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PRICE-EFFECT ANALYSIS OF DEMAND FOR MEAT AND FISH AMONGST RURAL HOUSEHOLDS IN SOUTH-EASTERN NIGERIA

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Abstract

Model builders and policy analysts have relied on their subjective price-effect estimation on fish and other meat components in consumer diet with the result that their analyses do not exactly and reliably reflect the reality. This study provides empirical price-effect analysis of the demand for meat- and fish-consuming rural households in South-eastern Nigeria. Data collected from 590 rural household consumers of meat and fish were analyzed using the Linear Approximate Almost Ideal Demand System (LA/AIDS) and the Slusky decomposition. The results showed that meat and fish consumers exhibit some inconsistent behaviour in expenditure, and expend the highest proportion of their conditional income on chicken with mo relationship in commodities demand by price of fish. Fish and other meat components are necessities with only chicken as a luxury commodity in the region. Although, the unobservable own-price effect components of the total price-change show that there is likely no preference ordering that can rationalize observed meat and fish consumer demand behaviour in the region, the consumers are consistent in their choice among the different commodities. The compensated demand curve for the commodities, except for chicken is downward-sloping, while the unobservable own-price effect of fish and meat are higher than their income effect. Only the income-effect on meat and fish consumption in the region was higher than the substitution effect for chicken meat in relation to fish and other components of meat. Therefore, price-oriented policies interventions rather than income-oriented policies would be a more effective tool to combat animal protein-deficient nutrition in the basic diet of consumers in the region.

Keywords: *meat, price, substitution-effect, income-effect, LA/AIDS*
JEL Codes: *D11, D12*

1. Introduction

Many of the poorest households in South-eastern Nigeria are net buyers of foods (Ojogho & Ojo, 2017) with expenditures on fish and meat presenting the largest budget share by food consumers in the region (Obi, 2003). The region is known for its socio-economic status of high poverty incidence (76.8%), high difficulty in satisfying household needs particularly in food (25.7%) and health care (25.5%) when compared with 18.7%, 21.1% and 4.7% respectively in south-southern Nigeria (National Bureau of Statistics, NBS, 2011). Like the consumption of other agricultural food commodities, the consumption of fish and meat varies

with price of the commodities, income, tastes and preferences of consumers, besides price volatility and climate change (Gouel, 2013; Nelson, 2014; Gilbert & Morgan, 2010; Huchet-Bourdon, 2011; Kuwornu, Mensah-Bonsu, & Ibrahim, 2011; Jensen & Miller, 2011; Ojogho & Eqware, 2015). Understanding these price-effect components-interactions allows to deriving the effect of economic changes useful to policy-makers for price- or income-based policies.

In particular, the effects of prices and consumer income on food consumption, as expressed in terms of the properties of Marshallian elasticities of demand, have been studied extensively (Huang & Lin, 2000; Seale, Regmi, & Bernstein., 2003; Gao, 2012, Capps & Love, 2002; Dhar, Chavas, & Gould, 2003; Piggott, 2003; and LaFrance, 2008), assuming the two-stage budgeting, (Menezes, Azzoni, & Silveira., 2008; Jabarin, 2005; Shiptsova, Goodwin, & Holcomb, 2004; Piumsombun, 2003). These studies, however, neither separated the income component of the price-effect from the unobservable in the Marshallian price elasticities nor provided information on the interaction among the effects on the demand in terms of the net substitutability or complementarity of fish and meat components in consumer diet. In addition, some identified tendencies in such studies, such as the use of panel data, of expenditures as a proxy for income and of single-equation models rather than demand systems, seem to result in lower elasticities (Ogundari & Abdulai, 2013; and Zhou & Yu, 2015).

This study, therefore, estimated the complete demand function for fish and meat, and examined the contribution of conditional income and the unobserved price-effects respectively to the total change in quantity demanded of fish and meat for their corresponding price-change in the region. It not only updates the earlier demand studies beyond estimates of price and expenditure elasticities of different food commodities in other parts of the world and in Nigeria (Ivanic & Martin, 2008; De Hoyos & Medvedev, 2009; Ojogho & Erhabor, 2010; Ojogho & Ojo, 2017), but differ from other similar studies in decomposing the total effect of a price-change of commodities into their substitution (observable) and unobservable components in classifying them into net substitute/complement for the rural households in south-eastern Nigeria using transverse data, best suited in countries where data limitations are commonplace. The results of the study would objectively fortify the confidence of model builders and policy analysts on the choice between price- and income-based policies rather than rely on the subjective estimation of the effects of changes in economic parameters on meat and fish demand in Nigeria.

