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Assessment of Fish Consumption Patterns in the Lake Victoria Basin of Uganda

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Abstract

Purpose: To establish fish consumption patterns and its determinants in the study area.

Materials and Methods: The study used random and stratified sampling methods to obtain a sample size of 621 fish consumers from Mayuge and Masaka districts. This study used primary data. Stata and statistical package for social sciences (SPSS) were used in data analysis. Frequencies, mean, percentages, inferential statistics were used to achieve the objectives of this study. Data was presented in tables and graphs.

Findings: Respondents mostly ate farmed tilapia (64%), captured tilapia (92%), captured Nile perch (84%). Sun dried silverfish was consumed at a level of 99%. Fish product consumption levels were negligible. Regression analysis established that fish price, education level, household income, location of resident, price of chicken, fish form consumed, fish fat level, production system of fish consumed and variation in fish availability significantly influenced monthly quantities of fish consumed.

Implications to Theory, Practice and Policy: The study recommended the need to improve household income, make the community aware of the nutritiousness of fish and its associated advantages and increase fish price competitiveness by improving efficiency in availing fresh fish to selling locations. Improvement was needed in fish management to put to market, highly nutritive and healthy farmed fish. Need to promote processed fish consumption for both captured and farmed fish. Lastly a vigorous drive to increase farmed fish consumption was key.

Keywords: *Farmed-Fish, Capture-Fish, Consumer-Behaviour, Substitutes, Factors*

JEL Codes: Q01 Q10 Q12 Q18

1.0 INTRODUCTION

Globally, fish is important for providing nutrition, food security and livelihoods for billions of people. In 2016, out of 171 million tons of fish `utilized worldwide, 151.2 million tons were consumed by humans Food Agricultural Organization (FAO, 2016), (World Bank, 2013) projects that sub Saharan Africa will have an annual consumption of 6.8 million tons by the year 2030. According to (FAO, 2023), Ghana was ranked highest and Ethiopia lowest with a per capita fish consumption of 31kg and 0.5kg respectively. FAO (2023) c reveals that Uganda's per capita fish consumption fluctuated from 7 kg in 1961 up to a high of 16.8 in 1978 and again lowered to 6.2kg in 2003. (Fig 1).

Period in years

Figure 1: Per Capita Fish and Sea Food Consumption Trend in Uganda 1961 To 2021

Data Source: FAO (2023)

Note: Data includes all fish species and major seafood commodities and cephalopods and crustaceans plus other mollusc species. Data was based on per capita fish supply at the consumer level, but does not account for fish waste at the consumer level. From 2003, there was generally a gradual increase with a slight rise to around 15.2kg in 2021 possibly due to the effect of COVID-19 lock down which could have increased fish availability to the Ugandan domestic fish market in relation to the regional and international fish markets. These consumption levels are less than the recommended 25kg per ca pita by World Health Organization.

Problem Statement

Fish consumption in Uganda is still low compared to the recommended levels, yet it is a well-established fact that fish provides nutrition, food security and livelihoods for many Ugandans. The main source of fish in the country is wild and aquaculture. Each source provides distinct satisfaction to the consumer. The information with regard to the current capture and farmed fish consumption patterns is always required by different stakeholders to promote the needed product. Information to this effect, is limited in Uganda. Most recent research on fish consumption in Uganda include: (Kadongola and Ahern, 2023), (FAO, 2023), (Simmance et al., 2022), (UBOS,

