$\text{Logit}(Y) = \text{Natural log odds} = \ln(\pi/(1-\pi)) = \alpha + \beta X$$

Where:

Y = frequency of purchasing fish

1 = Regular purchasers – that is persons that purchased fish at least once a week

0 = Occasional purchasers – persons that did not purchased fish at least once a week

ln = the natural logarithm

π = probability that Y occurs, $\varpi(Y=1)$

α = constant

X = vector of independent variables

β = vector of coefficients to be estimated

The independent variables used in the model are:

X_1 = Age, a binary variable coded 1 = 35 years and older 0 = under 35 years;

1 The data utilized in this study are part of a larger data set collected for the Caribbean Regional Fisheries Mechanism training workshop on "Value Chain Approach in Fisheries", 18-22 July, 2016, Suriname.

X_2 = Income, a binary variable coded 1 = TT$12,001 plus monthly family income 0 = under TT$ 12,000 per month;

X_3 = Educational level attained, a binary variable coded 1 for tertiary and 0 for primary and secondary level;

X_4 = Household size, a binary variable coded 1 for 1 to 4 family members and 0 greater than 4;

X_5 = Employment status, a binary variable coded 1 employed and 0 otherwise;

X_6 = Gender, a binary variable coded 1 for male and 0 female;

X_7 = Ethnicity, a binary variable coded 1 for African decent and 0 otherwise;

X_8 = Religion, a binary variable coded 1for Christian and 0 non-Christian;

RESULTS AND DISCUSSION

Figure 1 illustrates the percentages of regular and occasional fish purchasers of the sample of respondents. As is observed from the chart occasional purchasers, (322 respondents) 63% of the sample was the dominant group, while 37% of the respondents reported purchasing fish at least once a week and were classified as regular purchasers.

Figure 1: Percentage of regular and occasional fish purchasers

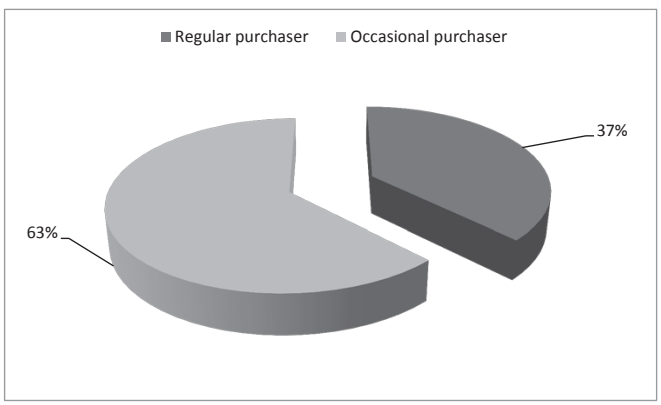

Table 2 illustrates the percentages of the independent variables used in the analysis. In the case of age over 68 % of the sample was between the 36 years and older. It is important to note that only 17% of the respondents had a monthly family income of over TT$ 12,001, which could be considered to be on the low side. The respondents could be considered well educated with 47.9% attaining tertiary level education. The majority of the households (67%) consisted of 1-4 persons, while 78% of the respondents were employed. Females accounted for 63% of the respondents, while Christians were 72%. People of African descent accounted for 48% of the respondents.

2 TT$6.79 = US$1.00 (June 2017)

Table 2: Frequencies of independent variables used in the model

Independent variables	Frequency	Percent
Age (years)		
36 and older{1}	348	67.6
35 and under{0}	167	32.4
Monthly family Income (TT$[2])		
> $12,001{1}	86	16.7
<$12,000{0}	429	83.3
Education		
Tertiary{1}	246	47.8
Primary & Secondary {0}	269	52.2
Household size (Adults and children)		
1-4{1}	343	66.6
>4{0}	172	33.4
Employment status		
Employed{1}	400	77.7
Unemployed{0}	115	22.3
Gender		
Male{1}	192	37.3
Female{0}	223	62.7
Ethnicity		
African descent{1}	247	48.0
Other{0}	268	52.0
Religion		
Christian{1}	371	72.0
Non-Christian{0}	144	28.0

N.B: {1} and {0} represent the coding of the independent variables

Table 3 illustrates the results of the binary logit analysis. The Prob > chi2 provides an indication of the usefulness of the model. If this number is less than 0.05 the model is considered acceptable. So with a likelihood ratio chi-square of -330.06 and a p-value of 0.00 the model as a whole is significantly better than a model with no predictors (the coefficients in the model are different than zero). The "pseudo R Square (0.03) however is not very high.