2. Method and Data

The study was carried out in Abia, Anambra and Imo states in south-eastern zone of Nigeria. Administratively, the three States are divided into 65 Local Government Areas (LGAs) with 17 in Abia, 21 in Anambra and 27 in Imo State. According to the National Population Commission, (NPC) (2006), the three States represents 14.61% of Nigeria population. The average monthly income in the states is between ₦5000 and ₦20000 with a poverty incidence of 52.1% in Abia, 45% in Anambra and 50.1% in Imo State, while household expenditure on food are 52.43% in Abia, 51.73% in Anambra and 55.58% in Imo State respectively (National Bureau of Statistics, NBS, 2011). The target population for the study was the set of households that consume beef, fish, chicken, chevon and mutton in the study area from April 2015 and May 2016.

A three-stage stratified sampling procedure was used to select households in the three States. The first stage used a simple random sampling of 3 Local Government Areas (LGAs) from each State. The LGAs were Isuikwuato in Abia State, Ihiala in Anambra State, and Ikeduru in Imo State. The second stage involved a simple random sampling of 2 communities

in each LGA from a sampling frame of communities in the respective LGAs. The communities were Imenyi and Ohaise in Isuikwuato LGA of Abia State, Umueze and Ikenga in ihiala LGA of Anambra State, and Akabo and Okwu in Ikeduru LGA of Imo State. The sample size for the study in each community was determined using the sample-size estimator as used by Ojogho and Ojo (2017) from estimates of the income variance for the different communities at 95% confidence interval and a 0.03 margin of error. The sample-size estimator is given as:

$$n_i = \frac{z^2_{\alpha/2} s_i^2}{e^2 + \frac{z^2_{\alpha/2} s_i^2}{N_i}} \quad (1)$$

where $z_{0.025} = 1.96$, s_i^2 is the income variance of the i^{th} community, N_i is the target population of the i^{th} community and $e = 0.03$. A simple random sample of households in each community was then taken from the list of the target population in the region developed from a pilot survey. The sample size were respectively 112 in Imenyi and 96 in Ohaise in Isuikwuato LGA of Abia State, 204 in Umueze and 156 in Ikenga in ihiala LGA of Anambra State, and 184 in Akabo and 168 in Okwu in Ikeduru LGA of Imo State making up a total of 208 in Abia state, 360 in Anambra state and 352 households in Imo state. 970 copies of questionnaire were administered but only 725 copies of questionnaire were retrieved from the respondents making a response rate of 75%. However, 590 copies of questionnaire were valid for analysis using data from 7 or more in 10 respondents who consume fish and meat.

The price of fish or any component of meat was measured as the sum of the transactions costs incurred by a household and the retail prices in ₦/Kg per unit, while the quantity consumed of meat or fish commodity by a household was the sum of that consumed from *backyard* animal farm produce and that purchase from market normalized on per *capita* in Kg per month. The expenditure on *backyard* animal farm produce food commodity consumed was measured as the cost of total consumption at current market price. The total expenditure was measured as the aggregate of expenditure on 4 meat components and fish consumed by a household.

3. Model Specification

The study used two models on the assumption that preferences are separable.

Model I

To abstract from a completely specified demand system containing the different equation for each of beef, fish, chicken meat, chevon and mutton, the Linear Approximate Almost Ideal Demand System (LA/AIDS) of Blancifirti and Green (1983) was used to model the conditional complete demand system as functions of prices and total expenditure. The model was used on the premise that it provides a first-order approximation to any demand system, it is easy to estimate, satisfies the axioms of consumer choice exactly, aggregates perfectly over consumers under certain conditions without imposing any *a priori* restriction on elasticities so that food commodities can be either normal or inferior while a pair of food commodities can be either substitutes or complements to each other (Deaton & Muellbauer, 1980a; Alston & Chalfant, 1993 and Eales & Unnevehr, 1994) and the estimated coefficients are easy to interpret (Fulponi, 1989). Besides, the model best explains the demand for meat in southern Nigeria (Ojogho & Erhabor, 2013). The model specification used in the study, in its budget share form, is given as:

$$\omega_1 = \alpha_{11} + \gamma_{11} lnp_1 + \gamma_{12} lnp_2 + \gamma_{13} lnp_3 + \gamma_{14} lnp_4 + \gamma_{15} lnp_5 + \beta_1 ln\left(\frac{X}{P}\right) + \epsilon_1$$

$$\omega_2 = \alpha_{21} + \gamma_{21} lnp_1 + \gamma_{22} lnp_2 + \gamma_{23} lnp_3 + \gamma_{24} lnp_4 + \gamma_{25} lnp_5 + \beta_2 ln\left(\frac{X}{P}\right) + \epsilon_2$$
$$\omega_3 = \alpha_{31} + \gamma_{31} lnp_1 + \gamma_{32} lnp_2 + \gamma_{33} lnp_3 + \gamma_{34} lnp_4 + \gamma_{35} lnp_5 + \beta_3 ln\left(\frac{X}{P}\right) + \epsilon_3$$
$$\omega_4 = \alpha_{41} + \gamma_{41} lnp_1 + \gamma_{42} lnp_2 + \gamma_{43} lnp_3 + \gamma_{44} lnp_4 + \gamma_{45} lnp_5 + \beta_4 ln\left(\frac{X}{P}\right) + \epsilon_4$$
$$\omega_5 = \alpha_{51} + \gamma_{51} lnp_1 + \gamma_{52} lnp_2 + \gamma_{53} lnp_3 + \gamma_{54} lnp_4 + \gamma_{55} lnp_5 + \beta_5 ln\left(\frac{X}{P}\right) + \epsilon_5 \quad (2)$$

Where p_i is the market unit price of the *i*th commodity, ω_i is the corresponding budget share, α_{ij} are the constant coefficient in the share equation representing the value of the budget share in the absence of income- and price- effects, γ_{ij} are the price coefficients, β_i is the expenditure coefficient of the *i*th commodity, X is consumer conditional income, and P is the Stone (1954) price index defined as $lnp = \sum_{i=1}^{5} ln\omega_i p_i$. The model was estimated with the regularity conditions of homogeneity, symmetry and adding-up restrictions imposed on the parameters to ensure integrability of the demand system as used by Moro and Sckokai (2000).

Model II

The second model used the comparative statics of the utility maximization model in the form of Slutsky equations to estimate the contribution of income and price respectively to the price-effect on total change in quantity demanded for the fish and the components of meat in the region. The Slutsky equations were given as:

$$\left(\frac{\partial q_i}{\partial p_j}\right)_y = \begin{cases} \left(\frac{\partial q_i}{\partial p_i}\right)_u - q_i\left(\frac{\partial q_i}{\partial y}\right)_p, & p_i \; varies, \forall i \\ \left(\frac{\partial q_i}{\partial p_j}\right)_u - q_j\left(\frac{\partial q_i}{\partial y}\right)_p, & p_j \; varies, \forall i \neq j \end{cases} \quad (3)$$

where q_i is the quantity demanded of the *i*th commodity, p_j price of *j*th commodity and y is the per *capita* income. As indicated by Hick's (1946) based on total substitution effect, $\left(\frac{\partial q_i}{\partial p_i}\right)_u$, *i*th and *j*th goods were then classified as substitutes, complements or independent depending on whether $\left(\frac{\partial q_i}{\partial p_j}\right)_u > 0$, $\left(\frac{\partial q_i}{\partial p_j}\right)_u < 0$ or $\left(\frac{\partial q_i}{\partial p_j}\right)_u = 0$, respectively. The Slutsky equation was, however, expressed in elasticity form as:

$$\varepsilon_{ij}^m = \varepsilon_{ij}^h - \omega_j \varepsilon_i^I \quad (4)$$

Where $\varepsilon_{ij}^m = \begin{cases} -1 + \frac{\gamma_{ii}}{\omega_i} - \beta_i, \forall i = j \\ \frac{\gamma_{ij}}{\omega_i} - \frac{\beta_i \omega_j}{\omega_i}, \forall i \neq j \end{cases}$, $\varepsilon_{ij}^h = \begin{cases} -1 + \frac{\gamma_{ii}}{\omega_i} - \omega_i, \forall \mathrm{i} = \mathrm{j} \\ \frac{\gamma_{ij}}{\omega_i} + \omega_j, \forall i \neq j \end{cases}$, $\varepsilon_i^I = 1 + \frac{\beta_i}{\omega_i}$,