2020), (Obiero et al., 2019), (Kiritu et al., 2018), (Namulawa et al., 2017), (Tamale et al., (2016), (Gordon et al., 2013) and (Odongkara et al., 2003). These studies give general fish consumption patterns. They never disaggregated the fish consumption data into farmed and capture fish. This study therefore was aimed at filling the research gap of assessing the household fish consumption levels by type of fish production system, fish species and fish form. It should be of interest to the government of Uganda, investors, non-government organizations, civil society organizations and farmers involved in this sector to evaluate the extent to which the investment in pond fish farming since 1941 (FAO, 2023) and later cage fish farming since 1990's (Kifuko, 2015) alongside capture fish, has contributed to achieving the recommended per capita fish consumption rates. Which type of fish by production system, fish species and fish form are being consumed most? Government and other stakeholders may use these results as a benchmark to assess with certainty, the contributions made by future interventions on benefiting communities in the same sub sector. Because the Lake Victoria basin community has co-existed for decades with the lake resources, they are amongst the most experienced fish consumers in Uganda who can tell the difference between farmed and captured fish. The insights from this study, therefore wild help in efforts to understand the other farmed and captured fish consumption dynamics in the different regions of Uganda. Further, the study findings are to help Uganda as a country in its efforts of navigating away from the dependency on capture fish.

Research Objectives

- To establish the current fish consumption patterns in the Lake Victoria basin of Uganda.
- To establish factors (socio demographic and fish related attributes) influencing the quantity of fish consumed on a monthly basis in the Lake Victoria basin of Uganda.

2.0 LITERATURE REVIEW

The theory of consumer behavior: In order to establish fish and its products consumption patterns in the Lake Victoria basin, the theory of consumer behavior was used. Arnould et al. (2002) defined consumer behavior as "actions that are involved in obtaining, consuming, disposing of products and services. This includes the decision processes that precede and follow these actions". Consumer purchase behavior is better understood or analyzed by combining economic and sociological factors / concepts together. Consumer theory is the study of how people decide to spend their money based on their individual preferences and budget constraints. Building a better understanding of individuals' tastes and incomes is important because these factors impact the shape of the overall economy. Consumers buy a varied variety of goods and services around the world due to fact that individuals vary in terms of income, taste, and education among others (Gary and Kotler, 2000). Though people in developing countries have low disposable incomes, physiological needs (water and food) have been found in many cases not to be predominant (Kinsey, 1988).

The poorer and malnourished may purchase luxurious goods and services that they don't desperately require (Walter, 1974). This may be due to peoples deferring cultural values, self-concept, cultural beliefs and values they ascribe to (Kinsey, 1988). Melika (2009) got luxury consumers Worldwide behaving in a similar manner regardless of their economic or social status. Wu et al. (2015) found social status conferred by expensive fashion wear, motivating female

consumers to spend on luxury brands even if their discretionary income was limited. Ergun (2021) established that low-income segments were having a likelihood of positive impact on purchasing conspicuous status goods. They concluded that compensating for feelings of powerlessness could have increased the demand for luxury goods. Considering the consumer's psychology for any future expectations could be useful for marketing managers who intend to increase the demand for luxury goods. As such predicting consumer behavior is sometimes very complex and multidimensional. As heeded to by (Hayden, 2009), the many factors that impact consumer behavior may be grouped into three groups. These include: external influences (individual's cultural background), internal processes (personal reasons for making a purchase) and post decision processes (Whether the product lived to its expectations).

Research Gaps: Empirical Analysis of Fish Consumption Patterns

Research on fish consumption patterns disaggregated by farmed fish, captured fish, fish species and fish form in the Lake Victoria basin of Uganda is scanty. Research performed along the fish value chain in Uganda has focused mainly on production and marketing nodes. To the best of the research teams' knowledge, literature indicates that most fish consumption related research in Uganda has in most cases provided generalized / combined farmed and captured household fish consumption data together. These include: (Kadongola and Ahern, 2023), (FAO, 2023), Simmance et al. (2022), UBOS (2020), (Obiero et al., 2019), (Kiritu et al., 2018), (Namulawa et al., 2017), (Tamale et al., 2016), (Gordon, 2013) and (Odongkara, 2003). Disaggregated fish consumption patterns would add depth to understanding fish consumer behavior of a community under study. Further still, according to (Padiyar, 2024), international data sources like FAO, have been found to have discrepancies with the nationally obtained data.