Of the eight independent variables analyzed in the binary model only three are statistically significant – Age, Education level attained and Religion. The β column of table 3 represents the estimated coefficients of the model, that are referred to as "log odds" The first thing to note is two of the coefficients are positive (age and education) while religion is negatively

related to being a regular purchaser of fish. As the coefficients are logarithmic expressions, the column labeled Odds Ratio is the exponentiation of these coefficients.

Table 3: Results of the binary logit choice model

Variable	β	S.E.	P>lzl	Odds Ratio
Age	0.629***	0.219	0.004	1.876
Family income	0.201	0.257	0.434	1.222
Education	0.332*	0.204	0.104	1.393
Household size	-0.031	0.200	0.876	0.969
Employment status	0.120	0.235	0.610	1.127
Gender	0.234	0.193	0.225	1.264
Ethnicity	0.277	0.198	0.163	1.319
Religion	-0.624***	0.217	0.004	0.536
Constant	-0.992***	0.336	0.003	0.371
Log likelihood	-330.06			
Number of observations	515			
LR chi2 (8)	21.17			
Prob > chi2	0.00			
Pseudo R2	0.03			

****** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level***

The results show that out of the significant variables the respondents' "Age" had the largest influence on the purchase frequency of fish (Odds Ratio = 1.876). With regards to the interpretation of the "odds ratio", for "Age" this is 1.876 and can be interpreted as follows: the odds of persons 35 years and older being regular purchasers of fish are 1.876 times greater than a person younger than 35 years, controlling for the other variables in the model. The other positive statistically significant variable can be interpreted in a similar manner; the odds of persons with tertiary level education being regular purchasers of fish are 1.393 times greater than persons with only primary and secondary education, controlling for the other variables in the model. In the case of religion, which is negatively related to the dependent variable, this is interpreted as follows; the odds of a Christian being a regular purchaser of fish is 0.536 times less than a non-Christian (Muslim, Hindu etc.), controlling for the other variables in the model.

Despite the Food and Agricultural Organization of the United Nations' (FAO) recent announcement that the global per capita consumption of fish has gone over twenty kilograms a year, in many countries per capita consumption is less than the required amount. Understanding the factors that affect consumption levels is imperative if consumption levels are going to be changed. This study used binary logit regression analysis in an attempt to determine the socioeconomic factors influencing fish purchase frequency, a proxy for intake levels, among shoppers in T&T. The model comprised of the following eight independent variables: age, family income, education, household size, employment status, gender, ethnicity and religion. The results from the logit regression analysis indicated that age, educational level attained and religion were statistically significant. This result is very different from (HIGUCHI et al. 2017) that found none of their socioeconomic variables to be statistically significant. Of the significant variables in the present study religion was the only variable with a negative influence. The result, with respect to age on the probability of shoppers is found to be consistent with results from (Musaba and Namukwambi, 2011). It should be noted here that gender, family income, household size, employment status and ethnicity did not have a statistically significant impact based on the results of the study. Further, gender was also found to be insignificance by (Musaba and Namukwambi, 2011), while the insignificance of ethnicity was also found by (Ahmed et al., 2011).

Self-reported purchase frequency is often used in nutrition related studies as a proxy for intake levels. The results of this study suggest there is room for fish consumption to be increased in T&T with only 38% of the shoppers classifying themselves as regular purchasers of fish. Thus marketing strategies aimed at increasing fish consumption in T&T should be specifically targeted at younger persons since age positively influences purchase. Hence the younger folks are the ones in need of coercing to increase their purchase frequency. Also, the positive influence (and statistical significance at the 10% level) of education suggests that promotional campaigns should try and target the lesser educated about the benefits of fish consumption.

Several factors might influence frequency of food and grocery shopping, of which fish is a subsector. Given the limited number of empirical studies available on food marketing in general and fish in particular, further researcher is required to gain a better understanding of the contemporary fish shopper's preferences, likes and dislikes in T&T. Of particular importance in this regard is the identification of the barriers to fish purchase and consumption by the younger generation. It is hoped that this study might encourage other researchers to explore the fascinating field of food marketing in general and fish marketing in particular in T&T and the wider Caribbean.

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