ε_{ij}^m is the Marshallian price elasticity, ε_{ij}^h is the Hicksian price elasticity and ε_i^I is the income elasticity while the other parameters are as defined in [2]. Thus given the parameter estimates from the LA/AIDS equation, percentage contribution of income-effect and the unobserved price-effect to the total change in quantity demanded for the commodities for a corresponding price-change was estimated through [4]. A commodity was then considered substitute if $\varepsilon_{ij}^m > 0, \forall i \neq j$ and complement if $\varepsilon_{ij}^h < 0, \forall i \neq j$.

4. Results and Discussion

Results of variables summary statistics are presented in Table 1. The results showed that the average budget share on fish, beef, chicken, chevon and mutton were 0.146, 0.259, 0.290, 0.158 and 0.147 respectively with a conditional income of ₦9833.43. These average budget shares are true 95% of the time within 0.15 ± 0.01, 0.26 ± 0.02, 0.29 ± 0.02, 0.16 ± 0.01, and 0.15 ± 0.01 intervals and a conditional income on the interval of ₦9822.43 ± 386.94 These suggest that a consumer of meat and fish in south-eastern Nigeria would expend ₦ 0.15, ₦ 0.26, ₦ 0.29, ₦ 0.16 and ₦ 0.15 respectively on fish, beef, chicken, chevon and mutton for ₦1.00 budget on fish and meat, with the highest proportion on beef but least on fish. The quantity consumed was, on average, highest for chicken (5.01 Kg), followed by fish (4.22 Kg), and least for mutton (1.34 Kg). These may suggest that fish and chicken are consumed more by consumers of meat and fish in the region, possibly attributable to the low price of these commodities relative to the other animal protein sources in the area.

Table 1. Summary Statistics of Variables

Variable	Mean	Median	Max.	Min.
ω_f	0.15 ± 0.01	0.12	0.52	0.01
ω_b	0.26 ± 0.02	0.23	0.62	0.06
ω_c	0.29 ± 0.02	0.23	0.70	0.11
ω_{ch}	0.16 ± 0.01	0.14	0.40	0.05
ω_m	0.15 ± 0.01	0.13	0.39	0.05
E_f	1286.85 ± 85.56	1200.00	4500.00	100.00
E_b	2419.70 ± 154.07	1800.00	5300.00	800.00
E_c	3339.97 ± 359.32	1800.00	10312.50	142.31
E_{ch}	1460.52 ± 62.32	1100.00	3300.00	500.00
E_m	1315.40 ± 63.18	1000.00	3300.00	900.00
p_f	305.04 ± 4.37	300.00	450.00	200.00
p_b	900.86 ± 4.06	900.00	1000.00	780.00
p_c	666.73 ± 8.21	650.00	900.00	600.00
p_{ch}	994.59 ± 11.65	980.00	1500.00	850.00
p_m	984.59 ± 9.97	980.00	1300.00	790.00
q_f	4.29 ± 0.29	4.00	18.00	0.34
q_b	2.69 ± 0.17	2.00	7.00	0.89
q_c	4.90 ± 0.52	2.77	15.50	0.20
q_{ch}	1.48 ± 0.08	1.12	3.33	0.45
q_m	1.35 ± 0.07	1.02	3.67	0.75
X	9822.43 ± 386.94	9000.00	19490.96	4150.00

Source: Authors' computation from Field Survey, 2016, ω_f, ω_b, ω_c, ω_{ch}, ω_m are respectively the budget share for fish, beef, chicken, chevon and mutton; p_f, p_b, p_c, p_{ch}, and p_m, q_f, q_b, q_c, q_{ch}, and q_m, E_f, E_b, E_c, E_{ch}, and E_n, are the corresponding prices, quantities and expenditure on the commodities; X is the total expenditure on fish and meat

The results of the budget share standard deviations show that there is more inconsistency among chicken meat (0.20) consumers than others like beef (0.13) and fish (0.09) consumers while mutton consumers had the least inconsistency in budget share. This suggests that the mean budget share of chicken meat consumers do not accurately summarize the behaviour of the consumers as much as chevon consumer behaviour. The trend is the same in terms of the

expenditure on the respective commodities. However, the inconsistency was highest with chevon consumers (99.31) and least with beef (34.64) consumers in terms of quantity consumed. The high variation in the average conditional income suggests that fish and meat consumers in the region exhibit very inconsistent behaviour about the expenditure on commonly consumed animal protein. This may be attributed to the relatively unstable conditions of supply and demand of the fish and meat items in the area contrary to that opined by Food and Agriculture Organisation, FAO, (2008), Christiaensen, (2009), Gilbert, (2010) and Ojogho and Egware, (2015) for food commodities in general.