The nationally obtained data being preferred because it adopts holistic approaches while giving paramount importance to fish and other aquatic food sources. Kiritu et al. (2018) in addition, demonstrated that regional variations in Uganda affect fish preference and consumption patterns in different localities. This justified the need to carry out this research on fish consumption patterns by type of fish production, fish species and fish form carried out through a holistic approach by considering fish substitutes as well. This was to enable a more through understanding of this community's fish consumption dynamics. Lastly, given the sampling procedure always utilized, though some of this research was carried out in some parts of the Lake Victoria basin, the results so obtained were not representative of the Lake Victoria basin community of Uganda.

3.0 MATERIALS AND METHODS

Sample and data collection: The study was conducted in Masaka and Mayuge districts which were randomly selected amongst the six districts located fully in the Lake Victoria basin of Uganda. These six districts were Namayingo, Mayuge, Mpigi, Ssembabule, Masaka and Rakai. Random selection was also done for the four sub counties and 1 division per district. The four villages per Sub County and 1 cell per division were also randomly chosen. Lastly, a list of village residents was generated with the help of local leaders. Systematic random sampling was then employed to select the households. Every third placed household on the generated sample list was selected, visited and interviewed using a structured questionnaire. Masaka and Mayuge had 315 and 306 respondents interviewed respectively. This gave a final sample total of 621 respondents.

Data analysis: Descriptive statistics and regression analysis were used to analyse data using the SPSS 29 and Stata 17 software. This study followed a household's consumption theory which gives the maximum amount of goods and services consumed as a function of income, price, age, experience and some social cultural factors (Varian ,1990). This is expressed theoretically as;

$Q = \beta_0 + \beta_1 X_1 \ldots\ldots \beta n X_n + \varepsilon_1 \ldots\ldots\ldots\ldots\ldots\ldots$ (1)

Where Q = Monthly consumption of fish in kg

B_0 = Intercept

ε = stochastic error / disturbance term

$K_1 \ldots\ldots K_n$ = Coefficients

$X_1 \ldots\ldots X_n$ = Explanatory variables (dummy and continuous)

Empirical model: The empirical model was guided by previous studies on determinants of fish consumption in Uganda and elsewhere as follows:

$Q = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \varepsilon$ ……..……(2)

Where:

Q = Monthly consumption of fish in (kg)

β_0= Intercept

β_1 to β_{14} = Coefficients

β_1= Price fish (UGx)

β_2= Education (Number of years)

β_3= Household income monthly (UGx)

β_4 = Location of respondent (1= Rural 0=Otherwise)

β_5= Variation fish availability (1= Yes 0=otherwise)

β_6 = Production system fish most consumed (1 = Tilapia 0 = Otherwise)

β_7 = Price chicken (UGx)

β_8 = Experience consuming fish (Years)

β_9 = Household size (Number of persons in household)

β_{10} = Distance to fish selling location(km)

β_{11} = Times captured available (Number of times)

β_{12} = Price beef (UGx)

β_{13} = Fish fat level (1=Fatty 0=Otherwise)

β_{14} = Fish form most eaten (1 = Fresh 0 = Otherwise)

4.0 FINDINGS

Socioeconomic and Demographic

Table 1 presents socio-demographic and socio-economic characteristics of interviewed fish consumers.

Table 1: Socio-Economic Characteristics of the Respondents (n=621)

Variable	Description	%	Mean(SD)	Min	Max
Education	No school	7.4	7.25 (3.85)	0	19
	Primary	52.8			
	Secondary	30.1			
	Tertiary	9.7			
Household size	1-4 persons	36.2	5.75 (2.64)	1	14
	5-10 persons	58.9			
	Over 10 persons	4.8			
Monthly household income	Less than 100,000	4.3	651,638.39	30,000	1991000
	100,001 to 500,000	42.4			
	500,001 to 1,000,000	34.6			
	More than 1,000,000	18.7			
Residence type	Rural	66.2			
	Peri urban	14.3			
	Urban	19.5			
Times farmed fish available for purchase (n=79)			2.82(1.96)	1	10
Times capture fish available for purchase			28.97(2.93)	10	31

Source: Field Data

On average, the majority (77%) of the households earned in the range of 100,001 to 1,000,000UGx monthly, (1USA $ = 3700 equivalent of US $270 to 2,702). Though the earnings by households appear low, some households could afford basic necessities like food including fish, cloth, house rent, pay school fees, buy alcohol and give offertory in church. This correlates well with UNPS survey findings between 2015/16 and 2019/20 time period where 75.9% were never poor, 10% moved out of poverty, 7.5% moved into poverty and 6.5% were chronically poor. Equally, (Anyanwu, 2014) analyzed and found fish consumer earning 30,000 Nigerian Naira (1 USA$= 172Naira) but he indicated that it was enough for the households to meet their fish demand.

Majority of the respondents resided in the rural areas (66%). This is in line with (UBOS, 2020) projections. According to the projection 10.6 million people would live in urban areas as compared to a total projected population of 40.6 million. In terms of fish availability, capture fish at the purchase location was considerably higher (29 times a month compared to only 3 times per month for farmed fish. The low frequency for farmed fish could be due to ignorance in identifying farmed fish which sellers prefer to conceal as captured fish. A possible reason for this could be due to traders wanting to maximize on sales through sell of farmed fish disguising it as captured

fish. Thong and Wuyang (2014) found that fish was most of the time available (42%) and as well always available (44%) in Colorado and Florida. By surprise, one third of the respondents in both study areas were unsure of farmed fish availability at their local grocery stores when purchasing sea food.

Fish Consumption Behavior / Patterns among the Respondents

As shown in Figure 2, the main reason for eating fish was;

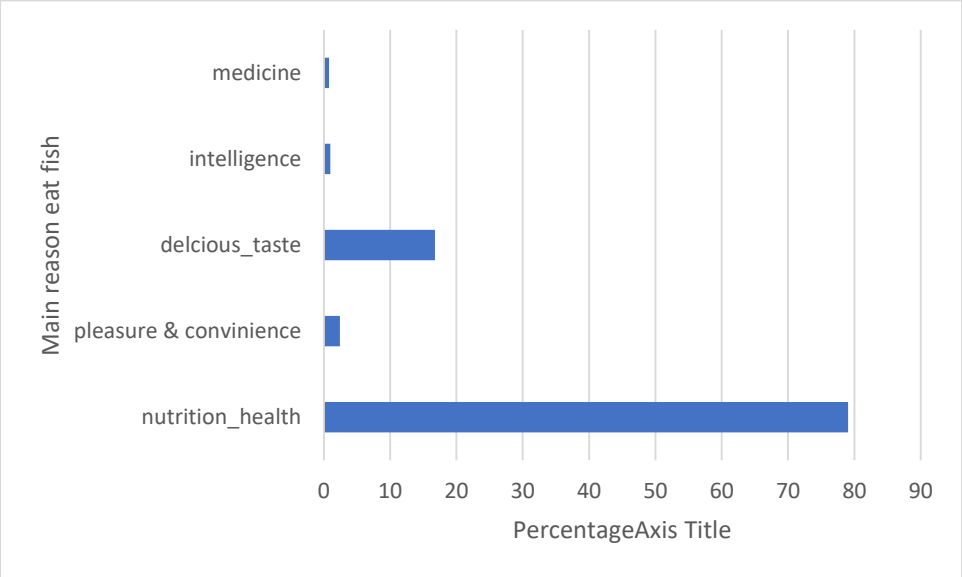

Figure 2: Main Reasons for Consuming Fish

Majority, 78% ate fish for nutrition and promoting physical health (Fig. 2) followed by 19% who ate it due to its delicious taste, pleasure and convenience. This tallies with findings by (Vitale, 2020) who revealed that Italian consumers appeared to greatly appreciate sea food eco-labels and their connection to health and a lesser connection to ethical issues.