The parameter estimates and the associated standard errors of meat and fish commodities as functions of their prices and total expenditure on meat and fish in the LA/AIDS model are presented in Table 2. The results showed that less than half of estimated coefficients were statistically significant with 17.14% and 14.29% accounting for price and expenditure effects respectively. This implies that price of meat and fish and the conditional income of the consumers are fairly responsible for the budget share on the commodities. Most of the expenditure coefficients were negative with only chicken having a positive expenditure coefficient. The expenditure corfficirnts for fish, beef, chicken, chevon and mutton were respectively -0.141, -0.083, 0.418, -0.076 and -0.118. These imply that chicken meat is a luxury to meat and fish consumers in the region while fish, beef, chevon and mutton are necessities. Besides, the values imply that the budget shares on fish, beef, chevon and mutton would decrease with real conditional income by ₦ 0.14, ₦ 0.08, ₦ 0.08 and ₦ 0.12 respectively.

Table 2. Parameter Estimates of the LA/AIDS Model and the Associated Standard Errors

Variables	Parameters	Fish	Beef	Chicken	Chevon	Mutton
Constant	α_i	0.536*** (0.059) [9.104]	0.380*** (0.090) [4.225]	-0.677** (0.082) [-8.302]	0.332*** (0.044) [7.587]	0.429*** (0.043) [9.885]
ln(Fprice)	γ_{1i}	0.031 (0.040) [0.759]	-0.033 (0.051) [-0.661]	-0.005 (0.041) [-0.129]	0.014 (0.025) [0.561]	-0.006 (0.026) [-0.240]
ln(Bprice)	γ_{2i}	-0.033 (0.051) [-0.661]	0.118 (0.113) [1.043]	-0.160** (0.072) [-2.230]	0.017 (0.048) [0.349]	0.059 (0.048) [1.238]
ln(Chiprice)	γ_{3i}	-0.005 (0.041) [-0.129]	-0.160** (0.072) [-2.230]	0.310*** (0.080) [3.852]	-0.100*** (0.035) [-2.879]	-0.044 (0.034) [-1.283]
ln(Cheprice)	γ_{4i}	0.014 (0.025) [0.561]	0.016591 (0.048) [0.349]	-0.100*** (0.035) [-2.879]	0.064* (0.035) [1.830]	0.005 (0.026) [0.210]
ln(Mutprice)	γ_{5i}	-0.006 (0.026) [-0.240]	0.059 (0.048) [1.238]	-0.044 (0.034) [-1.283]	0.005 (0.026) [0.210]	-0.014 (0.038) [-0.377]
ln(Expture)	β_i	-0.141*** (0.015) [-9.103]	-0.083** (0.024) [-3.470]	0.418*** (0.025) [16.716]	-0.076*** (0.012) [-6.373]	-0.118*** (0.011) [-10.343]
Budget share	ω_i	0.146	0.258	0.290	0.158	0.147

Source: Authors' computation Field Survey, 2016, values in parentheses are standard errors, values in brackets are t-values, *significant at 10%, **significant at 5%, ***significant at 1% levels of significance, Fprice is the price of fish, Bprice is the price of beef, Chicprice is the price of chicken, Cheprice is the price of chevon, Mutprice is the price of mutton, and Expture is the total expenditure on meat and fish commodities.

The price of fish has no effect on the consumption of meat in the study area. This implies that fish and meat consumption by consumers of these commodities are not inter-related by price. However, the conditional income of meat and fish consumers affects the demand for fish while demand for fish is independent of the price of the components of the meat market. This may be attributable to the fact that fish is rather the first animal protein source of food routinely consumed by fish and meat consumers in the region.

In the chicken meat budget share function, the demand of chicken was significantly affected by own-price, the price of beef, price of chevon and the conditional income of meat and fish consumers. The coefficients were respectively 0.310, -0.160, -0.100 and 0.418. These imply that 1% increase in the price of chicken meat, and conditional income of meat and fish consumers would increase the budget share for chicken by ₦ 0.31 and ₦ 0.42 respectively *ceteris paribus* while a similar 1% increase in the price of beef and chevon would reduce the budget share for chicken meat by ₦ 0.16 and ₦ 0.10 respectively at constant real conditional income of ₦1.00 fish and meat consumers.

In the beef demand function, only the price of chicken meat and the conditional income of consumers affected the share of beef in meat and fish consumption structure. The respective coefficients of the price of chicken meat and the conditional income of consumers were -0.160 and -0.083. These imply that 1% increase in the price of chicken meat would decrease the budget share for beef by ₦ 0.16 at constant real conditional income of ₦1.00 fish and meat consumers while a similar 1% increase in the conditional income of meat and fish consumers would reduce the budget share for beef by ₦ 0.08 at constant real conditional income of ₦1.00 fish and meat consumers.

In the chevon demand function, the demand of chevon was significantly affected by its own price, the price of chicken meat, and the conditional income of meat and fish consumers. The coefficients were respectively 0.064, -0.100, and -0.076. These imply that 1% increase in the price of chevon would increase the budget share for chevon by ₦ 0.06 at constant real conditional income of ₦1.00 fish and meat consumers while a similar 1% increase in the price of chicken meat and conditional income of meat and fish consumers would reduce the budget share for chevon by ₦ 0.10 and ₦ 0.08 respectively at constant real conditional income of ₦1.00 fish and meat consumers.

In the mutton demand function, only the conditional income of consumer affected the budget share of mutton consumers amongst fish and meat consumers. The coefficient of the conditional income was -0.118. This implies that 1% increase in the real conditional income of meat and fish consumers would reduce the budget share for mutton by ₦ 0.12 at constant real conditional income of ₦1.00 fish and meat consumers.

The results of the Slusky decomposition of the price-effects on the demand for meat and fish expressed in elasticities form are presented in Table 3. The results showed that the conditional income elasticities were all positive with the coefficients of the conditional income elasticities for fish, beef, chicken meat, chevon and mutton being respectively 0.034, 0.678, 2.441, 0.519 and 0.197. These imply that none of the commodity is inferior while fish and all the other meat commodities, besides chicken, are necessities with more responsiveness of demand to changes in income for beef, chicken and chevon than for fish and mutton. Chicken is a luxury to meat and fish consumers. In addition, with income elasticity of 0.034 and 0.197 respectively implies that fish and mutton constitute the basic animal protein sources of the basic consumption of fish and meat consumers in the region, whilst the commodities with the higher income elasticities like beef, chicken and chevon are supplements fish and chevon to the basic protein demand in most of the fish and meat consumers in the region.

The income effects of all the commodities in the Slusky decomposition were negative, the substitution effects due to own-price were negative except for chicken meat while the total change in ordinary demand due to own-price were also negative. The income-effect on meat

and fish consumption in the region was higher than the substitution effect for chicken meat in relation to that of fish and other component of meat. This may imply that the conditional income of meat and fish consumer in south-eastern Nigeria play a greater effect in deciding whether chicken meat is a net substitute or a net complement to fish and other components of the meat demand than the price-effect. A 1% price-change of fish and meat results in greater effect on the demand for fish and meat than a similar change in income of the consumers in South-eastern Nigeria for necessaries like fish, beef, chevon and mutton. The total cross-price effects maintained symmetry of the consumers of fish and meat substitution matrix, implying that the consumers are consistent in their choice among the different commodities.