Quantity of Fish Consumed by Fish Production System, Species and Form

Table 2 shows the quantities of fish consumed by fish production system, species and form.

Table 2: Quantities Consumed by Fish Production System, Species and Form

	Farmed		Captured	
Species	**Tilapia (*oreochromis sps*)**			
Form of fish consumed	**n(% out of sample)**	**Mean quantity (kg / month)**	**n (% out of sample)**	**Mean quantity (kg / month)**
Live	12(36.36%)	2.36(1.37)	32(7.05%)	2.43(1.92)
Fresh	21(63.64%)	2.24(1.45)	418(92.07%)	2.68(2.05)
Frozen	01(3.03%)	3.00	5(1.10%)	2.25(1.90)
Smoked	02(6.06%)	0.75(0.35)	74(16.30%)	1.44(0.97)
Total	35		454	
Species	**Nile perch *(lates sps)***			
Live	-	-	8(3.35%)	1.56(0.98)
Fresh	-	-	200(83.68%)	1.86(1.20)
Frozen	-	-	8(3.35%)	3.19(3.00)
Smoked	-	-	40(16.74%)	1.38(0.91)
Salted & sun dried	-	-	14(5.86%)	1.81(1.89)
Total			239	
Species	**Silver fish *(rastrineobola sps)***			
Live	-	-		
Fresh	-	-	7(1.91%)	296(1.26)
Sun dried	-	-	363(98.64%)	1.29(1.01)
Total			368	

Source: Field Data. Deep Fried Was Not Included amongst This Category

The primary processed fish forms considered in this study were; live, fresh, frozen, smoked and salted / sun dried. Captured tilapia fish was mostly consumed in a fresh fish form (92%) to a level of 2.7kg per month per household (Table 3). Farmed tilapia fish was mostly consumed in fresh form (64%) at 2.2 kg per household per month. Nile perch was mainly consumed in a fresh form (84%) at a level of 1.86 kg per household. Silverfish was mostly consumed in a sun-dried form (99%) at a level of 1.29kg per month per household. Other species both farmed and captured were found to have been consumed in negligible quantities. This can be attributed to the levels of fish produced and hence availed to the Ugandan domestic fish market. Similarly, (FAO, 2023) b reported the main species produced in Uganda as silver cyprid (20.4%), Nile tilapia (12.9%) and Nile perch (12.4%).

Quantities Consumed at Personal and Household Levels

Table 3 presents quantities consumed at personal and household levels

Table 3: Quantities Consumed at Personal and Household Levels

Description	n	Mean	SD	Min	Max
Qty of fish consumed per household per month	621	4.14	3.51	0.00	15.00
Qty of fish consumed per household per year	621	49.73	42.06	0.00	180.00
Per capita fish consumption	621	10.94	14.04	0.00	162.00
Qty of fish consumed per person per month	621	0.91	1.17	0.00	13.50

Source: Field Data

Fish consumption for all fish types was 4kg per household per month (Table 2). This translated into 50kg per household per year and pa ca pita consumption of 10.94kg. This low figure of 10.94kg, could be due to the specific period in which this data was collected. Quantities of fish available for purchase varies by having peaks and troughs throughout the different months of the year. This could have easily had an impact on the household quantities afforded / consumed at these specific periods of time

Processed Fish Product Consumption Patterns

Processed fish products consumption patterns by fish production system are as presented in Table 4.

Table 4: Secondary Processed Fish Product Consumption Patterns

Description	Farmed		Captured	
	Freq	%	Freq	%
Fish balls	-	-	11	0.03
Deep fry	1	0.03	28	0.06
Fish sausage	-	-	4	0.01
Fillets	1	0.03	5	0.01
Total	**35**		**454**	

Source: Field Data

Capture fish products were being consumed to a level of: deep fried (0.06%) followed by fish balls at (0.03%) among others (Table 5). On the other hand, it is worthy to note that respondents had just started consuming secondary processed farmed fish products in negligible percentages. Hyuha et al. (2017) observed that marketing tilapia fish products both in the domestic Uganda and global market was gaining popularity.

Consumption of Animal-Based Fish Substitutes

Consumption of fish substitutes in the Lake Victoria basin of Uganda (See Table 5).

Table 5. Consumption of Fish Substitutes

Variable	Beef	Chicken
	n=507	n=283
Number of times bought per month	3.24	1.95
Quantity bought per month (kg)	2.86	2.14
Price per kg (UGx)	10,852.74	16,062.45
Respondent consuming a specific substitute	82.64%	45.57
Ranking alternative purchase to fish	1	2

Source: Field Data

Findings found most consumers apart from consuming fish and its products, frequently consumed beef (83%) followed by chicken (46%). (Table 6). This can be explained from the fact that Uganda apart from fish, produces a lot of beef and chicken. FAO (2023)a found most consumed to be aquatic foods (36.1%) followed by dairy (25.4%) then bovine (12.9%), pork (9.3%), poultry (5.7%), ovine and caprine (4.1%), eggs (2.0%) and other animal proteins (4.3%), in a decreasing order of importance.

Factors Influencing Quantities of Monthly Fish Consumption

Table 6 presents the factors (socio-economic and fish related attributes) influencing fish consumption patterns.

Table 6: Determinants of Monthly Fish Consumption in the Lake Victoria Basin

Dependent variable = Quantity of Fish Consumed

Variable	Coefficient	t	Sig.
Price of fish	-0.193	-5.426	0.001
Education	0.234	6.551	0.001
Income	0.188	5.113	0.001
Location of respondent	0.196	5.437	0.001
Variation fish availability	0.086	2.452	0.014
Production system fish most consumed	0.075	2.089	0.037
Price chicken	0.087	2.376	0.018
Experience in consuming fish	-0.097	-2.719	0.007
Household size	0.058	1.627	0.104
Distance to fish selling location	0.013	0.348	0.728
Times captured available	0.037	1.049	0.294
Price of beef	-0.045	-1.230	0.219
Fish fat level	0.120	3.367	0.001
Fish form most eaten	0.081	2.338	0.020
(Constant)		1.041	0.298
F value	16.519		<.001[b]
R^2	0.276		
Adjusted R^2	0.259		
n	620		

Source: Field Data

Before running the regression model, a correlation analysis amongst variables to be included in the model was done. Multicollinearity using the variance inflation factor (VIF) was also done. The model results had the expected negative sign on fish price with the F-value of 14.496 significant at 1%. The study findings indicated the following: Fish price negatively and significantly influenced the quantity of fish consumed on a monthly basis at 1%. This implies that a unit increase in price resulted in a decrease of fish quantities consumed by 0.2 units. In a related study (Hyuha et al., 2011) posted that, the fish value chain in Uganda, was prevalent with imperfections in marketing. The monthly household incomes positively and significantly influenced fish consumption at 1% (Table 7). A unit increase in income resulted in the increase in the quantity of monthly fish consumption by 0.195units.

Education level of the consumers significantly and positively affected fish consumption at 1%. This implied that a one unit increase in the level of education increased fish consumption by 0.231units. Households who consumed fresh fish consumed 0.079units more than those who consumed other alternative fish forms. This can be explained from the fact that the study area was near Lake Victoria, the primary source of captured fish. Processing fish into smoked form, was irrelevant as it would increase on the production costs rendering it more expensive to fish consumers who could easily access in fresh form. This was also in agreement with (Abdullahi et al., 2011) who found consumer taste and nutritional value significant in influencing respondent fish purchasing behavior in Malaysia.