Table 3. Estimates of Price Effects on Demand for Meat and Fish in South-eastern Nigeria

Variables		Fish	Beef	Chicken	Chevon	Mutton
Fish	TE	-0.647	0.023	0.246	0.248	0.101
	SE	-0.642	0.032	0.256	0.254	0.006
	IE	-0.005	-0.099	-0.356	-0.076	-0.029
Beef	TE	0.023	-0.460	-0.527	0.117	0.276
	SE	0.032	-0.285	-0.330	0.224	0.124
	IE	-0.009	-0.175	-0.630	-0.134	-0.051
Chicken	TE	0.246	-0.527	-0.349	-0.573	-0.364
	SE	0.256	-0.330	0.359	-0.187	-0.005
	IE	-0.010	-0.197	-0.708	-0.151	-0.057
Chevon	TE	0.248	0.117	-0.573	-0.519	0.102
	SE	0.254	0.224	-0.187	-0.595	0.179
	IE	-0.005	-0.107	-0.386	-0.082	-0.031
Mutton	TE	0.101	0.276	-0.364	0.102	-0.977
	SE	0.006	0.124	-0.005	0.179	-0.948
	IE	-0.005	-0.100	-0.359	-0.076	-0.029
ε_i^I		0.034	0.678	2.441	0.519	0.197

Source: Authors' computation from Field Survey, 2016, TE is total elasticity, SE is substitution elasticity contribution to total elasticity, IE is income elasticity contribution to total elasticity, $\boldsymbol{\varepsilon_i^I}$ is the conditional income elasticity

In relation to fish, the total effect of own-price of fish, and the prices beef, chicken meat, chevon and mutton were -0.647, 0.023, 0.246, 0.248 and 0.101 respectively. the substitution effects were -0.642, 0.032, 0.256, 0.254 and 0.006 respectively while the income effects were -0.005, -0.099, -0.356, -0.076 and -0.029 respectively. These imply that 1% increase in the own-price of fish would result in 0.65Kg decrease in the quantity demanded of fish accounted for by 0.64% decrease due to own-price and 0.01% decrease due to conditional income by meat and fish consumers in the region. A similar 1% increase in the prices of beef, chicken meat, chevon and mutton would result in 0.02 %, 0.25%, 0.25% and 0.10% increase respectively in the quantity of fish demanded, accounted for by an increase of 0.03%, 0.26%, 0.25% and 0.01% due to cross-prices respectively of beef, chicken meat, chevon and mutton, and a decrease of 0.10%, 0.36%, 0.08% and 0.03% respectively due to conditional income of consumers. The result also showed that beef, chicken meat, chevon and mutton are net substitutes to fish.

The results showed that, in relation to beef, the total effect of own-price of beef, and the prices fish, chicken meat, chevon and mutton were -0.460, 0.023, 0.527, 0,117 and 0.276

respectively. The substitution effects were 0.032, -0.285, -0.330, 0.224 and 0.124 respectively while the income effects were -0.175, -0.009, -0.630, -0.134 and -0.051 respectively. Hence, 1% increase in the own-price of beef would result in 0.46% decrease in the quantity demanded of beef accounted for by 0.03% decrease due to own-price and 0.18% decrease due to conditional income by meat and fish consumers in the region. A similar 1% increase in the prices of fish, chicken meat, chevon and mutton would result in 0.02%, 0.53%, 0.12% and 0.28% increase respectively in the quantity of beef demanded, accounted for by a decrease of 0.29%, 0.33% due to cross-prices respectively of fish and chicken meat, an increase of 0.22% and 0.12% of chevon and mutton respectively, and a decrease of 0.01%, 0.63%, 0.13% and 0.05% respectively if there is an increase in the conditional income alone of consumers. Only chicken meat is a net complement to beef while fish, chevon and mutton are substitutes to beef.

In relation to chicken meat, the total effect of own-price of chicken meat, and the prices fish, beef, chevon and mutton were -0.349, 0.246, -0.527, -0.573 and -0.364 respectively. The substitution effects were 0.359, 0.256, -0.330, -0.187 and -0.005 respectively while the income effect were -0.708, -0.010, -0.197, -0.151 and -0.057 respectively. A 1% increase in the own-price of chicken meat, therefore, would result in 0.35% decrease in the quantity demanded of chicken meat accounted for by 0.36% increase in quantity demanded due to own-price and 0.71% decrease due to conditional income by meat and fish consumers in the region. The unobservable increase in the quantity demanded of chicken meat due to own-price may be, besides being a luxury, the resultant effect of the consumption of chicken meat during any celebration by the people and festive period such as the Easter, Children's day, Nigeria Independence-Day and the Christmas and New-year celebration. The observed decrease in the quantity of chicken meat demanded is due to the larger effect of the income component in the total own-price effect of chicken meat on the quantity demanded. A similar 1% increase in the prices of fish, beef, chevon and mutton would result in 0.24%, 0.53%, 0.57% and 0.36% decrease respectively in the quantity of chicken meat demanded, accounted for by a decrease of 0.33%, 0.19% and 0.01% due to cross-prices respectively of beef, chevon and mutton, an increase of 0.26% of fish, and a decrease of 0.20%, 0.15%, 0.06% and 0.01% respectively due to an increase in the conditional income alone of consumers. The cross-price total effect of beef, chevon and mutton commodities with respect to chicken meat are negative. Thus, chicken meat with stronger substitution effects than the income effects is a gross complement to beef, chevon and mutton. In addition, only fish meat is a net substitute to chicken meat while beef, chevon and mutton are complements to chicken meat.