The location of the consumers had a negative influence and was significant at 1%. Those who were in the rural setting had eaten 0.254units more than those who resided in the peri-urban and urban settings. A possible explanation could be the fact that Lake Victoria had rural areas as its immediate surroundings. This implied easy access to fish by rural residents in comparison those in urban settlements. Years of experience in consuming fish negatively affected the quantity of fish consumed at 5%. This implies that a unit increase in the years of experience in consuming fish resulted into a decrease in fish consumption by 0.126units. Price of chicken bought and consumed significantly affected fish consumption at 1%. A unit increase in the price of chicken bought and consumed would increase fish consumption by 0.081units. This could be explained from the fact that chicken was a complement to fish. Experiencing variation fish supply at the fish selling location by respondents positively and significantly affected the quantity of fish consumed on a monthly basis. This implies, respondents who noted variations in fish availability at the selling location, consumed 0.098 units more than consumers who did not experience any variations.

The fish production system from which fish was harvested positively and significantly influenced household monthly fish quantities consumed. Consumers who consumed fish from capture sources ate 0.073 units more than those who consumed fish from other fish production systems. Lastly, fish fat level influenced quantities of fish consumed positively and significantly. Respondents who consumed fatty fish ate 0.120 units more than those who consumed other portions.

5.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Discussion

With regard to establishing factors (socio demographic and fish related attributes) influencing the quantity of fish consumed on a monthly basis in the Lake Victoria basin of Uganda, findings

revealed four socio-demographic characteristics significantly influenced monthly quantities of fish consumed. The first socio-demographic characteristic was education level which positively and significantly (β=0.231, P=0.000) affected household monthly fish quantities consumed. As consumers get more educated, they are more aware about the nutritional benefits of fish. This improved fish consumption let alone its perceived health benefits. Similar results were posted by (Nurul et al., 2016) who conducted a 3-day food record survey and found that education was significantly associated with fish consumption amongst the three major ethnic groups in Peninsular, Malaysia. The forms in which fish are mostly eaten had a positive effect and was significant at 10%. This was followed by household monthly income which positively and significantly influenced monthly quantities of fish consumed (β=0.189, P=0.000). The more households earned, the more fish they consumed. These results compare well with, (Akinbode and Dipeolu, 2012) using a double hurdle model, for the second stage model and found husband's income and wife's income significantly influencing fish quantities consumed. Resident type positively and significantly (β=0.231, P=0.000) affected monthly household quantities of fish consumed. The rural community being in the Lake Victoria basin had more access to landing sites which had plenty of fish supply relative to urban communities. Secondly, it could be explained by restrictions put on harvesting of immature fish and hence limiting the availability of it in urban areas at affordable prices. However, years' experience in consuming fish negatively and significantly (β=-0.112, P=0.002) influenced household monthly quantities of fish consumed. Thus, household heads who were more experienced and by default were aged with bigger family sizes had this negatively influencing the quantity of fish consumed per household.

Regarding fish related attributes affecting the quantity of fish consumed on a monthly basis, the study findings reveal that the price of fish, production system and variation in fish supplies annually influenced monthly household quantities of fish consumed. Fish price negatively and significantly (β=-0.200, P=0.000) influenced household quantities of fish consumed. Fish production system also positively and significantly (β=0.073, P=0.044) affected the monthly quantities of fish consumed. Lastly, variation in fish supplies throughout the year positively and significantly (β=0.104, P=0.004) influenced the household quantities of fish consumed. Most likely, the respondents who noticed the variation could have been more frequent and regular buyers / consumers. They could have opted to always purchase more to store often to cater for the shortage expected ahead. On the other hand, respondents who did not notice any variation could have been occasional fish buyers and consumers. To establish the fish substitutes affecting the quantity of fish consumed on a monthly basis in the Lake Victoria basin, results found that price of chicken positively and significantly (β=0.094, P=0.011) influenced the monthly household fish quantities consumed. In this community chicken complemented fish consumption. This could be in the periods of less capture fish supplies. Equally, (Saroja et al., 2015) established that, as the per capita fish consumption increased moderately, chicken consumption had increased at a relatively faster rate than fish for the 1985 to 2010 time period. Their implied income elasticities indicated that beef, fish and lamb were luxuries while chicken was considered a necessity in Saudi Arabia.