For chevon, the total effect of own-price of chevon, and the prices of fish, beef, chicken meat and mutton were -0.519, 0.248, 0.117, -0.573 and 0.102 respectively. The substitution effect were of -0.595, 0.224, -0.187, and 0.179 respectively while the income effect were -0.082, -0.005, -0.107, -0.386 and -0.031 respectively. These connote that a 1% increase in the own-price of chevon would result in 0.52% decrease in the quantity demanded of chevon accounted for by 0.60% decrease due to own-price and 0.08% decrease due to conditional income by meat and fish consumers in the region. A similar 1% increase in the prices of fish, beef, mutton and chicken meat would result in 0.25%, 0.12%, 0.10% increase and 0.57% decrease respectively in the quantity of chevon demanded, accounted for by an increase of 0.25%, 0.22% and 0.18% due to cross-prices respectively of fish, beef and mutton, and a 0.19% decrease of chicken meat, and a decrease of 0.01%, 0.11%, 0.03% and 0.39% respectively. These are attributable only to an increase in the conditional income alone of fish and meat consumers. All other components of the meat consumed by fish and meat consumers in the region, except chicken meat, are net complements to chevon while chicken meat is substitute to chevon.

For mutton, the total effect of own-price of mutton, and the prices fish, beef, chicken meat and chevon were -0.977, 0.101, 0.276, -0.364 and 0.102 respectively. The substitution effect were -0.948, 0.006, 0.124, -0.005 and 0.179 respectively while the income effect were -0.029, -0.005, -0.100, -0.359 and -0.076 respectively. These means that the quantity demanded of mutton due to a 1% increase in the own-price of mutton would decrease by 0.98%. This 0.98% decrease in quantity demanded of mutton is composed of 0.95% decrease due to own-price and 0.03% decrease due to conditional income of fish and meat consumers in the region. A similar 1% increase in the prices of fish, beef and chevon would result in 0.10%, 0.28% and 0.10% increase respectively in the quantity of mutton demanded, accounted for by an decrease of 0.01%, 0.12% and 0.18% due to cross-prices respectively of fish, beef and chevon, but a 0.36% decrease in quantity of mutton demanded due to cross-price of chicken meat, and a decrease of 0.01%, 0.10%, 0.08% and 0.36% respectively if there is an increase in the conditional income alone of consumers. All other components of the meat consumed by fish and meat consumers, except chicken meat, are net complements to mutton while chicken meat is substitute to mutton.

5. Conclusions

This study reveals certain systematic tendencies in the behavior of meat and fish consumers in South-eastern Nigeria from the year 2015 to 2016. Evidence from the micro-level budget data in the region suggests that the consumers are inconsistent in their expenditure on the fish and meat items. The relative low income effects of the food commodities also indicate that increasing-income interventions for the consumers of these products can have a less significant impact on their consumption, at least in the short run. Increase in price of fish and meat items can have bad toll on the demand level of fish and meat consumers, in South-eastern Nigeria. Although, the unobservable own-price effect components of the total price-change show that there is likely no preference ordering that can rationalize observed meat and fish consumer demand behaviour in the region, the compensated demand curve for the commodities, except chicken meat, would be everywhere downward sloping, while the unobservable own-price effect of fish and meat are higher than their income effect. Only the income-effect on meat and fish consumption in the region was higher than the substitution effect for chicken meat in relation to the other component of meat and fish. So it is important that policymakers pay attention to price-oriented policies on these agricultural commodities targeted at reducing such impact and the attendant consequences on poor fish and meat consuming households in the region, particularly the areas of price hike. The assertion of no preference ordering, however, may require further empirical investigation.

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