Conclusions

Most fish consumers ate fish for nutrition and health reasons. Consumers mostly ate captured fish. Mostly eaten were fresh fish forms for both tilapia and Nile perch. Silver fish had sun dried fish form mostly consumed. Fish consumption level was lower than the expected per capita

consumption of 25kg. Consumption of processed fish was low and negligeable for capture and farmed fish respectively. Beef followed by chicken were the close substitutes to fish in the Lake Victoria basin of Uganda. The research was done with a view to establish the determinants of household fish consumption in kilograms. To achieve the objectives of the study, an empirical household fish consumption model was estimated. Independent variables considered were: fish price, level of education, household income, location of respondent, years of experience in consuming fish, production system, chicken price, experiencing variation fish supply, household size, distance to fish selling location, times fish available at selling location, beef price. The findings of this study revealed that if household fish consumption is to increase, there is the need to promote sensitizing and creating awareness amongst the communities on the importance of fish consumption. Promoting programs that increase household incomes would increase household fish quantities consumed in the Lake Victoria basin of Uganda. Adequate fish availability coupled with ensuring efficient fish price flows within the economy which can translate into fish prices being competitive are a necessity in upholding adequate fish purchases and hence increased fish consumption, if Uganda is to achieve the per capita fish consumption of 25kg set by World Health Organization to support peoples' lives sustainably.

Recommendations

Need to supplement our capture supplies / consumption with increased farmed fish supply / consumption. Promote processed fish consumption for both captured and farmed fish. Efficient fish price movement from points of fish capture to fish selling locations is key to determining the household fish quantities consumed. This is due to the fact that increase / decrease in fish prices at the selling locations significantly influences fish quantities purchased and thereby consumption within the households. People always make expenses for an intended benefit, as such communities need to be made well aware of the nutritiousness of fish and its associated advantages to the fish consuming community. Communities / individual households must have the necessary purchasing power, if they have to buy household commodities, fish inclusive. Individual need to have income generating activities which will help them generate high incomes to facilitate fish consumers in buying fish for home consumption there by improving on the family's nutrition status. The Ministry of Agriculture Animal Industry and Fisheries and other stakeholders need to put an extra effort in ensuring that fish availability to fish consumers at the fish selling points does not vary significantly. Fish availability variations at points of fish sell to households directly / indirectly influences the fish price and quantities purchased for household consumption. Given the importance of fish in peoples' diet and its other related benefits, this should not be overlooked.

Implications Made to Theory, Practice and Policy

This study was guided by consumer theory, where a consumer strives to get maximum utility from the resources at hand, given his limited budget. This study further proved that improved household incomes together with increased awareness creation about the nutritive value of fish to communities, will likely increase the monthly household fish quantities consumed. Additionally, adequate infrastructure improvements thereby reducing bottlenecks to fish movement and sharing of fish market information within the rural and urban settings, will likely lead to competitive fish market prices. These can as well improve fish consumption. With regard to fish attributes, availing the desired captured fatty fish in a fresh form, will greatly improve quantities of fish consumed.

Given negligible consumption levels of farmed fish, farmed fish products and captured fish products, a vigorous drive to promote their production and consumption would be a good promotional effort. That is to say, a policy that will lead to improved education, increased house hold income levels and availing the desired fish at moderate prices at selling locations will be a step in the right direction in improving fish consumption

Areas for Further Study

This study established some factors influencing monthly household fish quantities consumed. Also, given that (Kiritu, 2018) posted that fish consumption levels varied by region. There is the need to carry out similar studies on fish consumption patterns by type of fish production system, fish species and fish form in all the four regions of Uganda. Need to repeat this study in Kampala, the capital city of the republic of Uganda given its diversity in ethnicity and a high population with varying socio-demographics. Additionally, there is also the need, to establish the dynamics of specific fish quantities moving on different Uganda fish routes, their related market fish prices and fish consumption patterns.

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